CA Performance Management for OpenVMS

Performance Manager Administrator Guide

r3.1

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Contents

Chapter 1: Introduction

This chapter introduces CA Performance Management for OpenVMS and discusses its features, supported configurations, and system requirements.

This section contains the following topics:

CA Performance Management for OpenVMS

CA Performance Management for OpenVMS includes layered products designed to reduce the time and effort required to manage and monitor system performance and to plan for future resource requirements. These products can be used with standalone and with OpenVMS cluster systems.

CA Performance Management for OpenVMS includes the following products:

- Performance Manager
- Performance Agent
- Accounting Chargeback

Performance Manager and Performance Agent share a common database and basic set of utilities. Any one component may provide these utilities on behalf of the other components of the same version, as shown in the following items:

- Performance Agent gathers, manages, classifies, and archives OpenVMS system data. It provides the following functions:
  - Data collection and storage
  - Data archiving
  - Dump reports
  - Disk analysis
  - PC sampling
  - Real-time file activity display

- Performance Manager makes recommendations for improving system performance. It does this by analyzing system data through the application of expert system technology, identifying specific conditions causing performance degradation, and presenting detailed evidence to support its conclusions. It also provides real-time displays of performance data using either DECwindows Motif or character cell displays. The user can interactively view and investigate system performance problems and resource usage. The following functions are included in this component:
  - Performance knowledge base and rules compiler
  - Performance analysis and reports
  - Real-time displays of performance data
  - Graphing
  - Data export facility

The common utilities that are shared by all components provide the capability for managing and interrogating the files in the database. These include a workload parameter editor, a schedule file editor, a data archive, and a data file dump utility.

Performance Manager

To deal with system performance effectively, you must understand the workload and the capabilities and limitations of system resources. Generally, any attempt to improve system performance requires specific performance goals stated in measurable terms.

Performance Manager provides the tools you need to analyze, graph, and present performance data on standalone systems or clusters running OpenVMS. Performance Manager analyzes statistics and parameters collected by Performance Manager from each node in a configuration to determine whether specific conditions are contributing to system performance degradation. Based on its findings, Performance Manager recommends ways to improve system performance and provides evidence to support its conclusions.

Performance Manager can organize your information into several different reports that can do the following actions:

- Identify system resource limitations when they exist for the workload
- Identify system parameter settings that may be adding to system overhead or degrading system performance
- Evaluate trends in system performance
- Evaluate the effects of changes in workload and configuration characteristics

Performance Manager Features

Performance Manager has the following major features:

- Performance knowledge base and rules compiler
- Performance analysis and reports
- Real-time displays of performance data
- Graphing
- Data export facility

Knowledge Base and Rules Compiler

The Performance Manager knowledge base consists of rules and thresholds used to evaluate system performance. The rules, provided at installation time, are known as factory rules. When Performance Manager produces an Analysis Report, by default it uses the factory rules.

Performance Manager also provides the capability to define your own rules. User-defined rules are identified using a text editor to create a file that contains rule definitions. The chapter Customizing the Knowledge Base (see page 135) explains the syntax of user-defined rules. In addition to writing new rules, you can disable any factory rules.

After you define your site-specific rules, you must compile them before Performance Manager can use them. The compiled version of your rules is called an auxiliary knowledge base. After the rules have been compiled, they can be used, along with Performance Manager factory rules, to create an Analysis Report. You can have an auxiliary knowledge base used automatically or can specify it when requesting an Analysis Report.

Analysis and Reporting Facility

The analysis and reporting facility generates the Analysis Report, the Brief Analysis Report, the Performance Evaluation Report, the Tabular Report and histograms. The Analysis Report identifies the effects of system parameter settings, hardware configurations, workload mixes, and applications when they degrade the performance of individual nodes in the cluster or the entire cluster system. Conclusions and recommendations are based on data collected.

The Brief Analysis Report is a synopsis of the Analysis Report. It contains a one-line description of each rule fired. For more detail, produce a full Analysis Report.

You can also request a Performance Evaluation Report or Tabular Report to help you determine improved or degraded system performance. You can also request histograms that consist of chronological charts that show peak resource use. You can select a specific set of items (disks or processes) for reporting.

The ADVISE PERFORMANCE REPORT command invokes analysis of performance data to generate Performance Manager reports.

You can specify five types of reports:

- **Analysis Report**-Consists of conclusions for each node and includes cluster-wide conclusions for a clustered system. You can request the conditions that caused a rule to fire and the supporting evidence.
- **Brief Analysis Report**-Is a brief version of the analysis report. It includes a one-line synopsis of each rule firing.
- **Histograms**-Consists of chronological charts that show peak resource use.
- **Performance Evaluation Report**-Consists of metrics for measuring performance improvement or degradation. Use these metrics to evaluate the recommendations made by Performance Manager and to measure results against baseline models.
- **Tabular Report**-Provides a consolidated summary of some of the performance metrics related to system-wide activity, process activity and disk activity.

Generating Daily Reports Automatically

You can generate daily reports automatically by submitting a Performance Manager batch command procedure at night. The Performance Manager software kit contains a sample daily command procedure (PSPA$EXAMPLES:PSPA$DAILY.COM) that you can use as a template. You can use the OpenVMS Mail Utility to send the brief analysis to you directly.

Real-time Displays of Performance Data

The real-time feature provides continuously updated displays of data.

You can produce and customize three-dimensional bar graphs, strip charts and digital meters to evaluate and investigate performance data using Performance Manager Motif real-time display.

You can also produce tabular and graphical displays to evaluate and investigate performance data by using the Character Cell interface with optional ReGIS graphics.

Using *Playback* mode, you can view displays of data recorded earlier in either a continuous flow or step mode.

Graphing Facility

To graph chronologically any group of metrics stored in the database, use the ADVISE PERFORMANCE GRAPH command to produce a wide range of predefined graphs. You can also define your own custom graphs if the predefined graphs do not meet your specific needs. You can select a specific set of items (disks or processes) for graphing. For more information on graphing see the chapter Generate Historical Graphs (see page 107).

Data EXPORT Facility

The performance data from Performance Manager files can be written out to a file for subsequent processing with third-party software tools. The desired classes of data, as well as the time period of interest can be specified. The data can be averaged into a series of records representing whatever time interval the user wishes, as long as it is a multiple of the collection interval. For instance, data collected every two minutes can be averaged into half hour records. You can select a specific set of items (disks or processes) for output. An ASCII or binary file can be created. Either daily or archived data can be exported.

DECwindows Interface

Performance Manager includes DECwindows Motif Interfaces for real-time displays and for analysis and graphing. These interfaces are installed only if the necessary windowing libraries are found in SYS$LIBRARY and the necessary DECwindows directories are accessible.

What to Expect from Performance Manager

Performance Manager analyzes collected system data required for determining whether a specific resource is causing a performance problem. The data collected at your site may cause Performance Manager rules to fire. To *fire* means that when all the data has been processed, Performance Manager examines the count of a rule's occurrences, and if there are enough occurrences for a particular rule, that rule is said to fire. This causes an entry for that rule to be placed in the report file in the form of a conclusion. However, you can modify or disable Performance Manager rules or threshold values, which govern performance analysis.

When you request an Analysis Report, you may receive advice about performance problems for some of the following reasons:

- Inefficient setting of SYSGEN or UAF parameters
- Excessive demand
- Excessively long device queues
- Insufficient system resources
- Inefficient application design
- Insufficient hardware for the workload

Before you follow any Performance Manager recommendations, ask the following questions:

- Is the problem caused by a temporary condition?

  Performance Manager does provide summary analysis for extended time periods, such as weeks or months.

- How frequently does the problem occur?
- Is there a difference in the workload before and during the time the problem occurs? (Occasionally, the problem may be caused by the inherent characteristics of an application or workload.)

If Performance Manager recommends that you need additional hardware, keep track of this recommendation over a period of time. If system performance degrades, this recommendation occurs more frequently. You must decide whether the problem is serious enough to warrant additional hardware.

Never rely solely on Performance Manager recommendations. As you become familiar with the workload on your system, you develop your own ideas on how to recognize and alleviate performance problems. Use the Performance Manager as a tool to help you discover and resolve performance problems. Although you need the information Performance Manager provides for investigating any perceived performance problem, this information is not infallible. Occasionally, Performance Manager recommendations do not improve performance. Additional expertise, analysis, hardware, and tuning may be required to solve a specific performance problem.

Cross-Platform Support

If you run Performance Analysis across platforms between r3.1 and a VAX or Alpha system running prior releases of Performance Agent, you need to be aware of the following situations:

- CA does not support using an older Performance Manager (r3 or older) with the new Performance Agent (r3.1).
- The Performance Manager r3.1 runs performance analysis on Alpha and VAX data from prior releases. However, the results might be different from those generated on prior releases due to the updated and new rules.
- The VAX Performance Manager does not analyze r3.1 data.

Chapter 2: Analyze Performance

This chapter contains example Performance Manager Analysis Reports and information to help you interpret them. The chapter Performance Manager Commands (see page 175) explains how to generate these reports.

This section contains the following topics:

Analysis Reports

When you request an Analysis Report, the Performance Manager analyzes data for the requested time period and nodes against the rules in the knowledge base.

The Analysis Report consists of conclusions for each node and includes cluster-wide conclusions for a cluster system. Each conclusion is caused by a rule firing. When a rule fires, the Performance Manager reports the problem condition and makes a recommendation for improving performance. All rules are identified with a unique five-character alphanumeric code, such as {M0010}. A rule identifier appears with each conclusion.

In addition to the conclusions, you can request that the Performance Manager list the rule conditions that satisfied the rule firing. The Performance Manager also provides supporting evidence. By default, the Performance Manager provides conditions and evidence when you specify an output file or when you run the analysis process in batch mode. To suppress the conditions and evidence in the report, use the /NOEXPLAIN qualifier.

The conclusions in the Analysis Report for a cluster system are listed in the following order by node:

- Each node's local analysis and conclusions, which may include the following conclusions:
  - Memory-related
- I/O-related
  - CPU-related
  - Miscellaneous
  - Auxiliary

- Cluster-wide analysis and conclusions, which may include the following conclusions:
  - HSC limitation
  - Disk-related
  - Lock-related
  - Auxiliary

If you request a Performance Evaluation Report along with an Analysis Report, the performance data for each node follows that node's local analysis. The performance data for the cluster appears after the cluster-wide analysis.

Factory analysis reports can be produced only from data collected by the primary data collector, namely that which is associated with the CPD definition.

Interpret the Analysis Reports

This section explains excerpts from example Analysis Reports. The explanation follows each excerpt.

The header at the top of each page in the report includes the version number of the Performance Manager used to generate the report. This version number does not necessarily correspond to the version number of the Performance Agent that collected the data being analyzed.

Memory Rule Report

The following example shows a Memory Rule report:

```
Full Analysis             NODE01 (VAXstation 3100)                    Page   1


PA    Vx.x


Thursday 20-FEB-1997 00:00 to 23:59
CONCLUSION 1.

        While excessive page faulting was occurring, there were some  users  running  images  which
        seemed to want more memory than their WSEXTENTS allowed.  If the  WSEXTENTS for  these
        users were larger, there may have been less page faulting.

        Increase the WSEXTENT  for  the  following  users.   If batch  queue  settings  for  working
        set  extents  are causing the limitation, increase  those.   If  detached processes are
        causing the problem, increase the working set  extents  specified  in  either  the
        "RUN/PROCESS" commands, or the calls to the $CREPRC System Service or LIB$SPAWN Runtime
        Library Routine.  As  a  last  resort for  detached  processes,  increase  the
        PQL_DWSEXTENT SYSGEN parameter if it is responsible for  establishing the working set extent
        value for the detached process.

        Total number of users needing an increase :  2

        User name(s)
        ------------
        SMITH
        CORREY

CONDITIONS
        1.  SOFT_FAULT_RATE .GE. 100.00 * SOFT_FAULT_SCALING .OR. HARD_FAULT_RATE .GE. 10.00 *
             HARD_FAULT_SCALING
        2.  IMAGE_ACTIVATION_RATE .LT. 0.50 * IMG_ACT_RATE_SCALING
        3. SYSGEN_MPW_HILIMIT + SYSGEN_FREEGOAL .LT. MEMORY_PAGES_NOT_ALLOC_TO_VMS * ( 0.04 +              0.05 ).OR.
PAGES_ON_FREELIST .GE. SYSGEN_FREEGOAL .OR. HARD_FAULT_RATE .GE. 10.00 *
            HARD_FAULT_SCALING
        4. SYSGEN_MPW_HILIMIT + SYSGEN_FREEGOAL .GE. MEMORY_PAGES_NOT_ALLOC_TO_VMS * 0.05 .OR.
            SOFT_FAULT_RATE .GE. 100.00 * SOFT_FAULT_SCALING
        5. PROCESSES_NEED_MORE_EXTENT .EQ. 1.00
        6. OCCURRENCES .GE. 1
EVIDENCE
        Working Set  Time range           Avg      Image      Faults     Avg  sz    No
User             ------------ (batch jobs   Image   W.Set  flts/ -----------    of Free of
Name      Quota Extent   are flagged) Name   Size  cpusc  Hrd   Soft   List   Tims
-----         -----    ------      -----------   ------     ----     -----    ---     ----    -----   ----
  1                     2              3                4          5         6       7        8       9       10
SMITH         200    200
                   11:34-13:34  LOGINOUT    163   288   1  288  12262    4
                   11:34-15:14    TEST31    195   268   0  268  12468    5
                   11:34-13:30       SET    179   363   2  363  12765    2

CORREY   2048  4000 (batch)
                   13:16-13:18    TEST33   4000  2046   0 2046  11162    2
```

The following statements are keyed to the columns in the previous Memory Rule report:

1. User name associated with a process.
2. Working set quota and working set extent.
3. Time range for which selected image records for this process are summarized.
4. The first 12 characters of the image name string associated with the user's process.
5. Average working set size (in pages) for the user's process while running the specified image.
6. Total number of page faults for the user's process while running the specified image, divided by the CPU seconds for the same period.
7. Average system-wide hard page fault rate during the major sampling intervals when the user's process ran the specified image.
8. Average system-wide soft page fault rate during the major sampling intervals when the user's process ran the specified image.
9. Average size of the free page list (in pages) during the periods when the user's process ran the specified image.
10. Number of times that a Performance Manager process or image record supports the evidence.

In the previous Memory Rule report example, the total number of page faults per CPU second are in the range of 268 to 363 for user Smith, and 2046 for user Correy. This high rate of page faulting probably contributed to the system-wide soft page fault rate (ranging from 106 to 791), which exceeded the threshold of 100. This occurred 13 times (4+5+2+2) because Smith's WSEXTENT was too low at the current value of 200 and Correy's WSEXTENT was too low at its value of 4000.

CPU Rule Analysis Report

The following example shows a CPU Rule analysis:

```
Full Analysis                SUPPLY (VAX-11/780)                     Page   2
PA Vx.x
Saturday 01-OCT-2006 00:00 to 23:59
CONCLUSION 2.                                                                  {C0010}
There is an apparent bottleneck at the CPU due to the large number of COM/COMO processes.  There exists
higher priority process(es) which are  causing  lower priority  COM  and/or  COMO processes to wait for
the CPU which may be the cause of the problem.   This  is considered a LOCKOUT condition. Examine and or
review process priorities.   For an equitable distribution  of  CPU  time  over  the COM processes, be
sure they all have the same BASE PRIORITY.
Total number of samples giving this conclusion:  4
CONDITIONS
1. COMPUTABLE_PROCESSES .GE. 5.00 * COM_SCALING
2. PRIORITY_LOCKOUT .EQ. 1.00
3. TOP_CPU_PROC_CPU .GT. 7.00 4. OCCURRENCES .GE. 4
EVIDENCE
# Proc     Process receiving most CPU        COM Process
in COM   --------------------------------   ----------------     Time of
or COMO  USERNAME     IMAGE     %CPU PRIB  USERNAME     PRIB    occurrence
------   ------------ --------- ---- ----  ------------ ----  ----------------
     1       2           3         4    5    6             7            8
     8   SMITH        GAME        83    8  JONES           4    1-OCT 00:04:00
    20   JOHN         TIME        83    8  DOE             4    1-OCT 00:06:00
    20   TOM          LIFE        83    8  MACK            4    1-OCT 00:08:00
    20   JERRY        MEGA        83    8  HALL            4    1-OCT 00:10:00
```

The following statements are keyed to the columns in the previous CPU Rule analysis report:

1. Average number of processes in computable or computable outswapped state during the interval.
2. User name string of the process that consumed the most CPU time during the interval.
3. The first 12 characters of the image name.
4. Percentage of the total available CPU time consumed by the user's process during the interval.
5. Base priority of the process that used the most CPU time during the interval.
6. User name string for the process that was in the computable state most during the interval.
7. Base priority of the process that was in the computable state most during the interval.
8. Beginning time of the interval in which the condition occurred.

In the previous CPU Rule analysis report example, the average number of processes in either COM or COMO state is five or greater on four occasions, with the actual number of COM/COMO processes ranging from 8 to 20. These blocked computable processes (for users Jones, Doe, Mack, and Hall) each have a base priority of 4. Other processes with a base priority of 8 (for users Smith, John, Tom, and Jerry) prevent the other computable processes from executing because of their elevated base priority, thereby creating the LOCKOUT condition.

I/O Rule Analysis Report

The following example shows an I/O Rule analysis report:

```
Full Analysis                 SUPPLY (VAX-11/780)                      Page   3
PA Vx.x
Saturday 01-OCT-2006 00:00 to 23:59
CONCLUSION 3.{I0060}
Swapping  or  modified  page  writing  is  creating  an excessive load on the noted disk.  This may be a
memory related problem, however if the swapping file is  on  a shared  system  disk,  the situation can
be improved by moving it to a less utilized disk.
Total number of samples supporting this conclusion:  4
CONDITIONS
1.       ANY_DISK_OVER_QL_THRESHOLD .EQ. 1.00
2.       PERCENT_CPU_TIME_IN_FILE_SYSTEM .LT. 30.00
3.       EXEC .LT. 35.00
4.       DISK_SWAPPING_IO_RATE ( DISK_OVER_QL_THRESHOLD_X ).GT. DISK_IO_RATE ( DISK_OVER_QL_THRESHOLD_X ) /
.00

5.       OCCURRENCES .GE. 4
EVIDENCE
Volume w/Highest Queue Length         %tim %tim
---------------------------------------------  file EXEC
Name        IOs/sec Pag.IOs/sec Swp.IOs/sec  sys. mode Time of occurrence
------------ ------- ----------- -----------  ---- ---- ------------------
   1              2         3          4        5    6              7
BRANDY1          34         5         20       10   10     1-OCT 09:04:00
BRANDY1          29         3         23        8    9     1-OCT 09:06:00
BRANDY1          31         5         22        3    3     1-OCT 09:08:00
BRANDY1          32         4         27       11    0     1-OCT 09:10:00
```

The following statements are keyed to the columns in the previous I/O Rule Analysis report:

1. Name of the volume on which excessive swapping occurred. This volume had the highest queue length during the interval exampled.
2. Average number of I/Os per second to the volume from the node currently being analyzed (SUPPLY).
3. Number of paging I/Os per second to the volume. The value of paging I/Os per second is a subset of the total I/Os per second as described above.
4. Number of swapping I/Os per second to the volume. This value is also a subset of the total I/Os per second.
5. Percentage of CPU time spent in the file system.
6. Percentage of CPU time spent in executive mode.
7. Beginning time of the interval in which the condition occurred.

In the previous example I/O Rule Analysis report, the disk queue length on volume BRANDY1 exceeded its threshold on four occasions during the reporting interval. In each occurrence, less than 30 percent of the CPU time was spent in the file system and less than 20 percent of the CPU time was spent in executive mode. Swapping I/Os per second have values of 20, 23, 22, and 27, thereby contributing to more than 50 percent of the total operations to volume BRANDY1.

Miscellaneous Rule Analysis Report

The following example shows a Miscellaneous Rule Analysis report:

```
Full Analysis                SUPPLY (VAX-11/780)                   Page   4

                                                         PA Vx.x

        Saturday 01-OCT-2006 00:00 to 23:59

CONCLUSION 4.                                                      {R0010}



The system fault rate for VMS is over  2  faults  per second  for  the following time periods.
Performance can be improved for the whole system if the VMS fault rate can be reduced.



Increase the working set size for VMS  (SYSMWCNT)  to reduce  the  system fault rate.  Do this by adding
an entry in MODPARAMS.DAT  similar  to  "ADD_SYSMWCNT  = 100",  and  running  AUTOGEN.   The  "100" is

just an initial guideline.
Total number of samples giving this  conclusion:   12
Current setting of this system parameter:  730
CONDITIONS

1.  SYSTEM_FAULT_RATE .GE. 3.00
2.  OCCURRENCES .GE. 4
EVIDENCE

System fault
    rate          Time of occurrence
------------     ------------------


     1                   2
     5           1-OCT 00:04:00
     5           1-OCT 00:54:00
     5           1-OCT 02:02:00
     5           1-OCT 02:10:00
     5           1-OCT 10:20:00
     5           1-OCT 10:44:00
     5           1-OCT 11:08:00
     5           1-OCT 13:26:00
     5           1-OCT 15:12:00
     5           1-OCT 15:36:00
     5           1-OCT 16:20:00
     5           1-OCT 16:34:00
```

The following statements are keyed to the columns in the Miscellaneous Rule analysis report:

1. Average number of times per second that a page fault (hard or soft) occurred for the OpenVMS system working set.
2. Beginning time of the interval in which the condition occurred.

Analysis Summary Report

The following example shows an Analysis Summary report:

```
Full Analysis                 SUPPLY (VAX-11/780)                    Page   5

                                                                     PA Vx.x

        Saturday 01-OCT-2006 00:00 to 23:59

                   ANALYSIS SUMMARY

                   for node SUPPLY

Number of Records Processed.......................720 1

Number of Records satisfying rule conditions......33  2

Number of Records not satisfying rule conditions..687 3

Number of Conclusions............................4   4
```

The following statements are keyed to the rows in the previous Analysis Summary report:

1. Number of Performance Manager records analyzed for the specified reporting period.
2. Number of Performance Manager records that satisfied rule conditions. This number does not necessarily equal the number of rules that fired, due to rule threshold values. Although a record may satisfy a rule condition, the number of occurrences required to fire the rule may not be sufficient during the reporting period.
3. Number of Performance Manager records that did not satisfy any rule conditions.
4. Number of conclusions generated for the node being analyzed.

Although records may have satisfied a specific rule, the number of occurrences of records satisfying a specific rule may not have reached the occurrence threshold. This means the number of conclusions may be zero while the number of records satisfying the rule conditions is greater than zero.

Cluster Rule Analysis Report

The following example shows a Cluster Rule analysis report:

```
Full Analysis                        CLUSTER                            Page   6
                                                                        PA Vx.x
        Saturday 01-OCT-1996 00:00 to 23:00
CONCLUSION 1.
                                                                        {L0050}
Queues are  forming  on  heavily  used  disks.   Longer delays will be experienced when longer queues
form.

Suggested Remedies:

1.      If the disk is fragmented (use the command $ ADVISE COLLECT REPORT DISK_SPACE devicename in
order to check on this), backup and  restore  the disk using the BACKUP utility without the
/PHYSICAL qualifier.
2.      If possible, assign all new work during  the  noted times to other disk volumes.
3.      If possible, attempt to lower the future  usage  of the noted disk volumes.

Volume name(s)      Number of Samples
--------------      -----------------
PROBLEM_DISK                  4

CONDITIONS

1.      DISK_QUEUE_AT_SERVER .GE. 1.00 .OR. ( MAXIMUM_DISK_QUEUE .GE. 1.00 AND.DISK_IS_SERVED .EQ.
0.00 )
2.      CW_DISK_IO_RATE .GE. DISK_IO_RATE_THRESHOLD .OR. CW_DISK_THRUPUT_RATE .GE.
DISK_THRUPUT_RATE_THRESHOLD
3.      OCCURRENCES .GE. 1

EVIDENCE
Disk Volume      Srv Node               Time of Occ    Shdw Rbld
    \                    Avg I/O    Avg   IO Sz
    \Src Node            per    sec  Que  Pages    Hottest File
--------------------------------------------------------------------------------
  1                    2                                    3                    4
PROBLEM_DISK MARCUS          25-JUN 00:06:00          *
      5                                     6         7            8            9
      SUPPLY                  25.80  2.17      6.0 [PSCP]PSCP010.B;9
      DEMAND                  32.80  1.64    16.0 [PSALL]BIGFILE.DAT
PROBLEM_DISK MARCUS          25-JUN 00:12:00
      SUPPLY                  20.59  1.60      5.6 [PSDC]PSDC010.B;21
      DEMAND                  16.55  1.73      5.6 [PSDC]PSDC010.B;21
PROBLEM_DISK MARCUS          25-JUN 00:16:00
      SUPPLY                  28.59  1.64      5.6 [PSDC]PSDC010.B;21
      DEMAND                  31.33  1.87      6.3 [PSPA]PSPA010.B;14
PROBLEM_DISK MARCUS          25-JUN 00:26:00
      SUPPLY                  24.59  1.55      5.6 [PSDC]PSDC010.B;21
      DEMAND                  29.58  1.97      6.2 [SMITH.WORK.PSCP]PSCP$MAIN.EXE;67
```

The following statements are keyed to the previous Cluster Rule analysis report example:

1. Name of the disk experiencing heavy use.
2. Name of the node that actually services requests.
3. Beginning time of the interval in which the condition occurred.
4. An asterisk indicates that a disk is a shadow set and the disk underwent a COPY operation.

5. Name of the node in the cluster that shares the heavily used disk.
6. Average number of operations per second to the volume, during the given interval, by the contributing node.
7. Average size of the queue during the interval exampled, measured by the number of requests.
8. Average size, in pages, of all I/O requests during the interval.
9. When hot file data exists, the hottest file (highest I/O rate)is listed.

In the previous Cluster Rule analysis report example, the queue length on volume PROBLEM_DISK exceeds the value of 1.0 on four occasions. During those four occasions, the total operations per second for each interval exceeded the device threshold.

Brief Analysis Reports

The Brief Analysis Report is a synopsis of the Analysis Report. It contains the following information:

- Rule identifiers.
- The percentage of time there were instances of rule occurrences during the reporting period. This field is blank if the rule reflects an analysis of a summary of the over-all analysis period.
- The number of records supporting the rule occurrence. This field is blank if the rule reflects an analysis of a summary of the over-all analysis period.
- A brief (one line) synopsis of the problem statement.

The Brief Analysis Report provides a synopsis for each node in the cluster system, followed by a cluster-wide synopsis.

Until you are familiar with the long version of the conclusions, you should not rely solely on the Brief Analysis Report. In many instances, the one-line synopsis is not sufficient to convey the meaning of the problem.

Interpret the Brief Analysis Report

The following example is an example of a Brief Analysis Report. A description of each item in the report headings follows the example.

The following statements are keyed to the columns in the report example:

1. Rule identifier.
2. For this reporting period, the percentage of time that the conditions of a rule were satisfied.
3. Number of records satisfying rule occurrences.

Rules in Summary domain do not provide data in columns 2 and 3 because their conditions are based on data averaged over the entire analysis period.

```
Brief Analysis                       CLUSTER                            Page   1
                                                                        PA Vx.x
                   Saturday 01-OCT-2006 00:00 to 23:00




                                                              NODE: DEMAND
ID  %oftime Recds       One Line Description
-----  ----- ----  -----------------------------------
  1       2    3
M0010   0.3    1  Application program pagefaults very heavily.
M0500   0.3    1  Heavy paging, increase the working set extent for user(s).
R0270   0.6    2  Process(es) hung in AST.  (See full report.)
I0160   1.2    4  Window turns are too high, alleviate file fragmentation.
R0070             More resources than hash table entries; increase RESHASHTBL.
R0300   0.3    1  Lots of contention for distributed locks.

Summary for DEMAND: 6 rules fired; of 337 records, 8 satisfied conditions.

NODE: SUPPLY
ID %oftime Recds       One Line Description
----- ----- ----  -----------------------------------
R0095     6   22  Low hit ratio, high attempt rate on the file header cache.
R0300     0    1  Lots of contention for distributed locks.

Summary for SUPPLY: 2 rules fired; of 338 records, 23 satisfied conditions.

Summary for VOLTY: 0 rules fired; of 337 records, 1 satisfied conditions.

                                                              CLUSTER
ID %oftime Recds       One Line Description
----- ----- ----  -----------------------------------
L0050          1  I/O bottleneck on disk; reduce or redistribute load.

Summary for CLUSTER:      1 Rules fired.
```

Chapter 3: Evaluate Performance in Detail

This chapter contains example Performance Manager statistical reports and information to help you interpret them. For more information about obtaining Performance Manager reports, see the chapter Performance Manager Commands (see page 175).

This section contains the following topics:

Performance Evaluation Report

The Performance Evaluation Report provides statistics on system use, component use, and process activity. It also provides metrics for performance improvement or degradation, to use when evaluating the impact of recommendations made by the Performance Manager.

The Performance Evaluation Report has the following sections:

- Process statistics by primary and secondary keys
- Pool statistics
- CPU mode statistics
- SCS statistics
- Lock statistics
- CI, NI, and adapter statistics
- Disk statistics
- Tape statistics
- Hot file statistics
- Summary of node's CPU and memory statistics
- Histograms of CPU and memory utilization, and terminal and disk I/O

To display the Performance Evaluation Report, specify the ADVISE PERFORMANCE REPORT PERFORMANCE_EVALUATION command. The /FILTER qualifier lets you select a subset of data for reports. For more information, see the chapter Performance Manager Commands (see page 175).

Interpret the Process Statistics

The following example illustrates the default process statistics section of the Performance Evaluation Report.

The /PROCESS_STATISTICS qualifier allows you to tailor the process statistics section of the Performance Evaluation Report. You can specify the focus of the report to obtain different sets of statistics that pertain to the focus area. The grouping, merging, and sorting of the process data is controlled with the primary and secondary key settings.

The following list shows the primary and secondary keys:

- MODE
- USERNAME
- IMAGENAME
- UIC_GROUP
- PROCESS_NAME
- WORKLOAD_NAME
- ACCOUNT_NAME
- PID

For more information on how to specify the /PROCESS_STATISTICS qualifier, see the chapter Performance Manager Commands (see page 175).

To display only the process statistics section of the Performance Evaluation Report, use the following qualifier:

```
/INCLUDE=PROCESS_STATISTICS
```

To disable the process statistics display from the Performance Evaluation Report, use the following qualifier:

```
/INCLUDE=NOPROCESS_STATISTICS
```

Because process classification by PID or PROCESSNAME results in virtual memory requirements, these reports keys are disabled by default and require you to specifically enable them. For more information on virtual memory requirements, see the appendix Estimate Virtual Memory Needs (see page 535).

The following example shows a Performance Evaluation Report, Process Statistics by Image for Interactive, Batch, Detached, and Network Jobs:

```
Performance              YQUEM (VAX 6000-440)                Page   1
Evaluation                                               PA Vx.x
                                      Tuesday 26-JAN-1997 09:00 to 10:00

  +---------------------------------------------------------------------+
  | The table below lists observed workload characteristics of all the |
  | interactive images that were run during the given interval. Note   |
  | that Diskio, Bufio and Cputim are percentage contributions of the  |
  | respective images to the total system load.  Working set size and  |
  | working set faults are the average for the respective images.  In  |
  | the case of 0 image activations, the Uptime/image and Cputim/image |
  | actually report the cumulative Uptime and Cputim for the image.    |
  +---------------------------------------------------------------------+


Node Name: YQUEM       MODE:   INTERACTIVE

           # of   Page Faults  Avg.  % of     % of          Uptime/   Cputim/
           activ-  per Actvtn   Ws   Direct Buffered % of    image     image
Image      ations -Soft--Hard  size   I/O     I/O   Cputim   (sec)     (sec)
--------  ------- ------ ---- ------ ------  ------ ------  -------   --------
    1        2       3     4     5      6       7      8       9         10
(dcl)          0     830     0   492   0.05    0.23   0.11  142470     16.54
ACS            1     242    13   818   0.00    0.01   0.00       2      0.29
CDU            1    8531     5  2168   0.01    0.01   0.01       3      2.00
CLR            1      68     7   345   0.00    0.01   0.00       6      0.36
CMS            5     522    31   509   0.12    0.13   0.06      48      1.59
COPY           5     124     3   540   0.33    0.15   0.02      16      0.43
DEBUGSHR       2    1739    44  1938   0.01    0.06   0.03     724      2.10
DECPRESENT     2   17125   138  5185   2.34    4.04   1.95    1774    140.73
.              .       .    .     .      .       .      .       .          .
.              .       .    .     .      .       .      .       .          .
.              .       .    .     .      .       .      .       .          .
.              .       .    .     .      .       .      .       .          .
VMOUNT         1     107    13   520   0.00    0.18   0.00     361      0.62
VMSHELP        4     132     7   660   0.04    0.11   0.01      31      0.40
VTX$CLIENT_C   3     540    20   916   0.13    0.17   0.03      98      1.62
            ----                    ------- ------- ------
Totals       197                      24.70   29.94  12.30
              11                         12      13     14
```

```
Performance                  YQUEM (VAX 6000-440)                    Page   5
Evaluation                                                       PA Vx.x
                                       Tuesday 26-JAN-1997 09:00 to 10:00


  +-----------------------------------------------------------------------+
  | The following table summarizes the workload characteristics on a per   |
  | image activation basis.  Note that values would be zeros if total      |
  | number of image activations is zero.                                   |
  +-----------------------------------------------------------------------+


PrimaryKey:                          Avg.  Avg.   Avg.   Avg.
    Mode            # of      Avg.   Soft  Hard  Direct Buff'd    Avg.   Images
Secondary Key:    processes   WSiz/  flts/ flts/  IO/    IO/    Cputim/   per
    None          activ/inact  image  image image image  image    image   Second
--------------    ----- -----  -----  ----- ----- ------ ------  ------- --------
  15               16    17     18     19    20     21     22        23      24
INTERACTIVE        32    53   1905  830.8  15.7  122.8  473.3     8.99   0.0547
BATCH               1     1   4144    0.0   0.0    0.0    0.0     0.33   0.0000
NETWORK             5     2    671  367.4   4.6   35.0  114.9     1.19   0.0389
DETACHED           31    38   1855 1592.0   9.0 5295.3  15542   124.73   0.0036
```

The following statements are keyed to the columns in the previous example:

1. By default, the Performance Manager displays the process information by image name. In this example, images running or waiting on the system during the report time period are shown.
2. Number of times that an image was activated during the report time period. If an image has zero activations, than it has been activated previously (before the reporting period). If you specify the secondary key as USERNAMES, the Performance Manager displays the number of image activations per user.
3. Number of soft page faults incurred by an image during the report time period, divided by the number of activations. If you specify the secondary key as USERNAMES, this column displays the total number of soft page faults for all images, divided by the total number of image activations for the user.
4. Number of hard page faults incurred by an image during the report time period, divided by the number of activations. If you specify the secondary key as USERNAMES, this column displays the total number of hard page faults for all images, divided by the total number of image activations for the user, invoked per user.
5. Average number of process private pages plus the global pages for this image (or user) during the report time period.
6. Percentage of all direct I/O attributable to an image or user during the report time period.
7. Percentage of all buffered I/O attributable to an image or user during the report time period.

8. Percentage of all CPU time attributable to an image or user during the report time period.
9. Total elapsed time (wall clock, in seconds) of an image or user, divided by the number of its activations. If the number of image activations is zero, this measurement represents the total residence time of all activations of the image (or all images if the USERNAMES option was specified).
10. Total amount of CPU seconds used by processes running an image (or by a user if the USERNAMES option was specified) during the report time period, divided by the number of its activations, unless the number of activations is zero.
11. Total number of image activations due to interactive, batch, or network processes, calculated for the report time period. This example shows 197 interactive image activations.
12. Percentage of all direct I/O due to interactive, batch, or network processes during the report time period. In this example, 24.70 percent of all direct I/O was due to interactive processes.
13. Percentage of all buffered I/O due to interactive, batch, or network processes during the report time period. In this example, 29.94 percent of all buffered I/O was due to interactive processes.
14. Percentage of all CPU time used by interactive, batch, or network processes during the report time period. In this example, interactive processes consumed 12.30 percent of all CPU time.
15. Process type: interactive, batch, network or detached, or name of workload when primary key options are used or /CLASSIFY_BY.
16. Average number of active processes. In this example, there is an average of 32 active interactive processes during the 30 intervals.
17. Average number of inactive processes. In this example, there is an average of 53 inactive interactive processes during the 30 intervals.
18. Average number of private and global pages in the process's working set for the active processes.
19. Average number of soft page faults calculated by dividing the total number of soft page faults (for this type) by the number of image activations. A *soft page fault* is the total number of times that processes reference a virtual page that is not in its working set but is in memory.
20. Average number of hard page faults calculated by dividing the total number of hard page faults (for this type) by the number of image activations. A *hard page fault* is the total number of times that processes reference a virtual page that is not in its working set and requires a read operation from disk.
21. Average number of direct I/O operations per image. Calculated by dividing the total number of direct I/O operations (for this type of process) by the total number of image activations.

22. Average number of buffered I/O operations per image. Calculated by dividing the total number of buffered I/O operations by the total number of image activations. Buffered I/O operations use intermediate system buffers rather than process context buffers.
23. Average CPU time used per image. Calculated by dividing the total CPU time accrued by processes, in seconds, by the total number of image activations.
24. Images per second. Total number of image activations divided by the total elapsed wall-clock time during which processes were active, resulting in the average number of images completed per second.

Interpreting Process Statistics by Image Name and User Name

The process statistics in the Performance Evaluation Report can be presented in a number of ways. The previous example showed the default presentation of process statistics. The following example shows the data presented by image and user. This report was generated with the /PROCESS_STATISTICS=(FOCUS=TRADITIONAL, PRIMARY_KEY=IMAGE,SECONDARY_KEY=USERNAME) qualifier.

The following statements are keyed to the columns in following example:

1. Identifies the image name. The Performance Manager displays process statistics for each image executed.
2. Identifies all of the users who activated the image.
3. The imagename, with a summarization of its overall usage.

```
Performance                   YQUEM (VAX 6000-440)                     Page   1
Evaluation                                                         PA Vx.x
                              Tuesday 26-JAN-1997 09:00 to 10:00

  +------------------------------------------------------------------+
  | The table below lists observed workload characteristics of all the |
  | interactive images that were run during the given interval. Note   |
  | that Diskio, Bufio and Cputim are percentage contributions of the  |
  | respective images to the total system load.  Working set size and  |
  | working set faults are the average for the respective images.  In  |
  | the case of 0 image activations, the Uptime/image and Cputim/image |
  | actually report the cumulative Uptime and Cputim for the image.    |
  +------------------------------------------------------------------+
1
Node Name: YQUEM       IMAGENAME:   (dcl)

        # of   Page Faults  Avg.  % of     % of          Uptime/   Cputim/
 2      activ-  per Actvtn   Ws   Direct Buffered % of     image     image
User    ations -Soft--Hard  size   I/O     I/O   Cputim    (sec)     (sec)
------  ------ ------ ---- ------ ------  ------ ------  -------   --------
ARROYO       0     60    0    486   0.00    0.01   0.01     5778       0.94
BHAT         0    127    0    500   0.02    0.06   0.00     2316       0.64
FORD         0     14    0    553   0.00    0.00   0.00     2227       0.36
.            .      .    .      .      .       .      .        .          .
.            .      .    .      .      .       .      .        .          .
.            .      .    .      .      .       .      .        .          .
STEWART      0      0    0    492   0.00    0.00   0.00    10800       0.49
SYSTEM       0     59    0    360   0.00    0.01   0.01     6753       1.41
TORREY       0      0    0    472   0.00    0.00   0.00     3360       0.19
VOBA         0      0    0    483   0.00    0.00   0.00     7080       0.29
        ------                          ----    ----- ------
Totals       0                          0.07    0.24   0.13


Node Name: YQUEM       IMAGENAME:   CMS

        # of   Page Faults  Avg.  % of     % of          Uptime/   Cputim/
        activ-  per Actvtn   Ws   Direct Buffered % of     image     image
 User   ations -Soft--Hard  size   I/O     I/O   Cputim    (sec)     (sec)
------- ------ ------ ---- ------ ------  ------ ------  -------   --------
SELOSKY      5    522   31    509   0.12    0.13   0.06       48       1.59
        ------                   ------- ------- ------
Totals       5                          0.12    0.13   0.06


Node Name: YQUEM       IMAGENAME:   COPY

        # of   Page Faults  Avg.  % of     % of          Uptime/   Cputim/
        activ-  per Actvtn   Ws   Direct Buffered % of     image     image
 User   ations -Soft--Hard  size   I/O     I/O   Cputim    (sec)     (sec)
------- ------ ------ ---- ------ ------  ------ ------  -------   --------
ARROYO       1    166    3    584   0.01    0.08   0.00        2       0.43
BHAT         1    154    3    571   0.04    0.06   0.00        3       0.42
FORD         1     61    3    640   0.25    0.00   0.01       43       0.79
QUANG        2    119    3    407   0.02    0.01   0.00       17       0.26
VERRIER      1    150    3    416   0.01    0.04   0.00        1       0.29
        ------                   ------- ------- ------
Totals       6                          0.33    0.19   0.02
```

```
Performance                  YQUEM (VAX 6000-440)                    Page  29
Evaluation                                                       PA Vx.x
Tuesday 26-JAN-1997 09:00 to 10:00

  +----------------------------------------------------------------------+
  | The following table summarizes the workload characteristics on a per   |
  | image activation basis.  Note that values would be zeros if total      |
  | number of image activations is zero.                                   |
  +----------------------------------------------------------------------+
    3
PrimaryKey:                          Avg.  Avg.   Avg.   Avg.
Image            # of         Avg.   Soft  Hard  Direct Buff'd    Avg.   Images
Secondary Key:    processes   WSiz/  flts/ flts/  IO/    IO/    Cputim/   per
None             activ/inact  image  image image image  image    image   Second
---------------- ----- -----  -----  ----- ----- ------ ------  ------- --------
   (dcl)            18    23    486  950.0   0.0   73.0  760.0    19.05   0.0000
   CMS               0     0    509  522.4  30.8   23.6   80.6     1.59   0.0014
   COPY              0     0    539  128.0   3.0   54.5   98.3     0.41   0.0017
   CSP               1     0    396    0.0   0.0    0.0   64.0     4.42   0.0000
   DEBUGSHR          0     0   1938 1739.0  44.0    6.5   89.5     2.10   0.0006
   DECW$BOOKREAD     0     1   4886    0.0   0.0    0.0    0.0     0.00   0.0000
   DECW$CLOCK        2     0   2696    3.0   0.0    0.0  125.0     2.04   0.0000
   DECW$DWT_FONT     0     1   1753    0.0   0.0    0.0    0.0     0.00   0.0000
   .                 .     .      .      .     .      .      .        .        .
   .                 .     .      .      .     .      .      .        .        .
   .                 .     .      .      .     .      .      .        .        .
```

Interpret Process Statistics by Workload

The following example illustrates the process statistics section displayed by workload. This report displays process statistics for each workload definition in the workload family supplied with the /CLASSIFY_BY qualifier. In this example, the Performance Manager uses the workload family MODEL_TRANSACTIONS including the workload definitions SYSMAN, UTILITIES, EDITORS, and so forth.

```
Performance                  YQUEM (VAX 6000-440)                    Page   1
Evaluation                                                       PA Vx.x
                                                   Tuesday 26-JAN-2006 09:00 to 10:00

  +-------------------------------------------------------------------+
  | The table below lists observed workload characteristics of all the |
  | interactive images that were run during the given interval. Note   |
  | that Diskio, Bufio and Cputim are percentage contributions of the  |
  | respective images to the total system load.  Working set size and  |
  | working set faults are the average for the respective images.  In  |
  | the case of 0 image activations, the Uptime/image and Cputim/image |
  | actually report the cumulative Uptime and Cputim for the image.    |
  +-------------------------------------------------------------------+

Node Name: YQUEM       WORKLOAD:   EDITORS

        # of    Page Faults  Avg.  % of    % of           Uptime/   Cputim/
        activ-   per Actvtn   Ws   Direct Buffered % of    image     image
Image   ations  -Soft--Hard  size   I/O     I/O   Cputim   (sec)     (sec)
------  ------- ------ ---- ------ ------  ------ ------  -------   --------
EDT           4    372     5    705   0.09    0.33   0.04      258       1.57
EMACS         0      0     0   3578   0.00    0.00   0.00    10800       0.00
LSEDIT        3   3896    17   5993   1.27    0.45   0.11     1375       5.32
TPU           8   2267    24   5574   3.50    3.79   0.64     1796      11.44
        ------                     ------   ----- ------
Totals       15                       4.87    4.56   0.79

Node Name: YQUEM       WORKLOAD:   NETWORK

        # of    Page Faults  Avg.  % of    % of           Uptime/   Cputim/
        activ-   per Actvtn   Ws   Direct Buffered % of    image     image
Image   ations  -Soft--Hard  size   I/O     I/O   Cputim   (sec)     (sec)
------  ------- ------ ---- ------ ------  ------ ------  -------   --------
FAL           4     43     2    508   0.82    2.11   0.26     1285       9.43
FILESERV      0      0     0    215   0.00    0.00   0.00     3600       0.12
LATSYM        0      0     0    221   0.00    0.15   0.02     3600       3.13
NETACP        0      0     0   8817   0.01    0.62   0.21     3600      29.86
NETSERVER    44     45     2    409   0.43    0.12   0.06      161       0.18
REMACP        0      0     0    154   0.00    0.00   0.00     3600       0.03
RTPAD         4     79     5    473   0.04    0.15   0.01      611       0.43
         ------                   ------- ------- ------
Totals       52                       1.30    3.17   0.56

Node Name: YQUEM       WORKLOAD:   SYSMAN

        # of    Page Faults  Avg.  % of    % of           Uptime/   Cputim/
        activ-   per Actvtn   Ws   Direct Buffered % of    image     image
Image   ations  -Soft--Hard  size   I/O     I/O   Cputim   (sec)     (sec)
------  ------- ------ ---- ------ ------  ------ ------  -------   --------
CDU       1    8531    5   2168   0.01    0.01   0.01        3       2.00
CLR       1      68    7    345   0.00    0.01   0.00        6       0.36
CMS       5     522   31    509   0.12    0.13   0.06       48       1.59
CONFIGURE 0       0    0    265   0.00    0.00   0.02     3600       2.29
CSP       0       0    0    396   0.00    0.02   0.03     3600       4.42
ERRFMT    0       0    0    241   0.03    0.01   0.00     3600       0.64
.         .       .    .      .      .       .      .        .          .
.         .       .    .      .      .       .      .        .          .
.         .       .    .      .      .       .      .        .          .
```

```
Performance                  YQUEM (VAX 6000-440)                     Page   5
Evaluation                                                        PA Vx.x
Tuesday 26-JAN-2006 09:00 to 10:00

  +---------------------------------------------------------------------+
  | The following table summarizes the workload characteristics on a per   |
  | image activation basis.  Note that values would be zeros if total      |
  | number of image activations is zero.                                    |
  +---------------------------------------------------------------------+
   1
PrimaryKey:                          Avg.  Avg.   Avg.   Avg.
  Workld            # of      Avg.   Soft  Hard  Direct Buff'd    Avg.   Images
Secondary Key:    processes   WSiz/  flts/ flts/  IO/    IO/    Cputim/   per
  None            activ/inact  image  image image image  image    image   Second
--------------    ----- -----  -----  ----- ----- ------ ------   ------- --------
 EDITORS              1     7   4755 2087.2  17.5  317.7  947.0      7.59   0.0042
 NETWORK              5     4   1394   47.3   2.2   24.5  189.7      1.55   0.0144
 OTHER               51    70   1741 1879.0  27.7 1101.8 3228.2     42.17   0.0186
 SYSMAN               7     3    865 1967.6  22.1  241.0  661.3     31.10   0.0022
 UTILITIES            6    12   1952  290.4   6.9   77.6  316.0      1.40   0.0578
```

The following statement is keyed to the column in the previous example:

The Primary Key: Workld indicates the workload names associated with the specified workload family.

View Process Statistics with a Generalized Set of Metrics

The following report example illustrates the process statistics section with a focus on CPU, memory, and IO data, primarily presented as rates. Some UAF parameters are also provided. This format of the report is obtained by using the qualifier /PROCESS_STATISTICS=FOCUS=GENERAL.

To view the report with a different orientation, provide your choice of sort keys. For example, the following syntax presents the statistics by workload family with a breakdown by image:

```
/PROCESS_STATISTICS=(FOCUS=GENERAL,PRIMARY_KEY=WORKLOAD,SECONDARY_KEY=IMAGENAME)
```

```
Performance                  YQUEM (VAX 6000-440)                  Page   1
Evaluation                                                     PA Vx.x
                       Tuesday 26-JAN-1997 09:00 to 10:00


     +------------------------------------------------------------------------------------------------------------------------+
     | The following table gives the average general statistics for processes during the selected time frame.                  |
     +------------------------------------------------------------------------------------------------------------------------+

Primary/Secondary Key              Img  Cpu time  DirI/O  BufI/O  SftFlt  HrdFlt   Ave     Max     Ave     WS      WS      WS
    Pid/ Image         Pri  State  Cnt   (Min)     /Sec    /Sec    /Sec    /Sec  WSsize  WSsize  Global Default  Quota   Extent
-------------------- ----- ----- ----- -------- ------- ------- ------- ------- ------- ------- ------- ------- ------- -------
29400201
   Swapper            16/16  HIB     0    0.021    0.00    0.00    0.00    0.00       0       0       0       1       1       1
29400206
   CONFIGURE          10/ 8  HIB     0    0.038    0.00    0.00    0.00    0.00     265     265       0     512    1636   75000
29400209
   ERRFMT              7/ 7  HIB     0    0.011    0.01    0.01    0.00    0.00     241     241       0     512    1636   75000
.                       .     .     .       .       .       .       .       .       .       .       .       .       .       .
.                       .     .     .       .       .       .       .       .       .       .       .       .       .       .
.                       .     .     .       .       .       .       .       .       .       .       .       .       .       .
294004C0
   (dcl)               4/ 4  CUR     0    0.017    0.00    0.01    0.02    0.00     452     474      52     818    2048   10000
   CMS                 4/ 4  CUR     5    0.133    0.03    0.11    0.73    0.04     509     862      58     818    2048   10000
   DIRECTORY           4/ 4  CUR     1    0.005    0.01    0.02    0.02    0.00     477     477      64     818    2048   10000
   MAIL                5/ 4  LEF     2    0.046    0.03    0.10    0.37    0.01    1115    1317     311     818    2048   10000
29400A41
   (dcl)               4/ 4  CUR     0    0.022    0.00    0.01    0.02    0.00     379     554      39     818    2048    9216
   DELETE              5/ 4  CUR     1    0.002    0.00    0.00    0.03    0.00     308     308      28     818    2048    9216
   DIRECTORY           4/ 4  CUR     1    0.002    0.00    0.00    0.02    0.00     495     495      97     818    2048    9216
   SEARCH              5/ 4  CUR     1    0.006    0.00    0.01    0.04    0.00     325     325      30     818    2048    9216
   SHOW                5/ 4  CUR     1    0.002    0.00    0.00    0.09    0.00     375     375      35     818    2048    9216
   TPU                 6/ 4  CUR     5    0.164    0.09    0.19    2.17    0.04    1167    1497     308     818    2048    9216

User Command: ADVISE PERF REPORT PERF/NODE=YQUEM/BEG=26-JAN-1997 09:00:00.00/END=26-JAN-1997 10:00:00.00 -
    /INCLUDE=PROC/PROC=FOCU=GEN/OUT=EXAMPLE_3_GEN.
```

The following statements describe the columns in the previous report:

- Primary/Secondary Key-This column lists the primary and secondary key identifiers for the process detail lines. The keys may be Mode, Username, Imagename, Processname, Account, UIC group, Workloadname, or PID.
- Pri-This column shows the process's current priority and base priority. For more than one process, they are averages weighted by the process's uptime.
- State-This column represents the scheduling state of the process for the most recent data. For more than one process, this column reflects the state of only one of these processes.
- Img Cnt-This column provides the number of image activations as a count for the process or processes.
- Cpu time (Min)-This column provides the amount of CPU time consumed by the process or processes in minutes.

- DirI/O /Sec-This column provides the average Direct I/O rate per second for the process or processes.
- BufI/O /Sec-This column provides the average Buffered I/O rate per second for the process or processes.
- SftFlt /Sec-This column provides the average soft pagefault rate per second for the process or processes.
- HrdFlt /Sec-This column provides the average hard pagefault rate per second for the process or processes.
- Ave WSsize-This column provides the average working set size (private pages + global pages) for the process. For more than one process, the value is an average weighted by the processes' uptime.
- Max WSsize-This column provides the maximum working set size (private pages + global pages) of any one process, for any one recording example.
- Ave Global-This column provides the average number of global workingset pages for the process. For more than one process, the value is an average weighted by the processes' uptime.
- WS Default-This column provides the WSDEFAULT value for the process. For more than one process, the value is an average weighted by the processes' uptime.
- WS Quota-This column provides the WSQUOTA value for the process. For more than one process, the value is an average weighted by the processes' uptime.
- WS Extent-This column provides the WSEXTENT value for the process. For more than one process, the value is an average weighted by the processes' uptime.

View Process Statistics with an Emphasis on CPU Metrics

The following report example illustrates the process statistics section with a focus on CPU related statistics. The default primary and secondary keys are USERNAME and IMAGENAME. This format of the report is obtained by using the qualifier /PROCESS_STATISTICS=FOCUS=CPU_RELATED. To view the report with a different orientation, provide your choice of sort keys. For example, the following syntax presents the statistics by imagename with a breakdown of who is using those images:

```
/PROCESS_STATISTICS=(FOCUS=CPU_RELATED,PRIMARY_KEY=IMAGENAME,SECONDARY_KEY=USERNA
ME)
```

```
Performance                  YQUEM (VAX 6000-440)                    Page   1
Evaluation                                                       PA Vx.x
Tuesday 26-JAN-1997 09:00 to 10:00


      +-------------------------------------------------------------------------------------------------------------+
      | The following table gives the average CPU related statistics for processes during the selected time frame.     |
      +-------------------------------------------------------------------------------------------------------------+

Primary/Secondary Key   %CPU    Cpu time  Uptime Response Terminal Terminl              Img  COM   SftFlt DskI/O TapeI/O Process
User/ Image           Utilizatn  (Min)    (Min)  tim(sec) Inpt/Sec Chrs/sec  Pri  State  Cnt  Prct   /Sec   /Sec   /Sec   Mwait
-------------------- --------- -------- ------- -------- -------- -------- ----- ----- ----- ----- ------- ------- ------- -----
<dfs$comacp>
   DFS$COM_ACP            0.00    0.000   60.00     0.00     0.00     0.00  10/ 8   HIB    0   0.0    0.00    0.00    0.00
 ARROYO
   (dcl)                  0.01    0.016   96.30     0.01     0.00     0.00   4/ 4   CUR    0  14.6    0.02    0.01    0.00
   COPY                   0.00    0.007    0.03     0.00     0.00     0.00   4/ 4   CUR    1   0.0    0.05    0.01    0.00
   DECPRESENT             0.47    1.127   17.08     0.00     0.00     0.00   5/ 4   CUR    0   3.9    0.60    0.09    0.00
   DIRECTORY              0.01    0.024    0.17     0.02     0.00     0.00   6/ 4   CUR    1   0.0    0.04    0.00    0.00
   MAIL                   0.05    0.128    6.44     0.02     0.04     0.00   5/ 4   CUR    2   1.3    1.07    0.08    0.00
BEYH
   (dcl)                  0.00    0.004   59.10     0.00     0.00     0.00   4/ 4   CUR    0  38.2    0.00    0.00    0.00
   DECW_QUOTE             0.03    0.078   60.00     0.00     0.00     0.00   4/ 4   LEF    0   0.1    0.00    0.01    0.00
   DQS$CLIENT             0.01    0.012    0.26     1.85     0.00     0.00   4/ 4   CUR    2  64.1    0.08    0.01    0.00
   MAIL                   0.20    0.486   14.61     0.05     0.03    16.08   5/ 4   CUR    1   1.1    0.70    1.64    0.00     Scs
   VUE$MASTER             0.00    0.006  120.00     0.00     0.00     0.00   4/ 3   LEF    0   0.0    0.00    0.00    0.00
      .                      .        .       .        .        .        .     .     .     .     .       .       .       .
      .                      .        .       .        .        .        .     .     .     .     .       .       .       .
      .                      .        .       .        .        .        .     .     .     .     .       .       .       .


User Command: ADVISE PERF REPORT PERF/NODE=YQUEM/BEG=26-JAN-1997 09:00:00.00/END=26-JAN-1997 10:00:00.00 -
    /INCLUDE=PROC/PROC=FOCU=CPU/OUT=EXAMPLE_3_CPU.INFO
```

The following statements describe the columns in the previous example:

- Primary/Secondary Key-Lists the primary and secondary key identifiers for the process detail lines. The keys may be Mode, Username, Imagename, Processname, Account, UIC group, Workloadname, or PID.
- %CPU Utilizatn-Provides the amount of CPU time consumed by the process (or processes) represented as a percentage of the node's total capacity. If this is a cluster report (/PROCESS=CLUSTER), then the figure is a percentage of the cluster's total capacity. The process CPU time is scaled by the node's VUP rating (power rating).
- Cpu time (Min)-Provides the amount of CPU time consumed by the process or processes in minutes.
- Uptime (Min)-Provides the total amount of wall-clock time during which the process(es) were resident on the system, in minutes.
- Response tim(sec)-Represents the average response time per terminal input operation for the process or processes.
- Terminal Inpt/Sec-Provides the average number of Terminal Inputs (completion of a read QIO to the terminal) per second for the process or processes.
- Terminl Chrs/sec-Provides the average number of bytes (characters) per second transferred to, or received from the terminal, for the process or processes.

- Pri-Shows the process's current priority and base priority. For more than one process, they are averages weighted by the process's uptime.
- State-Represents the scheduling state of the process for the most recent data. For more than one process, this column reflects the state of only one of these processes.
- Img Cnt-Provides the number of image activations as a count for the process or processes.
- COM Prct-Provides the percent of time that a process is observed in the COM scheduler state. If more than one process is represented, this figure could be greater than 100, however, it is still a meaningful gauge as to which processes are queued up at the CPU.
- Sft Flt/Sec-Provides the average soft pagefault rate per second for the process or processes.
- Dsk I/O/Sec-Provides the average number of disk I/O operations per second for the process or processes.
- Tape I/O/Sec-Provides the average number of tape I/O operations per second for the process or processes.
- Process Mwait-If the process (or processes) was observed by the data collector in an MWAIT scheduler state, the resource name is provided (RSN). The low numbered resource states have precedence if more than one state was recorded. The order of precedence starting with the highest is: RWAST, MAILBOX, NPDYNMEM, PGFILE, PGDYNMEM, BRKTHRU, IACLOCK, JQUOTA, LOCKID, SWPFILE, MPLEMPTY, MPWBUSY, SCS, CLU.

View Process Statistics with an Emphasis on IO Metrics

The following report example illustrates the process statistics section with a focus on process IO related metrics, primarily presented as rates. Up to 3 top volume names associated with the IO activity are also displayed. The example uses the default primary and secondary keys of USERNAME and IMAGENAME. This format of the report is obtained by using the qualifier /PROCESS_STATISTICS=FOCUS=IO_RELATED. To view the report with a different orientation, provide your choice of sort keys. For example, the following syntax presents the statistics by imagename with a breakdown by user:

```
/PROCESS_STATISTICS=(FOCUS=IO_RELATED,PRIMARY_KEY=IMAGENAME,SECONDARY_KEY=USERNAM
E)
```

```
Performance                  YQUEM (VAX 6000-440)                     Page   1
Evaluation                                                        PA Vx.x
Tuesday 26-JAN-1997 09:00 to 10:00
    +-----------------------------------------------------------------------------------------------------------------+
    | The following table gives the average I/O statistics for processes during the selected time frame.               |
    +-----------------------------------------------------------------------------------------------------------------+
Primary/Secondary Key  DirI/O  BufI/O  HrdFlt  Img   Dsk Ops KB Thru -----Top Disk------ ---2nd Top Disk---- ---3rd Top Dsk-----
User/ Image              /Sec    /Sec    /Sec  Cnt      /Sec put/sec Volume Name  IO/sec Volume Name  IO/sec Volume Name  IO/sec
-------------------- ------- ------- ------- -----  ------- ------- ------------ ------ ------------ ------ ------------ ------
ARROYO
   (dcl)                0.00    0.01    0.00     0     0.01     0.0     TRAINING   0.00      SYSPACK   0.00                0.00
   COPY                 0.00    0.07    0.00     1     0.01     0.1     TRAINING   0.00      SYSPACK   0.00                0.00
   DECPRESENT           0.08    1.06    0.00     0     0.09     0.2     TRAINING   0.08      SYSPACK   0.00                0.00
   DIRECTORY            0.00    0.01    0.00     1     0.00     0.0      SYSPACK   0.00                0.00                0.00
   MAIL                 0.06    0.14    0.02     2     0.08     0.8     TRAINING   0.05      SYSPACK   0.03        PAGER   0.00
BEYH
   (dcl)                0.00    0.00    0.00     0     0.00     0.0      SYSPACK   0.00                0.00                0.00
   DECW_QUOTE           0.01    0.00    0.00     0     0.01     0.0        PAGER   0.01                0.00                0.00
   DQS$CLIENT           0.00    0.02    0.01     2     0.01     0.1      SYSPACK   0.01        PAGER   0.00                0.00
   MAIL                 0.23    3.07    0.02     1     0.28     1.5        SWDEV   0.26      SYSPACK   0.01        PAGER   0.00
   NOTES$MAIN           0.08    9.47    0.00     0     0.08     0.3        SWDEV   0.08                0.00                0.00
   RTPAD                0.00    0.00    0.00     1     0.00     0.0                0.00                0.00                0.00
BHAT
   (dcl)                0.00    0.05    0.00     0     0.01     0.0      SYSPACK   0.00        ADMIN   0.00                0.00
   COPY                 0.01    0.05    0.00     1     0.01     0.4        ADMIN   0.01      SYSPACK   0.00                0.00
   DECPRESENT           0.56    2.44    0.07     2     0.64     3.8        ADMIN   0.39      SYSPACK   0.25                0.00
   DIRECTORY            0.00    0.00    0.00     1     0.00     0.0                0.00                0.00                0.00
   MAIL                 1.63    0.43    0.01     1     1.64     8.2        ADMIN   1.61      SYSPACK   0.03        PAGER   0.00
   QUOTE_V0             0.00    0.01    0.00     1     0.00     0.0        ADMIN   0.00      SYSPACK   0.00                0.00
   SET                  0.00    0.00    0.00     2     0.00     0.0                0.00                0.00                0.00
   SUBMIT               0.00    0.00    0.00     1     0.00     0.0      SYSPACK   0.00                0.00                0.00
   VMSHELP              0.01    0.09    0.01     4     0.02     0.4      SYSPACK   0.02                0.00                0.00

User Command: ADVISE PERF REPORT PERF/NODE=YQUEM/BEG=26-JAN-1997 09:00:00.00/END=26-JAN-1997 10:00:00.00 -
  /INCLUDE=PROC/PROC=FOCU=IO/OUT=EXAMPLE_3_IO.INFO
```

The following statements describe the columns in the previous example:

- Primary/Secondary Key-This column lists the primary and secondary key identifiers for the process detail lines. The keys may be Mode, Username, Imagename, Processname, Account, UIC group, Workloadname, or PID.
- DirI/O /Sec-This column provides the average Direct I/O rate per second for the process or processes.
- BufI/O /Sec-This column provides the average Buffered I/O rate per second for the process or processes.
- HrdFlt /Sec-This column provides the average hard pagefault rate per second for the process or processes.
- Img Cnt-This column provides the number of image activations as a count for the process or processes.
- Dsk Ops /Sec-This column provides the average number of disk I/O operations per second for the process or processes.

- KB Thruput/sec-This column provides the average number of Kilobytes transferred to or from disks, per second, for the process or processes.
- Top Disk-Volume Name IO/sec

  This column provides both the volume name and average I/O rate, for the disk which this process or processes access most. Note that the I/O rate might be understated, and that some other disk might be accessed heavily but not reported, because the primary data collector is only capturing the top two devices that the process uses, each two minute interval. If an alternate collection is used, these columns show no data, since the data is not provided by an alternate collector.
- 2nd Top Disk-Volume Name IO/sec

  See previous paragraph.
- 3rd Top Dsk-Volume Name IO/sec

  See previous paragraph.

View Process Statistics with an Emphasis on Memory Metrics

The following report example illustrates the process statistics section with a focus on process memory related metrics. Some relevant UAF parameters are also displayed. The example uses the default primary and secondary keys of IMAGENAME and USERNAME. This format of the report is obtained by using the qualifier /PROCESS_STATISTICS=FOCUS=MEMORY_RELATED. To view the report with a different orientation, provide your choice of sort keys. For example, the following syntax presents the statistics by user with a breakdown by image:

```
/PROCESS_STATISTICS=(FOCUS=MEMORY_RELATED,PRIMARY_KEY=USERNAME,SECONDARY_KEY=IMAG
ENAME)
```

```
Performance                    YQUEM (VAX 6000-440)                     Page   1
Evaluation                                                          PA Vx.x
Tuesday 26-JAN-2006 09:00 to 10:00


  +-----------------------------------------------------------------------------------------------------------------+
  | The following table gives the average memory statistics for processes during the selected time frame.          |
  +-----------------------------------------------------------------------------------------------------------------+

Primary/Secondary Key  SftFlt  HrdFlt   Ave     Ave     Ave   Obs   Max     Max     Ave     Ave     WS      WS      WS     Uptime
Image/  User            /Sec    /Sec  Private  Global VA Spac PFW VA Spac  WSsize  WSsize  WSlist Default  Quota   Extent   (min)
--------------------- ------- ------- ------- ------- ------- --- ------- ------- ------- ------- ------- ------- ------- --------
(dcl)
   ALAM                  0.00    0.00     426      61    6338  N     6338     767     487     834     818    2048   16384    16.18
   ARROYO                0.02    0.00     421      65    4960  N     4996     504     486     818     818    2048    9216    96.30
   BEYH                  0.00    0.00     657     102    6227  N     6227     759     759    1024    1024    2048   16384    59.10
CMS
   SENDLOSKY             0.73    0.04     451      58   11922  Y    12141     862     509     962     818    2048   10000     3.96
COPY
   ARROYO                0.05    0.00     489      95    5618  N     5618     584     584     818     818    2048    9216     0.03
   BHAT                  0.04    0.00     476      95    5618  N     5618     571     571     818     818    2048   10000     0.04
   FORD                  0.02    0.00     496     144    5560  N     5560     640     640     918     818    2048   50000     0.71
   QUANG                 0.07    0.00     317      90    5824  N     5824     426     407     818     818    2048    9216     0.55
   VERRIER               0.04    0.00     359      57    5618  N     5618     416     416    1024    1024    2048   16384     0.02
   .                        .       .       .       .       .  .        .       .       .       .       .       .       .        .

User Command: ADVISE PERF REPORT PERF/NODE=YQUEM/BEG=26-JAN-2006 09:00:00.00/END=26-JAN-2006 10:00:00.00 -
   /INCLUDE=PROC/PROC=FOCU=MEM/OUT=EXAMPLE_3_MEM.INFO
```

The following statements describe the columns in the previous example:

- Primary/Secondary Key-This column lists the primary and secondary key identifiers for the process detail lines. The keys may be Mode, Username, Imagename, Processname, Account, UIC group, Workloadname, or PID.
- SftFlt /Sec-This column provides the average soft pagefault rate per second for the process or processes.
- HrdFlt /Sec-This column provides the average hard pagefault rate per second for the process or processes.
- Ave Private-This column provides the average number of private workingset pages for the process. For more than one process, the value is an average weighted by the processes uptime.
- Ave Global-This column provides the average number of global workingset pages for the process. For more than one process, the value is an average weighted by the processes uptime.
- Ave VA Spac-This column provides the average number of process virtual pages for the process. For more than one process, the value is an average weighted by the processes uptime.
- Obs PFW-This column is set to a Y if the process was observed by the data collector in the pagefault wait scheduler state (PFW).
- Max VA Spac-This column provides the maximum number of virtual address space pages for any one process, for any one recording example.
- Max WSsize-This column provides the maximum working set size (private pages + global pages) of any one process, for any one recording example.

- Ave WSsize-This column provides the average working set size (private pages + global pages) for the process. For more than one process, the value is an average weighted by the processes uptime.
- Ave WSlist-This column provides the average working set list size for the process. For more than one process, the value is an average weighted by the processes uptime.
- WS Default-This column provides the WSDEFAULT value for the process. For more than one process, the value is an average weighted by the processes uptime.
- WS Quota-This column provides the WSQUOTA value for the process. For more than one process, the value is an average weighted by the processes uptime.
- WS Extent-This column provides the WSEXTENT value for the process. For more than one process, the value is an average weighted by the processes uptime.
- Uptime (min)-This column provides the total amount of wall-clock time during which the process(es) were resident on the system, in minutes.

Interpret Pool Statistics

The pool statistics follow the process statistics for each node in a cluster system. To display only the pool statistics section of the Performance Evaluation Report, use the following qualifier:

```
/INCLUDE=POOL_STATISTICS
```

To disable the pool statistics display from the report, use this qualifier:

```
/INCLUDE=NOPOOL_STATISTICS
```

The following example shows the pool statistics of the Performance Evaluation Report:

```
Performance                     SUPPLY (VAX-11/78)                    Page   3
Evaluation                                                          PA Vx.x
Wednesday 14-JAN-1997 00:00 to 12:16

  +----------------------------------------------------------------------+
  | The following table gives the average pool resources used and         |
  | allocated on this node.  N/A means not applicable.                    |
  +----------------------------------------------------------------------+

                              LRP     IRP     SRP    NP-POOL    LOCKS  RESOURCES
--------------------------------------------------------------------------------
                                1       2       3        4        5        6
Avg number in use              17     756    1745   499518      864      776
Max number in use              41     839    2122   516976     1052      968
Number of intvls w/expansns     0       0       0        0        0      N/A
Allocation (xRPCOUNT)          40     881    1249   799744     1184     1024
Virtual Alloc (xRPCOUNTV)     160    3524    4996  2399744      N/A      N/A
```

The following statements are keyed to the columns in the previous example:

1. Large request packets
2. Intermediate request packets
3. Small request packets
4. Nonpaged pool (in bytes)
5. Number of locks
6. Number of named resources known by the Distributed Lock Manager

For OpenVMS Versions 6.0 and higher, the metrics for LRP, IRP, and SRP are obsolete. The following sample shows an example of this report:

```
Performance               MUMMS (VAXstation 3100/GPX)                  Page   1
Evaluation                                                         PA Vx.x
                                        Saturday 19-MAR-2006 23:00 to 23:59


+-------------------------------------------------------------------------+
| The following table gives the average pool resources used and           |
| allocated on this node.  N/A means not applicable.                      |
+-------------------------------------------------------------------------+

                                    NP-POOL         LOCKS        RESOURCES
--------------------------------------------------------------------------
Avg number in use                    2449519          940            916
Max number in use                    2456128          940            916
Number of intvls w/expansns                0            0            N/A
Allocation (xRPCOUNT)                 962048          535            512
Virtual Alloc (xRPCOUNTV)            4810240          N/A            N/A

Virtual I/O Cache             Pages                        Rate per second
-------------------------------------------------------------------------
Average Total Size             6663    Average Read I/O              0.00
Average Free                   5567    Average Read Hit              0.00
Average in Use                 1096    Average Write I/O             0.00
Maximum Size (SPTEs)          20315    I/O Bypassing the Cache       0.00
-------------------------------------------------------------------------
Average Files Retained           87    Cache Effectiveness           80.0 %

User Command: ADVISE PERF REP PERF/INCLU=POOL/BE=19-MAR-2006 23:00:00.00/NOD=MUMMS/OUT=A.A
```

Interpret CPU Mode Statistics

The CPU mode statistics follow the pool statistics for each node in a cluster system. To display only the CPU mode statistics section of the Performance Evaluation Report, use the qualifier:

/INCLUDE=MODE_STATISTICS

To disable the CPU mode statistics display from the report, use the qualifier:

/INCLUDE=NOMODE_STATISTICS

The following example shows the CPU mode statistics section of the Performance Evaluation report:

```
Performance                     SUPPLY (VAX-11/78)                     Page   4
Evaluation                                                        PA Vx.x
                                                   Wednesday 14-JAN-2006 00:00 to 12:16
  +------------------------------------------------------------------------+
  | The following table gives the average percent of time in each of the   |
  | various CPU modes for each active processor in the local node.          |
  | "Samples" is the record count contributing to the summary line.         |
  +------------------------------------------------------------------------+
CPU
No.  Kernel  Exec  Supervisor  User  Interrupt  Compat  Null  MP Synch  Samples
---  ------  ----  ----------  ----  ---------  ------  ----  --------  -------
 1      2      3         4       5        6        7     8        9       10
 1    6.8    1.6       0.6     5.9      4.5      0.0  80.6      0.0      432
```

The following statements are keyed to the previous example:

1. Physical processor identification
2. Percentage of time in kernel mode for this physical processor
3. Percentage of time in executive mode for this physical processor
4. Percentage of time in supervisor mode for this physical processor
5. Percentage of time in user mode for this physical processor
6. Percentage of time in interrupt stack for this physical processor
7. Percentage of time in compatibility mode for this physical processor
8. Percentage of time in null mode for this physical processor
9. Percentage of time in multiprocessor synchronization mode for this physical processor
10. Number of Performance Manager data records contributing to the above statistics

Interpret SCS Statistics

If included in the Performance Evaluation Report, SCS statistics, follow the CPU mode statistics for each node in a cluster. This report also presents cluster-wide SCS statistics. The SCS statistics are not included in the default group of Performance Report options.

To enable the SCS statistics display from the Performance Evaluation Report, use the following qualifier:

```
/INCLUDE=SCS_STATISTICS
```

The following statements are keyed to the columns in the SCS Statistics report:

1. Other nodes in cluster. The Performance Manager reports SCS message and transfer rate statistics as seen by node NODE2 to the other nodes listed here.
2. Port name if multiple paths are possible.
3. Physical circuit connecting all nodes on a common interconnect.
4. Datagram send rate per second.
5. Datagram receive rate per second.
6. Datagram discard rate per second.
7. Message send rate.
8. Message receive rate.
9. Block send rate.
10. Block request rate.
11. Kilobyte send rate.
12. Kilobyte receive rate.
13. Kilobyte map rate.
14. Send credit waits.
15. Buffered descriptor waits.

The following example shows the Performance Evaluation report, SCS Statistics:

```
Performance                     NODE02 (VAX-11/78)                    Page   9
Evaluation                                                        PA Vx.x
Wednesday 14-JAN-2006 00:00 to 23:59

  +-----------------------------------------------------------------------+
  | The following table gives the SCS message and transfer rates from      |
  | this node to all other nodes in the cluster.  Values are rates (/sec). |
  +-----------------------------------------------------------------------+

CLUSTR PATH CIR- DGS  DGS  DGS  MGS  MGS  BLKS  BLKS   KB    KB    KB     CRD  BDT
 NODE  PORT CUIT SND  RCD  DSD  SND  RCVD SEND  RQSTD  SEND  RCVD  MAPPED WAI  WAI
------ ---- ---- ---  ---  ---  ---  ---- ----- -----  ----  ----  ------ ---- ----
   1     2    3    4    5    6    7    8     9     10    11    12     13  14   15
DEFEND PAA0 CI-0    0    0    0    0    0     0     0     0     0      0 0.00 0.00
NODE3  PAA0 CI-0    0    0    0    2    1     0     0     0     0      0 0.00 0.00
AGRIC  PAA0 CI-0    0    0    0    3    3     0     0     0     0      5 0.00 0.00
SUPPLY PAA0 CI-0    0    0    0    4    2     0     0     0     0      0 0.00 0.00
Total  PAA0 CI-0    0    0    0    8    6     0     0     0     0      5 0.00 0.00
  .     .      .    .    .    .    .    .     .     .     .     .       .  .
  .     .      .    .    .    .    .    .     .     .     .     .       .  .
  .     .      .    .    .    .    .    .     .     .     .     .       .  .
```

```
Performance                         CLUSTER                           Page  12
Evaluation                                                        PA Vx.x
Wednesday 14-JAN-2006 00:00 to 23:59

  +-----------------------------------------------------------------------+
  | The following table gives the SCS message and transfer rates to the    |
  | target node from other nodes in the cluster.  Values are rates (/sec). |
  +-----------------------------------------------------------------------+

TARGET NODE: DEFEND
SOURCE PATH CIR- DGS  DGS  DGS  MGS  MGS  BLKS  BLKS   KB    KB    KB     CRD  BDT
 NODE  PORT CUIT SND  RCV  DSD  SND  RCVD SEND  RQSTD  SEND  RCVD  MAPPED WAI  WAI
------ ---- ---- ---  ---  ---  ---  ---- ----  -----  ----  ----  ------ ---- ----
NODE2  PAA0 CI-0   0    0    0    0     0    0      0     0     0       0 0.00 0.00
SUPPLY PAA0 CI-0   0    0    0    1     1    0      0     0     0       1 0.00 0.00
NODE3  PAA0 CI-0   0    0    0    0     0    0      0     0     0       0 0.00 0.00
Total  PAA0 CI-0   0    0    0    1     1    0      0     0     0       2 0.00 0.00
  .     .      .   .    .    .    .     .    .      .     .     .       .  .
  .     .      .   .    .    .    .     .    .      .     .     .       .  .
  .     .      .   .    .    .    .     .    .      .     .     .       .  .
```

Interpret cluster-wide Lock Statistics

The lock statistics are the first cluster-wide statistics, and follow the system-specific SCS statistics. To display only the lock statistics section of the Performance Evaluation Report, use this qualifier:

```
/INCLUDE=LOCK_STATISTICS
```

To disable the lock statistics display from the report, use this qualifier:

```
/INCLUDE=NOLOCK_STATISTICS
```

The following example shows the lock statistics section of the Performance Evaluation Report:

```
Performance                         CLUSTER                           Page  14
Evaluation                                                        PA Vx.x
                                                        Wednesday 14-JAN-2006 00:00 to 12:16

  +---------------------------------------------------------------------+
  | The following table gives a summary of the average amount of lock     |
  | traffic per second in the cluster                                     |
  +---------------------------------------------------------------------+

         Local       Incoming     Outgoing      Waiting   LOCK-  Deadlk  Deadlk
Node     ENQ/CVT/DEQ ENQ/CVT/DEQ  ENQ/CVT/DEQ    locks    DIRWT   find   search
-------- ----------- -----------  -----------   -------   -----  ------  ------
   1          2           3            4            5       6       7       8
NODE01   24/ 23/ 24  13/  3/ 13/  0/  1/  0/        0       2       0       0
-------  --- --- --- --- --- ---  --- --- ---      ---             ---     ---
Total    24/ 23/ 24  13/  3/ 13/  0/  1/  0/        0               0       0
```

The following statements are keyed to the columns in previous example:

1. Each node in the cluster.
2. Average enqueue (ENQ), conversion (CVT), and dequeue (DEQ) lock requests per second for locks that are managed by the node requesting the lock. An enqueue lock request queues a new lock resource. A conversion lock request occurs when a lock of one mode has already been granted and a lock request to change the lock mode is to be granted. A dequeue lock request releases the granted lock.
3. Average lock requests per second for locks that are managed by the local node but originate on other nodes.
4. Average lock requests per second for locks that originate on a local node but are managed by other nodes.
5. Average number of ENQ lock requests per second that had to wait in the wait queue.
6. Value of the SYSGEN parameter LOCKDIRWT on each respective node.
7. Deadlock detections per second during the reporting period.
8. Deadlock searches per second during the reporting period.

Interpret cluster-wide CI, NI, and Adapter Statistics

The CI, NI, and adapter statistics follow the cluster-wide Lock statistics. To display only the CI, NI and adapter statistics section of the Performance Evaluation Report, use the following qualifier:

```
/INCLUDE=CI_NI_AND_ADAPTER_STATISTICS
```

To disable the CI, NI and adapter statistics display from the report, use the following qualifier:

```
/INCLUDE=NOCI_NI_AND_ADAPTER_STATISTICS
```

Note: The phrase *CI, NI and adapter statistics* is seen in the Performance Evaluation Report to describe cluster interconnect statistics in general. CI hardware is not supported on HP Integrity Servers. On a cluster of only Integrity Servers, you will see only NI adapters.

```
Performance                         CLUSTER                          Page   7
Evaluation                                                       PA Vx.x
                                       Wednesday 14-JAN-2006 00:00 to 12:16

     +----------------------------------------------------------------------+
     |          CI, NI, and Adapter Statistics   (values are rates/sec)       |
     +----------------------------------------------------------------------+
                                                                  Block
Cir-                           Data-    Mess-     Disk       Disk      Transfers
cuit   Node    Component       grams     ages   Operations  KB Thruput  KB Thruput
----   ------  ---------       -----    -----   ----------  ----------  ----------
  1      2         3             4        5          6           7           8
PAA0           ** total **     0.0    101.9        17.8        47.2        56.1
PAB0           ** total **     0.0      0.0         0.0         0.0         0.0
PAA0   DEFEND  CIBCA-A         0.0     16.9         5.0         7.1        13.8
PAA0   SUPPLY  CI780           0.0     39.2         0.0         0.0        16.6
PAA0   AGRIC   CIBCA-A         0.0     33.7        12.7        40.0        42.2
PAA0   SUPPLY  BCI750          0.0     75.0        12.2        38.9        38.9
PAB0   TAYLOR  CIBCA-A         0.0      0.0         0.0         0.0         0.0
PAA0   NODE2   CI780           0.0     39.1         5.7         8.3         8.2
PAB0   NODE2   CI780           0.0      0.0         0.0         0.0         0.0
```

The following statements are keyed to the columns in the previous report:

1. Device identification of path to remote SCS nodes.
2. Node name of the cluster node.
3. Adapter type for the cluster node (all Ethernet adapter types are reported as NI).
4. Number of datagrams per second sent and received by this node's port.
5. Number of messages per second sent and received by this node's port.
6. Number of disk IOs per second delivered through this port.
7. Number of kilobytes per second delivered through this port to disks.
8. Number of kilobytes per second total delivered through this port.

Interpret cluster-wide Disk Statistics

The disk statistics follow the cluster-wide CI, NI, and adapter statistics. To display only the disk statistics section of the Performance Evaluation Report, use the following qualifier:

```
/INCLUDE=DISK_STATISTICS
```

To disable the disk statistics display from the report, use the following qualifier:

```
/INCLUDE=NODISK_STATISTICS
```

The following report shows an example of the disk statistics section of the Performance Evaluation report:

```
Performance                          CLUSTER                           Page   8
Evaluation                                                         PA Vx.x
                                        Wednesday 14-JAN-2006 13:00 to 14:00

  +--------------------------------------------------------------------------+
  | The following table gives the summary of all disk activity as seen       |
  | by the indicated node.  An "*" for service node indicates that more      |
  | than one was detected.                                                   |
  +--------------------------------------------------------------------------+

Disk    Avg I/O  Avg   Avg    IOsz  Source Service  %    % IO % IO       # of
Volume  per Sec Queue Kb/sec in pgs  Node   Node   Busy  Read Split Type Samples
------  ------- ----- ------ ------ ------ ------ ------ ---- ----- ---- -------
  1        2     3       4      5    6       7      8      9    10  11      12
ARNOLD        ($2$DJA4)
         0.00  0.00   0.0    0.0        NODE1            0    0  RA60
         0.00  0.00   0.0    0.0 SUPPLY        0.00      0    0          30
         0.00  0.00   0.0    0.0 DEMAND        0.00      0    0          30
         0.00  0.00   0.0    0.0 NODE1         0.00      0    0          30
BARRY         ($2$DUA15)
         0.66  0.03   2.3    7.0         ERNIE         100    4  RA81
         0.00  0.00   0.0    0.0 SUPPLY        0.00      0    0          30
         0.66  0.03   2.3    7.0 DEMAND        1.97    100    4          30
         0.00  0.00   0.0    0.0 NODE1         0.00      0    0          30

CLEM          ($2$DUA5)
         2.02  0.06   5.0    4.9         ERNIE          83    1  RA82
         0.14  0.00   0.3    3.6 SUPPLY        0.35     98    0          30
         1.46  0.04   3.8    5.2 DEMAND        3.89     82    2          30
         0.42  0.01   1.0    4.6 NODE1         1.15     81    0          30

DUFIS         ($2$DUA10)
         3.86  0.14  16.5    8.6        BERT            86   15  RA81
         0.00  0.00   0.0    0.0 SUPPLY        0.00      0    0          30
         1.98  0.08   9.1    9.2 DEMAND        7.31     84   13          30
         1.88  0.06   7.4    7.9 NODE1         5.66     89   17          30

ELLIE         ($2$DUA7)
         8.93  0.40  28.5    6.4        BERT            93    0  RA82
         0.04  0.01   1.6   74.4 SUPPLY        0.26     15    0          30
         8.36  0.35  22.0    5.3 DEMAND       18.73     95    0          30
         0.53  0.04   5.0   19.0 NODE1         2.15     79    0          30
```

The following statements are keyed to the columns in the previous example:

1. Volume name of the disk to which one or more nodes in the cluster directs activity.
2. Average number of I/O operations per second to the disk volume. For each disk, the total I/O per second is reported, followed by a breakdown of this activity from contributing nodes, when applicable. In this example, there was an average of 2.02 I/O operations per second to disk volume CLEM, with node SUPPLY contributing an average of 0.14 I/O operations per second, node DEMAND contributing 1.46, and node NODE1 accounting for the remaining 0.42 I/O operations per second.
3. Average number of I/O requests waiting for service to the disk. The average queue size for each disk is followed by a breakdown of this value from contributing nodes, when applicable.

4. Average number of kilobytes per second transferred to or from the disk.
5. Average size of the I/O operations to the disk, in pages. The average size for each disk is followed by a breakdown of this value from contributing nodes, when applicable.
6. Name of the node that uses the various disk volumes. For rows in which no source node name appears, the data refers to the cluster-wide activity on the disk volume.
7. Name of the node that services I/O requests. An asterisk denotes that more than 1 server existed for this disk.
8. Percentage of time that I/O requests are outstanding to the volume for each node utilizing the disk volume.
9. Percentage of total I/O activity devoted to read operations. This value for each disk is followed by the percentage of read operations to the disk from contributing nodes, when applicable.
10. Percentage of total I/O activity that were split I/O operations. This value for each disk is followed by the percentage of read operations to the disk from contributing nodes, when applicable.
11. Disk volume type. In this example, all but one of the disks are RA81s.
12. Count of the Performance Manager records containing data for a disk volume during the interval.

Interpret cluster-wide Tape Statistics

The tape statistics follow the cluster-wide disk statistics.

To display only the tape statistics section of the Performance Evaluation Report, use the following qualifier:

```
/INCLUDE=TAPE_STATISTICS
```

To disable the tape statistics display from the report, use the following qualifier:

```
/INCLUDE=NOTAPE_STATISTICS
```

The following example shows the tape statistics section of the Performance Evaluation Report:

```
Performance                          CLUSTER                          Page   1
Evaluation                                                      PA Vx.x
                                                  Wednesday 14-JAN-2006 09:00 to 19:20



  +------------------------------------------------------------------------+
  | The following table gives the summary of all tape activity as seen    |
  | by the indicated node.  An "*" for service node indicates that more   |
  | than one was detected.                                                 |
  +------------------------------------------------------------------------+


Tape    Avg I/O  Avg    Avg    IOsz  Source Service  %    % IO % IO       # of
Volume  per Sec Queue Kb/sec in pgs  Node   Node   Busy  Read Split Type Samples
------  ------- ----- ------ ------ ------ ------ ------ ---- ----- ---- -------
  1        2      3     4      5      6      7       8     9    10    11    12
8JUL02        ($2$MUA43)
           3.76 20.14  119.1   63.3 LATOUR JULIO   15.46    0    0  TA90E     9
ABC           ($2$MUA43)
          99.21 61.30  270.5    5.5 LATOUR JULIO   39.62    0    0  TA90E     9
```

The following statements are keyed to the columns in the previous report:

1. Volume name of the tape to which one or more nodes in the cluster directs activity.
2. Average number of I/O operations per second to the tape volume. For each tape, the total I/O per second is reported, followed by a breakdown of this activity from contributing nodes, when applicable.
3. Average number of I/O requests waiting for service to the tape. The average queue size for each tape is followed by a breakdown of this value from contributing nodes, when applicable.
4. Average number of kilobytes per second transferred to or from the tape.
5. Average size of the I/O operations to the tape, in pages. The average size for each tape is followed by a breakdown of this value from contributing nodes, when applicable.
6. Name of the node that uses the various tape volumes. For rows in which no source node name appears, the data refers to the cluster-wide activity on the tape volume.
7. Name of the node that services I/O requests.
8. Percentage of time that I/O requests are outstanding to the volume for each node utilizing the tape volume.
9. Percentage of total I/O activity devoted to read operations. This value for each tape is followed by the percentage of read operations to the tape from contributing nodes, when applicable.
10. Percentage of total I/O activity that was split I/O operations. This value for each tape is followed by the percentage of read operations to the tape from contributing nodes, when applicable.

11. Tape volume type. In this example, all of the tapes are TA90Es.
12. Count of the Performance Manager records containing data for a tape volume during the interval.

The following example shows the cluster-wide tape statistics section of the Performance Evaluation report:

```
Performance                          CLUSTER                            Page   2
Evaluation                                                          PA Vx.x
                                                     Wednesday 14-JAN-2006 09:00 to 19:20

  +-----------------------------------------------------------------------+
  | The following tables gives the summary of all tape activity as seen   |
  | by the indicated node.                                                |
  +-----------------------------------------------------------------------+

                               Percent      Metrics during active records
Cluster  Tape                 of records    ---------------------------- Device
 Node    controller Unit     with activity   I/Os/sec     Errors/sec      Type
-------  ---------- ----     -------------   -----------  -----------    -------
   1             2   3             4              5            6            7
SUPPLY         MFA  0            0.813          0.325        0.000        TU78
               MUA  0            0.000          0.000        0.000        TA78
               MUA  1            0.000          0.000        0.000        TA78
DEMAND         MUA  0            0.000          0.000        0.000        TA78
               MUA  1            0.000          0.000        0.000        TA78
NODE01         MFA  0            0.000          0.000        0.000        TU78
               MUA  0            0.000          0.000        0.000        TA78
               MUA  1            0.000          0.000        0.000        TA78
```

The following statements are keyed to the columns in the previous example:

1. Node name
2. Tape controller
3. Unit number
4. Percentage of records having tape activity on a given node during the interval
5. I/Os per second to the tape controller unit
6. Errors per second
7. Tape controller unit type

Interpret cluster-wide Hot File Statistics

In the Performance Evaluation Report, the hot file statistics follow the cluster-wide tape statistics. The hot file statistics highlight the files with the most I/O operations for each disk in the configuration. By default, the 20 hottest files are provided for each disk; however, you can change this number by specifying /HOTFILE_LIMIT=n on the command line.

To display only the hot file statistics section of the report, use the following qualifier:

```
/INCLUDE=HOTFILE_STATISTICS
```

To disable the hot file statistics display from the Performance Evaluation Report, use the following qualifier:

```
/INCLUDE=NOHOTFILE_STATISTICS
```

The following example shows the hot file statistics section of the Performance Evaluation report:

```
Performance                          CLUSTER                           Page   1
Evaluation                                                         PA Vx.x
                                                   Wednesday 04-JAN-2006 11:00 to 11:45

  +-----------------------------------------------------------------------+
  | The following table gives a summary of the top  20 hottest files      |
  | as collected for disks with a queue higher than the /HOT_QUEUE value. |
  +-----------------------------------------------------------------------+

IO Rate  %   %     Peak
--------- Ops Ops   Time   Rec
Dev  Avg Peak Rds Spl DD-HH:MM Cnt     File spec
--- ---- ---- --- --- -------- --- -----------------------------------------
BORDEAUX  ($3$DUA29)
 1   2    3     4   5     6      7           8
    0.03 0.03   0  33  4-11:46   1 [VAXMAN.OSF] PROJECT_PLAN.TXT;5
    0.02 0.02   0  50  4-11:46   1  (40672,3,0)
    0.01 0.02 100   0  4-11:44   2 [VAXMAN.REMINDER] WRK.DIR;1
    0.01 0.01 100   0  4-11:46   1 [LANGELO] CIRRUS_ROM.DIR;1
       .    .   .   .        .   .       .
       .    .   .   .        .   .       .
       .    .   .   .        .   .       .
ZINFANDEL  ($3$DUA30)
    3.25 3.42  55   0  4-11:44   2  (Non Virtual QIO)
    0.03 0.03  40   0  4-11:46   2 [DECPS.DATABASE] PSDC$YQUEM_1991OCT04.CPD;1
    0.02 0.03 100  50  4-11:44   2 [DECPS.DATABASE] PSDC$SCHEDULE.DAT;1
    0.02 0.02 100   0  4-11:44   1 [DECPS] DATABASE.DIR;1
```

The following statements are keyed to the columns in the previous example:

1. The disk device and volume name.
2. The average I/O rate, in I/O operations per second, for the intervals of time when the file is “hot.”

3. The peak I/O rate, in I/O operations per second, for the interval record when the file is "hottest."
4. The percentage of I/O activity devoted to file READs.
5. The percentage of I/O activity where a split I/O operation occurred.
6. The interval time for the peak file activity. The hours and minutes are preceded by the day of the month. In this case, 4--11:46 represents October 4 at 11:46 a.m. Because this report can span multiple days, the Performance Manager reports the day as well as the time in this field.
7. The record count indicates the number of Performance data records during the reporting period in which the file is "hot."
8. The file specification for the hot file. If the file is deleted before the Performance Manager detects its specification, the FID is provided in parentheses instead of its name. All non-virtual QIO activity to the disk is reported under the filespec "(Non Virtual QIO)."

Interpret cluster-wide Summary Statistics

In the Performance Evaluation Report, the summary statistics follow the cluster-wide hot file statistics. The summary statistics highlight the CPU and memory utilization for the configuration.

To display only the summary statistics section of the report, use the following qualifier:

```
/INCLUDE=SUMMARY_STATISTICS
```

To disable the summary statistics display from the report, use this qualifier:

```
/INCLUDE=NOSUMMARY_STATISTICS
```

The following example shows the summary statistics section of the Performance Evaluation report:

```
Performance                          CLUSTER                           Page   1
Evaluation                                                           PA Vx.x
                                        Tuesday 26-JAN-2006 09:00 to 10:00


  +-----------------------------------------------------------------------+
  | The following table gives a summary of the average CPU and MEMORY     |
  | utilization, and average number of jobs by type for each node.        |
  +-----------------------------------------------------------------------+

Average number of processes
                                  CPU     MEM    ---------------------------
Node        Hardware Type        %Util   %Util   Intractv Batch Netwrk Detach
------   ---------------------   -----   -----   -------- ----- ------ ------
  1          2                     3       4         5       6      7     8
LATOUR   VAX 8700                 29.4    50.3      35.38  0.16   4.13  40.02
 YQUEM   VAX 6000-440             32.4    62.6     115.05  3.00   6.34  41.00
 GALLO   VAX 8700                 27.9    85.1      30.66  1.00   4.48  56.01


User Command: ADVISE PERF REPORT PERF/BEG=26-JAN-2006 09:00:00.00/END=26-JAN-2006 -
10:00:00.00/INCLUDE=SUMMARY/OUT=EXAMPLE_3_13.INFO
                            9
```

The following statements are keyed to the previous example:

1. Node name.
2. Type of processor. LATOUR is a VAX 8700, YQUEM is a VAX 6000-400, and GALLO is a VAX 8700.
3. Average percentage of time that each node's CPU was used during the reporting time period. On an SMP system, all active processors are considered when computing this value.
4. Average percentage of each node's memory that was used during the reporting time period.
5. Average number of interactive jobs, by node, during the reporting period.
6. Average number of batch jobs, by node, during the reporting period.
7. Average number of network jobs, by node, during the reporting period.
8. Average number of detached jobs, by node, during the reporting period.
9. Command line used to generate the requested report.

Histograms

Histograms provide a chronological view of the CPU, memory, disk, and terminal I/O use for each node, as well as node status information. Select histograms by specifying the HISTOGRAM option in the command line as follows:

```
$ ADVISE PERFORMANCE REPORT HISTOGRAMS
```

The data in histograms shows how the system is being used during the specified time interval. A shorter reporting period alters the scale of the histograms, providing finer resolution. This information helps you double-check some of the conclusions reached by the Performance Manager, including CPU and memory limitations.

Image Residence Histograms

You can also plot the residence time for a specified interactive image. The residence time is the time, in seconds, between image activation and image termination. This information can help you track images that consume a fixed amount of resources, such as a database update. Changes in the affect the residence time of jobs that use a fixed amount of resources.

In the CPU Utilization histogram, interrupts (designated by "X") used approximately 5 percent of the CPU, interactive jobs used 10 percent of the CPU, and batch jobs used 85 percent of CPU at approximately 11:30 a.m. on October 1, 2007.

An asterisk (*) appears in the histogram if there is a discrepancy between the total CPU utilization and the utilization accounted for by processes. This can happen if the image activation rate is high and the Performance Agent cannot capture all of the image activity.

CPU Utilization Histogram

The following example shows a CPU Utilization histogram:

```
Histograms                      DEMAND (VAX 8700)                       Page   1
                                                                         PA Vx.x
Wednesday 01-OCT-2007 00:00 to 12:16

                                                       *--------------------*
                                                       |    Legend: 1       |
                                                       |                    |
                                                       | D  DECnet jobs     |
                                                       | I  interactive     |
                                                       | B  batch           |
                                                       | O  overhead        |
                                                       |    (swapper+netacp)|
                                                       | X  intrupt & mpsync|
                       CPU utilization                 | *  other           |
%used 2                  ---------------               *--------------------*
100 !                                           BBB
 95 !                                           BBB                       B
 90 ! D                                         BBB                       B
 85 ! BB                                        BBB                      BB
 80 ! BB                                        BBB                      BB
 75 ! BB                                        BBB                  B  BBB
 70 ! BB                                        BBB                  B  BBBB
 65 ! BB                                        BBB                  B  BBBB
 60 ! BB                                        BBB                  B  BBBB
 55 ! BB                                        BBB                  B  BBBB
 50 ! BBB                                       BBB                  B  BBBB
 45 ! BBB                                       BBB                  B  BBBB
 40 ! BBBB                                      BBB               II B  BBBB
 35 ! IBBB BB                                  BBBB               II BB BBBI
 30 ! IBBBBBB                                  BBBB               II BB BBBII
 25 ! IBBBBBB                                  BBBB             I II BBBBBBII
 20 ! IBBIBBB                                  BBBB            IIIIIBIIIIBBIII
 15 ! IBIIBBB                            B     BBBB        I   IIIIIIIIIIBIIII
 10 ! IIIIIIIB                           B     BBBB     IIIII IIIIIIIIIIIIIII
  5 ! XXXXXXXB     B   B     B     B     B     XIBXI IXXXXXXXXXXXXXXXXXXXXXXXX
! -----01----02----03----04----05----06----07---08----09----10----11----12
                                                                         3
   Each Column represents approximately 10 minutes starting from
   1-OCT 00:00:00 to 1-OCT 12:16:44.  An "N" indicates NO DATA.
```

The following statements are keyed to the CPU Utilization histogram example:

1. Explanatory list of symbols in the histogram columns.
2. Percentage of CPU time used by categories of processes and system overhead.
3. Number of hours spanned by the reporting period. This histogram reflects a reporting period of 12 hours.

Physical Memory Use Histogram

The following example shows a physical memory use histogram:

```
Histograms                      DEMAND (VAX 8700)                       Page   6
                                                                         PA Vx.x
                                                   Tuesday 06-SEP-2005 00:00 to 23:59


                                                      *------------------*
                                                      |    Legend: 1     |
                                                      |                  |
                                                      | m Modified List  |
                                                      | . Free List      |
                                                      | u User Ws        |
                                                      | s Tot Wss For All|
                                                      |   'System' Users |
                         PHYSICAL MEMORY USAGE        | v VMS Allocated  |
% of memory  2           --------------------         *------------------*
100 ! ...........................................u............................
 95 ! ..................................uuuuuuuuuu..uuu.......................
 90 ! ................................uuuuuuuuuuuuuuuuu.......................
 85 ! ..............................uuuuuuuuuuuuuuuuuuuu......................
 80 ! ..............................uuuuuuuuuuuuuuuuuuuuu.....................
 75 ! ..............................uuuuuuuuuuuuuuuuuuuuu.....................
 70 ! .............................uuuuuuuuuuuuuuuuuuuuuuu....................
 65 ! ............................uuuuuuuuuuuuuuuuuuuuuuuuuuuuu...............
 60 ! ...........................uuuuuuuuuuuuuuuuuuuuuuuuuuuuuu...............
 55 ! ..........................uuuuuuuuuuuuuuuuuuuuuuuuuuuuuuu...............
 50 ! .........................uuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuu...............
 45 ! ........................uuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuu.............
 40 ! ..............uu.......uuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuu............
 35 ! u....uuuuuuuuussuuuuuuuuuuuussssssssssssssssuuuuuuuuuuuuussuuuuuuuuuuuuu
 30 ! ssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
 25 ! vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
 20 ! vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
 15 ! vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
 10 ! vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
  5 ! vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
    ! ---01-02-03-04-05-06-07-08-09-10-11-12-13-14-15-16-17-18-19-20-21-22-23-
                                                                            3
        Each Column represents approximately 20 minutes starting from
        6-SEP 00:00:00 to  6-SEP 23:59:00.  An "N" indicates NO DATA.
```

The following statements are keyed to the columns in the previous example:

1. Explanatory list of units in the histogram columns.
2. Percentage of memory used.
3. Number of hours spanned by the reporting period. This histogram reflects a reporting period of 24 hours.

Disk I/O Per Second Histogram

The following example shows a disk I/O per second histogram:

```
Histograms                       DEMAND (VAX 8700)                       Page   7
         PA Vx.x
                                                   Tuesday 06-SEP-2005 00:00 to 23:59

                                                            *---------------*
                                                            |    Legend: 1  |
                                                            |               |
                                                            | * user io     |
                              DISK I/O PER SECOND           | P pag+swping  |
IOs per sec  2                -------------------           *---------------*
150 !
145 !
100 !
 95 !
 90 !
 85 !
 80 !
 75 !
 70 !
 65 !
 60 !
 55 !
 50 !
 45 !
 40 !
 35 !                                   **
 30 !                                   **
 25 !       *                           **   * **
 20 !       *                       ****PP** * **  *  *
 15 !       *                  *  * ****PP***P*P**** *****
 10 !       P*                 *****PP*PPPPP*PPPPPPP*PPPP** *** *
  5 ! *P*P**PPPP****P**PP*PPP*PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP*P**PP*PPPP
    ! ---01-02-03-04-05-06-07-08-09-10-11-12-13-14-15-16-17-18-19-20-21-22-23-
                                                                          3
        Each Column represents approximately 20 minutes starting from
        6-SEP 00:00:00 to  6-SEP 23:59:00.  An "N" indicates NO DATA.
```

The following statements are keyed to the previous example:

1. Explanatory list of units in the histogram columns.
2. The number of disk I/Os per second attributable to either user I/O or paging and swapping.
3. Number of hours spanned by the reporting period. This histogram reflects a reporting period of 24 hours.

Terminal I/O Per Second Histogram

The following example shows a terminal I/O per second histogram:

```
Histograms                      DEMAND (VAX 8700)                       Page   8
PA Vx.x
                                                   Tuesday 06-SEP-2005 00:00 to 23:59
                                                            *---------------*
                                                            |    Legend: 1  |
                                                            |               |
                                                            |  L = LTx      |
                                                            |  T = TTx      |
                                                            |  X = TXx      |
                                                            |  V = NVx      |
                                                            |  W = WTx/TWx  |
                             TERMINAL I/O PER SECOND        |  R = RTx      |
IOs per sec  2               -----------------------        *---------------*
100 !
 95 !
 90 !
 85 !
 80 !
 75 !
 70 !
 65 !
 60 !
 55 !
 50 !
 45 !
 40 !                                    L
 35 !                                    L
 30 !                                  L LL
 25 !                               L  L LL    L    LL
 20 !                            L LLLLL RLLL  LLLL LL L  L
 15 !                           LLLLLLLLLRLLLLLLLLLLLLLL LL
 10 !                         LLLLLLLLLLLRLLLLLRLLLLLLLLLLLL
  5 !                 LLLLLLLLRLLRLLLLLLLRLLLLLRRLRLLLLRLLLLLLLLLLLLLL   LL
    ! ---01-02-03-04-05-06-07-08-09-10-11-12-13-14-15-16-17-18-19-20-21-22-23-
                                                                            3
        Each Column represents approximately 20 minutes starting from
        6-SEP 00:00:00 to  6-SEP 23:59:00.  An "N" indicates NO DATA.
```

The following statements are keyed to the columns in the previous example:

1. Explanatory list of units in the histogram columns.
2. The number of terminal I/Os per second.
3. Number of hours spanned by the reporting period. This histogram reflects a reporting period of 24 hours.

System Uptime Chart Histogram

The following example shows a system uptime chart histogram:

```
Histograms                           CLUSTER                           Page  13
PA Vx.x
                                                              Tuesday 06-SEP-2005 00:00 to 23:59




+-------------------------------------------------------------------------+
| The following chart presents the status of each node in the cluster     |
| over the report time period.                                            |
+-----------------------------------------+      Legend: 1               |
                                          |                               |
                                          | "."  Node up with data        |
                                          | "n"  Node up (no data wanted) |
                                          | "N"  Node up (no data found)  |
                                          | "d"  Node down                |
                                          | "u"  unknown (and no data)    |
                                          +-------------------------------+
  2
DEMAND |.......................................................................
 TWIST |.......................................................................
OLIVER |.......................................................................
       |---01-02-03-04-05-06-07-08-09-10-11-12-13-14-15-16-17-18-19-20-21-22-23
                                                                              3
          Each Column represents approximately 20 minutes starting from
          6-SEP 00:00:00 to  6-SEP 23:59:00.
```

The following statements are keyed to the columns in the previous example:

1. Explanatory node status.
2. List of node names in the cluster.
3. Number of hours spanned by the reporting period. This histogram reflects a reporting period of 24 hours.

Combined CPU Usage Chart Histogram

The following example shows a combined CPU usage chart histogram:

```
Histograms                           CLUSTER                            Page  17
PA Vx.x
                                                   Friday 18-SEP-2005 00:00 to 23:59

                                            *-----------------------------------*
                                            |              Legend: 1            |
                                            |                                   |
                                            |   a = SUPPLY      b = DEMAND      |
                                            |   c = NODE01                      |
                                            |   O = Cluster Utilization         |
                 COMBINED CPU USAGE CHART   |       (Scaled by CPU speed)       |
% utilized  2    ------------------------   *-----------------------------------*
100 !
.
.
.
 70 !
 65 !                                                aa
 60 !                                 aa            a..a
 55 !                                a..3           ....
 50 !                                ...           a....a
 45 !                               a...a         a......
 40 !                               .....         .......
 35 !                              a.....a       a.......a
 30 !                 aaaaa        .......      a.........
 25 ! aaaaaaaaaaaaaaaa.....aaaaa aa.......a   aa..........a
 20 ! ..........................a.....OOOO.  a............
 15 ! ...OOOO.......................OO....OOaOOOOOOOOOOOO..a        c
 10 ! ..O....O...............OOOOOOO........O............OO.aaaaaOOOa  O 4
  5 ! OO bbbbbOOOOOOOOOOOOOOObbbbbbbbbbbbb...bbbbb..bbbbbb.OOOOOObbbO   OO OOO
  0 !         bbbbbbbbcccccbb             bbb     bb      bbbb            O
    ! ---01-02-03-04-05-06-07-08-09-10-11-12-13-14-15-16-17-18-19-20-21-22-23-
                                                                             5
        Each Column represents approximately 20 minutes starting from
        18-SEP 00:00:00 to 18-SEP 23:59:00.  An "N" indicates NO DATA.
```

The following statements are keyed to the previous example:

1. Explanatory list of symbols in the histogram columns.
2. Percentage utilizations of the most- and least-used nodes in a cluster for a requested period.
3. Imbalance in cluster-wide CPU use (represented by periods).
4. cluster-wide averages (designated by *O*) for all of the nodes included in the report. *O*s print on top of all other symbols when coincident with another legal symbol.
5. Number of hours spanned by the reporting period. This histogram reflects a reporting period of 24 hours.

Tabular Report Sections

The Tabular Report provides statistics summarized by classes of metrics. These classes include CPU, DISK, IO, LOCK, MEMORY, PAGING, PROCESS, SCS, and CACHE. The report classes are accessed by using the SECTION qualifier.

The sections include the following classes:

- Configuration Section

  Overview section listing node, collection interval and reporting interval information

- Summary Section

  Presents classes CPU, IO, LOCK, MEMORY, PAGING, SCS, and CACHE.

- Disk Section

  Presents the DISK metrics class.

- Process Section and Extended Process Section

  Presents the PROCESS metrics class.

Because the Tabular Process Metrics displays the information by PID, IMAGENAME, PROCESSNAME, ACCOUNT, and USERNAME, you must specify all these key levels when selecting data in either command mode or via the DECwindows interface.

The Tabular report can be requested in either a final form, which presents the data summarized over the entire reporting period specified, or in an interval form, which presents a series of sub-reports for the reporting interval specified. For example, if the overall time period indicated by the /BEGIN and /END qualifiers is one hour, and the /INTERVAL qualifier is used with a value of 600 seconds, each requested report section is produced 6 times, summarizing successive 10 minute periods.

The Interval reports (all sections) are available from the DCL command line interface. Command mode does not provide access to the Interval reports. The DECwindows Motif interface allows viewing of interval data with the exception of the Process Section.

Examples of final tabular reports are shown in the following sections.

To display the Tabular Report, specify the ADVISE PERFORMANCE REPORT TABULAR command.

System Configuration Data

The following example shows a tabular report with system configuration data:

```
Tabular Report                          YQUEM (VAX 6000-440)                                Page   1
PA Vx.x
Tuesday 26-JAN-2006 09:00 to 10:00


+------------------------------------- VAX VMS System Configuration ------------------------------------+
!                                                                                                        !
! Node : YQUEM                                                                                           !
! Data collection started : 26-JAN-2006 09:00:00.00                                                      !
! Data collection ended :   26-JAN-2006 09:02:00.00                                                      !
! Sample interval :       120 seconds /      2.0 minutes                                                 !
! Report generated :        12-FEB-2006 17:08:14.35                                                      !
! Processor type is : VAX 6000-440                                                                       !
! Running VMS version V5.4-3                                                                             !
! Total memory :  524288 pages = 256.00 MB                                                               !
! Non-paged memory =   70012 pages (13.4 % of total memory)                                              !
! Paged memory =  454276 pages (86.6 % of total memory)                                                  !
! System working set =  16384 pages ( 3.6 % of paged memory)                                             !
! User memory (paged-system working set) =  437892 pages (96.4 %of paged memory : 83.5 %of total memory) !
!                                                                                                        !
+--------------------------------------------------------------------------------------------------------+
```

System configuration data consists of the following items:

No**de**

The name of the node for which the system configuration data has been gathered.

Data collection started

The date/time data collections were started.

Data collection ended

The date/time of the last record in the log file.

Example interval

The interval at which data is collected, also referred to as the collection interval. The collection interval is expressed in seconds and minutes. Data is collected during each interval and written to the log file at the specified intervals.

Report generated

The time when the report was generated.

Processor type is

The VAX processor type, for example, 6000-440.

Running OpenVMS version

The current version of OpenVMS.

Total memory

The total physical memory used by the OpenVMS operating system in pages and in megabytes. This is the smaller of the actual physical memory on the system and the system parameter PHYSICALPAGES.

For Integrity and Alpha systems, memory figures are presented as pagelets (512 bytes).

Nonpaged memory

The difference between the amount of total memory and paged memory:

(total memory)-(paged memory)

expressed in pages and as a percentage of total memory. It includes the PFN database, nonpaged executive code and data, nonpaged pool, and the system header. If the system parameters POOLPAGING or SYSPAGING are set to zero, then the paged pool or paged system pages, which are normally paged in the system working set, are instead allocated as nonpaged memory.

Paged memory

The total paged memory is expressed in pages and as a percentage of total memory and is represented by the PFN database. This memory is consumed by the user working sets, the system working set, and the page cache (free and modified page lists).

System working set

The number of pages set by the system parameter SYSMWCNT is expressed in pages and as a percentage of paged memory.

User memory

The difference between the amount of paged memory and the system working set:

```
(paged memory) - (system working set)
```

These are expressed in pages and as percentages of both paged and total memory. It represents the memory available for user working sets and the free and modified page lists.

Summary Statistics Sections

The following example shows the Summary Statistics sections:

```
Tabular Report                                       YQUEM (VAX 6000-440)                                       Page   1
PA Vx.x
Tuesday 26-JAN-2006 09:00 to 10:00

************************                       Node: YQUEM      Final Statistics                           ***********************
************************     Data Analyzed: from  26-JAN-2006 09:00:00.00  to  26-JAN-2006 10:00:00.00     ***********************

+--- Avg Process-Memory Counts ---+------- Memory Utilization -------+- Avg Mem/CPU -+------------- Swapper Counts --------------+
!                                 !                                  !    Queues     !                                           !
!  Proc    Balset    Free    Modify !  Total    Paged   User    Modify !               !                   Header  Header  Swapper  !
!  Count    Count    Pages    Pages !  MEMutl  MEMutl  MEMutl  MEMutl  !  Mem     CPU  !  InSWP   OutSWP  InSWP   OutSWP   CPU %   !
! ------  ------  -------  ------ !  ------  ------  ------  ------  ! -----   ----- !  ------  ------  ------  ------  ------   !
!    164     162   180700   15491 !  65.5 %  56.6 %  58.7 %   3.5 % !     0       0 !       0       0       0       0   0.0 %  !
+---------------------------------+----------------------------------+---------------+-------------------------------------------+

+---------------------------- CPU Statistics -------------------------+------------------+
!  CPU   Total   MP     Inter                                          !                  !
!   ID    Idle  Synch   Stack   Kernel   Exec   Super    User   Compat !  System   Task   !
!  ---  ------  ------  ------  ------  ------  ------  ------  ------ !  ------  ------  !
!    1  64.4 %   0.7 %  18.7 %   2.7 %   0.9 %   0.0 %  12.7 %   0.0 % !   22.9 %  12.7 % !
!    4  70.3 %   2.9 %   0.7 %  11.1 %   2.9 %   0.0 %  12.2 %   0.0 % !   17.5 %  12.2 % !
!    5  68.4 %   3.0 %   0.7 %  12.0 %   3.0 %   0.1 %  12.9 %   0.0 % !   18.6 %  12.9 % !
!    6  67.3 %   2.9 %   0.7 %  11.8 %   3.3 %   0.1 %  14.0 %   0.0 % !   18.7 %  14.0 % !
+---------------------------------------------------------------------+------------------+

+-------- Lost CPU --------+----------- CPU and I/O Overlap ----------+
!                    Page  !                                         !
!   Page    Swap   or Swp  !  CPU+IO   CPU     I/O     Multi   CPU+IO !
!   Wait    Wait    Wait   !   Idle    Only    Only    I/O      Busy  !
!  ------  ------  ------  !  ------  ------  ------  ------  ------  !
!    3.4 %   0.0 %   3.5 % !    0.0 %   0.0 %  64.3 %  82.5 %  35.7 % !
+--------------------------+-----------------------------------------+
```

```
+--------------------------------------- Paging Rates (per second) ----------------------+      +----------------+
!                                                                                        !      !                !
!  Page   System   Pages   Read    Pages   Write   Free   Modify  Dzero   Gvalid  WritIn !      !  Hard   Soft   !
! Faults  Faults   Read    I/Os   Writen   I/Os    List    List   Faults  Faults   Prog  !      ! Faults  Faults !
! ------  ------  ------  ------  ------  ------  ------  ------  ------  ------  ------ !      ! ------  ------ !
!   69.0     0.0    13.6     1.1     0.4     0.0     9.8    15.3    23.3    19.4     0.0 !      !   1.7 %  98.3 %!
+----------------------------------------------------------------------------------------+      +----------------+

+--------- I/O Rates (per second) ---------+              +------ File I/O Rates (per second) -----+              +----------+
!                                          !              !                                        !              !   AVE    !
!  Direct  Buffrd  Lognam  Mailbx  Mailbx  !              ! Window  Window   Split   Erase   File  !              !   Open   !
!   I/Os    I/Os    Trans   Reads  Writes  !              !  Hits    Turns   I/Os    I/Os   Opens  !              !   Files  !
!  ------  ------  ------  ------  ------  !              ! ------  ------  ------  ------  ------ !              !  ------  !
!    27.3    86.6    22.7    13.3    13.3  !              !   26.4     1.0     0.4     0.0     0.8 !              !   990.2  !
+------------------------------------------+              +----------------------------------------+              +----------+
```

```
Tabular Report                                          YQUEM (VAX 6000-440)                                    Page   2
PA Vx.x
Tuesday 26-JAN-2006 09:00 to 10:00


+---------- File Cache Attempt Rate (per second) ----------+         +----------------- File cache Effectivness ----------------+
!                                                           !         !                                                          !
!    Dir     Dir            File    File             Bit    !         !    Dir     Dir            File    File             Bit   !
!    FCB     Data    Quota   Id      Hdr     Extent   Map    !         !    FCB     Data    Quota   Id      Hdr     Extent   Map   !
!  ------  ------  ------  ------  ------  ------  ------   !         !  ------  ------  ------  ------  ------  ------  ------   !
!     1.7     4.8     0.1     0.1     2.9     0.5     0.1   !         !  98.9 %  94.2 %  40.0 %  99.8 %  90.9 %  96.1 %  28.2 % !
+-----------------------------------------------------------+         +----------------------------------------------------------+

+------------------------------------ Lock Rates (per second) ----------------------------------+
!                                                                                                !
!                                                                   Directory        Deadlock    !
!    New ENQ      Converted ENQ        DEQ         Blocking AST     Functions        Messages    !
! -------------   -------------   -------------   -------------   -------------   ------------- !
!  Local    29.4    Local    10.4    Local    7.1    Local    27.0                                 !
!     In    15.1       In     9.1       In   29.2       In    10.4       In     7.1      In    0.0 !
!    Out     0.0      Out     0.0      Out    2.5      Out     2.5      Out     0.0     Out    0.0 !
+------------------------------------------------------------------------------------------------+

+---------------- Lock Counts ---------------+
!                                            !
! ENQ     ENQ    Dlock   Dlock   Total  Total !
! Wait   NotQD   Search  Find    Locks  Resrcs!
!------  ------  ------  ------  ------  ------!
!   697     865       1       0   17745   13322!
+--------------------------------------------+

+--------------------------------------- System Communication Service Rates (per second) ----------------------------------------+
!                                                                                                                                 !
!                    Data G   Data G   Data G   Msgs     Msgs     Snd Cr   Send     K Byte   Reqst    K Byte   K Byte   Buf Dsc  !
!   Node Name        Sent     Recvd    Discd    Sent     Recvd    Queued   Data     Sent     Data     Reqd     Mapd     Queued   !
!   ---------        ------   ------   ------   ------   ------   ------   ------   ------   ------   ------   ------   ------   !
!   YQUEM               0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0  !
!   BLUE                0.0      0.0      0.0      7.9      7.9      0.0      0.0      0.0      0.0      0.0     34.4      0.0  !
!   LATOUR              0.0      0.0      0.0     22.3     28.8      0.0      0.0      0.0      0.0      0.0      0.0      0.0  !
!   GALLO               0.0      0.0      0.0     23.5     23.1      0.0      0.0      0.0      0.0      0.0      0.0      0.0  !
!   ERNEST              0.0      0.0      0.0     15.0     15.0      0.0      0.0      0.0      0.0      0.0     31.1      0.0  !
!   NUN                 0.0      0.0      0.0      0.1      0.2      0.0      0.0      0.0      0.0      0.0      0.0      0.0  !
!   JULIO               0.0      0.0      0.0      5.8      5.8      0.0      0.0      0.0      0.0      0.0     12.8      0.0  !
+---------------------------------------------------------------------------------------------------------------------------------+


User Command: ADVISE PERF REPORT TAB/SECT=SUMM/NODE=YQUEM/BEG=26-JAN-2006 09:00:00.00/END=26-JAN-2006 10:00:00.00/OUT=TAB_SUM.YQUEM
```

Avg Process-Memory Counts

Average memory statistics provide page, process, and cache information. These metrics are collected from OpenVMS performance statistics.

Proc Count

The number of processes in the system (including SWAPPER).

Balset Count

The number of processes resident in the balance set.

Free Pages

The free page list size that is based upon the average number of pages in the free list for the reporting interval.

Modify Pages

The modified page list size that represents the average number of modified pages for the reporting interval.

Memory Utilization

This section reports memory utilization for the reporting interval.

Total MEMutl

The percentage of total available memory that is being utilized, computed as (total system memory - free pages) / (Total Memory).

Paged MEMutl

The percentage of pageable memory utilized in the interval, computed as (paged memory - free pages) / (Paged Memory).

User MEMutl

The percentage of user memory being utilized in the interval, computed as (user memory - free pages) / (User Memory).

Modify MEMutl

The percentage of modified memory being utilized, computed as (modify pages) / (user memory).

Avg Mem/CPU Queues

This section reports the number of times processes were waiting for memory or CPU.

Mem

The average number of processes waiting for available memory. Equivalent to the count of processes in the computable outswapped queue (COMO).

CPU

The average number of processes waiting for the CPU. There is a queue if this number is greater than one (1) (the process that would have run in absence of the Performance collection process). Equivalent to the sum of processes in the computable queue (COM).

Swapper Counts

This section reports the metrics of the swapper process.

InSWP

The number of process inswaps performed during the reporting interval.

OutSWP

The number of process outswaps performed during the reporting interval.

Header

The number of process headers swapped in during the reporting interval.

Header OutSWP

The number of process headers swapped out during the reporting interval. A process body may be swapped out without outswapping the corresponding header.

Swapper CPU %

The percentage of CPU time used by the SWAPPER process. This includes time for swapping, modified page writing, and process working set trimming activities. Also some of the swapper activity may be reported as MP_SYNCH time.

CPU Statistics

In a multiprocessor system, the statistics for the additional processors are included for the following metrics:

CPU ID

A unique number distinguishing one processor from another.

Total Idle

The percentage of time that the CPU was idle.

MP_SYNCH Wait

The time a CPU spends waiting to acquire a spinlock in kernel mode. This metric is always 0 on a single processor system.

Inter Stack

Percentage of CPU time spent executing on the interrupt stack.

Kernel

Percentage of CPU time spent executing in kernel mode (for example, while in the OpenVMS executive) but not on the interrupt stack.

Exec

Percentage of time the CPU spent executing in executive mode. For example, RMS is usually executed in executive mode.

Super

Percentage of time the CPU spent executing in supervisor mode. For example, DCL normally executes in supervisor mode.

User

Percentage of time the CPU spent executing in user mode.

Compat

Percentage of CPU time spent in (PDP-11) compatibility mode. Not all processors support compatibility mode; hence, in these cases this value is always zero.

System

Computed as the sum of the interrupt, busy wait, kernel, and executive CPU Busy percentages. This metric represents the amount of CPU time the system uses to keep itself running and can be thought of as overhead.

Task

Computed as the sum of the supervisor, user, and compatibility mode busy percentages. This metric represents the amount of CPU time the system uses to perform work.

Lost CPU

This section reports occurrences of the CPU's inability to execute because of some memory limitation.

Page Wait

Percentage of time that the CPU was idle and at least one disk device had paging I/O in progress. In a multiprocessor system, all CPUs must be idle.

Swap Wait

Percentage of time that the CPU was idle and at least one disk device had swapping I/O in progress. This includes both swapping and modified page writing. In a multiprocessor system, both CPUs must be idle.

Page or Swp Wait

Percentage of time that the CPU was idle and at least one disk device had either page I/O or swap I/O in progress. In a multiprocessor system, both CPUs must be idle. Page and swap data is based on statistics Performance collects at 100-millisecond intervals from I/Os waiting to be processed.

CPU and I/O Overlap

This section reports the CPU and I/O overlap statistics collected by the PSDCTIMER.EXE timer driver.

CPU+IO Idle

The percentage of time that the CPU and all disk devices were idle.

CPU Only

The percentage of time (non-overlapped CPU time) that a CPU was busy, and no disk device was busy.

I/O Only

The percentage of time that the CPU or all CPUs in a multiprocessor system were idle and at least one disk device

Multi I/O

The percentage of time that two or more of the disk devices were busy.

CPU+IO Busy

The percentage of time (overlapped CPU and I/O time) that both the CPU (at least one CPU in a multiprocessor system)and at least one disk device were busy.

Note: CPU and I/O overlap statistics are not available if the PSDCTIMER.EXE driver was not loaded when data was collected.

Paging Rates

This section reports paging subsystem or memory management metrics. This data is collected from OpenVMS performance statistics.

Page Faults

The total number of page faults per second (both hard and soft) during the reporting interval. This includes system faults.

System Faults

The number of page faults incurred in system space per second during the reporting interval. The following are examples of system components that are pageable in system space: XQP caches, logical name tables, process page tables, global page table, and some OpenVMS executive code, for example, RMS. System Fault is a special designation for a page fault, in addition to the types of faults described below.

Pages Read

The number of pages read per second to resolve page faults during the reporting interval. Note that this may be from a page file, an image file, or a file-backed global section.

Read I/Os

The number of page read I/O operations per second during the reporting interval.

Pages Written

The number of pages written per second to disk during the reporting interval, including pages written to the swapping file, to mapped image sections, and to the paging file for modified page writing. Not included are pages written to user files (RMS).

Write I/Os

The number of page write I/O operations per second during the reporting interval.

Free List

The number of page faults per second resolved from the free list during the reporting interval.

Modify List

The number of page faults per second resolved from the modified list during the reporting interval.

Dzero Faults

The number of page faults per second resolved as demand zero pages during the reporting interval.

Gvalid Faults

The number of page faults per second resolved as valid global pages (already in memory) during the reporting interval.

WritIn Prog

WritIn Prog faults are the number of page faults per second resolved from pages currently being written to disk.

Hard Faults

The percentage of Page Faults that required a read from disk. This is (read I/Os)/(page faults) expressed as a percentage.

Soft Faults

The percentage of page faults that were resolved from memory, that is, without reading from disk. This is equal to (100 - hard faults) percent.

I/O Rates

This section describes the I/O subsystem collected from OpenVMS performance data.

Direct I/Os

The number of direct I/O operations performed per second during the reporting interval, exclusive of page and swap I/O. This system-wide statistic is also exclusive of I/O to mapped image sections, but includes RMS I/O.

Buffrd I/Os

The number of buffered I/O operations system-wide, performed per second during the reporting interval.

Lognam Trans

The number of logical name translations system-wide, performed per second during the reporting interval.

Mailbx Reads

The number of mailbox reads system-wide, performed per second during the reporting interval.

Mailbx Write

The number of mailbox writes performed per second during the reporting interval.

File I/O Rates

This section reports file system metrics (XQP) collected from OpenVMS performance statistics.

Window Hits

The number of times the executive I/O subsystem successfully maps a virtual to logical segment, without needing to invoke XQP services.

Window Turns

The number of times the XQP updates the Window Control Block (WCB). Window turns occur when the executive I/O subsystem fails to map a virtual-to-logical segment using the current contents of the Window Control Block (WCB). The XQP updates the WCB with virtual-to-logical mapping information by reading a new portion of the file's header from disk or cache and reissues the I/O transfer. A large number of window turns usually indicate that a file or volume is fragmented. If the WCB is regarded as a cache of file mapping pointers, each window turn indicates a cache miss.

A very large file may cause excess window turns due to its size, even if the file is contiguous. This is because the maximum size of a window control block pointer is 65K blocks. If you encounter this case, you should provide a larger default window size when mounting the disk.

Split I/Os

The number of times the executive must map and queue a segment in a multi-segment request to a driver. A split I/O occurs when the executive I/O subsystem cannot map a single logical I/O request as a single physically contiguous request and must split the logical request into multiple physical segments. Usually Split I/Os result from transfers occurring on fragmented disks.

Erase

The number of disk erase I/O operations per second (for example, when the DCL commands DELETE/ERASE or PURGE/ERASE are used).

File Opens

This is the number of file open requests during the reporting interval.

AVE Open Files

This section reports open files.

AVE Open File

This is the average number of open files on any disk device during the reporting interval.

File Cache Attempt Rate

This section reports the file system cache statistics. System caches hold frequently accessed disk blocks of various types. Blocks in file cache do not require disk I/O; therefore, the use of caches expedites I/O requests.

Dir FCB

The number of attempts per second that were made to find directory file control blocks in the directory cache.

Dir Data

The number of attempts per second that were made to find directory data in the directory cache.

Quota

The number of attempts per second that were made to find entries in the quota cache.

File Id

The number of attempts per second that were made to find file identifiers in the file ID cache.

File Hdr

The number of attempts per second that were made to find file headers in the file header cache.

Extent

The number of attempts per second that were made to find extents in the extent cache.

Bit Map

The number of attempts per second that were made to find entries in the bit map cache.

File Cache Effectiveness

For each item (for example, Dir FCB), the effectiveness is computed as the ratio of (item hits)/(item hits + item misses) expressed as a percentage.

D**ir FCB**

The effectiveness of the directory cache for finding directory file control blocks.

Dir Data

The effectiveness of the directory cache for finding directory data.

Quota

The effectiveness of the quota cache.

File Id

The effectiveness of the file ID cache.

File Hdr

The effectiveness of the file header cache.

Extent

The effectiveness of the extend cache.

Bit Map

The effectiveness of the bit map cache.

Lock Rates

This section reports the lock manager metrics collected from OpenVMS performance statistics. This report contains three columns: Local, In and Out. Each of these columns report rates for a variety of lock manipulation requests, such as New ENQ, Converted ENQ, and DEQ.

Rates for locking information are:

Local

Lock manipulation requests made at the local node for the benefit of that node.

In

Lock manipulation requests coming to the local node from other nodes in a cluster.

Out

Lock manipulation requests being sent from the local node to other nodes in the cluster.

Lock manipulation requests are:

New ENQ

The number of new locks requested (enqueued) per second.

Converted ENQ

The number of lock conversion requests per second.

DEQ

he number of locks released (dequeued) per second.

Blocking AST

The number of blocking ASTs received per second. Use of blocking ASTs allows a process to lock a resource and then release it only when another process requests that resource. When another process requests a lock on the resource, a blocking AST is delivered to the process currently holding the lock.

Directory Functions

The number of messages per second for directory operations. There are three categories: the rate for lookups in a directory, the rate for inserts in a directory, and the rate for deletes from a directory.

Deadlock Messages

The number of messages per second required for deadlock detection.

Lock Counts

This section reports lock statistics. With the exception of the Total Resrcs field, all data is collected from OpenVMS performance statistics.

ENQ Wait

The number of times lock requests were forced to wait.

ENQ NotQD

The number of times a lock request was not granted (process failed to get lock and did not wait).

DLock Search

The number of times a search for deadlocks was initiated by the system. The system parameter, DEADLOCK_WAIT, defines the number of seconds that a lock request must wait before the system initiates a deadlock search on behalf of that lock.

DLock Find

The number of times a deadlock was found. The system selects a victim of the deadlock and does not grant the new lock or lock conversion request.

Total Locks

The total number of locks taken out on all resources. This number is an average of the examples taken at each recording interval over the reporting interval.

Total Resrcs

The total number of resources that can be locked. This number is an average of the examples taken at each recording interval over the reporting interval.

System Communication Service Rates

These statistics are collected from OpenVMS performance statistics for each node in a cluster that was present during the reporting interval. Each line of statistics gives the name of the node that is sending data to, or receiving data from, the local node. There are three types of messages:

- Datagrams
- Block transfers
- Sequenced messages

Datagrams are used primarily by DECnet, the CI, and by the HSC for error logging. The delivery and order of messages is not guaranteed.

For block transfer mode, if I/Os are targeted to disks on an HSC, the Kbytes mapped by the local node are recorded, but not the transfer counts, nor the Kbytes transferred. This is because the HSC actually initiates the block mode transfer.

If I/Os are targeted to disks hosted on an OpenVMS node (MSCP server), the hosting OpenVMS node shows the transfer counts, and Kbytes mapped as I/O that it initiated to satisfy requests for data made by a remote node. This is the only time numbers for transfer counts and Kbytes transferred are reported. The initiator of the transfer is not the node that issues the initial QIO but the node that issues the SCS directive for block mode transfer services to satisfy the I/O request.

Sequenced messages are used by the Distributed Lock and Connection Managers, also implicitly in disk I/O to set up block mode transfers. For sequenced messages SCS imposes its own flow control, and delivery and order of messages is guaranteed.

Data G Sent

Rate (number per second) at which datagrams are sent to the named node by the local node doing the data collection.

Data G Recvd

Rate (number per second) at which datagrams are received from the named node by the local node doing the data collection.

Data G Discd

Rate (number per second) at which datagrams are discarded by the CI port driver because a receive buffer is not available. This is the rate at which datagrams are sent to, but never received by, the named node from the local node doing the data collection.

Msgs Sent

Rate (number per second) at which sequenced messages are sent to the named node by the local node doing the data collection.

Msgs Recvd

Rate (number per second) at which sequenced messages are received from the named node by the local node doing the data collection.

Snd Cr Queued

Metric related to sequenced messages. The number of times that a local node Sysap (system application) had to wait for sufficient “credits” on the target node to become available to complete a transfer. The number of credits is controlled by the system parameter SCSRESPCNT.

Send Data

Metric related to block transfers. The number of times per second that data was written to a remote node using block mode transfers that were initiated by the local node. This field is zero for all other nodes in the list.

K Byte Sent

The amount of information, in Kbytes, written to some remote node using block mode transfers that were initiated by the local node. (Used for block transfers, primarily HSC, MSCP, and Connection Manager transfers.) This field is zero for all other nodes in the list.

A process on a remote node does a QIO read from a disk that is hosted locally. The MSCP server on the local node has to read the data from the local disk, then do an SCS Send Data Directive that initiates a block mode transfer to write that data to the remote node.

Reqst Data

Metric related to block transfers. The number of times per second that data was read from a remote node using block mode transfers that were initiated by the local node. This field is zero for all other nodes in the list.

K Byte Reqd

The amount of information, in Kbytes, read from a remote node using block mode transfers that were initiated by the local node. (Used for block transfers, primarily HSC, MSCP, and Connection Manager transfers.) This field is zero for all other nodes in the list.

A process on a remote node does a QIO write to a disk that is hosted locally. The MSCP server on the local node has to do an SCS Request Data Directive that initiates a block mode transfer to read from the remote node so that it can write that data to the local disk.

K Byte Mapd

The amount of buffer space, in kilobytes, mapped to receive data from or send data to the named node by the local node doing the data collection. Used for block transfers, primarily HSC, MSCP, and Connection Manager transfers.

Buf Dsc Queued

Metric related to block transfers. The number of times that a local node Sysap attempted to map a buffer and there were no free buffer descriptor table (BDT) entries available. The number of BDTs is controlled by the system parameter SCSBUFCNT.

Disk and Server Statistics Section

The following example shows the Disk Statistics Section:

```
Tabular Report                                    YQUEM (VAX 6000-440)                                    Page   1
PA Vx.x
Tuesday 26-JAN-1997 09:00 to 10:00

************************                       Node: YQUEM      Final Statistics                      ***********************
************************    Data Analyzed: from  26-JAN-1997 09:00:00.00  to  26-JAN-1997 10:00:00.00     ***********************

+------------------------------------------------ Disk Statistics ------------------------------------------+
!                        Work                                                 Resp                          !
! Node: YQUEM            Avail  Paging  Swping  Contlr   Rate    Read   Remote  Time   Queue   Space        !
!                         %       %       %       %      (/s)     %      I/O%   (ms)   Length  Used %       !
!                       ------  ------  ------  ------  ------  ------  ------  ------  ------  ------      !
! DSA0                     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0     0.0    95.8       !
! DSA1                     0.0     0.0     0.0     0.0     0.0     0.0     0.0      0     0.0    80.9       !
! DSA10                    2.2     0.0     0.0     2.4     0.7    86.7     0.0     36     0.0    61.1       !
! DSA111                  11.7    26.1     0.0    14.8     4.0    71.8     0.0     34     0.1    98.8       !
! DSA12                    0.6     0.0     0.0     0.5     0.1    79.3     0.0     43     0.0    32.8       !
! DSA29                    0.2     0.0     0.0     0.3     0.1    56.5     0.0     35     0.0    81.8       !
! DSA30                    1.0    34.9     0.0     1.0     0.3    62.4     0.0     39     0.0    99.0       !
! DSA31                    2.1     0.0     0.0     2.9     0.8    57.3     0.0     30     0.0    99.9       !
! DSA32                    1.0     0.0     0.0     0.9     0.2    80.6     0.0     40     0.0    99.3       !
! DSA33                    0.0     0.0     0.0     0.0     0.0    93.3     0.0     28     0.0    85.0       !
! .                          .       .       .       .       .       .       .      .       .       .       !
! .                          .       .       .       .       .       .       .      .       .       .       !
! .                          .       .       .       .       .       .       .      .       .       .       !
! YQUEM$DFSC7101           0.0     0.0     0.0     0.0     0.0     0.0     0.0      0     0.0  Unknown      !
! YQUEM$DFSC7102           0.0     0.0     0.0     0.0     0.0     0.0     0.0      0     0.0  Unknown      !
! YQUEM$DFSC7103           0.0     0.0     0.0     0.0     0.0     0.0     0.0      0     0.0  Unknown      !
! YQUEM$DFSC7104           0.0     0.0     0.0     0.0     0.0     0.0     0.0      0     0.0  Unknown      !
! YQUEM$DFSC7105           0.0     0.0     0.0     0.0     0.0     0.0     0.0      0     0.0  Unknown      !
+-----------------------------------------------------------------------------------------------------------+

User Command: ADVISE PERF REPORT TAB/SECT=DISK/NODE=YQUEM/BEG=26-JAN-1997 09:00:00.00/END=26-JAN-1997 10:00:00.00/OUT=TAB_DISK.YQUEM
```

The following statistics are given for each mounted disk:

Work Avail %

The percentage of time that the disk had any type of I/O request outstanding.

Paging %

The percentage of the Work Avail time that the disk was doing paging I/O (including I/O to and from paging files, image activations or global section writes.

Swping %

The percentage of the Work Avail time that the disk was doing swapping I/O. This includes both swapping and modified page writing.

Contlr %

The percentage of this disk controller's activity that was busy because of this disk.

Rate(/s)

The number of I/O operations per second performed by the disk.

Read %

The percentage of read I/O performed to the disk.

Remote I/O %

The percentage of I/O to a disk performed on behalf of other nodes in a cluster system.

Resp Time (ms)

The response time is the mean time, per I/O request, for the device in milliseconds. This is the total time taken to perform an I/O request and is the sum of the queuing time at the server and the service time. It is measured from the time the I/O request is issued until the time the controller completes the request.

Queue length

The average number of disk I/O requests waiting for service.

Space Used %

The percentage of the total disk volume space that is allocated. Reported only for file structured and mounted disks.

The following example shows the Server Statistics Section:

```
+-------------------- Server Statistics --------------------+
!                    Work                                  !
!                    Avail     Paging    Swaping    Queue   !
!                      %         %         %        Length  !
!                    ------    ------    ------    ------   !
!  ARGOT                0.0       0.0       0.0       0.0   !
!  EXURB                0.0       0.0       0.0       0.0   !
!  GLIA                 0.0       0.0       0.0       0.0   !
!  HSC0                 0.4       0.1       0.0       0.0   !
!  HSC002               0.0       0.0       0.0       0.0   !
!  HSC1                 0.6      10.5       0.0       0.2   !
!  MNGLNG               0.0       0.0       0.0       0.0   !
!  SNOLPD               0.0       0.0       0.0       0.0   !
!  ULTRA                0.0       0.0       0.0       0.0   !
!  VERB                 0.0       0.0       0.0       0.0   !
+-----------------------------------------------------------+
```

The server statistics reported are as follows:

Work Avail %

The percentage of time there were I/O requests at the server queue. Reported only for By Node statistics.

Paging %

The percentage of the work available marked as Page I/O.

Swping %

The percentage of work available marked as Swap I/O.

Queue Length

The average sum of the requests at the server queue.

Process Metrics Data

Process metrics consist of:

- Standard process metrics (with image name)
- Extended process metrics

Standard Process Metrics

The following example shows standard process metrics data. Standard process metrics are collected by the Performance software from process data structures and include these statistics:

PID

The process identification in hexadecimal.

Process Name

The process name.

UIC

The process user identification code.

Pri

The process priority (0 to 31). This is the priority of the process at the time the example is taken.

State

The process scheduling state. This is the state of the process at the time the example is taken. In final tabular statistics, the state of the last interval is reported.

Image Count

The number of images activated by the process during the interval.

CPUtime (min)

The CPU time in minutes accrued by the process during the last reporting interval.

Direct I/O

The number of direct I/O operations issued by the process during the last reporting interval as a rate per second.

Buffrd I/O

The number of buffered I/O operations issued by the process during the last reporting interval as a rate per second.

Page Flts

The number of page faults incurred by the process during the reporting interval as a rate per second.

Flt I/O

The number of page fault I/Os incurred by the process during the reporting interval as a rate per second.

Working Set (MIN/AVE/MAX)

The minimum, average, and maximum working set size for the process during the reporting interval.

Mo

The process mode (IN=Interactive, BA=batch, NE=network, DE=detached).

Image Name

A line containing the image name follows each process-metrics line if the image name was collected and reported. This is the name of the image at the time the example is taken.

```
Tabular Report                                     YQUEM (VAX 6000-440)                                    Page    1
PA Vx.x
Tuesday 26-JAN-1997 09:00 to 10:00

************************                       Node: YQUEM      Final Statistics                      ***********************
************************    Data Analyzed: from  26-JAN-1997 09:00:00.00  to  26-JAN-1997 10:00:00.00     ***********************

+-------------------------------------------------------- Process Metrics ----------------------------------------------------+
!                                                                                                                              !
!                Process                              Image  CPUtime   DirI/O  BufI/O  Pg Flt  FltI/O      Working Set        !
!    PID          Name         UIC          Pri State Count   (min)     /sec    /sec    /sec    /sec    MIN     AVE     MAX  Mo !
! --------   -------------- ------------ ----- ----- ----- --------  ------  ------  ------  ------  ------  ------  ------ -- !
! 29400201  SWAPPER         [1,4]         16/16 HIB       0   0.021     0.0     0.0     0.0     0.0       0       0       0 DE !
!            Swapper                                                                                                           !
! 29400206  CONFIGURE       [1,4]         10/ 8 HIB       0   0.038     0.0     0.0     0.0     0.0     265     265     265 DE !
!           DSA111:[SYS2.SYSCOMMON.][SYSEXE]CONFIGURE                                                                          !
! 29400209  ERRFMT          [1,6]          7/ 7 HIB       0   0.011     0.0     0.0     0.0     0.0     241     241     241 DE !
!           DSA111:[SYS2.SYSCOMMON.][SYSEXE]ERRFMT                                                                             !
! 2940020A  CACHE_SERVER    [1,4]         16/16 HIB       0   0.002     0.0     0.0     0.0     0.0     215     215     215 DE !
!           DSA111:[SYS2.SYSCOMMON.][SYSEXE]FILESERV                                                                           !
!        .         .                                      .       .       .       .       .       .       .       .       .  . !
!        .         .                                      .       .       .       .       .       .       .       .       .  . !
!        .         .                                      .       .       .       .       .       .       .       .       .  . !
!           DSA111:[SYS2.SYSCOMMON.][SYSEXE]LOGINOUT                                                                           !
! 29401EFB  OPERATOR        [1,6]          4/ 4 CUR      12   0.073     0.0     0.1     0.4     0.0     537    1216    1295 IN !
!           DSA111:[SYS2.SYSCOMMON.][SYSEXE]LOGINOUT                                                                           !
! 29401EFC  BHAT_2          [310,57]       4/ 4 CUR       1   0.008     0.0     0.0     0.0     0.0     388     568     571 IN !
!           DSA111:[SYS2.SYSCOMMON.][SYSEXE]COPY                                                                               !
! 29401EFE  DQS_34061       [300,311]      4/ 4 CUR       1   0.010     0.0     0.0     0.1     0.0     403     403     403 NE !
!           DSA111:[SYS2.SYSCOMMON.][SYSEXE]LOGINOUT                                                                           !
+------------------------------------------------------------------------------------------------------------------------------+

User Command: ADVISE PERF REPORT TAB/SECT=PROC/NODE=YQUEM/BEG=26-JAN-1997 09:00:00.00/END=26-JAN-1997 10:00:00.00/OUT=TAB_PROC.YQUEM
```

Extended Process Metrics

The following example shows process metrics data. Extended process metrics include these statistics:

PID

The process identification number in hexadecimal.

User Name

The user name for the process.

Account

The account name for the process.

Globl (MIN/AVE/MAX)

The minimum, average, and maximum number of global pages in use by the process at the reporting interval.

Priv (MIN/AVE/MAX)

The minimum, average, and maximum number of process private pages in use by the process at the reporting interval.

WS Deflt

The working set default value for the process.

WS Quota

The working set quota value for the process.

WS Extnt

The working set extent value for the process.

Virt (MIN/AVE/MAX)

The minimum, average, and maximum virtual page count for the process during the reporting interval.

```
Tabular Report                                          YQUEM (VAX 6000-440)                                          Page    1
PA Vx.x
                                          Tuesday 26-JAN-2006 09:00 to 10:00

************************                        Node: YQUEM      Final Statistics                        ***********************
************************     Data Analyzed: from  26-JAN-2006 09:00:00.00  to  26-JAN-2006 10:00:00.00     ***********************

+---------------------------------------------------- Extended Process Metrics ---------------------------------------------------+
!                                                                                                                                   !
!                                  MIN     AVE     MAX     MIN     AVE     MAX     WS      WS      WS      MIN     AVE     MAX     !
!    PID     User Name    Account  Globl   Globl   Globl   Priv    Priv    Priv    Deflt   Quota   Extnt   Virt    Virt    Virt    !
! -------- ------------ -------- ------  ------  ------  ------  ------  ------  ------  ------  ------  ------  ------  ------  !
! 29400201 SYSTEM                      0       0       0       0       0       0       1       1       1       1       1       1  !
! 29400206 SYSTEM       <start>        0       0       0     265     265     265     512    1636   75000    3403    3403    3403  !
! 29400209 SYSTEM       <start>        0       0       0     241     241     241     512    1636   75000    3145    3145    3145  !
! 2940020A SYSTEM       <start>        0       0       0     215     215     215     512    1636   75000    3004    3004    3004  !
!        .   .            .            .       .       .       .       .       .       .       .       .       .       .       .  !
!        .   .            .            .       .       .       .       .       .       .       .       .       .       .       .  !
!        .   .            .            .       .       .       .       .       .       .       .       .       .       .       .  !
! 2940027E MACNEIL      3YW           70      70      70     377     377     377     818    2048    9216    4938    4938    4938  !
! 2940027F FRIES        341          438     438     438    1816    1816    1816     818    2048   16000   10545   10545   10545  !
! 294002C3 LUNDGREN     341          165     165     165    1319    1342    1348    1024    4096    4096    8216    8323    8344  !
! 294002EC STEPHENS     341           51      51      51     374     374     374     818    2048   12288    6297    6297    6297  !
! 294010E4 BHAT         341          180     509     779    1056    4076    7158     818    2048   10000   14835   21185   21877  !
! 294010E5 RAMAN        341           20     178     193     265    1208    1299     818    2048    9216    4996    9767   10229  !
! 2940115B FRIES        341           53      53      53     360     360     360     818    2048   16000    6222    6222    6222  !
! 29401286 DBIGELOW     341         1472    1472    1472    3399    3425    3446     818    4096    9216   13888   13888   13888  !
!        .   .            .            .       .       .       .       .       .       .       .       .       .       .       .  !
!        .   .            .            .       .       .       .       .       .       .       .       .       .       .       .  !
!        .   .            .            .       .       .       .       .       .       .       .       .       .       .       .  !
! 29401EF9 <login>      <login>       84      84      84     289     289     289     818    8192   75000    3519    3519    3519  !
! 29401EFB OPERATOR     CNB          128     286     306     408     930     989    4096   65536   75000    5236    7239   32389  !
! 29401EFC BHAT         341           58      94      95     330     474     476     818    2048   10000    4996    5609    5618  !
! 29401EFE DQS$SERVER   CNB           58      58      58     345     345     345     818    1636    9216    5580    5580    5580  !
+-----------------------------------------------------------------------------------------------------------------------------------+

User Command: ADVISE PERF REPORT TAB/SECT=EXTEND/NODE=YQUEM/BEG=26-JAN-2006 09:00:00.00/END=26-JAN-2006 10:00:00.00 -
/OUT=TAB_PROC.YQUEM
```

Cluster Summary Statistics (with By Node Breakout)

Tabular cluster reports have two formats: by cluster and by node. The following example shows final statistics by cluster. In both formats, statistics are given for memory, CPU, disks, and locks.

```
Tabular Report                                                CLUSTER                                                Page    1
PA Vx.x
                                         Tuesday 26-JAN-2006 09:00 to 09:20

************************                                 Final Statistics                               ***********************
************************     Data Analyzed: from  26-JAN-2006 09:00:00.00  to  26-JAN-2006 09:20:00.00     ***********************

+----------------------------------------------- CLUSTER Memory ----------------------------------------------+
!                                                                                                             !
!                    Total    Memory   Proc     Balset   Page     Hard     Soft     Gvalid   System  InSWP    !
!                    MEMutl   Queue    Count    Count    Faults   Faults   Faults   Faults   Faults  Count    !
!                      (%)    (avg)    (avg)    (avg)    (/sec)    (%)      (%)     (/sec)   (/sec)  (tot)    !
!                    ------   ------   ------   ------   ------   ------   ------   ------   ------  ------   !
! Node Average         67.9        0      111      109     48.9      2.4     97.6     11.2      0.0       0   !
! Node Minimum         52.4        0       79       77     28.2      1.8     96.9      5.5      0.0       0   !
! Node Maximum         87.1        0      163      161     65.5      3.1     98.2     16.1      0.0       0   !
! Cluster Total        67.2        0      333      327    146.6      2.4     97.6     33.7      0.0       0   !
+-------------------------------------------------------------------------------------------------------------+

+--------------------------------------------- CLUSTER CPU --------------------------------------------+--- CLUSTER I/O ---+
!                                                                                                      !                   !
!                     CPU     System   Task     CPU      CPU     CPU+IO    CPU      I/O      Multi    CPU+IO  !  Direct    Buffrd  !
!                     Busy    CPU      CPU      Queue    Idle    Idle      Only     Only     I/O      Busy    !  I/Os      I/Os    !
!                      (%)    (%)      (%)      (avg)     (%)     (%)      (%)      (%)      (%)       (%)    !  (/sec)    (/sec)  !
!                    ------   ------   ------   ------   ------   ------   ------   ------   ------   ------  !  ------    ------  !
! Node Average         39.5     29.8      9.8        1     60.5      0.0      0.0     60.1     76.9     39.9  !    16.1      52.9  !
! Node Minimum         29.5     22.6      6.8        0     54.0      0.0      0.0     54.7     30.6     31.6  !     7.5      23.2  !
! Node Maximum         46.0     34.6     13.8        2     70.5      0.0      0.0     68.4    100.0     45.3  !    26.4     111.3  !
! Cluster Total        39.5     29.8      9.8        4     60.5      0.0      0.0     60.1     76.9     39.9  !    48.3     158.6  !
+------------------------------------------------------------------------------------------------------+-------------------+

+------------------------- CLUSTER Lock ------------------------+
!                                                               !
!                    H-Orig   Out      Enq      Dir Op   R-Orig  !
!                    Lck Act  Bound    Wait     Incomg   Lck Act !
!                    (/sec)    (%)      (%)     (/sec)   (/sec)  !
!                    ------   ------   ------   ------   ------  !
! Node Average        101.2     39.6      0.7      4.2     40.1  !
! Node Minimum         56.1     26.9      0.3      3.7     13.9  !
! Node Maximum        128.6     52.9      1.9      4.8     64.7  !
! Cluster Total       303.6     39.6      0.7     12.7    120.3  !
+---------------------------------------------------------------+


User Command: ADVISE PERF REPORT TABULAR=BYCLUSTER/BEG=26-JAN-2006 09:00:00.00/END=26-JAN-2006 09:20:00.00 -
/OUT=BYCLU.TAB/SECTION=SUMMARY
```

Memory By Cluster Format

In the By Cluster format for summary statistics, the leftmost column of the tabular report contains the words Node Average, Node Minimum, Node Maximum, and Cluster Total. Each of these words begins a line of memory statistics. For Cluster Total, the value is left blank in case of percentages.

Node Average

The average value of the statistic across all nodes in the cluster system.

Node Minimum

The minimum value of the statistic across all nodes in the cluster system.

Node Maximum

The maximum value of the statistic across all nodes in the cluster system.

Cluster Total

The total value of the statistic across all nodes in the cluster system.

By Node Format

The following example shows final statistics by node:

```
Tabular Report                                              CLUSTER                                            Page    1
PA Vx.x
                                                 Tuesday 26-JAN-2006 09:00 to 09:20

************************                                Final Statistics                           ***********************
************************     Data Analyzed: from  26-JAN-2006 09:00:00.00  to  26-JAN-2006 09:20:00.00     ***********************

+---------------------------------------------- CLUSTER Memory ---------------------------------------------+
!                                                                                                           !
!                    Total    Memory   Proc     Balset   Page     Hard     Soft     Gvalid   System  InSWP   !
!                    MEMutl   Queue    Count    Count    Faults   Faults   Faults   Faults   Faults  Count   !
!                      (%)    (avg)    (avg)    (avg)    (/sec)    (%)      (%)     (/sec)   (/sec)  (tot)   !
!                    ------   ------   ------   ------   ------   ------   ------   ------   ------  ------  !
! LATOUR               52.4        0       79       77     65.5      3.1     96.9     12.1      0.0       0  !
! YQUEM                64.1        0      163      161     52.8      1.8     98.2     16.1      0.0       0  !
! GALLO                87.1        0       90       88     28.2      2.1     97.9      5.5      0.0       0  !
+-----------------------------------------------------------------------------------------------------------+

+------------------------------------------- CLUSTER CPU --------------------------------------------+--- CLUSTER I/O ---+
!                                                                                                    !                   !
!                     CPU     System   Task     CPU     CPU     CPU+IO   CPU      I/O     Multi   CPU+IO  !  Direct   Buffrd  !
!                     Busy    CPU      CPU      Queue   Idle    Idle     Only     Only    I/O     Busy    !  I/Os     I/Os    !
!                      (%)    (%)      (%)      (avg)    (%)     (%)      (%)      (%)    (%)      (%)    !  (/sec)   (/sec)  !
!                    ------   ------   ------   ------  ------  ------   ------   ------  ------  ------  !  ------   ------  !
! LATOUR               46.0     32.2     13.8        2    54.0     0.0      0.0     54.7    30.6    45.3  !    14.4     23.2  !
! YQUEM                29.5     22.6      6.8        0    70.5     0.0      0.0     68.4   100.0    31.6  !    26.4    111.3  !
! GALLO                43.2     34.6      8.6        1    56.8     0.0      0.0     57.3   100.0    42.7  !     7.5     24.0  !
+----------------------------------------------------------------------------------------------------+-------------------+

+------------------------- CLUSTER Lock ------------------------+
!                                                               !
!                    H-Orig    Out      Enq     Dir Op  R-Orig  !
!                    Lck Act   Bound    Wait    Incomg  Lck Act !
!                    (/sec)     (%)     (%)     (/sec)  (/sec)  !
!                    ------   ------   ------   ------  ------  !
! LATOUR              118.9     52.9      0.6      4.3    13.9  !
! YQUEM               128.6     26.9      0.3      4.8    41.7  !
! GALLO                56.1     40.4      1.9      3.7    64.7  !
+---------------------------------------------------------------+

User Command: ADVISE PERF REPORT TABULAR=(BYNODE)/BEG=26-JAN-2006 09:00:00.00/END=26-JAN-2006 09:20:00.00 -
/OUT=BYCLU.TAB/SECTION=SUMMARY
```

In the By Node format for summary statistics, the leftmost column of the tabular report contains the name of each node. Each node name begins a line of summary statistics as in the case of By Cluster format. These statistics show the contribution of each individual node to each summary statistic.

By Cluster or By Node Summary Statistics

The following is an explanation of memory statistics in By Cluster and By Node formats:

Total MEMutl (%)

This is equal to (Total Memory - Free Pages / Total Memory).

Memory Queue (avg)

The average number of processes waiting for available memory. The value of Memory Queue is equivalent to the count of processes in the computable outswapped queue (COMO).

Proc Count (avg)

The number of processes in the system (including SWAPPER).

Balset Count (avg)

The number of processes resident in the balance set.

Page Faults (/sec)

The total number of page faults per second during the example interval.

Hard Faults (%)

The percentage of Page Faults that required a read from disk. This is (Read I/Os)/(Page Faults) expressed as a percentage.

Soft Faults (%)

The percentage of Page Faults that were resolved from memory, that is, without reading from disk. This is equal to (100 - Hard Faults) %.

Gvalid Faults (/sec)

The number of page faults per second resolved as valid global pages (already in memory) during the example interval.

System Faults (/sec)

The number of page faults incurred in system space per second during the example interval.

InSWP Count (avg)

The number of process inswaps performed during the last example interval.

The following CPU statistics are reported in By Cluster and By Node formats:

CPU Busy (%)

Percentage of time the CPU time spent in interrupt stack, busy wait, kernel, executive, supervisor, user, and compatibility modes. This is the sum of System CPU % and Task CPU %.

System CPU (%)

The sum of the interrupt, kernel, executive and busy wait CPU percentages.

Task CPU (%)

The sum of the supervisor, user, and compatibility mode busy percentages.

CPU Queue (avg)

The average number of processes waiting for the CPU. There is a queue if this number is greater than one (1) (the process that would have run in absence of the collection process). Equivalent to the sum of processes in the computable queue (COM).

CPU Idle (%)

The percentage of time that the CPU was idle.

CPU+IO Idle (%)

The percentage of time that the CPU and all disk devices (selected for data collection) were idle.

CPU Only (%)

The percentage of time (non-overlapped CPU time) that the CPU was busy and no disk device (selected for data collection) was busy.

I/O Only (%)

The percentage of time (non-overlapped I/O time) that the CPU was idle and at least one disk device (selected for data collection)was busy.

Multi I/O (%)

The percentage of time that two (2) or more disk devices (selected for data collection) were busy.

CPU+IO Busy (%)

The percentage of time (overlapped CPU and I/O time) that both the CPU and at least one disk device (selected for data collection) were busy.

The following I/O statistics are reported in By Cluster and By Node formats.

Direct I/Os (/sec)

The number of direct I/O operations performed per second during the example interval, exclusive of page and swap I/O.

Buffrd I/Os (/sec)

The number of buffered I/O operations performed per second during the example interval.

The following lock statistics are reported in By Cluster and By Node formats:

H-Orig Lck Act (/sec)

This metric is the Host-Originated Locking Activity per second. This is the amount of locking activity generated by the host node. It is equal to the sum of local and outgoing enqueue operations, plus local and outgoing converted enqueue operations, plus local and outgoing dequeue operations.

Out Bound (%)

This is the percentage of the host originated locking activity (above) which had to be serviced by other nodes in the cluster. It is equal to the sum of the outgoing enqueue, outgoing converted enqueue, and outgoing dequeue operations, divided by the total host originated lock activity.

Enq Wait (%)

This is the percentage of enqueue and converted enqueue operations that were forced to wait. It is equal to the enqueue wait rate, divided by the sum of local and outgoing enqueue and local and outgoing converted enqueue, operations.

Dir Op Incomg (/sec)

This metric is the Directory Operations Incoming per second. This is the number of lock directory operations per second being requested of the host node.

R-Orig Lck Act (/sec)

This is the number of locking operations performed on the host node on behalf of other nodes in the cluster. It is equal to the sum of incoming enqueue, incoming converted enqueue, and incoming dequeue operations.

Cluster Disk and Server Statistics (with By Node Breakout)

The Performance software reports disk statistics By Cluster and By Node. Cluster statistics represent the total of all disk I/O for a cluster. By Node statistics represent each node's contribution to the cluster I/O load. The following example shows disk statistics by cluster:

```
Tabular Report                                              CLUSTER                                                   Page    1
PA Vx.x
                                                   Tuesday 26-JAN-2006 09:00 to 09:20

************************                                 Final Statistics                                ***********************
************************     Data Analyzed: from  26-JAN-2006 09:00:00.00  to  26-JAN-2006 09:20:00.00     ***********************

+------------------------ CLUSTER Disk Statistics -----------------------+
!                                                                         !
!                                                Resp                     !
!                         Paging  Swping   Rate   Time   Queue   Space    !
!                            %       %     (/s)   (ms)   Length  Used %   !
!                         ------  ------  ------ ------  ------  ------   !
!   DSA0                     0.0     0.0     0.0      0     0.0      96   !
!   DSA1                     0.0     0.0     0.0      0     0.0      81   !
!   DSA10                    0.0     0.0     1.9     38     0.1      61   !
!   DSA111                  26.5     0.0    12.4     33     0.4      99   !
!   DSA12                    0.0     0.0     0.0     35     0.0      33   !
!   DSA13                    0.0     0.0     0.0     27     0.0      85   !
!   DSA14                  100.0     0.0     0.0     31     0.0      95   !
!     .                        .       .       .      .       .       .   !
!     .                        .       .       .      .       .       .   !
!     .                        .       .       .      .       .       .   !
!   YQUEM$DFSC7104           0.0     0.0     0.0      0     0.0  ......   !
!   YQUEM$DFSC7105           0.0     0.0     0.0      0     0.0  ......   !
+-------------------------------------------------------------------------+


User Command: ADVISE PERF REPORT TABULAR=(BYCLUSTER)/BEG=26-JAN-2006 09:00:00.00 -
/END=26-JAN-2006 09:20:00.00/OUT=BYCLU.TAB/SECTION=DISK
```

The way the Performance software counts a node's contribution when calculating By Node and By Cluster disk statistics is based upon the node's relationship to the disk. There are two types of relationships a node may have to a disk; a disk may be either hosted or served by a node.

If a node is directly connected to a disk by a MASSBUS, UNIBUS or HSC (Hierarchical Storage Controller), the disk is hosted by the node. If a node is not directly connected to a disk and must go through an intermediary node that hosts the disk, the disk is served.

For the purposes of this discussion, the term, *direct access*, refers to the relationship where a node hosts a disk, and the term, *remote access*, refers to the relationship where a node serves a disk.

The reason a node's relationship is important when calculating disk statistics is because the I/O of a node with remote access to a disk is processed through a node with direct access to the disk. Therefore, rates for the node with remote access are included in disk statistics for the node with direct access and in the disk statistics for the remote node as well.

The calculation of Total Cluster Disk I/O rates is fairly simple; the disk statistics from the nodes with direct access to the disk are added together. Data from nodes with remote access to the disk is ignored, as this data is already accounted for by nodes with direct access to the disk.

The following table is a summary of how the software calculates By Cluster disk statistics:

Disk/Node Relationship	Calculation of Total Cluster Disk Statistics
One or more nodes with direct access and any number of nodes with remote access	Add I/O data from node(s) with direct access to disk
No nodes with direct access in the collection specification and one or more nodes with remote access	Add I/O data from all nodes with remote access only

Depending upon the number of nodes with direct and remote access to the disk, computing By Node I/O disk statistics is complex and sometimes not possible to calculate for all nodes. This is because it is not always possible to distinguish each node's contribution to the total Cluster I/O rate.

When there is only one node with direct access to a disk and any number of nodes with remote access, the By Node contribution of the node with direct access is calculated as follows: Subtract the I/O statistics of any nodes with remote access from the I/O statistics of the node with direct access. The By Node contribution of nodes with remote access to the disk is the I/O statistic for each remote node.

In the case of more than one node with direct access to a disk and more than one node with remote access, calculation of each node's contribution is not possible because there is no way to distinguish which node with direct access performed the I/O operations for which nodes with remote access.

The following table shows a summary of how the software calculates By Node disk statistics:

Disk/Node Relationship	Calculation of By Node Disk Statistics
One or more nodes with direct access; no nodes with remote access	Take I/O data from node with direct access to disk.

Disk/Node Relationship	Calculation of By Node Disk Statistics
One node with direct access; one or more nodes with remote access	Node(s) with remote access, take I/O data from the node with remote access. Node with direct access, subtract all remote access nodes' I/O statistics from the direct access node's I/O statistics. (Information is unavailable if all data is not present, that is, when interval times for all nodes do not align.)
More than one node with direct access; more than one node with remote access	Unable to report By Node data.

The following Example Configuration diagram below is an example system configuration. There are two disks, DU1 and DB2, and three nodes, A, B and C. Disk DU1 is hosted by nodes A and B; that is, nodes A and B have direct access to DU1. Nodes A and B are served to disk DB2; that is, nodes A and B have remote access to disk DB2. Node C has remote access to disk DU1 and direct access to DB2.

Detailed examples of how the Performance software would calculate By Cluster and By Node disk statistics using the example configuration are given in the following By Cluster and By Node report format explanations.

Disk By Cluster Format

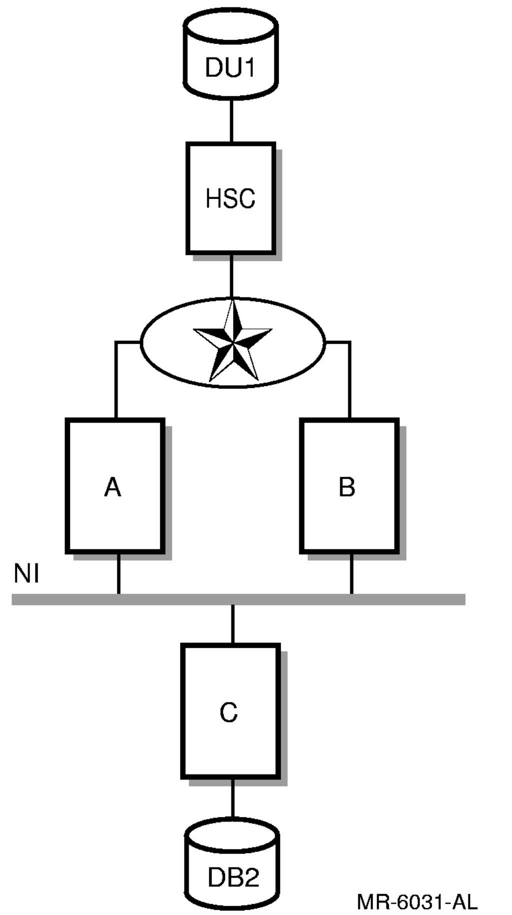
In the By Cluster format for disk statistics, the leftmost column of the tabular report contains the name of each disk that is accessible cluster-wide. Disk names are usually prefixed by a node name or allocation class. Each disk name begins a line of disk statistics. Each statistic shows the activity for the specific disk due to all nodes in the cluster.

When determining cluster-wide statistics for a disk, only statistics from nodes with direct access are considered. This is because I/O for nodes with remote access is processed by nodes directly accessing the disk and is therefore already included in the node with direct access statistics. For example, the software would calculate cluster rates for disks DU1 and DB2 in the following figure as follows:

- For disk DU1 with the HSC, all I/Os come to this disk through host (direct access) nodes A and B. Therefore, adding the I/O statistics from each of these nodes provides the total cluster I/O for disk DU1. The I/O statistics of node C are already included in the I/O statistics for nodes A and B and are therefore ignored.

- For disk DB2, node C is the host (direct access) node. All I/Os come to this disk through node C; therefore, the I/O statistic of node C provides the total cluster I/O rate for disk DB2. As above, the I/O statistics of nodes A and B are already included in the I/O statistics for node C and are therefore ignored.

Example Configuration: Disk By Cluster Format



Disk By Node Format

The following example shows disk statistics in By Node format:

```
Tabular Report                                              CLUSTER                                                  Page    1
PA Vx.x
                                        Tuesday 26-JAN-2006 09:00 to 09:20

************************                                 Final Statistics                                 ***********************
************************    Data Analyzed: from  26-JAN-2006 09:00:00.00  to  26-JAN-2006 09:20:00.00     ***********************

+------------------------------------ BY NODE Disk Statistics -------------------------+
!                                                                                      !
!                             Work                              Resp                   !
!                             Avail   Paging  Swping   Rate     Time    Queue   Space  !
!                               %       %       %      (/s)     (ms)    Length  Used % !
!                             ------  ------  ------  ------   ------   ------  ------ !
! DSA0                                                                                 !
!       LATOUR                   0.0     0.0     0.0     0.0        0      0.0      96 !
!       YQUEM                    0.0     0.0     0.0     0.0        0      0.0      96 !
!       GALLO                    0.0     0.0     0.0     0.0        0      0.0      96 !
! DSA1                                                                                 !
!       LATOUR                   0.0     0.0     0.0     0.0        0      0.0      81 !
!       YQUEM                    0.0     0.0     0.0     0.0        0      0.0      81 !
!       GALLO                    0.0     0.0     0.0     0.0        0      0.0      81 !
! DSA10                                                                                !
!       LATOUR                   1.9     0.0     0.0     0.6       37      0.0      61 !
!       YQUEM                    3.7     0.0     0.0     1.0       40      0.0      61 !
!       GALLO                    1.3     0.0     0.0     0.4       36      0.0      61 !
! DSA111                                                                               !
!       LATOUR                  16.9    25.9     0.0     7.1       29      0.2      99 !
!       YQUEM                    9.3    27.9     0.0     3.1       36      0.1      99 !
!       GALLO                    7.7    26.3     0.0     2.2       39      0.1      99 !
!    .                             .       .       .       .        .        .       . !
!    .                             .       .       .       .        .        .       . !
!    .                             .       .       .       .        .        .       . !
+--------------------------------------------------------------------------------------+


User Command: ADVISE PERF REPORT TABULAR=(BYNODE)/BEG=26-JAN-2006 09:00:00.00 -
/END=26-JAN-2006 09:20:00.00/OUT=BYCLU.TAB/SECTION=DISK
```

In the By Node format for disk statistics, the leftmost column of the tabular report contains the name of each disk, followed by the name of each node from which the disk was accessed. Following each node name is the processor type; and if the node hosted the disk, the word *host*.

Each disk, with node names, begins a line of disk statistics similar to the By Cluster format. These statistics show the contribution of each individual node to the cluster-wide activity of a specific disk. The way the Performance software determines a node's contribution to the cluster-wide activity of a disk depends upon whether the node has direct or remote access to the disk. For nodes with remote access, the I/O statistic for each node is that node's contribution to the total cluster I/O load.

In the case of a configuration with one node with direct access to the disk and any number of nodes with remote access, I/O statistics for the node with direct access includes I/Os from any nodes with remote access to the disk. Therefore, to compute the direct access node's contribution, the software subtracts the number of I/Os of the nodes with remote access from the I/O information of the node with direct access.

In the case of two nodes with direct access to a disk with any number of nodes with indirect access, both direct nodes' I/O statistics include I/O from any remote nodes. Therefore, it is not possible to compute the By Node contribution to the cluster total of the nodes with direct access to the disk. The By Node contribution of the nodes that access the disk remotely is each node's I/O statistics.

For example, the software would calculate By Node rates for disks DU1 and DB2 in the example configuration as follows. For disk DU1 with the HSC, all I/Os come to this disk through host (direct access) Nodes A and B. The I/O information for these nodes includes I/O from the served (remote access) Node C. There is no way to distinguish whether Node C's I/Os were processed by Node A or Node B. Therefore, calculating the By Node contribution for Nodes A and B, which directly access the disk, is not possible. The By Node contribution for Node C, which has remote access to Disk DU1, is the I/O statistic for Node C.

For disk DB2, Node C is the host (direct access) node; all I/Os come to this disk through Node C. Therefore, to calculate Node C's By Node contribution, subtract from Node C's I/O information the I/O information from Nodes A and B, which have remote access to DB2. The By Node contribution of Nodes A and B, is each node's I/O statistics.

By Cluster and By Node Disk Statistics

The following discussion explains the By Cluster and By Node Disk Statistics. The disk statistics reported in By Cluster and By Node formats are as follows:

Work Avail%

The percentage of time that work was available for the disk. Reported only for By Node statistics.

Paging %

The percentage of the work available, marked as Page I/O.

Swping %

The percentage of the work available, marked as Swap I/O. This includes both swapping and modified page writing.

Rate(/s)

The number of I/O operations per second performed by the device.

Resp Time(ms)

The response time. This is the mean total service time, per I/O request, for the device in milliseconds. This is the total time taken to service an I/O request and is the sum of the queuing time and the busy time. It is thus measured from the time the I/O request is issued until the time the controller completes the request. This value is computed as (Average device queue length)/Rate.

Queue length

The average number of disk I/O requests waiting for service.

Space Used %

The percentage of the total disk volume space that is allocated. Reported only for mounted disks.

Server By Cluster Format

The following example shows server statistics in BYCLUSTER format.

In the By Cluster format for server statistics, the leftmost column of the tabular report contains the name of each server that is accessible cluster-wide. Server names are followed, in parentheses, by the name of the CPU or HSC server with which they are associated. Each server name begins a line of server statistics. Each statistic shows the activity for the specific server due to all nodes in the cluster, as shown in the following example:

```
+----------------- CLUSTER Server Statistics ---------------+
!                    Alloc     Paging    Swping    Queue     !
!                    Class       %         %       Length    !
!                    ------    ------    ------    ------    !
! ARGOT     (VAX )      0        0.0       0.0       0.0     !
! EXURB     (VAX )      0        0.0       0.0       0.0     !
! GLIA      (VAX )      4        0.0       0.0       0.0     !
! HSC0      (HS70)      1        0.1       0.0       0.0     !
! HSC002    (HS50)      1        0.0       0.0       0.0     !
! HSC1      (HS70)      1        8.5       0.0       0.3     !
! MNGLNG    (VAX )      0        0.0       0.0       0.0     !
! SNOLPD    (VAX )      1        0.0       0.0       0.0     !
! ULTRA     (VAX )      1        0.0       0.0       0.0     !
! VERB      (VAX )      0        0.0       0.0       0.0     !
+-----------------------------------------------------------+
```

Server By Node Format

In the By Node format for server statistics, the leftmost column of the tabular report contains the name of each server that is accessible cluster-wide. This is followed by the name of each node from which the server was accessed. Each server, by node name, begins a line of server statistics as in the case of By Cluster format. These statistics show the contribution of each individual node to the activity of a specific server. Server names are followed, in parentheses, by the processor type or HSC type with which they are associated. Node names are followed, in parentheses, by the processor type for the node. The following example shows server statistics in BYNODE format:

```
+---------------- BY NODE Server Statistics --------------+
!                                                              !
!              Work Avail     Paging    Swping    Queue     !
!                   %           %         %       Length    !
!                 ------      ------    ------    ------    !
!    SNOLPD  (VAX )    0.6      10.5       0.0       0.2    !
! MNGLNG     (VAX )                                         !
!    ULTRA   (VAX )    0.0       0.0       0.0       0.0    !
!    SNOLPD  (VAX )    0.0       0.0       0.0       0.0    !
! SNOLPD     (VAX )                                         !
!    ULTRA   (VAX )    0.0       0.0       0.0       0.0    !
!    SNOLPD  (VAX )    0.0       0.0       0.0       0.0    !
! ULTRA      (VAX )                                         !
!    ULTRA   (VAX )    0.0       0.0       0.0       0.0    !
!    SNOLPD  (VAX )    0.0       0.0       0.0       0.0    !
! VERB       (VAX )                                         !
!    ULTRA   (VAX )    0.0       0.0       0.0       0.0    !
!    SNOLPD  (VAX )    0.0       0.0       0.0       0.0    !
+---------------------------------------------------------+
```

By Cluster and By Node Server Statistics

The server statistics reported in By Cluster and By Node formats are:

Alloc Class

The allocation class of the node or HSC associated with the server. Reported only for By Cluster statistics.

Work Avail %

The percentage of time there were I/O requests at the server queue. Reported only for By Node statistics.

Paging %

The percentage of the work available marked as Page I/O.

Swping %

The percentage of work available marked as Swap I/O.

Queue Length

The average sum of the requests at the server queue.

Chapter 4: Generate Historical Graphs

You can generate graphs and pie charts from current or historical data for many aspects of the system. Numerous types of predefined graphs are available. You can also create custom graphs to represent your site-specific needs. These graphs can be printed or displayed on your terminal. The /FILTER qualifier lets you select a subset of data for graphs. For more information, see the chapter Performance Manager Commands (see page 175).

This section contains the following topics:

Generate Predefined Graphs

You can generate predefined graphs in the following three ways:

- At the DCL level - see the section Generate Graphs from the DCL Level (see page 108)
- Within the Performance Manager command mode - see the section Generate Graphs in Command Mode (see page 108)
- Within the DECwindows interface - see the chapter Use the DECwindows Motif Interface (see page 257)

Regardless of the method you use, the basic process is the same. The Performance Manager selects, reads, and buckets the data, then formats and writes the graph to the output device.

Each method has its own advantages and disadvantages in terms of ease of use, efficiency, and equipment. This section discusses how to create single and multiple graphs from the DCL level and within the Performance Manager command mode. The DECwindows Motif Interface is discussed in the chapter Use the DECwindows Motif Interface (see page 257).

Generate Graphs from the DCL Level

Generating graphs at the DCL level offers the most efficient method of selecting data. Only those metrics contributing to the selected graphs are saved and bucketed when the performance data is read. The CPU demand is mostly for reading and decoding the data files. By contrast, the data selection for the DECwindows and command mode interfaces is somewhat more costly because all the performance metrics are usually saved and bucketed in anticipation of a subsequent user request to view them. See Appendix D for information on estimating virtual memory needs and selecting data.

To generate a graph or pie chart

- Use the following commands:

```
$ ADVISE PERFORMANCE GRAPH
$ ADVISE PERFORMANCE PIE_CHART
```

With either command, you can control the data selection by specifying a time period and list of node names. The /TYPE qualifier specifies graphs or performance metrics or both. The /FORMAT qualifier controls the format of the output data. The /OUTPUT qualifier directs the output data to the desired destination.

You can generate all of the predefined graphs in a single command by using the /TYPE=ALL_GRAPHS qualifier. However, if you do not specify a graph, the CPU Utilization graph is the default.

Generate Graphs in Command Mode

If you are investigating performance data interactively, generating graphs from command mode offers several distinct advantages. Once the data has been loaded into memory, you can view graphs and reports quickly, skipping around as dictated by your investigation, without causing the input data to be reread and reanalyzed. Also, if you need to produce output files in different formats, command mode is more efficient than using DCL commands.

To invoke command mode

- Enter the following command:

```
$ ADVISE PERFORMANCE
PSPA>
```

In command mode, you must first select the data you want to use, and then you specify the method you want to use to view it.

The graphs can be viewed in ReGIS mode on a terminal, and then written to a file in Postscript, for example, without having to reread and analyze the data. Also, you can switch between graphs and pie charts without reprocessing the data.

To select data, enter the SELECT command and specify the processing options you want to use. You can specify any or all of these processing options: ANALYSIS, PERFORMANCE, and GRAPHS. For example:

```
PSPA> SELECT GRAPHS /NODE=SUPPLY
```

This command selects data for node SUPPLY; subsequent GRAPH commands use this data to generate graphs.

The ANALYSIS option provides the results of the factory rules and optionally user rules that may fire as a result of your performance data.

The PERFORMANCE_EVALUATION option allows you to view and output sections of the Performance Evaluation Report and Tabular Report, which contain statistics about the system, including process and disk activity, and summaries.

The GRAPHS option lets you control how data is to be selected for subsequent graphing operations (including pie charts). The GRAPHS option has the following eight sub-options:

- IMAGENAMES
- USERNAMES
- HOTFILES
- USERVOLUMES
- IO_DEVICES (and workloads)
- BY_NODE

- ALL
- DEFAULT

DEFAULT, generates graphs for IMAGENAMES, USERNAMES, and IO_DEVICES (and workloads).

DEFAULT is used in the absence of any specified graph processing options. ALL is equivalent to the complete list: IMAGENAMES, USERNAMES, HOTFILES, USERVOLUMES, IO_DEVICES (and workloads), and BY_NODE.

Note that when you are processing a large amount of data, each option can pose significant additional CPU and memory demands on your process.

If you specify NOALL, only system-level metrics are saved. NOALL is helpful when you need to select data as fast as possible, and retain the ability to generate graphs for the system-level metrics. The system-level metrics are always saved BY_NODE as well.

The processing options IMAGENAMES, USERNAMES, HOTFILES, IO_DEVICES (and workloads), and USERVOLUMES cause the selection process to maintain the graph statistics for each unique occurrence of an image name, user name, and so forth. The BY_NODE option causes these statistics to be maintained on both a per-node and a composite (all nodes) basis. The BY_NODE option can increase the memory demands to select the data, as a factor of the number of nodes being selected. See Appendix D for information on estimating virtual memory needs and selecting data.

After selecting the data, you can specify as many GRAPH, PIE_CHART, or REPORT commands as you wish. You can also select more data. The chapter “Using Command Mode Commands” describes the commands available in command mode.

Because Performance Manager provides so many different choices for predefined and custom graphs, you may prefer to use an interactive dialogue to make your selections.

You can request this interactive prompting from within command mode by entering the GRAPH/TYPE=PROMPT command. The Performance Manager's response is as follows:

```
PSPA> GRAPH/TYPE=PROMPT


        Please select either     1) a predefined graph or
                                 2) a custom graph


                Choice: [1]:
```

Enter the graph type keyword (<cr> for list): cpu_utilization

A graph is produced. When you press Return, prompting continues.

Generate Multiple Graphs

When you generate multiple graphs with one DCL command or in Command Mode, you can produce a separate output file for each graph by specifying the /OUTPUT qualifier. The Performance Manager names each file according to the node and graph type with a default or user-specified file type.

For example, the following command creates a separate graph output file for each graph. The files reside in the default directory, and are named SUPPLY_CPU_UTILIZATION.REG and SUPPLY_TOP_BUSY_VOLUMES.REG.

```
$ ADVISE PERFORMANCE GRAPH/TYPE=(CPU_UTILIZATION,TOP_BUSY_VOLUMES)-
_$ /FORMAT=REGIS=CHARACTERISTIC=COLOR/NODE=SUPPLY/OUT=[]
```

You can specify device, directory, and filenames with the /OUTPUT qualifier if you do not want to take the defaults.

Components of Graphs

Each graph has the same basic components, as shown in the following table:

Component	**Applies to**
Title	graphs and pie charts
Subtitle	graphs and pie charts
Axis labels	graphs only

X- and Y-axis markers	graphs only
Legend	graphs only
Units and Unit total	pie charts only
MIN, MAX, and AVG	graphs only, if one metric or if items are stacked

The following list describes each component:

Title

For the predefined graphs, the title identifies the type of graph and is centered at the top of the graph. For custom graphs, the title is PSPA CUSTOM GRAPH unless you specify a title. Titles for ReGIS and PostScript graphs are in enlarged characters.

Subtitle

The graph and pie chart subtitle gives the node name (or the list of node names for composite graphs) and the date and time of the selected data. Also, the *x*-axis data points and the width, in time, of each point, is provided for graphs.

Axis Labels

All graphs have Time implied as the *x*-axis label. Labels for the *y*-axis specify the units of the plotted values, for example, Page Faults Per Second. If metrics of differing units coexist on the graph, the *y*-axis label is blank.

Y-Axis Markers

Axis markers indicate the magnitude and time of any point on the graph. The *x*-markers indicate the time and are displayed differently depending on the graphic format. The *x*-markers are displayed as HH:MM, HH, MM:SS, MM, DD, or MMM depending on the graph time range, and graphic format. When graphing historical data, month or even years may appear, depending on the time range selected.

The *y*-markers are based on the maximum value of all the data points. The increments are obtained from an internal table to make the graph easy to read. You may define the maximum value on the *y*-axis by using, the Y_AXIS_MAXIMUM keyword.

Legend

The legend appears at the bottom of the graph for all graphs other than ANSI graphs. The legend identifies the name of the metric, and the color, pattern, or graph character associated with it. For the predefined TOP*xxx* graphs, the items are always in the same format and order; for example, other (users, workloads, images, volumes, disks, and so forth), topmost, second top, third top, fourth, and fifth.

Composite Graphs

If multiple nodes contribute data to a graph, the graph is considered a *composite* graph. Data for each node can be added together, scaled by some factor, and added, or averaged. The method used depends on the metric being displayed. CPU percentages are scaled by CPU VUP rating, then added. Response times, I/O sizes, and disk space are averaged for each node and all other metrics are summed for each node.

To generate composite graphs, specify /COMPOSITE on the DCL command line, or if in command mode with more than one nodes data selected, omit the /NODE qualifier. When using Windows, the CLUSTER option or ALL NODES option generates the composite graph.

You can recognize a composite graph if there is more than one node listed in the subtitle.

Note: When you produce a composite Graph or Pie Chart and the nodes contribute data to the graph for different time periods (possibly missing data), the results are undefined. Composite Graphs and Pie Charts show accurate totals and averages when the data for the nodes correspond to the same time period.

Stacked Graphs

Graphs showing more than one metric can be displayed either stacked or unstacked. When stacked, the metric data points are added such that the top-most category on the graph plots the sum of all the metrics. You can specify that all graphs be stacked with the /STACK qualifier or you can specify that none are to be stacked with the /NOSTACK qualifier. Also, each graph you request can have its own specific stack or nostack attribute.

Stacking is provided by default on some graphs, where it makes good sense to do so, and the remaining graphs are provided unstacked. Specifically, rates, percentages, and counts are stacked by default, and response times, I/O size, and disk space utilization are unstacked, by default.

Create Typical Time Period Graphs

If you want your graphs to represent a typical time period, such as an average day, you can turn on graph averaging. On the DCL command line, specify /AVERAGE=DAILY (WEEKLY, MONTHLY, and QUARTERLY are also options). From command mode the /AVERAGE qualifier must be specified with the SELECT verb. Window users can set this option from the Select Data dialog box under Additional Options....

If you want a typical Monday type graph, you specify /AVERAGE=WEEKLY and specify a schedule with only Monday as indicated in the following example:

```
/SCHEDULE=(NOEVERYDAY,MON=0-24)
```

If history data, with the periodicity attribute set, is used for the graph, the history's periodicity is used for (and overrides) the graph averaging.

Scheduling

If you want certain time periods included and others not included on the graph, you can use a combination of the schedule and dates features. The /SCHEDULE qualifier, and the schedule time clocks in the window interface, allow you to specify desired hours on a weekly basis for inclusion on the graph. If you need more specific selection time frames, you can use a DATES file (see the /DATES qualifier), which specifies an unlimited number of date ranges, to indicate the desired time frames for inclusion in the graph.

You may want to use both the /DATES qualifier and the /SCHEDULE qualifier together. For example, if you need a graph depicting an average Monday through Thursday prime time for the first week of September, October, November and December of 2005, your schedule and dates file would be as follows:

```
MYDATES.DAT:
07-SEP-2005,11-SEP-2005
05-OCT-2005,09-OCT-2005
02-NOV-2005,06-NOV-2005
07-DEC-2005,11-DEC-2005
```

To use this dates file

- Enter a command similar to the following:

  ```
  $ ADVISE PERFORMANCE GRAPH/SCHEDULE=(NOWEEKENDS,WEEKDAYS=(9-12 -,
  _$ 14-17),NOFRIDAY)/DATES=MYDATES.DAT/AVERAGE=WEEKLY
  ```

Use Binary Graph Data

The DECwindows and the command mode interfaces let you save the graph data that you selected for viewing into a file. This binary file can later be reloaded into either of the interfaces and the graphs presented, eliminating the need for re-analyzing the data.

The following example shows the command mode interface:

```
$ ADVISE PERFORMANCE
PSPA> SELECT GRAPHS=BY_NODE /BEG=26-JAN-2006:9/END=26-JAN-2006:17
PSPA> SAVE JAN26.GRAPHS
PSPA> EXIT

$ ADVISE PERFORMANCE
PSPA> LOAD JAN26.GRAPHS
PSPA> GRAPH /TYPE=CPU_UTILIZATION /NODE=NODE1
```

You can modify the PSPA$DAILY.COM file in PSPA$EXAMPLES to save the graph data during a nightly batch job and the next day, load the data if the analysis report indicated any problems.

Components of Pie Charts

Each pie chart includes the following components:

Title

For the predefined pie charts, the title identifies the type of pie chart.

Subtitle

The pie chart subtitle gives the node name (or the list of node names for composite pie charts) and the date and time of the selected data.

Whole Pie Represents

The Whole Pie represents the sum of metric values represented by each pie slice.

Pie Slices

The Pie Slices represent the average value of the metric over the time period presented in descending order by value.

Label

The label associated with each slice identifies the metric or item being presented along with the percentage contribution to the pie chart. The actual value of the metric can be obtained through either the tabular or CSV pie chart formats.

Legend

The legend identifies the name of the metric, and the color, pattern, or character associated with it.

Pie Chart Presentation of CPU Utilization

Pie charts that reflect metrics measured in terms of CPU percentages now have two possible presentations. If you specify /PERCENTAGE=MAXIMUM, the pie is drawn in terms of 100 percent, with an IDLE section appearing. If you specify /PERCENTAGE=TOTAL the pie is drawn to represent the total of the metrics presented.

For example, if you are producing a pie chart of CPU utilization and the parts of the pie chart have the following values:

- Interactive 30%
- Batch 10%
- Network 5%
- Overhead 1%
- Interrupts 5%
- Other 0%

If you specify /PERCENTAGE=MAXIMUM, the pie chart contains an idle slice representing 49 percent of the total pie with the remaining 51 percent representing their respective slices.

If you specify /PERCENTAGE=TOTAL, the pie chart represents the sum of these parts, a total of 51 percent utilization, with the largest slice of the pie (approximately 3/5) being represented by Interactive.

If you do not specify /PERCENTAGE on the PIE command line, then /PERCENTAGE=MAXIMUM is assumed. This qualifier has no effect on graphs, custom pie charts, or pie charts of metrics other than CPU Utilization.

Format Graphs and Pie Charts

You can control the format of the Performance Manager's graphs and pie charts. The following formats are available:

Format available	Graphs	Pie Charts
PostScript	Y	y
Tabular	Y	y
CSV	Y	y
ReGIS	Y	
ANSI	Y	

The ANSI-formatted, tabular and PostScript output can be printed on any output device. Color graphs print or display on monochrome devices in shades of gray.

See the discussion on the logical names to change the colors of the ReGIS and PostScript graphs in the Appendix Performance Manager Logical Names (see page 405).

Refresh a ReGIS Graph with New Characteristics

After you generate a ReGIS graph to the SYS$OUTPUT device, you receive the following prompt:

```
Type <CR> to continue
```

If a broadcast message disrupts the display of the ReGIS graph you can refresh the display with the following procedure. You can either enter a C (for color), P (for pattern), or L (for line) to regenerate the graph currently on the screen with a changed characteristic. The DCL qualifiers that obtain these characteristics are as follows:

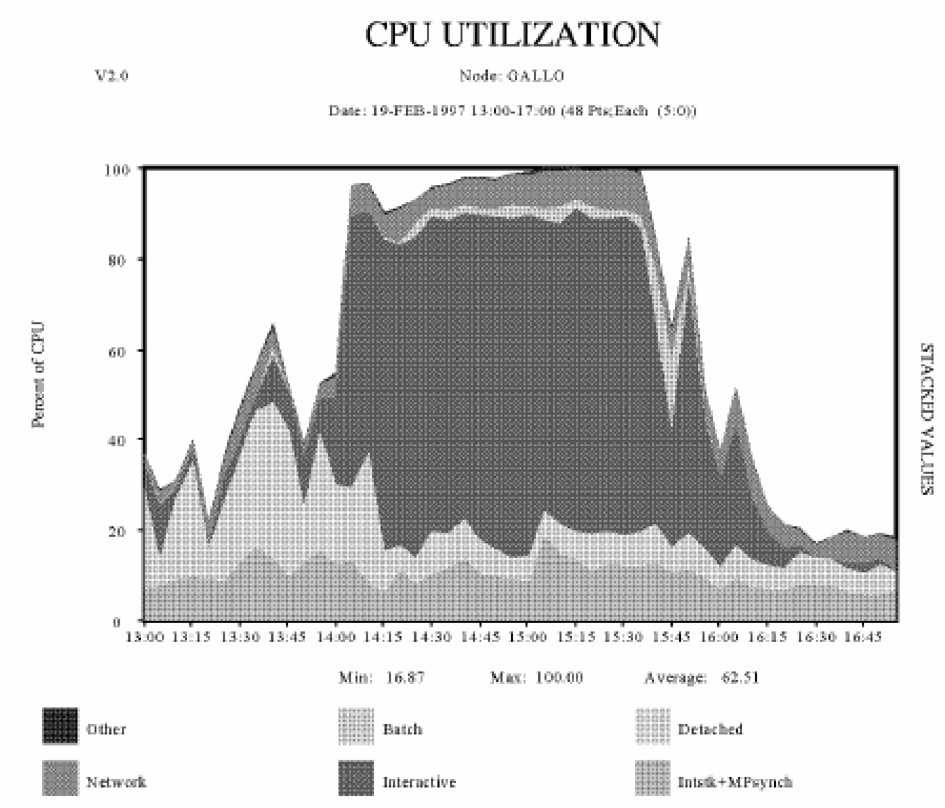
```
/FORMAT=ReGIS=CHARACTERISTIC=COLOR
/FORMAT=ReGIS=CHARACTERISTIC=LINE
/FORMAT=ReGIS=CHARACTERISTIC=PATTERN
```

With each method, it is possible to redraw the current graph if a broadcast message disrupts the display.

Output Formats

The following figure, PostScript Graph, illustrates a PostScript formatted pattern graph. The graph was generated with the following command:

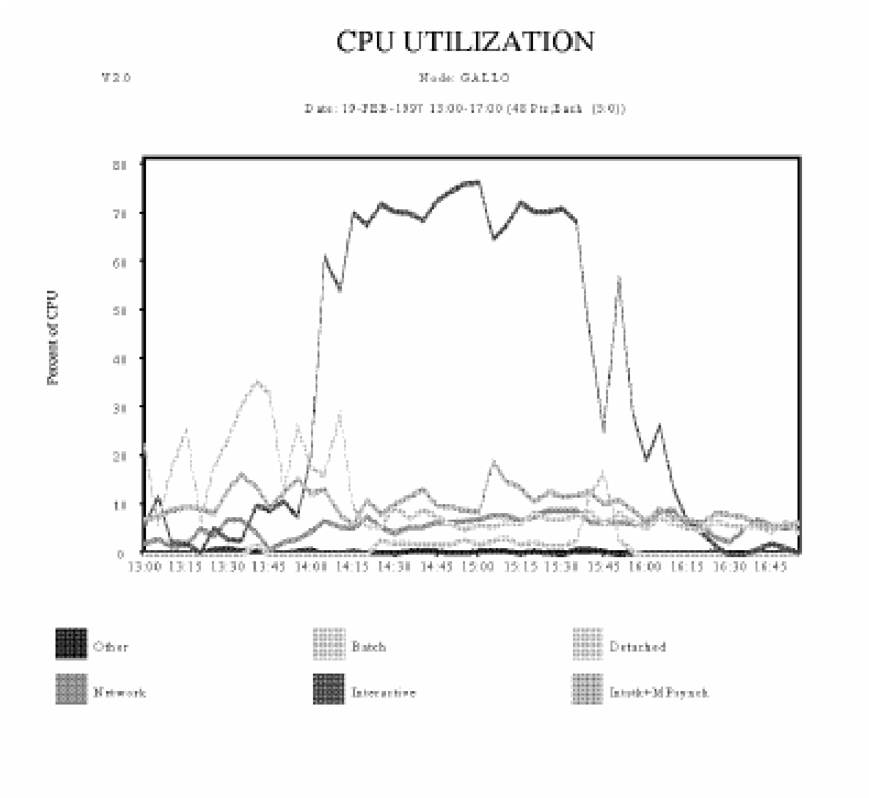
```
$ ADVISE PERFORMANCE GRAPH/BEGINNING=19-FEB-2006:13:00/ENDING=19-FEB-2006:17:00 -
_$ /TYPE=CPU_UTILIZATION/NODE=GALLO/OUTPUT=CH4CPU.PS -
_$ /FORMAT=POSTSCRIPT=CHARACTERISTIC=PATTERN
```



The following figure, PostScript Formatted Line Graph, illustrates a PostScript formatted line graph. The graph was generated with the following command:

```
$ ADVISE PERFORMANCE GRAPH/BEGINNING=19-FEB-2006:13:00
_$ /ENDING=19-FEB-_$2006:17:00/TYPE=CPU_UTILIZATION/NODE=GALLO
_$ /FORMAT=POSTSCRIPT=CHARACTERISTICS=LINE/OUTPUT=CPU_LINE.PS
```

The LINE keyword is used with the /NOSTACK qualifier to avoid occlusion.



ANSI Formatted Graph is the same CPU utilization graph as Tabular Formatted Graph in ANSI formatted output. The default width of an ANSI graph is 132 characters. This graph overrides the default width. It was generated with the following command:

```
$ ADVISE PERFORMANCE GRAPH/BEGINNING=19-FEB-2006:13:00/ENDING=19-FEB-2006:17:00 -

_$ TYPE=CPU_UTILIZATION/NODE=GALLO/OUTPUT=CPU.LIS -

_$ /FORMAT=ANSI=(WIDTH=79,HEIGHT=25)
```

```
                   CPU UTILIZATION
                                                     Node: GALLO
                                        Date: 19-FEB-2006 13:00-17:00

                                                                        LEGEND:
                                                                        * =  Other
                                                                        N =  Network
                                                                        B =  Batch
                                                                        I =  Interactive
                                                                        D =  Detached
                                                                        X =  Intstk+MPsynch
                                                                        (Metric Values are Stacked)
Y-Units: Percent of CPU
100 !                     N     * NNNNNNNNNNNNNNNNNNN
 96 !                    NIN  NNNNNBINNNBNINNBNBNNNNB
 92 !                   *NINNNNBIBIIIIIBIIIBBIBIIIIBI
 88 !                   NIIINIIIIIIIIIIIIIIIIIIIIIIII  N
 84 !                   IIIIIIIIIIIIIIIIIIIIIIIIIIIII  IN
 80 !            N      IIIIIIIIIIIIIIIIIIIIIIIIIIIIIN IB
 76 !            B      IIIIIIIIIIIIIIIIIIIIIIIIIIIIIN II
 72 !          * I      IIIIIIIIIIIIIIIIIIIIIIIIIIIIIB II
 68 !          N I      IIIIIIIIIIIIIIIIIIIIIIIIIIIIIBNII
 64 !          N D      IIIIIIIIIIIIIIIIIIIIIIIIIIIIIBNII
 60 !          D D     NIIIIIIIIIIIIIIIIIIIIIIIIIIIIIBBII
 56 !          D D     NIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIBII
 52 !          DNDN    IIIDIIIIIIIIIIIIIIIIIIIIIIIIIIIIBIIN  N
 48 !I       N DBDIN INDIIDIIIIIIIIIIIIIIIIIIIIIIIIIIIIBIII  N
 44 !I       I DIDDI IIDIIDIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIN IN
 40 !D    N  I DIDDI IDDIIDIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIN II
 36 !D    D  D DIDDDIDDDIIDIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIINIIN
 32 !D IN D  DNDDDDDIDDDDIDIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIN
 28 !DNIDID NDNDDDDDIDDDDIDIIIIIIIIIIIIIIIIDIIIIIIIIIIIIIIIIIIINN
 24 !DIDDDDNNDIDDDDDIDDDDIDDIIIIDIDDIIIIIIDDDIIIIIIIDDIIIIIIIIIINNN*   *   N
 20 !DIDDDDDDDDXDXDDDXDDDDDDIIIIDDDDDDIIIIXXDDDDDDDDDDDDDDIIIDIIIININNNNNNDN
 16 !DDDDDDDDDXXXXDDDXXXXDDDDDDDDDXXDDDDDDXXXXDDXXDDXXDDDDDIDDDDIIDDNDDIIIDN
 12 !DDDXXXXDXXXXXXXXXXXXXXDXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXDDXDDDDDXXDDDDDDDD
  8 !XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  4 !XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    ++-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+----
   13:00 13:20 13:40 14:00 14:20 14:41 15:01 15:21 15:41 16:01 16:22 16:42
          Min:   12.72   Max:  100.00   Average:   62.51
```

The following table, Tabular Formatted Output, illustrates tabular formatted output. Tabular output is in 132-column format. It was generated with the following command:

```
$ ADVISE PERFORMANCE GRAPH/BEGINNING=19-FEB-2006:13:00/ENDING=19-FEB-2006:17:00 -
_$ /TYPE=CPU_UTILIZATION/NODE=GALLO/OUTPUT=CPU_TAB.LIS/FORMAT=TABULAR
```

```
                                                     CPU UTILIZATION
                                                      Node: GALLO
                                                Date: 19-FEB-2006 13:00-17:00
Metric Values are Stacked (Added to the left)
Units:     Percent of CPU
Time                Other    Network  Batch   Interactive Detached  Intstk+MPsynch
19-FEB-2006 13:00   37.0417  36.8618  34.8204  34.7315    29.2958    7.1025
19-FEB-2006 13:05   28.7843  28.6284  25.6078  25.5536    13.9655    7.7340
19-FEB-2006 13:10   30.8503  30.6480  29.0889  29.0197    26.4432    8.9179
19-FEB-2006 13:15   39.5400  39.1330  37.2836  37.2375    35.1232    9.5303
19-FEB-2006 13:20   21.6206  21.3342  16.1865  16.1200    15.7037    9.1339
.
.
.
19-FEB-2006 16:30   16.8700  16.5002  13.9558  13.9363    13.8224    7.8752
19-FEB-2006 16:35   18.6083  18.4667  13.4750  13.4625    13.3917    7.7000
19-FEB-2006 16:40   20.1096  19.7068  12.6488  12.6349    11.5711    6.1713
19-FEB-2006 16:45   18.3733  18.3733  12.5977  12.5852    10.4367    5.7852
19-FEB-2006 16:50   19.1731  18.7125  13.6036  13.5897    12.2661    5.7172
19-FEB-2006 16:55   18.2973  17.5590  11.2668  11.0500    10.7143    6.5597
 Minimum Values      0.0000   0.9171   0.0083   0.0708     4.1546    5.7172
 Maximum Values      1.1978   9.0092  16.5792  75.3240    34.9630    8.7164
 Average Values      0.4288   5.6702   1.4347  33.7350    11.1873    0.0492
```

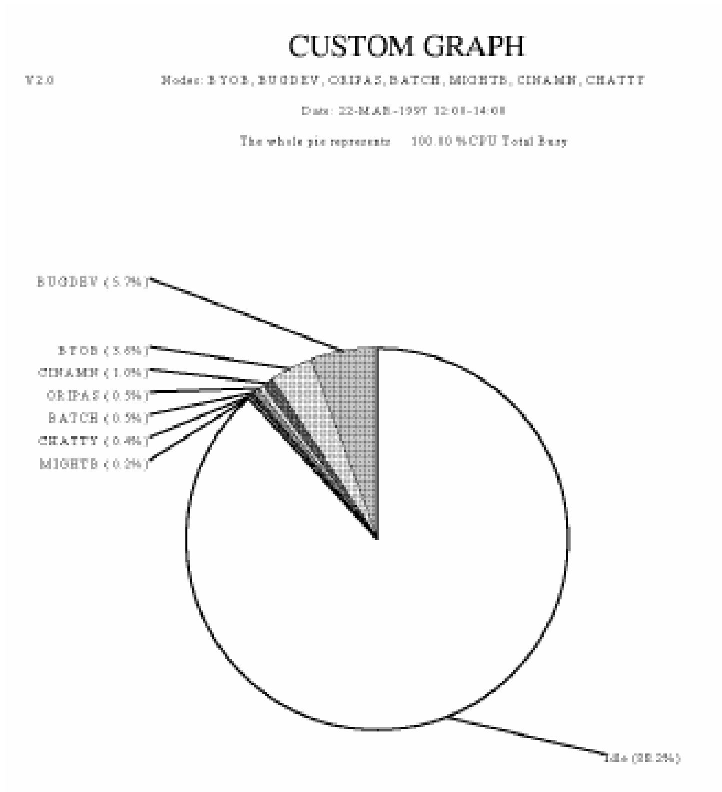
The following example, CSV Formatted Output, illustrates CSV formatted output. It was generated with the following command:

```
$ ADVISE PERFORMANCE GRAPH/BEGINNING=22-MAR-2006:12:00/ENDING=22-MAR-2006:14:00 -
_$ /NODE=(BYOB,BUGDEV,ORIPAS,BATCH,MIGHTB,CINAMN,CHATTY)/FORMAT=CSV=X_POINTS=8 -
_$ /TYPE=CUSTOM=SYSTEM_METRIC=CPU_TOTAL/COMPOSITE
```

```
"PSPA CUSTOM GRAPH"
"Nodes: BYOB, BUGDEV, ORIPAS, BATCH, MIGHTB, CINAMN, CHATTY"
"Date: 22-MAR-2006 12:00-14:00"
"Metric Values are Stacked (Added to the left)"
"Units:     %CPU Total Busy"
"Time","2 Other Nodes,total","BUGDEV","BYOB","CINAMN","ORIPAS","BATCH"
"22-MAR-2006 12:00",4.5250,3.8487,2.7485,1.5865,0.9080,0.6247
"22-MAR-2006 12:15",4.3510,3.6925,2.9084,1.2251,0.4400,0.1722
"22-MAR-2006 12:30",3.5105,2.9182,2.7072,1.5696,0.9082,0.6624
"22-MAR-2006 12:45",4.6329,4.0381,3.6512,2.6581,1.2887,1.0471
"22-MAR-2006 13:00",9.6964,9.1100,2.8984,1.8634,0.8863,0.4046
"22-MAR-2006 13:15",11.1101,10.2576,3.4636,2.3228,1.2826,0.5255
"22-MAR-2006 13:30",28.1334,27.2356,12.2585,2.3256,1.2172,0.3333
"22-MAR-2006 13:45",29.9854,29.1150,14.0548,2.1800,0.9782,0.1727
```

PostScript Formatted Pie Chart Output illustrates PostScript formatted output for a pie chart. It was generated with the following command:

```
$ ADVISE PERFORMANCE PIE_CHART/BEGINNING=22-MAR-2006:12:00 -
_$ /ENDING=22-MAR-2006:14:00 -
_$ /NODE=(BYOB,BUGDEV,ORIPAS,BATCH,MIGHTB,CINAMN,CHATTY)/FORMAT=POSTSCRIPT -
_$ /TYPE=CUSTOM=SYSTEM_METRIC=CPU_TOTAL/COMPOSITE
```



The following example, Tabular Formatted Pie Chart Output, illustrates tabular formatted output for a pie chart. It was generated with the following command:

```
$ ADVISE PERFORMANCE PIE_CHART/BEGINNING=22-MAR-2006:12:00 -
_$ /ENDING=22-MAR-2006:14:00 -
_$ /NODE=(BYOB,BUGDEV,ORIPAS,BATCH,MIGHTB,CINAMN,CHATTY)/FORMAT=TABULAR -
_$ /TYPE=CUSTOM=SYSTEM_METRIC=CPU_TOTAL/COMPOSITE
```

```
                                         PSPA CUSTOM GRAPH
         Nodes: BYOB, BUGDEV, ORIPAS, BATCH, MIGHTB, CINAMN, CHATTY
                         Date: 22-MAR-2006 12:00-14:00

              The whole pie represents      11.79 %CPU Total Busy

Item                                    Value     Percent of Total
------------------------------------------------------------------------
BUGDEV                                  5.68626             48.216 %
BYOB                                    3.59973   30.523 %
CINAMN                        0.96963             8.222 %
ORIPAS                        0.49438             4.192 %
BATCH                                   0.49370             4.186 %
CHATTY                                  0.36808             3.121 %
 MIGHTB                       0.18164             1.540 %
```

The following example, CSV Formatted Pie Chart Output, illustrates CSV formatted output for a pie chart. It was generated with the following command:

```
$ ADVISE PERFORMANCE PIE_CHART/BEGINNING=22-MAR-2006:12:00 -
_$ /ENDING=22-MAR-2006:14:00 -
_$ /NODE=(BYOB,BUGDEV,ORIPAS,BATCH,MIGHTB,CINAMN,CHATTY)/FORMAT=CSV -
_$ /TYPE=CUSTOM=SYSTEM_METRIC=CPU_TOTAL/COMPOSITE
```

```
"PSPA CUSTOM GRAPH"
"Nodes: BYOB, BUGDEV, ORIPAS, BATCH, MIGHTB, CINAMN, CHATTY"
"Date: 22-MAR-2006 12:00-14:00"
"The whole pie represents      11.79 %CPU Total Busy"
"Item","Value","Percent of Total"
"BUGDEV",      5.68626,48.216
"BYOB",      3.59973,30.523
"CINAMN",      0.96963, 8.222
"ORIPAS",      0.49438, 4.192
"BATCH",      0.49370, 4.186
"CHATTY",      0.36808, 3.121
"MIGHTB",      0.18164, 1.540
```

Data Resolution with X_POINTS

For ReGIS and PostScript graphs, the X_POINTS keyword indicates the number of data points to plot along the *x*-axis of the graph, and is specified with the */FORMAT=REGIS=X_POINTS=number* qualifier, from a DCL command, or /X_POINTS=*number* qualifier from command mode.

For Tabular graphs, the X_POINTS keyword specifies the number of data points to present in the report, and is specified with the /FORMAT=TABULAR=X_POINTS=*number* qualifier. The valid range for X_POINTS is 2 to 480, the default is generally from 45 to 90, but is computed to produce an even time interval per point.

The following are examples of specifying the X_POINTS keyword:

- DCL command:

  ```
  $ ADVISE PERFORMANCE GRAPH/FORMAT=REGIS=X_POINTS=number
  ```

- Command mode:

  `PSPA> SELECT GRAPH/X_POINTS=number`

- DECwindows:

  ```
  Specify the Additional Options... option from the
  Select Data dialog box.
  ```

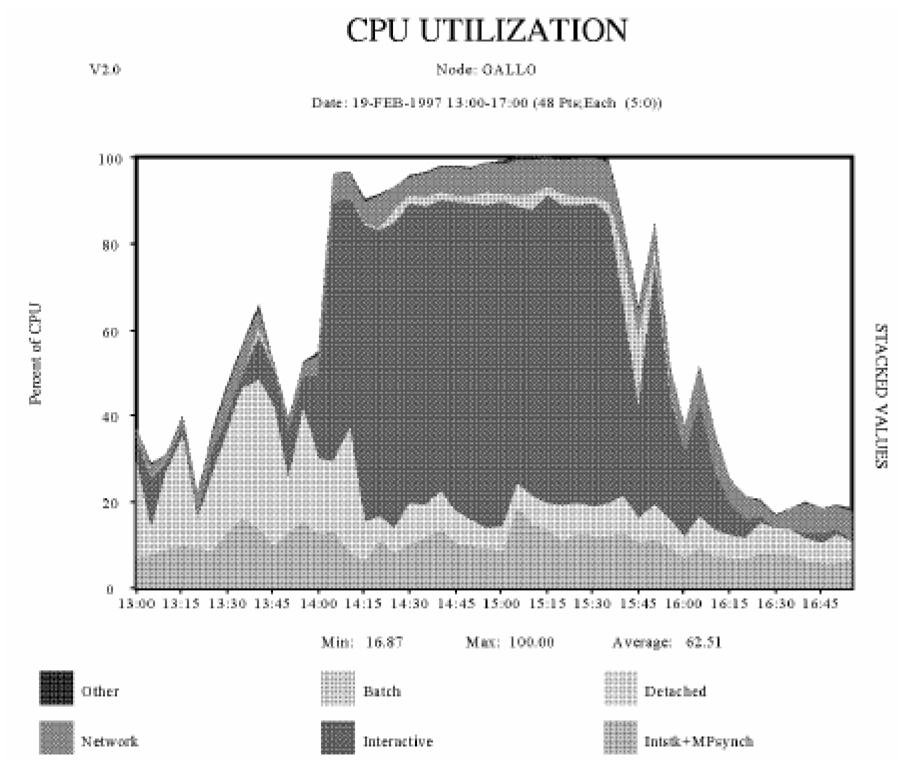
As the value of X_POINTS increases, more peaks and valleys appear on a graph. As the value decreases, the peaks and valleys are smoother because Performance Manager averages data points within the time frame requested.

The next three figures illustrate the relationship between the value of X_POINTS and a time frame of 4 hours. During this period the Performance Manager records statistics 120 times (every 2 minutes).

The following graph, X_POINTS Default Value Graph, uses 60 for the value of X_POINT. Therefore, two data records are averaged to calculate the value of each point plotted.

This command generates the graph:

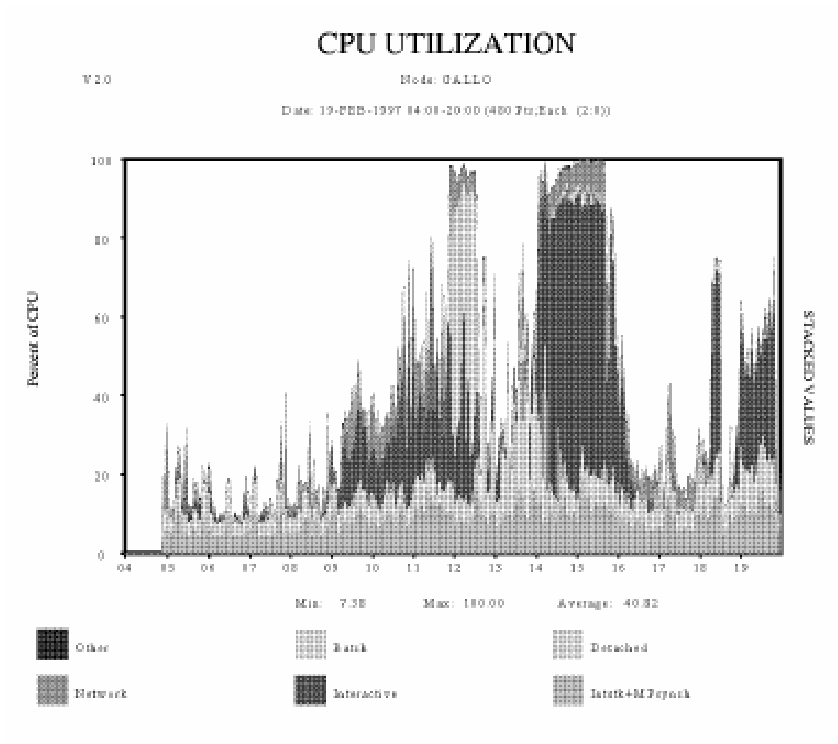
```
$ ADVISE PERFORMANCE GRAPH/BEGINNING=19-FEB-2006:13:00/ENDING=19-FEB-2006:17:00 -
_$ /TYPE=CPU_UTILIZATION/NODE=GALLO/OUTPUT=SUPPLY_XP_60.PS -
_$ /FORMAT=POST=CHARACTERISTIC=PATTERN
```



In the Maximum X_POINTS Graph, the value of X_POINTS is 480. Therefore, the graphing facility did not average the data.

This following command generates the following graph:

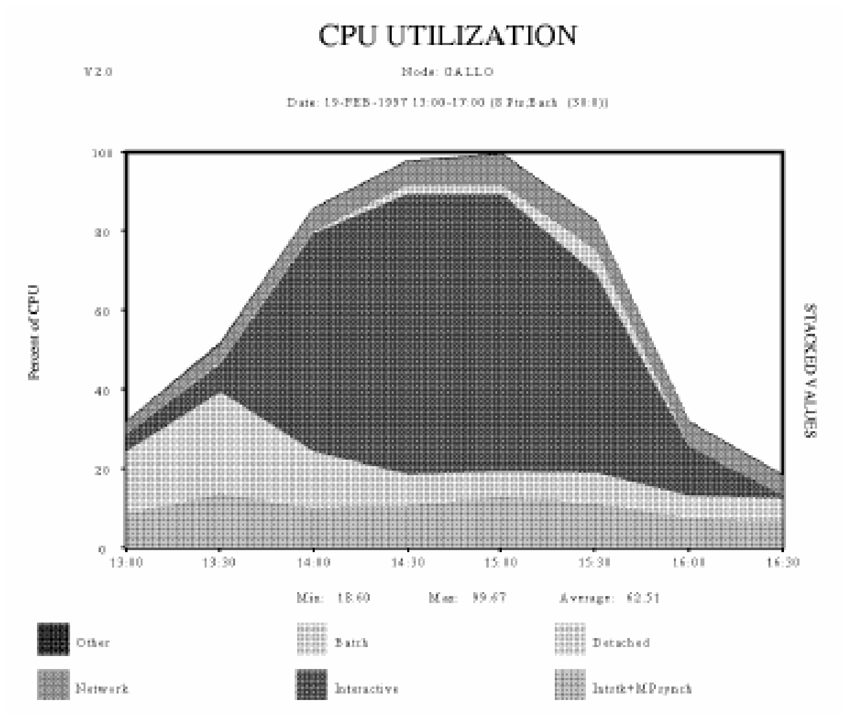
```
$ ADVISE PERFORMANCE GRAPH/BEGINNING=19-FEB-2006:04:00/ENDING=19-FEB-2006:20:00 -
_$ /TYPE=CPU_UTILIZATION/NODE=GALLO/OUTPUT=CH4CPU_XP_480.PS -
_$ /FORMAT=POSTSCRIPT=(CHARACTERISTIC=PATTERN,X_POINTS=480)
```



In the Minimum X_POINTS Graph, the value of X_POINTS is 8. The graphing facility averages every 15 data points in the four hour time span.

This command generates the graph:

```
$ ADVISE PERFORMANCE GRAPH/BEGINNING=19-FEB-2006:13:00/ENDING=19-FEB-2006:17:00 -
_$/TYPE=CPU_UTILIZATION/NODE=GALLO/OUTPUT=CH4CPU_XP_8.PS -
_$ /FORMAT=POSTSCRIPT=(CHARACTERISTIC=PATTERN,X_POINTS=8)
```



Generate Custom Graphs

The Custom graph type behaves differently than all other graph types because to control the graph data, you must specify one metric and up to six data items or up to six metrics and one data item.

You can use metrics from one of the following groups for a custom graph:

- System metrics
- Process metrics, selected by user name, image name or workload name
- Disk device metrics, selected by device name or volume name
- Processor mode metrics, selected by processor ID
- HSC metrics, selected by HSC node name
- SCS metrics, selected by SCS cluster node name
- Rule metrics (for archived data only), selected by rule ID
- HSC channel metrics, selected by HSC channel name

- File metrics, selected by file name
- Process Disk Volume I/O Rates, selected by user name and volume name, or image name and volume name

These metrics are described in the chapter Performance Manager Commands (see page 175).

You can specify the metrics and data items by one of the following methods:

- DCL command
- Interactive prompting

The units that the various metrics represent may differ, for example, I/Os per second or percentage of CPU time. The Performance Manager allows you to include data with different metrics on the same graph. Use your discretion when doing this, however.

Graph System Metrics

The following command generates a custom graph:

```
$ ADVISE PERFORMANCE GRAPH/TYPE=CUSTOM=( -
_$ SYSTEM_METRICS=(DZRO,GVALID),TITLE="Pagefaulting")
```

The following example, Prompting for System Metrics Custom Graph, shows Performance Manager prompts and user input that generate the same graph in command mode:

```
$ ADVISE PERFORMANCE
PSPA> SELECT/BEGINNING=19-FEB-2006:13:00 -
_PSPA> /ENDING=19-FEB-2006:17:00 GRAPH=BY_NODE
```

The resulting graph appears in the example, Custom Graph for System Metrics.

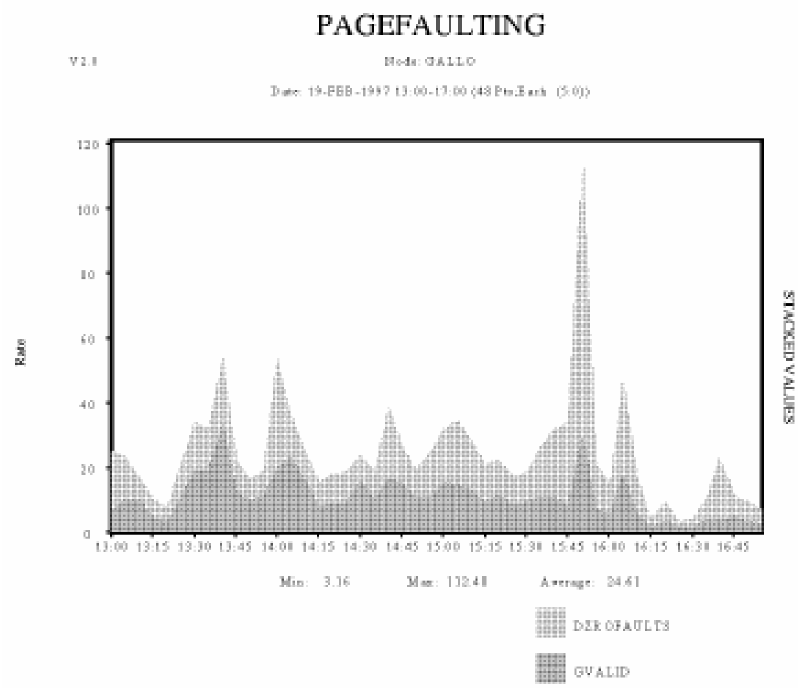
```
Processing Options
----------------------------------------------------------------
ANALYSIS REPORT NO
PERFORMANCE_EVALUATION REPORT NO
GRAPHS YES
User Names YES
Image Names YES
Hot File Names NO
User/Image Volume IO NO
IO Devices & workloads YES
By Node details YES

Reading data for node YQUEM
Reading data for node GALLO
PSPA>GRAPH/TYPE=PROMPT/FORMAT=POSTSCRIPT=CHARACTERISTIC=PATTERN/OUT=CH4CUSTOM_PROMT.PS
Please select either 1) a predefined graph or
 2) a custom graph
Choice [1]: 2
0. Composite
1. YQUEM
2. GALLO

Please select a node number [0]: 2
For the CUSTOM Graph, select one of the following:

 1. System Metrics
 2. Process metrics selected by user name
 3. Process metrics selected by image name
 4. Process metrics selected by workload name
 5. Disk device metrics selected by device name
 6. Disk device metrics selected by volume name
 7. Processor mode metrics by physical processor ID
 8. HSC metrics by HSC node name
 9. SCS metrics by SCS Cluster node name
10. RULE metrics by rule id
11. HSC Channel metrics by channel name
12. File metrics by file name
13. IOs by Username and Volumename
14. IOs by Imagename and Volumename

Enter Choice (1 - 14): 1 [1]
Select Up to 6 System Metrics (<CR> for list): [2]
GRAPH
 /TYPE
 CUSTOM
 System_metrics

Select up to 6 of the following system metrics to be displayed on a custom graph:

Sampled %CPU mode metrics (for all CPUs in an SMP configuration):

COMPAT EXEC FILE_SYS IDLE INTERRUPT
KERNEL MP_SYNCH SUPER USER_MODE

Sampled process counts by process state:

COLPG MWAIT CEF PFW CUR
LEF LEFO HIB HIBO SUSP
SUSPO FPG COM COMO
INPROCACT INPROCINACT
OUTPROCACT OUTPROCINACT
TOTAL_PROCESSES

Sampled process counts by type:

BATCH_PROCESSES INTERACTIVE_PROCESSES
NETWORK_PROCESSES DETACHED_PROCESSES

Derived CPU time metrics:

%CPU Utilization Compute Queue
------------------------------------- -----------------------------
CPU_BATCH CPU_INTERACTIVE BATCH_COMQ INT_COMQ
```

```
CPU_NETWORK CPU_OTHER NETWORK_COMQ DETACHED_COMQ
CPU_DETACHED CPU_TOTAL
CPU_MP_INT

Sampled paging/swapping/memory metrics:
Paging Rates MemoryPages Swaprate
-------------------------------- -------- --------
DZROFAULTS FAULTS FREEFAULTS FREECNT INSWAP
GVALID MFYFAULTS PREADIO MPYCNT
PREADS PWRITES PWRITIO
SYSFAULTS WRTINPROG IMAGE_ACTIVATIONS

Derived paging/swapping/memory metrics:

Memory Utilization as a percentage Pagefile Utilization
--------------------------------- -------------------
FREELIM FREELIST MODIFIED PAGEFILE_UTILIZATION
MEM_TOTAL SYSTEMWS USERWS
VMSALLOC

Sampled system IO rates:

BUFIO DIRIO ERASE_QIO FILE_CACHE_HIT
FILE_CACHE_MISS FILE_OPEN LOGNAM MBREADS MBWRITES
SPLITIO WINDOW_TURN

Derived system IO rates:

 Disks Terminals and Printers
----------------------------- --------------------------------
DISK_PAGING DISK_SWAPPING LAT_TERMIO NV_TERMIO RT_TERMIO
DISK_USER TT_TERMIO TX_TERMIO TW_TERMIO
 WT_TERMIO OTHERBUFIO
Sampled DECnet metrics:

ARRLOCPK ARRTRAPK DEPLOCPK RCVBUFFL TRCNGLOS

Sampled distributed locking metrics:

DEADLOCK_FIND DEADLOCK_SEARCH INCOMING_LOCKING
LOCAL_LOCKING OUTGOING_LOCKING

Sampled pool metrics:

IRP_CNT IRP_MAX LOCK_CNT LRP_CNT
LRP_MAX NP_FREE_BLOCKS NP_FREE_BYTES NP_FREE_LEQ_32
NP_MAX_BLOCK NP_MIN_BLOCK NP_POOL_MAX PG_FREE_BLOCKS
PG_FREE_BYTES PG_FREE_LEQ_32 PG_MAX_BLOCK PG_MIN_BLOCK
PG_POOL_MAX RESOURCE_CNT SRP_CNT SRP_MAX

Other system metrics:

SM_RESPONSE MED_RESPONSE LG_RESPONSE
CPU_VUP_RATING RELATIVE_CPU_POWER

Select Up to 6 System Metrics (<CR> for list): DZROFAULTS, GVALID [3]
Enter an optional title for the CUSTOM graph <40 characters max>

Title [PSPA CUSTOM GRAPH]:PAGEFAULTING [4]
```

The following statements are keyed to the Prompting for System Metrics Graph:

1. 1 was entered to select System Metrics.
2. <CR> was entered to select the list of system metrics.

3. DZRO, GVALID was entered to select these two metrics.
4. Pagefaulting was entered to select the custom graph title.



Graph Process Metrics by User

When graphing process metrics by user you must specify either of the following user names and process metrics:

- A list of up to six user names and a single process metric

  or

- A single user name with a list of up to six process metrics

Performance Manager graphs include the metrics for all users that match any one of the user names you specify in the list. The resulting graph depicts each of the specified users or metrics separately on the plot.

To graph process metrics by user in DCL mode, issue the command:

```
$ ADVISE PERFORMANCE GRAPH -
_$ /TYPE=CUSTOM=(USER_METRICS=CPUTIME,-
_$ SELECTION=(DIEGER,HAFFMAN,ORIPAS,-
_$ SANTELK,FRED_CARL,SARBID),-
_$ TITLE="CPU time used by the team"
```

The Prompting for Process Custom Graph example shows Performance Manager prompts and user input that generate the same graph using command mode and specifying the following command:

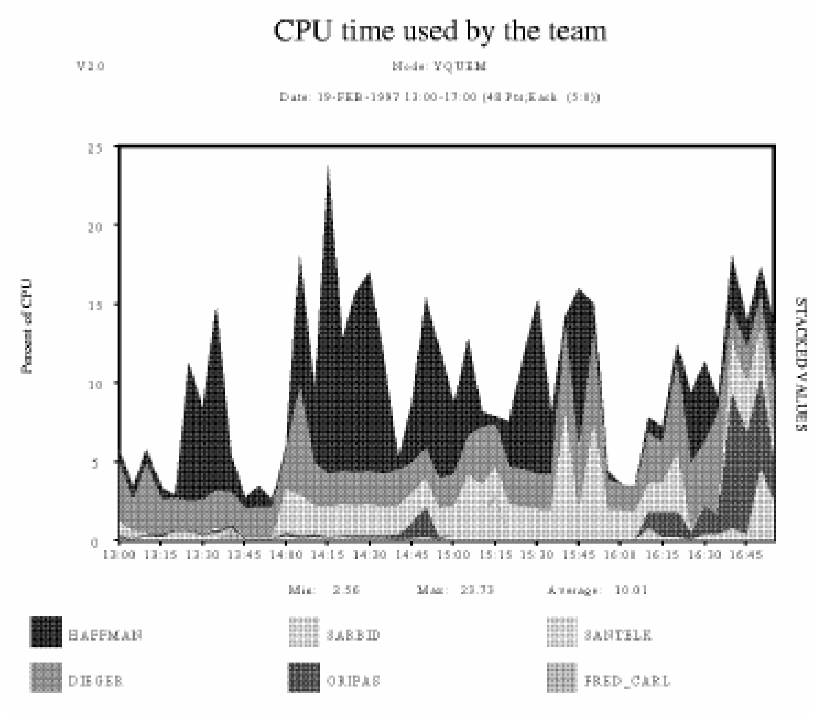
```
PSPA> GRAPH/TYPE=PROMPT/FORMAT=POSTSCRIPT=CHARACTERISTIC=PATTERN -
_PSPA> /OUT=CH4CUSTOM_USER_PROMPT.PS
```

The graph itself appears in the figure, Custom Graph for Process Usage.

The following statements are keyed to the Prompting for Process Custom Graph example:

1. 2 was entered to select process metrics selected by user name.
2. The user names were entered to select the users.
3. <CR> was entered to request the list of process metrics.
4. CPUTIME was selected from the list and entered.
5. The Custom graph title was entered.

```
Please select either 1) a predefined graph or
 2) a custom graph

Choice [1]: 2
0. Composite
1. YQUEM
2. GALLO

Please select a node number [0]: 1

For the CUSTOM Graph, select one of the following:

1. System Metrics
2. Process metrics selected by user name
3. Process metrics selected by image name
4. Process metrics selected by workload name
5. Disk device metrics selected by device name
6. Disk device metrics selected by volume name
7. Processor mode metrics by physical processor ID
8. HSC metrics by HSC node name
9. SCS metrics by SCS Cluster node name
10. RULE metrics by rule id
11. HSC Channel metrics by channel name
12. File metrics by file name
13. IOs by Username and Volumename
14. IOs by Imagename and VolumenameEnter Choice (1 - 14): 2

Enter Choice b(1 - 14) : 2 [1]

Select up to 6 User Names (<CR> for list): SANTELK,HAFFMAN,SARBID,ORIPAS,FRED_CARL,DIEGER [2]

Select one process metric (<CR>) for list: [3]

GRAPH
 /TYPE
 CUSTOM
 Process_metrics

The following process metrics can be requested on a custom graph.

BUFIO CPUTIME DIRIO DSKIO
DSKTP FAULTS HARDFAULTS IMAGE_ACTIVATIONS
IO_SIZE RESIDENCE RESPONSE_TIME TAPIO
TAPTP TERM_INPUT TERM_THRUPUT WSSIZE VASIZE

Select one process metric (<CR> for list): CPUTIME [4]
Enter an optional title for the CUSTOM graph <40 characters max>

Title [PSPA CUSTOM GRAPH]:CPU time used by the team [5]

PSPA>
```



Graph the Hot File Activity

By default, PA combines files with the same names regardless of differing directory or device locations. To separate files having different directories or devices, you must define the logical names PSPA$GRAPH_FILE_DIRECTORY and PSPA$GRAPH_FILE_DEVICE. Or, alternatively, use the /FILTER qualifier to select hotfile records for specific processes and/or disk devices.

If the graph legend is undesirable due to its length, you have several options to shrink the font used to print the legend. DECwindows has a Resources file that can change the font. PostScript has a logical name.

The Pie Chart can be presented in tabular format which gives a wider legend text.

If the file is deleted before the prod_fam Performance Manager detects its specification, its name is not available. The FID is provided in parentheses instead of its name. All non-virtual QIO activity to the disk is reported under the file specification, Non Virtual QIO.

Chapter 5: Customize the Knowledge Base

This chapter provides information about the knowledge base, rules, and customizing both.

This section contains the following topics:

The Knowledge Base

The Performance Manager makes assertions and inferences about system performance based on a large and changing body of technical information called a *knowledge base*. This information is in the form of performance rules. Performance rules come from one or two sources. The first source of rules is the product itself. The factory rules are automatically loaded by the user interfaces that require them. The second source is an *auxiliary rules file*, which you create.

While the Performance Manager is designed to work without any modifications, an experienced system manager can further benefit from the tool by customizing the knowledge base. Good reasons to customize the knowledge base include the following rules:

- Eliminating the firing of rules for conditions that are customary and unchangeable for your system
- Refining rules to filter testing of specific images or other conditions that are a required and unchangeable part of your workload
- Modifying the characteristics of certain (older) disk devices that you might own and still use (for example, RF31)
- Adding rules to check for additional warning conditions that are specific for your own workloads and systems

Investigate Rule Firing

The factory rules embedded in the Performance Manager follow the methodology in the HP's *OpenVMS Performance Management* guide. Some rules go beyond this methodology.

Keep in mind that, while the Performance Manager alerts you to potential performance problems, it does not (by default) screen out firings that are insignificant. Some circumstances on your system might fire a rule, for a one-time transient condition, without any implications for the long-term performance of your system. The factory rules try to minimize this possibility by setting occurrence thresholds within rules, but this might still happen.

Figure out whether you need to be concerned about a particular rule firing. Check the evidence provided with each rule. Does the problem appear to be persistent (as indicated by many lines of evidence)? Check the time of occurrence: does this happen at the same time as a regularly scheduled job? Make sure you understand the meaning of each data item presented. If you are unsure of a definition, look it up in the Data Cell Types and Use section, or use the online Help system, which contains hotspots to all the data items in the Conditions and in the Evidence. Many of the data items presented as evidence are used in the rule's conditions: read the conditions, and understand how each data item is being used, and what values would cause it to fire.

You are probably very familiar with approximate or typical values for many parameters of your systems. If a rule fires, but all related evidence appears normal for your environment, then you probably want to adjust that rule's thresholds to reflect more precisely the upper bounds of performance for your particular workloads and systems. For more information on how to do this, see How to Implement Changes in this chapter.

However, if the evidence presented does not look normal, or if you don't know what normal looks like for those data items, you need to investigate further. One good way is to generate graphs of those or related data items for the time periods given in the evidence, and then look for unusual spikes of activity. If you find spikes occurring at the same time in different graphs, then you might suspect that the data items graphed are somehow related to the underlying problem, which might lead you to ideas of what might be changed to fix the problem.

Another path of investigation is to look for related rule firings. A rule might not present the full picture by itself, but when coupled with related rules, could give you a clear indication of the source of the problem. Related rules need not appear one after the other, as Performance Manager processes rules in the following order: CPU, memory, I/O, resource (miscellaneous), and (after all nodes have been analyzed) cluster-wide. (You do not need to have a cluster for one of these rules to fire, but the metrics used are not specific to an individual node, so they are evaluated after all node-specific rules.) Rules which require special evidence processing (as indicated by the absence of evidence data items in the rules source file) are presented first.

Finally, if you observe a persistent performance problem, you can use the Real-time Motif displays to investigate dynamically-see the chapters Use the DECwindows Motif Real-time Display (see page 321) and Customize the DECwindows Motif Real-time Display (see page 341). This new functionality supports progressive disclosure, so that you can start monitoring with high-level system displays, and then progressively launch panels to focus on perceived problem areas, as they are occurring.

Components of Rules

A *rule* is a conditional statement in an *if/then* format. A rule can contain multiple conditions. The Performance Manager evaluates rules while generating Analysis Reports. If all conditions of the rule are true, then there is a *rule occurrence*. If the number of rule occurrences meet the rule occurrence threshold, the rule is said to *fire* and the Performance Manager reports the associated rule conclusion.

A Performance Manager rules file contains entities known as *constructs*. Performance Manager *rule constructs* represent rules. Rule construct elements govern the syntax of the rule.

Rules File Constructs

The format of a rules file is not rigid. Multiple spaces, tabs, carriage return, and form feeds are treated as a single space. A rules file can include the following five constructs:

- RULE
- DISABLE
- LITERAL
- COMMENT
- THRESHOLD

These rule constructs, their format, and use are discussed next:

RULE

Constructs define rules.

- The format of the rule construct is as follows:

  ```
  RULE rule_elements ENDRULE
  ```

- The rule construct consists of seven rule elements. The optional elements in the list following are enclosed in brackets:
  - Rule ID element
  - [Domain element]
  - Rule condition element [Rule condition element...]
  - [Occurrence threshold element]
  - [Evidence element]
  - [Conclusion text element]
  - [Brief conclusion text element]
- Once defined and compiled, the rules can be supplied to the analysis process to cause a conclusion to be fired as appropriate or can be supplied to the archival process to cause the number of occurrences of the rule to be archived.

DISABLE

Constructs allow you to turn off individual rules.

- The format of the disable construct is as follows:

  ```
  DISABLE rule_id [rule_id...];
  ```

- The parameter *rule id* specifies which rule or rules to disable; the construct ends with a semicolon (;).

LITERAL

Constructs allow you to define unique symbols for use in a rule expansion.

- The format of the literal construct is as follows:

  ```
  LITERAL literal_definition [literal_definition...] ENDLITERAL
  ```

- A literal definition is defined as:

  ```
  literal_symbol = decimal_value
  ```

- A *literal symbol* is a unique symbol that you have equated to a decimal value. A literal symbol can contain up to 40 alphanumeric characters that have not been defined before as a literal, a threshold, or a data cell. A literal symbol can be used in a rule expansion.

COMMENT

Constructs allow you to include notations in the rules file.

- An exclamation point (!), occurring as the first character in the line, denotes a comment construct. The Performance Manager ignores any text on the line after the exclamation point.

THRESHOLD

Constructs allow you to modify internal thresholds that affect the calculation of derived data cells.

- The format of a threshold construct is as follows:

  ```
  THRESHOLD threshold_definition [threshold_definition...] ENDTHRESHOLD
  ```

- A threshold definition is defined as:

  ```
  threshold_name = decimal_value
  ```

- A *threshold name* must match one of the Performance Manager's predefined thresholds. These thresholds are not used directly in the rule expression; however, they influence the resultant value of some data cells that can be used in rule expressions. Some thresholds act as occurrence limits for a few factory rules.

- The following table lists the Performance Manager's predefined thresholds and the default value of each threshold, and describes how each threshold affects the data cells or evidence.

- All thresholds have a prefix of TD. These thresholds cannot be redefined, but their values can be modified.

The following tables show the Performance Manager thresholds:

Name	Default Value	Description
TD_MIN_DSKSPC_PCT	.05	The minimum percentage of disk free blocks required to set the data cell ANY_DISK_FULL to 1 for a given Performance Manager two-minute record.
TD_DISK_QL_MAX	1	The maximum queue length on any disk required to set the data cell ANY_DISK_OVER_QL_THRESHOLD to 1 for a given Performance Manager two-minute record. This affects condition-checking on rules I0040, I0050, I0055, I0060, and I0150.

Name	Default Value	Description
TD_SMP_VUP_RATIO	85	A percentage of the threshold TD_SINGLE_CPU_VUP_n value applied to additional CPUs in an SMP system used to compute the total VUPs. This is used to compute the data cell CPU_VUP_RATING for processor type N. See the processor specific thresholds in the next table.
TD_M0010_PROBRECS_PER_IMAGE	4	Number of records for any one image required to fire the rule M0010.
TD_PROCESS	2	Number of problem records per user/image combination required to include the record into the evidence for rules M0050, M0055, and M0060.
TD_CIO	4	Number of problem records per disk volume required to include the image into the evidence for rule L0050, L0060, and L0070.
TD_IO_ERROR	2	Number of problem records per disk volume required to include the volume into the evidence for rule L0080.
TD_CI_PORT_IO	1500000	Number of bytes per second through any CI port required to set the data cell EXCESS_THRUPUT_ON_ANY_CHANNEL to 1 for a given Performance Manager two-minute record.
TD_UNIBUS_CHANNEL_IO	1000000	Number of bytes per second through any UNIBUS port required to set the data cell EXCESS_THRUPUT_ON_ANY_CHANNEL to 1 for a given Performance Manager two-minute record.

Name	Default Value	Description
TD_KDA_CHANNEL_IO	800000	Number of bytes per second through any KDA50 port required to set the data cell EXCESS_THRUPUT_ON_ANY_CHANNEL to 1 for a given Performance Manager two-minute record.
TD_KDB_CHANNEL_IO	900000	Number of bytes per second through any KDB port required to set the data cell EXCESS_THRUPUT_ON_ANY_CHANNEL to 1 for a given Performance Manager two-minute record.
TD_MASSBUS_CHANNEL_IO	1700000	Number of bytes per second through any MASSBUS port required to set the data cell EXCESS_THRUPUT_ON_ANY_CHANNEL to 1 for a given Performance Manager two-minute record.
TD_GENERIC_DISK_IO	30	Default I/O operation per second threshold for disks that are not covered in the translation table (TD_Tn_x) thresholds.
TD_GENERIC_DISK_THRUPUT	1000000	Default number of bytes per second threshold for disks that are not covered in the translation table (TD_In_x) thresholds.
TD_T1_RK06	20	I/O per second threshold for disk type. Data cell DISK_IO_RATE_THRESHOLD has this value if the current disk sub-record is of this type.
TD_T2_RK07	20	Same as previous.
TD_T3_RP04	26	Same as previous.
TD_T4_RP05	26	Same as previous.
TD_T5_RP06	26	Same as previous.
TD_T6_RM03	26	Same as previous.
TD_T7_RP07	32	Same as previous.
TD_T8_RP07HT	32	Same as previous.
TD_T13_RM80	30	Same as previous.

Name	Default Value	Description
TD_T15_RM05	26	Same as previous.
TD_T20_RA80	27	Same as previous.
TD_T21_RA81	28	Same as previous.
TD_T22_RA60	20	Same as previous.
TD_T25_RD51	10	Same as previous.
TD_T27_RD52	20	Same as previous.
TD_T28_RD53	26	Same as previous.
TD_T30_RA82	33	Same as previous.
TD_T31_RD31	18	Same as previous.
TD_T32_RD54	26	Same as previous.
TD_T34_RRD50	20	Same as previous.
TD_T36_RX33	10	Same as previous.
TD_T37_RX18	10	Same as previous.
TD_T38_RA70	32	Same as previous.
TD_T39_RA90	34	Same as previous.
TD_T40_RD32	20	Same as previous.
TD_T42_RX35	10	Same as previous.
TD_T43_RF30	24	Same as previous.
TD_T44_RF71	24	Same as previous.
TD_T45_RD33	18	Same as previous.
TD_T46_ESE20	240	Same as previous.
TD_T47_TU56	30	Same as previous.
TD_T48_RZ22	24	Same as previous.
TD_T49_RZ23	24	Same as previous.
TD_T50_RZ24	32	Same as previous.
TD_T51_RZ55	31	Same as previous.
TD_T52_RRD40S	20	Same as previous.
TD_T53_RRD40	20	Same as previous.
TD_T54_GENERIC_DK	30	Same as previous.
TD_T55_RX23	10	Same as previous.

Name	Default Value	Description
TD_T56_RF31	78	Same as previous.
TD_T57_RF72	37	Same as previous.
TD_T58_RAM_DISK	130	Same as previous.
TD_T59_RZ25	38	Same as previous.
TD_T60_RZ56	34	Same as previous.
TD_T61_RZ57	38	Same as previous.
TD_T62_RX23S	10	Same as previous.
TD_T63_RX33S	10	Same as previous.
TD_T64_RA92	33	Same as previous.
TD_T65_SSTRIPE	60	Same as previous.
TD_T66_RZ23L	30	Same as previous.
TD_T67_RX26	10	Same as previous.
TD_T68_RZ57I	38	Same as previous.
TD_T70_RZ58	4	Same as previous.
TD_T71_SCSI_MO	20	Same as previous.
TD_T72_RRD42	20	Same as previous.
TD_T73_CD_LOADER_1	20	Same as previous.
TD_T74_ESE25	240	Same as previous.
TD_T75_RFH31	78	Same as previous.
TD_T76_RFH72	37	Same as previous.
TD_T77_RF73	44	Same as previous.
TD_T78_RFH73	44	Same as previous.
TD_T79_RA72	40	Same as previous.
TD_T80_RA71	40	Same as previous.
TD_T81_RF35	69	Same as previous.
TD_T82_RFH35	69	Same as previous.
TD_T83_RF31F	40	Same as previous.
TD_T84_RZ72	37	Same as previous.
TD_T85_RZ73	36	Same as previous.
TD_T86_RZ35	53	Same as previous.

Name	Default Value	Description
TD_T87_RZ24L	35	Same as previous.
TD_T88_RZ25L	41	Same as previous.
TD_T89_RZ55L	34	Same as previous.
TD_T90_RZ56L	37	Same as previous.
TD_T91_RZ57L	42	Same as previous.
TD_T92_RA73	44	Same as previous.
TD_T93_RZ26	50	Same as previous.
TD_T94_RZ36	51	Same as previous.
TD_T95_RZ74	47	Same as previous.
TD_T96_ESE52	1300	Same as previous.
TD_T97_ESE56	1300	Same as previous.
TD_T98_ESE58	1300	Same as previous.
TD_T99_RZ27	51	Same as previous.
TD_I1_RK06	530000	Number of bytes per second threshold for disk type. Data cell DISK_THRUPUT_RATE_THRESHOLD has this value if the current disk sub-record is of this type.
TD_I2_RK07	530000	Same as previous.
TD_I3_RP04	800000	Same as previous.
TD_I4_RP05	800000	Same as previous.
TD_I5_RP06	800000	Same as previous.
TD_I6_RM03	1200000	Same as previous.
TD_I7_RP07	1300000	Same as previous.
TD_I8_RP07HT	2200000	Same as previous.
TD_I13_RM80	1000000	Same as previous.
TD_I15_RM05	1200000	Same as previous.
TD_I20_RA80	800000	Same as previous.
TD_I21_RA81	1500000	Same as previous.
TD_I22_RA60	1300000	Same as previous.
TD_I25_RD51	300000	Same as previous.

Name	Default Value	Description
TD_I27_RD52	530000	Same as previous.
TD_I28_RD53	530000	Same as previous.
TD_I30_RA82	1600000	Same as previous.
TD_I31_RD31	500000	Same as previous.
TD_I32_RD54	530000	Same as previous.
TD_I34_RRD50	120000	Same as previous.
TD_I36_RX33	400000	Same as previous.
TD_I37_RX18	400000	Same as previous.
TD_I38_RA70	1000000	Same as previous.
TD_I39_RA90	1900000	Same as previous.
TD_I40_RD32	500000	Same as previous.
TD_I42_RX35	400000	Same as previous.
TD_I43_RF30	900000	Same as previous.
TD_I44_RF71	900000	Same as previous.
TD_I45_RD33	500000	Same as previous.
TD_I46_ESE20	2000000	Same as previous.
TD_I47_TU56	750000	Same as previous.
TD_I48_RZ22	1000000	Same as previous.
TD_I49_RZ23	1000000	Same as previous.
TD_I50_RZ24	1200000	Same as previous.
TD_I51_RZ55	1000000	Same as previous.
TD_I52_RRD40S	120000	Same as previous.
TD_I53_RRD40	120000	Same as previous.
TD_I54_GENERIC_DK	750000	Same as previous.
TD_I55_RX23	400000	Same as previous.
TD_I56_RF31	2100000	Same as previous.
TD_I57_RF72	1200000	Same as previous.
TD_I58_RAM_DISK	5000000	Same as previous.
TD_I59_RZ25	1800000	Same as previous.
TD_I60_RZ56	1400000	Same as previous.

Name	Default Value	Description
TD_I61_RZ57	1700000	Same as previous.
TD_I62_RX23S	400000	Same as previous.
TD_I63_RX33S	400000	Same as previous.
TD_ _RA92	1900000	Same as previous.
TD_I65_SSTRIPE	1200000	Same as previous.
TD_I66_RZ23L	1200000	Same as previous.
TD_I67_RX26	500000	Same as previous.
TD_I68_RZ57I	1500000	Same as previous.
TD_I70_RZ58	3100000	Same as previous.
TD_I71_SCSI_MO	750000	Same as previous.
TD_I72_RRD42	120000	Same as previous.
TD_I73_CD_LOADER_1	120000	Same as previous.
TD_I74_ESE25	2000000	Same as previous.
TD_I75_RFH31	2100000	Same as previous.
TD_I76_RFH72	1600000	Same as previous.
TD_I77_RF73	2100000	Same as previous.
TD_I78_RFH73	2100000	Same as previous.
TD_I79_RA72	1400000	Same as previous.
TD_I80_RA71	1400000	Same as previous.
TD_I81_RF35	2600000	Same as previous.
TD_I82_RFH35	2600000	Same as previous.
TD_I83_RF31F	1400000	Same as previous.
TD_I84_RZ72	1400000	Same as previous.
TD_I85_RZ73	1900000	Same as previous.
TD_I86_RZ35	2600000	Same as previous.
TD_I87_RZ24L	1900000	Same as previous.
TD_I88_RZ25L	2000000	Same as previous.
TD_I89_RZ55L	1100000	Same as previous.
TD_I90_RZ56L	1500000	Same as previous.
TD_I91_RZ57L	1800000	Same as previous.

Name	Default Value	Description
TD_I92_RA73	2100000	Same as previous.
TD_I93_RZ26	2600000	Same as previous.
TD_I94_RZ36	3700000	Same as previous.
TD_I95_RZ74	3100000	Same as previous.
TD_I96_ESE52	2000000	Same as previous.
TD_I97_ESE56	2000000	Same as previous.
TD_I98_ESE58	2000000	Same as previous.
TD_I99_RZ27	3700000	Same as previous.

Processor-Specific Thresholds

The processor-specific thresholds can be modified by using threshold scaling factors indicated in the following table:

Threshold Name	Affected Data Cell Name
TD_SINGLE_CPU_VUP_n	CPU_VUP_RATING
TD_SOFT_FAULT_SCALING_n	SOFT_FAULT_SCALING
TD_HARD_FAULT_SCALING_n	HARD_FAULT_SCALING
TD_IMGACT_SCALING_n	IMGACT_SCALING
TD_COM_SCALING_n	COM_SCALING

The *n* is an integer that specifies an individual processor and must be replaced by a model number. All Integrity servers use 4096 for a model number. For Alpha systems, you can get the model number of a specific processor by using the $GETSYI system service using the item code SYI$HWMODEL. An entry of zero is used for an unknown model.

A scale factor of 1.0 is used as a basis for the rules when applied to a VAX-11/780 system.

For example, the threshold construct TD_SOFT_FAULT_SCALING_40 = 0.4 places the value 0.4 in the data cell SOFT_FAULT_SCALING when a VAX model 40 is being analyzed. A VAX model 40 is a MicroVAX 2000.

Rule Construct Elements

A rule construct consists of up to seven elements. Each construct begins with RULE and ends with ENDRULE. The following sections describe each of the elements listed in the following table:

Rule Construct Elements and Descriptions

Element	Presence	Description
Rule ID	Required	Identifies a rule definition.
Domain	Optional	Identifies the domain; default is LOCAL.
Rule conditions	Required	There must be at least one condition.
Occurrence	Optional	Number of occurrences for the rule to fire; default is one.
Evidence	Optional	If omitted, no evidence is presented.
Conclusion text	Optional	If omitted, no conclusion text is presented.
Brief conclusion text	Optional	If omitted, no conclusion text is presented.

Auxiliary Rules File Example

As shown in following example, the first three elements - rule ID, domain, and the rule conditions - must be in this order. The next four elements may be in any order.

```
!       disable M0010
DISABLE M0010;
!       fire this rule after 10 rule occurrences
LITERAL Too_many = 10 ENDLITERAL
Rule UM010 Domain Local
Soft_fault_Rate .ge. 100 ;
Hard_fault_Rate .ge. 8 ;
Pages_on_Freelist .le. 300 ;
Computable_Processes_Ovr_Defpri .ge. 2.5 ;
Direct_IO_Rate .ge. 40 ;
Occurrences = Too_many;
Evidence =
                 Soft_Fault_Rate
                 Hard_fault_Rate
                 Pages_on_freelist
```

```
                 Computable_Processes_Ovr_Defpri
                 Direct_IO_Rate
                 User_name (Top_HF_User_X)
                 Volume_Name (Highest_IO_rate_disk_x)Time;
                   Conclusion " There are significant demands on all of
                 the system's resources.  Either lower
                 the overall demand, or expand the data
                 processing resources."

Brief_conclusion
                  "System resources fully taxed;
                   performance degradation likely."

EndRule
```

Rule ID Element

The rule ID identifies the rule. Each rule must begin with a unique *rule identifier*. The format of a rule identifier is this:

```
RULE rule_ID
```

Where *rule_ID*:

- Is one to five alphanumeric characters.
- Does not have a zero for the second character. The zero is reserved for use by CA.
- Is not already defined by Performance Manager factory rules.

By convention, the first character of a rule identifier describes the rule performance category. The Performance Manager uses the alphabetic characters in the following table as the first letter of the rule identifier.

The following table lists the rule ID abbreviations:

Letter	Rule Performance Category
C	CPU-related rule
M	Memory-related rule
I	I/O-related rule
R	Resource (miscellaneous) rule
L	Cluster-related rule
X	XFC-related rule

Domain Element

The domain element defines the context in which the rule exists. The association between a rule and its domain designates when a rule is tested and under which Analysis Report section the rule firing is reported.

The definition of a domain for Performance Manager knowledge base processing is based on the sub-records that are read from collected data. Each rule exists within a single domain. Also, each data cell is associated with a set of domains. Rules can reference any data cells in the domain in which the rule exists. If you omit the domain element, the default domain for the rule is LOCAL.

The format of the domain element is as follows:

`DOMAIN` *`domain_name`* `[TRACE]`

domain_name

Can be one of the following names:

- CLUSTER
- COMMUNICATION
- CONFIGURATION
- CPU
- DISK
- FILE
- LOCAL
- LOCALC
- PROCESS
- SUMMARY
- TAPE

Domain Names, Rule Testing, and Reporting

Domain selection determines the data against which the rule is evaluated, the frequency with which the rule is tested and the Analysis Report section in which the conclusion is reported. See the following table. An interval record contains data for a single node in a cluster system.

Domain Name	Report Section	Testing Frequency
CLUSTER	Cluster analysis	Multiple times depending on the number of disks

Domain Name	Report Section	Testing Frequency
COMMUNICATION	Local analysis	Multiple times per interval record depending on the number of terminal controllers
CONFIGURATION	Local analysis	Multiple times per interval record depending on the number of remote nodes within a cluster system
CPU	Local analysis	Multiple times per interval record depending on the number of processors in a multiprocessor system
DISK	Local analysis	Multiple times per interval record depending on the number of disk sub-records
FILE	Local analysis	Multiple times per interval record depending on the number of hot file sub-records
LOCAL	Local analysis	Once per interval record
LOCALC	Cluster analysis	Once per interval record
PROCESS	Local analysis	Multiple times per interval record depending on the number of process sub-records
SUMMARY	Local analysis	Once per node
TAPE	Local analysis	Multiple times per interval record depending on the number of tape sub-records

Optionally, you can display a trace each time a rule's condition is tested. During report generation, the Performance Manager displays the trace only on the terminal screen.

The following code is sample output using TRACE:

```
%RULETRACE of UM010 condition 1 is TRUE
%RULETRACE of UM010 condition 2 is FALSE
```

The Performance Manager displays this debugging information for each rule condition when the condition is evaluated and terminates with the first FALSE condition. It is possible that the Performance Manager does not output a trace for your rule. This occurs when another rule with a rule condition identical to one of your rule's conditions is evaluated to FALSE. In this case, the Performance Manager does not evaluate your rule because it is known to be false.

The relationship between domains and data cells is fixed. Rules are in domains. Data cells are in one or more domains.

- Rules defined in the CLUSTER or SUMMARY domain can reference data cells only in the CLUSTER or SUMMARY domain, respectively.
- Rules defined in the LOCAL domain can reference data cells in the LOCAL domain and in other domains, but only if there is an index specifier for the specific domain.
- Rules defined in any of the remaining seven domains - COMMUNICATION, CONFIGURATION, CPU, DISK, FILE, PROCESS, or TAPE - can reference data cells in their own domains or the LOCAL domain. The rule can reference data cells in any other six domains only if there is an index specifier for the other domains.

Rule Condition Element

A rule must have one or more *rule conditions*. A rule condition is an expression that the Performance Manager resolves to true or false status during the course of rule evaluation. A rule condition must end with a semicolon (;). If the Performance Manager evaluates the rule condition to 1.0, then the rule condition is true; otherwise, it is false.

A rule condition is composed of *rule expressions*. A rule expression is one of the following values:

- decimal_value
- literal_symbol
- tally_data_cell
- (rule_expression)
- numeric_data_cell [(index_specifier_data_cell)]
- boolean_data_cell [(index_specifier_data_cell)]
- scan_routine_data_cell(rule_expression)
- string_item string_operator string_item
- rule_expression numeric_binary_operator rule_expression

Rule Expression Operators and Descriptions

A numeric or string *operator* is one of the symbols listed in the following table:

Symbol	Definition
.EQS.	String equal to string
.NES.	String not equal to string
*	Multiply
/	Divided by
+	Plus
-	Minus
.EQ.	Equal to
.NE.	Not equal to
.LT.	Less than
.LE.	Less than or equal to
.GT.	Greater than
.GE.	Greater than or equal to
.AND.	And
.OR.	Or

The Boolean operators .AND. and .OR. evaluate to either a decimal 1.0 for true or a 0 for false. The operands are treated as true if their values equal decimal 1.0, and anything else as false. Valid components of rule expressions are defined as follows:

- A *decimal value* is a rational number.
- A *literal symbol* is a symbol previously defined by the literal construct.
- A *tally data cell* is a data cell (see the Data Cell Types and Use section).
- *Parentheses* can be used to denote precedence.
- A *numeric data cell* is a data cell (see the Data Cell Types and Use section).
- An *index specifier data cell* is a data cell (see the Data Cell Types and Use section).
- A *Boolean data cell* is a data cell (see the Data Cell Types and Use section).
- A *scan routine data cell* is a data cell (see the Data Cell Types and Use section).

- A *string item* is either a string data cell (see the Data Cell Types and Use section) or a string literal, where the literal string is enclosed in quotation marks.
- A *string operator* is either the .EQS. or .NES. operator.
- A *numeric binary operator* is one of the operators in the previous table.

Occurrence Element

When the Performance Manager evaluates a rule and all of the conditions of the rule are true, there is a rule *occurrence*. The number of times the Performance Manager evaluates a rule depends upon its domain, the number of interval records, and the number of nodes. The format for an occurrence element is as follows:

```
OCCURRENCES = {literal_symbol | decimal_value};
```

A *literal symbol* or *decimal value* specifies the number of times a rule must *occur* for it to fire. The occurrence element ends with a semicolon (;). When a rule fires, an entry is made in the Analysis Report.

Evidence Element

You can specify evidence for every rule. You can select one or more data cells to use in the evidence list. You cannot use scan routine data cells as evidence. When the rule fires (all rule conditions are true and the occurrence threshold is met), the Performance Manager saves the current values for all data cells listed as evidence.

The format for an evidence element is as follows:

```
EVIDENCE = evidence_value [evidence_value...];
```

Evidence value is a data cell that is not a scan routine:

```
data_cell [(index_specifier[(index_specifier)])]
```

The evidence element ends with a semicolon (;). When a rule fires, an entry is made in the Analysis Report.

Present the Evidence

The Performance Manager starts preparing conclusions, if any, after all data has been processed. After the conclusion, the Performance Manager lists the evidence in the Analysis Report in tabular format. Each column corresponds to an evidence data cell and is indicated by an appropriate column header.

If there are many evidence fields, the width of the evidence columns could exceed 80 characters. If, when writing user auxiliary rules, you do not want the width to exceed 80 characters, then you must limit the number of evidence items. The width of each evidence column depends on the column header and the width of the data that must be displayed.

Performance Manager Factory Evidence

The Performance Manager's factory rules use column headers that are created to improve readability. If you need to reference the same data cell that is displayed as evidence on a factory rule conclusion, reference the factory rules file PSPA$EXAMPLES:PSPA$KB.VPR to see what evidence data cells are provided for the desired rule.

These factory rules have special evidence processing:

M0010	M0050	M0055
M0060	M0421	R0140
R0150	R0160	R0170
R0210	R0230	R0240
R0245	R0250	R0270
R0280	L0040	L0050
L0060	L0070	L0080
L0090		

The special processing allows non-chronological sorting and the use of special display requirements. These rules do not have evidence data cells listed in the factory rules file. The evidence headers and conclusions for factory rules are stored in the file SYS$SYSTEM:PSPA$MSG.TXT.

See the Data Cell Types and Use section for a list and description of the data cells.

Conclusion Text Element

A *conclusion* is a block of text presented in the Analysis Report when a rule fires. It describes the problem detected by the rule. The format for conclusion text is shown in the following code:

```
CONCLUSION "text_string"
```

Conclusions can contain multiple lines of text. An example of a multiline conclusion follows:

```
CONCLUSION

"         Queues are forming on heavily used disks. Longer
         delays will be experienced when longer queues form."
```

The format of this conclusion (10 spaces at the beginning of each line) ensures consistent formatting with Performance Manager factory rules.

Brief Conclusion Text Element

A *brief conclusion* is one line of text presented in the Brief Analysis Report when a rule fires. A brief conclusion describes the problem detected by the rule. The format for a brief conclusion is the following code:

```
BRIEF_CONCLUSION "text_string"
```

To ensure consistent formatting with Performance Manager factory rules, the text must be aligned with the left quotation mark.

Data Cell Types and Use

The Performance Manager sub-record types in the following table are stored in Performance Manager data records. You can access the fields within the sub-records as data cells within a rule construct. See Appendix C for the names of the data cells. You can also dump them using the ADVISE COLLECT REPORT DUMP_DATACELLS command. This command produces a dump report of all data cells in the LOCAL domain.

The following table shows the data sub-record types and associated domains:

Sub-record Type	Associated Domain
Communication	COMMUNICATION
Configuration	CONFIGURATION
CPU	CPU

Sub-record Type	Associated Domain
Disk	DISK
Hot_Files	FILE
Metrics	COMMUNICATION, CONFIGURATION, CPU, DISK, FILE, LOCAL, PROCESS, TAPE
Parameters	COMMUNICATION, CONFIGURATION, CPU, DISK, FILE, LOCAL, SUMMARY, PROCESS, TAPE
Process	PROCESS
Tape	TAPE

Note: The CLUSTER domain references a sub-record type that exists only in memory. It does not exist in the Performance Manager data records.

If you write a rule in the LOCAL domain, the data cells available to the rule conditions and rule evidence include all values from the metrics and parameters records for a single node. The Performance Manager evaluates the rule once for each interval record (2 minutes for daily data, user-defined for history data), for each node that is processed. For example, an hour of daily data at the default interval contains 30 records per node for the LOCAL domain.

If you write a rule in the PROCESS domain, data cells available to the rule include all values from the process sub-record. Metric and parameter sub-record data cells are also available from the PROCESS domain because they are part of the *current* interval record containing the given process sub-record for the current node. The Performance Manager passes each of the process sub-records through all rules in the PROCESS domain for each interval record and for each node.

The number of process sub-records that the Performance Manager examines depends on the number of processes logged in, the time range, system activity, and for history files, the workload classification scheme. You must reference data in a process sub-record from the PROCESS domain or from the LOCAL, COMMUNICATION, CONFIGURATION, CPU, DISK, FILE, or TAPE domains with a process domain index specifier. The Index Specifier Data Cell section describes Index Specifier data cells.

The SUMMARY and CLUSTER domains do not directly correlate to Performance Manager data records; however, they are derived from them.

The data cells available in the SUMMARY domain are metrics that are maximums or averaged from all of the interval records. After processing all the data for a single node, the summary data cells become available in the SUMMARY domain. The last parameter sub-record is also available in the SUMMARY domain. The number of times the Performance Manager tests a rule in the SUMMARY domain is equal to the number of nodes processed.

After the Performance Manager processes all nodes data, the data cells available in the CLUSTER domain are disk statistics that represent the cluster perspective of the I/O traffic. The Performance Manager combines data from each node's two-minute disk sub-records into a set of two-minute cluster records in memory. The Performance Manager provides items such as cluster-wide throughput and operation rates; however, there is no longer any association with the "current two-minute" data record. Metric and parameter sub-record values (available from the LOCAL domain) are not accessible from the CLUSTER domain.

The following table lists the seven types of data cells:

Data Cell Types	Brief Descriptions
Boolean	1.0 (True) or 0 (False)
Numeric	Floating point value
String	An ASCII string
Time	Clock time for data
Scan routines	Loads tally data cells and returns sub-record count
Tally	Derived data
Index specifier	Index to a sub-record

Boolean Data Cell

A Boolean data cell is a value provided by the Performance Manager software that represents the result of applying a commonly needed condition to a domain (or a subset of internal records). A Boolean data cell has a value of true (1.0) or false (0).

For example, the ANY_DISK_OVER_THRESHOLD data cell is set to either true or false. If it is set to TRUE, at least one disk for the current Performance Manager interval record has exceeded the I/O rate threshold for the given disk type. If this Boolean operator did not exist, you would have to use an expression similar to the following code:

```
DISK_SCAN(DISK_IO_RATE .GE. DISK_IO_RATE_THRESHOLD) .GT. 0
```

Numeric Data Cell

A numeric data cell provides a floating-point value. For example, NUMBER_OF_PROCESS is a numeric data cell in the LOCAL domain that contains the floating-point value for the average number of processes resident on the system during the given two-minute period for the current node.

String Data Cell

A string data cell provides the actual string when the cell is used as evidence. However, when you use it in a rule condition, you must compare the string data cell to another string data cell or to a string literal with one of the string operators (.EQS. or .NES.).

Time Data Cell

The time data cell represents the time of the current Performance Manager interval record. You cannot use this data cell in a rule condition; however, it is valid as an evidence item.

Scan Routine Data Cell

You can use scan routines to scan sub-records in the target domain. The scan routine data cell name starts with the target domain name. The scan routine data cell counts sub-record occurrences and tallies data into tally data cells for use in a rule expression. The scan routine data cell requires a rule expression, enclosed with parentheses, following the scan routine name. This rule expression can contain data cells. These cells referenced in the rule expression must be in the target domain scanned by the scan routine.

For example, you can use the scan routine data cell PROCESS_SCAN to return tally information. If a rule is in the LOCAL domain, you can use the following rule expression to test whether the image XYZZY.EXE is being used:

```
PROCESS_SCAN (IMAGE_NAME .EQS. "XYZZY") .GT. 0
```

```
The PROCESS domain is the target domain for PROCESS_SCAN.
```

The value that a scan routine returns is an integer indicating the number of times the specified expression tested true (evaluated to 1.0). In this case, the value returned by PROCESS_SCAN would be the count of process sub-records with an image name of XYZZY. If the value is greater than 0, the rule expression is true.

These scan routine data cells are valid:

- COMMUNICATION_SCAN
- CONFIGURATION_SCAN
- CPU_SCAN
- DISK_SCAN
- FILE_SCAN
- PROCESS_SCAN
- TAPE_SCAN

You cannot use scan routine data cells as evidence.

Tally Data Cell

Tally data cells contain data tallied from those sub-records scanned when the scan routine rule expression holds true.

Each scan routine has a target domain. Each tally data cell has a target domain. A given scan routine updates those tally data cells with the same target domain as the scan routine's target domain. Scan routine data cell names start with the target domain name.

For a given rule, you can use tally data cells in a rule expression or evidence after a call to a scan routine. For example, a LOCAL domain rule with the following expression makes available the process TALLY fields that contain the sum of all PROCESS domain metrics for process sub-records with the user name of CHARLIE:

```
PROCESS_SCAN(USER_NAME .EQS. "CHARLIE") .GT. 0
```

Subsequent rule expressions may use the tally data cells in the same rule. For example:

```
PROCESS_CPUTIME_TALLY .GT. 1000
```

Tally Data Cells and Associated Scan Routines

The following table shows tally data cells and the associated scan routines:

Scan Routines	Tally Data Cells Updated by Scan Routines
COMMUNICATION_SCAN	COMM_OPERATION_RATE_TALLY

Scan Routines	Tally Data Cells Updated by Scan Routines
CONFIGURATION_SCAN	DATAGRAMS_SEND_TALLY DATAGRAMS_RECEIVED_TALLY DATAGRAMS_DISCARDED_TALLY SEQUENCED_MESSAGES_SENT_TALLY SEQUENCED_MESSAGES_RECD_TALLY BLOCK_SEND_DATAS_INIT_TALLY KB_SENT_VIA_SEND_DATAS_TALLY BLOCK_REQUEST_DATAS_INIT_TALLY KB_RECVD_VIA_REQST_DATAS_TALLY KB_MAPPED_TALLY SEND_CREDIT_QUEUE_TALLY BUFFER_DESC_QUEUE_TALLY
CPU_SCAN	CPU_KERNEL_TALLY CPU_EXEC_TALLY CPU_SUPER_TALLY CPU_USER_TALLY
DISK_SCAN	DISK_SERVICE_TIME_TALLY DISK_QUEUE_LENGTH_TALLY DISK_IO_RATE_TALLY DISK_THRUPUT_TALLY DISK_PAGING_IO_RATE_TALLY DISK_PAGING_THRUPUT_TALLY DISK_SWAPPING_IO_TALLY DISK_SWAPPING_THRUPUT_TALLY DISK_BUSY_PERCENT_TALLY DISK_ERROR_COUNT_TALLY DISK_READ_IO_RATE_TALLY DISK_FREE_PAGES_TALLY DISK_MSCP_IO_RATE_TALLY DISK_MSCP_PAGING_IO_TALLY DISK_MSCP_THRUPUT_TALLY DISK_SPLIT_IO_TALLY
FILE_SCAN	FILE_THROUGHPUT_TALLY FILE_OPERATION_TALLY FILE_READ_TALLY FILE_SPLIT_IO_TALLY FILE_PAGING_IO_TALLY FILE_SWAPPING_IO_TALLY

Scan Routines	Tally Data Cells Updated by Scan Routines
PROCESS_SCAN	PROCESS_CPUTIME_TALLY WORKING_SET_FAULT_TALLY WORKING_SET_FAULT_IO_TALLY PROCESS_DIRECT_IO_TALLY PROCESS_BUFFERED_IO_TALLY GLOBAL_PGS_TALLY PRIVATE_PGS_TALLY WORKING_SET_LIST_TALLY WORKING_SET_DEFAULT_TALLY WORKING_SET_QUOTA_TALLY WORKING_SET_EXTENT_TALLY PROCESS_UPTIME_TALLY PROCESS_IMAGE_ACTS_TALLY PROCESS_COM_PERCENT_TALLY PROCESS_DISK_THRUPUT_TALLY PROCESS_DISK_IO_TALLY
TAPE_SCAN	TAPE_IO_TALLY TAPE_ERROR_TALLY

Index Specifier Data Cell

Index specifiers are data cells that indicate a specific occurrence of a sub-record that has a unique characteristic in one of these domains:

- COMMUNICATION
- CONFIGURATION
- CPU
- DISK
- FILE
- PROCESS
- TAPE

During analysis, the Performance Manager reads an interval record. The Performance Manager evaluates rules in the following domains:

- LOCAL
- PROCESS
- DISK
- FILE
- CPU

- COMMUNICATION
- CONFIGURATION
- TAPE

Data cells available in the LOCAL domain are available to rules in all of these domains. You can reference data cells in the PROCESS, DISK, FILE, CPU, COMMUNICATION, CONFIGURATION, or TAPE domains and *not* in the LOCAL domain directly by rules within that domain, or indirectly with an index specifier to data cells in any of the other domains. Each index specifier data cell has a target domain. The target domain indicates the name of the domain of the desired data cell.

For example, the index specifier TOP_CPU_PROC_X points to a specific process sub-record for the current interval. You might use the index specifier in rule definitions in the LOCAL, DISK, FILE, CPU, COMMUNICATION, CONFIGURATION, or TAPE domains.

Specify the PROCESS domain data cell with the index specifier as a parameter. A rule expression for a rule in the LOCAL domain is as follows:

```
PROCESS_CPUTIME(TOP_CPU_PROC_X)
```

`This expression calculates which process has the highest CPU time. Although PROCESS_CPUTIME is a PROCESS domain data cell, TOP_CPU_PROC_X is a LOCAL domain index specifier that has a target domain of PROCESS. So, you can reference any PROCESS domain data cell from a rule in the LOCAL domain by using an index specifier with the target domain of PROCESS. The maximum index depth for index specifiers is two.`

Implement Changes

This section provides scenarios for customizing the knowledge base with the following actions:

- Disabling an existing rule
- Modifying an existing rule
- Adding a new rule
- Changing a threshold value
- Changing a rule literal value

While the scenarios assume that your auxiliary rules file is called MYRULES.VPR, you can name it whatever you like, provided that it conforms to standard OpenVMS naming conventions.

There are two files to which you probably need to refer when making changes to the factory rules. The first is a copy of the source file for the factory rules, located in PSPA$EXAMPLES:PSPA$KB.VPR. The second is the message text file (which contains the Conclusions and Evidence headings), located in SYS$SYSTEM:PSPA$MSG.TXT. You should make a copy of each in your private directory to modify; do **not** edit these files directly.

Disable an Existing Rule

Assume that you work in a secure government facility, and data security is a top priority. You do not care if security erase I/Os exceed their default threshold of 1 I/O per second, and would like to disable the rules that check for this.

To do this, first check in the source file of the factory rules (PSPA$EXAMPLES:PSPA$KB.VPR) and in the message text file (SYS$SYSTEM:PSPA$MSG.TXT) for the rules of interest. You find one rule, I0180, which focuses on security erasures. To eliminate this rule from further consideration in your knowledge base, add the following line to your rules source file MYRULES.VPR:

```
DISABLE I0180;
```

The semicolon terminator (;) is important: if you forget one of these, your auxiliary rules file probably does not compile.

To use this rule file, see the sections Build an Auxiliary Knowledge Base (see page 172) and Use an Auxiliary Knowledge Base for Reporting and Archiving (see page 173).

Modify an Existing Rule

Assume that you do not want to see all the lines of evidence produced by rule R0095 for the image VMSBUXX, because you cannot change the operation of this image. To modify a rule, you need to first disable the factory version of that rule, then copy the factory version into your MYRULES.VPR file and modify it accordingly. Make sure that you define all literals used in this rule - see the section Change a Rule Value (see page 172).

The following example shows how your auxiliary rules file might look.

The bulk of the new rule came from the corresponding factory rule in PSPA$EXAMPLE:PSPA$KB.VPR. The only difference is the addition of a condition to filter out VMSBUXX image records from the rules processing. The actual rule number could not simply be copied in the auxiliary rules file, as a zero in the second character is reserved.) Most of the conclusion sections were copied from their corresponding sections in SYS$SYSTEM:PSPA$MSG.TXT. The example also shows that you can make minor modifications to the factory rules, without investing significant time and effort.

To use this rule file, see the sections Build an Auxiliary Knowledge Base (see page 172) and Use an Auxiliary Knowledge Base for Reporting and Archiving sections (see page 173).

To change an Existing Rule

- Use the following code:

```
DISABLE R0095;
Literal TD_FILE_CACHE_HITRATIO = 70
TD_FILE_CACHE_MISSEDIO_RATE = 5
TD_XQP_CACHE = 10
EndLiteral

Rule UR095
XQP_Cache_hit_ratio .lt. td_file_cache_hitratio;
XQP_Cache_missedio_rate .ge. td_file_cache_missedio_rate;
File_header_Cache_HR .lt. td_file_cache_hitratio;
(100 - File_header_Cache_HR) / 100 * File_header_Cache_AR
 .ge. td_file_cache_missedio_rate;
Disk_header_cache_size(Highest_IO_rate_disk_x) .ge.
 Sysgen_Acp_Hdrcache;
Image_name(Top_Dirio_process_x) .nes. "BACKUP";
Image_name(Top_Dirio_process_x) .nes. "VMSBUXX";
Occurrences = td_XQP_cache;
```

```
Evidence =
 Sysgen_Acp_Hdrcache
 Disk_Header_Cache_size(Highest_IO_rate_disk_x)
 File_header_Cache_HR
 File_header_Cache_AR
 Volume_name(top_dskio_proc_topdsk_x)
 Disk_IO_rate(top_dskio_proc_topdsk_x)
 User_name(top_dskio_process_x)
 Image_name(top_dskio_process_x)
 Time;
Conclusion
"There are too many disk I/Os caused by a low hit ratio on
the file header cache. This will occur if your workload
causes disk files to be scanned instead of repeatedly
accessed (i.e., BACKUP, DIR, SEARCH, etc). However, if your
workload does not scan disk files, so that there is still
useful information in the cache, then you may benefit by
using AUTOGEN with the feedback mechanism to automatically
increase the SYSGEN parameter ACP_HDRCACHE. After
successive uses of AUTOGEN, its feedback mechanism provides
the system with sufficient file header cache for the average
workload."
Brief_conclusion
"Low hit ratio, high attempt rate on the file header cache."
EndRule
```

Add a New Rule

Assume that a user would like you to add a rule that fires when any disk is low on space. The following data cells: DISK_MAX_BLOCKS, ANY_DISK_FULL (a binary data cell type derived from DISK_MAX_BLOCKS), and DISK_MOST_FULL_X (an index specifier pointing to the most affected disk) make this type of rule possible. An example of adding a new rule to check for disk space shortages follows:

To creating a new rule

- Use the following code

```
Rule UI101
 Any_disk_full .eq. True;
 Occurrences = td_IO;

Evidence =
 Volume_name(Disk_most_full_x)
 Disk_free_pages(Disk_most_full_x)
 Time;

Conclusion
"The following disks are almost full. You should purge or
delete any unnecessary files. You might also consider
moving some files to a disk with more free space."

Brief_conclusion
"Disk space shortage. Clean up disk or off-load some files."

EndRule
```

You could insert the type of rule shown in the previous example in many possible places within the I/O decision tree used by the Performance Manager software, which would add more conditions to those presented here. Also, you might have a large reference database that completely fills up N-1 volumes of its volume set, so you would want to exclude those from consideration. Finally, you might want to show additional data cells in the Evidence.

Change a Threshold Value

Assume that you would like to be even more proactive detecting potential bottlenecks on disks. You might want to reduce the global threshold on disk queue length (which is used as an initial condition in many disk rules) from 1.0 to 0.66, and see how many more rule firings you get as a result of this change.

The list of all Performance Manager thresholds is presented in the Performance Manager Thresholds table at the beginning of this chapter. To implement a change like this is relatively straightforward. Simply add the following line to your MYRULES.VPR file:

```
Threshold TD_DISK_QL_MAX = 0.66 EndThreshold
```

Assume that you would like to make this change, plus raise the threshold of free space remaining on a disk from 5 percent to 10 percent (for use in the rule that you just finished adding in the last section). To change more than one threshold, you might want to change your format within MYRULES.VPR to the following, for greater clarity:

```
Threshold

TD_DISK_QL_MAX = 0.66
TD_MIN_DSKSPC_PCT = 0.10

EndThreshold
```

There are other cases when a threshold might need to be changed. For example, if you own older RF31 disk drives, you should change the RF31 threshold values, as they now reflect the performance of the newer RF31T disk. (The internal model number used by OpenVMS to identify disk types is no longer unique: this is the first case of an ID number being re-used for a newer disk, but more recycling of IDs is expected in the future.)

Also, certain disks may be able to process many more I/Os per second than indicated by the given disk thresholds, if they are able to make effective use of their (embedded or HSC-based) disk cache. If you have many I/O rule firings, but upon investigation, find relatively low queue lengths on disks that are processing I/Os at a much higher rate than shown in the Performance Manager Thresholds table, then you might want to increase your disk operations rate thresholds to account for this performance, and eliminate these extraneous rule firings.

Suggested numbers for these scenarios are as follows:

- If you have an older RF31 (as opposed to the newer RF31T), then you should change the threshold TD_T56_RF31 to 34.
- If your workloads on any of the following disks benefit from disk caching, then you might want to set the following thresholds:

  ```
  TD_T43_RF30 = 31 TD_T48_RZ22 = 40
  TD_T44_RF71 = 31 TD_T49_RZ23 = 41
  TD_T56_RF31 = 96 TD_T50_RZ24 = 51
  TD_T57_RF72 = 55 TD_T51_RZ55 = 54
  TD_T75_RFH31 = 96 TD_T59_RZ25 = 65 (est.)
  ```

```
TD_T76_RFH72 = 55 TD_T60_RZ56 = 58
TD_T77_RF73 = 63 TD_T61_RZ57 = 62
TD_T78_RFH73 = 63 TD_T66_RZ23L = 47
TD_T81_RF35 = 87 TD_T68_RZ57I = 62
TD_T82_RFH35 = 87 TD_T70_RZ58 = 70 (est.)
TD_T83_RF31F = 56
 TD_T84_RZ72 = 63 (est.)

For the older RF31: TD_T85_RZ73 = 63
TD_T56_RF31 = 51 TD_T86_RZ35 = 87
TD_T75_RFH31 = 51 TD_T87_RZ24L = 55 (est.)
 TD_T88_RZ25L = 62 (est.)
With HSC caching: TD_T89_RZ55L = 59 (est.)
TD_T80_RA71 = 97 TD_T90_RZ56L = 60 (est.)
TD_T79_RA72 = 97 TD_T91_RZ57L = 62 (est.)
TD_T92_RA73 = 102 TD_T93_RZ26 = 87
 TD_T94_RZ36 = 88 (est.)
 TD_T95_RZ74 = 78 (est.)
 TD_T99_RZ27 = 88 (est.)
```

You might want to change processor-specific thresholds (in the Performance Manager Thresholds table). To learn what default values are in effect for your system, you can produce a dump report for a single two-minute interval as follows:

```
$ ADVISE COLLECT REPORT DUMP_DATACELLS -
_$ /BEGINNING=hh:mm/ENDING=hh:mm+2/NODE_NAMES=node1
```

hh:mm+2

Take the the actual hours and minutes from the beginning statement, add two minutes, and then enter the final value in the hh:mm format. Do not use *+2* as part of the syntax.

Look up the values given for their corresponding data cells CPU_VUP_RATING, COM_SCALING, SOFT_FAULT_SCALING, HARD_FAULT_SCALING, and IMG_ACT_RATE_SCALING. (Since the DUMP_DATACELLS report produces voluminous output for each interval, and since the processor-specific thresholds do not change, generate this report for only one two-minute interval to learn their (fixed) values.)

These scaling factors are multiplied by the values shown in the following examples before being applied in rule condition-checking:

- Soft fault scaling factors are multiplied by TD_HIGH_SOFT_FAULT (rule literal), default value = 100.
- Hard fault scaling factors are multiplied by TD_HIGH_HARD_FAULT (rule literal), default value = 10.
- Image activation scaling factors are multiplied by TD_HIGH_IMGACT (rule literal), default value = 0.5.

- Number in the Compute queue scaling factors are multiplied by TD_COM_PROCESSES (rule literal), default value = 5.
- VUPS for SMP systems are computed by adding 85 percent (threshold TD_SMP_VUP_RATIO) of the single processor VUPS rating for each additional processor.

If you decide that you would like to refine the scaling factors to more precisely reflect typical activity on your system, then you need to know your system's hardware model ID number. To get this, enter the following at the DCL prompt:

```
$ n = f$getsyi("hw_model")

$ show symbol n
```

Assume that this action returned the number 230 to you. Then, if you want to change the threshold for the number of jobs in the Compute queue from its default value of 1.30 to 1.45, you just add another line in MYRULES.VPR in the following format:

```
Threshold TD_COM_SCALING_230 = 1.45 EndThreshold
```

Change a Rule Literal Value

Assume that security (due to its additional overhead)is not a priority for your systems. Minimal security erasure I/Os should occur on your system. You would like to change the threshold used in rule I0180 from 1.0 to 0.1. You look in the source file for the factory rules (PSPA$EXAMPLES:PSPA$KB.VPR) and find TD_HIGH_ERASE_IO = 1.0 in the initial literals section.

Performance Manager Rule Literals

This rule literals section is listed in the following table for ease of reference:

```
Literal
        TD_HIGH_ERASE_IO = 1.00
        TD_DISK_QUEUE_LENGTH = 1.00
        TD_HIGH_PROC_PAGE_FAULT = 500
        TD_IO_ERROR_COUNT = 2
        TD_IO = 4
        TD_CPU = 4
        TD_IMG = 10
        TD_XQP_CACHE = 10
        TD_PAR = 4
        TD_SYS = 4
```

```
        TD_HDW = 10
        TD_RSR_PPR = 2
        TD_RSR_INT = 10
        TD_HIGH_INTERRUPT_STACK = 20
        TD_HIGH_KERNEL_MODE = 30
        TD_HIGH_EXEC_MODE = 35
        TD_HIGH_HARD_FAULT = 10
        TD_HIGH_SOFT_FAULT = 100
        TD_HIGH_DECNET_RATE = 100
        TD_IDLE_MEM_RATIO = 0.05
        TD_HIGH_SWAPPING = 1.00
        TD_LOW_SWAP_IDLETIME = 20
        TD_LOW_BALSET_MEM_AVL = 15
        TD_HIGH_GLOBAL_FAULT = 40
        TD_HIGH_SYSTEM_FAULT = 3
        TD_HIGH_SPLIT_IO = 5
        TD_HIGH_TURN_RATE = 6
        TD_FILE_CACHE_HITRATIO = 70
        TD_FILE_CACHE_MISSEDIO_RATE = 5
        TD_COM_PROCESSES = 5
        TD_CPU_NORMAL_OVERHEAD = 7
        TD_HIGH_SYS_BUFIO = 70
        TD_HIGH_FILE_SYSTEM = 30
        TD_HIGH_SYS_OPENS = 5
        TD_HIGH_TERM_IO = 60
        TD_HIGH_IMGACT = 0.5
        TD_POOL_EXPANSION_RATIO = 0.40
        TD_POOL_EXPANSION_LIMIT_RATIO = 0.85
        TD_CIBCI_PEAK_KBTHRUPUT = 1200
        TD_BCAA_PEAK_KBTHRUPUT = 1400
        TD_BCAB_PEAK_KBTHRUPUT = 2200
        TD_CIXCD_PEAK_KBTHRUPUT = 9000
        TD_CI780_PEAK_KBTHRUPUT = 1900
        TD_ADAPTER_SATURATION_WARNIING_RATIO = 0.80
        TD_AVG_MESSAGE_SIZE_KB = 0.117
        True = 1
        False = 0
Endliteral
```

While thresholds affect all rules, literals affect the rules that are local to them (that is, included in the same file). So, to make this change effective, you need to disable the original factory rules and copy over your own versions of this rule into your auxiliary knowledge base, where it may be compiled with the new, lower value of TD_HIGH_ERASE_IO.

Changing a Rule Value

An example of what you would include in your MYRULES.VPR to effect this change follows:

```
DISABLE I0180;

Literal TD_HIGH_ERASE_IO = 0.1 EndLiteral

Rule UI180
 Split_io_rate .lt. td_high_split_io;
 Window_turn_rate .lt. td_high_turn_rate;
 Erase_QIO_rate .ge. td_high_erase_io;
 Occurrences = td_io;

Evidence =
 Erase_QIO_rate
 Time;

Conclusion
"Security erasures (as measured by Erase I/Os) have exceeded
threshold. These I/Os may be generated on a per-file basis
by the use of $DELETE /ERASE or $PURGE /ERASE. They may also
be generated on a per-volume basis through the use of
$SET VOLUME /ERASE_ON_DELETE or by *NOT* turning off the
HIGHWATER_MARKING attribute, which OpenVMS enables by
default for all volumes."

Brief_conclusion
"Security erasures detected; disable if not necessary."

EndRule
```

In the previous example, the conditions and evidence were copied from the factory rules source file, while the conclusion and brief conclusion were copied from the message text file.

Build an Auxiliary Knowledge Base

You can supplement and disable Performance Manager rules. To modify the effect of the default Performance Manager knowledge base, create an auxiliary knowledge base with your own rule definitions. Edit your rules using a standard text editor.

Build your auxiliary knowledge base by entering the following command:

```
$ ADVISE PERFORMANCE COMPILE MYRULES.VPR
```

In this example, MYRULES.VPR is the name of your source rules file. The Performance Manager compiles the rules, and then names the resultant knowledge base MYRULES.KB.

Note: If you compile an auxiliary rules file, it is valid only for the version of the Performance Manager software on which it was compiled (and later versions). Use caution to not place it in a cluster common area. This is due to concern that the compiled rules file might be used on older software versions where the new keywords and data cells are not defined. The filename PSPA$KB.KB is reserved by CA and should not be used to name an auxiliary rules file.

Use an Auxiliary Knowledge Base for Reporting and Archiving

The Performance Manager generates Analysis Reports based on the Performance Manager factory knowledge base combined with the auxiliary knowledge base when you specify the name of your auxiliary rules file with the following command:

```
$ ADVISE PERFORMANCE REPORT ANALYSIS/RULES=MYRULES.KB
```

The Performance Manager archives analysis results for rules in all domains, except CLUSTER and SUMMARY. When you issue the following command, rule occurrences based on the Performance Manager factory knowledge base combined with the auxiliary knowledge base are archived:

```
$ ADVISE ARCHIVE/RULES=MYRULES.KB
```

If you want to use the auxiliary knowledge base regularly, you can use the Performance Manager Parameter Editor (ADVISE EDIT command) to set the AUTO_AUGMENT parameter to the name of your rule file. This setting becomes the system-wide default. The Performance Manager uses your auxiliary knowledge base file and augments the factory rules whenever you generate an Analysis Report or archive data.

When configuring AUTO_AUGMENT to use an auxiliary rules file in an OpenVMS Cluster, place the file in PSDC$DATABASE or place it in another directory that is accessible by all nodes of the cluster. If a logical name is used within the file specification, be sure that the logical name is defined in the SYSTEM logical name table on all nodes. Alternatively, the cluster logical name table could be used.

You can override the AUTO_AUGMENT parameter and specify another auxiliary rules file with the following command:

```
$ ADVISE PERFORMANCE REPORT ANALYSIS/RULES=MY_OTHER_RULES.KB
```

You can override the AUTO_AUGMENT parameter entirely and specify no auxiliary rules with the following command:

```
$ ADVISE PERFORMANCE REPORT ANALYSIS/NORULES
```

To clear the automatic augmenting of your site-specific rules, specify SET NOAUTO_AUGMENT with the Performance Manager Parameter Editor.

Chapter 6: Performance Manager Commands

This is a reference chapter for the Performance Manager command syntax. It describes all commands, their qualifiers, keywords, and options. See the *Performance Agent Administrator Guide* for a complete description of the ADVISE ARCHIVE, ADVISE COLLECT, and ADVISE EDIT commands.

At installation time the Performance Manager software adds the ADVISE PERFORMANCE command to the DCL command table. To start a Performance Manager action, issue the ADVISE PERFORMANCE command with the appropriate action option to perform the desired task, for example, ADVISE PERFORMANCE COMPILE.

This section contains the following topics:

ADVISE PERFORMANCE

The ADVISE PERFORMANCE command initiates the functions of the Performance Manager module.

Format

ADVISE PERFORMANCE option

ADVISE/INTERFACE[={DECWINDOWS|MOTIF}]

Description

The ADVISE PERFORMANCE command options are described individually in this guide. If you do not specify an option, the command defaults to command mode with a PSPA> prompt. For more information about command mode, see the chapters Customize the Knowledge Base (see page 135) and Use Command Mode Commands (see page 239).

If the /INTERFACE qualifier is used to start the DECwindows interface, refer to the chapter Use the DECwindows Motif Interface (see page 257) for more information. The following table lists the ADVISE PERFORMANCE command options:

Option	Function
COMPILE	Compiles user rules.
DISPLAY	Activates the Performance Manager Real-time Display Interface.
EXPORT	Activates the data export facility.
GRAPH/PIE_CHART	Activates the Performance Manager graphing facility.
REPORT	Activates the Performance Manager reporting facility.
SHOW VERSION	Identifies the current version of the Performance Manager module.

ADVISE PERFORMANCE COMPILE

The ADVISE PERFORMANCE COMPILE command invokes the Performance Manager rules compiler to compile a set of user rules from the specified file.

Format

ADVISE PERFORMANCE COMPILE file-spec

Parameter

file-spec

The file specification of a text file that contains user-defined rules or disabled Performance Manager factory rules. The default file type is .VPR.

Description

ADVISE PERFORMANCE COMPILE invokes the rules compiler to compile a set of rules into the auxiliary knowledge base. The output file is a compiled version of the rules (and thresholds) in an efficient format used to produce an Analysis Report. To use the auxiliary knowledge base, specify the file name with the /RULES qualifier when you generate either a Brief_Analysis or an Analysis report.

During the archiving process, the auxiliary rules can be applied to the data being processed, resulting in "rules" records being added to the archive files. Later processing of the archived data allows the rules records to be graphed, reported on, or dumped.

Optionally, set AUTO_AUGMENT in the parameters file and specify the file specification for the auxiliary knowledge base. The Performance Manager software uses your rules to augment the Performance Manager factory rules.

For information and additional examples on how to create an auxiliary rules file, see the chapter Customize the Knowledge Base (see page 135).

Qualifiers

/RULES=file-spec

Specifies the name of the auxiliary knowledge base output file. By default, the Performance Manager rules compiler creates an output file in the default directory with the file name of the specified input file and file type of .KB.

Examples

```
$ ADVISE PERFORMANCE COMPILE MY_SITE
```

The Performance Manager reads the MY_SITE.VPR file and compiles the rules for subsequent use. The Performance Manager creates a file named MY_SITE.KB in the default directory.

To use the compiled rules in conjunction with Performance Manager factory rules, type the following command:

```
$ ADVISE PERFORMANCE REPORT ANALYSIS/RULES=MY_SITE
```

Or alternately, use the Parameter Edit Utility to automatically use your compiled rules:

```
$ ADVISE EDIT
PSDC_EDIT> SET AUTO_AUGMENT DEVICE:[DIRECTORY]MY_SITE.KB
PSDC_EDIT> EXIT
$ ADVISE PERFORMANCE REPORT ANALYSIS
```

In either case, the Performance Manager reads in the compiled user rules in addition to the default Performance Manager rules when generating an Analysis Report.

```
$ ADVISE PERFORMANCE GRAPH/HISTORY=MONTHLY-USER -
_$ /TYPE=TOP_CPU_RULE_OCC
```

The top firing rules concerning CPU usage during the last month are displayed.

ADVISE PERFORMANCE DISPLAY

The ADVISE PERFORMANCE DISPLAY command invokes dynamic displays using a DECwindows Motif interface or using a character-cell terminal.

Format

ADVISE PERFORMANCE DISPLAY display_keyword

Description

Use the ADVISE PERFORMANCE DISPLAY command to produce dynamic Performance Manager displays. The following section describes the qualifiers you can use with the ADVISE PERFORMANCE DISPLAY command to control displays. The display keywords are:

- CHARACTER_CELL

  Provides dynamic displays on a character cell terminal.

- WINDOWS

  Provides dynamic displays using a DECwindows Motif interface.

Qualifiers

Some of the following qualifiers are valid for both the CHARACTER_CELL and WINDOWS interfaces, while others are valid for only CHARACTER_CELL. Each qualifier has one of the following interface annotations:

- (C)-CHARACTER_CELL only
- (C,W)-Both CHARACTER_CELL and WINDOWS

/BEGINNING=time

(C) Specifies the starting date and time for the display, for doing playback. Normally, you do not need to specify this qualifier, however to view previously recorded data using the Real-time displays, specify the desired begin time. When completed with the display, use the DISCONNECT and EXIT push buttons to exit.

You can specify either an absolute time or a combination of absolute and delta times. For complete information on specifying time values, see HP's OpenVMS User's Manual (or type HELP DATE_TIME).

You can also use the keywords TODAY, TOMORROW and YESTERDAY.

/BEGINNING is mutually exclusive (or ignored) with /MODE=NETWORK.

/COLLECTION_DEFINITION=collection-definition-name

(C,W) Specifies the name of the Collection Definition, and hence the collected data that you use for the dynamic display. If you omit this qualifier, data is obtained from the Collection Definition called "CPD." Use the ADVISE COLLECT SHOW STATUS command to see which collection definitions are active.

The /COLLECTION_DEFINITION qualifier is used in conjunction with the /MODE=DISKFILE qualifier and is ignored if you specify /MODE=NETWORK.

/DISK_DEVICES=(devicename,...)

(C,W) The /DISK_DEVICES qualifier allows you to specify a list of disk device names that are included in the Real-time Character Cell displays. If the qualifier is omitted, all disk devices are included on the displays.

Server statistics are provided for the servers that provide access to the disks selected. This qualifier is mutually exclusive with /VOLUMES.

/DNS_NAMES=filename

(C) Specifies the node name translation file for DECnet Phase V support when Phase V Node Synonyms are not defined. This qualifier is used along with the /MODE=NETWORK qualifier.

The format of this ASCII file is one translation per line which consists of two names separated by a comma. Provide the cluster name first and then the DECnet Phase V name (or name segment) or address. For example:

```
LATOUR,DEC:.TAY.StanWilk
```

For more information on this translation file, see the appendix Performance Manager Logical Names (see page 405).

/NODE_NAMES=(nodename,...)

(C,W) Specifies the node for which data is to be displayed. By default, all nodes associated with the collection definition are displayed.

/MODE={NETWORK|DISKFILE}

(C,W) Specifies which data gathering mode to use. DISKFILE access does not start up a new data collector, whereas the NETWORK keyword does. DISKFILE allows use of the cluster's currently open collection files for the source of data. DISKFILE cannot be used for displaying data from remote nodes Real-time; only for nodes within the current cluster. However, data from remote nodes can be selected for viewing in playback mode.

DISKFILE mode lets you display additional information that only the main CPD Performance Manager collects. This includes process terminal response time, hot file records, and process device IO rates. For the Motif displays, you can view several default panels that refer to this additional information, see Chapter 10 for these panels with (MODE=DISKFILE).

/INTERVAL=seconds

(C,W) Specifies the interval, in seconds, between collection records when collecting data in NETWORK mode. The /INTERVAL qualifier is ignored when you specify /MODE=DISKFILE; the interval is that of the collection selected. The valid range is 1 to 86400.

/RULES=file-spec

(C) With the character cell interface, generates brief conclusions based on a knowledge base you have specified to supplement the default knowledge base. The file-spec must point to the auxiliary knowledge base which has previously been compiled with the ADVISE PERFORMANCE COMPILE command. The default file type is .KB.

If you specify /NORULES, no auxiliary knowledge base is used for the display, even if AUTO_AUGMENT is enabled.

/VOLUMES=(name,...)

(C) The /VOLUMES qualifier allows you to specify a list of disk volume names that is included in the Real-time Character Cell displays. If the qualifier is omitted, all disk devices are included on the displays.

Server statistics are provided for the servers that provide access to the disks selected. This qualifier is mutually exclusive with /DISK_DEVICES.

/INITIAL=(options)

(C) With the character cell interface, indicates which display to bring up first, and what values to use for the Investigate screen scale factors.

The options are as follows:

- SCREEN=
  - NODE
  - PROCESS
  - DISK
  - RULES
  - INVESTIGATE_SYSTEM
  - INVESTIGATE_MEMORY
  - INVESTIGATE_CPU
  - INVESTIGATE_IO
  - INVESTIGATE_LOAD
  - RESOURCE_MEMORY
  - RESOURCE_CPU
  - RESOURCE_DISK
- PROCESS_SCALING = n,

- WORKINGSET_SCALING = n,
- RATE_PER_SECOND_SCALING = n

ADVISE PERFORMANCE EXPORT

The ADVISE PERFORMANCE EXPORT command allows Performance Manager data to be converted into a format you can use for further processing.

Format

ADVISE PERFORMANCE EXPORT

Description

The EXPORT command converts Performance Manager data into a format that can be read and processed by an alternative analysis tool.

This command generates a file in CSV (comma separated variable) format. Other tools can then import this data file directly for further processing.

Qualifiers

/BEGINNING=time

Specifies the starting date and time of the data to be exported. If /ENDING is not specified, the default /BEGINNING time is TODAY. If /ENDING is specified, the default /BEGINNING time is 00:00 of the date specified with /ENDING.

/BEGINNING is incompatible with the /DATES qualifier.

/CLASS=(item[,...])

Specifies which optional classes of statistics are included in the export file.

You can select any of the following class items:

Keyword	Meaning
ALL	Report all optional class statistics, along with default classes
CPU	Report CPU statistics
DEFAULT_STATISTICS	Report CPU, DISK, IO, MEMORY, PAGE_FAULT and XQP_CACHE statistics
DEVICE	Report device statistics
DISK	Report disk statistics
IO	Report I/O statistics

Keyword	Meaning
LOCK	Report lock statistics
MEMORY	Report memory statistics
PAGE_FAULT	Report page fault statistics
PROCESS[=([NO]EXTENDED, [NO]IMAGE,ALL)	Report process statistics
SYSTEM_COMMUNICATION	Report system communication services statistics
XQP_CACHE	Report XQP statistics

You can negate these keywords to indicate that reporting of a particular class of data is not wanted. Also, you can specify /CLASS=(ALL[,negated-keyword]) to allow an “all but these” capability.

The DEFAULT_STATISTICS class of statistics is always on unless specifically negated. For example, if /CLASS=LOCK is specified, then CPU, DISK, IO, MEMORY, PAGE_FAULT, XQP_CACHE and LOCK statistics are exported. To disable any classes of data which are part of the DEFAULT_STATISTICS group, you must specify NODEFAULT_STATISTICS. Therefore, if you want to report only disk and CPU data, specify /CLASS=(NODEFAULT_STATISTICS,CPU,DISK).

The PROCESS keyword allows you to specify the optional keywords EXTENDED, IMAGE or ALL. The presence of the EXTENDED keyword indicates that the extended process metric data is to be exported along with the standard process metric data. If you do not specify EXTENDED, then NOEXTENDED is assumed. The presence of the IMAGE keyword indicates that the image name for each process is to be exported along with the standard process metric data. If you do not specify IMAGE, then NOIMAGE is assumed. The presence of the ALL keyword indicates that all available process metric data is to be exported, including the standard process metric data, the extended process metric data, and the image name.

If you omit the /CLASS keyword from the command line, then /CLASS=DEFAULT_STATISTICS is assumed.

/CLASSIFY_BY=USERGROUP=workload-family

Lets you specify a workload family to control how process data is classified. By default, all process data is exported without being summarized.

/COLLECTION_DEFINITION=collection-definition-name

Specifies the name of the Collection Definition, and hence the collected data that you want to export. If you omit this qualifier, daily data is obtained from the Collection Definition called "CPD." To view the Collection Definitions that you have available, use the DCL command ADVISE COLLECT SHOW SCHEDULE. If you want to use history data instead of daily data, use the /HISTORY qualifier instead of the /COLLECTION_DEFINITION qualifier. These two qualifiers are mutually exclusive.

/DATES=filespec

Specifies that a file containing a series of date ranges is to be used in place of the /BEGINNING and /ENDING qualifiers. Each line in the dates file should look as follows:

```
dd-mmm-yyyy hh:mm:ss.cc,dd-mmm-yyyy hh:mm:ss.cc
```

The time can be either omitted entirely or truncated. Any truncated parts of the time default to 0. The periods of time represented by each line in the file need not be contiguous but they must be in ascending order.

/DATES is incompatible with the /BEGINNING and /ENDING qualifiers.

/ENDING=time

Specifies the ending date and time of the data to be exported. If you do not specify /BEGINNING, the default ending time is the current time. If you specify /BEGINNING, the default ending time is midnight (23:59) for the same day.

/FILTER=keyword

The /FILTER qualifier allows you select a subset of the daily or history data for exporting. Process data and disk data can be filtered.

Process data can be filtered by using any of the filter keywords: USERNAMES, IMAGENAMES, PROCESSNAMES, ACCOUNTNAMES, UICS, PIDS or WORKLOADNAMES. If a process record's identification information matches any of the identification specifications that are specified, then that record is selected.

Likewise, disk data can be filtered by using either of the filter keywords, VOLUMENAMES and DEVICENAMES. If a device record's identification information matches any of the volume names or device names that are specified, then that record is selected.

The following table lists the keywords:

Keyword	Description
/USERNAMES=(string,...)	Specify /FILTER=USERNAMES to export all process records with the username matching any of the specified strings.
/IMAGENAMES=(string,...)	Specify /FILTER=IMAGENAMES to export all process records with the imagename matching any of the specified strings. Do not specify any trailing ".EXE", nor the file version, device or directory.
/PROCESSNAMES=(string,...)	Specify /FILTER=PROCESSNAMES to export all process records with the processname matching any of the specified strings. The match string is case sensitive, so if the process names have any lowercase letters, spaces or tabs, use double quotes when you enter the value (e.g., /FILTER=PROCESSNAMES="--RTserver--").
/ACCOUNTNAMES=(string,...)	Specify /FILTER=ACCOUNTNAMES to export all process records with the accountname matching any of the specified strings.
/WORKLOADNAMES =(workloadname,...)	Specify /FILTER=WORKLOADNAMES to export all process records associated with any of the specified workloads. This filter is valid only if the /CLASSIFY_BY qualifier is used to specify a classification scheme for your workload data.
/UICS=(uic,...)	Specify /FILTER=UICS to export all process records with the UIC matching any of the specified UICs. An asterisk may be used to wildcard either the group or user field of the specified UICs.
/PIDS=(pid,...)	Specify /FILTER=PIDS to export all process records with the PID matching any of the specified PIDs.
/VOLUMENAMES=(string,...)	Specify /FILTER=VOLUMENAMES to export all disk records with the volumename matching any of the specified strings. Do not specify any trailing colon.

Keyword	Description
/DEVICENAMES=(string,...)	Specify /FILTER=DEVICENAMES to export all disk records with the devicename matching any of the specified strings. Do not specify any trailing colon.

/HISTORY=history-descriptor-name

Allows you to select history data from the Performance Manager database. By default, daily .CPD files are processed. However, by specifying the name of a history file descriptor you can select historical data instead.

You must have previously defined the descriptor-name in the parameters file and have used the archiving facility to create the history files. Use the DCL command ADVISE EDIT to start the parameters editor. From the utility, you can ADD, DELETE, MODIFY, and SHOW history file descriptors.

If you want to use history data instead of daily data, use the /HISTORY qualifier instead of the /COLLECTION_DEFINITION qualifier. These two qualifiers are mutually exclusive.

/INTERVAL=seconds

Specifies the elapsed time to be summarized in an output record. Its minimum value is that of the performance data file being exported. It must be a multiple of the interval of the data file, and are rounded up to match such a value.

The default value is the interval of the data file being exported.

The value is expressed in seconds.

/NODE_NAME=node-name

Identifies the node for which data is to be exported. /NODE_NAME is required if your collection definition supports multiple nodes. Only one node's data can be written out to an export file.

/OUTPUT[=file-spec]

Specifies the name of the export file. If you do not specify /OUTPUT, or if you specify /OUTPUT without a file specification, a default filename of PSPA$DUMP.DAT is used.

/PROCESS_STATISTICS=([PRIMARY_KEY=option] [,SECONDARY_KEY=option])

This qualifier allows you to specify how process records can be summarized and sorted, and to indicate what output fields to preserve in the output. By default, all details are preserved, and all fields are supplied. The default settings are:

/PROCESS_STATISTICS=(PRIMARY_KEY=PID,

SECONDARY_KEY=IMAGENAME)

If you use /CLASSIFY_BY to attach workload information to the process records, you affect the default PRIMARY_KEY, which then becomes WORKLOAD_NAME. To obtain all detail fields (such as PID), including the workload name, you must specify both the /CLASSIFY_BY qualifier, and the /PROCESS_STATISTICS = (PRIMARY_KEY=PID, SECONDARY_KEY=IMAGENAME) settings.

Primary key options are:

PRIMARY_KEY={MODE|USERNAME|IMAGENAME|
UIC_GROUP|PROCESS_NAME| WORKLOAD_NAME|ACCOUNT_NAME|PID}

Key option	Description
MODE	Group process statistics by the process mode (Interactive, Batch, Network, or Detached).
USERNAME	Group process statistics by the process's User name. (The fields UIC and ACCOUNT are also enabled when this key is specified.)
IMAGENAME	Group process statistics by the process's Image Name. (The field IMAGE_DIRECTORY is also enabled when this key is used in combination with PID.)
UIC_GROUP	Group process statistics by the process's UIC Group.
PROCESS_NAME	Group process statistics by the process name.
WORKLOAD_NAME	Group process statistics by the workload name. You must specify /CLASSIFY_BY to indicate the workload family that you intend to use.
ACCOUNT_NAME	Group process statistics by the process's account name.

Key option	Description
PID	Group process statistics by the process's EPID. (The fields USERNAME, PROCESS_NAME, UIC, MODE and ACCOUNT are also enabled when this key is specified. If both PID and IMAGENAME are used for the primary and secondary keys, the WORKLOAD_NAME and IMAGE fields are also enabled ((i.e., all fields are enabled.)

Secondary key options are:

SECONDARY_KEY={MODE|USERNAME|IMAGENAME|
UIC_GROUP|PROCESS_NAME| WORKLOAD_NAME|ACCOUNT_NAME|PID}

Secondary key option	Description
MODE	Provide process records subgrouped by the process mode (Interactive, Batch, Network, or Detached).
USERNAME	Provide process records subgrouped by the process's User name. (The fields UIC and ACCOUNT are also enabled when this key is specified.)
IMAGENAME	Provide process records subgrouped by the process's Image Name. (The field IMAGE_DIRECTORY is also enabled when this key is used in combination with PID.)
UIC_GROUP	Provide process records subgrouped by the process's UIC Group.
PROCESS_NAME	Provide process records subgrouped by the process name.
WORKLOAD_NAME	Provide process records subgrouped by the workload name. You must specify /CLASSIFY_BY to indicate the workload family that you intend to use.
ACCOUNT_NAME	Provide process records subgrouped by the process's account name.
PID	Provide process records subgrouped by the process's EPID. (The fields USERNAME, PROCESS_NAME, UIC, MODE and ACCOUNT are also enabled when this key is specified. If both PID and IMAGENAME are used for the primary and secondary keys, the WORKLOAD_NAME and IMAGE fields are also enabled, that is all fields are enabled.)

If the value for secondary key is the same as for the primary key, no secondary level breakout occurs. This also happens if the primary key is specified and no secondary key is given.

The following example demonstrates the use of this qualifier:

```
$ ADVISE PERFORMANCE EXPORT /CLASS=(NODEFAULT, PROCESS)/NODE=MYNODE - _$
/BEGIN=time/END=time -
_$ /PROCESS_STATISTICS=(PRIMARY_KEY=IMAGENAME,SECONDARY_KEY=PID) -
_$ /CLASSIFY_BY=USERGROUP=MODEL_TRANSACTIONS
```

This command produces an output file called PSPA$DUMP.DAT in the current directory, in ASCII CSV format. The process data records contain all detail fields, including the workload name with which it is associated, sorted by imagename first, then PID within that. The /CLASSIFY_BY qualifier is needed to specify the Family definition (and Workload definitions) that define the workload groups.

/SCHEDULE=({day=(hour-range[,...]) | NOday}[,...])

Where day is one of the following words:

- EVERYDAY
- WEEKDAYS
- WEEKENDS
- MONDAY
- TUESDAY
- WEDNESDAY
- THURSDAY
- FRIDAY
- SATURDAY
- SUNDAY

The hour-range is in the form of m-n where m is an integer (hour) from 0 to 23 and n is an integer (hour) from 1 to 24 and larger than m.

Use the /SCHEDULE qualifier to select a sub-set of the performance data for exporting. By default all data between the /BEGINNING time and the /ENDING time is selected. Use the day keywords with hour ranges to specify what data is to be included.

Negate any of the day keywords to omit data for a range of days. Do not specify any hour ranges with negated keywords.

/TYPE={ASCII | BINARY}

There are two different data types available for the exported file, ASCII and BINARY.

The default type is ASCII which provides data in CSV (comma separated variable) format with text items in quotes. For examples commands and the resulting output data, see Appendix E.

To use either format in subsequent processing of the data, two files have been placed in the PSPA$EXAMPLES directory area, PSPA$DUMP_ASCII.DTR and PSPA$DUMP_BINARY.DTR. To specify a format, supply a value to the qualifier of “ASCII” or “BINARY.” The default is “BINARY.”

Examples

```
$ ADVISE PERFORM EXPORT/TYPE=BINARY -
_$ /CLASS=(NODEFAULT,MEMORY)/NODE=MYNODE/BEGIN=9:00 -
_$ /END=10:00/OUTPUT=MYNODE_MEMORY.BIN
```

The previous command creates an export file containing memory statistics for node MYNODE for an hour's worth of data.

```
$ADVISE PERFORM EXPORT/TYPE=BINARY -
_$ /CLASS=(NODEFAULT,MEMORY)/NODE=MYNODE/BEGIN=20-Jan-1997 -
_$ /END=21-Jan-1997/INTERVAL=1800/OUTPUT=MYNODE_MEMORY.20JAN
```

The previous command creates a file with a day's worth of data summarized into 30 minute records.

```
$ DTR
DTR>DEFINE DICTIONARY CDD$TOP.DECPS_BIN;
DTR>SET DICTIONARY CDD$TOP.DECPS_ASC;
DTR>@PSPA$EXAMPLES:PSPA$DUMP_BINARY.DTR
DTR>DEFINE DOMAIN MEMORY_BIN USING BINARY_RECORD ON -
CON>MYNODE_MEMORY.20JAN;
DTR>READY MEMORY_BIN
DTR>FIND MEMORY_BIN WITH DATA_TYPE = "MEMO"
[48 records found]
DTR>LIST ALL HEADER AND MEMO
```

The previous command shows you how you can examine the binary data with DATATRIEVE, interactively. The DATATRIEVE record definition is contained in PSPA$EXAMPLE:PSPA$DUMP_BINARY.DTR and PSPA$EXAMPLE:PSPA$DUMP_ASCII.DTR.

ADVISE PERFORMANCE GRAPH

Use the ADVISE PERFORMANCE GRAPH command to chronologically graph any group of metrics stored in the Performance Manager database.

Format

ADVISE PERFORMANCE GRAPH

Description

The Performance Manager can produce a multitude of predefined graphs. You can also define your own custom graphs if the predefined graphs do not meet your specific needs. You can generate multiple graphs with a single command. The Performance Manager produces at least one graph, and can produce many graphs depending on how you specify the /TYPE and /NODE qualifiers.

When producing many graphs, you are likely to benefit by using the command mode interface invoked by the ADVISE PERFORMANCE command. Command mode allows many graphs to be built in memory and selectively viewed or written to a file. You can also direct the output to either the SYS$OUTPUT device or an output device as specified by the /OUTPUT qualifier.

The Performance Manager generates the graphs using ReGIS format if the SYS$OUTPUT device has the ReGIS capability, or if you specify /FORMAT=ReGIS. Otherwise, the Performance Manager generates a less resolute graph using standard ASCII characters.

Qualifiers

/AVERAGE={DAILY | WEEKLY | MONTHLY | QUARTERLY}

Causes graphs to depict a summarization of a specified time period. The selected data is averaged into the time period selected. See Chapter 4 for more information.

If you also use the /SCHEDULE or /DATES qualifiers, the DAILY and WEEKLY graphs are trimmed to show only the selected hours.

If history data with the periodicity attribute is selected, the /AVERAGE value is automatically set to that periodicity value. This is true regardless of whether the /AVERAGE qualifier is used.

/BEGINNING=date

Specifies the beginning date and time of data selected for graphing.

Where date represents the date and time in standard DCL format.

The date and time format is the standard DCL format, either absolute or relative. If you do not specify the /BEGINNING qualifier, the Performance Manager uses 00:00:00 on the same day for which the ending date and time is specified. If you do not specify an /ENDING qualifier, the Performance Manager uses 00:00:00 of the current day as the default beginning time.

You can also use the keywords TODAY and YESTERDAY. See HP's OpenVMS User's Manual, or access the HELP topic SPECIFY DATE_TIME for complete information on specifying time values.

/BEGINNING is incompatible with the /DATES qualifier.

/COLLECTION_DEFINITION=collection-definition-name

Specifies the name of the Collection Definition, and hence the collected data that you desire to use for the graph. If you omit this qualifier, daily data is obtained from the Collection Definition called “CPD.”

To view the Collection Definitions that you have available, use the DCL command ADVISE COLLECT SHOW ALL.

If you want to use history data instead of daily data, use the /HISTORY qualifier instead of the /COLLECTION_DEFINITION qualifier. /COLLECTION_DEFINITION is incompatible with the /HISTORY qualifier.

/CLASSIFY_BY=USERGROUP=family_name

Specifies the workload family whose workload definitions are to be used for summarizing process activity. This affects the TOP_WORKLOAD graph types as well as custom graphs with WORKLOAD metrics by providing the desired metrics on an individual workload basis. The default is “other” which averages all process activity together. The family_type of USERGROUP is required. No restrictions are made on the family name.

/COMPOSITE

Combines data from all nodes into a single graph. Data from each node is either added or averaged.

The following command produces a graph of the total number of processes in the cluster.

```
$ ADVISE PERFORMANCE GRAPH/COMPOSITE/TYPE=PROCESSES
```

When the Performance Manager combines I/O data from more than one node, it is possible to double count I/O operations to a disk device if it is served. Therefore, when you specify /COMPOSITE, the Performance Manager does not count all MSCP-served I/O for individual disks.

When generating a customized graph for a single metric with /COMPOSITE, the Performance Manager graphs the metric by node.

When graphing CPU percentages with the /COMPOSITE qualifier each node's CPU time is scaled according to the VUP rating to produce a cluster average CPU utilization.

For more information, see the chapter Generate Historical Graphs (see page 107).

/DATES=filespec

Specifies that a file containing a series of date ranges is to be used in place of the /BEGINNING and /ENDING qualifiers. Each line in the dates file should look like the following command:

```
dd-mmm-yyyy hh:mm:ss.cc,dd-mmm-yyyy hh:mm:ss.cc
```

The time can be either omitted entirely or truncated. Any truncated parts of the time defaults to 0. The periods of time represented by each line in the file need not be contiguous but they must be in ascending order.

/DATES is incompatible with the /BEGINNING and /ENDING qualifiers.

/ENDING=date

Specifies the ending date and time of the graph. Where date represents the date and time in standard DCL format.

If you do not specify /BEGINNING, /ENDING defaults to the current time. If you do specify /BEGINNING, the /ENDING default are midnight (23:59) of the beginning date.

You can specify either an absolute time or a combination of absolute and delta times. You can also use the keywords TODAY, TOMORROW, and YESTERDAY. See HP's OpenVMS User's Manual, or access the HELP topic SPECIFY DATE_TIME for complete information on specifying time values.

/ENDING is incompatible with the /DATES qualifier.

/FILTER=keyword

The /FILTER qualifier allows you select a subset of the daily or history data for graphing. Process data and disk data can be filtered.

Hotfile data is also filtered. When you specify filtering by process, a hotfile record is selected if accessed by the specified process. When you specify filtering by disk device, a hotfile record is selected if located on the specified device. For hotfile records matching both process and disk device, specify filtering by both process and device.

Process data can be filtered by using any of the filter keywords: USERNAMES, IMAGENAMES, PROCESSNAMES, ACCOUNTNAMES, UICS, PIDS or WORKLOADNAMES. If a process record's identification information matches any of the identification specifications that are specified, then that record is selected.

Likewise, disk data can be filtered by using either of the filter keywords, VOLUMENAMES and DEVICENAMES. If a device record's identification information matches any of the volume names or device names that are specified, then that record is selected.

The following table lists the /FILTER keyword options:

Keyword	Description
/USERNAMES=(string,...)	Specify /FILTER=USERNAMES to graph all process records with the username matching any of the specified strings.
/IMAGENAMES=(string,...)	Specify /FILTER=IMAGENAMES to graph all process records with the imagename matching any of the specified strings. Do not specify any trailing ".EXE", nor the file version, device or directory.
/PROCESSNAMES=(string,...)	Specify /FILTER=PROCESSNAMES to graph all process records with the processname matching any of the specified strings. The match string is case sensitive, so if the process names have any lowercase letters, spaces or tabs, use double quotes when you enter the value (e.g., /FILTER=PROCESSNAMES="--RTserver--").
/ACCOUNTNAMES=(string,...)	Specify /FILTER=ACCOUNTNAMES to graph all process records with the accountname matching any of the specified strings.

Keyword	Description
/WORKLOADNAMES =(workloadname,...)	Specify /FILTER=WORKLOADNAMES to graph all process records associated with any of the specified workloads. This filter is valid only if the /CLASSIFY_BY qualifier is used to specify a classification scheme for your workload data.
/UICS=(uic,...)	Specify /FILTER=UICS to graph all process records with the UIC matching any of the specified UICs. An asterisk may be used to wildcard either the group or user field of the specified UICs.
/PIDS=(pid,...)	Specify /FILTER=PIDS to graph all process records with the PID matching any of the specified PIDs.
/VOLUMENAMES=(string,...)	Specify /FILTER=VOLUMENAMES to graph all disk records with the volumename matching any of the specified strings. Do not specify any trailing colon.
/DEVICENAMES=(string,...)	Specify /FILTER=DEVICENAMES to graph all disk records with the devicename matching any of the specified strings. Do not specify any trailing colon.

/FORMAT={
ReGIS[=(CHARACTERISTIC={COLOR | LINE | PATTERN}
[,X_POINTS=l])] |
ANSI=[(HEIGHT=m,WIDTH=n,LINE)] |
TABULAR[=X_POINTS=l] |
CSV[=X_POINTS=l]
POSTSCRIPT=(CHARACTERISTIC={COLOR,LINE,
PATTERN},X_POINTS=l)

Where:	
l	Is in the range of 2 to 480, and a best-fit value is chosen by default.
m	Is greater than or equal to 20 and less than or equal to 60.
n	Is greater than or equal to 40 and less than or equal to 132.

The Performance Manager graphs ReGIS or ANSI graph by default, depending on the device characteristics of the SYS$OUTPUT device. ANSI and ReGIS formats are not available with pie charts. You may override the default with the /FORMAT qualifier. A graph is one of four formats: ANSI, REGIS, TABULAR or PostScript.

Optionally, you may specify whether ReGIS graphs use LINE, PATTERN, or COLOR. COLOR is the default. PATTERN is incompatible with COLOR.

Use the X_POINTS keyword to specify the number of data points to plot across a ReGIS graph. The valid range for X_POINTS is 2 to 480. By default, the Performance Manager chooses a best-fit value for x-points so that the time period represented by each point is even.

As the value of X_POINTS increases, spikes and valleys become more defined and the graph has a higher resolution. A low number of X_POINTS produces a smoother graph because the graphing facility averages any additional data points within the time frame requested. Consider the time frame of a particular graph request when you determine the value of X_POINTS.

For example, over a 12-hour span, the Performance Manager records statistics 360 times (every 2 minutes). If the value of X_POINTS is 24, the graphing facility averages every 15 data records (or 30 minutes) and produces a graph with smooth flow. If the value of X_POINTS is 72, the graphing facility averages every 5 data records (or 10 minutes) and produces a graph with valleys and spikes.

Use the WIDTH keyword to specify the column width of the ANSI graph output. Valid widths range from 40 to 132 columns. If you do not specify the WIDTH qualifier, the Performance Manager uses the terminal width setting. When you specify the /OUTPUT qualifier or generate the graph under batch, the width of the graph is 132 columns.

Use the HEIGHT keyword to specify the graph height of the ANSI graph output. Valid heights are from 20 to 60 lines. If you do not specify HEIGHT, the Performance Manager uses the terminal page length setting. When you use the /OUTPUT qualifier or generate the graph under batch, the height of the graph is 40 lines.

/HISTORY=history_descriptor_name

Allows you to select history data from the Performance Manager database. By default, daily data files are used to supply data for graphing. However, by specifying the name of a history file descriptor, you can select historical data instead.

You must define the history file descriptor in the parameters file and have archived data according to the descriptor's definition. Use the DCL command ADVISE EDIT to invoke the Performance Manager Parameter Edit Utility. From the utility, you can ADD, DELETE, MODIFY, and SHOW history file descriptors. Use the ADVISE ARCHIVE command to create the archived files.

If history data with the periodicity attribute is selected, the /AVERAGE value is automatically set to that periodicity value. This is true regardless of whether the /AVERAGE qualifier is used.

/HISTORY is incompatible with the /COLLECTION_DEFINITION qualifier.

For information on how to produce a graph of history data including a typical time period, see the chapter Generate Historical Graphs (see page 107).

Note: If model data was not archived, the /CLASSIFY_BY qualifier is restricted to those workload families specified in the history file descriptor.

/NODE_NAMES=(node-name[,...])

Identifies the nodes to graph.

The Performance Manager creates a separate graph for each node unless you specify the /COMPOSITE qualifier. If you omit the /NODE_NAMES qualifier, all the nodes in the schedule file associated with the specified collection definition (CPD by default) are used for the graph(s). If you specify only one node, the parentheses can be omitted. Do not use wildcard characters in the node-name specifications.

/OUTPUT=filespec

Creates an output file that contains the graphs. The default file extension for a ReGIS graph is .REG, the file type for ANSI and TABULAR formatted graphs is .RPT and the file extension for PostScript is .PS.

When you generate multiple graphs with a single command line, you can create a unique output file for each graph. To do this, omit the file name with the /OUTPUT qualifier. The Performance Manager generates a separate file for each graph created and uses the graph type keyword as the unique file name.

For example:

```
$ ADVISE PERFORMANCE GRAPH/NODE=SYSDEV/END=1/TYPE=(MEM,CPU_U,CPU_MODE)
/OUTPUT=.REG
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
MUMMS$DKA300:[CORREY]SYSDEV_CPU_UTILIZATION.REG;1
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
MUMMS$DKA300:[CORREY]SYSDEV_MEMORY_UTILIZATION.REG;1
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
MUMMS$DKA300:[CORREY]SYSDEV_CPU_MODES.REG;1
```

/RULES[=file-spec], /NORULES

Loads information from the rules file to establish user-defined hardware scaling factors. The file-spec must point to an auxiliary knowledge base which has previously been compiled with the ADVISE PERFORMANCE COMPILE command. The default file type is .KB. If the NORULES qualifier is specified no augmentation of the factory rules occur. See also the Chapter "Customize the Knowledge Base (see page 135)."

/SCHEDULE=({day=(hour-range)[,...]|NOday}[,...])

Specifies that a subset of Performance Manager data is to be used (or not used if keyword negation is specified) to generate graphs. By default, the Performance Manager selects all data between the /BEGINNING time and the /ENDING time, or as specified with the /DATES qualifier.

Where:

day	SUNDAY, MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, EVERYDAY, WEEKDAYS or WEEKENDS.
hour-range	Specified as m-n, where m and n are numbers from 0 to 24, and m is less than n. You can specify more than one hour range for a given day. Hour-range is mutually exclusive with the NO option.

If you omit a day keyword, the data for that day is selected. Data selection for individual days of the week can be inhibited by negating the keyword (for example, NOSUNDAY) or for all of the days of the week by specifying the NOEVERYDAY keyword. The values [NO]WEEKDAYS and [NO]WEEKENDS similarly can be used to enable or disable data selection for weekdays and weekends.

You must specify an hour range for any non-negated day keyword. Do not include an hour range if you are specifying a negated day keyword, such as NOMONDAY.

Less inclusive keyword values override more inclusive values. For example, MONDAY=10--12 overrides EVERYDAY=8--17 for Monday, but the Performance Manager selects data from 8:00 a.m. to 5:00 p.m. for all of the other days of the week.

For example:

```
$ ADVISE PERFORMANCE GRAPH -
_$ /SCHEDULE=(NOEVERYDAY,WEEKDAYS=(8-12,13-17))
```

Graphs do not depict the time periods deselected by the /SCHEDULE qualifier.

/SELECT[={GREATER_THAN[:percent] | LESS_THAN[:percent]}], /NOSELECT

Use /SELECT in conjunction with the optional threshold values which may be specified on a per graph type basis.

If this qualifier is present, before a graph is produced, a check is made to see if the values to be graphed fall within the threshold values for the indicated percentage of points. If so, then the graph (or pie chart) is produced. If not, no graph is produced. For details on THRESHOLD, see the /TYPE qualifier.

Keyword	Meaning
GREATER_THAN:percent	At least “percent” of the graph points plotted must be greater than or equal to the threshold value specified with the /TYPE qualifier.
LESS_THAN:percent	At least “percent” of the graph points plotted must be less than or equal to the threshold value specified with the /TYPE qualifier.

These keywords accept a single value representing the percentage of the points plotted that must meet the threshold criteria before the graph is produced. Each graph point value is determined by the sum (STACKED) of the items depicted (up to 6). If the GREATER_THAN keyword is specified without a value, then 50 percent is assumed. If the LESS_THAN keyword is specified without a value, then 90 percent is assumed.

If the /SELECT qualifier is present without a keyword, then GREATER_THAN:50 is assumed. For example:

```
$ ADVISE PERFORMANCE GRAPH /BEGINNING=10/ENDING=11/NODE=YQUEM -
_$ /TYPE=(CPU_U:THRESHOLD:25,CPU_M:THRESHOLD:35,TOP_CPU_I:THRESHOLD:45)-
_$ /SELECT=GREATER/OUTPUT=.REGIS
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
BADDOG:[CORREY.WORK.PSPA]YQUEM_CPU_UTILIZATION.REG;1
```

This command requests that three graphs be produced. The CPU Utilization graph is produced, if 50 percent or more of the data points exceed 25 percent CPU utilization. The CPU_MODES graph is produced if 50 percent or more of the data points exceed 35 percent CPU utilization. The TOP_CPU_IMAGES graph is produced if 50 percent or more of the data points exceed 45 percent CPU utilization. In this case only one graph is produced.

```
$ ADVISE PERFORMANCE GRAPH /BEGINNING=10/ENDING=11/NODE=YQUEM -
_$ /TYPE=(CPU_U:THRESHOLD:25,CPU_M:THRESHOLD:35,TOP_CPU_I:THRESHOLD:15)-
_$ /SELECT=GREATER/OUTPUT=.REGIS
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
BADDOG:[CORREY.WORK.PSPA]YQUEM_CPU_UTILIZATION.REG;3
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
BADDOG:[CORREY.WORK.PSPA]YQUEM_TOP_CPU_IMAGES.REG;1
```

This command produced two of three graphs because threshold quantity for the last graph was lowered.

```
$ ADVISE PERFORMANCE GRAPH /BEGINNING=10/ENDING=11/NODE=YQUEM -
_$ /TYPE=(CPU_U:THRESHOLD:25,CPU_M:THRESHOLD:35,TOP_CPU_I:THRESHOLD:15) -
_$ /SELECT=GREATER:90/OUTPUT=.REGIS

$
```

The previous command generated none of the graphs because in all cases 90 percent of the graph points did not exceed the specified thresholds.

/STACK, /NOSTACK

Stacks the values for each category on the graph. Use /NOSTACK to overlay the values on the graph. ReGIS graphs using /NOSTACK may cause some occlusion if you do not specify /FORMAT=ReGIS=CHARACTERISTICS=LINE also. If you are requesting a series of graphs in one command, you can override the /[NO]STACK qualifier by specifying the [NO]STACK keyword following each graph type. See Chapter 4 for an illustration of the use of the /NOSTACK qualifier and for additional information about default behavior.

**/TYPE=
([NO]graph_type[=([NO]STACK,Y_AXIS_MAXIMUM=n,
TITLE=string)],...,
ALL_GRAPHS[=([NO]STACK,THRESHOLD=m,
Y_AXIS_MAXIMUM=n)],
CUSTOM=(see below "TYPE=CUSTOM"))**

Specifies which of the graphs you want generated.

Use the TITLE keyword to override the Performance Manager supplied title. The text string may be a maximum of 40 characters.

The STACK keyword for a particular graph type overrides the setting established by the /STACK qualifier.

The THRESHOLD keyword specifies a threshold value associated with the graph. The m specifier is a positive decimal value. A horizontal line is placed on the graph at the position on the Y-axis associated with the value. You can use THRESHOLD in conjunction with the /SELECT qualifier to prevent the generation of the graph or pie chart.

The Y_AXIS_MAXIMUM specifies a fixed y-axis to be used for the graph. The default behavior is to setup the y-axis so that the maximum data point appears near the top of the graph. This graph modifier allows you to specify the y-axis so that you can compare data from different graphs without having different scales on the y-axis. The n specifier is a positive decimal value.

You can specify multiple graphs in a single command. For example, you can specify /TYPE=(TOP_IO_DISKS,TOP_HARDFAULTING_IMAGES). Of course, /TYPE=ALL_GRAPHS generate all of the predefined graphs. To suppress a graph type, specify NO graph_type.

CPU_UTILIZATION is the default graph type.

The following list contains all of the available Performance Manager graphs:

[NO]ALL_GRAPHS	[NO]COMPUTE_QUEUE
[NO]CPU_MODES	[NO]CPU_UTILIZATION
CUSTOM	[NO]DECNET
[NO]DISKS	[NO]FAULTS
[NO]FILECACHE	[NO]JOBS
[NO]LOCKS	[NO]MEMORY_UTILIZATION
[NO]PROCESSES	[NO]RESPONSE_TIME
[NO]TERMINALS	[NO]TOP_BDT_W
[NO]TOP_BLKS_R	[NO]TOP_BLKS_S
[NO]TOP_BUFIO_IMAGES	[NO]TOP_BUFIO_USERS
[NO]TOP_BUFIO_WORKLOADS	[NO]TOP_BUSY_DISKS
[NO]TOP_BUSY_PROCESSOR	[NO]TOP_BUSY_VOLUMES
[NO]TOP_CHANNEL_IO	[NO]TOP_CHANNEL_QUELEN
[NO]TOP_CHANNEL_THRUPUT	[NO]TOP_CLUSTER_RULE_OCC
[NO]TOP_COMPAT_PROCESSOR	[NO]TOP_CPU_IMAGES
[NO]TOP_CPU_RULE_OCC	[NO]TOP_CPU_USERS
[NO]TOP_CPU_WORKLOADS	[NO]TOP_CR_W
[NO]TOP_DGS_D	[NO]TOP_DGS_R
[NO]TOP_DGS_S	[NO]TOP_DIRIO_IMAGES
[NO]TOP_DIRIO_USERS	[NO]TOP_DIRIO_WORKLOADS
[NO]TOP_DISKIO_IMAGES	[NO]TOP_DISKIO_USERS
[NO]TOP_DISKIO_WORKLOADS	[NO]TOP_EXEC_PROCESSOR
[NO]TOP_FAULTING_IMAGES	[NO]TOP_FAULTING_USERS
[NO]TOP_FAULTING_WORKLOADS	[NO]TOP_FREEBLK_DISKS
[NO]TOP_FREEBLK_VOLUMES	[NO]TOP_HARDFAULTING_IMAGES

[NO]TOP_HARDFAULTING_USERS	[NO]TOP_HARDFAULTING_WORKLOADS
[NO]TOP_HSC_DISK_IO	[NO]TOP_HSC_DISK_THRUPUT
[NO]TOP_HSC_IO	[NO]TOP_HSC_TAPE_IO
[NO]TOP_HSC_TAPE_THRUPUT	[NO]TOP_HSC_THRUPUT
[NO]TOP_IDLE_PROCESSOR	[NO]TOP_IMAGE_ACTIVATIONS
[NO]TOP_IMAGE_VOLUME_IO	[NO]TOP_INTERRUPT_PROCESSOR
[NO]TOP_IOSIZE_DISKS	[NO]TOP_IOSIZE_VOLUMES
[NO]TOP_IOSIZE_IMAGES	[NO]TOP_IOSIZE_USERS
[NO]TOP_IOSIZE_WORKLOADS	[NO]TOP_IO_DISKS
[NO]TOP_IO_FILES	[NO]TOP_IO_RULE_OCC
[NO]TOP_IO_VOLUMES	[NO]TOP_KB_MAP
[NO]TOP_KB_RC	[NO]TOP_KB_S
[NO]TOP_KERNEL_PROCESSOR	[NO]TOP_MEMORY_RULE_OCC
[NO]TOP_MGS_R	[NO]TOP_MGS_S
[NO]TOP_MP_SYNCH_PROCESSOR	[NO]TOP_MSCPIO_FILES
[NO]TOP_PAGING_DISKS	[NO]TOP_PAGING_FILES
[NO]TOP_PAGING_VOLUMES	[NO]TOP_POOL_RULE_OCC
[NO]TOP_PRCT_FREE_DISKS	[NO]TOP_PRCT_FREE_VOLUMES
[NO]TOP_PRCT_USED_DISKS	[NO]TOP_PRCT_USED_VOLUMES
[NO]TOP_QUEUE_DISKS	[NO]TOP_QUEUE_VOLUMES
[NO]TOP_READ_DISKS	[NO]TOP_READ_FILES
[NO]TOP_READ_VOLUMES	[NO]TOP_RESIDENT_IMAGES
[NO]TOP_RESIDENT_USERS	[NO]TOP_RESIDENT_WORKLOADS
[NO]TOP_RESOURCE_RULE_OCC	[NO]TOP_RESPONSE_TIME_DISKS
[NO]TOP_RESPONSE_TIME_FILES	[NO]TOP_RESPONSE_TIME_IMAGES
[NO]TOP_RESPONSE_TIME_USERS	[NO]TOP_RESPONSE_TIME_VOLUMES
[NO]TOP_RESPONSE_TIME_WORKLOADS	[NO]TOP_RULE_OCCURRENCES
[NO]TOP_SPLITIO_DISKS	[NO]TOP_SPLITIO_FILES
[NO]TOP_SPLITIO_VOLUMES	[NO]TOP_SUPER_PROCESSOR

[NO]TOP_TERMINAL_INPUT_IMAGES	[NO]TOP_TERMINAL_INPUT_USERS
[NO]TOP_TERMINAL_INPUT_WORKLOADS	[NO]TOP_TERMINAL_THRUPUT_IMAGES
[NO]TOP_TERMINAL_THRUPUT_USERS	[NO]TOP_TERMINAL_THRUPUT_WORKLOADS
[NO]TOP_THRUPUT_DISKS	[NO]TOP_THRUPUT_FILES
[NO]TOP_THRUPUT_IMAGES	[NO]TOP_THRUPUT_USERS
[NO]TOP_THRUPUT_VOLUMES	[NO]TOP_THRUPUT_WORKLOADS
[NO]TOP_USER_IMAGE_ACTIVATIONS	[NO]TOP_USER_PROCESSOR
[NO]TOP_USER_VOLUME_IO	[NO]TOP_VA_IMAGES
[NO]TOP_VA_USERS	[NO]TOP_VA_WORKLOADS
[NO]TOP_WORKLOAD_IMAGE_ACTIVATIONS	[NO]TOP_WRITE_DISKS
[NO]TOP_WRITE_FILES	[NO]TOP_WRITE_VOLUMES
[NO]TOP_WSSIZE_IMAGES	[NO]TOP_WSSIZE_USERS
[NO]TOP_WSSIZE_WORKLOADS	

The following sections list the graph types and their descriptions. Included are keywords used with the /TYPE qualifier.

- /TYPE=CUSTOM

  You must specify the items for the Performance Manager to graph. The metrics and selection objects are described below.

```
ADVISE PERFORMANCE
GRAPH/TYPE=CUSTOM=({SYSTEM_METRICS=(system_metrics) |
USER_METRICS=(process_metrics),SELECTION=(usernames) |
IMAGE_METRICS=(process_metrics),SELECTION=(imagenames) |
WORKLOAD_METRICS=(process_metrics),SELECTION=(workloadnames)|
DEVICE_METRICS=(disk_metrics),SELECTION=(devicenames) |
VOLUME_METRICS=(disk_metrics),SELECTION=(volumenames) |
CPU_METRICS=(cpu_modes),SELECTION=(Phy-cpu-ids) |
HSC_METRICS=(hsc_metrics),SELECTION=(HSC-nodenames) |
SCS_METRICS=(scs_metrics),SELECTION=(SCS-nodenames) |
RULE_METRICS=(rule_metrics),SELECTION=(Rule-ids) |
CHANNEL_METRICS=(channel_metrics),SELECTION=(channel-specs) |
FILE_METRICS=(file_metrics),SELECTION=(file-names) |
DISK_USER_METRICS=(disk_user_metrics),SELECTION=(username-volumename) |
DISK_IMAGE_METRICS=(disk_image_metrics),SELECTION=(imagename-volumename)}
[,[NO]STACK] [,Y_AXIS_MAXIMUM=n] [,THRESHOLD=m] [,TITLE=string])
```

Where:	
metric_class	The metrics are grouped together by metric class and described in the next table.
Selection_string	Specify up to six strings, or only one if you specify multiple metrics. The strings are used to match against Performance Manager records to select data for the CUSTOM graph. If you specify /TYPE= CUSTOM= (USER_METRICS= CPUTIME,SELECTION= WILK) the Performance Manager selects and graph all process records which have the username field “WILK.”

The CUSTOM graph type allows you to graph a selection of metrics for either the system, or selected users, images, workloads, disk devices, volumes, HSCs, SCS nodes, rule-ids or channels. You may graph up to six selections with a single metric, or up to six metrics with a single selection. The Performance Manager either prompts you in command mode for the data (ADVISE PERFORMANCE) or you can specify the desired metrics and selections in a single DCL command.

For example:

```
$ ADVISE PERFORMANCE GRAPH/TYPE = CUSTOM = SYSTEM_METRICS = -
_$ (DZROFAULTS,GVALID)
```

The SELECTION string must be chosen based on the metric class that you use:

– If the metric class is USER_METRICS then the selection strings are interpreted as user names.

– If the metric class is IMAGE_METRICS then the selection strings are interpreted as image names.

– If the metric class is WORKLOAD_METRICS then the selection strings are interpreted as workload names. (Unless you use the /CLASSIFY_BY qualifier to characterize the process data into various workloads, all workload data is grouped into the default workload called “OTHER.”)

– If the metric class is DEVICE_METRICS then the selection strings are interpreted as device names.

– If the metric class is VOLUME_METRICS then the selection strings are interpreted as volume names.

- If the metric class is CPU_METRICS then the selection strings are interpreted as physical processor IDs which are in the form NODENAME_INTEGER, such as, NODE1_3.

  To display a graph which shows active CPUs in an OpenVMS multiprocessing system, enter a command similar to the following:

  $ ADVISE PERFORMANCE GRAPH/END=0:10/NODE=YQUEM -
  _$ /TYPE=TOP_BUSY_PROCESSOR

  Specifying a physical CPU ID allows you to isolate and analyze one CPU of a selected node in an SMP configuration.

- If the metric class is HSC_METRICS then the selection strings are interpreted as HSC node names.
- If the metric class is SCS_METRICS then the selection strings are interpreted as cluster node names.
- If the metric class is FILE_METRICS then the selection strings are interpreted as file names.
- If the metric class is RULE_METRICS then the selection strings are interpreted as rule IDs.

Note: Rule Metrics are available only from history files.

- If the metric class is DISK_USER_METRICS, then the selection strings are interpreted as username-volumename.
- If the metric class is DISK_IMAGE_METRICS, then the selection strings are interpreted as imagename-volumename.
- If the metric class is CHANNEL_METRICS then the selection strings are interpreted as a channel-spec which is the HSC nodename, an underscore, and the HSC's channel number (for example, HSC001_6).

The following tables identify the custom graphing metrics grouped by metric class.

Channel	**Description**
CHANNEL_IO	Number of I/O operations transferred by the HSC K.SDI channel
CHANNEL_QUELEN	Number of I/O operations outstanding to all disks on the HSC K.SDI channel
CHANNEL_THRUPUT	Number of bytes per second transferred by the HSC K.SDI channel
CPU	**Description**
P_BUSY	Percentage of time that the physical CPU was busy

Channel	Description
P_COMPAT	Percentage of time that the physical CPU was in compatibility mode
P_EXEC	Percentage of time that the physical CPU was in exec mode
P_IDLE	Percentage of time that the physical CPU was idle
P_INTERRUPT	Percentage of time that the physical CPU was in interrupt stack mode
P_KERNEL	Percentage of time that the physical CPU was in kernel mode
P_MP_SYNCH	Percentage of time that the physical CPU was in MP_synch mode
P_SUPER	Percentage of time that the physical CPU was in supervisor mode
P_USER	Percentage of time that the physical CPU was in USER mode

Disk	Description
BUSY	Percent of time that there was one or more outstanding I/O operation to the disk
D_IO_SIZE	Number of 512 byte pages per I/O request
D_RESPONSE_TIME	Average number of milliseconds to process an I/O operation (Note that this is zero if there are no I/O operations)
SPLITIO	Number of split I/O operations per second to the disk
FREEBLKS	Number of free blocks on the disk
MSCPIO	Number of MSCP I/O operations per second
PAGIO	Number of paging and swapping I/O operations per second
PRCT_FREE	Percentage of free disk space for a given disk
PRCT_USED	Percentage of used disk space for a given disk

Channel	Description
QUEUE	Average number of I/O operations outstanding
READIO	Number of read I/O operations per second
THRUPUT	Number of Kbytes per second transferred to or from the disk
TOTIO	Number of I/O operations per second
WRITIO	Number of write I/O operations per second

Disk User	Description
USER_VOLUME_IO	Number of I/Os per second for the user's use of the disk volume. This is based on the collected top two disks' I/O rates per process.

HSC	Description
HSC_DISK_IO	Number of disk I/O operations performed by the HSC
HSC_DISK_THRUPUT	Number of bytes per second transferred to and from disks on the HSC
HSC_IO	Number of I/O operations transferred by the HSC
HSC_TAPE_IO	Number of tape I/O operations performed by the HSC
HSC_TAPE_THRUPUT	Number of bytes per second transferred to and from tapes on the HSC
HSC_THRUPUT	Number of bytes per second transferred by the HSC

File Metric	Description
FILE_TOTIO	Number of I/O's per second to this file.
FILE_PAGIO	Number of paging I/Os per second to this file.
FILE_READIO	Number of read I/O's per second to this file.

Channel	Description
FILE_WRITIO	Number of write I/O's per second to this file.
FILE_THRUPUT	Number of bytes per second transferred to or from this file.
FILE_RESPONSE_TIME	Average number of milliseconds elapsed between the start of the IO (SIO) and its completion (EIO), for all of the I/Os to the file.
FILE_SPLITIO	Number of split I/O's per second to this file.

Process	Description
BUFIO	Number of process buffered I/O operations per second
CPUTIME	Percent of total CPU time that the process(es) consumed
DIRIO	Number of process direct I/O operations per second
DSKIO	Number of process disk I/O operations per second
DSKTP	Number of process bytes per second transferred to and from disks
FAULTS	Number of process hard and soft page faults per second
HARDFAULTS	Number of process page fault I/O operations per second
IMAGE_ACTIVATIONS	Number of process image activations per second
IO_SIZE	Average number of pages per process disk I/O
RESIDENCE	Number of resident processes with either the specified user name or image name
RESPONSE_TIME	Average number of seconds between the end-transaction for a terminal read, and the start-transaction for the next terminal read, or an image termination.

Channel	**Description**
TAPIO	Number of process tape I/O operations per second.
TAPTP	Number of process bytes per second transferred to and from tapes.
TERM_INPUT	Number of process terminal read operations per second.
TERM_THRUPUT	Number of process bytes per second transferred via terminal reads.
VASIZE	Number of pages in the virtual address space for a given process
WSSIZE	Number of working set pages (X 1000) per process
Rule	**Description (Rule Metrics available from history data only)**
CLUSTER_OCCURRENCES	Number of rules prefixed with the letter "L" that fired per hour. (Does not include any rules in Domain Cluster)
CPU_OCCURRENCES	Number of rules prefixed with the letter "C" that fired per hour
IO_OCCURRENCES	Number of rules prefixed with the letter "I" that fired per hour
MEMORY_OCCURRENCES	Number of rules prefixed with the letter "M" that fired per hour
OCCURRENCES	Number of rules that fired per hour (including user written rules)
POOL_OCCURRENCES	Number of rules in the set: R0020, R0025, R0030, R0035, R0040, R0045, R0050, R0060, R0070, R0080 that fired per hour
RESOURCE_OCCURRENCES	Number of rules prefixed with an "R" but not in the above set that fired per hour
SCS	**Description**
BDT_W	Number of times per second that message had to wait for buffers
BLKS_R	Block request rate

Channel	Description
BLKS_S	Block send rate
CR_W	Number of times per second that messages had to wait due to insufficient credits
DGS_D	Datagrams discarded rate
DGS_R	Datagram receive rate
DGS_S	Datagram send rate
KB_MAP	Kbytes transferred rate
KB_RC	Kbytes received rate
KB_S	Kbytes sent rate
MGS_R	Message receive rate
MGS_S	Message send rate
System	**Description**
ARRLOCPK	Arriving local packets per second
ARRTRAPK	Transit packets per second
BATCH_COMQ	Number of computable batch processes
BATCH_PROCESSES	Number of Batch processes
BUFIO	Buffered I/O per second
CEF	Average number of processes in common event flag wait state
COLPG	Average number of processes in collided page wait state
COM	Average number of processes in computable state
COMO	Average number of processes in computable outswapped state
COMPAT	Percent CPU time spent in compatibility mode
CPU_BATCH	Percent CPU time used by batch jobs
CPU_DETACHED	Percent CPU time used by detached jobs
CPU_INTERACTIVE	Percent CPU time used by interactive jobs

Channel	Description
CPU_NETWORK	Percent CPU time used by network jobs
CPU_OTHER	Percent CPU time for which the Performance Manager did not capture process data
CPU_TOTAL	Percent CPU time not in idle mode
CPU_VUP_RATING	The VUP rating of the CPU
SWPBUSY	Percentage of CPU SWAPPER busy
IOBUSY	Percentage of CPU Multi I/O busy
ANYIOBUSY	Percentage of CPU Any I/O busy
PAGEWAIT	Percentage of CPU idle: page wait
SWAPWAIT	Percentage of CPU idle: swap wait
MMGWAIT	Percentage of CPU idle: page or swap wait
SYSIDLE	percentage of CPU and I/O idle
CPUONLY	Percentage of CPU only busy
IOONLY	Percentage of I/O only busy
CPUIO	Percentage of CPU and I/O busy
CUR	Average number of processes in currently executing process state
DEADLOCK_FIND	Number of deadlocks found by OpenVMS per second
DEADLOCK_SEARCH	Number of deadlock searches per second
DEPLOCPK	Departing local packets per second
DETACHED_COMQ	Number of computable detached processes
DETACHED_PROCESSES	Number of detached processes
DIRIO	Direct I/O per second
DISK_PAGING	Number of paging I/O operations per second
DISK_SWAPPING	Number of swapping I/O operations per second

Channel	Description
DISK_USER	Number of user I/O disk operations per second
DZROFAULTS	Number of demand-zero page faults per second
ERASE_QIO	Number of Erase QIO operations per second
EXEC	Percent CPU time charged to executive mode
FILE_OPEN	Number of files opened per second
FILE_SYS	Percent CPU time spent in the file system
System	**Description**
FPG	Average number of processes in free page wait state
FREECNT	Free list page count
FREEFAULTS	Number of free list page faults per second
FREELIM	Percent of physical memory allocated to the free list by the SYSGEN parameter FREELIM
FREELIST	Percent of physical memory on the FREELIST, excluding the number of pages for FREELIM
GVALID	Global page faults per second
HIB	Average number of processes in hibernate wait state
HIBO	Average number of processes in hibernate outswapped wait state
IDLE	Percent CPU time that is idle time
IMAGE_ACTIVATIONS	Number of image activations per second
INCOMING_LOCKING	Number of incoming ENQs or Lock Conversion (CVTs) from remote nodes per second
INPROCACT	Number of active inswapped processes

Channel	Description
INPROCINACT	Number of inactive inswapped processes
ISWPCNT	Inswaps per second
INTERACTIVE_PROCESSES	Number of interactive processes
INTERRUPT	Percent CPU time spent on the interrupt stack
INT_COMQ	Number of computable interactive processes
IRP_CNT	Count of the IRPs in use
IRP_MAX	Length of the IRP list
KERNEL	Percent CPU time charged to kernel mode time
LAT_TERMIO	Number of LAT terminal I/O operations per second
LEF	Average number of processes in local event flag wait state
LEFO	Average number of processes in local event flag outswapped wait state
LG_RESPONSE	Average process terminal response time for interactions requiring greater than 1.0 CPU seconds
LOCAL_LOCKING	Number of local node ENQs or Lock Conversion (CVTs) per second
LOCK_CNT	Count of lock IDs in use
LOGNAM	Number of logical name translations per second
LRP_CNT	Count of the LRPs in use
LRP_MAX	Length of the LRP list
MBREADS	Mailbox reads per second
MBWRITES	Mailbox writes per second
MED_RESPONSE	Average process terminal response time for interactions requiring greater than or equal to 0.1 CPU seconds, and less than 1.0 CPU seconds

Channel	Description
MEM_TOTAL	Percent of physical memory in use, excluding pages on the free and modified list
MFYCNT	Modified list page count
MFYFAULTS	Number of modified list pagefaults per second
MODIFIED	Percent of physical memory on the modified list
MP_SYNCH	CPU time charged while waiting for a resource protected by a spin lock to be freed
MWAIT	Average number of processes in miscellaneous wait state
NETWORK_COMQ	Number of computable network processes
NETWORK_PROCESSES	Number of network processes
NP_FREE_BLOCKS	Count of non-paged blocks
NP_FREE_BYTES	Number of free Kbytes in non-paged pool
NP_FREE_LEQ_32	Number of free non-paged pool blocks less than or equal to 32 bytes in size
NP_MAX_BLOCK	Size, in Kbytes, of largest free non-paged pool block
NP_MIN_BLOCK	Size, in bytes, of smallest free non-paged pool block
NP_POOL_MAX	Size, in Kbytes, of non-paged pool
NV_TERMIO	Number of NV terminal I/O operations per second
OTHERBUFIO	Number of buffered I/O operations less any terminal I/O operations per second
OUTGOING_LOCKING	Number of outgoing ENQs or Lock Conversion (CVTs) to remote nodes per second
OUTPROCACT	Number of active outswapped processes (COMO)

Channel	Description
OUTPROCINACT	Number of inactive outswapped processes
PAGEFILE_UTILIZATION	Percent of pagefile pages in use or occupied
PFW	Average number of processes in page fault wait state
PG_FREE_BLOCKS	Count of paged blocks
PG_FREE_BYTES	Number of free Kbytes in paged pool
PG_FREE_LEQ_32	Number of free paged pool blocks less than or equal to 32 bytes in size
PG_MAX_BLOCK	Size, in Kbytes, of largest free paged pool block
PG_MIN_BLOCK	Size, in bytes, of smallest free paged pool block
PG_POOL_MAX	Size, in Kbytes, of paged pool
PREADIO	Read operations per second from a disk due to a page fault
PREADS	Pages read per second from a disk due to a page fault
PWRITES	Pages written per second to paging files
PWRITEIO	Write operations per second to paging files
RCVBUFFL	Receiver buffer failures per second
RELATIVE_CPU_POWER	This node's VUP rating as a percentage of the composite of selected nodes
RESOURCE_CNT	Count of resources in use
RT_TERMIO	Number of remote (RT) terminal I/O operations per second
SM_RESPONSE	Average process terminal response time for interactions requiring less than 0.1 CPU seconds
SPLITIO	Number of split I/O transfers per second
SRP_CNT	Count of SRPs in use

Channel	Description
SRP_MAX	Length of the SRP list
SUPER	Percent CPU time charged to supervisor mode
SUSP	Average number of processes in suspend wait state
SUSPO	Average number of processes in suspend outswapped wait state
SYSFAULTS	System page faults per second
SYSTEMWS	Percent of physical memory used by processes with the user name of SYSTEM
TOTAL_PROCESSES	Total number of processes
TRCNGLOS	Transit congestion losses per second
TT_TERMIO	Number of TT terminal I/O operations per second
TW_TERMIO	Number of DECterm I/O operations per second
TX_TERMIO	Number of TX terminal I/O operations per second
USERWS	Percent of physical memory used by process working sets
USER_MODE	Percent CPU time spent in user mode
VMSALLOC	Percent of physical memory allocated to OpenVMS (including pool)
WINDOW_TURN	Number of file window turns per second
WRTINPROG	Transition page faults per second
WT_TERMIO	Number of UIS terminal operations per second

/TYPE=COMPUTE_QUEUE (Number of Processes in COM and COMO)

Plots the number of computable processes categorized by:

- Network processes (NETWORK_COMQ)
- Interactive processes (INT_COMQ)
- Batch processes (BATCH_COMQ)
- Detached processes (DETACHED_COMQ)

/TYPE=CPU_MODES (CPU Modes)

Plots the percentage of CPU time spent in the various processor modes:

- Multiprocessor synchronization (MP_SYNCH)
- User (USER_MODE)
- Supervisor (SUPER)
- Executive (EXEC)
- Kernel (KERNEL)
- Interrupt Stack (INTERRUPT)

/TYPE=CPU_UTILIZATION (CPU Utilization)

Plots 6 metrics for percent CPU utilization:

- Interrupt stack and MP Synch (CPU_MP_INT)
- Detached processes (CPU_DETACHED)
- Interactive processes (CPU_INTERACTIVE)
- Batch processes (CPU_BATCH)
- Network processes (CPU_NETWORK)
- Other (CPU_OTHER)

This is the default graph type.

/TYPE=DECNET (System-Wide DECnet Traffic)

Plots the number of DECnet operations per second in terms of:

- Arriving packets (ARRLOCPK)
- Departing packets (DEPLOCPK)
- Transit packets (ARRTRAPK)

/TYPE=DISKS (DISK I/O)

Plots the disk operations per second categorized by:

- User (DISK_USER)
- Paging (DISK_SWAPPING)
- Swapping (DISK_PAGING)

/TYPE=FAULTS (Page Fault Rate)

Plots the page fault rate per second, and places the rate into these categories:

- Demand zero page faults (DZROFAULTS)
- Free page faults (FREEFAULTS)
- Modified page faults (MFYFAULTS)
- Global page faults (GVALID)
- Hard page faults (PREADIO)
- System page faults (SYSFAULTS)

/TYPE=FILECACHE (File Cache Usage)

Plots the file operation attempt rate to the file system caches categorized by:

- Hits (FILE_CACHE_HIT)
- Misses (FILE_CACHE_MISS)

/TYPE=JOBS (Number of Jobs)

Plots the number of processes categorized by:

- Interactive (INTERACTIVE_PROCESSES)
- Batch (BATCH_PROCESSES)
- Network (NETWORK_PROCESSES)
- Detached (DETACHED_PROCESSES)

/TYPE=LOCKS (Distributed Locking)

Plots the number of distributed lock operations per second categorized by:

- Incoming enqueues and converts (INCOMING_LOCKING)
- Outgoing enqueues and converts (OUTGOING_LOCKING)
- Local enqueues and converts (LOCAL_LOCKING)

/TYPE=MEMORY_UTILIZATION (Memory Utilization)

Plots physical memory usage categorized by:

- Percentage allocated to the free list (FREELIM)
- Percentage in the modified page list (MODIFIED)
- Percentage allocated to user processes (USERWS)
- Percentage allocated to system processes (SYSTEMWS)
- Percentage allocated to OpenVMS (VMSALLOC)

/TYPE=PROCESSES (Number of Processes by State)

Plots the number of processes categorized as:

– Inswapped/active (INPROCACT)

– Inswapped/inactive (INPROCINACT)

– Outswapped/inactive (OUTPROCINACT)

– Outswapped/active (OUTPROCACT)

/TYPE=RESPONSE_TIME (Terminal Response Time)

Plots the terminal response time for interactive processes categorized as:

– Large transactions (LG_RESPONSE)

– Medium transactions (MED_RESPONSE)

– Small transactions (SM_RESPONSE)

/TYPE=TERMINALS (Terminal I/O)

Plots the number of terminal operations per second categorized by the type of terminal used:

– TX (TX_TERMIO)

– TT (TT_TERMIO)

– RT (RT_TERMIO)

– LT (LAT_TERMIO)

– NV (NV_TERMIO)

– TW (TW_TERMIO)

/TYPE=TOP_BDT_W (Top BDT Wait Rate)

Plots five remote nodes with the highest rate of BDT waits (plus "Other") resulting when a local node issues an I/O, but the connection had to wait for a buffer descriptor. The metric graphed is BDT_W.

/TYPE=TOP_BLKS_R (Top Blk Transfers Requested)

Plots the top five nodes with the highest block transfer requests (plus "Other") from the remote system to the local system. The metric graphed is BLKS_R.

/TYPE=TOP_BLKS_S (Top Blk Transfers Sent)

Plots the top five nodes with the highest block transfers sent (plus "Other") from the local system to the remote system. The metric graphed is BLKS_S.

/TYPE=TOP_BUFIO_IMAGES (Top Buffered I/O Images)

Plots the top five (plus "Other Images") creators of buffered I/O by image names. The metric graphed is BUFIO.

/TYPE=TOP_BUFIO_USERS (Top Buffered I/O Users)

Plots the top five (plus "Other Users") creators of buffered I/O by user names. The metric graphed is BUFIO.

/TYPE=TOP_BUFIO_WORKLOADS (Top Buffered I/O Workloads)

Plots the top five (plus "Other Users") creators of buffered I/O by workload names. The metric graphed is BUFIO.

/TYPE=TOP_BUSY_DISKS (Top Busy Disk Device)

Plots the five (plus "Other Disks") disk devices that experienced the highest busy time percentages. The metric graphed is BUSY.

/TYPE=TOP_BUSY_PROCESSOR (Top Busy Physical Processor)

Plots the five (plus "Other") processors that experienced the highest busy time percentages. The metric graphed is P_BUSY.

/TYPE=TOP_BUSY_VOLUMES (Top Busy Disk Volume)

Plots the five (plus "Other Volumes") disk volumes that experienced the highest busy time percentages. The metric graphed is BUSY.

/TYPE=TOP_CHANNEL_IO (Top HSC Channel I/O)

Plots the five (plus "Other") HSC channels that experienced the largest I/O rate, in I/Os per second. The metric graphed is CHANNEL_IO.

/TYPE=TOP_CHANNEL_QUELEN (Top Queue HSC Channel)

Plots the five (plus "Other") HSC channels that experienced the largest queue length. The metric graphed is CHANNEL_QUELEN.

Note: The channel names are provided in the format nodename_n, where n represents the channel number (K.SDI) on the HSC node indicated by node name. If the channel cannot be identified, the character u is substituted for n. See logical name PSDC$hscname_hscunitnumber in the *Performance Agent Administrator Guide.*

/TYPE=TOP_CHANNEL_THRUPUT (Top HSC Channel Thruput)

Plots the five (plus "Other") HSC channels that experienced the largest throughput rate, in Kilobytes per second. The metric graphed is CHANNEL_THRUPUT.

Note: The channel names are provided in the format nodename_n, where n represents the channel number (K.SDI) on the HSC node indicated by node name. If the channel cannot be identified, the character u is substituted for n. See logical name PSDC$hscname_hscunitnumber in the *Performance Agent Administrator Guide*.

/TYPE=TOP_CLUSTER_RULE_OCC (Top Cluster Rule Occurrences)

Plots the five (plus "Other") rule identifiers that fired, as a rate per hour. The metric graphed is CLUSTER_OCCURRENCES and is available only from history data.

/TYPE=TOP_COMPAT_PROCESSOR (Top Compat Mode Processor)

Plots the five (plus "Other") processors in terms of time spent in compatibility mode, as a percent of CPU time. The metric graphed is P_COMPAT.

/TYPE=TOP_CPU_IMAGES (Top CPU Images)

Plots the top five (plus "Other Images") consumers of CPU time by image name. The metric graphed is CPUTIME.

/TYPE=TOP_CPU_RULE_OCC (Top CPU Rule Occurrences)

Plots the five (plus "Other") CPU rule identifiers that fired, as a rate per hour. The metric graphed is CPU_OCCURRENCES and is available only from history data.

/TYPE=TOP_CPU_USERS (Top CPU Users)

Plots the top five (plus "Other Users") consumers of CPU time by user name. The metric graphed is CPUTIME.

/TYPE=TOP_CPU_WORKLOADS (Top CPU Workloads)

Plots the top five (plus "Other") workloads as consumers of CPU time. The metric graphed is CPUTIME.

/TYPE=TOP_CR_W (Top Credit Wait Rate)

Plots five nodes with the highest rate of credit waits (plus "Other") resulting when a connection has to wait for a send credit. The metric graphed is CR_W.

/TYPE=TOP_DGS_D (Top Datagrams Discarded)

Plots five nodes with the most datagrams discarded (plus "Other")resulting when application datagrams are discarded by the port driver. The metric graphed is DGS_D.

/TYPE=TOP_DGS_R (Top Datagrams Received)

Plots five nodes with the most datagrams received (plus "Other")resulting when the local system receives datagrams over the connection from the remote system and given to SYSAP. The metric graphed is DGS_R.

/TYPE=TOP_DGS_S (Top Datagrams Sent)

Plots five nodes with the most datagrams sent (plus "Other") resulting when application datagrams are sent over the connection. The metric graphed is DGS_S.

/TYPE=TOP_DIRIO_IMAGES (Top Direct I/O Images)

Plots the top five (plus “Other Images”) creators of direct I/O by image name. The metric graphed is DIRIO.

/TYPE=TOP_DIRIO_USERS (Top Direct I/O Users)

Plots the top five (plus “Other Users”) creators of direct I/O by user name. The metric graphed is DIRIO.

/TYPE=TOP_DIRIO_WORKLOADS (Top Direct I/O Workloads)

Plots the top five (plus “Other Users”) creators of direct I/O by workload name. The metric graphed is DIRIO.

/TYPE=TOP_DISKIO_IMAGES (Top Image I/O Operations)

Plots the top five (plus “Other Images”) creators of disk I/O by image name. The metric graphed is DSKIO.

/TYPE=TOP_DISKIO_USERS (Top User Disk Operations)

Plots the top five (plus “Other Users”) creators of disk I/O by user name. The metric graphed is DSKIO.

/TYPE=TOP_DISKIO_WORKLOADS (Top Workload Disk Operations)

Plots the top five (plus “Other”) creators of disk I/O by workload name. The metric graphed is DSKIO.

/TYPE=TOP_EXEC_PROCESSOR (Top Exec Mode Processor)

Plots the five (plus “Other”) processors in terms of time spent in executive mode, as a percent of CPU time. The metric graphed is P_EXEC.

/TYPE=TOP_FAULTING_IMAGES (Top Faulting Images)

Plots the top five (plus “Other Images”) creators of page faults by image name. The metric graphed is FAULTS.

/TYPE=TOP_FAULTING_USERS (Top Faulting Users)

Plots the top five (plus “Other Users”) creators of page faults by user name. The metric graphed is FAULTS.

/TYPE=TOP_FAULTING_WORKLOADS (Top Faulting Workloads)

Plots the top five (plus “Other Users”) creators of page faults by workload name. The metric graphed is FAULTS.

/TYPE=TOP_FREEBLK_DISKS (Top Freeblks Disk Device)

Plots the top five (plus “Other”) disk devices in terms of number of free disk pages. The metric graphed is FREEBLKS.

/TYPE=TOP_FREEBLK_VOLUMES (Top Freeblks Disk Volume)

Plots the top five (plus “Other”) disk volumes in terms of number of free disk pages. The metric graphed is FREEBLKS.

/TYPE=TOP_HARDFAULTING_IMAGES (Top Hard Faulting Images)

Plots the top five (plus "Other Images") creators of hard page faults by image name. The metric graphed is HARDFAULTS.

/TYPE=TOP_HARDFAULTING_USERS (Top Hard Faulting Users)

Plots the top five (plus "Other Users") creators of hard page faults by user name. The metric graphed is HARDFAULTS.

/TYPE=TOP_HARDFAULTING_WORKLOADS (Top Hard Faulting Workloads)

Plots the top five (plus "Other Users") creators of hard page faults by workload name. The metric graphed is HARDFAULTS.

/TYPE=TOP_HSC_DISK_IO (Top HSC Disk IO)

Plots the top five (plus "Other") HSCs in terms of disk I/O operations per second. The metric graphed is HSC_DISK_IO.

/TYPE=TOP_HSC_DISK_THRUPUT (Top HSC Disk Thruput)

Plots the top five (plus "Other") HSCs in terms of disk throughput in Kilobytes per second. The metric graphed is HSC_DISK_THRUPUT.

/TYPE=TOP_HSC_IO (Top HSC IO)

Plots the top five (plus "Other") HSCs in terms of I/O operations per second. The metric graphed is HSC_IO.

/TYPE=TOP_HSC_TAPE_IO (Top HSC Tape IO)

Plots the top five (plus "Other") HSCs in terms of tape I/O operations per second. The metric graphed is HSC_TAPE_IO.

/TYPE=TOP_HSC_TAPE_THRUPUT (Top HSC Tape Thruput)

Plots the top five (plus "Other") HSCs in terms of tape thruput in Kilobytes per second. The metric graphed is HSC_TAPE_THRUPUT.

/TYPE=TOP_HSC_THRUPUT (Top HSC Thruput)

Plots the top five (plus "Other") HSCs in terms of total thruput in Kilobytes per second. The metric graphed is HSC_THRUPUT.

/TYPE=TOP_IMAGE_ACTIVATIONS (Top Images Activated)

Plots the top five (plus "Other") images in terms of image activations per second. The metric graphed is IMAGE_ACTIVATIONS.

/TYPE=TOP_IMAGE_VOLUME_IO (Top I/O Images and the Disk Volumes they access)

Plots the top five (plus "Other") image and volume name pairs in terms of their I/O rate. The metric graphed is IMAGE_VOLUME_IO.

/TYPE=TOP_INTERRUPT_PROCESSOR (Top Interrupt Stack Processor)

Plots the five (plus “Other”) processors in terms of time spent on the interrupt stack, as a percent of CPU time. The metric graphed is P_INTERRUPT.

/TYPE=TOP_IO_DISKS (Top Operations Disk Device)

Plots the five (plus “Other Disks”) disk devices that incurred the highest I/O rates. The metric graphed is TOTIO.

/TYPE=TOP_IO_FILES (Top IO Operations Files)

Plots the five (plus “Other”) files that incurred the highest I/O rates. The metric graphed is FILE_TOTIO.

/TYPE=TOP_IO_RULE_OCC (Top IO Rule Occurrences)

Plots the five (plus “Other”) IO rule identifiers that fired, as a rate per hour. The metric graphed is IO_OCCURRENCES.

/TYPE=TOP_IO_VOLUMES (Top Operations Disk Volume)

Plots the five (plus “Other Volumes”) disk volumes that incurred the highest I/O rates.

/TYPE=TOP_KB_MAP (Top Kilobyte Mapped Rate)

Plots five nodes (plus “Other”) in terms of the number of kilobytes of data mapped for block transfer. The metric graphed is KB_MAP.

/TYPE=TOP_KB_RC (Top Kilobyte Received Rate)

Plots five nodes (plus “Other”) in terms of the number of kilobytes of data received by the local system from the remote system through request-data commands. The metric graphed is KB_RC.

/TYPE=TOP_KB_S (Top KB Sent Rate)

Plots five nodes (plus “Other”) in terms of the number of kilobytes of data sent from the local system to the remote system through send-data commands. The metric graphed is KB_S.

/TYPE=TOP_KERNEL_PROCESSOR (Top Kernel Mode Processor)

Plots the five (plus “Other”) processors in terms of time spent in kernel mode as a percent of CPU time. The metric graphed is P_KERNEL.

/TYPE=TOP_MEMORY_RULE_OCC (Top Memory Rule Occurrences)

Plots the five (plus “Other”) memory rule identifiers that fired, as a rate per hour. The metric graphed is MEMORY_OCCURRENCES and is available only from history data.

/TYPE=TOP_MGS_R (Top Messages Received)

Plots five nodes (plus "Other") in terms of number of application datagram messages received over the connection. The metric graphed is MGS_R.

/TYPE=TOP_MGS_S (Top Messages Sent)

Plots five nodes (plus "Other") in terms of number of application datagram messages sent over the connection. The metric graphed is MGS_S.

/TYPE=TOP_MP_SYNCH_PROCESSOR (Top MP Synch Mode Processor)

Plots the five (plus "Other") processors in terms of time spent in MP synchronization mode, as a percent of CPU time. The metric graphed is P_MP_SYNCH.

/TYPE=TOP_MSCPIO_FILES (Top MSCP I/O Operations Files)

Plots the five (plus "Other") files that incurred the highest MSCP I/O rates. The metric graphed is FILE_MSCPIO.

/TYPE=TOP_PAGING_DISKS (Top PG&SWP Operations Disk Device)

Plots the five (plus "Other Disks") disk devices that incurred the highest I/O paging and swapping rates. The metric graphed is PAGIO.

/TYPE=TOP_PAGING_FILES (Top PG&SWP Operations Files)

Plots the five (plus "Other") files that incurred the highest I/O paging and swapping rates. The metric graphed is FILE_PAGIO.

/TYPE=TOP_PAGING_VOLUMES (Top PG&SWP Operations Disk Volume)

Plots the five (plus "Other Volumes") disk volumes that incurred the highest I/O paging and swapping rates. The metric graphed is PAGIO.

/TYPE=TOP_POOL_RULE_OCC (Top Pool Rule Occurrences)

Plots the five (plus "Other") pool rule identifiers that fired, as a rate per hour. The metric graphed is POOL_OCCURRENCES and is available only from history data.

/TYPE=TOP_PRCT_FREE_DISKS (Top Percent Freeblks Disk Device)

Plots the top five (plus "Other") disk devices in terms of percentage of free disk blocks. The metric graphed is PRCT_FREE.

/TYPE=TOP_PRCT_USED_DISKS (Top Percent Usedblks Disk Device)

Plots the top five (plus "Other") disk devices in terms of percentage of used disk blocks. The metric graphed is PRCT_USED.

/TYPE=TOP_PRCT_FREE_VOLUMES (Top Percent Freeblks Disk Volume)

Plots the top five (plus “Other”) disk volumes in terms of percentage of free disk blocks. The metric graphed is PRCT_FREE.

/TYPE=TOP_PRCT_USED_VOLUMES (Top Percent Usedblks Disk Volume)

Plots the top five (plus “Other”) disk volumes in terms of percentage of used disk blocks. The metric graphed is PRCT_USED.

/TYPE=TOP_QUEUE_DISKS (Top Queue Disk Device)

Plots the five (plus “Other Disks”) disk devices that experienced the longest queue lengths. The metric graphed is QUEUE.

/TYPE=TOP_QUEUE_VOLUMES (Top Queue Disk Volume)

Plots the five (plus “Other Volumes”) disk volumes that experienced the longest queue lengths. The metric graphed is QUEUE.

/TYPE=TOP_READ_DISKS (Top Read Operations Disk Device)

Plots the five (plus “Other Disks”) disk devices that incurred the highest read I/O rates. The metric graphed is READIO.

/TYPE=TOP_READ_FILES (Top Read Operations Files)

Plots the five (plus “Other”) files that incurred the highest read I/O rates. The metric graphed is FILE_READIO.

/TYPE=TOP_READ_VOLUMES (Top Read Operations Disk Volume)

Plots the five (plus “Other Volumes”) disk volumes that incurred the highest read I/O rates. The

metric graphed is READIO.

/TYPE=TOP_RESIDENT_IMAGES (Most Resident Images)

Plots the top five (plus “Other Images”) images most resident on the system by image name. The metric graphed is RESIDENCE.

/TYPE=TOP_RESIDENT_USERS (Most Resident Users)

Plots the top five (plus “Other Users”) users most resident on the system by user name. Note that each subprocess adds to the residence for the parent process's user name. The metric graphed is RESIDENCE.

/TYPE=TOP_RESIDENT_WORKLOADS (Most Resident Workloads)

Plots the top five (plus “Other Workloads”) workloads most resident on the system by workload name. The metric graphed is RESIDENCE.

/TYPE=TOP_RESOURCE_RULE_OCC (Top Resource Rule Occurrences)

Plots the five (plus “Other”) resource rule identifiers that fired, as a rate per hour. The metric graphed is RESOURCE_OCCURRENCES and is available only from history data.

/TYPE=TOP_RESPONSE_TIME_DISKS (Top Response Time Disk Device)

Plots the five (plus “Other Disks”) disk devices that incurred the highest response times. The metric graphed is D_RESPONSETIME.

/TYPE=TOP_RESPONSE_TIME_FILES (Top Response Time Files)

Plots the five (plus “Other”) files that incurred the highest response times. The metric graphed is FILE_RESPONSE_TIME.

/TYPE=TOP_RESPONSE_TIME_IMAGES (Top Image Response Time)

Plots the five (plus “Other Images”) images with the highest terminal response time. The metric graphed is RESPONSE_TIME.

/TYPE=TOP_RESPONSE_TIME_USERS (Top User Response Time)

Plots the five (plus “Other Users”) users with the highest terminal response time. The metric graphed is RESPONSE_TIME.

/TYPE=TOP_RESPONSE_TIME_VOLUMES (Top Response Time Disk Volume)

Plots the five (plus “Other Volumes”) disk volumes that have the highest response times. The metric graphed is D_RESPONSETIME.

/TYPE=TOP_RESPONSE_TIME_WORKLOADS (Top Workload Response Time)

Plots the five (plus “Other Workloads”) workloads with the highest terminal response time. The metric graphed is RESPONSE_TIME.

/TYPE=TOP_RULE_OCCURRENCES (Top Rule Occurrences)

Plots the five (plus “Other”) rule identifiers that fired, as a rate per hour. The metric graphed is OCCURRENCES and is available only from history data.

/TYPE=TOP_SPLITIO_DISKS (Top Split Operations Disk Device)

Plots the five (plus “Other”) disk devices that have the highest split I/O operations. The metric graphed is SPLITIO.

/TYPE=TOP_SPLITIO_FILES (Top Split Operations Files)

Plots the five (plus “Other”) files that have the highest split I/O operations. The metric graphed is FILE_SPLITIO.

/TYPE=TOP_SPLITIO_VOLUMES (Top Split Operations Disk Volume)

Plots the five (plus “Other”) disk volumes that have the highest split I/O operations. The metric graphed is SPLITIO.

/TYPE=TOP_SUPER_PROCESSOR (Top Supervisor Mode Processor)

Plots the five (plus "Other") processors in terms of time spent in Supervisor mode, as a percent of CPU time. The metric graphed is P_SUPER.

/TYPE=TOP_TERMINAL_INPUT_IMAGES (Top Image Terminal Input)

Plots the top five (plus "Other Images") images with the highest character per second terminal input. The metric graphed is TERM_INPUT.

/TYPE=TOP_TERMINAL_INPUT_USERS (Top User Terminal Input)

Plots the top five (plus "Other Users") users with the highest character per second terminal input. The metric graphed is TERM_INPUT.

/TYPE=TOP_TERMINAL_INPUT_WORKLOADS (Top Workload Terminal Input)

Plots the top five (plus "Other Workloads") workloads with the highest character per second terminal input. The metric graphed is TERM_INPUT.

/TYPE=TOP_TERMINAL_THRUPUT_IMAGES (Top Image Terminal Thruput)

Plots the top five (plus "Other Images") images with the highest character per second terminal thruput. The metric graphed is TERM_THRUPUT.

/TYPE=TOP_TERMINAL_THRUPUT_USERS (Top User Terminal Thruput)

Plots the top five (plus "Other Users") users with the highest character per second terminal thruput. The metric graphed is TERM_THRUPUT.

/TYPE=TOP_TERMINAL_THRUPUT_WORKLOADS (Top Workload Terminal Thruput)

Plots the top five (plus "Other Workloads") workloads with the highest character per second terminal thruput. The metric graphed is TERM_THRUPUT.

/TYPE=TOP_THRUPUT_DISKS (Top Throughput Disk Device)

Plots the five (plus "Other Disks") disk devices that incurred the highest throughput rates. The metric graphed is THRUPUT.

/TYPE=TOP_THRUPUT_FILES (Top Throughput Files)

Plots the five (plus "Other") files that incurred the highest throughput rates. The metric graphed is FILE_THRUPUT.

/TYPE=TOP_THRUPUT_IMAGES (Top Throughput Images)

Plots the five (plus "Other") images with the highest throughput rates. The metric graphed is THRUPUT.

/TYPE=TOP_THRUPUT_USERS (Top Throughput Users)

Plots the five (plus "Other") users with the highest throughput rates. The metric graphed is THRUPUT.

/TYPE=TOP_THRUPUT_VOLUMES (Top Throughput Disk Volume)

Plots the five (plus "Other") disk volumes that incurred the highest throughput rates. The metric graphed is THRUPUT.

/TYPE=TOP_THRUPUT_WORKLOADS (Top Throughput Workloads)

Plots the five (plus "Other") workloads with the highest throughput rates. The metric graphed is THRUPUT.

/TYPE=TOP_USER_IMAGE_ACTIVATIONS (Top Image Activations Users)

Plots the top five (plus "Other") users in terms of image activations per second. The metric graphed is IMAGE_ACTIVATIONS.

/TYPE=TOP_USER_PROCESSOR (Top User Mode Processor)

Plots the five (plus "Other") processors in terms of time spent in User mode, as a percent of CPU time. The metric graphed is P_USER.

/TYPE=TOP_USER_VOLUME_IO (Top I/O Users and the Disk Volumes they access)

Plots the top five (plus "Other") user and volume name pairs in terms of their I/O rate. The metric graphed is USER_VOLUME_IO.

/TYPE=TOP_WORKLOAD_IMAGE_ACTIVATIONS (Top Image Activations Workload)

Plots the top five (plus "Other") workloads in terms of image activations per second. The metric graphed is IMAGE_ACTIVATIONS.

/TYPE=TOP_WRITE_DISKS (Top Write Operations Disk Device)

Plots the five (plus "Other Disks") disk devices that incurred the highest write I/O rates. The metric graphed is WRITIO.

/TYPE=TOP_WRITE_FILES (Top Write Operations Files)

Plots the five (plus "Other") files that incurred the highest write I/O rates. The metric graphed is FILE_WRITIO.

/TYPE=TOP_WRITE_VOLUMES (Top Write Operations Disk Volume)

Plots the five (plus "Other Volumes") disk volumes that incurred the highest write I/O rates. The metric graphed is WRITIO.

/TYPE=TOP_VA_IMAGES (Top VA Space Images)

Plots the top five (plus “Other Images”) images that had the largest combined virtual address space by image name. The metric graphed is VASIZE.

/TYPE=TOP_VA_USERS (Top VA Space Users)

Plots the top five (plus “Other Users”) users that had the largest combined virtual address space by user name. The metric graphed is VASIZE.

/TYPE=TOP_VA_WORKLOADS (Top VA Space Workload)

Plots the top five (plus “Other”) workloads that had the largest combined virtual address space. The metric graphed is VASIZE.

/TYPE=TOP_WSSIZE_IMAGES (Top WS Size Images)

Plots the top five (plus “Other Images”) images that had the largest combined working set sizes by image name. The metric graphed is WSSIZE.

/TYPE=TOP_WSSIZE_USERS (Top WS Size Users)

Plots the top five (plus “Other Users”) users that had the largest combined working set sizes by user name. The metric graphed is WSSIZE.

/TYPE=TOP_WSSIZE_WORKLOADS (Top WS Size Workload)

Plots the top five (plus “Other”) workloads that had the largest combined working set sizes. The metric graphed is WSSIZE.

Examples

```
$ ADVISE PERFORMANCE GRAPH
```

The default graph of CPU_UTILIZATION, for today, is displayed for all nodes.

```
$ ADVISE PERFORMANCE GRAPH/TYPE=TOP_RESPONSE_TIME_VOLUME -
_$ /NOSTACK/FORMAT=REGIS=CHARACTERISTICS=LINE
```

The previous command produces a graph of the top response times for the top 5 disks. /NOSTACK and LINE are used together to compare the response times on a graph without any occlusion.

```
$ ADVISE PERFORMANCE GRAPH/COMPOSITE-
_$ /BEGINNING=9-JAN-1990:09:00/ENDING=10-JAN-1990:09:00-
_$ /TYPE=TOP_IO_VOLUME/HISTORY=monthly_user
```

The previous command produces one composite graph of archived data for all nodes in the cluster system.

```
$ ADVISE PERFORMANCE
PSPA> SELECT/BEGIN=12:00
PSPA> GRAPH/TYPE=PROMPT


        Please select either 1) a predefined graph or
                             2) a custom graph


                        Choice:
                                 .
                                 .
                                 .
```

In command mode GRAPH/TYPE=PROMPT displays available graph types and custom metrics as shown in the previous command.

ADVISE PERFORMANCE PIE_CHART

Use the ADVISE PERFORMANCE PIE_CHART command to produce a pie chart instead of a graph. The PIE_CHART option has the same format as the ADVISE PERFORMANCE GRAPH command, however the data is presented as a pie chart instead of as a graph.

Format

ADVISE PERFORMANCE PIE_CHART

Description

The Performance Manager can produce a multitude of predefined charts, however, only PostScript and DECwindows formats are supported. The pie charts have the advantage of being able to display more than the top 5 values.

Qualifiers

The following are qualifiers that are specific to pie charts. For a complete description of the remaining ADVISE PERFORMANCE PIE_CHART qualifiers, refer to the ADVISE PERFORMANCE GRAPH (see page 191) command.

/FILTER=keyword

The /FILTER qualifier allows you select a subset of the daily or history data for charting. Process data and disk data can be filtered.

Hot file data is also filtered. When you specify filtering by process, a hot file record is selected if accessed by the specified process. When you specify filtering by disk device, a hot file record is selected if located on the specified device. For hot file records matching both process and disk device, specify filtering by both process and device.

Process data can be filtered by using any of the filter keywords: USERNAMES, IMAGENAMES, PROCESSNAMES, ACCOUNTNAMES, UICS, PIDS or WORKLOADNAMES. If a process record's identification information matches any of the identification specifications that are specified, then that record is selected.

Likewise, disk data can be filtered by using either the filter keywords, VOLUMENAMES or DEVICENAMES. If a device record's identification information matches any of the volume names or device names that are specified, then that record is selected.

The following table lists the FILTER keyword options:

Keyword	Description
/USERNAMES=(string,...)	Specify /FILTER=USERNAMES to chart all process records with the username matching any of the specified strings.
/IMAGENAMES=(string,...)	Specify /FILTER=IMAGENAMES to chart all process records with the image name matching any of the specified strings. Do not specify any trailing ".EXE", nor the file version, device or directory.
/PROCESSNAMES=(string,...)	Specify /FILTER=PROCESSNAMES to chart all process records with the process name matching any of the specified strings. The match string is case sensitive, so if the process names have any lowercase letters, spaces or tabs, use double quotes when you enter the value (e.g., /FILTER=PROCESSNAMES="--RTserver--").
/ACCOUNTNAMES =(string,...)	Specify /FILTER=ACCOUNTNAMES to chart all process records with the account name matching any of the specified strings.
/WORKLOADNAMES =(workloadname,...)	Specify /FILTER=WORKLOADNAMES to chart all process records associated with any of the specified workloads. This filter is valid only if the /CLASSIFY_BY qualifier is used to specify a classification scheme for your workload data.
/UICS=(uic,...)	Specify /FILTER=UICS to chart all process records with the UIC matching any of the specified UICs. An asterisk may be used to wildcard either the group or user field of the specified UICs.
/PIDS=(pid,...)	Specify /FILTER=PIDS to chart all process records with the PID matching any of the specified PIDs.

Keyword	Description
/VOLUMENAMES=(string,...)	Specify /FILTER=VOLUMENAMES to chart all disk records with the volume name matching any of the specified strings. Do not specify any trailing colon.
/DEVICENAMES=(string,...)	Specify /FILTER=DEVICENAMES to chart all disk records with the device name matching any of the specified strings. Do not specify any trailing colon.

/PERCENTAGE = {TOTAL | MAXIMUM}

Specifies that a pie chart representing data in units of percentages is to be filled out to be the MAXIMUM of 100 percent, or is to represent only the TOTAL of the parts. For example; if you are producing a pie chart of CPU Utilization, and the parts of the pie chart have the following values:

- Interactive 30%
- Batch 10%
- Network 5%
- Overhead 1%
- Interrupts 5%
- Other 0%

If you specify /PERCENTAGE=TOTAL, the pie chart represents the sum of these parts, a total of 51 percent utilization, with the largest slice of the pie (approximately 3/5ths) being represented by "Interactive." If you specify /PERCENTAGE=MAXIMUM, the pie chart contains a slice representing IDLE at 49 percent of the total pie with the remaining 51 percent representing their respective slices. If /PERCENTAGE is not used on the Pie command line, then /PERCENTAGE=MAXIMUM is assumed.

This qualifier has no effect on graphs, custom pie charts, or pie charts of metrics other than CPU Utilization.

ADVISE PERFORMANCE REPORT

The ADVISE PERFORMANCE REPORT command generates Analysis Reports, Performance Evaluation Reports, Tabular Reports and Histograms using daily or historical data.

Format

ADVISE PERFORMANCE REPORT report_keyword[,...])

Description

Use the ADVISE PERFORMANCE REPORT command to produce Performance Manager reports. The Performance Manager can generate reports using either daily or historical data. The following section describes the qualifiers you can use with the ADVISE PERFORMANCE REPORT command to control report generation. The report keywords are as follows:

- ANALYSIS
- Consists of conclusions, conditions, and evidence for each rule that fired for each node and includes cluster-wide conclusions for a cluster system.
- BRIEF_ANALYSIS

  A brief version of the analysis report consisting of a one-line synopsis of each conclusion.
- HISTOGRAMS

  Consists of chronological charts that show peak resource usage. The Performance Manager produces a report containing separate histograms for CPU utilization, number of disk I/Os, number of terminal I/Os, memory usage, node status information, and, if you include the /IMAGE qualifier, an image residence time histogram. Use of the /IMAGE qualifier it limited to the DCL command interface.
- PERFORMANCE_EVALUATION
- TABULAR[=(FINAL,INTERVAL,BYCLUSTER,BYNODE)

  Contains an overview of the system activity on a per node basis, or cluster-wide. Subsections of this report can be selected or omitted with the /SECTION qualifier.

  The Tabular report can be presented in the following ways:

FINAL	Each Tabular report section is presented with statistics representing the whole time period.
INTERVAL	Each Tabular report section is presented for each reporting interval. By default the reporting interval is the same as the recording interval, however you can specify the reporting interval with the /INTERVAL qualifier.
BYCLUSTER	Each Tabular report section is presented in a cluster-wide format. The configuration section is not available in the cluster-wide format.
BYNODE	Each Tabular report section is presented in a cluster-wide format with the by-node detail included. The configuration section is not available in the cluster-wide format.

If both BYNODE and BYCLUSTER are omitted, the Tabular report sections are presented on a node by node basis, and not on a cluster-wide basis. By default, if none of the above options are specified, FINAL is assumed.

Using BYCLUSTER or BYNODE presents a different output format than FINAL or INTERVAL. For example, the following commands produce different output formats:

```
ADVISE PERF REPORT TABULAR/SECTION=ALL
ADVISE PERF REPORT TABULAR=BYCLUSTER/SECTION=ALL
```

Examples

```
$ ADVISE PERFORMANCE REPORT ANALYSIS,PERFORMANCE_EVALUATION-
_$ /OUTPUT=SAMPLE
```

This command produces an Analysis Report and a Performance Evaluation Report for the current day using a beginning time of midnight (00:00) and the current time of day as the ending time. The reports contain information for each of the nodes listed in the Performance Manager schedule file. The /OUTPUT qualifier directs the output to a file called SAMPLE.RPT. (The .RPT extension is the default.)

```
$ ADVISE PERFORMANCE REPORT ANALYSIS/NODE_NAMES=DEMAND -
_$ /NOEXPLAIN/RULES=MYRULES
```

This command produces an Analysis Report for the node DEMAND. This report is for the current day using the beginning time of midnight (00:00) and the current time of day as the ending time. In addition to the Performance Manager factory rules, the Performance Manager use an auxiliary knowledge base. The /NOEXPLAIN qualifier indicates that the report contains only conclusions and recommendations, omitting the rule conditions and the evidence. Because the /OUTPUT qualifier is not specified, the report is displayed on the terminal.

```
$ ADVISE PERFORMANCE REPORT BRIEF_ANALYSIS-
_$ /BEGIN=30-JUN-1996:10:00/END=30-JUN-1996:14:00 -
_$ /OUTPUT=ZERO_IN
```

This command produces a Brief Analysis Report for the time period between 10:00 a.m. and 2:00 p.m. on June 30, 1996. The /OUTPUT qualifier directs the output to a file called ZERO_IN.RPT. The Brief Analysis Report contains rule identifiers, the percentage of time for which there were instances of rule occurrences during the reporting period, the number of Performance Manager data records (two-minute records) supporting the rule occurrence, and a brief (no more than one line) synopsis of the problem statement. A cluster-wide synopsis follows the synopsis for each node.

As you become more familiar with analysis reports, the brief report may be sufficient on a daily basis.

```
$ ADVISE PERFORMANCE REPORT ANALYSIS,PERFORMANCE_EVALUATION -
_$ /BEGIN=10:00/END=14:00 -
_$ /OUTPUT=ZERO_IN
```

This command produces both an Analysis Report and a Performance Evaluation Report for the nodes listed in the schedule file. These reports are for the time period between 10:00 a.m. and 2:00 p.m. on the current day. The /OUTPUT qualifier directs the output to a file called ZERO_IN.RPT.

```
$ ADVISE PERFORMANCE REPORT HISTOGRAM,PERFORMANCE_EVALUATION -
_$ /PROCESS_STATISTICS= -
_$ (PRIMARY_KEY=USERNAME,SECONDARY_KEY=IMAGENAME )-
_$ /INCLUDE=PROCESS/END=8/IMAGE=LOGINOUT/OUTPUT=CHECK_BREAKIN
```

This command produces a Performance Evaluation Report for the current day from midnight to 8:00 a.m. An additional histogram for the LOGINOUT image is generated. The /OUTPUT qualifier writes the Performance Evaluation Report to a file called CHECK_BREAKIN.RPT. Only the Process Statistics section of the Performance Report is produced showing the process activity of each user by image.

```
$ ADVISE PERFORMANCE REPORT TABULAR=INTERVAL -
_$ /INTERVAL=600/BEGIN=10:00/END=11:00 -
_$ /NODE=MYNODE/SECTION=SUMMARY_STATISTICS
```

This command produces the summary statistics section of the tabular report for the node MYNODE. The section is repeated 6 times, each summarizing 10 minutes of data from within the 1 hour reporting period.

ADVISE PERFORMANCE SHOW VERSION

Use the ADVISE PERFORMANCE SHOW VERSION command to display the current version of the Performance Manager module.

Format

ADVISE PERFORMANCE SHOW VERSION

Example

```
$ ADVISE PERFORMANCE SHOW VERSION <Return>

Performance Manager version Vx.x-yymm built dd-MMM-yyyy

$
```

The ADVISE PERFORMANCE SHOW VERSION command in this example displays a version of x.x-yymm.

Chapter 7: Use Command Mode Commands

This is a reference chapter for the Performance Manager command mode syntax. Command mode allows you to specify an analysis period that you may want to investigate and then to interactively view graphs and reports.

To start a command mode session, enter the DCL command ADVISE PERFORMANCE.

This section contains the following topics:

ADVISE PERFORMANCE

The ADVISE PERFORMANCE command invokes a Performance Manager command mode session.

Format

ADVISE PERFORMANCE

Description

When you invoke command mode you see the PSPA> prompt. At this prompt you can enter the commands listed in the following table. You can end a command mode session with the EXIT command.

Command	Function
SELECT	Causes data to be selected for subsequent viewing by GRAPH and REPORT commands.

Command	Function
LOAD	Loads a binary graph data file.
GRAPH/PIE_CHART	Causes a graph or pie chart to be produced from the selected data.
REPORT	Causes the preparation of one of the reports.
SAVE	Saves a binary graph data file.
PSPAWN	Creates a subprocess of the current process.
EXIT	Causes the program to exit.
HELP	Assists the user by providing a detailed discussion of any parameter or qualifier.
@	Executes the commands in the file-spec.

SELECT

The SELECT command selects data for analysis.

Format

SELECT option[,...]

Description

The SELECT command causes data to be selected for subsequent viewing by GRAPH and REPORT commands. The following table lists all the SELECT command options.

You can abort the SELECT operation and return to the PSPA> prompt by entering Ctrl+C.

Options

Option	Function
ANALYSIS	Enables the viewing of the Analysis Report from the selected data. By default, the Performance Manager provides analysis processing.

Option	Function
PERFORMANCE_EVALUATION-[=([NO]suboption,...)]	Enables the viewing of the Performance Evaluation Report, the Tabular Report and Histograms from the selected data. Suboptions include HOT_FILE, PROCESS (=key levels), and ALL. The PROCESS keyword may be followed by a list of PROCESS Key Levels indicating the detail level by which process data can be reported. These key levels include: IMAGENAME, MODE, USERNAME, UIC_GROUP, PROCESS_NAME, WORKLOAD_NAME, ACCOUNT_NAME, and PID. For a description of these key levels, see the table of focus types in ADVISE PERFORMANCE REPORT. The Tabular process metrics require ALL key levels. When specifying PID or PROCESS_NAME key levels, additional virtual memory may be required. See Appendix D, "Estimating Virtual Memory Needs," for more information. By default, the Performance Manager provides Performance Evaluation processing without Process key levels, PID, or Processname.
GRAPHS[=([NO]suboption,...)]	Suboptions include IMAGENAMES, USERNAMES, HOTFILES, USERVOLUMES, IO_DEVICES, BY_NODE, ALL, and DEFAULT. DEFAULT consists of IMAGENAMES, USERNAMES and IO_DEVICES. By default, the Performance Manager provides GRAPH=DEFAULT processing.

Qualifiers

/AVERAGE={DAILY | WEEKLY | MONTHLY | QUARTERLY}

Causes graphs to depict a specified time period. The selected data is averaged into the time period selected. If you also use the /SCHEDULE qualifier, the DAILY and WEEKLY graphs are trimmed to show only the selected hours.

The DAILY and WEEKLY graphs must select data from at least two different days, and the MONTHLY and QUARTERLY graphs must select data from at least two different months.

If history data with the periodicity attribute is selected, the /AVERAGE value is automatically set to that periodicity value. This is true regardless of whether the /AVERAGE qualifier is used.

/BEGINNING=date

Specifies the beginning time for the data selection. By default 00:00 is used.

/CLASSIFY_BY= USERGROUP= family_name

Specifies the family name, which dictates how to classify the workload for workload graphs, and the process statistics section of the Performance Evaluation Report. By default, no classification is used.

/COLLECTION_DEFINITION=collection-definition-name

Specifies the name of the Collection Definition, and hence the collected data that you desire to use for graphs and reports. If you omit this qualifier, daily data is obtained from the Collection Definition called "CPD."

To view the Collection Definitions that you have available, use the DCL command ADVISE COLLECT SHOW ALL.

If you want to use history data instead of daily data, use the /HISTORY qualifier instead of the /COLLECTION_DEFINITION qualifier. These two qualifiers are mutually exclusive.

/DATES=filespe

Specifies that a file containing a series of date ranges is to be used in place of the /BEGINNING and /ENDING qualifiers. Each line in the dates file should look like the following code:

dd-mmm-yyyy hh:mm:ss.cc,dd-mmm-yyyy hh:mm:ss.cc

The time may be omitted entirely or may be truncated. Any truncated parts of the time are defaulted to 0. The periods of time represented by each line in the file need not be contiguous but they must be in ascending order.

/DATES is mutually exclusive with /BEGINNING and /ENDING.

/ENDING=date

Specifies the ending time for the data selection. By default, 23:59 or NOW is used.

/FILTER=keyword

The /FILTER qualifier allows you select a subset of the daily or history data for interactive displays. Process data and disk data can be filtered.

Hotfile data is also filtered. When you specify filtering by process, a hotfile record is selected if accessed by the specified process. When you specify filtering by disk device, a hotfile record is selected if located on the specified device. For hotfile records matching both process and disk device, specify filtering by both process and device.

Process data can be filtered by using any of the filter keywords: USERNAMES, IMAGENAMES, PROCESSNAMES, ACCOUNTNAMES, UICS, PIDS or WORKLOADNAMES. If a process record's identification information matches any of the identification specifications that are specified, then that record is selected.

Likewise, disk data can be filtered by using any of the filter keywords: VOLUMENAMES and DEVICENAMES. If a device record's identification information matches any of the volume names or device names that are specified, then that record is selected.

Keyword	Description
/FILTER=USERNAMES=(string,...)	Specify /FILTER=USERNAMES to select all process records with the username matching any of the specified strings.
/FILTER=IMAGENAMES=(string,...)	Specify /FILTER=IMAGENAMES to select all process records with the imagename matching any of the specified strings. Do not specify any trailing ".EXE," nor the file version, device or directory.
/FILTER=PROCESSNAMES=(string,...)	Specify /FILTER=PROCESSNAMES to select all process records with the processname matching any of the specified strings. The match string is case sensitive, so if the process names have any lowercase letters, spaces or tabs, use double quotes when you enter the value (e.g., /FILTER=PROCESSNAMES="--RTserver--").
/FILTER=ACCOUNTNAMES =(string,...)	Specify /FILTER=ACCOUNTNAMES to select all process records with the accountname matching any of the specified strings.
/FILTER=WORKLOADNAMES =(workloadname,...)	Specify /FILTER=WORKLOADNAMES to select all process records associated with any of the specified workloads. This filter is valid only if the /CLASSIFY_BY qualifier is used to specify a classification scheme for your workload data.

Keyword	Description
/FILTER=UICS=(uic,...)	Specify /FILTER=UICS to select all process records with the UIC matching any of the specified UICs. An asterisk may be used to wildcard either the group or user field of the specified UICs.
/FILTER=PIDS=(pid,...)	Specify /FILTER=PIDS to select all process records with the PID matching any of the specified PIDs.
/FILTER=VOLUMENAMES=(string,...)	Specify /FILTER=VOLUMENAMES to select all disk records with the volumename matching any of the specified strings. Do not specify any trailing colon.
/FILTER=DEVICENAMES=(string,...)	Specify /FILTER=DEVICENAMES to select all disk records with the devicename matching any of the specified strings. Do not specify any trailing colon.

/HISTORY= history-descriptor-nam

Specifies the name of a history file descriptor to cause history files to be used instead of daily data. By default, no history selection is made.

/NODE_NAMES=(nodename[,...])

Specifies the list of node names on which to select data. By default, the Performance Manager uses all nodes.

/RULES=file

Specifies a user compiled rules file to be used when data is selected for Analysis.

/SCHEDULE= (dow=m-n[,...])

Specifies that a weekly selection schedule is to be used when selecting data. By default, no schedule is used.

/X_POINTS=n

Specifies the number of points to plot along the *x*-axis for graphs. /X_POINTS also affects the width of ANSI formatted graphs. The default value varies depending on the time period selected.

LOAD

The LOAD command allows you to load a selection of graph data that was previously saved to the specified file. If you already have a period of time selected, this command replaces the current selection.

Format

LOAD file-spec

GRAPH

The GRAPH command graphs any group of metrics stored in the database that are selected with the SELECT command.

Format

GRAPH

Description

The Performance Manager can produce a multitude of predefined graphs. You can also define your own custom graphs if the predefined graphs do not meet your specific needs.

Qualifiers

/FORMAT

Specifies the graph's output format. Options include:

```
REGIS=[CHARACTERISTICS=(COLOR,LINE,PATTERN)]
POSTSCRIPT=[CHARACTERISTICS=(COLOR,LINE,
PATTERN)]|TABULAR|ANSI[=(HEIGHT=n[,LINE])]
CSV
```

The default value depends on terminal characteristics. For more information, see the section Advise Performance Graph (see page 191).

/NODE_NAME=nodename

Specifies the preparation of a graph for only one of the selected nodes. The BY_NODE graph processing option may be required during data selection if the metric is not a system metric. By default, the Performance Manager prepares graphs for all selected nodes (Composite graphs).

/OUTPUT=filespec

Creates an output file that contains the graphs. The default file extension for a ReGIS graph is .REG, the file type for ANSI and TABULAR formatted graphs is .RPT and the file extension for PostScript is .PS.

When you generate multiple graphs with a single command line, you can create a unique output file for each graph. To do this, omit the file name with the /OUTPUT qualifier. The Performance Manager generates a separate file for each graph created and uses the graph type keyword as the unique file name.

For example:

```
$ ADVISE PERFORMANCE GRAPH/NODE=SYSDEV/END=1/TYPE=(MEM,CPU_U,CPU_MODE)
/OUTPUT=.REG
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
MUMMS$DKA300:[CORREY]SYSDEV_CPU_UTILIZATION.REG;1
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
MUMMS$DKA300:[CORREY]SYSDEV_MEMORY_UTILIZATION.REG;1
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
MUMMS$DKA300:[CORREY]SYSDEV_CPU_MODES.REG;1
```

/SELECT[={GREATER_THAN[:percent] | LESS_THAN[:percent]}], /NOSELECT

Use /SELECT in conjunction with the optional threshold values which may be specified on a per graph type basis.

If this qualifier is present, before a graph is produced, a check is made to see if the values to be graphed fall within the threshold values for the indicated percentage of points. If so, then the graph (or pie chart) is produced. If not, no graph is produced. For details on THRESHOLD, see the /TYPE qualifier.

Keyword	Meaning
GREATER_THAN:percent	At least “percent” of the graph points plotted must be greater than or equal to the threshold value specified with the /TYPE qualifier.
LESS_THAN:percent	At least “percent” of the graph points plotted must be less than or equal to the threshold value specified with the /TYPE qualifier.

These keywords accept a single value representing the percentage of the points plotted that must meet the threshold criteria before the graph is produced. Each graph point value is determined by the sum (STACKED) of the items depicted (up to 6). If the GREATER_THAN keyword is specified without a value, then 50 percent is assumed. If the LESS_THAN keyword is specified without a value, then 90 percent is assumed.

If the /SELECT qualifier is present without a keyword, then GREATER_THAN:50 is assumed. For example:

```
$ ADVISE PERFORMANCE GRAPH /BEGINNING=10/ENDING=11/NODE=YQUEM -
_$ /TYPE=(CPU_U:THRESHOLD:25,CPU_M:THRESHOLD:35,TOP_CPU_I:THRESHOLD:45)-
_$ /SELECT=GREATER/OUTPUT=.REGIS
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
BADDOG:[CORREY.WORK.PSPA]YQUEM_CPU_UTILIZATION.REG;1
```

This command requests that three graphs be produced. The CPU Utilization graph is produced, if 50 percent or more of the data points exceed 25 percent CPU utilization. The CPU_MODES graph is produced if 50 percent or more of the data points exceed 35 percent CPU utilization. The TOP_CPU_IMAGES graph is produced if 50 percent or more of the data points exceed 45 percent CPU utilization. In this case only one graph is produced.

```
$ ADVISE PERFORMANCE GRAPH /BEGINNING=10/ENDING=11/NODE=YQUEM -
_$ /TYPE=(CPU_U:THRESHOLD:25,CPU_M:THRESHOLD:35,TOP_CPU_I:THRESHOLD:15)-
_$ /SELECT=GREATER/OUTPUT=.REGIS
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
BADDOG:[CORREY.WORK.PSPA]YQUEM_CPU_UTILIZATION.REG;3
%PSPA-I-CREAGRAPHOUT, PSPA Graph created file
BADDOG:[CORREY.WORK.PSPA]YQUEM_TOP_CPU_IMAGES.REG;1
```

This command produced two of three graphs because threshold quantity for the last graph was lowered.

```
$ ADVISE PERFORMANCE GRAPH /BEGINNING=10/ENDING=11/NODE=YQUEM -
_$ /TYPE=(CPU_U:THRESHOLD:25,CPU_M:THRESHOLD:35,TOP_CPU_I:THRESHOLD:15) -
_$ /SELECT=GREATER:90/OUTPUT=.REGIS

$
```

The previous command generated none of the graphs because in all cases 90 percent of the graph points did not exceed the specified thresholds.

/STACK, /NOSTACK

Stacks the values for each category on the graph. Use /NOSTACK to overlay the values on the graph. ReGIS graphs using /NOSTACK may cause some occlusion if you do not specify /FORMAT=ReGIS=CHARACTERISTICS=LINE also. If you are requesting a series of graphs in one command, you can override the /[NO]STACK qualifier by specifying the [NO]STACK keyword following each graph type. See Chapter 4 for an illustration of the use of the /NOSTACK qualifier and for additional information about default behavior.

/TYPE={
(graph_type[=([NO]STACK,Y_AXIS_MAXIMUM=n,
THRESHOLD=m,TITLE=string)],...)|
ALL_GRAPHS[=([NO]STACK,THRESHOLD=m,Y_AXIS_MAXIMUM=n)]
CUSTOM=(see "/TYPE=CUSTOM in Chapter 6")|
PROMPT}

Specifies which of the graphs you want generated.

The PROMPT keyword specifies that the Performance Manager prompt you for the graph types and custom metrics. Using PROMPT has the advantage of allowing an interactive user the ability to preview any predefined or custom graphs quickly and view any item categories to see what choices exist.

Use the TITLE keyword to override the Performance Manager supplied title. The text string may be a maximum of 40 characters.

The STACK keyword for a particular graph type overrides the setting established by the /STACK qualifier.

The THRESHOLD keyword specifies a threshold value associated with the graph. THRESHOLD does not apply to pie chart graphs and is ignored. The m specifier is a positive decimal value.

The Y_AXIS_MAXIMUM specifies a fixed y-axis to be used for the graph. The default behavior is to setup the y-axis so that the maximum data point appears near the top of the graph. This graph modifier allows you to specify the y-axis so that you can compare data from different graphs without having different scales on the y-axis. The n specifier is a positive decimal value.

You can specify multiple graphs in a single command. For example, you can specify /TYPE=(TOP_IO_DISKS,TOP_HARDFAULTING_IMAGES). Of course, /TYPE=ALL_GRAPHS generates all of the predefined graphs.

CPU_UTILIZATION is the default graph type.

For a list of valid graph types, see the chapter "Performance Manager Commands".

PIE_CHART

Use the PIE_CHART command to produce a pie chart instead of a graph. The PIE_CHART option has the same format as the GRAPH command, however the data is presented as a pie chart instead of as a graph.

Format

PIE_CHART

Description

The Performance Manager software can produce a multitude of predefined or custom pie charts, in the following formats PostScript and DECwindows formats, tabular, and CSV. In command mode the /OUTPUT qualifier must be used to direct the output to a PostScript file.

The /PERCENTAGE qualifier is specific to the PIE_CHART command. For other applicable PIE_CHART qualifiers, see the GRAPH command (see page 245).

Qualifiers

/PERCENTAGE = {TOTAL | MAXIMUM}

Specifies that a pie chart representing data in units of percentages is to be filled out to be the MAXIMUM of 100 percent, or is to represent only the TOTAL of the parts. For example; if you are producing a pie chart of CPU Utilization, and the parts of the pie chart have the following values:

- Interactive 30%
- Batch 10%
- Network 5%
- Overhead 1%
- Interrupts 5%
- Other 0%

If you specify /PERCENTAGE=TOTAL, the pie chart represents the sum of these parts, a total of 51 percent utilization, with the largest slice of the pie (approximately 3/5ths) being represented by “Interactive.” If you specify /PERCENTAGE=MAXIMUM, the pie chart contains a slice representing IDLE at 49 percent of the total pie with the remaining 51 percent representing their respective slices. If /PERCENTAGE is not used on the Pie command line, then /PERCENTAGE=MAXIMUM is assumed.

This qualifier has no effect on graphs, custom pie charts, or pie charts of metrics other than CPU Utilization.

REPORT

The REPORT command generates Performance Manager Analysis Reports, Performance Evaluation Reports, Tabular Reports, and Histograms.

Format

REPORT report_keyword[,...]

Description

Use the REPORT command to produce Performance Manager reports. The Performance Manager can generate reports using either daily or historical data. The following table lists all the REPORT command options.

Options

Option	Function
ANALYSIS	Displays the full Analysis Report.
BRIEF_ANALYSIS	Displays the brief Analysis Report.
PERFORMANCE_EVALUATION	Displays the Performance Evaluation Report.
HISTOGRAMS	Displays standard ANSI graphs of CPU, memory, and I/O use. The Image Residence histogram is not available in Command Mode.
TABULAR=[{FINAL|BYCLUSTER|BYNODE}]	Displays an overview of the system activity on a per node basis, or cluster-wide. Subsections of this report can be selected or omitted with the /SECTION qualifier. Tabular process statistics require that you select PROCESS=ALL to save by-PID details for each process. See also SELECT.

Qualifiers

/EXPLAIN, /NOEXPLAIN

Specifies for the Full Analysis Report, whether to include the rule's conditions and evidence in the report output. By default, the Performance Manager uses the /EXPLAIN qualifier for a batch process or if /OUTPUT is specified or asks you if the process is interactive.

/HOTFILE_LIMIT=n

Specifies the maximum number of hot files to list per disk volume in the Hotfile Statistics section of the Performance Evaluation Report. By default the maximum number of hot files is 20.

/INCLUDE =(section,...)

Specifies which sections of the Performance Evaluation Report are to be included. The negatable options are as follows:

- ALL_STATISTICS
- POOL_STATISTICS
- LOCK_STATISTICS
- TAPE_STATISTICS
- SCS_STATISTICS
- HOTFILE_STATISTICS
- CI_NI_AND_ADAPTER_STATISTICS
- DISK_STATISTICS
- SUMMARY_STATISTICS
- PROCESS_STATISTICS
- MODE_STATISTICS
- RULE_STATISTICS

By default, the Performance Manager includes all sections except SCS statistics. Rule statistics are only available with archived data.

/NODE_NAME=nodename

Specifies the preparation of a report for only one of the selected nodes. By default, the Performance Manager prepares reports for all selected nodes. cluster-wide statistics are always included.

/OUTPUT=filespec

Specifies an output file specification as a destination for the report output. By default, the output file destination is SYS$OUTPUT.

```
/PROCESS_STATISTICS=([FOCUS={TRADITIONAL|SUMMARY|
            GENERAL|MEMORY_RELATED|
            IO_RELATED|CPU_RELATED}]
          [,PRIMARY_KEY={
                    MODE|
                    USERNAME|
                    IMAGENAME|
                    UIC_GROUP|
                    PROCESS_NAME|
                    WORKLOAD_NAME|
                    ACCOUNT_NAME|
                    PID}]
          [,SECONDARY_KEY={
                    MODE|
                    USERNAME|
                    IMAGENAME|
                    UIC_GROUP|
                    PROCESS_NAME|
                    WORKLOAD_NAME|
                    ACCOUNT_NAME|
                    PID}]
         [,[NO]CLUSTER]
         [,[NO]BY_NODE])
```

The previous code lets you tailor the process statistics section of the Performance Evaluation report. You can specify the focus of the report to obtain slightly different sorts of statistics that pertain to the focus area. The grouping, merging, and sorting of the process data is controlled with the primary and secondary key settings. To use a given primary or secondary key, you must have previously specified the process key level with the SELECT command. See the description of the PERFORMANCE_EVALUATION option with SELECT. Also, you can specify whether a cluster-wide report, or a node-by-node presentation is desired.

By default, the focus area is TRADITIONAL, that being an image based report showing relative resource consumption. Reports are provided by node, unless otherwise specified.

Where:

FOCUS Types:	Provide:
TRADITIONAL	An 80 column report showing process CPU, memory and IO statistics on a per image activation basis, or as a relative percentage. The default primary and secondary keys are MODE and IMAGENAME. The SUMMARY focus report is also provided with the TRADITIONAL flavor.

FOCUS Types:	**Provide:**
SUMMARY	An 80 column report showing process CPU, memory and IO counts on a per image activation basis. The default primary key is MODE (no secondary key).
GENERAL	A 132 column report showing process CPU, memory and IO statistics primarily as rates. Some UAF parameters are also provided. The default primary and secondary keys are USERNAME and IMAGENAME.
MEMORY_RELATED	A 132 column report showing primarily process memory related statistics. Some UAF parameters are also provided. The default primary and secondary keys are IMAGENAME and USERNAME.
IO_RELATED	A 132 column report showing primarily process IO related statistics as rates. The default primary and secondary keys are USERNAME and IMAGENAME.
CPU_RELATED	A 132 column report showing primarily process CPU related statistics. The default primary and secondary keys are USERNAME and IMAGENAME.
Primary Keys:	**Provide:**
MODE	Group process statistics by the process mode (Interactive, Batch, Network, or Detached).
USERNAME	Group process statistics by the process's User name.
IMAGENAME	Group process statistics by the process's Image Name.
UIC_GROUP	Group process statistics by the process's UIC Group.
PROCESS_NAME	Group process statistics by the process name.
WORKLOAD_NAME	Group process statistics by the workload name. You must specify /CLASSIFY_BY to indicate the workload family that you intend to use.
ACCOUNT_NAME	Group process statistics by the process's account name.
PID	Group process statistics by the process's PID.
Secondary Keys:	**Provide:**
MODE	Process statistics detail lines by the process mode (Interactive, Batch, Network, or Detached).
USERNAME	Process statistics detail lines by the process's User name.
IMAGENAME	Process statistics detail lines by the process's Image name.

FOCUS Types:	Provide:
UIC_GROUP	Process statistics detail lines by the process's UIC Group.
PROCESS_NAME	Process statistics detail lines by the process name.
WORKLOAD_NAME	Process statistics detail lines by the workload name. You must specify /CLASSIFY_BY to indicate the workload family that you intend to use.
ACCOUNT_NAME	Process statistics detail lines by the process's account name.
PID	Process statistics detail lines by the process's PID.
Other Options:	**Provide:**
[NO]CLUSTER	A summary of process data for the entire cluster, scaled by CPU speed. The default is NOCLUSTER
[NO]BY_NODE	Per node detail of cluster process data. The default is NOBY_NODE if you specify CLUSTER.

If the value for the secondary key is the same as the primary key, no secondary level breakout occurs. This also happens if you specify the primary key and no secondary key is given.

The CLUSTER and BY_NODE keywords allow you to specify that the process statistics section of the Performance Evaluation Report is to present data combining process information for all selected nodes (CLUSTER), and if so, whether the (BY_NODE) detail should also be included. By default, process data is not combined for all selected nodes.

When the CLUSTER option is used, the percentage of CPU Utilization for the data line of each process is scaled according to the processor speeds of the nodes in the cluster. The speed ratings can be changed using an auxiliary knowledge base.

If you specify CLUSTER or BY_NODE, a by-node breakdown of the process data is provided following the line representing the cluster-wide data.

/SECTION=(item[,...])

Specifies which sections of the Tabular Report should be displayed. By default, all are displayed.

For node analysis, the available sections are as follows:

- CONFIGURATION
- SUMMARY_STATISTICS
- DISK_STATISTICS
- PROCESS_STATISTICS
- EXTENDED_PROCESS_STATISTICS

For PROCESS_STATISTICS and EXTENDED_PROCESS_STATISTICS, the process data must be selected with the PROCESS=ALL keyword. For example:

```
PSPA> SELECT=PERFORMANCE=PROCESS=ALL
```

For cluster analysis, the available sections are as follows:

- SUMMARY_STATISTICS
- DISK_STATISTICS

SAVE

The SAVE command allows you to save a selection of graph data to a disk file in a binary format. All graph data points are saved, and they can be reloaded using the LOAD command. The SAVE operation does not affect the current selection.

Format

SAVE file-spec

SPAWN

The SPAWN command creates a subprocess of the current process. Portions of the current process context are copied to the subprocess.

Format

SPAWN [command-string]

Parameter

command-string

Specifies a command string of less than 132 characters that is to be executed in the context of the created subprocess. When the command completes execution, the subprocess terminates and control returns to the parent process.

Description

The SPAWN command creates a subprocess of your current process with the following attributes copied from the parent process:

- All symbols except $RESTART, $SEVERITY, and $STATUS
- Key definitions
- The current keypad state
- The current prompt string
- All process logical names and logical name tables except those explicitly marked CONFINE or those created in executive or kernel mode
- Default disk and directory
- Current SET MESSAGE settings
- Current process privileges
- Control and verification states

Note that some attributes, such as the process's current command tables, are not copied.

EXIT

The EXIT command returns you to the DCL command level.

Format

EXIT

@(Execute Procedure)

Format

@ file-spec

Description

The @ command causes subsequent commands to be obtained from the specified file, instead of the user's terminal. When all the commands are executed, command input is returned to the user's terminal.

Chapter 8: Use the DECwindows Motif Interface

This chapter provides information about using the Performance Manager DECwindows Motif Interface to perform Performance Manager analysis functions.

This section contains the following topics:

Start the DECwindows Motif Interface

To use the windowing interface, the Performance Manager does not need to be installed or running on a workstation. The windowing interface can be started and directed to your workstation by setting host to the node or cluster where the Performance Manager is installed, and issuing the commands:

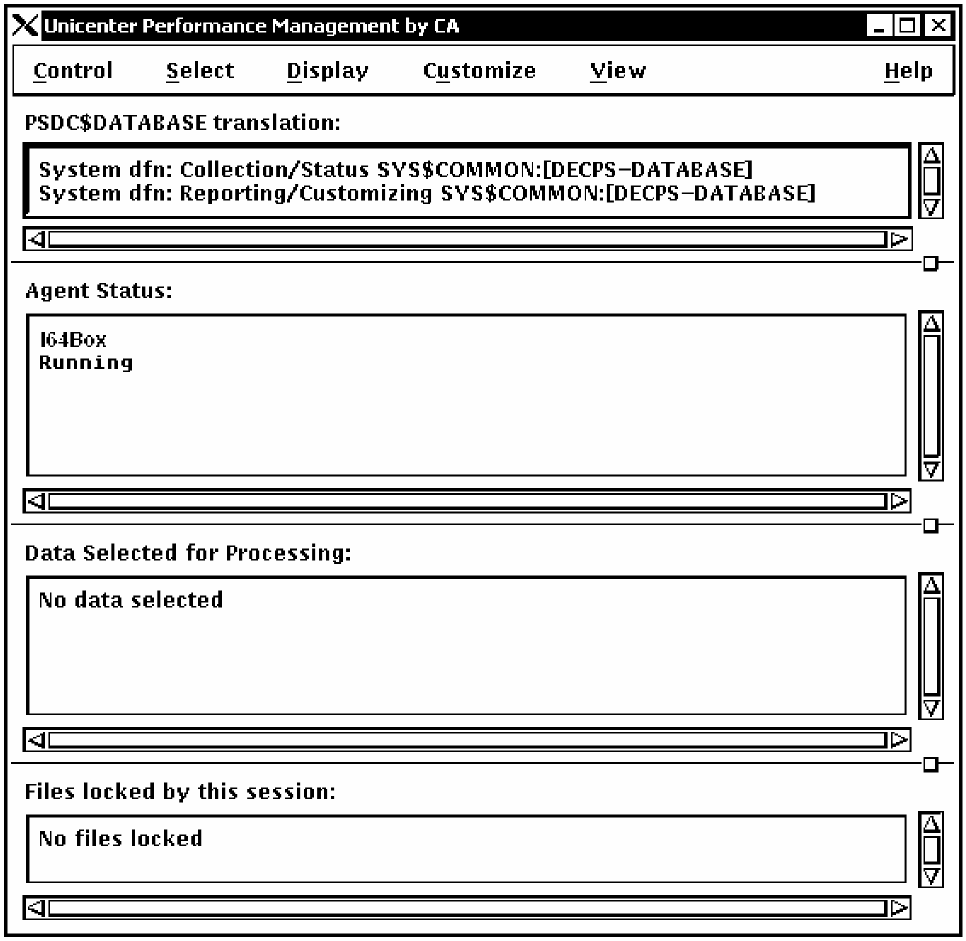
```
$ SET DISPLAY/CREATE/NODE=mynode
$ ADVISE/INTERFACE=MOTIF
 or
$ ADVISE/DECWINDOWS
```

Note: If the fonts required by the Performance Manager interface are not present, a warning appears listing the expected font names. All fonts used can be redirected to those available in your environment by modifying the Performance Manager resource, DECPS$RESOURCES.DAT.

For any font not available, the DECwindows tool kit provides a “best fit” substitute which may alter the intended presentation. For more information about the Resource File, see the *Installation Guide*.

Use the Main Window

When initiated, DECwindows Motif displays its main window, from which you select the activity you want to perform. It reflects the status of your use of the application and, if available, the status of data collection in your environment.



The Performance Manager Main Window lets you do the following tasks:

- Control the DECwindows interface
- Select data for analysis
- Display analyzed data
- Customize data collection, PSDC$DATABASE definition, and the parameters file
- View or remove specified main window sections
- Get Help, either Contextual (specific to a widget) or General (relating to a window)

Main Window Status Information

The Performance Manager Main Window displays the following information:

PSDC$DATABASE Translation

Displays the following directory information:

- Collection/Status-Displays the system-wide definition of the logical name PSDC$DATABASE. If there is a data collector running on your analysis node, this directory contains the data files produced by the Performance Manager and the schedule file for controlling the collection.
- Reporting/Customizing-Displays the process definition of the logical name PSDC$DATABASE, if it exists. If not, the job definition, group definition, or system definition is displayed.

If you want to analyze a Performance Manager database directory other than the system directory, you can specify an alternate directory. This directory might contain Performance Manager data files from another cluster or archived data whose classification definition is not applicable to your current scheme.

Performance Manager Status

The status of the data collection process can be one of the following:

- Running
- Stopped
- Down
- Waiting due to schedule
- Waiting for disk space
- No path to database device
- Unknown (user lacks SYSLCK privilege)

For more information on Performance Manager status, see the *Performance Manager Administrator Guide*.

Data Selected for Processing-Displays the start and end time of the analysis period, the processing options chosen and the nodes selected for analysis. Until you select data, the message “No data selected” is displayed and all display menu options are disabled.

This is a brief list of the results of an analysis of performance data. Additional information can be gained by reviewing the Work in Progress box and the Data Selection box.

Files locked by this session-Displays one of the following files:

- Schedule file
- Parameters file
- No files locked

The schedule file is locked when you customize Data Collection and is unlocked when you complete your changes.

The parameters file is locked when you customize parameters. When you complete your changes a message box appears asking you if you want to release the file. See the section How You Customize (see page 296) for more information about customizing either file.

How You Control the DECwindows Interface

Pull down the Control menu and release on the menu item you want. The Control menu lets you do the following actions:

- Save reports
- Monitor work in progress
- Read the Parameters file
- Write the Parameters file
- Load binary graph data
- Save binary graph data
- Quit the DECwindows session

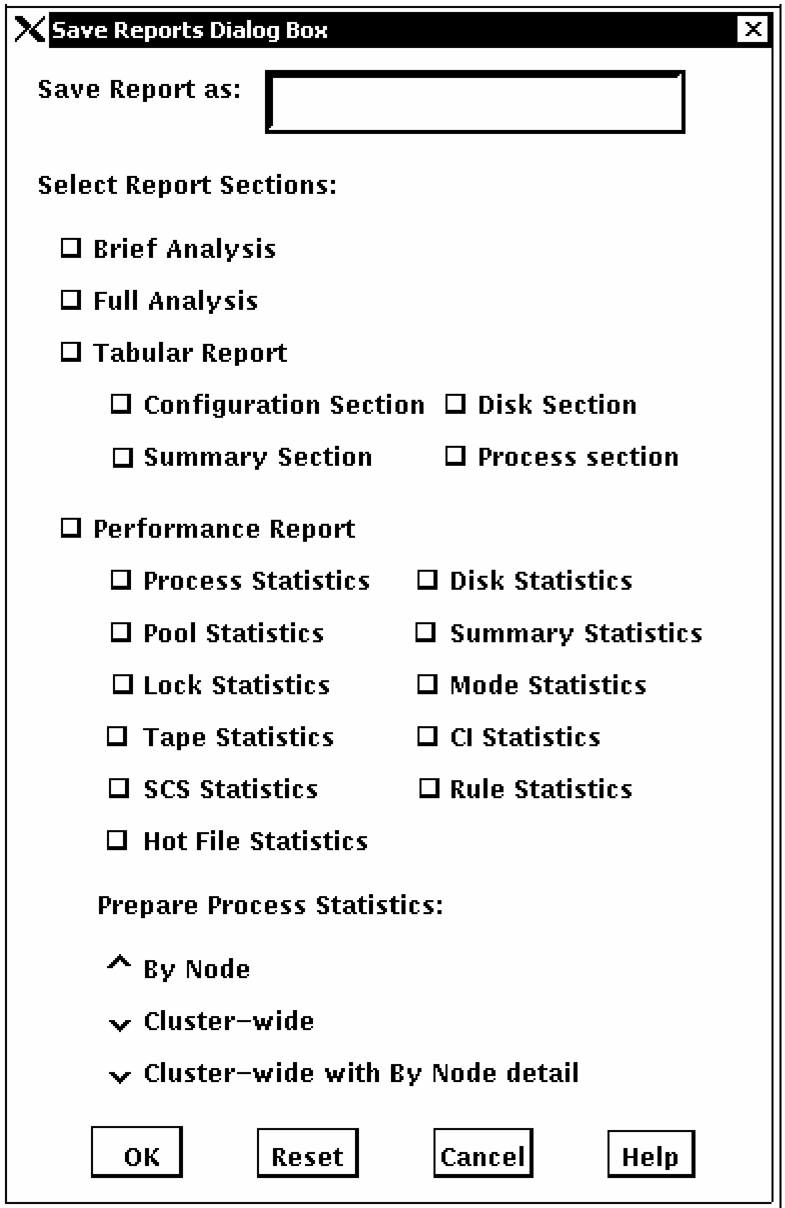
Save the Reports

To save the reports

1. Release on the Save As... menu item to save reports.

   Performance Manager displays the Save Reports dialog box. The reports reflect the data selected for analysis as shown in the main window's Data Selected for Processing Section. This option is disallowed if no data has been selected or if data selection was canceled.

   For details of data selection, see the section How You Select Data for Analysis (see page 266).



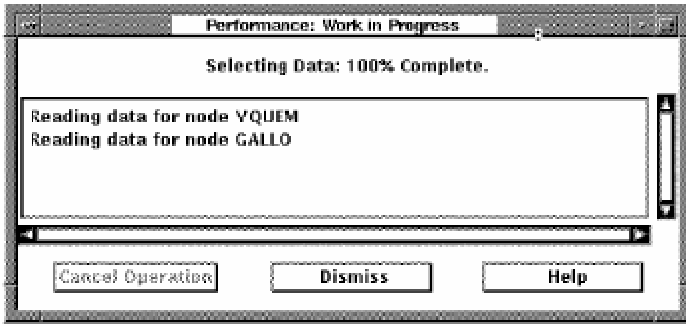
2. Enter a file name and select report sections you want to save.
3. Click OK to apply your selections and save the indicated reports.

   The dialog box is removed from the screen and the file created.
4. Click Reset to redisplay the default settings if you changed settings without applying them.
   OR
   Click Cancel to dismiss the dialog box without changing any settings or saving a report.

Monitor the Work in Progress

To monitor the work in progress

1. To display the Performance Manager Work in Progress dialog box, release on Work in Progress... .



   The work that is being monitored is the reading of the Performance Manager data files and the building of the internal data structures needed for the requested analysis.

   This work is started as a result of data selection. See the section How You Select Data for Analysis (see page 266) for information on requesting an analysis of performance.

2. If the analysis process is currently active, the completion percentage is less than 100 percent. Click the Cancel Operation button to stop work in progress and cancel data selection.

   No reporting capabilities are allowed until a complete data selection is performed.

3. When work is complete, click the Dismiss button to clear the dialog box from your screen.

   The Main Window's Data Selected for Processing Section is updated to reflect the new selection.

If data is missing from the selected time period, *missing data* messages appear in the Work in Progress box. This is to alert you that a subsequent examination of the selected analysis period may be incomplete or inaccurate.

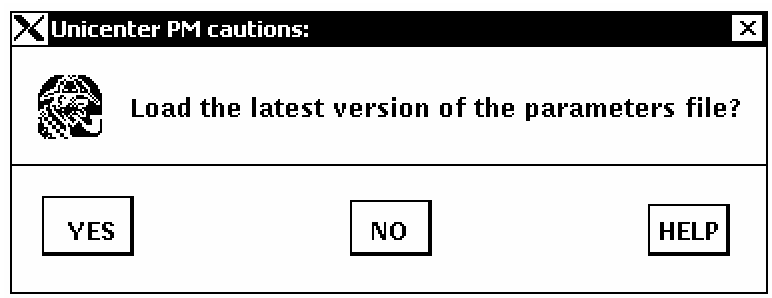
The length of time required to read and analyze the selected data depends on the options selected (such as hot file information) and the duration of time (1 hour as opposed to one day). You may want to remove the Main window and leave only the Work in Progress box on the screen.

Read the Parameter File

To read the parameter file

1. Release on the Read Parameter File... menu item,

   You are prompted with the following message:



Important! By clicking YES, any changes to the parameter file that you have made are not saved and are lost.

2. Click YES to load and view the parameters file.

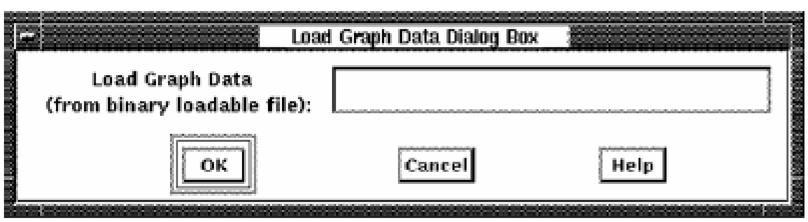
Write the Parameter File

To write the parameter file

- Release on the Write Parameter File... menu item if you want to save changes you have made to the file.
  OR
  If you have not made changes, this option is desensitized.

Load the Binary Graph Data

The Performance Manager software lets the saving of analyzed data required to support graphing functions in a summarized format. To load one of these files and use the graphing options, release on the Load Binary Graph Data menu item. The Performance Manager software displays the Load Graph Data Dialog Box.



To load the binary graph data

- Specify a file to which a selection of previously saved graphing data is to be loaded.

  If you previously requested data analysis using an option from the Select menu, access to that analysis data is lost.

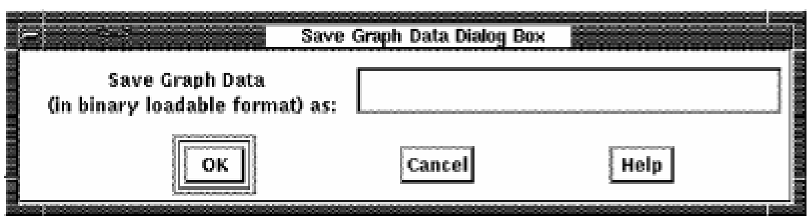
Normally Performance Manager data is selected and processed prior to performing any of the display functions available. This selection process can be very time consuming, especially if you have activated all processing options. If, at a later date, you want to view other graphs or pie charts associated with the original selection, you might want to use the SAVE and LOAD graph data features. Otherwise, the only way to recover the selected data, is to reselect. A faster way is to SAVE the selected data so that if later review of the same time period is required, you can use the load function for much faster retrieval of the data.

Save the Binary Graph Data

To save the binary graph data

1. Release on the Save Binary Graph Data menu item.

   Performance Manager displays the Save Graph Data Dialog Box.



2. Specify a file to which the currently selected graph data is to be saved in a binary format.

   All graph data points are saved, and the file can be reloaded using the Load Graph Data Dialog Box. The save operation does not affect the current selection.

You can also load and save this binary graph data using the DCL command mode interface.

Quit the Session

To end a DECwindows session

1. Click the Quit menu item.

   If you have any outstanding changes to the Schedule file or the Parameters file, you are asked if you want to save them.

2. Click Yes to save your changes
   OR
   Click No to quit without saving your changes.

   The interface proceeds to end of job.

How You Select Data for Analysis

The DECwindows Interface lets you analyze performance data and display graphs, pie charts, and reports, including the Analysis Report, Performance Evaluation Report, Tabular Report and Dump Reports. You must specify the time period, the nodes, and the processing options desired, before these functions can be performed.

To analyze Performance Manager data

1. Pull down the Select menu and release on the menu item you want.
2. The Select menu lets you specify the following data for analysis:
   - Data collected today
   - Specific data
   - Data collected during the last hour of the current day

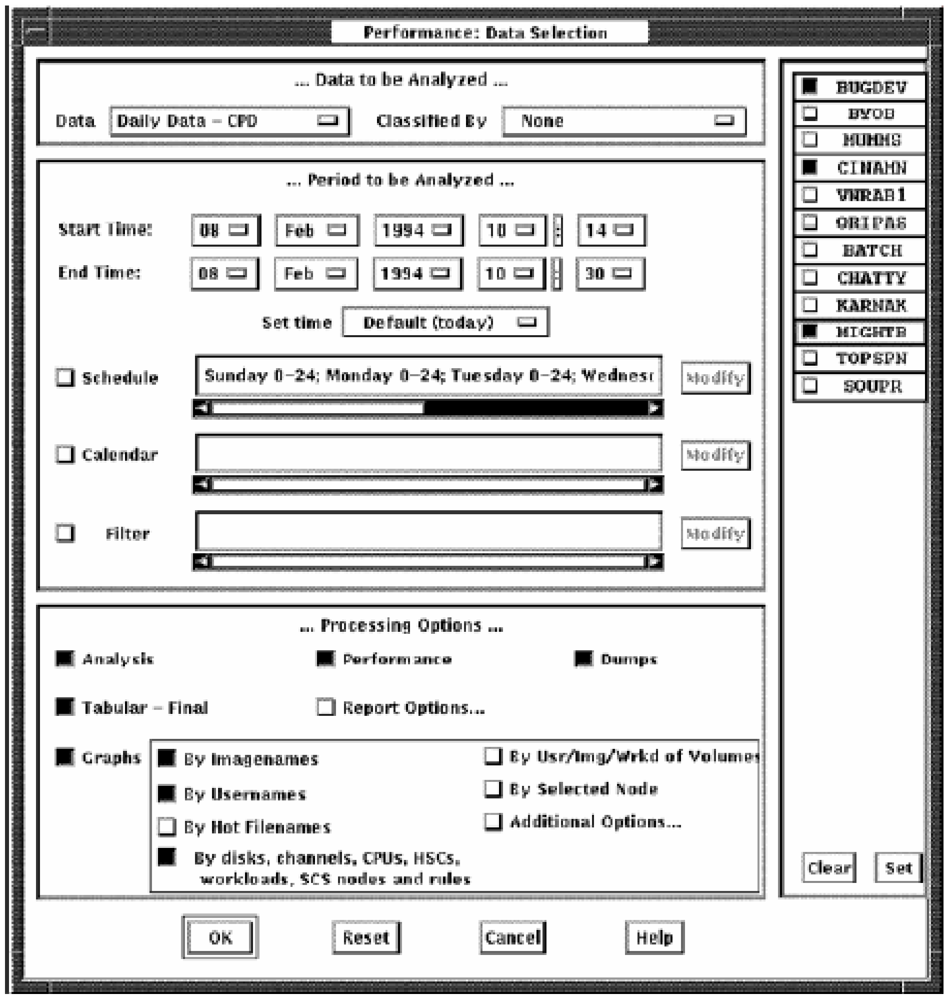
Select Today's Data

By default, the Performance Manager selects daily data for all nodes and analyzes data for the Analysis, Performance, and Tabular Reports and the graphs and pie charts unless you have adjusted these options by using the Specific Data... menu item.

The Performance Manager uses 00:00:00 of the current day as the beginning time and the current time as the ending time and chooses the CPD collection as the source. To select the default, release on Select Today from the Select menu. You can override the defaults if you have a local resource file (PSPA$SELECT.DAT) that sets your preferred defaults. See the section Data to be Analyzed (see page 268) for a discussion of the Resource file.

Select Specific Data

Choose the Specific Data... menu item from the Select menu to specify data to be analyzed. Performance Manager displays the Performance Manager Data Selection dialog box.



The time period and the processing options selected affect the amount of time needed to complete the analysis and the quantity of memory required (generally restricted by your pagefile quota, PGFLQUO, and the system parameter VIRTUALPAGECNT).

See the Appendix Estimate Virtual Memory Needs (see page 535) for information on estimating virtual memory needs and selecting data.

Including each graphing sub-option expands the memory and CPU requirements. Selecting archived data in place of daily data reduces memory and processing time, but also reduces flexibility. The By Selected Node menu item associated with graphing greatly increases memory requirements, as does the number of *x*-points.

The Performance Manager Data Selection dialog box lets you perform the following actions:

- Choose type and classification of data to be analyzed
- Set the beginning and ending date and time of the reporting period
- Set hourly schedule within the beginning and ending date
- Specify a Calendar file, indicating specific dates for analysis.
- Choose processing and report options
- Choose nodes for which data is to be reported

Data to Be Analyzed

Enter any of the following information:

Data

Specifies the source of data to be analyzed. Press MB1 on the Data option item and a menu appears. The menu lists daily data collection definitions in your local schedule file and history file definitions in your local parameter file.

Release on the item you want. The option menu disappears. The menu item you chose is now the current source for performance data. The default data source is daily data from the CPD collection definition.

Note: Changing the source of data may change how it can be classified and which nodes can be analyzed. If you have chosen a history file descriptor, the Classify By options are changed to reflect those specified by the descriptor's definition. If you choose daily data, Classify By options reflect all workload families currently defined in the parameters file. If a data source selection nullifies the current Classify By selection, the Classify By selection is reset to the default of None.

For daily collection definitions, the nodes specified by the collection definition are the only valid nodes for analysis. For this reason the source of the data should always be chosen ahead of the classification of the data and the nodes to be analyzed.

If you select archived data for processing, the history files will be locked, blocking any archiving process. Also, if an archiving process is in progress, the DECwindows interface will be suspended from reading the files until the archiving is complete.

Classified By

Specifies how the Performance Manager is to classify process activity in the Process Statistics Reports and in graphs presenting workload metrics. Press MB1 on the Classify By option item and a menu appears. The menu lists workload families. Release on the family name you want.

The default option is None, which results in the following summarizations. All graph data will be displayed in the workload "Other." All Process Statistics reports will use the processing modes of Interactive, Batch, Network, or Detached.

Period to Be Analyzed

Enter any of the following information:

Start time\End time

Hold MB1 down on any of the date and time fields to see all available choices. Release MB1 on the desired value. Press and hold MB2 to advance through the possible values. Press and hold MB3 to move back through the values.

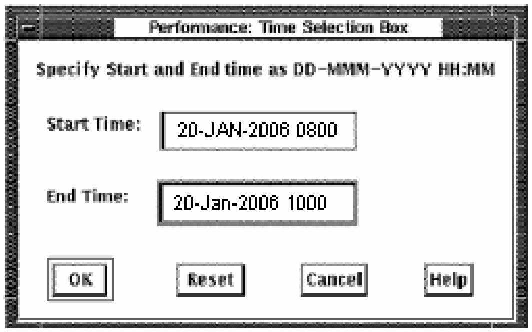
These controls are desensitized if you have enabled the calendar option and have loaded a file of date ranges.

Press MB1 on the Set time option button and an option menu appears.

Enter any of the following options:

- Default (today)-Specifies midnight to now.
- Yesterday-Specifies yesterday, from midnight to midnight.
- Most recent hour-Specifies the last 60 minutes.
- First hour of today-Specifies the time period of 00:00 to 01:00.
- Advance by a day-Increment the beginning and end dates by one.
- Backup by a day-Decrement beginning and end dates by one.
- Specify text...-Release on the Specify text... menu item to specify the beginning and end day and time from the keyboard.

Performance Manager displays the Performance Manager Time Selection Box.



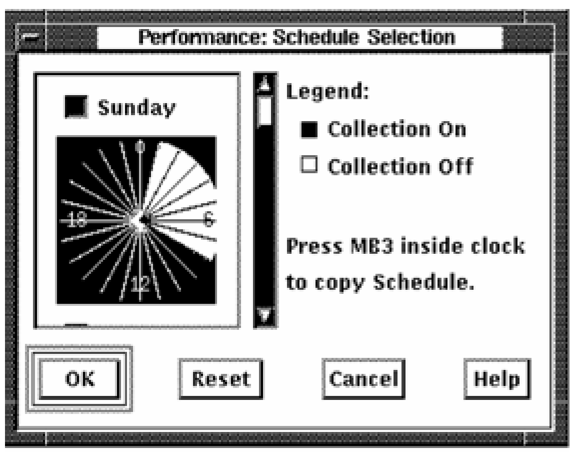
The day and time can be entered in the format shown in the window.

Clicking on the OK button applies the start and end times and removes the dialog box from the screen. The Reset button restores the start and end times to those displayed in the Performance Manager Data Selection box.

Clicking on the Cancel button removes the dialog box without changing the time fields currently displayed in the Data Selection box.

Schedule

Specifies a subset of hours within your beginning and ending reporting period. Release on the Modify button and a Schedule Selection dialog box appears.



A 24-hour clock is displayed. A bar on the right side of the clock lets you scroll to each day of the week. By default, data collection is set ON for each hour of the day, every day of the week.

To set the clock:

1. Set or reset the square toggle button above the clock to turn data analysis on or off for an entire day.

   To turn off data collection for a specific hour, point to the hour on the clock and click MB1. Holding MB1 down and dragging the pointer around the clock will set data collection to the value of the initial hour setting for a series of hours.

2. Drag the slider on the scroll bar to display the collection schedule for each day of the week or click the up or down stepping arrows.

To duplicate a day's schedule:

1. Press and hold MB3 inside the clock. A pop-up menu is displayed. Release on the Cut menu item.
2. Scroll to another day and press MB3 inside the clock. Release on the appropriate Paste menu item. The clock displays the copied schedule.

The OK button removes the dialog box and applies the new schedule. Reset causes the schedule to revert to your previous selection. Cancel removes the Schedule Selection dialog box.

Calendar

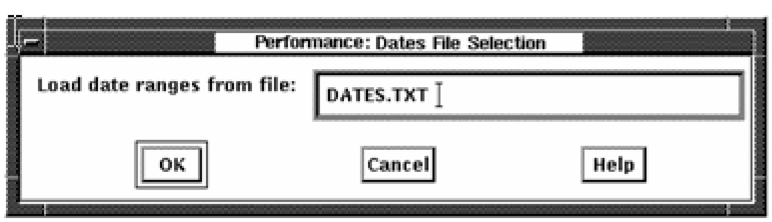
lets you specify a series of date ranges that are listed in a text file.

For example, if you wanted to generate graphs and reports for the all Mondays in January, but wanted to substitute a Tuesday for the Martin Luther King holiday, you could create a text file with the following entries:

```
04-JAN-2006 10:00, 04-JAN-2006 12:00
04-JAN-2006 14:00, 04-JAN-2006 16:00
11-JAN-2006 10:00, 11-JAN-2006 12:00
11-JAN-2006 14:00, 11-JAN-2006 16:00
19-JAN-2006 10:00, 19-JAN-2006 12:00
19-JAN-2006 14:00, 19-JAN-2006 16:00
25-JAN-2006 10:00, 25-JAN-2006 12:00
25-JAN-2006 14:00, 25-JAN-2006 16:00
```

The above date list indicates that the hours of 10 to 12 a.m. and 2 to 4 p.m. should be processed for the 4 days specified. Tuesday the 19th is processed in place of Monday the 18th, a holiday.

Release on the Modify button and a Performance Manager Dates File Selection box appears.

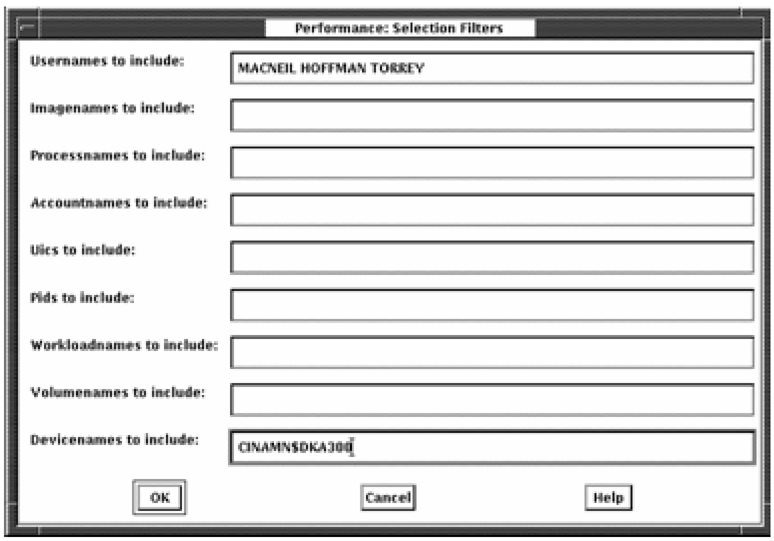


Enter the name of the file containing the date ranges and release on OK. When the dates are successfully loaded, the box is removed and the Start Time and End Time buttons are updated and desensitized. Click the Calendar button to turn off the Dates File.

Filtering Options

Click Filter to select a subset of data for reporting and graphing. Click Modify to change the entries for filtering.

The Selection Filters dialog box lets you select a subset of the daily or history data for PA reports and graphs. Process data and disk data can be filtered.



Process data can be filtered by using any of the filter entries: Usernames, Imagenames, Processnames, Accountnames, UICs, PIDs or Workloadnames. If a process record's identification information matches any of the identification specified, that record is selected. When using one or more of the process filters, the following PA reports and graphs include only information on the selected processes:

- Process Statistics section of the Performance Evaluation Report
- Process and Extended Process Metrics sections of the Tabular report.
- Hot file report (only files used by the specified processes are selected)
- Top or Custom Username, Imagename, and Workloadname graphs
- Top or Custom User_Volume, Image_Volume, and Workload_Volume graphs
- Top or Custom Hot file graphs (only files used by the specified processes are selected)

Likewise, disk data can be filtered by using any of the filter entries: Volumenames and Devicenames. If a device record's identification information matches any of the volume names or device names specified, that record is selected. When using one or more of the disk filters, the following PA reports include only information on the selected disks:

- Disk Statistics section of the Performance Evaluation Report
- Disk Metrics section of the Tabular report
- Hot file report (only files located on the specified disk are selected.)
- Top or Custom Volumename and Devicename graphs
- Top or Custom User_Volume, Image_Volume, and Workload_Volume graphs
- Top or Custom Hot file graphs (only files located on the specified disk are selected

If you specify both a process filter and a disk filter, the hot file report section and hot file graphs will select only hot files that are both located on the specified disk volume, and used by the specified process. The same will be true for the User_Volume, Image_Volume, and Workload_Volume graphs.

The following entries allow you to select specific processes or disks for the reports and graphs:

Usernames

Specify a list of strings (separated by commas, spaces or tabs) to generate reports and graphs for all process records with the username matching any of the specified strings.

Imagenames

Specify a list of strings (separated by commas, spaces or tabs) to generate reports and graphs for all process records with the imagename matching any of the specified strings. Do not specify any trailing ".EXE", nor the file version, device or directory.

Processnames

Specify a list of strings (separated by commas, spaces or tabs) to generate reports and graphs for all process records with the processname matching any of the specified strings. The match string is case sensitive, so if the process names have any lower case letters, spaces or tabs, use double quotes when you enter the value; (for example,"--RTserver--").

Accountnames

Specify a list of strings (separated by commas, spaces or tabs) to generate reports and graphs for all process records with the accountname matching any of the specified strings.

Workloadnames

Specify a list of strings (separated by commas, spaces or tabs) to generate reports and graphs for all process records associated with any of the specified workloads. This filter is valid only if the Classified By option is used to specify a classification scheme for your workload data.

Uics

Specify a list of UICs (separated by commas, spaces or tabs) to generate reports and graphs for all process records with the UIC matching any of the specified UICs. An asterisk may be used to wildcard either the group or user field of the specified UICs.

Pids

Specify a list of PIDs (separated by commas, spaces or tabs) to generate reports and graphs for all process records with the PID matching any of the specified PIDs.

Volumenames

Specify a list of strings (separated by commas, spaces or tabs) to generate reports and graphs for all disk records with the volumename matching any of the specified strings. Do not specify any trailing colon.

Devicenames

Specify a list of strings (separated by commas, spaces or tabs) to generate reports and graphs for all disk records with the devicename matching any of the specified strings. Do not specify any trailing colon.

Process Your Options

You can enter any of the following options:

Analysis

Directs the Performance Manager to analyze the data to generate an Analysis Report.

Performance

Directs the Performance Manager to analyze the data to generate Performance Evaluation and Process Statistics Reports. The primary key for presenting process statistics defaults to Interactive, Batch, Network, Detached, or Other organization. The secondary key defaults to Imagename.

While viewing the resulting report, an option is provided to re-sort the process statistics.

Dumps

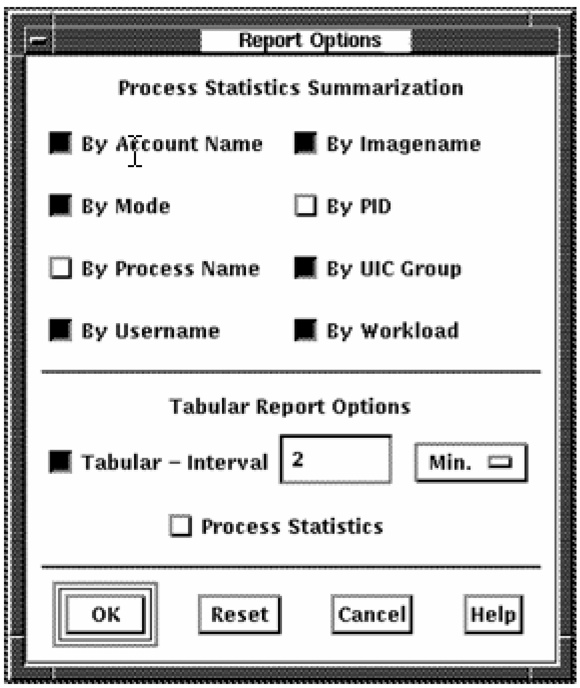
Specifies that the unanalyzed data will be made available for user inspection. Since no pre-processing of the data is required for dumps, no overhead is added to the analysis process. Refer to the CA Performance Manager for OpenVMS Administrator Guide for more information about dump reports.

Tabular-Final

Directs the Performance Manager to analyze data to generate the Tabular Report sections averaged over the entire analysis period.

Report Options

Displays options for summarizing process statistics and for specifying the reporting intervals, as shown in the following screen:



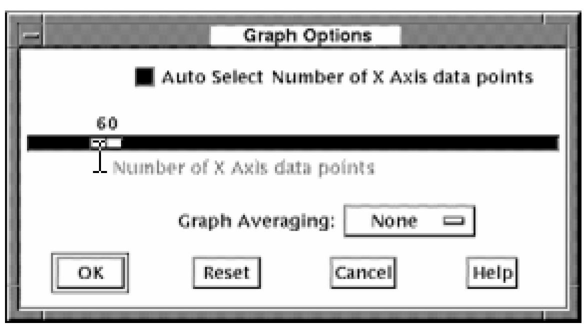
Tabular-Interval

Directs the Performance Manager to prepare interval reports summarizing data into specified intervals. This reporting option is unavailable unless the Final Tabular report is selected. Once selected, the reporting interval becomes available. Performance Manager data collection for daily performance data is recorded every two minutes. This is the default reporting interval. This value can be adjusted by varying the supplied value of 2 and the units value of minutes. When the analysis process is initiated, it may override your selections for the reporting interval if it is not a multiple of the recording interval.

Graphs

Directs the Performance Manager to analyze the data to generate all graphs and pie charts. The options are as follows:

- By Imagenames-Enables graphing of process statistics by imagename.
- By Usernames-Enables graphing of process statistics by user name.
- By Hot Filenames-Enables graphing of file statistics by file name.
- By Disks, channels, CPUs, HSCs, workloads, SCS nodes and rules-Enables graphs for listed categories.
- By Users/Images of Volumes-Enables graphing of process I/O statistics by the user or image of volumes.
- By Selected Node-Enables predefined top graphs and custom graphs for selected nodes. The system metric graphs are always available By node. This option greatly increases memory requirements.
- Additional Options...-Click the Additional Options... button and the interface displays the Performance Manager Graph Options dialog box.



The Auto Select Number of X Axis data points button is used to have the Performance Manager choose a value that results in an even time interval to be represented by each data point. When you disable this button, you can specify the number of X Axis data points to plot across a graph.

As the value of X Axis data points increases, spikes and valleys become more defined and the graph has a higher resolution. A low number of X Axis data points produces a smoother graph because the graphing facility may average multiple data points within the time frame specified.

Press on the Graph Averaging button and an option menu appears. The selected data is averaged into the time period selected. For more information on graph averaging, see the chapter "Generating Historical Graphs."

Node Control and Toggle Buttons

By default, the Performance Manager analyzes data for all nodes in your schedule file. Click a node's toggle button to include or exclude the node from the processing. Clear and Set buttons are available for adjusting all toggles.

Control Buttons

The OK button applies your selection, removes the data selection box and activates a Performance Manager Work in Progress dialog box which includes a real time display of the progress of the analysis procedure. See the Controlling the DECwindows Motif Interface section for details of the Work in Progress box.

The Cancel button closes the Data Selection dialog box and resets all widgets.

The Reset button sets all widgets back to their settings of either the startup defaults or the last approved selection.

Select the Last Hour

Release on the Last Hour option from the Select menu to apply the current data selection settings, for the last hour of the day. To review what the current data selection settings are, release on the Specific data... menu item and view the Data Selection dialog box.

Use Custom Default Settings

You can override the default data selection settings by providing a selections resource file, PSPA$SELECT.DAT in the DECW$USER_DEFAULTS directory area (typically SYS$LOGIN). A sample file is provided in PSPA$EXAMPLES.

The PSPA$SELECT.DAT file will be read once when you make the first data selection. This file can be edited with a text editor. A leading exclamation point (!) makes a setting a comment.

Only override those items that are significant to you, as the process does slow the activation of the Data Selection dialog box.

How You Display Analyzed Data

To display reports or graphs, pull down the Display Menu and release on the option you want. The Display menu lets you generate the following reports:

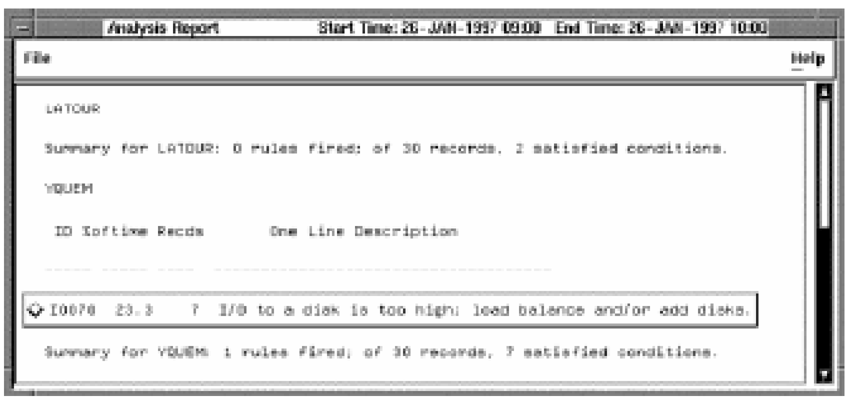
- Brief Analysis Reports
- Full Analysis Reports
- Performance Evaluation Reports
- Process Statistics Reports
- Tabular Reports
- Graphs and pie charts
- Dump Reports

  For more information about dump reports, see the *Performance Agent* Administrator *Guide*.

Until a complete data selection process has occurred, these options are unavailable.

Brief Analysis Report

Release on the Brief Analysis menu item from the Display menu to open a Performance Manager Analysis Report Window.

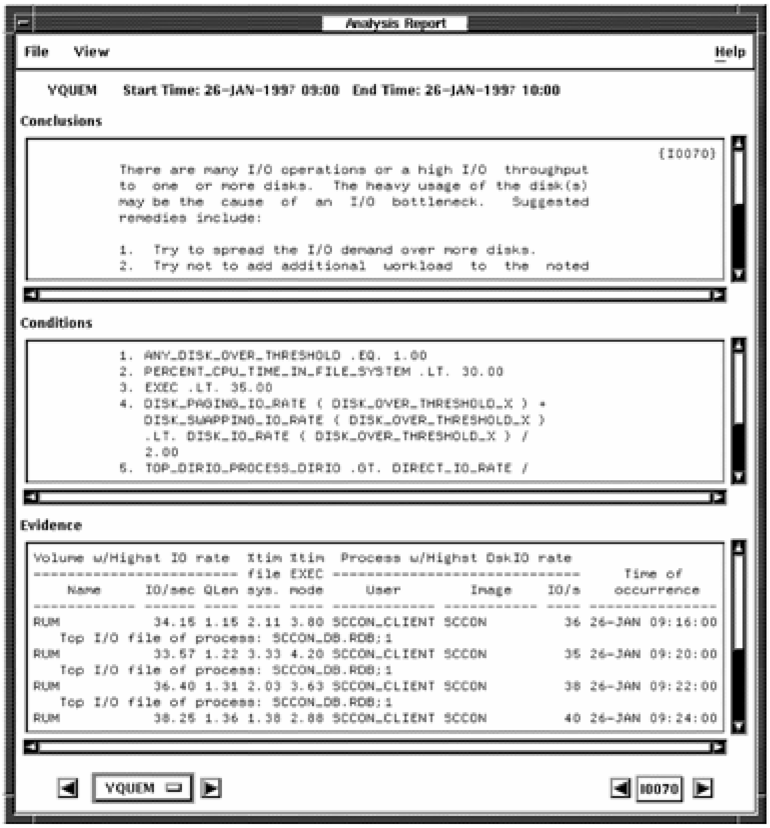


The Brief Analysis Report lists the rules that fired during the analysis period. Click anywhere on the rule and Performance Manager DECwindows opens another Analysis Report Window that displays the fired rule's conclusions, conditions, and evidence.

To return to the Brief Analysis Report, pull down the File menu and release on the Close menu item or click the Close button at the bottom of the window.

Full Analysis Report

Release on the Full Analysis menu item from the Display menu to open a Performance Manager Analysis Report window, as shown in the following screen:



The menu bar contains File and View menus. To close the window, pull down the File menu and release on the Close menu item.

By default, the Full Analysis Report lists conclusions, evidence, and rule conditions that satisfied rule firings. To remove either evidence or conditions or both from your report, pull down the View menu and release on the appropriate item.

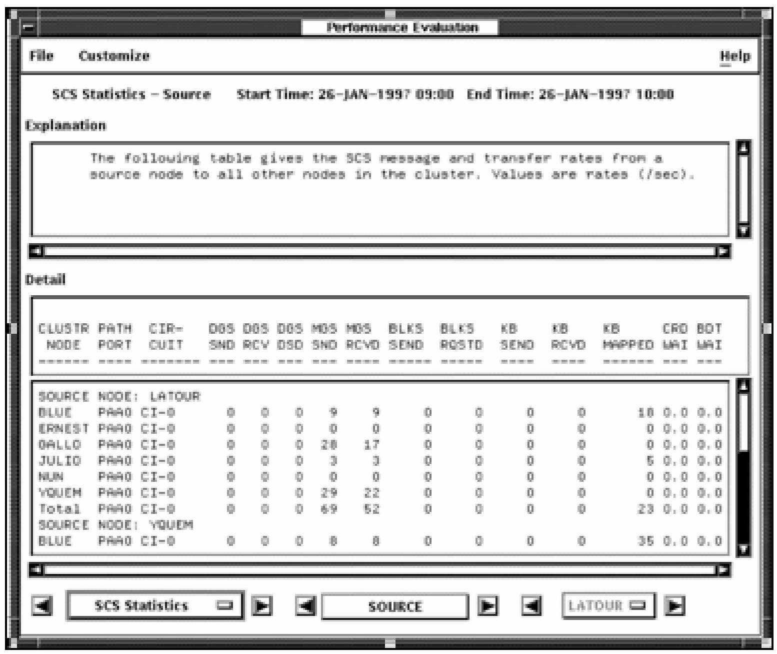
To proceed through the list of nodes, click the appropriate Node arrow button or hold MB1 down on the node button to display an option menu with the selected nodes. Releasing on the desired node name updates the window with that node's report.

If more than eight nodes were selected for analysis, the node option menu contains two <more> buttons, which cause the node names to be shifted up or down when the cursor is within their option entry. To stop the shifting, move the cursor out of the <more> button. Releasing on a node name causes the Analysis Report window to be updated with that node's report. Releasing on a <more> button causes the report window to be updated with data of the node name adjacent to the <more> button.

To proceed through the list of conclusions, click the appropriate rule ID arrow button.

Performance Evaluation Report

Release on the Performance Evaluation menu item from the Display menu to open the Performance Manager Performance Evaluation Window, as shown in the following screen:



To navigate through the Performance Evaluation Report, click the Statistics label. An option menu appears listing all of the Performance Evaluation Reports. Release on the report section you want displayed. You can also advance through the report by clicking on the appropriate direction arrows.

The Section label, here labeled SOURCE, changes according to the report being viewed, and will be desensitized if irrelevant. The arrows on either side of this label allow you to advance to other sections of the report.

Press on the Node button and an option menu appears listing the nodes for which the report is available. Release on the node you want displayed. Only pool statistics are available by node.

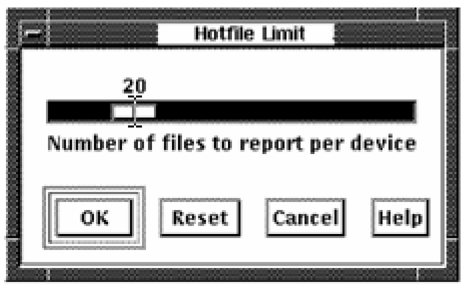
To exit from the Performance Evaluation Window, pull down the File menu and release on Close.

To customize the Performance Evaluation Report, pull down the Customize menu and release on the menu item you want.

The Customize menu lets you alter the hotfiles report.

Set hotfile limit..

Release on the Set Hotfile limit... menu item to display the Set Hotfile limit dialog box containing a scale set at the current hotfile reporting count, as shown in the following screen:



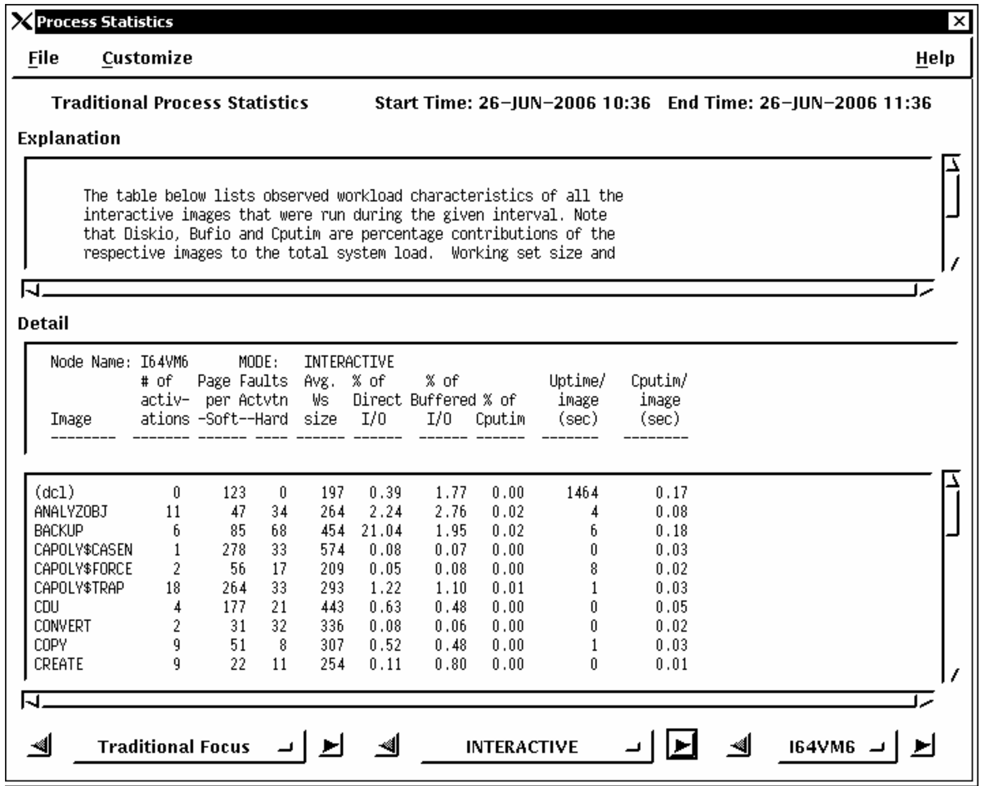
Drag the arrow to change the number of files that you want reported for each disk device.

Control Buttons

- The OK button applies the change and removes the dialog box.
- The Reset button restores the value to your last selection (if you previously changed the default) or to the default value of 20.
- The Cancel button removes the dialog box without changing the limit.

Process Statistics

Release on the Process Statistics menu item from the Display menu to open the Performance Manager Process Statistics Window, as shown in the following screen:



To navigate through the Process Statistics Reports, click the Traditional Focus label. An option menu appears listing all of the Process Statistics Reports. Release on the report type you want displayed. You can also advance through the reports by clicking on the appropriate direction arrows.

The Section label, here labeled INTERACTIVE, changes according to the report section being viewed, and will be desensitized if irrelevant. The arrows on either side of this label allow you to advance to other sections of the report.

Holding MB1 down on the section label will display all other available reports. Releasing MB1 on the desired report name will update the Detail window.

Press on the Node button and an option menu appears listing the nodes on which the report is based. Release on the node you want displayed.

To exit from the Process Statistics Window, pull down the File menu and release on Close.

To customize the Process Statistics Report, pull down the Customize menu and release on the menu item you want.

The Customize menu lets you enter any of the following:

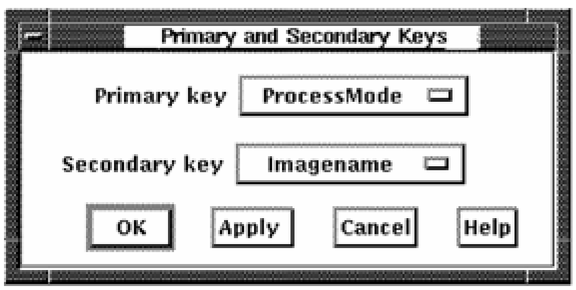
Cluster stats by node

Release on the Cluster stats by node menu item to turn on or off the reporting of cluster-wide process statistics by node.

Report keys...

To re-sort the process data, release on the Report keys... menu item. Performance Manager displays the Primary and Secondary Keys dialog box.

The Primary and Secondary keys you specify are applied when you use the SAVE AS option to save process statistics, as shown in the following screen:

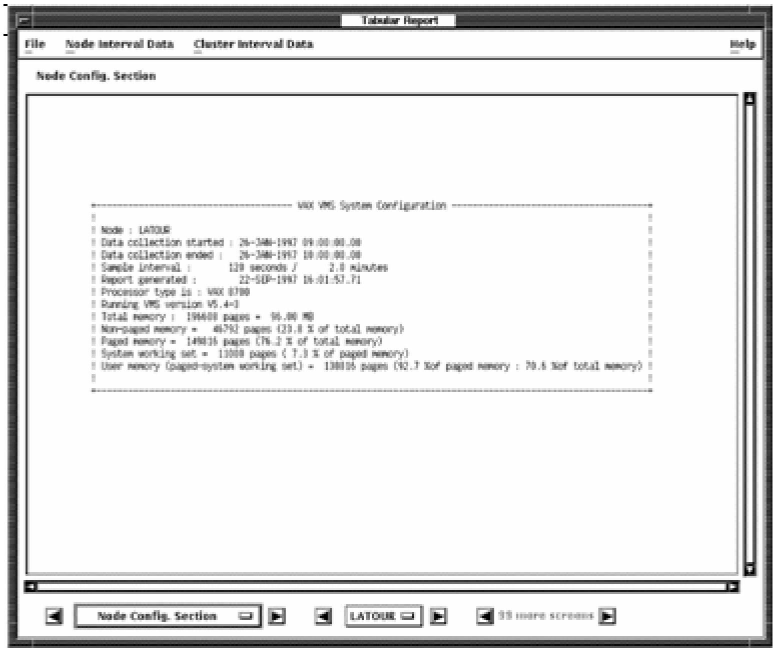


Control Buttons

- The OK button removes the dialog box, sorts the process data, and re-displays the report.
- The Apply button sorts the process data and re-displays the report.
- The Cancel button removes the dialog box without changing the keys.

Tabular Report Sections

Release on the Tabular report menu item from the Display menu to open the Performance Manager Tabular Report window, as shown in the following screen:



To navigate through the Tabular Report, click the arrow buttons on either side of the Configuration label. This updates the window with the Summary, Process, Extended Process, Disk, or Server Statistics sections for node reporting. Cluster-wide reports are also provided for summary, process, disk, and server reports which focus on either a cluster view or a by-node view. The window is sized to accommodate the requirements of the Summary Statistics display. The section label changes according to what section is currently viewed, as are the arrow buttons enabled or disabled.

Pressing the node button (labeled LATOUR in the figure) displays an option menu with the list of selected node names for which the report can be viewed. Releasing on a node name causes the report window to be updated with that node's data. The arrow buttons on either side of the node button can be used to progress sequentially through the selected nodes.

The node option menu and arrow buttons are not enabled while cluster reports are being viewed.

The process and disk report sections can generate many screens worth of data. When viewing these report sections the number of screens available for viewing and the arrow buttons on either side become enabled to allow reviewing all available data.

To exit from the Tabular Report Window, pull down the File menu and release on Close.

Tabular Interval Report Sections

In addition to viewing the tabular report statistics summarized over the selected analysis period, you can also view classes of statistics according to a subinterval specified during data selection. The menu entries *Node Interval Data* and *Cluster Interval Data* provide access to the subinterval statistics windows. If the *Tabular - Interval* option was not chosen during data selection, these menu options are desensitized.

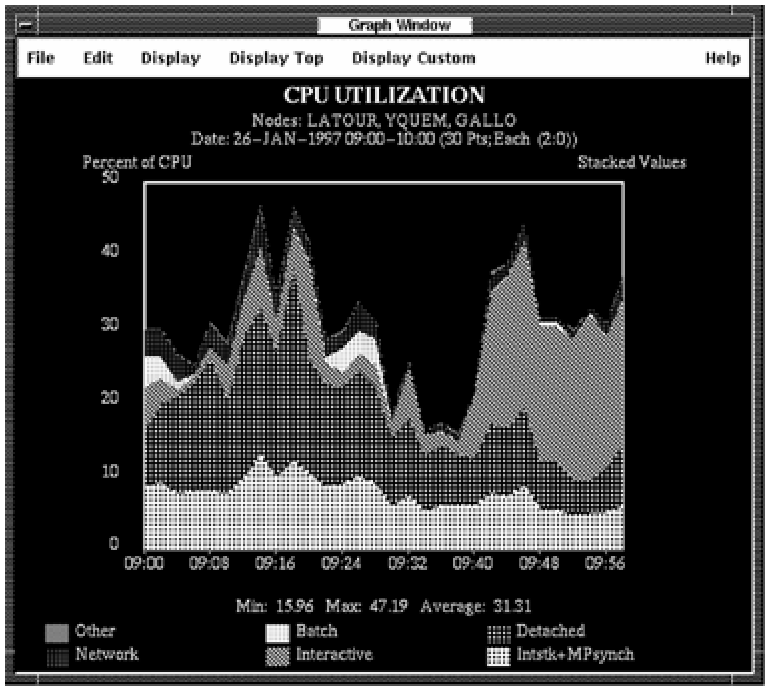
The node statistics classes include memory, CPU, paging, IO, XQP, lock, SCS, and process statistics. Each class appears in a separate window. If the node selected in the parent window is changed, the interval statistics windows are all updated with that node's data. The beginning time stamp of each interval is included in the display.

The cluster statistics classes include memory, CPU, and lock statistics, either in terms of minimum/maximum/average displays or by node displays.

For details on the data displayed in the different report sections, see the chapter Evaluate Performance in Detail (see page 33).

Graphs

To view graphs or pie charts of selected data, release on the graph item of the Display menu. The Performance Manager Graph Window is displayed, as shown in the following screen:



Each graph has the same basic format. The components are these:

Title

The title is centered at the top of the graph and identifies the type of graph.

Subtitle

The subtitle gives the node name (or list of node names for composite graphs), the date and time of the selected data, the number of x-axis data points, and the time represented by each point.

Axis Labels

Time is implied as the x-axis label. Labels on the y-axis specify the units of the plotted values, for example, “Percent of CPU.”

X- and Y-Axis Markers

Axis markers indicate the magnitude and time of any point on the graph. The x-markers indicate the time. The y-markers are scaled based on the maximum value of all the data points.

Legend

The legend appears at the bottom of the graph. The legend identifies the name of the metric, and the color or pattern associated with it.

The Performance Manager Graph Window lets you do the following:

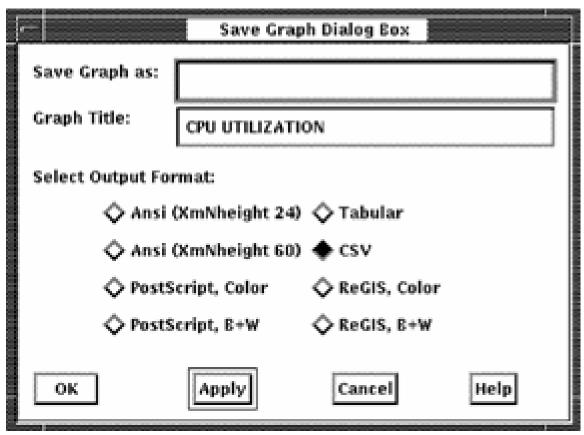
- Save the graph
- Edit the graph format
- Display predefined graphs
- Display Top system use graphs
- Display Custom graphs

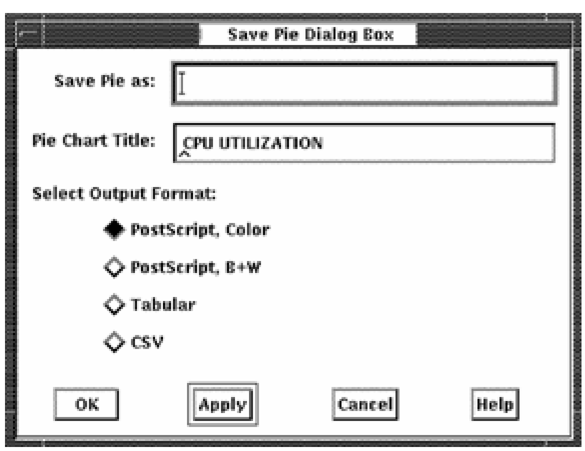
Save a Graph

To save the graph or pie chart

1. Pull down the File menu and release on the Save as... menu item.

   The Performance Manager Save Graph or Save Pie dialog box is displayed, as shown in the following screen:





The Save Graph or Save Pie dialog boxes allow you to do the following actions:

- Specify a file name
- Select an output format

  More output formats are available for graphs than for pie charts.
- Specify the title

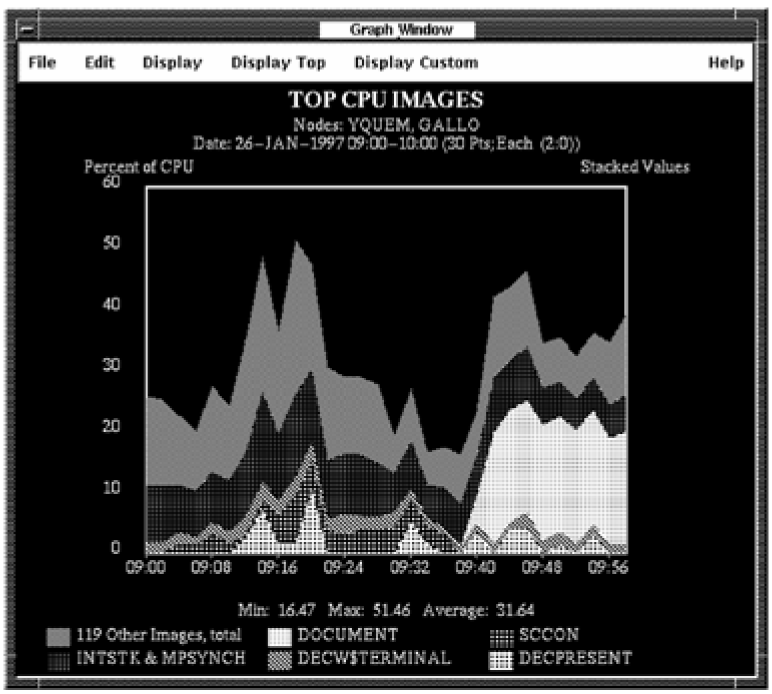
2. Click OK to save the graph or pie chart to a file.
   OR
   Click Cancel to remove the window from the screen, with no data being saved.

Edit the Graph Format

Pull down the Edit menu. You can change the following aspects of the graph:

Stack

Specifies that the values for each category on the graph are to be stacked. This is the default.



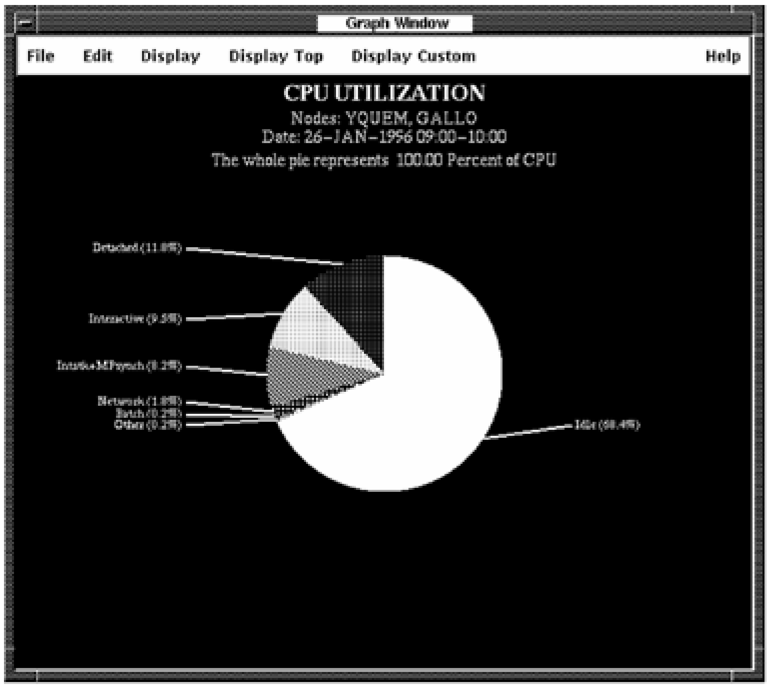
Release on the button to turn Stack off. The Performance Manager software displays a line mode graph to avoid occlusion. The values for each category are overlaid or unstacked.

If you request an unstacked graph of top metrics, the items grouped together are displayed as an average instead of a total.

Pie Chart

Specifies that the display is to be a pie chart. A pie chart produces a slice for each item, using size to depict average units of measure over the specified time period. When pie charts are displayed, stack and line mode toggle buttons do not affect the display.

For more information, see the chapter Generate Historical Graphs (see page 107).

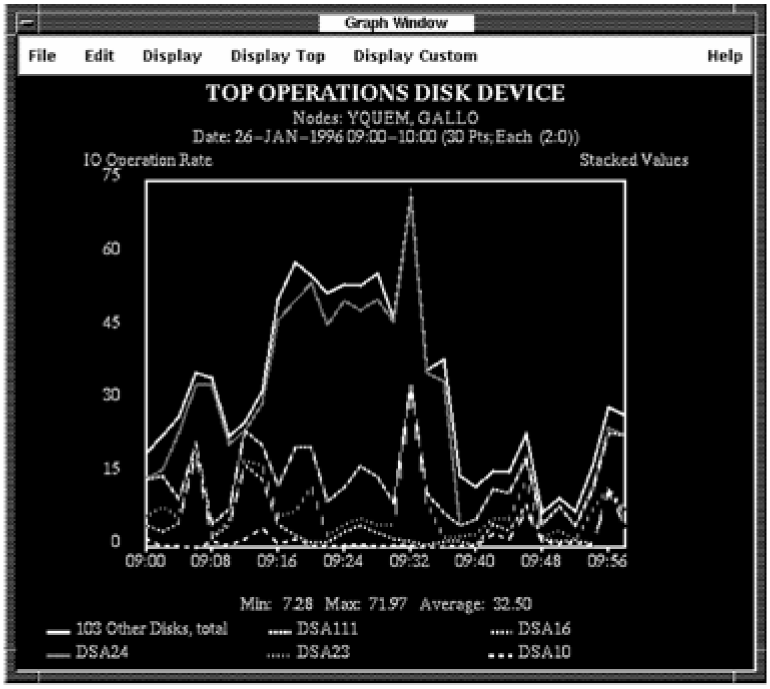


Monochrome

Specifies that shades of a single color shall be used to display the graph or pie chart.

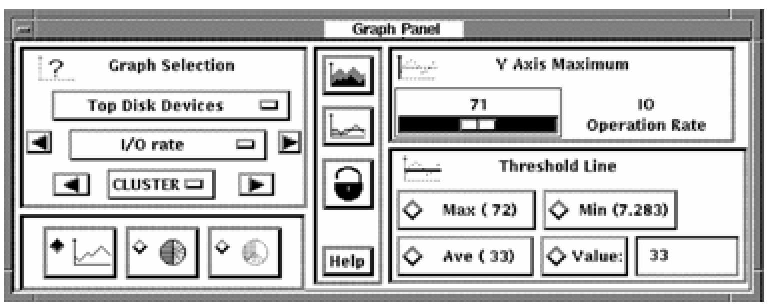
Line Mode

Specifies that the values for each category on the graph are to be displayed in a line mode. Click the button to turn line mode off or on.



Editing Panel

Release on the Editing Panel menu item and the Performance Manager interface displays a Graph Panel dialog box.



The Graph Panel dialog box contains five sections that allow you to enter any of the following:

- Graph selection-The first option menu lets you specify a major class of graphs to be viewed. In response, Performance Manager replaces the entries in the second option menu with those that are appropriate for the class you specified in the first option menu.

  The graph window is updated with the first graph in the list indicated by the major category. An exception to this is switching between the Top User and Top Image categories, which causes the same graph metric to be displayed.

- Selecting the major category of custom graph updates the lower menu with custom classes. Selecting a custom subclass, causes the custom graph metrics dialog box to appear. For more information about displaying custom graphs, see the section Display Custom Graphs (see page 295).

  The arrow buttons allow you to proceed through the categories in the specified class.

  If multiple nodes have been selected for graphing, access to graphs by individual nodes is provided. Press MB1 on the CLUSTER menu entry to view the popup menu with all selected node names. Release MB1 on the node to be graphed. The arrow keys allow stepping through the node names sequentially.

  Access to the System graph category is always available by node. To access the other graph categories, when the data was selected, the BY NODE toggle button must have been set.

- Graph format-This radio box lets you choose between a graph and a pie chart. For graphs displaying data in terms of percentages (CPU UTILIZATION), Performance Manager provides an additional option. If selected, the percentage reflected in the pie is 100%, with a slice labeled “IDLE” added to the pie chart.

- Middle section (contains 4 buttons arranged vertically)-This panel contains two toggle buttons for adjusting the graph presentation, a lock for locking your settings, and a Help button.

  The top toggle button flips the graph from line mode to fill mode, and back again. The pixmap on the button reverses to be the opposite of the state of the graph, allowing you to see where you can go.

The second toggle button changes the graph presentation from stacked to unstacked, and back again. A stacked graph displays the metrics one on top of another. An unstacked graph displays each metric value with respect to the X-axis. This can cause occlusion of some details, so it is best to view unstacked graphs in line mode.

The lock button will lock your current settings for stack/unstack, line/fill mode, Y-axis maximum, and threshold line selection. As you view different graphs, the same settings will be applied.

- Y Axis maximum-Specifies a new value for Y Axis Maximum. This lets you minimize the affect of spikes on graph presentation and to gain consistency in graphs generated from different data selections.

  You can either drag the pointer across the scale or click either side of the value to adjust the scale. Press and hold MB1 to scroll the values.

  The Y Axis Maximum value is maintained until the next data selection.

- Threshold line-Specifies a line to be displayed on the graph reflecting the value of the selected button. You can also specify a specific value at which a threshold line is to be displayed.

  The Max, Min, and Ave lines are available only for stacked graphs.

Change Color

Releasing MB1 on an option in the Change Color submenu causes Performance Manager to display a color mixing dialog box. The colors you establish are used when you save a color PostScript graph.

By Node

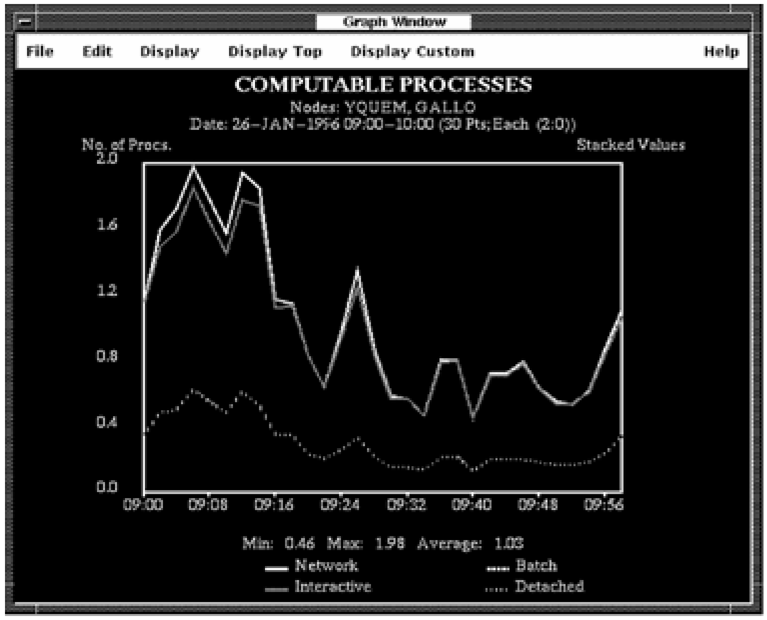
Releasing MB1 on a node name in the By Node submenu causes the current graph and all subsequent graphs to be drawn for that node only.

Note: If you did not select the By Selected Node processing option in the Data Selection dialog box, only system metrics graphs are available by node.

All Nodes-Releasing MB1 on All Nodes causes the current graph and all subsequent graphs to be redrawn for all nodes selected. When all nodes are selected the graph becomes a Composite graph. See the chapter Generate Graphs (see page 191) for more information on Composite graphs.

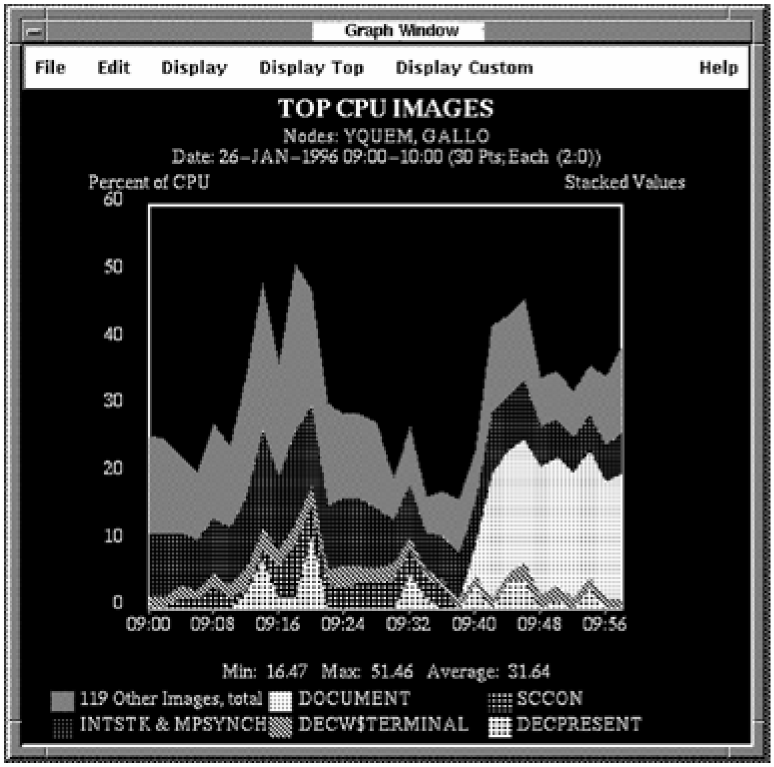
Display Predefined Graphs

Pull down the Display menu to view the possible system metrics graphs. Release on the type of graph you want. Your choice is displayed in the Performance Manager Graph Window, as shown in the following screen:



Display Top System Use Graphs

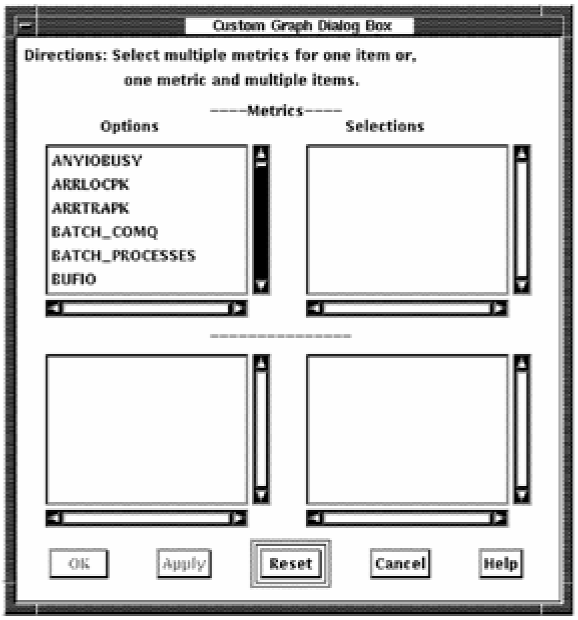
Pull down the Display Top menu to display graphs of top system use. Point to a Top menu item and click the submenu icon. Click a menu item in the submenu. The graph you have chosen is displayed, as shown in the following screen:



For more information on predefined graphs, see the chapter Evaluate Performance in Detail (see page 33).

Display Custom Graphs

Pull down the Display Custom menu to display custom graphs. Choose the custom graph category that you want to select. Performance Manager interface displays a dialog box, as shown in the following screen:



You can take the following actions in this screen:

- To move your selected option into the selections box, click a metric option. Up to six system metrics can be selected.
- To apply your changes and draw the graph, click the Apply button without closing the dialog box.
- To apply your changes and close the dialog box, click the OK button.
- To clear all selected items, click the Reset button.
- To close the dialog box without applying any changes, click the Cancel button.

For most custom categories, additional items appear in the lower option box. You can display up to six metrics when using system metrics. For other types of metrics you can display up to six metrics when one item is chosen and up to six items when one metric is chosen.

How You Customize

To select and item for customization, pull down the Customize menu and release on the item.

The Customize menu lets you perform the following actions:

- View and change Performance Agent settings
- Specify or redefine the PSDC$DATABASE definition
- View and change Performance Manager parameters

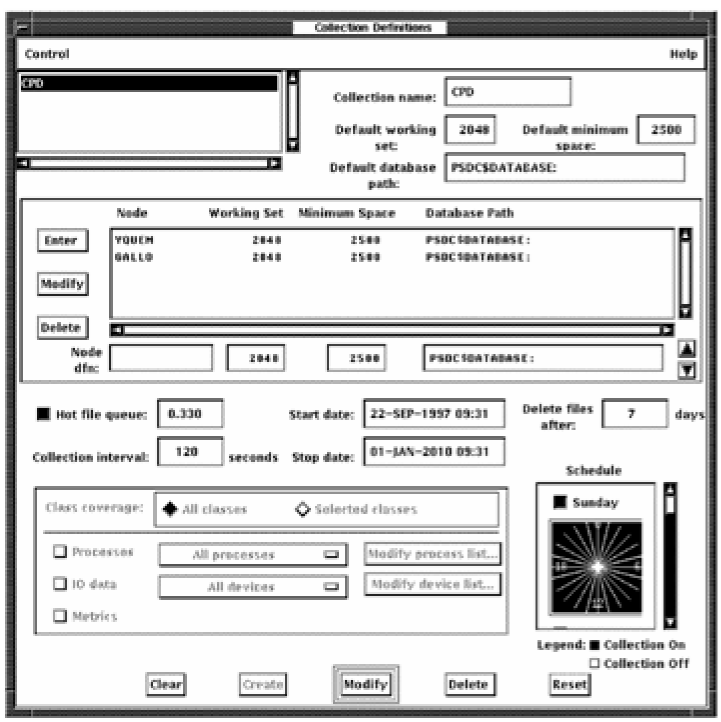
Customize the Data Collection

To view Performance Agent settings

- Pull down the Customize menu and release on the Data Collection... menu item.

  The Performance Manager DECwindows Motif displays the Performance Agent Collection Definition dialog box.

The primary data collection process collects performance data according to parameters in the CPD collection definition within the schedule file. If no other collection definitions exist, the CPD parameters will be displayed in the Collection Definitions box, as shown in the following screen:



The Collection Definition dialog box lets you do the following actions:

- Modify, create, or remove collection definitions
- Change collection parameters
- Change collection schedules
- Add or remove nodes

Your changes to the Collection Definition file are applied when you pull down the Control menu and release on Save schedule file or exit. If you change settings and then decide not to use the changes, pull down the Control menu and release on Load schedule file to start over with the latest version.

When you are done with this window, pull down the Control menu and release on Exit.

Before writing out a new schedule file or releasing the lock, a message box appears with one of the following messages:

- (If modifications have been made:) Do you want to write out your changes to the schedule file and release the lock?
- (If no modifications have been made:) You have locked access to the schedule File, do you want to release it to other users?
  - Press *YES* to release the lock. Your modifications, if any, are written out.
  - Press *NO* to keep the lock. Your modifications, if any, are not written out.

Modify or Create a Collection Definition

The names of the collection definitions are listed in the box at the upper left-hand corner. To select a collection definition, click the collection definition. The definition and current parameters will appear. Use the Tab key to move between parameter entries or point to the entry and click MB1.

Click the buttons at the bottom of the window to perform the following actions:

Clear

Removes all the entries from display and restores all default values

Create

Adds the collection definition you have created to the list

The software displays an error message if it finds an error in your entries.

Modify

Updates the collection definition with your changes.

Delete

Removes the collection definition from the list and restores all default values

Reset

Returns all the parameters on display to their original values

Change the Collection Definition Parameters

To change the collection definitions, enter any of the following parameters:

Collection Definition List

The box in the upper left-hand corner contains the names of the current collection definitions. When you click an entry, the parameters for that collection definition appear.

Collection name

The Collection name is a text field that shows the name of the definition currently displayed. When creating a new definition, use this field to enter the name. Names can be up to 20 characters in length.

Default working set

Enter the working set quota. This value is a decimal number greater than 1024 that sets both the working set quota and the working set extent if the value is higher than the default values. By default, the working set quota is 2048 and the working set extent is 20K. You can override this default by specifying values for individual nodes.

Default minimum space

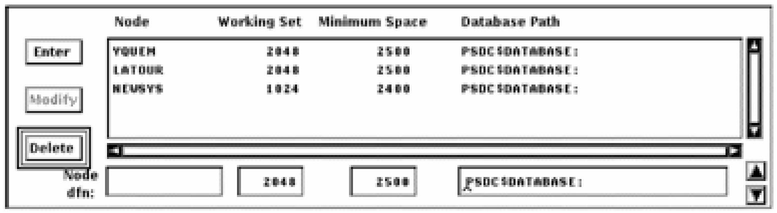
Enter the minimum number of blocks of free disk space needed on each database disk for each node in the definition. Data collection suspends recording if there are fewer blocks of free disk space available. You can override this default by specifying values for individual nodes.

Default database path

The default database path for all nodes in the collection definition. You can override this default by specifying values for individual nodes.

Node Definition Section

This displays the nodes in a collection definition. Default values are displayed. Although the changes that you make appear as they are made, they are not applied to the collection definition until you click the Create or Modify buttons at the bottom of the window.



To add a node, enter the name and make any modifications you want to the default values shown to the right. Then press Return or click Enter.

To modify a node entry, double-click it. The definition appears under the list. Make the changes you wish and then press Return or click Modify to the left of the box.

To delete one or more nodes, click the entries in the list, and then click Delete to the left of the box.

To change the order of the nodes in the list, click the node to be moved, and then the arrows in the right-hand corner. Only one node can be moved at a time.

The changes you make in the node definition section do not modify the collection definition until you click Create or Modify to update the entire collection definition.

Enter

Enter lets a new node to be added to the node list. When you type in a new node name, you can click Enter or press Return to add it to the list.

Modify

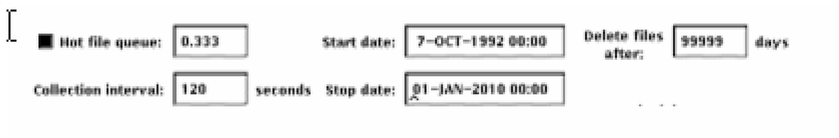
Modify takes changes you make to a node definition and puts the changes into the list. Modify is disabled until you have selected a node from the list by double-clicking on the node. Changes to the collection definition take effect when you click Modify at the bottom of the window.

Delete

Delete removes any selected, or highlighted, nodes from the list. The nodes are removed from the collection definition when you click Modify at the bottom of the window.

Hot file queue

To enable hot file collection in the CPD collection definition, the toggle button to the left must be on. This lets you specify the queue length in the text entry box. This pertains only to the CPD collection definition because only the primary data collector collects hot file data.



Enter the minimum average queue size that a disk must have to start collecting the hottest files for that disk. This value is a decimal number less than 100.00 and greater than or equal to 0.00. The default is 0.33.

If the toggle button is off, no hot file data is collected.

If the toggle button is on, you must specify a queue length or accept the default value.

Collection interval

The Collection interval specifies the number in seconds in a sampling interval. At the end of this time period, data is recorded into an interval record.

The CPD collection definition has an interval of 120 seconds which cannot be modified.

You can specify an interval from 1 to 3600 seconds for other definitions.

Delete files after

Enter the number of days that data is to be retained. The default is seven days for the primary data collector. Data files are automatically deleted from the database when they are older than the specified number of days.

For alternate data collectors, the default is 99,999 days which lets you control the how long data files are retained.

This value should be coordinated with any data archiving and the amount of free space required for the database area. For information on archiving, see the Performance Agent Administrator Guide.

Start date

The date and time on which the collection definition goes into effect. A data collection process will hibernate until this date and time. The formatting is as follows: DD-MMM-YYYY HH:MM

End date

The date and time on which a data collection process Is to terminate. The formatting is as follows: DD-MMM-YYYY HH:MM

Changing the Collection Schedule

A 24-hour clock is displayed. A bar on the right side of the clock lets you scroll to each day of the week. By default, data collection is set ON for each hour of the day, every day of the week.

To set the clock:

1. Set or reset the square toggle button above the clock to turn data collection on or off for an entire day.

   To turn off data collection for a specific hour, point to the hour on the clock and click MB1. Holding MB1 down and dragging the pointer around the clock will set data collection to the value of the initial hour setting for a series of hours.

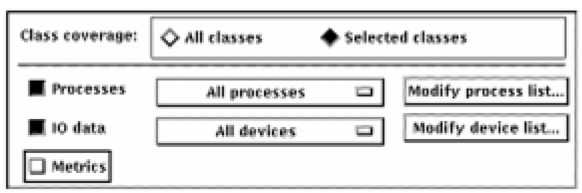
2. Drag the slider on the scroll bar to display the collection schedule for each day of the week or click the up or down stepping arrows.

To duplicate a day's schedule

1. Press and hold MB3 inside the clock. A pop-up menu is displayed. Release on the Cut menu item.
2. Scroll to another day and press MB3 inside the clock. Release on the Paste menu item. The clock displays the copied schedule.

Class Coverage Section

The Class Coverage section lets you specify which major areas of performance data should be collected. While the CPD can not be limited, other collection definitions can be limited to only those classes of data needed for special-purpose analysis.



The toggle buttons enable you to choose all or selected classes.

All classes

Turn on this toggle button to collect all classes of data.

Selected classes

Turn on this toggle button to choose which classes of data you wish to collect: processes; IO data; or metrics.

Processes

Turn on this toggle button to collect Process data or to collect process data for specified processes.

IO data

Turn on this toggle button to collect IO data or to collect IO data on specified devices.

Metrics

The Metrics field lets you choose whether or not to collect a summary set of system metrics including such data items as memory utilization, CPU, and I/O parameters.

All processes

When you select the collection of process data, the All Processes option is collected by default. If you have modified the process list, the menu is revised to reflect the type of coverage list (include or exclude) and the count of specified processes. Clicking on this menu will display the correct list. This menu provides a convenient way to view the coverage list.

Modify process list...

Click this button to specify a list of processes in the Collection Coverage List box. You specify a list of processes to be included in collection or excluded from collection.

All devices

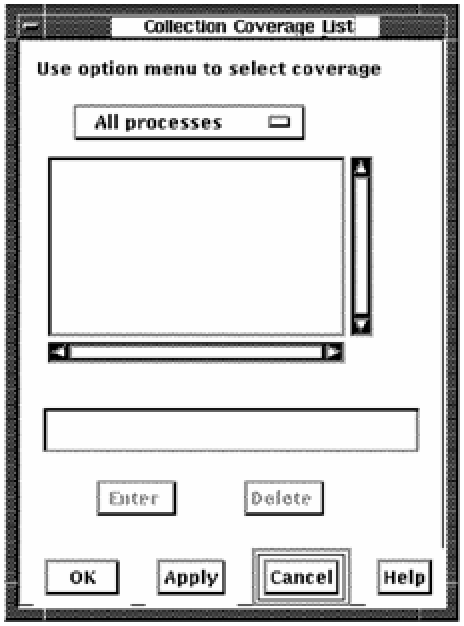
When you select the collection of IO data, the All Devices option is collected by default. If you have modified the device list, the menu is revised to reflect the type of coverage list (include or exclude) and the count of specified devices. Clicking on this menu will display the correct list. This menu provides a convenient way to view the coverage list.

Modify device list...

Click this button to specify a list of devices in the Collection Coverage List box. You specify a list of devices to be included in collection or excluded from collection.

Coverage Lists

For Process and Disk classes, you can collect data for specific lists of items or exclude lists of items.



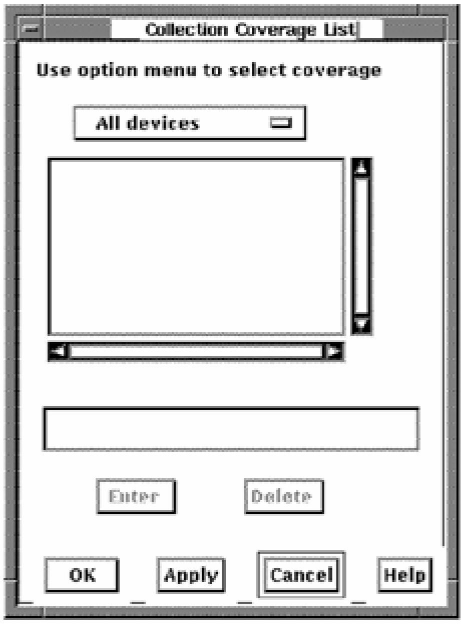
To create a list of processes, push down and hold on the uppermost box in this window, which displays All processes or one of the other options. When the menu appears, pull down to the menu item you want and release.

Click the text entry field to activate the cursor.

To add a process name, enter a name and press Return or click the Enter button. The name will appear in the list box and be cleared from the text entry field.

To delete a name, click the name in the name list box, then click the Delete button. The name is removed from the list box. To remove multiple names, click the names and then click the Delete button.

To create a list of devices, push down and hold on the uppermost box in this window, which displays All devices or one of the other options. When the menu appears, pull down to the menu item you want and release.

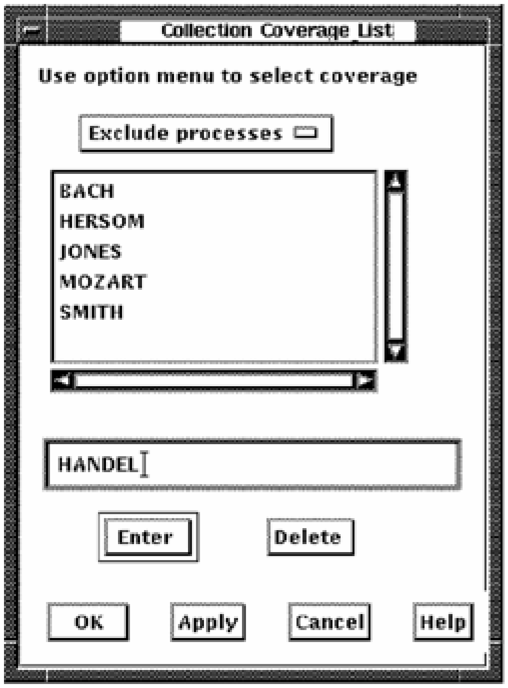


Click the text entry field to activate the cursor.

To add a device name, enter a name and press Return or click the Enter button. The name will appear in the list box and be cleared from the text entry field.

To delete a name, click the name in the name list box, then click the Delete button. The name is removed from the list box. To remove multiple names, click the names and then click the Delete button.

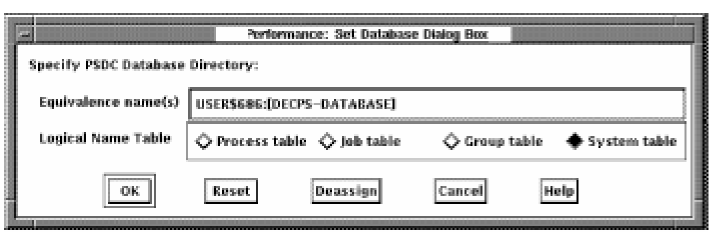
The following sample Collection Coverage List box shows a list of processes for which no data is to be collected.



The type of list being managed cannot be converted. For example, an include processes list cannot become an exclude processes list. All list entries must be deleted before the coverage list type can be changed.

Customize the PSDC$DATABASE Definition

To specify or redefine a PSDC$DATABASE definition, pull down the Customize menu and release on the PSDC$DATABASE definition... menu item. DECwindows Motif displays the Set Database dialog box. This box lets you redirect editing and review of dump reports to an alternate database area. You can also redirect performance analysis to an alternate area.



The translation of the lowest level definition is displayed, along with a toggle setting indicating the logical name table in which it is defined.

To remove a definition, click Deassign. The dialog box is removed, and the definition at the next highest level goes into effect, possibly reloading a schedule and parameter file.

To create a new definition, click a toggle to specify which logical name table the definition should be placed in and type in the new definition. Click OK when done. The dialog box is removed and any new schedule and parameter files are loaded. There must be at least one definition of PSDC$DATABASE defined for the interface to run.

Customize Parameters

The DECwindows Motif Interface lets you view and change the Performance Manager parameters file. The Performance Manager Parameters file contains workload definitions, family definitions, history file descriptors, and auxiliary knowledge base information.

See the *Performance Agent Administrator Guide* for more discussion of these definitions.

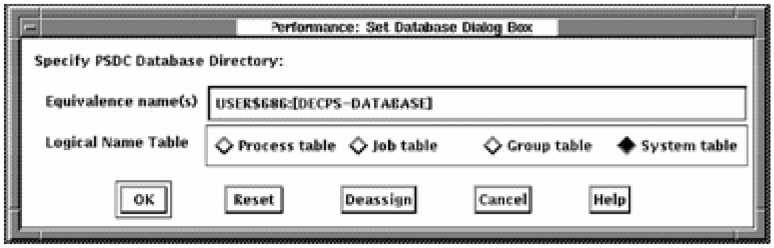
Start Parameter Editing

To edit parameters

1. Pull down the Customize menu in the Performance Manager Main Menu.
2. Click the pointer on the Parameters menu item.
3. Choose a menu item from that submenu.

Only one user at a time is allowed to edit data in the parameter file PSDC$PARAMS.DAT. The file is locked by anyone using any editor. If the file is locked by another user when you initiate any of the parameter menu's submenus, a message box appears explaining that read-only access to the file is allowed. You are able to view the contents of the file, but any requests to change data are denied. Should the file become unlocked during the course of your DECwindows Motif session, a second message box appears asking you if you would now like update capabilities. Indicate your choice by clicking on either Yes or No.

Once you have gained update access to the file, it is unavailable to other users. Whenever you close one of the parameter editor's dialog boxes, you are asked if you would now like to release the file.

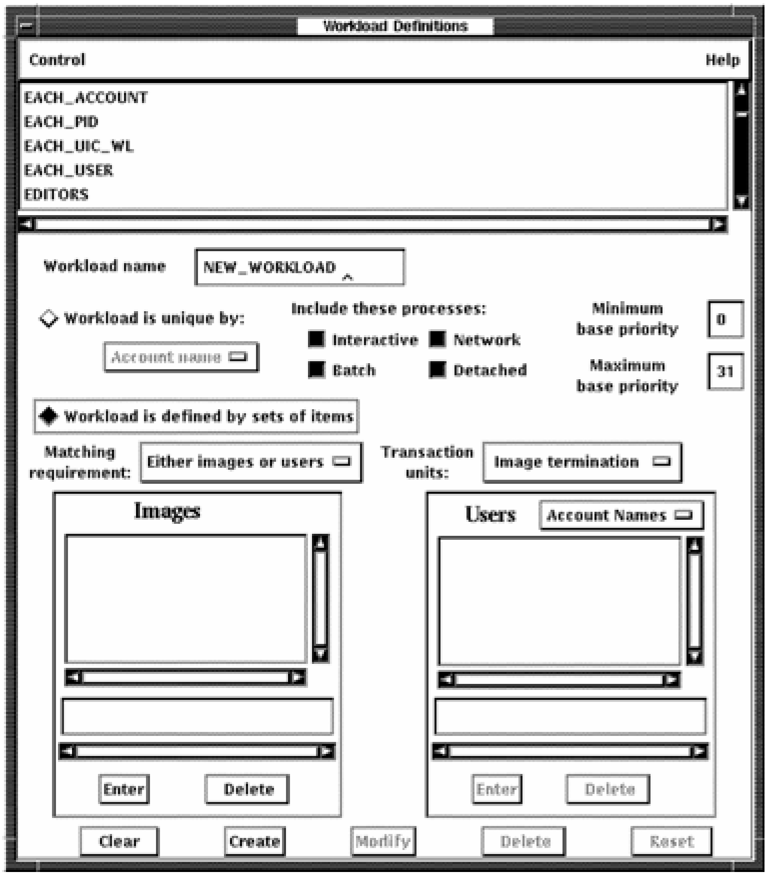


When you have completed your set of changes to the file, click Yes in response to this request. Otherwise, as long as your DECwindows Motif session remains active, even though you may be doing other tasks, such as graphing, you still have the file locked.

A reminder of the status of the parameter file appears in the main window.

Workload Definitions

To create or modify workload definitions in the parameters file, pull down the parameter submenu and choose the Workload Definitions menu item. The Performance Manager displays the Workload Definitions dialog box, as shown in the following screen:



The menu bar contains Control and Help menus. A list of defined workload definitions appears at the top of the dialog box. To close the dialog box, pull down the Control menu and click the Exit menu item. The Workload Definitions dialog box lets you do the following:

- Create a workload definition
- Delete a workload definition
- Modify a workload definition

Create a Workload Definition

Use the following options to create workload definitions.

Workload name

Enter the name of the workload definition. The workload definition's name is limited to 20 characters.

Workload is unique by

lets you specify a category for workload summarization. A workload will be defined for each unique element of the category you choose.

Click the Workload is unique by toggle button and then click MB1 on the box beneath this that displays Account name when first accessed. The option menu will appear displaying the following items:

- Account name
- Process name
- Image name
- UIC group
- User name
- PID

Click MB1 on the category you want.

Include these processes

Set the toggle buttons to specify the processing modes to be included by the workload definition.

- Interactive
- Batch
- Network
- Detached

Process base priority

Enter the minimum and maximum values for the process' Base Priority to be included in the definition. Values can range from 0 to 31 and the minimum value must be less than or equal to the maximum.

Workload is defined by sets of items

Selects the alternative to “unique by” criteria. lets you enter lists of user criteria, or images, or both for defining a workload.

Matching requirement:

This is an option menu with two entries. Press MB1 on the current setting to view the choices.

Either images or users

Indicates that the Performance Manager will match either the image names or the user criteria of a process record to include the process data in the workload.

Both images and users

Indicates that the Performance Manager must match both the image names and the user criteria of a process record to include the process data in the workload.

Transaction units

This is an option menu with two entries. Press MB1 on the current setting to view the choices. Click either image termination or terminal responses to indicate how response time should be evaluated. This will affect the workload frequency when building a model. See the ADD/WORKLOAD command in the CA Performance Management for OpenVMS Agent Administrator Guide for information about transaction units.

Images

Click the text entry field to activate the text insertion cursor.

To add an Image name, enter a name and press Return or click the Enter button. The name will appear in the list box and be cleared from the text entry field. If you wish to preserve lower case characters, enclose image names in double quotes when you enter them.

To delete an Image name, click the name in the image name list box, then click the Delete button. The name is removed from the list box. To remove multiple names, click all their names and then click the Delete button.

A list of image names can be provided through a file. Use the at sign (@) as the first character to indicate that the text is to be interpreted as a file name. The default directory is assumed if not supplied, as is a file type of .DAT. The format of the file must be a series of image names separated by white space or commas. Supply only the filename field; do not include the file type.

Image names can contain wildcard characters. Image names can contain up to 39 characters. If you wish to preserve lower case characters, enclose image names in double quotes when you enter them.

Users

Press MB1 on the Users option menu to view the categories available. Release MB1 on the entry indicating the type of user you want to create. You cannot create a list until you make this selection.

To add a user field, enter the appropriate string and press the Return key or click the Enter button. The field will appear in the list box and be cleared from the text entry field.

To delete a user field, click the entry in the user list box, then click the Delete button. The entry is removed from the list box. To remove multiple entries, click all entries to be deleted the fields and then click the Delete button.

A list of user entries can be provided through a file. Use the at sign (@) as the first character to indicate that the text is to be interpreted as a file name. The default directory is assumed if not supplied, as is a file type of .DAT. The format of the file must be a series of user fields separated by white space or commas.

User names can contain wildcard characters. User names longer than 12 characters are truncated to 12 characters to ensure a match because the Performance Agent compares up to 12 user name characters only. Account names can be up to 8 characters in length, and process names up to 15. If you wish to preserve lower case characters, enclose your entries in double quotes.

User criteria can be specified in terms of UICs, account names, process names, or user names.

A UIC group can be indicated by using an asterisk for the user number, ([200,*]).

Control Buttons

The Clear button removes all dialog box entries.

The Create button adds the workload name to the list and clears the entries.

Delete a Workload Definition

To delete a workload definition

1. Click a workload definition name.

   The dialog box is updated to show the current definition field settings.

2. Click the Delete control button to remove the workload definition.

   The Performance Manager removes the workload definition name from the workload list and clears the definition fields. If the definition is not deleted, a message box is displayed, explaining why the request cannot be executed. A failure can occur when a workload family has been defined in terms of this workload. A list of those families displays.

3. Modify the workload family to remove the reference to this workload definition.

Modify Workload Definitions

To modify a workload definition

1. Click a workload definition name.

   The dialog box will display the current definition values.

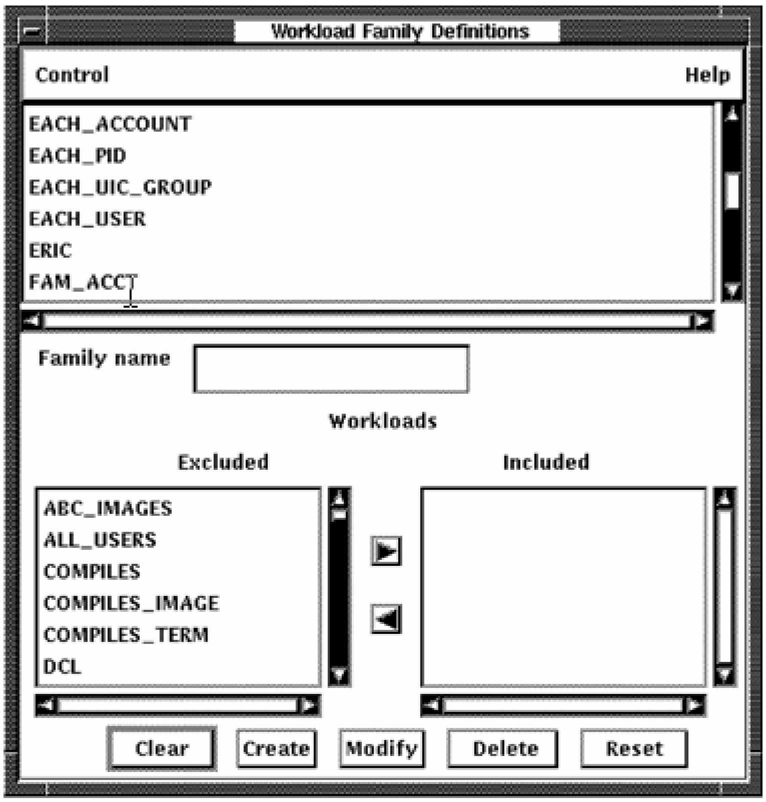
2. Modify settings as you wish and click Modify at the bottom of the box.

Workload Family Definitions

To define or modify workload families

1. Pull down the Parameters submenu and choose the Workload Families... menu item.

   Performance Manager displays the Workload Family Definitions dialog box, as shown in the following screen:



   The menu bar contains Control and Help menus. A list of workload family names appears at the top of the dialog box.

2. To close the dialog box, pull down the Control menu, drag the pointer to the Exit menu item and release MB1.

The Workload Family Definitions dialog box lets you do the following actions:

- Create a workload family
- Delete a workload family
- Modify a workload family

Create a Workload Family

To create a workload family

- Enter any of the following parameters:

Family Name

Enter the name of the workload family. The family name is limited to 20 characters.

Workload Specification

The Workloads Excluded list box contains a list of workload definitions. To add a workload definition to a workload family, click the workload name and click the Include transfer button (right arrow).

To indicate a position within this included workload list, click an existing entry in the Workloads Included list box. All new workload definitions will be placed ahead of this entry. To deselect a position entry, click it again. All new entries will be placed at the end. The position of a workload within a family can determine which workload will include a transaction. When a transaction qualifies for more that one workload, it will be included in the first listed matching workload.

To add multiple workload definitions, click all their names contained in the Excluded list box. Then click the Include transfer button.

The Workloads Included list box contains a list of workload definitions in the new workload family. To remove an entry from the INCLUDED list box, click the name and click the Exclude transfer button (left arrow). To delete multiple workload definitions, click all their names and then click the Exclude transfer button.

Control Buttons

To remove all entries and cancel the definition, click the Clear button.

To add a family definition to the defined list and clear the entries, click the Create button.

Modify or Delete a Workload Family

To modify a workload family

1. Click a family name.

   The family name and the Workload Included list box display the definition of the selected family.

2. Enter any of the following parameters:

   Family Name

   When you modify a family name, the Performance Manager assumes that you want to create a workload family based on the displayed definitions.

Workload Specifications

The Workloads Excluded list box contains a list of workload definitions that are not part of this family. To add a workload, click the workload definition name and click the Include transfer button (right arrow). To add multiple workload definitions, click all their names contained in the Excluded list box. Then click the Include transfer button.

To indicate a position within this included workload list, click an existing entry in the Included list box. All new workload definitions will be placed ahead of this entry. To deselect a position entry, click it again. All new entries will be placed at the end.

The Workloads Included list box contains the names of the workload definitions in the family. To remove an entry from the Included list box, click the name and click the Exclude transfer button.

Control Buttons

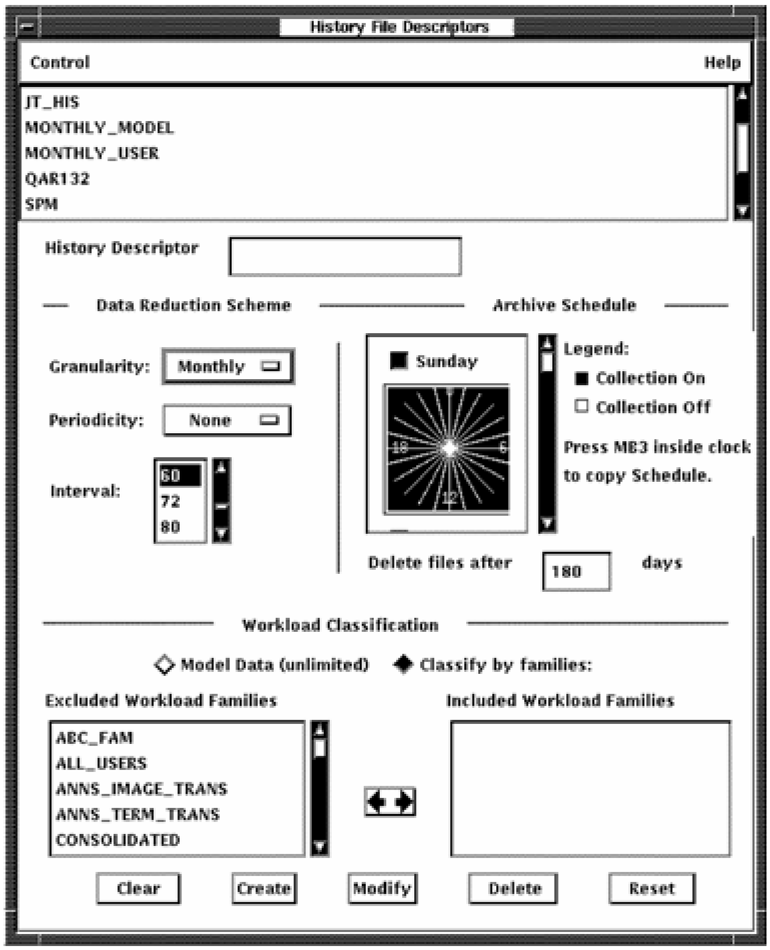
- The Clear button removes all entries.
- The Modify button applies the changes and clears the entries.
- The Delete button removes the selected family name and its definition.
- The Reset button redisplays all entries for the current family definition.

History File Descriptors

To create, modify, or delete history file descriptors in the parameters file

1. Pull down the Parameter submenu and choose the History File Descriptors menu item.

   The Performance Manager displays the History File Descriptors dialog box.



   The menu bar contains Control and Help menus. A list of history file descriptors appears at the top of the dialog box.

2. To close the dialog box, pull down the Control menu and click the Exit menu item.

The History File descriptor dialog box lets you do the following actions:

- Create a history file descriptor
- Delete a history file descriptor
- Modify a history file descriptor

For a detailed description of history file descriptors, see the *Performance Agent Administrator Guide*.

Create a History File Descriptor

Enter any of the following parameters:

History Descriptor

Enter the name of the history file descriptor. The descriptor name is limited to 20 characters.

Data Reduction Scheme

By default, the granularity value is monthly. Click and hold the pointer on monthly and the granularity pop-up menu displays a list of value options. Release the mouse button when the cursor is on your choice. The pop-up menu disappears and your selection is displayed.

By default, the periodicity value is None. Click and hold the pointer on the current value and the periodicity pop-up menu displays a list of value options. Release the mouse button when the cursor is on your choice. The pop-up menu disappears and your selection is displayed.

By default, the interval value, the time period over which the Performance Manager averages daily data records into a single history data record, is 60 minutes. To display valid entries, click the up or down arrow. When your selection is displayed, click the value. Your choice will be highlighted.

Archive Schedule

A 24-hour clock is displayed. A bar on the right side of the clock lets you scroll to each day of the week. By default, archiving is set on for 24 hours a day, seven days a week, including holidays.

To set the clock:

1. Set or reset the square toggle button above the clock to turn archiving on or off for an entire day.
2. To turn archiving off for a specific hour, point to the hour on the clock and click MB1. Holding down MB1 and dragging the pointer around the clock will turn off archiving for a series of contiguous hours.
3. Drag the slider on the scroll bar to display the archiving schedule for each day of the week or click the up or down stepping arrows.

To duplicate a day's schedule

1. Press and hold MB3 inside the clock. A pop-up menu is displayed. Release on the Cut menu item.
2. Scroll to another day and press MB3 inside the clock. Release on the Paste menu item. The clock displays the copied schedule.

Workload Classification

By default, Performance Manager stores process data in the history file summarized by workload families. To save modeling data in the history file, click the model data (unlimited) button. When model data is enabled, no workload families can be selected and raw process data will be preserved. Specific classification can then be done when the archived data is processed.

If you choose Classify by Families without specifying the workload families, process data will be summarized into four records representing interactive, batch, network, and detached processing. All other process data will be lost such as process data based on image name, account name, and so on.

Workload Families Excluded

The Workload Families Excluded list box contains a list of workload families. To add a workload family to a history file definition, click a workload family name and click the transfer button.

To add multiple workload families, click all their names contained in the Excluded list box. Then click the transfer button.

Workload Families Included

The Workload Families Included list box contains a list of workload family names. These names specify the workload families that define the new history descriptor. To remove an entry from the Included list box, click the name and click the transfer button.

Control Buttons

- The Clear button removes all entries and cancels the definitions.
- The Create button adds the family definitions to the defined list and clears the entries.

Delete a History File Descriptor

To delete a history file descriptor

1. Click a defined history file descriptor name.

   The dialog box displays the current definition values.

2. Click the Delete button to remove the history file descriptor.

   Performance Manager removes the descriptor name from the history file descriptor list and clears the definition fields. If the history file descriptor is not deleted, a message box displays explaining why your request was not executed. A failure occurs when history files are created from this definition; a list of these history file names displays.

3. Delete the files, then remove the definition.

Modify a History File Descriptor

To modify a history file descriptor

- Click a defined history file descriptor name.

  The dialog box displays the current definition values. You can modify only the archive schedule.

  Control Buttons

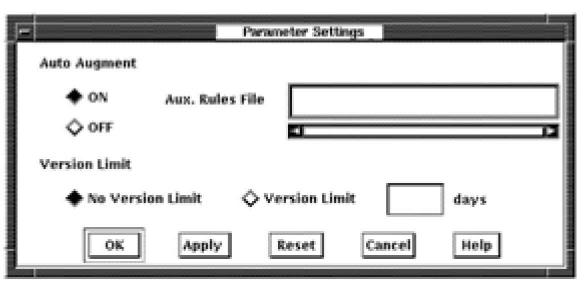
  - The Clear button removes all entries and cancels the modifications.
  - The Modify button applies the changes and clears the entries.
  - The Delete button removes a selected family definition.
  - The Reset button redisplays the current family definition.

Parameter Settings

To view parameter settings

1. Pull down the Parameters submenu and choose the Parameter Settings menu item.

   Performance Manager displays the Parameter Settings dialog box, as shown in the following screen:



Highlighted buttons indicate the current settings. Your changes in the Parameter Settings box are applied when you click OK or Apply.

2. Click the Reset button to restore the last settings that have been applied.
   OR
   Click the Cancel button to close the dialog box without applying any changes.
3. From the Parameter Settings dialog box, you can set any of the following parameters:

Auto Augment

Click the ON button to establish automatic augmentation of an auxiliary knowledge base for analysis. The initial setting is OFF.

When auto augment is set on, the dialog box lets you enter the file specification of the compiled auxiliary rules file.

For more information, see the SET AUTO AUGMENT command described in the *Performance Agent Administrator Guide*.

Version Limit

Enter a decimal number to modify the file version limit on the Performance Manager parameters file and history files. The initial setting is 180.

View the Main Window

To view the main window

- Pull down the View menu and choose the Main Window sections you want to display.

Depending on your processing mode, not all the sections in the Main window may be relevant or of interest. To allow for smaller windows and the elimination of distracting sections, the View menu contains a series of toggle buttons that can be set or reset to add or remove sections of the Main window. Resetting a toggle button causes a section to disappear; setting it restores the section. Do not remove the File Locks section if you share editing access of database files with other users.

Chapter 9: Use the DECwindows Motif Real-time Display

This chapter provides information about the use and basic modification of the default displays supplied with the Performance Manager real-time display.

These predefined displays consist of windows or instrument panels containing bar graphs, strip charts, or meters. These instruments are used to view OpenVMS system performance statistics.

To access performance data for use with the Real-time Display, you must have the Performance Manager installed and access to the data established for the target node using proxies or network objects. Refer to the *Performance Agent Administrator Guide* for more information. To use the Real-time feature with DECnet Phase V when Phase V Node Synonyms are not defined, you will need to create a node name translation file and use the /DNS_NAME qualifier. For more information on this logical name, PSPA$DNS_NAMES, and the translation file, refer to the appendix Performance Manager Logical Names (see page 405).

This section contains the following topics:

Start the Real-time Display

To start the Real-time Display

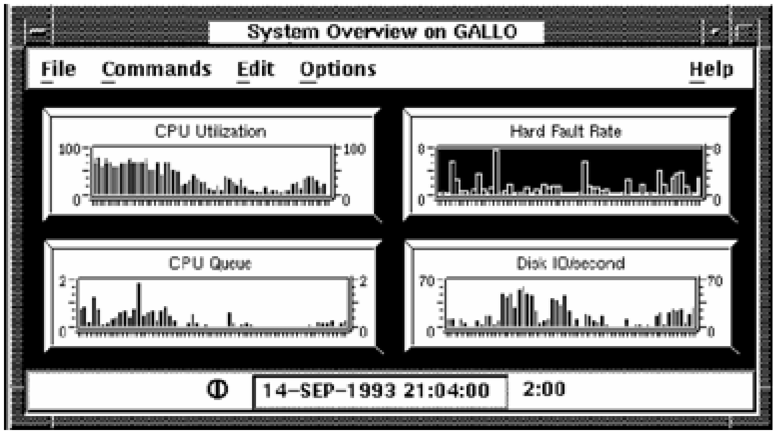
- Enter the following command:

```
$ ADVISE PERFORMANCE DISPLAY WINDOW -
_$ /MODE={NETWORK|DISKFILE}/NODE=(nodename[,...])
```

For more information about command syntax, see the chapter Performance Manager Commands (see page 175).

Note: The output for the Real-time Display must be directed to your display using the DCL SET DISPLAY command. For more information on starting Performance Manager Real-time and a complete description of all parameter options, see the chapter Customize the DECwindows Motif Real-time Display (see page 341).

The Real-time Display shows the following default panel on your display:



If the primary Performance Manager is not running on the monitored system, or the Real-time data collector is unable to start, an informational message is displayed. The *Performance Agent Administrator Guide* describes the steps that the system manager needs to take to enable data collection for a user.

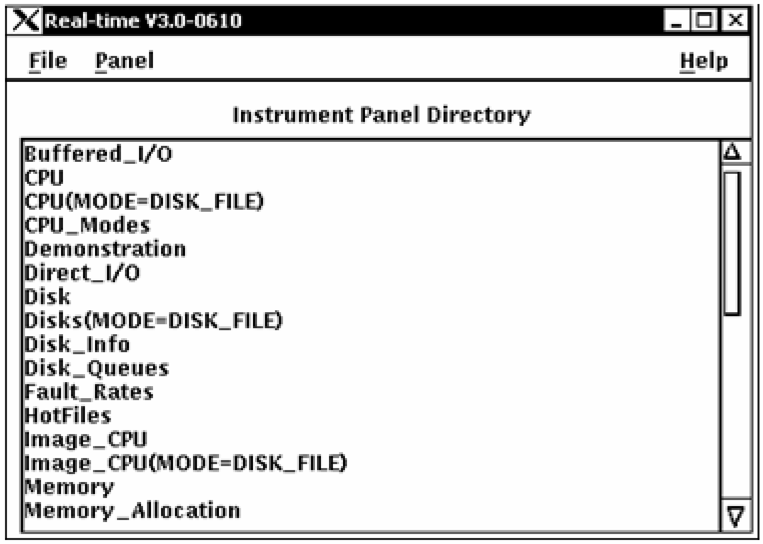
Control the Real-time Display

In addition to the initial default instrument panels, an icon for the Panel Manager is displayed when you start the Real-time Display. To display the Panel Manager, double-click the Real-time Display icon.

The Panel Manager is the control point for the Real-time Display:

- To stop the display, including the Panel Manager and all other panel windows that are invoked, choose the Exit menu item from the File menu in the Panel Manager menu bar
- To display previously recorded data, choose the Playback item from the File menu.

The Panel Manager lists the panels available to you. When you install Performance Manager for the first time, the list contains the names of all the default panels distributed with the Performance Manager.



Navigate Within the Default Panels

The Real-time Display default instrument panels facilitate a progressive disclosure style of investigation in which increasingly detailed data is presented to you. You inquire about a particular resource by double-clicking on the resource name displayed. This process is known as *launching*. You are then presented with panels of information about the use of the resource: the top users or processes requiring the resource, for example. If you need more detail, you can launch additional panels by double-clicking on a field in the instrument.

You can determine if the panel launch capability of the Real-time Display is enabled for an instrument by moving the pointer over the graph or label displayed within the instrument. The pointer changes to a plus sign if more information is available for this performance metric. For example, the four graphs displayed in the System Overview panel are entry points for disclosing additional information on CPU utilization, page faulting, and disk I/O activity. Moving the pointer into the graphs causes the pointer to change shape, informing you that a double-click operation here causes a new panel to be displayed.

To close a panel

- Choose the Close menu item from the File menu.

Use the Panel Commands Menu

To specify commands

- Pull down the Commands menu and release on the menu item you want. You can choose any of the following commands:

  Connect

  Connects instruments to online data.

  Disconnect

  Disconnects instruments from online data.

  Set Interval...

  Changes the update frequency of data in an instrument panel (default of 10 seconds). The interval is specified in minutes and seconds. The instrument panel must be disconnected before this option is available.

Default Panel Descriptions

The default panels within the Real-time Display alert you to potential performance problems in any of the following four major resource categories:

- CPU utilization
- CPU queuing
- Memory page faulting
- Disk I/O activity

When the Real-time Display is started, the System Overview default panel is displayed, which provides a summary for these four performance indicators.

System Overview

The System Overview Panel is the control panel for accessing information on any of these key system resources using the panel launch capability of the Real-time Display. The following table provides the panel information:

Label	Metric	Units	Next Panel
CPU Utilization	CPU utilization	Percentage (100% maximum)	CPU
CPU Queue	Computable queue length	Process count	

Label	Metric	Units	Next Panel
Hard Fault Rate	Hard page fault rate	Faults per second	Page Faults
Disk IO/second	Total disk I/O operation rate	Operations per second	Disk

To navigate from one level of panels to the next, double-click a label shown on a panel.

Default Panel Hierarchy

The following table shows the hierarchy of the default panels:

Resource	Level 2 Panel	Level 3 Panel	Level 4 Panel
CPU Utilization	CPU	CPU Modes	--
		User CPU	Process CPU
			Image CPU
CPU Queue	Process Wait	Image CPU	--
Hard Fault Rate	Page Faults	Fault Rates	--
		User Faults	Process Faults
		Memory	Memory Allocation
			User Memory
			Page File Allocation
Disk IO/second	Disk	Volume Info	--
		Disk Info	--

Each of the panels accessed from the System Overview panel are discussed in the following sections.

CPU Utilization Panel Descriptions

The CPU Utilization graph on the System Overview panel lets you access the following panels:

- CPU
- CPU Modes
- User CPU

- Process CPU
- Image CPU

This series of panels lets you investigate the use of the CPU on the monitored system. You can investigate the top users of the CPU and view what processes and images each user is executing.

The following tables describe the information presented within each panel:

CPU Panel

Label	Metric	Units	Next Panel
CPU Utilization	CPU utilization	Percentage (100% maximum)	CPU Modes
CPU Only	CPU is busy and no disk I/O is busy	Percentage	--
CPU & I/O Busy	CPU is busy and disk I/O is also busy	Percentage	--
I/O Only	Disk I/O is busy when CPU is not busy	Percentage	--
CPU & I/O Idle	CPU and I/O are not busy	Percentage	--
Top Users (list)	CPU Utilization by User	Percentage	User CPU

CPU Modes Panel

Label	Metric	Units	Next Panel
Int	Interrupt mode time	Percentage	--
MP	MultiProcessor synchronization mode time	Percentage	--
Ker	Kernel mode time	Percentage	--
Exc	Executive mode time	Percentage	--
Sup	Supervisor mode time	Percentage	--
Usr	User mode time	Percentage	--
Cmpt	Compatibility mode time	Percentage	--

User CPU Panel

Label	Metric	Units	Next Panel
CPU Utilization (with history)	CPU utilization	Percentage	--
CPU Utilization (current)	CPU utilization	Percentage	--
Direct IO Rate	Direct I/O for this user	Operations per second	--
Disk IO Rate	Disk I/O for this user	Operations per second	--
Disk Thruput	Disk throughput	Kilobytes per second	--
Hard Fault Rate	Hard page fault rate	Faults per second	--
Soft Fault Rate	Soft page fault rate	Faults per second	--
Buf I/O Rate	Buffered I/O rate	Operations per second	--
User Processes (list)	CPU utilization by process for this user	Percentage	Process CPU
User Images (list)	CPU utilization by image for this user	Percentage	Image CPU

Process CPU Panel

Label	Metric	Units	Next Panel
CPU Utilization (with history)	CPU utilization for this process	Percentage (100% maximum)	--
CPU Utilization (current)	CPU utilization for this process	Percentage (100% maximum)	--
Direct IO Rate	Direct I/O for this process	Operations per second	--
Disk IO Rate	Disk I/O for this process	Operations per second	--
Disk Thruput	Disk throughput	Kilobytes per second	--
Hard Fault Rate	Hard page fault rate	Faults per second	--

Label	Metric	Units	Next Panel
Soft Fault Rate	Soft page fault rate	Faults per second	--
Buf I/O Rate	Buffered I/O rate	Operations per second	--
Wssize	Working Set size for this process	Pages	--
Wsdefault	Working set default setting for this process	Pages	--
Wsquota	Working set quota setting for this process	Pages	--
Wsext	Working set extent setting for this process	Pages	--
Private	Private memory size for this process	Pages	--
Global	Global memory size for this process	Pages	--
Virtual Addr	Virtual address size for this process	Pages	--
User Name	User name for this process	Alphabetic	--
Account	User account for this process	Alphabetic	--
Process ID	Process ID (PID) for this process	Numeric	--
Image Name	Current image name for this process	Alphabetic	--
Process State	Current process state	Alphabetic	--
Process Priority	Current priority for this process	Numeric	--
Base Priority	Base priority for this process	Numeric	--

CPU Queue Panel Descriptions

The CPU Queue graph on the System Overview panel lets you access the following panels:

- Process Wait
- Image CPU

This series of panels lets you investigate the cause of high CPU queues on the monitored system. You can investigate the top images using the CPU.

The following tables describe the information presented within each panel:

Process Wait Panel

Label	Metric	Units	Next Panel
Computable Process Count (with history)	Number of processes in COM queue	Count	--
Total Processes	Number of processes scheduled	Count	--
Computable (current)	Number of processes on COM queue	Count	--
Hibernating	Number of processes in HIB state	Count	--
LEF Wait	Number of processes in LEF state	Count	--
Page Fault Wait	Number of processes in PFW state	Count	--
Top Images (list)	CPU utilization of top images	Percentage	Image CPU

Image CPU Panel

Label	Metric	Units	Next Panel
CPU Utilization (with history)	CPU utilization for this image	Percentage	--
CPU Utilization (current)	CPU utilization for this image	Percentage	--
Direct IO Rate	Direct I/O for this image	Operations per second	--

Label	Metric	Units	Next Panel
Disk IO Rate	Disk I/O for this image	Operations per second	--
Disk Thruput	Disk throughput	Kilobytes per second	--
Hard Fault Rate	Hard page fault rate	Faults per second	--
Soft Fault Rate	Soft page fault rate	Faults per second	--
Buf I/O Rate	Buffered I/O rate	Operations per second	--
CPU Utilization (list)	CPU Utilization for image by user	Percentage	--
Total Mem Pages	Total of all Working Sets for processes running this image	Pages	--
WSdefault	Working set default setting for this process	Pages	--
WSquota	Working set quota setting for this process	Pages	--
WSext	Working set extent setting for this process	Pages	--
Private	Private memory size for this process	Pages	--
Global	Global memory size for this process	Pages	--

Hard Fault Rate Panel Descriptions

The Fault Rate graph on the System Overview panel lets you access the following panels:

- Page Faults
- User Faults
- Process Faults
- Fault Types
- Memory
- Memory Allocation

- User Memory
- Page File Allocation

This series of panels lets you investigate the causes of hard page faulting on the monitored system. You can investigate the top faulting and top memory users and view what processes each user is executing.

The following tables describe the information presented within each panel:

Page Faults Panel

Label	Metric	Units	Next Panel
Hard Fault Rate	Hard page fault rate	Faults per second	Fault Rates
Hard Fault Rate for Top Users (list)	Hard page faults by user	Faults per second	User faults
Total Memory Utilization	Total memory utilization	Percentage	Memory

Faults Rates Panel

Label	Metric	Units	Next Panel
Soft Faults	Soft page fault rate	Faults per second	--
Hard Faults	Hard page fault rate	Faults per second	--
Demand Zero	Demand zero page fault rate	Faults per second	--
System Faults	System page fault rate	Faults per second	--
In Swap	In swap operations rate	Swaps per second	--
Out Swap	Out swap operations rate	Swaps per second	--

User Faults Panel

Label	Metric	Units	Next Panel
Hard Faults for User	Hard page fault rate for this user	Faults per second	--
Hard Fault Rate by User Process (list)	Hard page faults by process for this user	Faults per second	Process Faults
Total Memory Pages	Memory for this user	Pages	--

Process Faults Panel

Label	Metric	Units	Next Panel
Hard Faults for Proc	Hard page fault rate for this process	Faults per second	--
User Name	User name for this process	Alphabetic	--
Image Name	Image name executed by this process	Alphabetic	--
Account	User account for this process	Alphabetic	--
PID	Process ID for this process	Numeric	--
Mode	Process mode (interactive, batch, network, detached, other)	Alphabetic	--
CPU Utilization	CPU utilization for this process	Percentage	--
Disk IO Rate	Disk I/O for this image	Operations per second	--
Disk Thruput	Disk throughput	Kilobytes per second	--
Hard Fault Rate	Hard page fault rate	Faults per second	--
Soft Fault Rate	Soft page fault rate	Faults per second	--

Label	Metric	Units	Next Panel
Buf I/O Rate	Buffered I/O rate	Operations per second	--
Direct IO Rate	Direct I/O rate	Operations per second	--

Memory Panel

Label	Metric	Units	Next Panel
Free List Pages	Number of pages on free list	Pages	Memory Allocation
Total Memory Pages by Users (list)	Memory by user name	Pages	User Memory
Page File Utilization	Page file utilization	Percentage	Page File Allocation

Memory Allocation Panel

Label	Metric	Units	Next Panel
Free List Fault Rate	Free list fault rate	Faults per second	--
Top Memory Processes (list)	Memory by process name	Pages	--
Paged Bytes	Number of pages in paged pool	Pages	--
NonPaged Bytes	Number of pages in nonpaged pool	Pages	--
Free Balance Slots	Number of free balance set slots	Count	--
IRPs Used*	Number of IRP packets in use	Count	--
SRPs Used*	Number of SRP packets in use	Count	--
LRPs Used*	Number of LRP packets in use	Count	--

The fields marked with the "*" are obsolete and are set to zero.

User Memory Panel

Label	Metric	Units	Next Panel
Total Memory Pages for User	Memory utilization for this user	Pages	--
CPU Utilization	CPU utilization for this user	Percentage	--
Disk IO Rate	Disk I/O for this user	Operations per second	--
Disk Thruput	Disk throughput	Kilobytes per second	--
Hard Fault Rate	Hard page fault rate	Faults per second	--
Soft Faults Rate	Soft page fault rate	Faults per second	--
Buf I/O Rate	Buffered I/O rate	Operations per second	--
Direct IO Rate	Direct I/O rate	Operations per second	--
User Processes (list)	Memory utilization by process for this user	Percentage	--

Page File Allocation Panel

Label	Metric	Units	Next Panel
Page File Write Rate	Page file write rate	Pages per second	--
Page/Swap I/O Rate Top Volumes (list)	Page/Swap I/O Rate by volume	Faults per second	--
Read Rate	Page read operation rate	Operations per second	--
Write Rate	Page write operation rate	Operations per second	--
Read I/O Rate	Page read disk operation rate	Operations per second	--
Write I/O Rate	Page write disk operation rate	Operations per second	--

Label	Metric	Units	Next Panel
Swap Busy	Swapper busy	Percentage	--
Swap Wait	Swapper wait	Percentage	--

Disk Rate Panel Descriptions

The Disk Rate graph on the System Overview panel lets you access the following panels:

- Disk
- Volume Info
- Disk Info

This series of panels lets you investigate the I/O activity on the monitored system. You can investigate the top volumes and devices.

The following tables describe the information presented within each panel:

Disks Panel

Label	Metric	Units	Next Panel
Disk IO/second	Disk I/O operation rate	Operations per second	--
Top Volume (list)	Disk I/O operation rate for top volumes	Operations per second	Volume Info
Top Device (list)	Disk I/O operation rate for top devices	Operations per second	Disk Info

Volume Info Panel

Label	Metric	Units	Next Panel
I/O Rate for Volume (with history)	Disk I/O operation rate for this volume	Operations per second	--
I/O Rate (current)	Disk I/O operation rate for this volume	Operations per second	--
KB/second	Disk throughput for this volume	Kilobytes per second	--

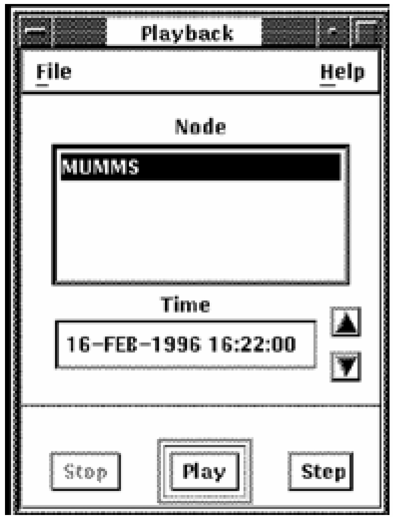
Label	Metric	Units	Next Panel
Disk Reads/second	Disk read I/O operations for this volume	Operations per second	--
Disk Writes/second	Disk write I/O operations for this volume	Operations per second	--
Page/Swap I/O Rate	Disk page and swap I/O operations for this volume	Operations per second	--

Disks Info Panel

Label	Metric	Units	Next Panel
I/O Rate for Device (with history)	Disk I/O operation rate	Operations per second	--
I/O Rate (current)	Disk I/O operation rate for this device	Operations per second	--
KB/second	Disk thruput for this device	Kilobytes per second	--
Disk Reads/second	Disk read I/O operations for this device	Operations per second	--
Disk Writes/second	Disk write I/O operations for this device	Operations per second	--
Page/Swap I/O Rate	Disk page and swap I/O operations for this device	Operations per second	--

Review Data in Playback Mode

Playback mode lets you display data recorded earlier. Select the Playback item from the File menu in the Panel Manager window.



Node

Click the node for which you want to display data.

Time

Time displays the time for which data is being displayed. To select a time from which to display data records, click Stop and then on the time box. Edit the date and time to select the beginning time you want. Click Play to start the display. Alternately, you can click the arrows to the right of the box to increment the time ahead or back.

Play

Click Play to start a continuous display of the data from the time displayed.

Step

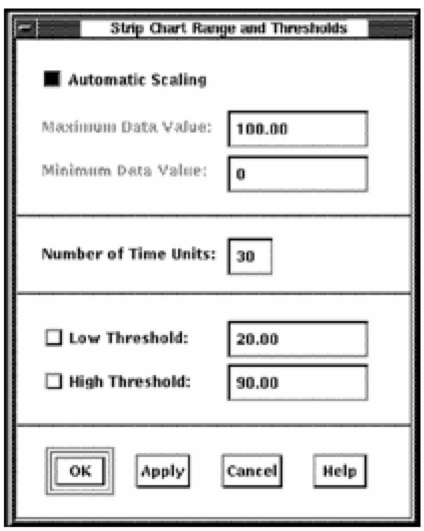
Click Step to display data from the next interval.

Set the Thresholds and Ranges

You can set threshold values for strip charts and bar graphs to alert you to potential performance problems. When a threshold value is exceeded, the color of the indicator changes. For example, the CPU utilization threshold on the strip chart in the CPU panel is set to alert you when CPU utilization exceeds 70 percent. If the percent utilization exceeds 70 percent the bar on the strip chart changes from black to red for the period of time during which the threshold is exceeded.

To set a threshold value:

1. Click MB1 anywhere in the instrument to be modified. The instrument appears to be depressed to show that it has been selected.
2. Press and hold MB3 to display the pop-up editing menu. The menu lets you edit the following items:
   - Ranges and thresholds
   - Patterns and colors
3. Choose Ranges and Thresholds by moving the cursor over this selection and releasing the MB3 button. For example, the following dialog box is displayed when one of the graphs on the System Overview panel is selected, as shown in the following screen:



This dialog box is also used to set the scale for an instrument. The maximum and minimum data values to be displayed for the bar or strip chart can be set. In addition, the strip chart can be set to automatic scaling whereby the height of the chart is dynamically adjusted to match the largest data value shown.

The Ranges and Thresholds dialog box lets you set two levels of thresholds.

To modify a threshold value

- Click the threshold field and type the new value.

  The *x*-axis on the strip chart can be changed by specifying a new value for the Number of Time Units. This value, with the display interval, determines the amount of time represented on the strip chart.

To apply your changes

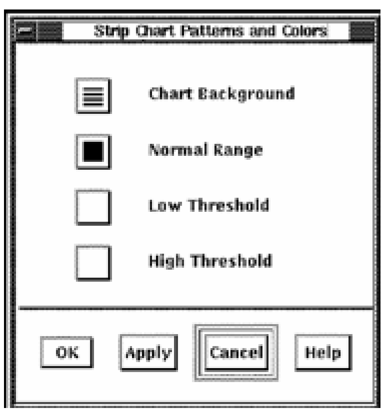
1. Click the Apply button at the bottom of the dialog box.
2. When you are satisfied with all your changes and want to exit the dialog box, click OK; to exit without saving any changes, click Cancel.

Change the Colors and Patterns

You can customize the colors used in any part of a PA Real-time Display panel or instrument.

To change the high threshold color for the strip chart in the CPU panel

1. Select the instrument by pressing MB1 within the instrument's border. The instrument will appear depressed to indicate that it has been selected.
2. Press MB3 and hold to get the pop-up menu.
3. Choose Colors and Patterns by moving the cursor over this selection and releasing the MB3 button. The following dialog box is displayed:



This dialog box lets you set colors for the thresholds set in the Ranges and Thresholds dialog. You can use these colors to alert you to potential performance problems.

4. Alter the background or the threshold colors by clicking on the associated button on this dialog. The Pattern Editor dialog is displayed.
5. Select new patterns and colors for each graph part, click OK on all dialoges to effect the change.

Chapter 10: Customize the DECwindows Motif Real-time Display

This chapter provides information about using the Panel Manager to customize the DECwindows Motif Real-time Display.

This section contains the following topics:

Access the Panel Manager

Use the following steps to access the Panel Manager:

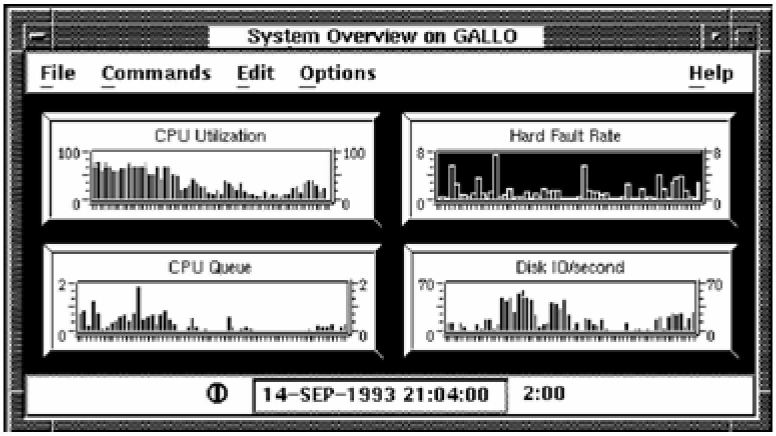
1. Start the DECwindows Motif Real-time display by entering the following command:

```
$ ADVISE PERFORMANCE DISPLAY WINDOWS/MODE=NETWORK
```

   For more information about the DISPLAY WINDOWS command syntax, see the chapter "Performance Manager Commands."

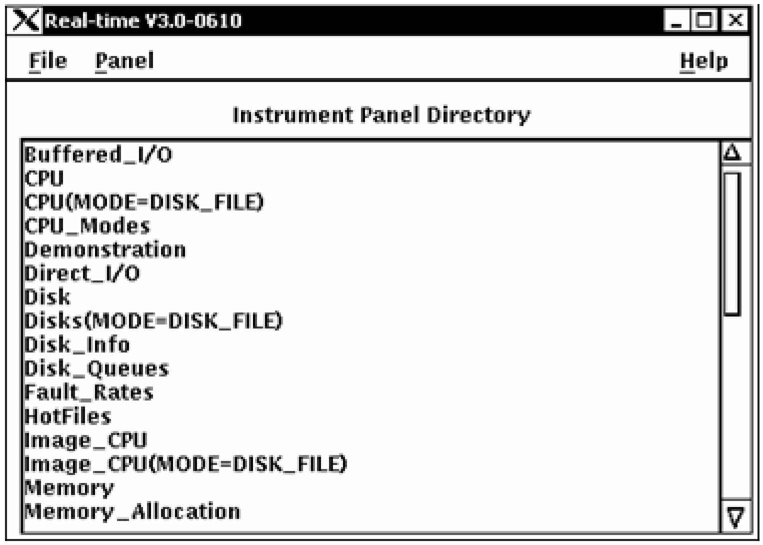
   Performance Manager displays the Panel Manager icon and the System Overview panel, as shown in the following screen:

Equation 1: System Overview Panel



2. Double-click the Panel Manager icon or from the System Overview Panel, pull down the File menu, and click the Panel Manager... menu item.

   Performance Manager displays the Real-time Panel Manager window, as shown in the following screen:



Performance Manager displays the Real-time Panel Manager window, which lets you do the following actions:

- Specify actions on panels
- Close the DECwindows session

Specify Actions on Panels

To specify actions on selected panels, pull down the Panel menu and click the menu item you want. The Panel menu lets you:

Open panels

You open a panel either to view it for modifications or to connect it to a node for displaying real-time data.

Click the panel name to select a panel. Pull down the Panel menu and click the Open menu item. Performance Manager displays the selected panel.

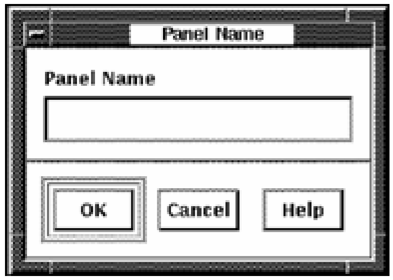
You can also open a panel by double-clicking on the panel name.

Rename panels

Specifies a panel name change.

Create panels

Click the Create menu item from the Panel menu and Performance Manager displays the Panel Name dialog, as shown in the following screen:

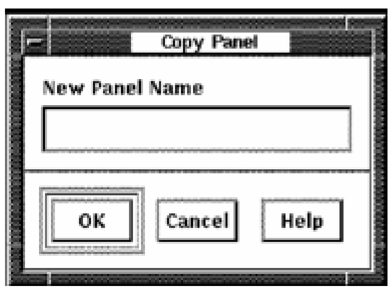


Type a panel name and click the OK button.

When you enter a panel name, the Panel Name dialog is removed and the name you specified is listed in the Instrument Panel Directory of the Panel Manager.

Copy panels

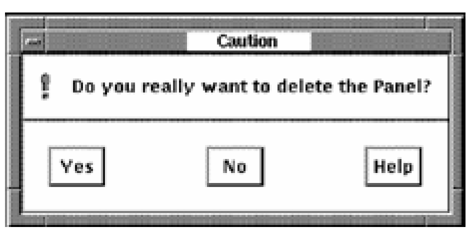
Click a panel name to select a panel. Pull down the Panel menu and click the Copy menu item. The Copy Panel dialog is displayed, as shown in the following screen:



Type the new panel name and click the OK button.

Delete panels

Click a panel name to select a panel. Pull down the Panel menu and click the Delete menu item. The following message box is displayed, as shown in the following screen:



If you click OK, that panel is deleted.

Auto Startup

Enable or disable a panel to startup automatically. When you enable automatic startup for a panel, it will be displayed and an attempt to connect will be made when you invoke the Real-time Display software. You can have several panels set for automatic startup.

To enable a panel to startup automatically

1. Select a panel from the Instrument Panel Directory in the Panel Manager by clicking on the panel name.
2. Choose Enable from the Auto Startup menu.

   The Instrument Panel Directory is updated. The label /auto_startup is appended to the panel name.

To disable a panel from starting automatically

1. Select a panel from the Instrument Panel Directory in the Panel Manager by clicking on the panel name.
2. Choose Disable from the Auto Startup menu.

   The Instrument Panel Directory is updated. The label /auto_startup appended to the panel name is removed.

Auto Connect

Enable or disable a panel to connect automatically. When you enable automatic connection for a panel, it will to connect when you open the panel. You can have several panels set for automatic connection.

To enable a panel to connect automatically

1. Select a panel from the Instrument Panel Directory in the Panel Manager by clicking on the panel name.
2. Choose Enable from the Auto Connect menu.

   The Instrument Panel Directory is updated. The label /auto_connect is appended to the panel name.

To disable a panel from connecting automatically

1. Select a panel from the Instrument Panel Directory in the Panel Manager by clicking on the panel name.
2. Choose Disable from the Auto Connect menu.

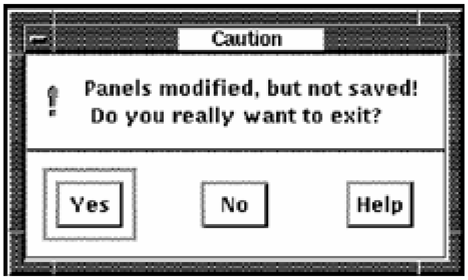
   The Instrument Panel Directory is updated. The label /auto_connect appended to the panel name is removed.

Terminate the Session

To end a DECwindows session

1. Pull down the File menu in the Panel Manager window and click the Exit menu item.

   If you have modified panels, Performance Manager displays the following message:



2. Click Yes and your changes are not saved.
   OR
   Click No and the exit process is aborted.
3. To save a panel, use the Save or Save As... menu entry in the panel.

   See the section Set the Panel Options (see page 366) section for more information about saving a panel.

How You Edit the Panel Instruments

To edit instruments

- Pull down the Edit menu on any open panel and release on the menu item you want.

  The Edit menu lets you perform the following actions:

  - Modify instruments
  - Enable build mode
  - Create instruments

  Strip charts

  A graphical representation of a data item in an X, Y wide grid. New data items enter from the right and the entire chart moves to the left with the oldest data disappearing at the left edge. A strip chart gives a pictorial view of historical data. An example of a strip chart is a medical electrocardiogram (EKG).

Bar graphs

A graphical representation of a data item in which the height or length of the bar represents the magnitude of the data item. At each interval the bar is redrawn for the new value of the data item, so the bar grows or shrinks as intervals progress.

Meters

The numerical or string representation of the data item. An automobile odometer is an example of a meter.

- Copy instruments
- Delete instruments
- Assign metrics
- Assign launch panels

To edit instruments

1. Enable build mode.
2. Select an instrument.
3. Select an editing function.

Enable the Build Mode

Enabling the build mode lets you create and edit instruments within the displayed panel.

To enable the build mode

1. Pull down the Edit menu.
2. Click the Build Mode menu item
3. Click the Enable menu item in the submenu.

Modify the Instruments

To modify the instruments

1. Pull down the Edit menu, choose the Build Mode menu item and click the Enable submenu item.
2. Select an instrument.
3. Pull down the Edit menu, choose the Modify menu item and select a menu item in the submenu.

This Modify submenu lets you do the following actions:

- Set ranges and thresholds
- Set patterns and colors
- Modify parts

The contents of the Modify submenu varies depending on the type of instrument selected. These submenu items are also available in a pop-up menu when you press MB3 in the window work area.

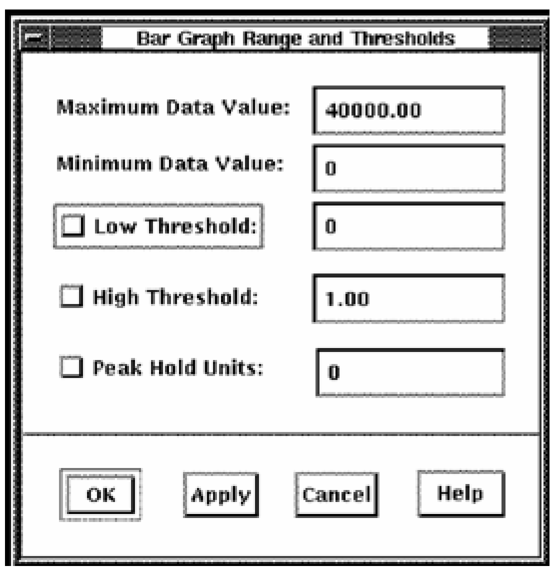
Set Ranges and Thresholds

Clicking on the Ranges and Thresholds menu item, Performance Manager displays the Ranges and Thresholds dialog for the selected instrument.

Depending on your selected instrument, Performance Manager displays one of the following dialoges:

- Bar Graph Range and Thresholds dialog
- Strip Chart Range and Thresholds dialog

The following example shows the Bar Graph Range and Thresholds screen:



The Bar Graph Range and Thresholds dialog lets you do the following actions:

- Set maximum and minimum data values
- Set low and high thresholds
- Set peak hold units

You can enter any of the following values:

Maximum Data Value

Specifies the maximum value of the graph's scale. The default value is 100.

Minimum Data Value

Specifies the minimum value of the graph's scale. The default value is 0.

Low Threshold

Enables and specifies a value line to be displayed on the graph. Data below this line is displayed in the patterns and colors you set for low threshold.

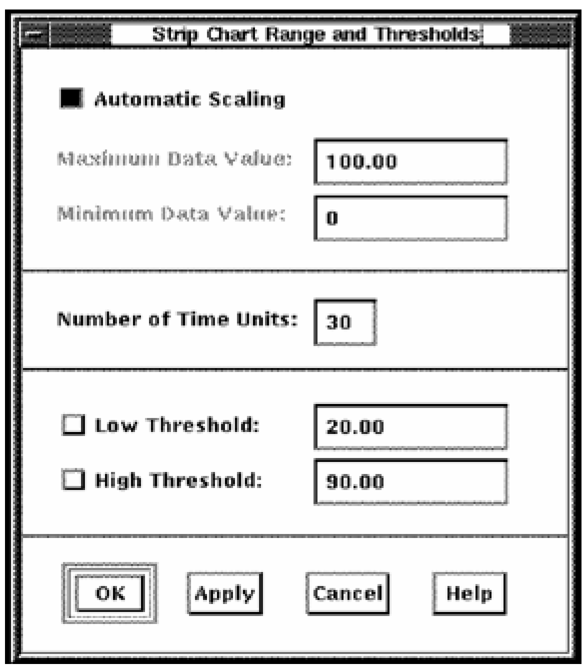
High Threshold

Enables and specifies a value line to be displayed on the graph. Data above this line is displayed in the patterns and colors you set for high threshold.

Peak Hold Units

Enables peak hold and specifies the number of units of time the peak (maximum value attained by the metric) is held in the display. This peak value indicator is displayed in the patterns and colors you set for the peak hold.

Strip Chart



The Strip Chart Range and Thresholds dialog lets you do the following actions:

- Set automatic scaling
- Set maximum and minimum data values
- Set number of time units along the *x*-axis
- Set low and high thresholds

You can enter any of the following values:

Automatic Scaling

Specifies that the height of the chart is to be dynamically adjusted to match the largest data value shown.

Maximum Data Value

Specifies the maximum value of the chart's scale. The default value is 100.

Minimum Data Value

Specifies the minimum value of the chart's scale. The default value is 0.

Number of Time Units

Specifies the number of time intervals to display in the chart. For example, if the data collection time interval is 10 seconds and the number of time interval units is set at 30, then up to 300 seconds, or 5 minutes of data is displayed.

Low Threshold

Enables and specifies a value line to be displayed on the chart. Data below this line appears in the patterns and colors you set for low threshold.

High Threshold

Enables and specifies a value line to be displayed on the chart. Data above this line appears in the patterns and colors you set for high threshold.

Set Patterns and Colors

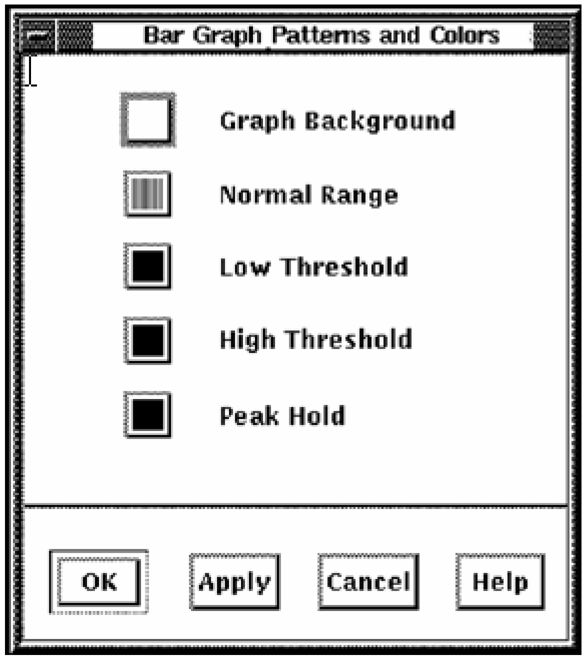
To set patterns and colors for the selected instrument

1. Pull down the Modify submenu.
2. Choose the Pattern and Colors menu item.

Performance Manager displays the appropriate Patterns and Colors dialog for that instrument.

Bar Graph

The Bar Graph Patterns and Colors dialog allows you set the pattern and color of the instrument graph, as shown in the following screen:



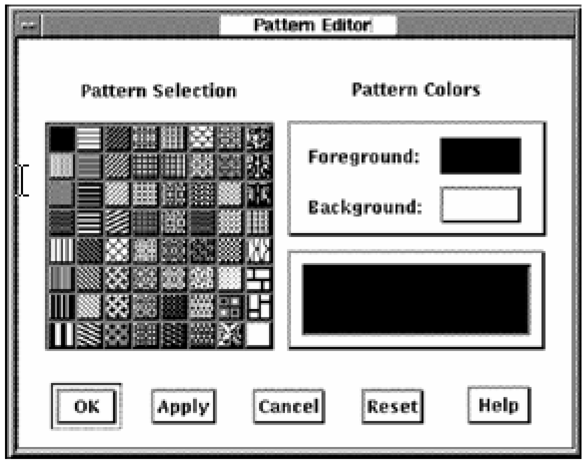
You can set the bar graph with the following attributes:

- Background
- Normal Range
- Low Threshold
- High Threshold
- Peak Hold

To set the Patterns and Colors for each of these attributes

1. Click the appropriate button.

   Performance Manager displays the Pattern Editor dialog, as shown in the following screen:

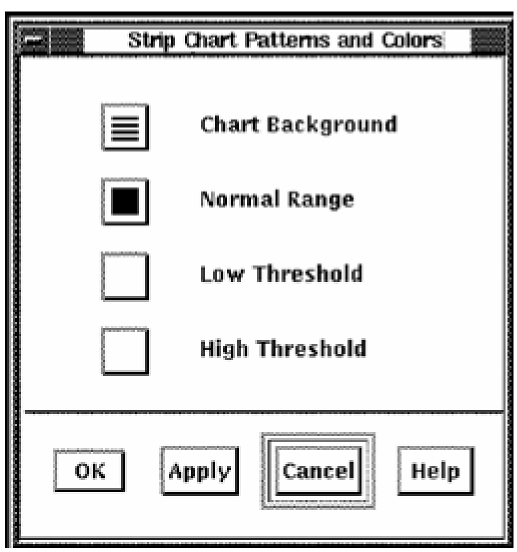


2. Click a pattern in the dialog and the selected pattern is displayed in the pattern viewer.

   To change the graph's pattern color, click the Foreground or Background button. Performance Manager displays a color mixing dialog.

3. Click Help for information on how to use the color mixing dialog.

Strip Chart



The Strip Chart Patterns and Colors dialog lets you set the pattern and color of the chart with the following attributes:

- Background
- Normal Range
- Low Threshold
- High Threshold

To set the Patterns and Colors for each of these attributes

1. Click the appropriate button.

   Performance Manager displays the Pattern Editor dialog.

2. Click a pattern in the dialog and the selected pattern is displayed in the pattern viewer.
3. To change the chart's pattern color, click the Foreground or Background button.

   Performance Manager displays a color mixing dialog.

4. Click Help for information on how to use the color mixing dialog.

Modify Parts

To modify the parts of an instrument

1. Pull down the Edit menu, choose the Build Mode menu item and click the Enable submenu item.
2. Select the instrument by clicking on it.
3. Pull down the Edit menu, choose the Modify menu item and click the Parts... menu item in the submenu.

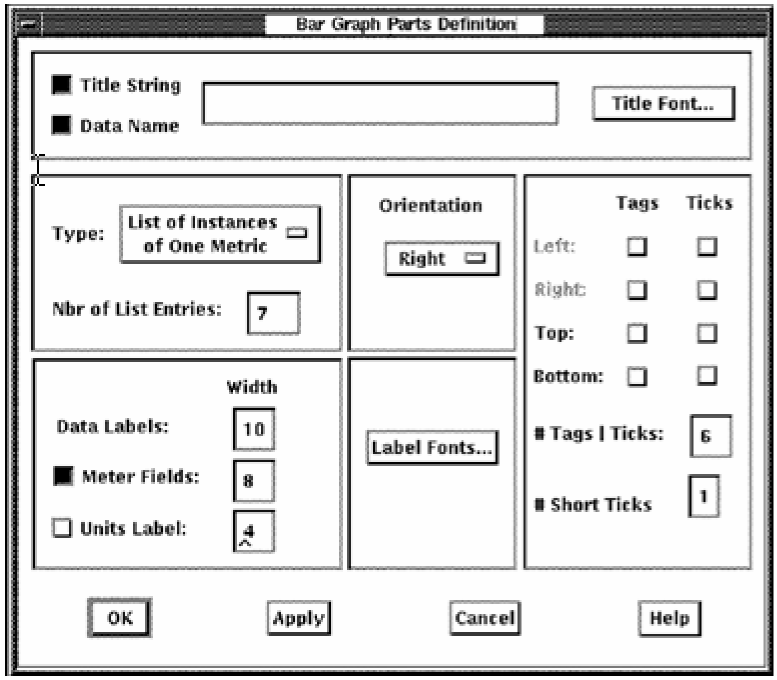
Performance Manager displays the appropriate Parts dialog for the selected graph or chart in one of the following boxes:

- Bar Graph Parts Definition dialog
- Strip Chart Parts Definition dialog
- Meter Parts Definition dialog

The Bar Graph Parts Definition dialog lets you specify:

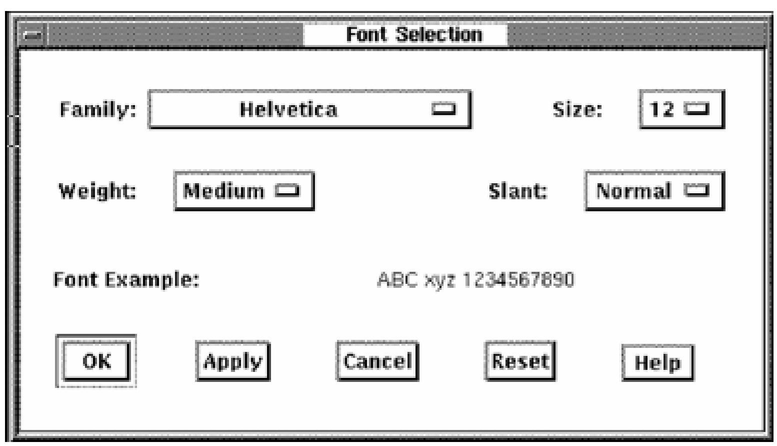
- Title String-Set the toggle button to display a title. Enter a title in the text entry box.
- Data Name-Set the toggle button to specify the title to be the metric name, overriding any supplied string.

Bar Graph Parts



Title Font

Click the Title Font... button and Performance Manager displays the Font Selection dialog, as shown in the following screen:



The Font Selection dialog lets you specify the following font characteristics:

- Family
- Size
- Weight
- Slant

Note: Font options not available on your server are disabled.

Metric Type

Specifies a list of instances of one metric or a list of metrics.

For example, to show the CPU Utilization for multiple processes on the system, use the List of Instances option.

To show a CPU mode (Interrupt, Kernel, Supervisor, and so on) for the system, choose the List of Metrics option since each metric has only one value associated with it.

Number of List Entries

Specifies the number of bars to be displayed.

Orientation

Specifies the orientation of the bar graph's maximum value.

Data labels: width (in characters)

Specifies the space available for the data labels, based on the characteristics of the font you have selected.

Meter: width (in characters)

Specifies the space available for the meter, based on the characteristics of the font you have selected.

Set the toggle button to include a meter for the bars. Specify the space for the meter in characters.

Units label: width (in characters)

Specifies the space available for the units label, based on the characteristics of the font you have selected.

Set the toggle button to include a units label for the bars. Specify the space for the units label in characters.

Label Fonts

The Font Selection dialog lets you specify label font characteristics.

Location of Tags and Ticks

Specifies whether tags (numeric values indicating a chart's scale) and tick marks are displayed on the left or right side or top or bottom of the chart. Tick marks can be displayed without tags. When tags are selected, tick marks are displayed automatically.

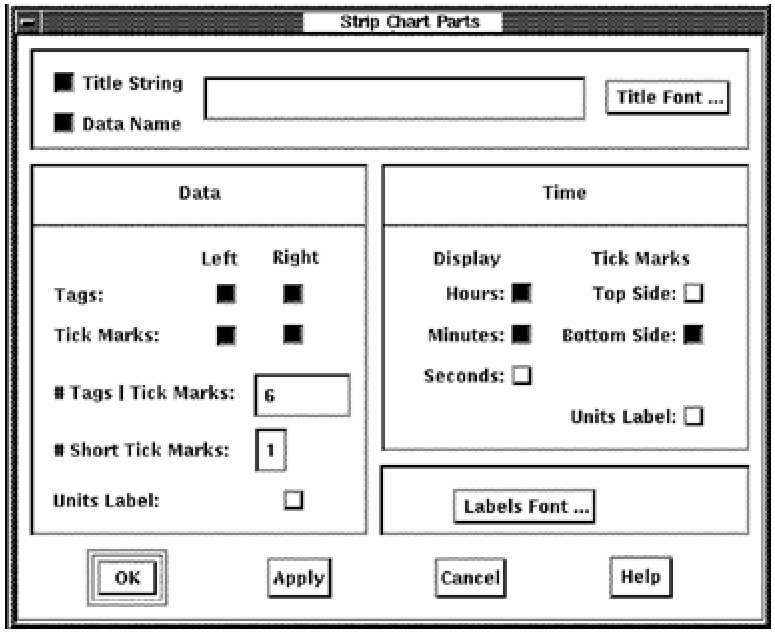
Number of Tags/Ticks

Specifies the number of tags and corresponding tick marks to be displayed. The default is six tags.

Number of Short Ticks

Specifies number of minor tick marks to be displayed between the major tick marks set in Number of Tags/Ticks. The default is one.

Strip Chart Parts



The Strip Chart Parts dialog lets you specify the following attributes:

Title

Set the toggle button to display a title. Enter a title in the text entry box.

Data Name

Set the toggle button to specify the title to be the metric name, overriding any supplied string.

Title Font

The Font Selection dialog lets you specify the following font characteristics:

- Family
- Size
- Weight
- Slant

Font options not available on your server will be disabled.

Data:

Tags

Specifies whether the tags are displayed on the left or right side of the chart, or both.

Tick Marks

Specifies whether tick marks are displayed on the left or right side of the chart, or both. Tick marks can be displayed without tags. When tags are selected, tick marks are displayed automatically.

Number of Tags/Tick Marks

Specifies the number of tags and corresponding tick marks to be displayed. The default is six tags.

Number of Short Tick Marks

Specifies the number of minor tick marks to be displayed. The default is one.

Units Label

Specifies whether the units label is included in the display.

Time:

Display

Specifies whether the time display will include hours, minutes, and seconds or a subset of these.

Tick Marks

Specifies whether tick marks are displayed on the top or bottom of the chart, or both.

Units Labe

Specifies whether the time units label in included in the display.

Labels Font

The Font Selection dialog lets you specify font characteristics.

Meter Parts

The Meter Parts Definition dialog lets you specify the following attributes:

Title String

Set the toggle button to display a title. Enter a title in the text entry box.

Data Name

Set the toggle button to specify the title to be the metric name, overriding any supplied string.

Title Font

The Font Selection dialog lets you specify the following font characteristics:

- Family
- Size
- Weight
- Slant

Font options not available on your server will be disabled.

Metric Type

Specifies a list of instances of one metric or a list of metrics.

For example, to show the CPU Utilization for multiple processes on the system, use the List of Instances option.

To show a CPU mode (Interrupt, Kernel, Supervisor, and so forth) for the system, choose the List of Metrics option since each metric has only one value associated with it.

Number of List Entries

Specifies the number of meters to be displayed.

Label Fonts

The Font Selection dialog lets you specify label font characteristics.

Data labels: width (in characters)

Specifies the space available for the data labels, based on the characteristics of the font you have selected.

Metric fields: width (in characters)

Specifies the space available for the meter, based on the characteristics of the font you have selected.

Units label: width (in characters)

Specifies the space available for the units label, based on the characteristics of the font you have selected.

Set the toggle button to include a units label for the meters. Specify the space for the units label in characters.

Create Instruments

To create an instrument

1. Pull down the Edit menu, choose the Build Mode option, and click the Enable submenu option.
2. Pull down the Edit menu, choose the Create menu item, and click the submenu entry.

You can choose from the following instruments:

- Strip Chart
- Bar Graph
- Meter

Copy Instruments

To copy instruments:

1. Pull down the Edit menu, choose the Build Mode option and release on the Enable submenu option.
2. Select the instrument.
3. Pull down the Edit menu and choose the Copy menu item.

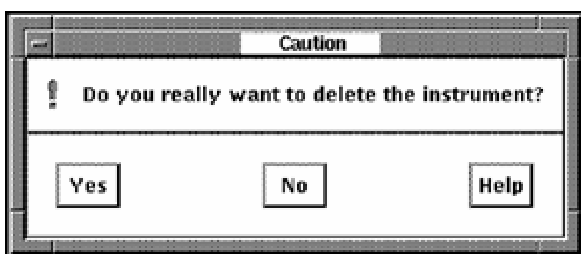
The cursor changes to an indicator that represents the upper left corner of the instrument. Position the cursor at the desired location for the new instrument in the panel. Click MB1 and the instrument is displayed.

Delete Instruments

To delete instruments

1. Pull down the Edit menu, choose the Build Mode menu item and release on e Enable submenu item.
2. Select the instrument.
3. Pull down the Edit menu and choose the Delete menu item.

Performance Manager displays the following message box:

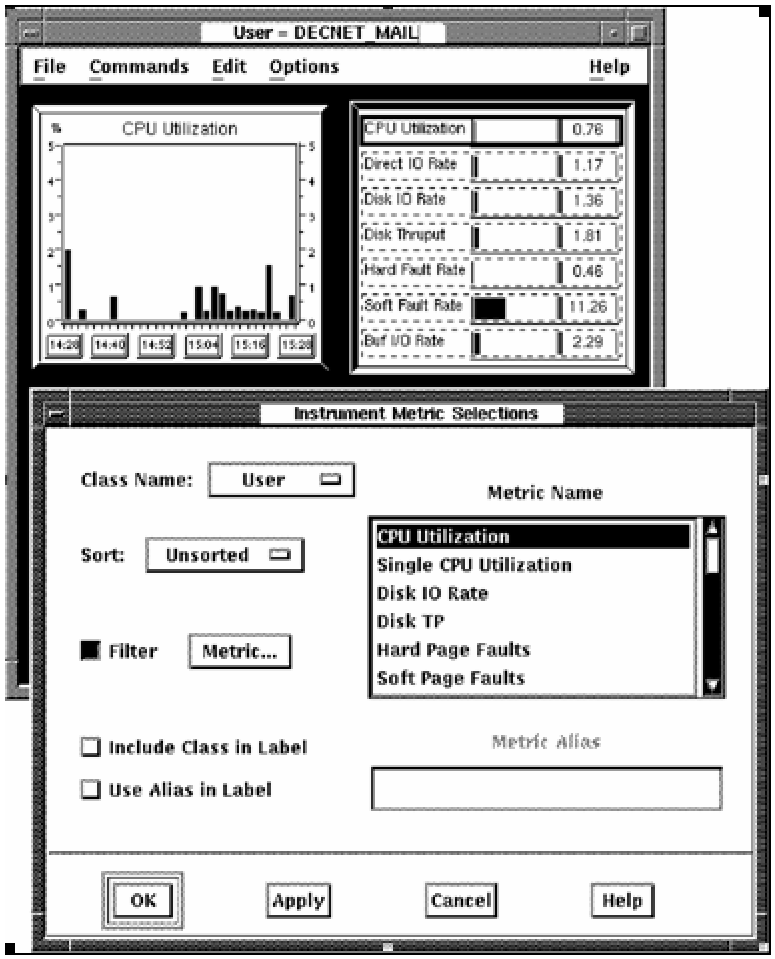


Assign Metrics

To specify metrics to be displayed:

1. Pull down the Edit menu, choose the Build Mode menu item and click the Enable submenu item.
2. Select the instrument.
3. Pull down the Edit menu and choose the Assign Metrics... menu item.

   Performance Manager displays an Instrument Metric Selections dialog, as shown in the following screen:



When Assign Metrics is chosen, the first metric field in the instrument to be assigned a metric will appear with a solid outline. If the instrument has more than one field, the others will appear with a dashed outline.

The Instrument Metric Selection dialog lets you perform the following actions:

- Select a metric class
- Select a metric name
- Sort metric classes in ascending or descending order
- Filter metric selections by value or instance
- Include the class name in the instrument label
- Specify a metric alias (a user supplied string which is displayed instead of the metric name)

The first metric field will automatically be selected, as shown by the solid outline. If another field is desired, click the instrument's outlined metric field. You may have to move the dialog out of the way if it occludes the instrument being modified. The Instrument Metric Selections dialog displays the instrument's current metric name and class. Hold MB1 down on the class name option menu to see all available choices. Release MB1 on the desired class name. A list of applicable metrics is displayed. Click the metric name you want to display. See Appendix C for a description of each metric.

Once you are satisfied with the metric selection for the field and you wish to specify another field in the instrument, press Apply and then select another field by clicking with MB1 within the dashed outline defining the field.

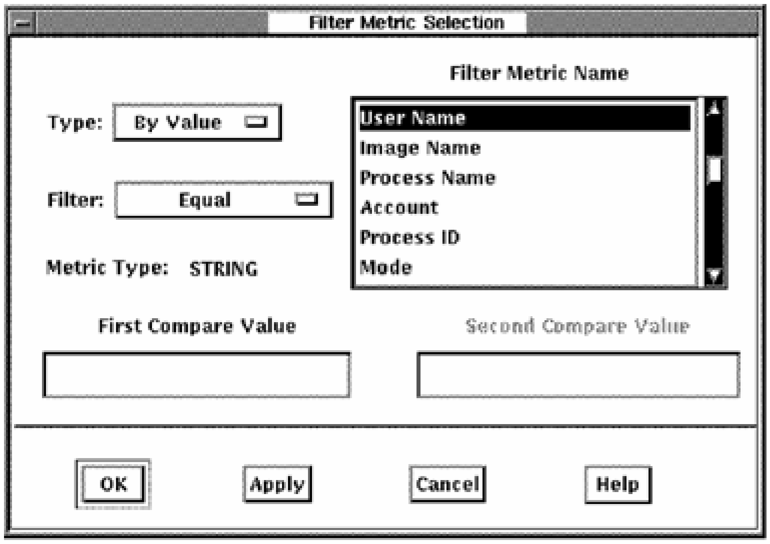
A sort option can be selected for all metric classes other than System.

To display only the data that matches a specific filtering criteria

1. Select the Filter toggle.

   This makes available the Metric... button.

2. Click Metric... to display the Filter Metric Selection dialog.



The Filter Metric Selection dialog lets you perform the following actions:

- Select a filter type
- Select a filter metric name
- Select the filter criteria
- Specify filter values

To enable filtering, position the mouse cursor over the Type option menu and hold down MB1. The following options are displayed:

- No Filter
- By Value
- By Instance

To enable filtering based on a metric value, select the By Value option. To enable filtering based on a specific data item identifier such as a specific user name, process name, disk name, and so on, select the By Instance option.

For the By Value option, you can then specify the range of values to be displayed using the Filter option menu. Press and hold MB1 over the Filter options to see the following range of options:

- Less
- Less or Equal
- Equal
- Not Equal
- Greater or Equal
- Greater
- In Range
- Out of Range

The value to be compared for range determination can be entered in the Compare Value fields or can be based on a value from a parent panel, as described below.

If the Filter metric is a string then the value specified is interpreted as all uppercase unless the string is contained within double quotes.

If the instrument being modified is launched from another panel, then a value may be implicitly passed to this panel. In this case, this value is considered the instance value. See the Launching Panels section for more information. If you want to use this instance value, select By Instance in the Type option menu and select the applicable Filter Metric Name corresponding to the passed value and leave the Compare Value field empty.

Clicking on the Apply button, applies your choices without closing the dialog. The OK button applies your choices and closes the dialog.

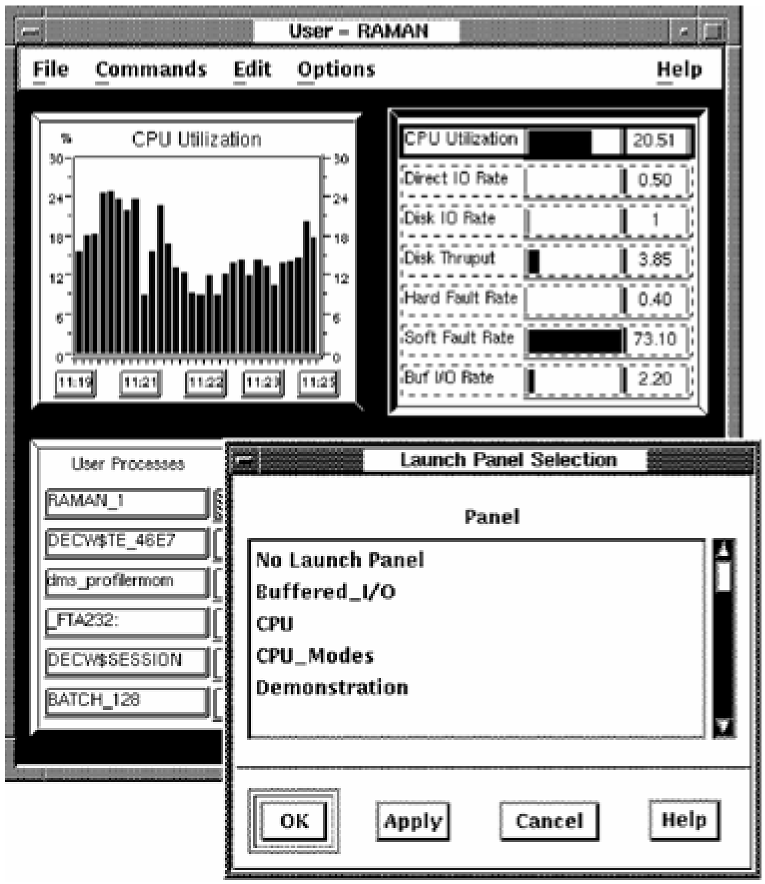
Assign Launch Panels

Performance Manager allows a panel to be activated, or launched, from an instrument within a different panel. In addition, a data item can be passed to the launched panel. This data item (the instance value) can then be used in a subsequent filtering of information displayed in the launched panel's instruments.

To assign launch panels:

1. Pull down the Edit menu, choose the Build Mode menu item and click the Enable submenu item.
2. Select the instrument that will launch a new panel.
3. Pull down the Edit menu, and choose the Assign Launch Panel... menu item.

   Performance Manager displays a Launch Panel Selection dialog as shown in the following screen:



   When you chose assign launch panel, the first metric field in the instrument to be assigned a launch panel will appear with a solid outline. If the instrument has more than one field that can launch panels, these appear with a dashed outline.

4. When you are satisfied with the launch panel assignment for the field and you wish to specify another field in the instrument, click Apply and select another field by clicking with MB1 within the dashed outline defining the field.
5. When you are satisfied with all the selections, click OK.

Launch Panels

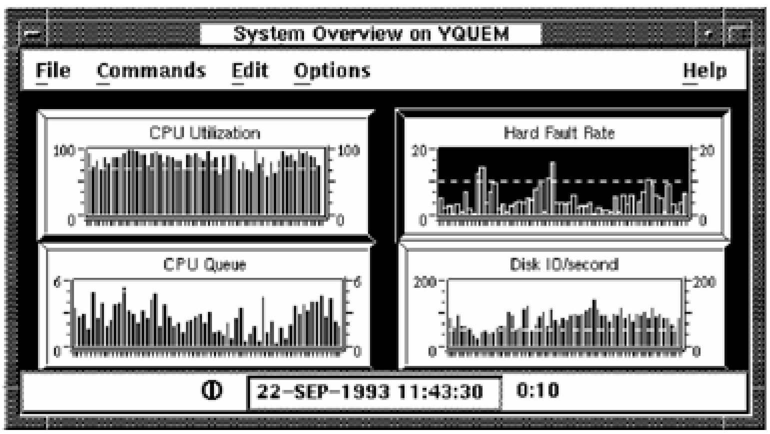
Once launch panels are set and you are connected, double-click the metric name or metric instance name you want to pass to the specified launch panel. Performance Manager displays this panel using the information passed.

For strip charts, digital meters, and bar graphs with one or more different metrics displayed (List of Metrics as the type), you can now launch the selected panel by double-clicking on the instrument title. For bar graphs that display multiple instances of a metric, for example, a bar graph of the CPU utilization for the top 7 users, you can double-click an instance identified by user name and have that name passed to the launched panel. The launched panel can then filter its displayed metrics based on the specific user.

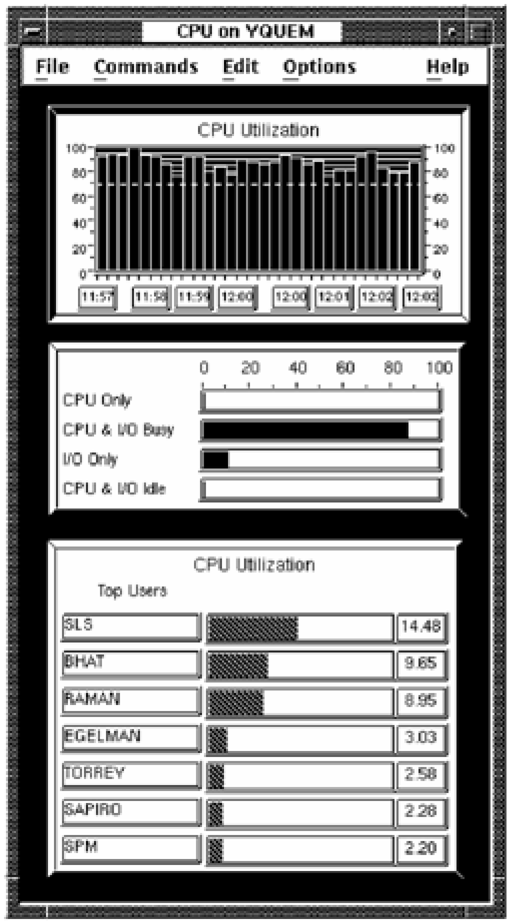
See the section Assigning Metrics (see page 359) for information on metric filtering.

To disable panel launching, select the Remove Launch Panel menu item and click OK.

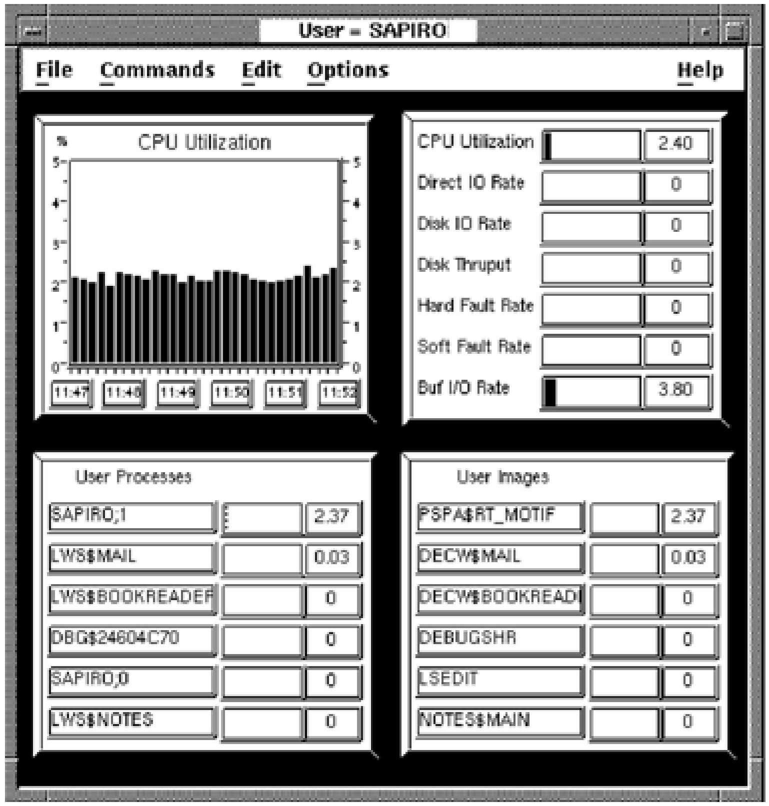
The following example illustrates progressive disclosure using panel launching:



In the following example, double-clicking on the metric CPU Utilization instrument in the Performance Manager System Overview panel launches the CPU panel on node YQUEM. The node YQUEM and the current interval are passed to the panel CPU.



Double-clicking on the Top Users metric name SAPIRO launches the user CPU panel passing it the current interval, the node YQUEM, and the user name SAPIRO, as shown in the following screen:



Each of the metrics in the panel are filtered by the user name SAPIRO. For example, the User Processes instrument is set up as follows:

The instrument's main metric is Process CPU Utilization sorted in ascending order. The metric is filtered by instance with a filter metric of user name. The filter compare value is left blank so the value is passed from the panel. The instrument's second metric is process name using an alias of User Processes.

How You Set the Panel Options

To set the panel options:

1. Pull down the Options menu of the Instrument Panel.
2. Choose the menu item you want.

The Options menu lets you perform the following actions:

- Set panel status
- Specify panel background
- Specify panel title
- Specify panel node and instance type
- Remove panel menu

Set the Panel Status

To set the panel status

1. Pull down the Options menu.
2. Choose the Status Display menu item.
3. Choose either the Restore or Remove submenu items.

The panel status is either displayed or removed from the panel's lower border.

The Panel Status displays the following items:

- Panel mode
  - Connected, indicated by a circle enclosing a vertical line
  - Disconnected, indicated by a circle enclosing a broken vertical line
- Last instrument update time, if connected
- Interval in minutes and seconds

Specify the Panel Background

To specify the panel background

- Pull down the Options menu and choose the Panel Background... menu item.

  Performance Manager displays the Pattern Editor.

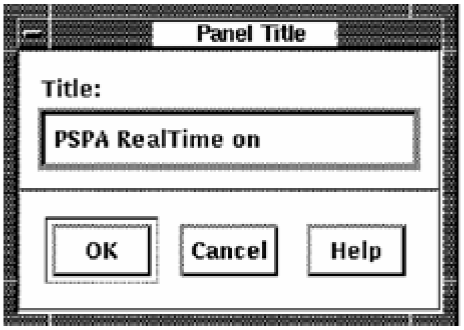
  See the section Set Patterns and Colors (see page 349) section for a discussion on how to use the Pattern Editor.

Specify a Panel Title

To specify a title

1. Pull down the Options menu and choose the Panel Title... menu item.

   Performance Manager displays the Panel Title dialog, as shown in the following screen:



2. Enter the title and click the OK button.

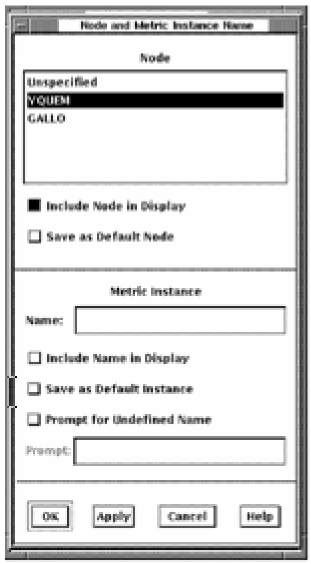
   The supplied string can optionally have appended to it the node name and the instance value.

Specify the Panel Node and Metric Instance Data

To specify the node for which data is to be displayed:

1. Pull down the Options menu.
2. Choose the Node and Metric Instance Name... menu item.

   Performance Manager displays the Node and Metric Instance Name dialog, as shown in the following screen:



The Node and Metric Instance Name dialog lets you perform the following actions:

- Show the current node assigned to the panel

  This would have been specified by you as a default, or at connect time, or when the panel was launched. If the panel was launched, the node passed in the launch overrides the default.

- Include the node in the panel's title display
- Specify the node as the default
- Show the current metric instance name

  This would have been specified by you as a default, by a prompt dialog at connect time, or when the panel was launched. If the panel was launched, the metric instance name passed in the launch overrides the default.

  You can also change the metric instance name by entering a new name in the Metric Instance text entry box. The metric name is interpreted as all uppercase unless you contain the name within double quotes.

- Include the metric instance name in the panel's title display
- Specify the name as the default

- Select prompting at connect time if a metric instance name is not defined
- Define the prompt string

  For example, if the instruments in a panel are set up to look at metrics for a specific user, a user name is required to specify the metric fully. In this case, the prompt might be: "Enter User Name:". If prompting is selected, then a prompt dialog appears at connect time requesting a user name.

  Panels requiring specific metric instance names (such as user name or process name), must be provided with a prompt for the appropriate name. This lets the panel to be invoked from the panel manager and to display without errors. An example is the User_CPU panel (labeled User=SAPIRO) described in the Launching Panels section.

Note: Any changes to the node selection or the metric instance name will have no affect on the instruments until the panel is connected or reconnected.

Remove Panel Menu

To remove the panel menu

1. Pull down the Options menu and click the Remove Panel menu item.

   The menu is removed from the panel.
2. To restore the menu, click MB3 and a pop-up menu displays.
3. Click the Restore Panel Menu option.

If no instrument is active when there is no panel menu, the pop-up menu options are limited to the following actions:

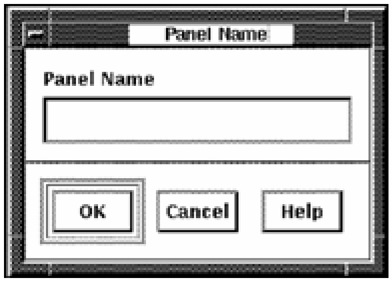
- Close
- Save
- Restore Panel Menu

Save the Panel

To save a panel

1. Pull down the File menu and release on the Save menu item.
2. To specify a new panel name, click the Save As... menu item.

   The Panel Name dialog appears.



3. Enter the new panel name and click the OK button.

Close the Panel

To close an instrument pane

1. Pull down the File menu and click the Close menu item.

   If you modified the instrument, Performance Manager displays the following message:

2. Click Yes to save the modifications and close.
   OR
   Click No to close without saving your changes.

Chapter 11: Use the Character-Cell Real-time Display

This chapter provides information about the Performance Manager character-cell Real-time Display.

This section contains the following topics:

Character-Cell Display Functions

The Performance Manager character-cell displays gather and present performance data using a video terminal. Some displays are available on terminals that support DEC_CRT characteristics, such as the VT100. Use the SET TERMINAL/DEC_CRT command to set characteristics for these terminals. Other displays are available only for ReGIS-compatible terminals, such as the VT340. If the terminal supports color, or if an external color monitor is attached, a multicolored display is generated. The display can also be printed on a graphics dot matrix printer.

Prerequisites

The Performance Manager character-cell displays have the following mandatory software and hardware requirements:

- For real-time remote data collection (/MODE=NETWORK command), see the discussion about establishing remote access in the *Performance Agent Administrator Guide.*
- For file access (/MODE=DISKFILE command), SYSLCK privilege is required.

- A ReGIS-compatible terminal such as the VT125, VT240, VT241, VT330, or VT340 is needed for most displays invoked through the INVESTIGATE command.
- A terminal with DEC_CRT characteristics, such as a VT100, is needed for all other displays.

Any number of users with these resources can simultaneously run the Performance Manager Real-time character-cell displays.

Start the Character-Cell Displays

Character-cell displays can be invoked for either a single node or multiple nodes of a cluster system.

To begin collecting data for all nodes in a cluster system and to display system metrics in realtime mode

1. Enter the following command:

   ```
   $ ADVISE PERFORMANCE DISPLAY CHARACTER_CELL
   ```

   PA displays a multi-node screen.

2. To view previously recorded data in playback mode, use the /BEGINNING qualifier.

   For more information on how to use the ADVISE PERFORMANCE DISPLAY command, see the chapter Performance Manager Commands (see page 175).

Control the Displays

Once you have started a character-cell display, you can control the display and its characteristics with commands.

The following table shows the Performance Manager character-cell commands available at the PSRT> prompt. These commands control which displays and metrics are shown on the terminal.

The keypad keys perform other functions such as selecting users, nodes, and metrics for display, and controlling the playback of data.

Command	Function
CPU	Provides a multi-node display of CPU utilization.

Command	Function
DISKS	Provides a composite display for all disks, servers, or volumes.
DISPLAY *x*	Provides a multi-node display for the desired metric.
FREEZE	Stops the input data stream.
STEP	Advances to the next interval while display is suspended.
IMAGENAME name	Provides a process display for the specified image name.
INVESTIGATE SYSTEM_OVERVIEW_DISPLAY	Provides the ReGIS display for investigating the selected system.
INVESTIGATE MEMORY_DISPLAY	Provides the ReGIS display for investigating the selected system's memory.
INVESTIGATE IO_DISPLAY	Provides the ReGIS display for investigating the selected system's IO rate.
INVESTIGATE CPU_DISPLAY	Provides the ReGIS display for investigating the selected system's CPU.
INVESTIGATE LOAD_BALANCE_DISPLAY	Provides the ReGIS or ANSI display for investigating the selected system's load balance.
INVESTIGATE	Provides the ReGIS display for investigating the last selected display or the system display if none had been selected.
IO	Provides a multi-node display of direct, paging and swapping IO rate.
MEMORY	Provides a multi-node display of memory utilization.
PAGEFILE	Provides a multi-node display of Pagefile Utilization.
PID n	Provides a process display for the specified PID.
RESOURCE CPU_DISPLAY	Provides a multi-node display of CPU resources.
RESOURCE DISK_DISPLAY	Provides a multi-node display of disk resources.

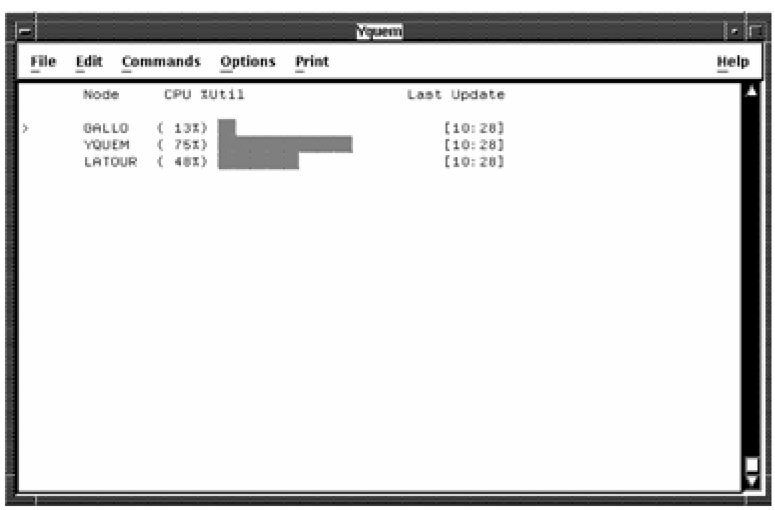
Command	Function
RESOURCE MEMORY_DISPLAY	Provides a multi-node display of memory resources.
RESOURCE	Provides the multi-node resource display for the last selected display or the CPU display if none had been selected.
RESUME	Resumes the data input stream that was stopped by the FREEZE command
RULES	Provides a per-node display of rules that have fired on that node.
SET SCALING PROCESS *n* WORKING_SET *n* RATE_PER_SECOND *n*	Changes scale (number within a tick mark) for process, working set size, and I/Os per second scales.
USERNAME name	Provides a process display for the specified user name.

Display Multi-node Statistics

A bar-graph style screen appears when you start Performance Manager character-cell displays. By default, the percentage of CPU utilization for each node in the cluster is displayed.

If you are collecting data at two-minute intervals, factory rule IDs or user rule IDs, or both, may also appear after the time stamp. For shorter intervals, the user rules may appear.

See the RULES command and the /RULES qualifier for more information.



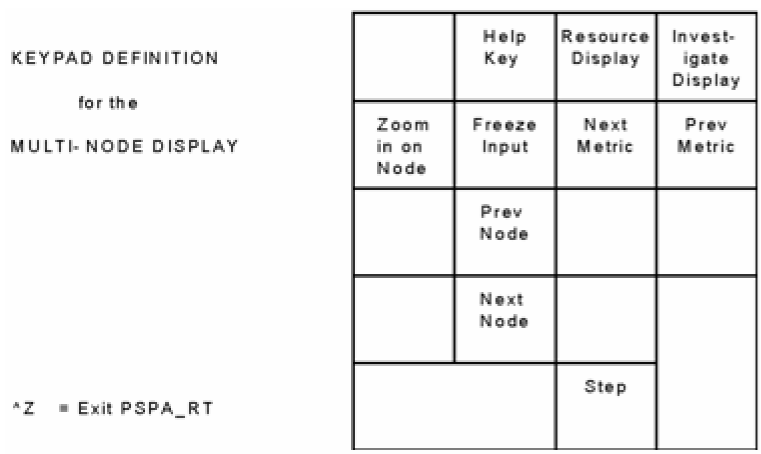
You can display in the following metrics previous screen:

- Percentage of memory utilization
- Disk I/Os per second
- Percentage of pagefile utilization
- Any other system data cell collected and provided. For a list of the system metrics you can select, see Appendix C. Only numeric metrics in Domain LOCAL can be requested.

Use the multi-node keypad to perform the following tasks:

- Get Help
- Zoom in on node
- Change to the next node
- Change to the previous node
- Change to the resource display
- Change to the next metric
- Change to the investigate display
- Change to the previous metric

The following illustration shows the functions of the multi-node display keypad:



Display Single-Node Statistics

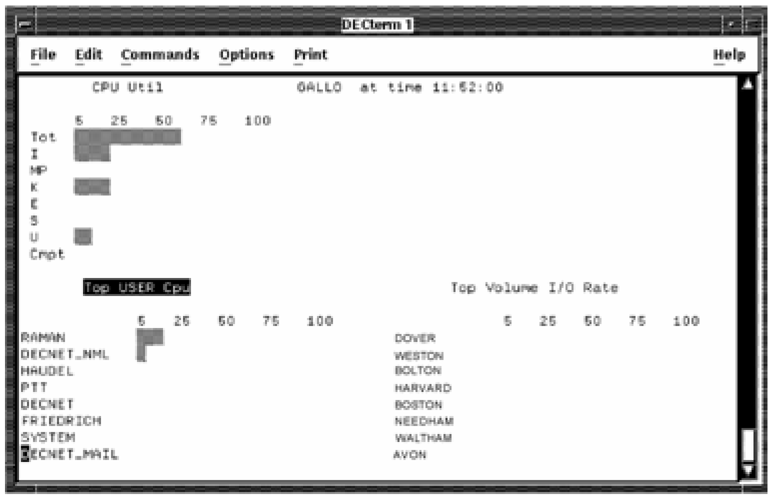
To navigate through the list of nodes

1. Press KP2 or KP5.

   The arrow identifies the node you choose to monitor.

2. Press the zoom-in-on-node key (KP7) in the multi-node keypad.

   Performance Manager displays a single-node screen.



The Performance Manager single-node screen provides the following three sections:

- CPU utilization and mode statistics
- Top processes statistics
- Top device statistics

The Process Statistics and Device Statistics sections can be updated with a new set of metrics. The title of the currently selected section is in reverse video. Press KP3 to select a different section.

3. Enter the Help command or press PF2 to display the single-node display keypad.

   The following table shows the functions of the single-node display keypad:

KEYPAD DEFINITION

for the

SINGLE-NODE DISPLAY

^Z = Exit PSPA_RT

	Help Key	Resource Display	Invest-igate Display
Zoom in on Section	Freeze Input	Next Metric	Prev Metric
Prev Node		Next Key	Prev Key
	Next Node	Select Section	
Zoom Out to Multi-Node Display		Step	

Display CPU Utilization

The CPU Utilization screen displays total utilization and the percentage of CPU utilization of each of the following processor modes:

- Interrupt stack
- MP synchronization
- Kernel mode
- Executive mode
- Supervisor mode
- User mode
- Compatibility mode

Display Top Processes Statistics

Process statistics are summarized and presented by the process key. The process statistics are presented in descending order by the selected metric value.

To summarize the process statistics according to a different key

- Press KP6.

  The available process keys are as follows:

  - TOP User metric
  - TOP Image metric
  - TOP Process metric
  - TOP Account metric
  - TOP PID metric

To change the metric displayed

- Press KP9.

The available metrics are as follows:

- CPU
- Disk IO
- Disk Thruput
- Soft Faults
- Hard Faults
- Buffered IO
- Direct IO
- WS pgs
- Private pages
- Global pages
- V/A pages

Display Top Device Statistics

Device statistics are summarized and presented by the device key. The device statistics are presented in descending order by the selected metric value.

To summarize the device statistics according to a different key

- Press KP6.

  The available device keys areas follows:

  - TOP Volume metric
  - TOP Disk metric
  - TOP Server metric

To change the metric displayed

- Press KP9.

  The available metrics are as follows:

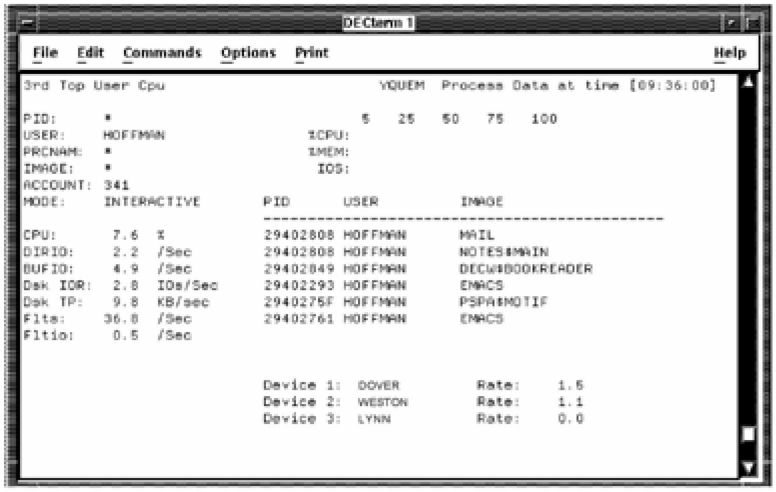
  - IO Rate
  - KB per second
  - Read Rate
  - Write Rate
  - Page/Swap IO Rate

Display Process Information

Performance Manager provides a Process display when you press KP7 from the single-node display when the Process Statistics section is selected or when you enter any of the following commands to the PSRT> prompt:

- USERNAME name
- IMAGENAME name
- PID *n*

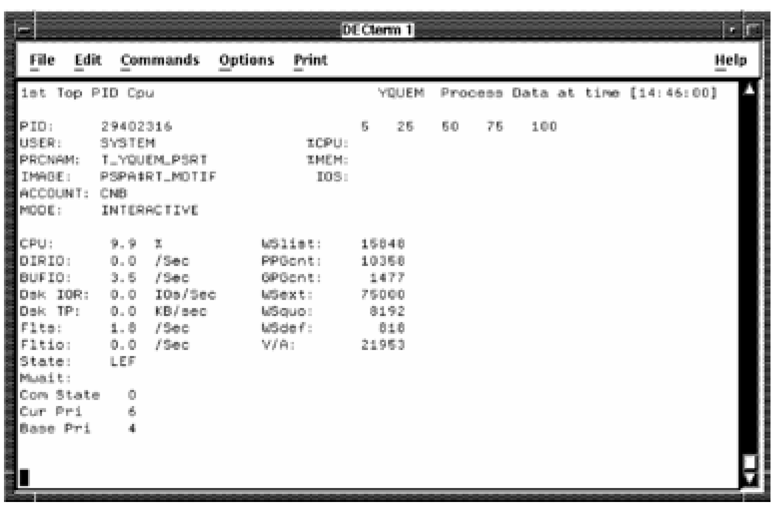
The following illustration is an example of a user name Process display:



In the upper left corner is a line describing the current summarization and sort position of the Process information. This text follows the format "nth TOP key metric", where you select the key by pressing KP6 (either User, Image, Processname, Accountname, or PID), and metric is selected by KP9 (see the previous section for a list of available metrics). To proceed to the nth + 1 entry, press KP1, or KP4 to go back. To lock the display on a specific process, enter PID *nnnnnnnn* for the desired PID.

Also in the upper left corner is the process identification section: user name, image name, process name, account name PID, and process mode for the currently displayed process. If any of these fields have an asterisk (*), more than one process has been summarized for this screen, and the given field had more than one value.

The following screen is an example of the Performance Manager Real-time Process Display, Single Process:



In the upper right corner is the name of the node and the current time of the data being viewed. Next, on the right side, are three bar charts that show CPU utilization, memory utilization and the processes working set as a percentage of the total system's memory, and the number of disk I/Os as a rate per second.

The mid-section of the screen contains the process statistics for the selected process, as in the previous illustration. If more than one process matches the selection criteria (such as a given user name), the working set data and state information is replaced by a list of processes that match the criteria, as in an earlier illustration (Performance Manager Real-time Process Display, Multiple Processes).

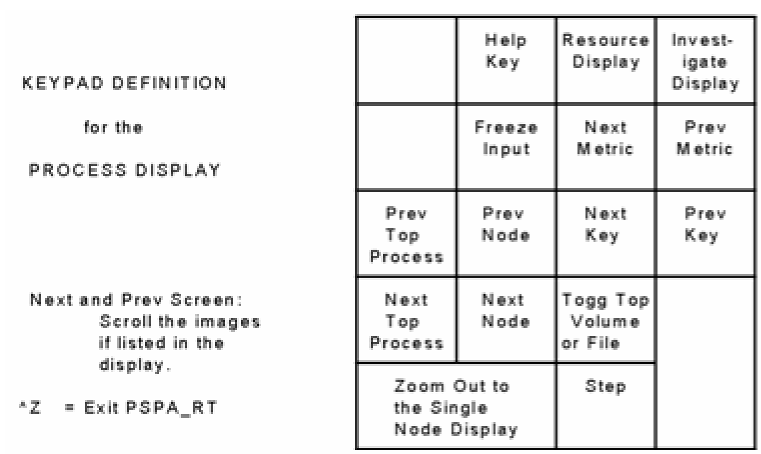
You can scroll through the process instances, as appear in the previous illustration, by using NextScreen and PrevScreen keys. If there is a particular PID, user name or image name that you want to lock the display on, enter the USERNAME, IMAGENAME, or PID command to do so.

For example:

```
PSRT> USER HOFFMAN
```

The last section of the display is the “volumes” section (also appearing in the earlier illustration showing Performance Manager Real-time Process Display, Multiple Processes), where disk volumes and I/O rates appear. These represent the top disks that the processes use and are list up to the top five disk volumes recorded by the main collector. By pressing KP3, you can view the top files being used by the processes. The top volumes and files data is available only when the /MODE=DISKFILE command and the default collection definition is used (/COLLECTION=CPD).

Press PF2 to view the keypad for Process displays. The following illustration shows the functions of the Process display keypad:

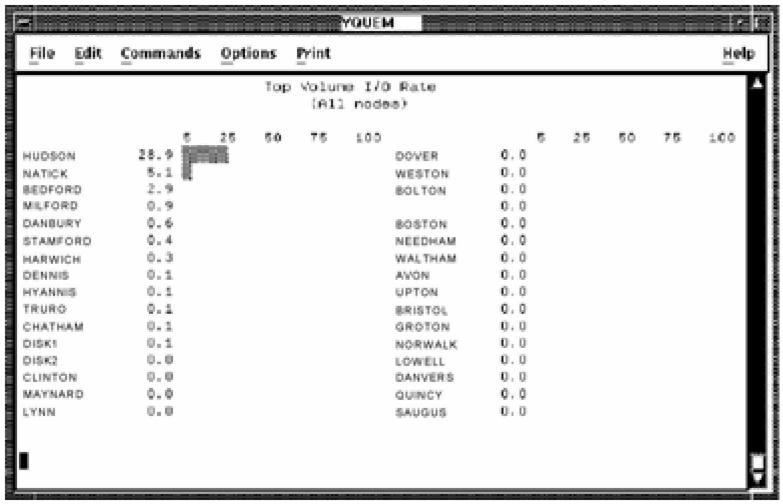


Display Disk Information

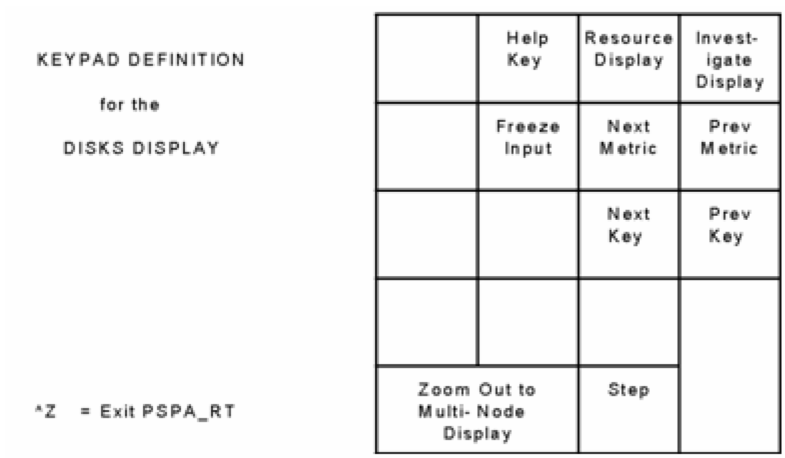
Performance Manager provides a Disks display when you enter the following command:

```
PSRT> DISKS
```

The following illustration is an example of a Disks display:



Press PF2 to view the keypad for the Disks display. The following illustration shows the functions of the Disks display keypad.



Press KP6 (to scroll through Disk keys and KP9) to scroll through disk metrics. To return to the multi-node display, press KP0.

Display Rules Information

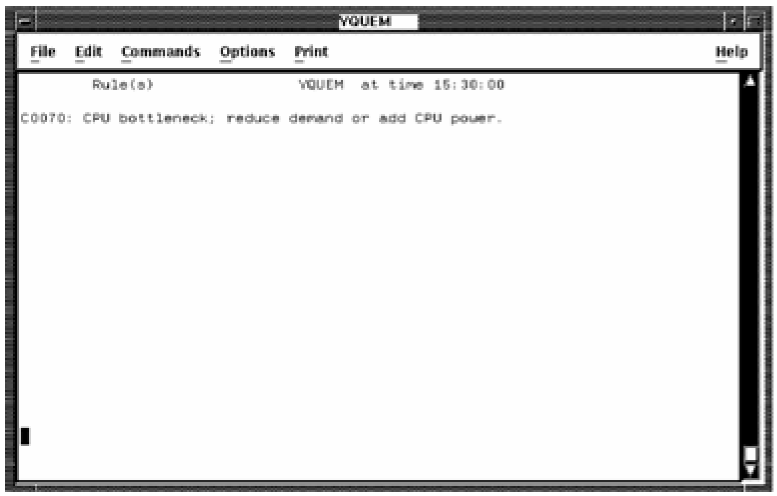
To obtain the Rules display

- Enter the RULES command.

  If any factory or user rules fire for the last data record processed, the rule ID and a brief explanation are displayed. If data is displayed at less than two-minute intervals, then only user rules are displayed.

Note: Rules in the Cluster and Summary domain are not displayed.

The following illustration is an example of a Rules display:



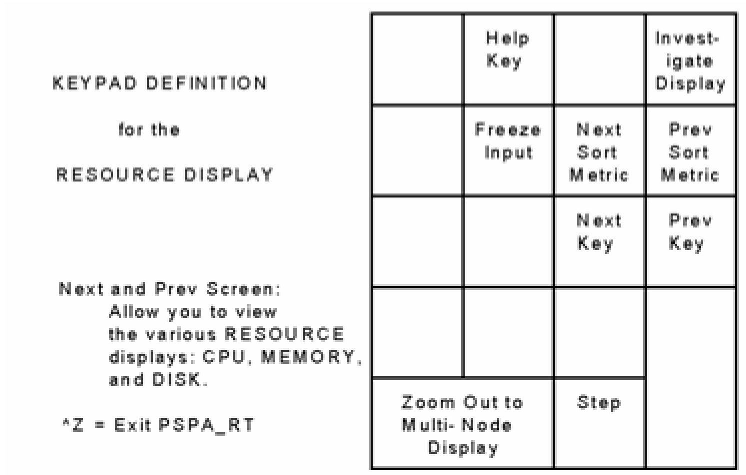
Display RESOURCE Information

The purpose of the Resource displays is to permit evaluation of resource utilization in interactive mode for one or more nodes in a cluster system.

```
RESOURCE CPU_DISPLAY
RESOURCE MEMORY_DISPLAY
RESOURCE DISK_DISPLAY
RESOURCE or press PF3
```

RESOURCE Keypad

The following illustration shows the functions of the RESOURCE keypad:



Balance Cluster System Utilization Using the Resource Display

Use the Resource displays to determine the workload on nodes and disks on your cluster system, and balance the workload as necessary. For example, if your Resource display shows one node that has a high percentage of a resource in use, you may wish to move work from that node to other nodes to balance resource utilization on your cluster system.

Each display shows cluster-wide information consisting of memory, disk, or CPU metrics for selected nodes and disks in a cluster. Each display consists of the following two parts:

- An upper part containing metrics appropriate to the display name (for example, memory-related metrics). This part is unique for each different type of display.
- A lower part containing memory utilization, direct I/O rate, and CPU utilization for selected nodes in the cluster. This part is the same for each of the three displays.

The lower portion of a display common to all three displays is described in the following section.

Lower (Common) Resource Display

The lower or common portion of each resource display contains bar graphs for nodes in the cluster. An example is the lower portion of the next illustration. The scale at left and right is graduated from 0 to 100, and is interpreted either as a percentage or an absolute value depending on the particular metric. There is a bar graph for each node in the current group set for display, the node name being displayed at the bottom of each graph.

The bar graph for a node contains three separate columns (metrics) as follows:

Memory Utilization (M)

This column is headed by the letter M, and is a percentage value as indicated by the percent sign (%) at the bottom of the column. The value is that of Total MEMutl expressed as a percentage. Total MEMutl is given by
(((Total Memory)-(Free Pages))/(Total Memory)).

I/O Rate (I)

This column is headed by the letter I, and is an absolute value (rate) as indicated by the letter R at the bottom of the column. The value is the Direct I/O rate (number of direct I/Os per second) for the node. If the rate exceeds 100 direct I/Os per second, the column is filled with asterisks.

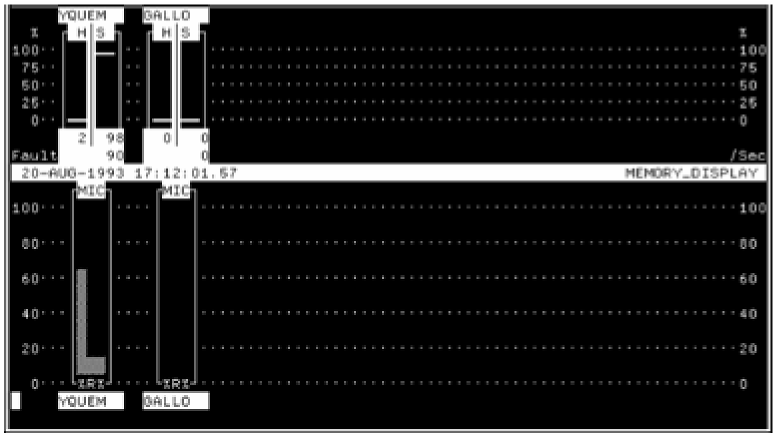
CPU Utilization (C)

This column is headed by the letter C, and is a percentage value as indicated by the percent sign (%) at the bottom of the column. The value is the percentage of the CPU being utilized, which is equal to the sum of the System and Task CPU percentages given in the tabular reports.

Memory Display

The Memory display contains memory statistics for analyzing a memory resource limitation is a cluster-wide manner.

An example of a resource Memory display is shown in the following illustration:



The top half of the memory display contains a bar graph for each cluster node currently set for display. The scale shown at right and left shows a percentage value ranging from 0 to 100%.

The name of the node is given at the top of an individual node graph, while the total page fault rate (faults per second) for the node is shown as a number at bottom right. Each node graph has two columns as follows:

Hard Faults (H)

This column is headed by the letter H, and is a percentage value. The value is not only given by the column height, but is also shown as a number at the bottom of the column. The value is the percentage of the total faults for the node that were hard (required a read from disk).

Soft Faults (S)

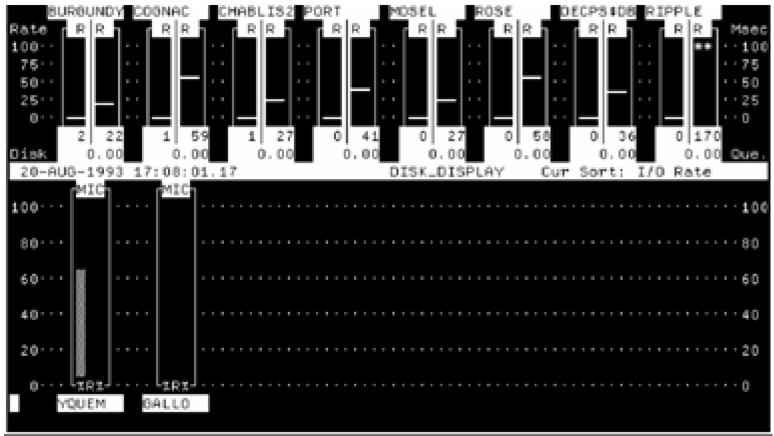
This column is headed by the letter S, and is a percentage value. The value is not only given by the column height, but is also shown as a number at the bottom of the column. The value is the percentage of the total faults for the node that were soft (resolved from memory without requiring a read from disk).

Note: The bottom value in this column is the total page fault rate (faults per second both hard and soft) for the node.

Disk Display

The Disk display contains disk statistics for analyzing an I/O resource limitation in a cluster-wide manner.

An example of a resource Disk display is shown in the following illustration:



The top half of the disk display contains a bar graph for each disk currently set for display. The scale shown at right and left shows an absolute value ranging from 0 to 100. The scale at left is headed with the word Rate, while the scale at right is head Msec (Milliseconds). The rate scale is used with the leftmost column in the bar graph for a particular disk, while the Msec scale is used with the rightmost column.

The name of the disk is given at the top of an individual disk graph. Preceding the disk name is a number, which corresponds to the number assigned the disk when listing disk groups with the SHOW GROUP command. This number allows a partial disk name, as given at the top of each disk graph, to be associated with the full disk name as given by SHOW GROUP subcommand. The number of I/O packets in the disk queue for each disk is shown as a number at the bottom right of each disk graph. Each disk graph has two columns as follows:

Rate (R)

This leftmost column is headed by the letter R, and is an absolute value. The value is not only given by the column height, using the leftmost scale (Rate scale), but is also shown as a number at the bottom of the column. The value is the number of direct I/Os per second for the disk.

Response (R)

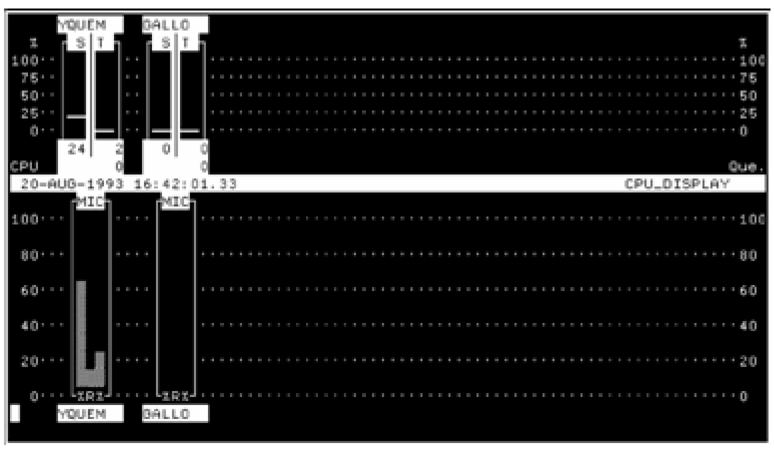
This rightmost column is headed by the letter R, and is an absolute value. The value is not only given by the column height, using the rightmost scale (Msec scale), but is also shown as a number at the bottom of the column. The value is the response time of the disk in milliseconds. This is the average time to process one I/O including both queuing time and service time.

Note that the bottom value in this column is the average number of I/O packets in the disk queue. If the value of the Rate or Response time exceeds 100, asterisks are shown at the top of the column, but the value is still given at the bottom of the column. If the actual value should exceed three digits, then asterisks are shown in place of the value.

CPU Display

The CPU display contains CPU statistics for analyzing a CPU resource limitation in a cluster-wide manner.

An example of a resource CPU display is shown in the following table:



The top half of the CPU display contains a bar graph for each cluster node currently set for display. The scale shown at right and left shows a percentage value ranging from 0 to 100%.

The name of the node is given at the top of an individual node graph, while the average number of processes in the CPU queue for the node is shown as a number at bottom right. There is a real queue if this number is greater than 1. This number is equivalent to the sum of processes in the computable queue (COM). Each node graph has two columns as follows:

System CPU (S)

This column is headed by the letter S, and is a percentage value. The value is not only given by the column height, but is also shown as a number at the bottom of the column. The value is the percentage of the total CPU time used by the System (Interrupt stack, Kernel mode, Executive mode).

Task CPU (T)

This column is headed by the letter T, and is a percentage value. The value is not only given by the column height, but is also shown as a number at the bottom of the column. The value is the percentage of the total CPU time used by user tasks (Supervisor, User, and Compatibility modes).

Note that the bottom value in this column is the average number of processes in the CPU queue. For a real queue to exist, this value must be at least 2.

The INVESTIGATE Command

The purpose of the Investigate displays is to help you evaluate performance on one node. All displays except one require use of a ReGIS-compatible terminal.

You may use the keypad or INVESTIGATE commands to control the display and its characteristics.

INVESTIGATE Command Options

The INVESTIGATE commands are shown in the following table:

Command	Function
INVESTIGATE CPU_DISPLAY	Displays CPU statistics.
INVESTIGATE IO_DISPLAY	Displays I/O statistics.
INVESTIGATE LOAD_BALANCE_DISPLAY	Displays load balance statistics.
INVESTIGATE MEMORY_DISPLAY	Displays memory statistics.
INVESTIGATE SYSTEM_OVERVIEW_DISPLAY	Displays system overview statistics.

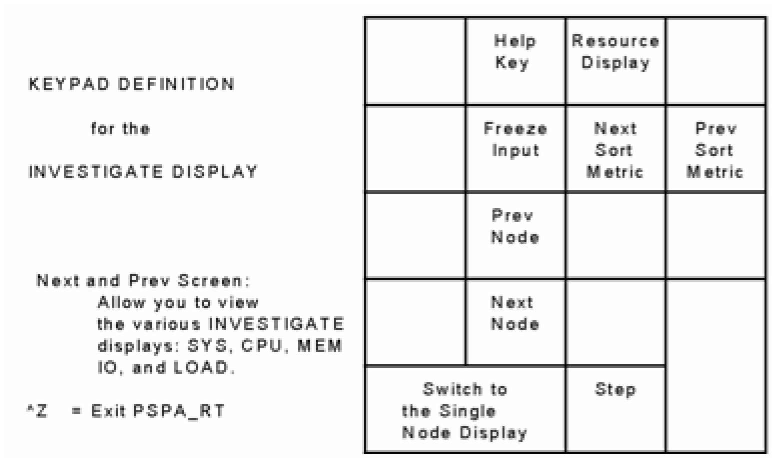
The Load Balance display is the only Investigate display available for both ReGIS and DEC_CRT terminals. It contains the same information in both cases. On ReGIS terminals, it is a Kiviat graph, and for DEC_CRT terminals, it is a bar graph.

The System Overview is the default Investigate display for ReGIS-compatible terminals, and for non-ReGIS or DEC_CRT terminals the default is the Load Balance display.

The following illustrations show an example of the ReGIS version of the system Overview display, an example of the ReGIS Load Balance display (Kiviat), and an example of the DEC_CRT (ANSI) version of the Load Balance display. Additional displays show memory, I/O, and CPU statistics and require a ReGIS-compatible terminal. There is also an example of the Memory display, an example of the I/O display, and an example of the CPU display.

INVESTIGATE Keypad

The following illustration shows the functions of the INVESTIGATE keypad:



Evaluate Performance Using the Investigate Displays

The System and Load Balance displays provide graphic information to determine which of the three main system resources (memory, I/O, or CPU) is a limitation. To investigate a limitation in more detail, use the Memory, I/O, and CPU displays.

Note: For a detailed description of a system tuning methodology, see HP's OpenVMS Performance Management guide.

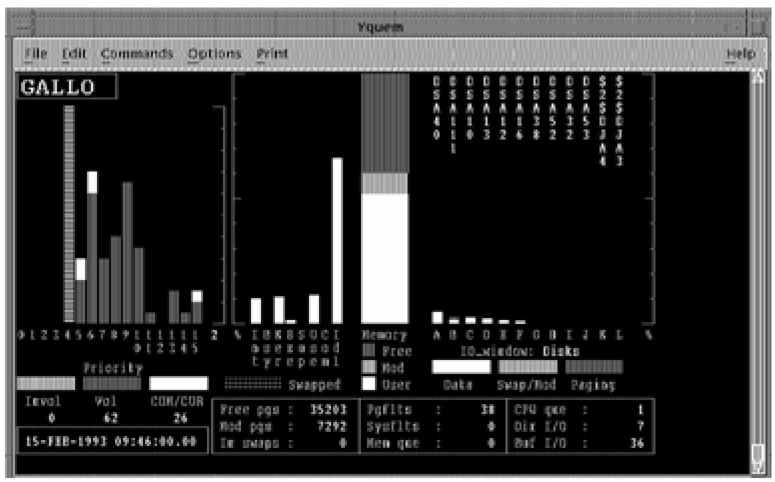
When determining a limitation in a main resource, investigate the resources in the following order:

1. Memory
2. I/O
3. CPU

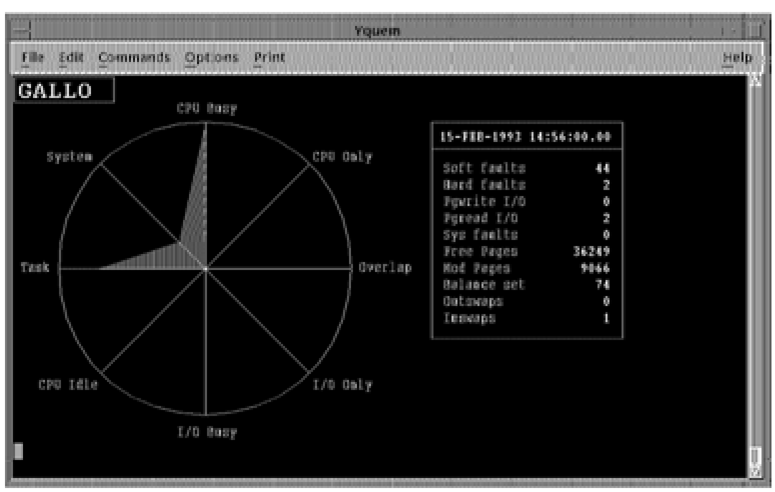
The order is important because memory limitations cause paging and swapping, which lead to I/O and CPU problems.

Begin your tuning investigation by using the System Overview or Load Balance displays, as shown in the following screens:

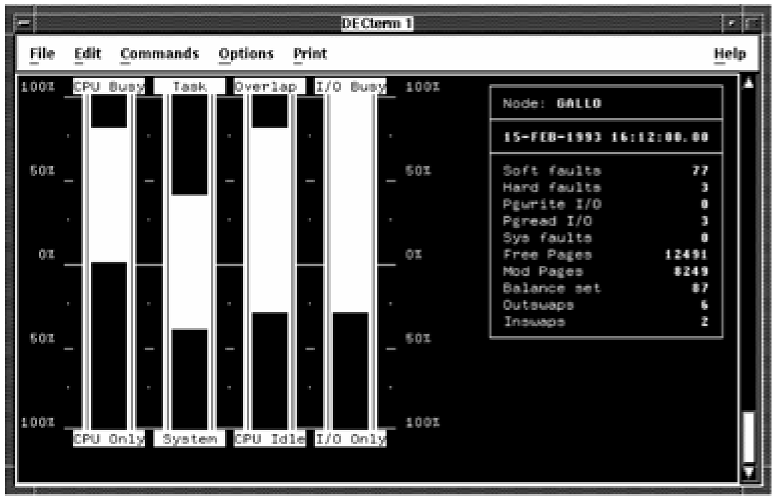
ReGIS System Overview Display



System Load Balance Display (ReGIS)



LOAD_BALANCE Display (ANSI)



Investigate a Memory Limitation

The chief indicators of a memory limitation are as follows:

No free memory

Look at the value of free pages, the memory bar histogram, and the memory queue (Mem que).

If the value of free pages approaches that of FREELIM (the system parameter that sets a lower limit on the number of pages on the free list), this indicates a memory shortage.

The memory bar histogram shows the amount of memory used by the free and modified page lists with respect to that available for user working sets. Again, a shortage of memory for the page caches (free plus modify lists) indicates a high degree of user memory utilization, and consequently a memory shortage.

A nonzero value of Mem que indicates processes in the memory queue in computable outswapped states, awaiting memory that is unavailable.

Page fault high

Look at the value of Pgflts (page faults), Sysflts (system faults), and paging in the IO_window for disks.

For a VAX-11/780 CPU, a value of Pgflts (page fault rate, or number of faults [hard and soft, including system] per second) greater than 100 is cause for concern. For other CPUs, use an appropriate threshold such as that supplied with the factory knowledge base. If Pgflts is greater than this number, page faults might be excessive on your system.

Sysflts (the rate at which pages are faulted into the system working set) should be no more than 1 fault per second; otherwise, the system is faulting itself to do work on the users' behalf. If system faults are high, it might be necessary to increase the value of system parameter SYSMWCNT, which controls the system working set size.

If disks are spending an excessive percentage of their time doing paging (indicated by the disk bars in the IO_window), then a memory limitation is causing harmful I/O effects.

Swapping high

Look at the value of “Inswaps,” the value of “Mem que,” and the amount of swapping and modified page writing done by the disks (Swap/Mod in the disk bars).

Inswaps gives the number of processes that were swapped back into memory during the last sample interval, and Mem que is the number of processes waiting for memory. If these are significant, then swapping is a problem on your system, and either indicates a memory limitation or memory management problem.

If disks are spending an excessive percentage of their time doing swapping and modified page writing (indicated by the disk bars in the IO_window), then a memory limitation is causing harmful I/O effects.

Investigate an I/O Limitation

The chief indicators of an I/O limitation are as follows:

Direct I/O high

Look at the value of Dir I/O, as well as Data in the disk bar histogram.

Dir I/O gives the system-wide direct I/O rate, including all disks. If there is a high direct I/O rate for your system, the disks might be a bottleneck. A value for direct I/O rate that exceeds this number indicates a high direct I/O rate.

Data in the disk bars shows how much of the disk's time is spent doing I/O on behalf of the user. A high rate for a given disk may indicate that the disk is a bottleneck.

Buffered I/O high

A high value of Buf I/O (the buffered I/O rate) may indicate an I/O limitation. If the value of Buf I/O exceeds this number, a high buffered I/O rate is indicated.

Investigate a CPU Limitation

The chief indicators of a CPU limitation are as follows:

Processes in the CPU queue

Look at the value of CPU queue and at processes in the COM/CUR states in the Priority bars.

CPU que gives the number of processes waiting for the CPU (COM state). There is a real queue if this value is greater than 1. (The process displaced by Performance Manager; the NULL process is not counted.) The existence of a real CPU queue indicates a CPU limitation.

A significant number of processes in the COM/CUR states (COM = computable, waiting for the CPU; CUR = the current process) also indicates a CPU queue, and consequently a CPU limitation.

No idle time

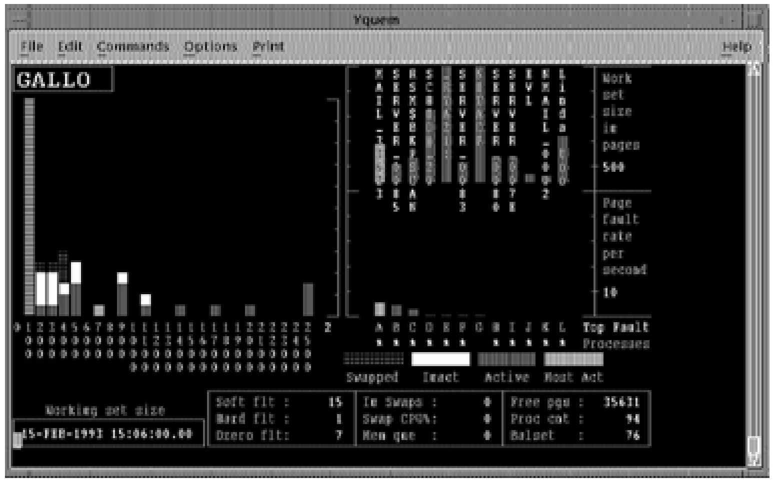
Look at the Idle (Idl) bar in the center of the display. If there is no CPU idle time, then the CPU is a limitation.

System CPU time high

Compare the system CPU time (sum of Int/Ker/Exe bars) with the task CPU time (sum of Sup/Com/Use bars). The system CPU time is the sum of time spent on the interrupt stack, and in kernel and executive modes. The task CPU time is the sum of time spent in supervisor, compatibility, and user modes. The sum of interrupt and kernel CPU time should not exceed 40 percent in most environments.

Isolate the Cause of a Memory Limitation

If an examination of the system overview reveals a memory limitation, you can investigate the cause of the limitation in more detail using the Memory display. The following illustration is an example of the Memory display:



The Memory display draws attention to the following indicators:

Hard versus Soft faults

Look at the value of Hard flt and Soft flt. Hard flt gives the number of page faults per second that were resolved by reading from the disk. Soft flt gives the number of faults per second resolved from memory. A hard fault involves I/O and is more expensive than a soft fault. Hard faults in a properly managed system should be no more than about 10 percent of the total faults (Hard flt + Soft flt).

Inappropriate working set (WS) sizes

Look at the Process bars at the right on the Memory display. This shows the working set size and page fault rate for the top faulting processes. Adjust the scaling factors, if necessary. Look for processes that are faulting heavily but have small working sets. If your system has ample memory, increase the working set quota (WSQUOTA) and the working set extent (WSEXTENT) for these processes. If memory is short on your system, increase WSQUOTA and WSEXTENT for these processes at the expense of processes that are not faulting but have large working sets.

Inappropriate automatic working set adjustment (AWSA) parameters

Look at the Process bars at the right on the Memory display. Look for top faulting processes with fluctuating working set sizes. If the working set size for such a process increases and decreases accompanied by page faulting, then the AWSA parameters might be out of adjustment. System parameters that affect automatic working set adjustment are PFRATH, PFRATL, WSINC, WSDEC, AWSTIME, AWSMIN, GROWLIM, BORROWLIM, and QUANTUM. Automatic decrementing can be turned off by setting PFRATL = 0 (this is normally recommended). Do not change any of the other parameters without a thorough understanding of the AWSA mechanism.

The automatic memory reclamation mechanism of OpenVMS should be enabled. This is controlled with the SYSGEN parameter MMG.CTLFLAGS.

Too many image activations

Look at the value of Dzero flts. A large number of demand zero faults indicates an excessive number of image activations. Activating an image in a process involves considerable overhead. If Dzero faults is a large percentage of total faults (Hard flt + Soft flt), image activations might be excessive. Paging induced by image activations is unlikely to respond to system parameter changes. Application design changes are needed.

Balance set too small

Look at Proc cnt (number of processes on system), Balset (number of processes in balance set), Free pgs (number of pages of free memory), and swapped processes. If the balance set count is too small, processes are swapped even if there is still free memory. If Balset is significantly less than Proc cnt, and Free pgs is adequate, then the balance set count is too low. Set the system parameter BALSETCNT to a value two less than the system parameter MAXPROCESSCNT.

A few active processes consuming memory

Look at the Process bars, in particular for active processes with large working sets. For example, a low priority compute-bound process is less likely to be swapped than one that performs terminal I/O. They may cause other processes to swap.

Decreasing DORMANTWAIT may help if the large processes are above their working set quotas. You can also suspend the large process with SET PROCESS/SUSPEND and allow the swapper to trim it back to SWPOUTPGCNT. The underlying problem might be that WSQUOTA is too large for the process.

Large processes with swapping disabled

Look at the Working Set and Process bars for inactive processes with large working sets. If these processes have swapping disabled, they cannot be swapped but retain memory at the expense of other processes. Use the system dump analyzer (SDA) to see if a large, inactive process has the PSWAPM (prohibit swap mode) bit set.

Inappropriate page cache sizes

Look at the page fault rate (Hard flt and Soft flt), free memory (Free pgs), and swapping (Working Set and Process bars).

If the overall fault rate is high, and the faults are mostly soft faults, the page cache might be too large. This may also be accompanied by swapping and extensive free and modified page lists. The page cache is encroaching on memory that could be made available for working sets.

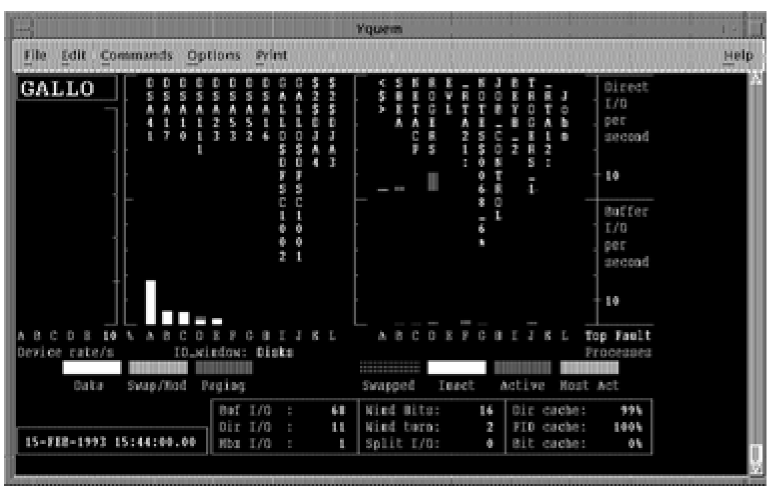
If the overall faulting rate is low while the hard fault rate is high, the page cache is ineffective; that is, the free page list and/or modified page list is too small. There is ample memory for working sets but the caching effectiveness is low.

The sizes of the page caches are controlled by the system parameters FREELIM, FREEGOAL, MPW_LOLIMIT, and MPW_THRESH.

Isolate the Cause of an I/O Limitation

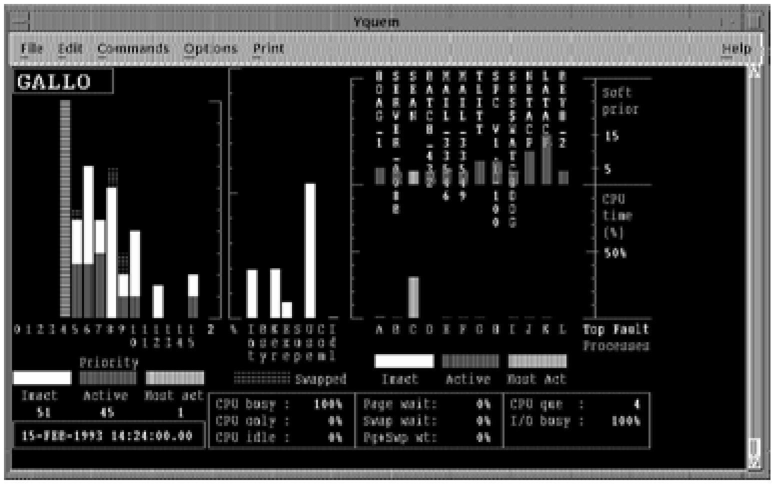
If an examination of the system overview reveals an I/O limitation, you can investigate the cause of the limitation in more detail using the I/O display.

The following illustration is an example of the I/O display:



Isolate the Cause of a CPU Limitation

If an examination of the system overview reveals a CPU limitation, you can investigate the cause of the limitation in more detail using the CPU display. The following illustration is an example of the CPU display:



Examine the following CPU display indicators:

Any available CPU

Look at the Idl bar (CPU Idle time) in the CPU mode bars in the middle of the CPU display. If there is no idle time, the CPU is a bottleneck.

A few processes blocking other processes

The blocking high-priority process might be: running an inefficient program, acting as a server, or acting as a process with which other processes must communicate.

Look at the Priority bars for high-priority, active processes, or at the Process bars for high-priority processes with a high CPU time percentage. Corrective action might include changing process priorities in the user authorization file, defining priorities in the user login command file, or changing the priorities of processes while they execute.

Lost CPU time

Look at Page wait, Swap wait, and Pg+Swp Wt. CPU time might be lost because the CPU has to wait for disk transfers, or page or swap I/O to complete.

A high value of Pg+Swp Wt is cause for concern. It indicates a memory problem resulting in a CPU limitation.

High device CPU usage

Look at the CPU mode bars, Int (interrupt stack). A high value for Int might be cause for concern. Processes might be blocked from using the CPU because of too many device interrupts.

Use the ADVISE COLLECT SYSTEM command to collect system-wide PC samples and determine the system module usage (for example, the device driver); hence, the device(s) responsible for the excessive interrupts.

Excessive kernel and/or executive CPU time

Look at the Ker (Kernel) and Exe (Executive) bars in the CPU mode bars. If time in Kernel mode is excessive and is not due to page faulting, or if time in Executive mode is excessive, use the ADVISE COLLECT SYSTEM command to collect system-wide PC samples, and determine the processes and system modules responsible.

Interrupt plus kernel CPU time should not be greater than 40 percent of total CPU time.

Exit the Character-Cell Displays

To exit the Performance Manager Real-time character-cell displays

- Press Ctrl+Z at the PSRT> prompt.

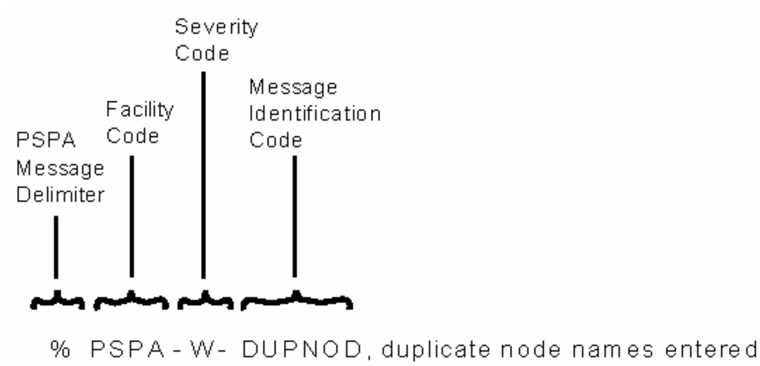
Appendix A: Performance Manager Messages and Recovery Procedures

This appendix describes messages that the Performance Manager software generates.

This section contains the following topics:

Sample Performance Manager Message

The following illustration illustrates the parts of a sample Performance Manager message:



Severity Codes

The following table defines the severity codes that are assigned to messages:

Severity Code	Explanation
I	Informational; the Performance Manager software sometimes provides additional information about an action.
W	Warning; the command may have performed some, but not all, of a requested action; verify the command or output.

Severity Code	Explanation
E	Error; The output or program result is incorrect, but the Performance Manager software attempts to continue the execution.
F	Fatal; the Performance Manager software terminates execution of the request.

To display error messages

- Type the following command:

  ```
  $ HELP ADVISE PERFORMANCE ERROR
  ```

  Each description includes a recovery procedure. Messages are listed alphabetically by the identification code that precedes the text of each message.

Appendix B: Performance Manager Logical Names

Performance Manager logical names begin with the prefix PSPA$. This appendix lists those names and describes how they are used to control various aspects of the Performance Manager module.

This section contains the following topics:

PSPA$DISPLAY_PROCESS_CPU_UNNORMALIZED

When this logical name is defined to anything, the Real-time Character-Cell display utility (ADVISE PERFORMANCE DISPLAY CHARACTER_CELL) displays the process CPU Utilization percentage relative to a single CPU, rather than to the total CPU time available for all CPUs in the system. This has an effect only when viewing processes on an SMP system containing more than one CPU. By default all CPU percentages are displayed relative to the total CPU time across all CPUs in the system.

This logical name has an effect on the single-node display and the process display when the current process key is either Top PID or Top Process. Top Users, Images, or Accounts will always show the CPU utilization percentage normalized with respect to the total system CPU time.

PSPA$DNS_NAMES

Define this logical name in the Process table to a node name translation file specification. Create this file to enable Real-time data transport in DECnet Phase V environments when Node Synonyms are not defined.

The file contains translations from OpenVMS cluster to DECnet Phase V fullname. The format of this ASCII file is one translation per line that consists of two names separated by a comma. The first name is a one to six character OpenVMS cluster name and the second name is a one to five hundred eleven character DECnet Phase V fullname (or segment thereof) or address that DECnet/OSI Phase V software will accept to establish a network connection. For example:

```
LATOUR,DEC:.TAY.StanWilks
```

PSPA$EXAMPLES

A system logical name defined by PSPA$STARTUP.COM indicating the directory where Performance Manager example files are located. This area may contain the following commands or rules:

PSPA$DAILY.COM	Template command procedure to generate daily reports
PSPA$GETDATA.COM	Command procedure to create image from PSPA$GETDATA.MAR and .C
PSPA$KB.VPR	Performance Manager factory rules source file

PSPA$GIVE_DEVICE_SERVICE

For the disk statistics section of the Performance Evaluation Report, the column labeled “Busy %” is changed to “Service Time,” when this logical name is defined to anything.

PSPA$GRAPH_CHARS

A user defined logical which specifies a string of six characters to be used in place of the normal ANSI graph legend characters.

PSPA$GRAPH_FILE_DEVICE

A user defined logical which when defined to anything causes the graph metrics for File Names to be displayed by file name and device.

PSPA$GRAPH_FILE_DIRECTORY

A user defined logical which when defined to anything causes the graph metrics for File Names to be displayed by file name and directory.

PSPA$GRAPH_LEGEND_FONT_POINT

Define this logical name to a number specifying a font point size for the PostScript graph item labels. If the PostScript Graph labels are longer than 24 characters, and you do not want the labels truncated, use this logical name to cause the labels to not truncate, and to be reduced in size, so as to fit on the page. By default, the graph legend font point is 10. Defining PSPA$GRAPH_LEGEND_FONT_POINT to 7 should reduce the font sufficiently, and a 5 makes the font size very small, but accommodates up to 50 characters.

PSPA$GRAPH_PATH

When this logical name is defined to anything, the graph metrics for "SCS Nodes" is displayed by pathname instead of nodename. This provides more detailed information about the load on each adapter for a given node.

PSPA$HLS

Specifies ReGIS HLS encodings enabling user specifications of color planes for the Performance Manager Color ReGIS graphs. The equivalence string must be a sequence of 4 plane definitions. The following example demonstrates the setting for the default graph colors:

```
$ DEFINE PSPA$HLS "H0L0S0 H0L50S50 H160L42S100 H0L100S0"
```

In this example, plane 0 is black (L0 - lightness zero%)and plane 3 is white (L100 - lightness 100%). H is HUE (0-360), S is SATURATION (0-100).

PSPA$PIE_FONT_POINT

Define this logical name to a number specifying a font point size for the PostScript pie chart item labels. If the pie chart labels are so long that they extend beyond the sides of the paper, use this logical name to cause the labels to fit on the page. By default PSPA$PIE_FONT_POINT is set to 10. Setting it to 7 should reduce the font sufficiently.

PSPA$PS_RGB_1 through PSPA$PS_RGB_6

These logical names allow the setting of the RGB color settings for the Performance Manager Color PostScript graphs. You can also use them to specify grey shades for black and white printers.

Each logical name pertains to one of the 6 colors that may appear. PSPA$PS_RGB_1 refers to the first color, appearing at the bottom of the graph, whose legend is located at the lower right of the display.

Specify a triplet of decimal values, separated by spaces, in the range of 0-1, where the first is for red, then green, and blue. A lower value produces a darker shade. For example the following settings establish the default colors for Performance Manager PostScript Graph Colors:

DEFINE PSPA$PS_RGB_1 ".22 1 .55"	Green
DEFINE PSPA$PS_RGB_2 ".77 .44 1 "	Magenta
DEFINE PSPA$PS_RGB_3 ".88 .77 .11"	Yellow
DEFINE PSPA$PS_RGB_4 ".33 .33 .22"	Brown
DEFINE PSPA$PS_RGB_5 "1 .22 0 "	Red, slightly Orange
DEFINE PSPA$PS_RGB_6 "0 0 1 "	Blue

If you want to specify grey shades, make the values for red, green and blue the same. For example:

DEFINE PSPA$PS_RGB_1 "0 0 0"	Black
DEFINE PSPA$PS_RGB_2 ".2 .2 .2"	
DEFINE PSPA$PS_RGB_3 ".4 .4 .4"	
DEFINE PSPA$PS_RGB_4 ".6 .6 .6"	
DEFINE PSPA$PS_RGB_5 ".8 .8 .8"	
DEFINE PSPA$PS_RGB_6 ".95 .95 .95"	near White

PSPA$SKIP_DISK_FILTER

For the disk reports, you can enable this logical name to have entries for shadowset member units included. By default, shadowset member units are not included in the disk reports. The logical name is enabled when defined to anything.

PSPA$SKIP_PIE_PERCENT

Define this logical to anything to suppress the printing of the percentages on the pie charts. If the pie chart labels are so long that they extend beyond the sides of the paper, the use of this logical name may make the labels fit.

PSPA$SUPRESS_TAPE_STATS_BY_VOLUME

The Tape Statistics section of the Performance Evaluation Report has a section for volumes, and a section for tape devices. If you define this logical name to anything, the tape statistics by volume is suppressed.

PSPA$UNNORMALIZE_CUSTOM_CPU

When this logical name is defined to anything, custom graphs of CPU utilization, depicting more than one node, will not have the percentage scaled by the nodes' Relative CPU power. By default, all composite graphs of CPU Utilization are scaled by each node's Relative CPU Power.

Appendix C: Performance Manager Data Cells

Data cells provide access to Performance Manager data for writing analysis rules or for writing your own applications. Each data cell entry is displayed in the following format:

- Data cell name (derived)
- Description
- Data Type
- Domains
- Target Domain

The *data cell name* is the name used when writing auxiliary rules. If a data cell is calculated from other data cells, thresholds, or provided routines, the word *derived* will be displayed in parentheses after its name.

The *description* explains the contents of the data cell. The *data type* describes the format of the data. Valid data types are:

- INDEX-SPECIFIER
- NUMERIC
- SCAN-ROUTINE
- STRING
- TALLY
- TIME

Domains identify the valid domains, by name, from which a rule may reference a data cell. When writing rules, specify a domain name as the rule's domain to access the data cell.

This section contains the following topics:

Data Cell Navigation Table

Use the following commands to navigate the data cells:

Click...	To move to this set of data cell descriptions...
A	ACTIVE_PROCESSORS through AWSA_IS_SLOW
B	BADPAGE_FAULT_RATE through BYTES_IN_PAGED_POOL
C	CHANNEL_OVER_THRESH_PORT through CW_VOLUME_NAME
D	DATAGRAMS_DISCARDED through DYN_MAXLEN
E	ENQUEUE_LOCKS_NOT_QUEUED_RATE through EXEC
F	FAMILY_NAME through FREE_BALANCE_SET_SLOTS
G	GLOBALPAGE_FAULT_RATE through GLOBAL_PGS_TALLY
H	HARD_FAULT_RATE through HSC_TYPE_HSC90
I	IDLE through IS_A_VAX
K	KB_MAPPED through KERNEL
L	LARGEST_BLK_IN_NONPAGED_POOL through LRP_MAXLEN
M	MAILBOX_READ_RATE through MULTI_IO
N	NETWORK_COUNT through NUM_PROCS_NOT_USING_WS_LOANS
O	OPEN_FILES through OUT_SWAP_RATE
Pa	PAGEFILE_PAGE_READ_RATE through PRIORITY_LOCKOUT
Pr	PROCESSES_IN_CEF through PSWP_WAIT
Q	QUOTA_CACHE_AR through QUOTA_CACHE_HR
R	RDTS_IN_LIST through RDT_WAIT_RATE
Sc	SCS_ADAPTERNAME through SWAP_WAIT
Sy	SYSGEN_ACP_DINDXCACHE through SYSTEM_FAULT_RATE
T	TAPE_CONTROLLER through TROLLER_IS_ON
U	USER through USER_NAME
V	VBS_INTSTK through VOLUME_NAME
W	WINDOW_TURN_RATE through WS_DECREMENTING_TOO_SEVERE
X	XQP_ACCESS_LOCK_RATE through XQP_VOL_SYNCH_LOCK_WAIT_RATE

Performance Manager Data Cells

ACTIVE_PROCESSORS (Derived)

This is the number of active CPUs for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

ANYIO_BUSYMET_F_SPMIOBUSY

Percentage of time that at least one disk device was busy for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

ANY_DISK_FULL (Derived)

This contains a Boolean value zero or one; where one (truth) represents the fact that the percentage of free space on any disk is less than or equal to the minimum disk free space percentage threshold, TD_MIN_DSKSPC_PCT. The data cell refers to the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

ANY_DISK_OVER_QL_THRESHOLD (Derived)

This contains a Boolean value zero or one; where one (truth) represents the fact that the queue length on any disk is greater than or equal to the maximum disk queue length threshold, TD_DISK_QL_MAX. The data cell refers to the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

ANY_DISK_OVER_THRESHOLD (Derived)

This contains a Boolean value zero or one; where one (truth) represents the fact that the operations rate on any disk is greater than or equal to the threshold for that disk type. The disk I/O threshold, such as TD_T21_RA81, is of the form TD_Tn_xxxx where n is the integer disk type as defined in STARLET, and xxxx is the disk model name. The data cell refers to the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

ARRIVG_DECNET_PACKET_RATEMET_F_ARRLOCPK

Average DECNET arriving local packet rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

AVERAGE_IRPS_INUSE (Derived)

This contains a value representing the average number of IRPs in use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

AVERAGE_LOCKS_INUSE (Derived)

This contains a value representing the average number of locks in use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

AVERAGE_LRPS_INUSE (Derived)

This contains a value representing the average number of LRPsin use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

AVERAGE_RESOURCES_INUSE (Derived)

This contains a value representing the average number of resources in use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

AVERAGE_SRPS_INUSE (Derived)

This contains a value representing the average number of SRPs in use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

AVERAGE_WORKING_SET_SIZE (Derived)

This contains the value of the average working set size for all processes for the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

AVG_NONPAGEDPOOLBYTES_INUSE (Derived)

This contains a value representing the average number of non-page pool bytes in use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

AWSA_IS_SLOW (Derived)

This contains a Boolean value zero or one where one (truth) represents the presence of slow automatic working set adjustment for 2 or more processes on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BADPAGE_FAULT_RATEMET_F_BADPAGE_FAULTS

Average number of page faults per second from the bad page list for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BATCH_COUNTMET_F_BATCH

This contains a value representing the average number of batch processes on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BIG_WS_AND_BIG_QUOTAS (Derived)

This contains a Boolean value representing the presence of large working sets and quotas on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BLKS_FREE_IN_NONPAGED_POOLMET_F_NP_FREE_BLOCKS

This contains the number of free blocks in non-paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BLKS_FREE_IN_PAGED_POOLMET_F_PG_FREE_BLOCKS)

This contains the number of free blocks in paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BLOCK_REQUEST_DATAS_INITIATEDSCS_F_REQDATS

This contains the value representing the number of block transfers initiated per second for request data's on the local node to the remote node for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

BLOCK_REQUEST_DATAS_INIT_TALLY (Derived)

This contains the sum of the values representing the number of block transfers initiated per second for request data's on the local node to the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

BLOCK_SEND_DATAS_INITIATEDSCS_F_SNDATS

This contains the value representing the number of block transfers initiated per second on the local node to the remote node for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

BLOCK_SEND_DATAS_INIT_TALLY (Derived)

This contains the sum of the values representing the number of block transfers initiated per second on the local node to the remote node for all the current configuration subrecords that were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

BUFFERED_IO_RATEMET_F_BUFIO

Average buffered I/O rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BUFFER_DESC_QUEUE_RATESCS_F_QBDT_CNT

This contains the value representing the number of times per second that a block transfer was queued because there were no available buffers on the local node to receive data from the remote node for the current configuration record and interval.

Data Type:	NUMERIC

Domains:	CFG

BUFFER_DESC_QUEUE_TALLY (Derived)

This contains the sum of the values representing the number of times per second that a block transfer was queued because there were no available buffers on the local node to receive data from the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

BYTES_FREE_IN_NONPAGED_POOLMET_F_NP_FREE

This contains the number of free bytes in non-paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BYTES_FREE_IN_PAGED_POOLMET_F_PG_FREE

This contains the number of free bytes in paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BYTES_IN_NONPAGED_POOLMET_F_NP_POOL_MAX

This contains the number of bytes in non-paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

BYTES_IN_PAGED_POOLMET_F_PG_POOL_MAX

This contains the number of bytes in paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_FREEMET_F_CACHE_FREE

This contains the number of free pages in the I/O Cache for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_MAXIMUMMET_F_CACHE_MAXI

This contains the maximum number of pages (SPTEs) in the I/O Cache for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_MISSES_LT33MET_F_CACHE_MISS_LT33

The number of read operations with a block size less than 33 that bypassed the XFC for the current interval for the local node.

Data Type:	NUMERIC
Domains:	LOC

CACHE_MISSES_3364MET_F_CACHE_MISS_3364

The number of read operations with a block size from 33 to 65 that bypassed the XFC for the current interval for the local node

Data Type:	NUMERIC
Domains:	LOC

CACHE_MISSES_65127MET_F_CACHE_MISS_65127

The number of read operations with a block size from 33 to 65 that bypassed the XFC for the current interval for the local node

Data Type:	NUMERIC
Domains:	LOC

CACHE_MISSES_128255MET_F_CACHE_MISS_128255

The number of read operations with a block size from 128 to 255 that bypassed the XFC for the current interval for the local node

Data Type:	NUMERIC
Domains:	LOC

CACHE_MISSES_GT255MET_F_CACHE_MISS_GT255

The number of read operations with a block size greater than 255 that bypassed the XFC for the current interval for the local node

Data Type:	NUMERIC
Domains:	LOC

CACHE_RBYPASSMET_F_CACHE_RBYPASS

This contains the number of read I/O operations per second bypassing the I/O cache for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_READHITSMET_F_CACHE_READHITS

This contains the number of read I/O operations per second to the I/O Cache that were satisfied by the cache, for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_READIOMET_F_CACHE_RDIO

This contains the number of read I/O operations per second to the I/O Cache for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_SIZEMET_F_CACHE_SIZE

This contains the current size (in pages) of the I/O Cache for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_USEDMET_F_CACHE_USED

This contains the number of used pages in the I/O Cache for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_WBYPASSMET_F_CACHE_WBYPASS

This contains the number of write I/O operations per second bypassing the I/O Cache for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CACHE_WRITEIOMET_F_CACHE_WRIO

This contains the number of write I/O operations per second to the I/O Cache for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CHANNEL_OVER_THRESH_PORT (Derived)

This contains the adapter nexus number that is experiencing excessive throughput on the local node for the current interval, or a zero. It is zero if the Boolean data cell EXCESS_THRUPUT_ON_ANY_CHANNEL is zero.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CHANNEL_OVER_THRESH_THRUPUT (Derived)

This contains a value representing the throughput rate through the adapter nexus port that is experiencing excessive throughput on the local node for the current interval, or a zero. It is zero if the Boolean data cell EXCESS_THRUPUT_ON_ANY_CHANNEL is zero.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CHANNEL_OVER_THRESH_TYPE (Derived)

This contains a text string representing the type of I/O adapter such as "CI", "MASSBUS",... that is experiencing excessive throughput on the local node for the current interval, or "None". It is "None" if the Boolean data cell EXCESS_THRUPUT_ON_ANY_CHANNEL is zero.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

COMMUNICATION_SCAN (Derived)

Provides the count of communication subrecords for which the specified rule expression is true. The expression will be evaluated for each communication subrecord.

Data Type:	SCAN
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	COM

COMM_CONTROLLER_NAMECOM_A_CTLR_NAME

This contains a string indicating the terminal controller of the current communication subrecord for the current interval.

Data Type:	STRING
Domains:	COM

COMM_OPERATION_RATECOM_F_OPCNT

This contains a value representing the average operations rate for the current communications subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM

COMM_OPERATION_RATE_TALLY (Derived)

This contains a value representing the sum of values of the average operations rate for all the current communications subrecords which were selected by the most recent COMMUNICATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	COM

COMO_PROCESSES_ARE_AT_BPRI (Derived)

This contains a Boolean value zero or one, one (true) representing the presence of processes in computable outswapped state and running at base priority on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

COMPATMET_F_COMPAT

Average percentage of CPU time spent in Compatibility mode for all processors in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

COMPUTABLE_PROCESSES (Derived)

This contains a value representing the number of computable processes (MET_F_COM + MET_F_COMO) on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

COMPUTABLE_PROCESSES_OVR_DEFPRI (Derived)

This contains a value representing the number of computable processes with a scheduling priority at or above the default priority DEFPRI on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

COM_SCALING (Derived)

This contains a value representing scaling factor for the compute queue length for the local node. The value is obtained from the threshold TD_COM_SCALING_n where n is the hardware model number of the local node. By default, if the local node is a VAX 11-780, the value would be 1.0. The value of this data cell can be modified using a threshold construct.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CONFIGURATION_SCAN (Derived)

Provides the count of configuration subrecords for which the specified rule condition is true. The condition will be evaluated for each configuration subrecord.

Data Type:	SCAN
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

CPUIO_BUSYMET_F_SPMCPUIO

Percentage of time that both the CPU and at least one disk device were busy for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CPUIO_IDLEMET_F_SPMSYSIDLE

Percentage of time that the CPU and all disk devices were idle for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CPU_BUSYMET_F_SPMBUSY

Percentage of time that the CPU was busy for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CPU_COMPATCPU_F_COMPAT

This contains the value representing the percent of time spent in COMPATIBILITY mode for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	NUMERIC
Domains:	CPU

CPU_COMPAT_TALLY (Derived)

This contains the sum of the values representing the percent of time in COMPATIBILITY mode for the current CPU subrecords which were selected by the most recent CPU_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_EXECCPU_F_EXEC

This contains the value representing the percent of time spent in EXEC mode for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	NUMERIC
Domains:	CPU

CPU_EXEC_TALLY (Derived)

This contains the sum of the values representing the percent of time in EXEC mode for the current CPU subrecords which were selected by the most recent CPU_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_IDLECPU_F_NULL

This contains the value representing the percent of time the CPU was idle for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	NUMERIC
Domains:	CPU

CPU_IDLE_TALLY (Derived)

This contains the sum of the values representing the percent of time the CPU was idle for the current CPU subrecords which were selected by the most recent CPU_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_INTERRUPTCPU_F_INTERRUPT

This contains the value representing the percent of time spent on the interrupt stack for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	NUMERIC
Domains:	CPU

CPU_INTERRUPT_TALLY (Derived)

This contains the value representing the percent of time spent on the interrupt stack for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_IS_PRIMARYCPU_C_PRIMID

This contains either the values 1, if the CPU for the current CPU subrecord is the primary CPU, or a 0 if it is not the primary CPU.

Data Type:	NUMERIC
Domains:	CPU

CPU_IS_RUNNINGCPU_C_RUN

This contains either the values 1, if the physical CPU for the current CPU subrecord is running, or a 0 if it is stopped.

Data Type:	NUMERIC
Domains:	CPU

CPU_KERNELCPU_F_KERNEL

This contains the value representing the percent of time spent in KERNEL mode for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	NUMERIC
Domains:	CPU

CPU_KERNEL_TALLY (Derived)

This contains the sum of the values representing the percent of time in KERNEL mode for the current CPU subrecords which were selected by the most recent CPU_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_MP_SYNCHCPU_F_MP_SYNCH

This contains the value representing the percent of time spent in MP_SYNCH mode for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	NUMERIC
Domains:	CPU

CPU_MP_SYNCH_TALLY (Derived)

This contains the sum of the values representing the percent of time in MP_SYNCH mode for the current CPU subrecords which were selected by the most recent CPU_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_ONLYMET_F_SPMCPUONLY

Percentage of time that a CPU was busy and all disk devices were idle for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CPU_PHYSICAL_ID (Derived)

This contains a string indicating the CPU's physical ID of the current CPU subrecord for the current interval.

Data Type:	STRING
Domains:	CPU

CPU_SCAN (Derived)

Provides the count of CPU subrecords for which the specified rule condition is true. The condition will be evaluated for each CPU subrecord.

Data Type:	SCAN
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_SUPERCPU_F_SUPER

This contains the value representing the percent of time spent in SUPERVISOR mode for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	NUMERIC
Domains:	CPU

CPU_SUPER_TALLY (Derived)

This contains the sum of the values representing the percent of time in SUPERVISOR mode for the current CPU subrecords which were selected by the most recent CPU_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_USERCPU_F_USER

This contains the value representing the percent of time spent in USER mode for the physical CPU represented by the current CPU subrecord and interval.

Data Type:	NUMERIC
Domains:	CPU

CPU_USER_TALLY (Derived)

This contains the sum of the values representing the percent of time in USER mode for the current CPU subrecords which were selected by the most recent CPU_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CPU

CPU_VUP_RATING (Derived)

This contains a value representing the VAX Unit of Processing (VUP) for a single physical processor for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

CW_DISK_CHANNEL_IO (Derived)

This contains a value representing the disk operations rate to the HSC's K.SDI channel associated with the current disk for all nodes during the current interval.

Data Type:	NUMERIC
Domains:	CLU

CW_DISK_CHANNEL_RATIO (Derived)

This contains a percentage value representing the cluster-wide ratio of disk operations for the current disk to the operations on the HSC's K.SDI channel associated with the current disk for all nodes during the current interval.

Data Type:	NUMERIC
Domains:	CLU

CW_DISK_ERROR_COUNT (Derived)

This contains a value representing the cluster-wide disk error count for the current disk for all nodes during the current interval.

Data Type:	NUMERIC
Domains:	CLU

CW_DISK_IO_RATE (Derived)

This contains a value representing the cluster-wide disk operations rate for the current disk for all nodes during the current interval.

Data Type:	NUMERIC
Domains:	CLU

CW_DISK_THRUPUT_RATE (Derived)

This contains a value representing the cluster-wide disk throughput rate in bytes per second for the current disk for all nodes during the current interval.

Data Type:	NUMERIC
Domains:	CLU

CW_TOP_FILE_NAME (Derived)

This contains a text string representing the file name of the file with the highest disk operations rate for all nodes for the current disk.

Data Type:	STRING

Domains:	CLU

CW_TOP_FILE_OPCNT (Derived)

This contains a value representing the disk operations rate of the file with the highest disk operations rate for the current disk for all nodes during the current interval.

Data Type:	NUMERIC
Domains:	CLU

CW_VOLUME_NAME (Derived)

This contains a string of text representing the cluster-wide volume name for the current disk during the current interval.

Data Type:	STRING
Domains:	CLU

DATAGRAMS_DISCARDEDSCS_F_DGDISCARD

This contains the value representing the number of datagrams discarded per second by the local node and received from the remote node for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

DATAGRAMS_DISCARDED_TALLY (Derived)

This contains the sum of the values representing the number of datagrams discarded per second by the local node and received from the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

DATAGRAMS_RECEIVEDSCS_F_DGRCVD

This contains the value representing the number of datagrams received per second on the local node from the remote node for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

DATAGRAMS_RECEIVED_TALLY (Derived)

This contains the sum of the values representing the number of datagrams received per second on the local node from the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

DATAGRAMS_SEND_RATESCS_F_DGSENT

This contains the value representing the number of datagrams sent per second from the local node to the remote node for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

DATAGRAMS_SEND_TALLY (Derived)

This contains the sum of the values representing the number of datagrams sent per second from the local node to the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

DEADLOCK_FIND_RATEMET_F_DLCKFND

This contains the number of deadlock finds per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DEADLOCK_SEARCH_RATEMET_F_DLCKSRCH

This contains the number of deadlock searches per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DECNET_RECV_BUFF_FAIL_RATEMET_F_RCVBUFFL

This contains the number of times per second the DECNET receiver buffer failed for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DECNET_TRANSIT_CONGSN_LOSS_RATEMET_F_TRCNGLOS

Average DECNET transit congestion loss rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DECNET_TRANSIT_PACKET_RATEMET_F_ARRTRAPK

Average rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DEMANDZERO_FAULT_RATEMET_F_DZROFLTS

Average number of demand zero pagefaults per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DEPARTG_DECNET_PACKET_RATEMET_F_DEPLOCPK

Average DECNET departing local packet rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DEVICE_NAMEDEV_A_DEVNAME

This contains a string indicating the disk device of the disk for which the current disk subrecord pertains (e.g., 2DUA11).

Data Type:	STRING
Domains:	DSK

DIRECTORY_DATA_CACHE_AR (Derived)

Attempt rate per second to the directory data cache for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DIRECTORY_DATA_CACHE_HR (Derived)

Hit ratio to the directory data cache for the local node for the current interval record. Calculated by dividing the number of directory data cache hits by the number of directory data cache attempts (hits + misses), times 100.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DIRECTORY_INDEX_CACHE_AR (Derived)

Attempt rate per second to the directory index cache for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DIRECTORY_INDEX_CACHE_HR (Derived)

Hit ratio to the directory index cache for the local node for the current interval record. Calculated by dividing the number of directory index cache hits by the number of directory index cache attempts (hits + misses), times 100.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DIRECT_IO_RATEMET_F_DIRIO

Average direct I/O rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

DISK_BUSY_PERCENTDEV_F_BUSY

This contains a value representing the average percent of time the I/O requests were outstanding to the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_BUSY_PERCENT_TALLY (Derived)

This contains the sum of the values representing the average busy percentage for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_CACHE_NAMEDEV_A_CACHENAME

This contains a string representing the file specification of the cache for the current disk on the local node for the current interval.

Data Type:	STRING
Domains:	DSK

DISK_CONTROLLERDEV_A_CTLR_NAME

This contains a string indicating the controller name of the current disk on the local node for the current interval (e.g., DUA).

Data Type:	STRING
Domains:	DSK

DISK_DINDX_CACHE_SIZEDEV_F_DINDXSIZE

This contains a value representing the number of entries in the directory index cache for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_DIRDATA_CACHE_SIZEDEV_F_DIRSIZE

This contains a value representing the number of entries in the directory data cache for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_ERROR_COUNTDEV_F_ERRCNT

This contains a value representing the number of errors recorded for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_ERROR_COUNT_TALLY (Derived)

This contains the sum of the values representing the number of errors for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_EXTENT_CACHE_SIZEDEV_F_EXTSIZE

This contains a value representing the number of entries in the file extent cache for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_FID_CACHE_SIZEDEV_F_FIDSIZE

This contains a value representing the number of entries in the file ID cache for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_FREE_PAGESDEV_F_FREE

This contains a value representing the average number of free pages on the current disk on the local node for the current interval.

Data Type:	NUMERIC

Domains:	DSK

DISK_FREE_PAGES_TALLY (Derived)

This contains the sum of the values representing the number of free pages for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_HAS_A_PAGING_FILE (Derived)

This contains a Boolean value representing true (1.0) if there is a paging file installed on the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_HAS_A_SWAPPING_FILE (Derived)

This contains Boolean a value representing true (1.0) if there is a swapping file installed on the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_HEADER_CACHE_SIZEDEV_F_HDRSIZE

This contains a value representing the number of entries in the file header cache for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_INTERVAL_MSDEV_F_ITVL

This contains a value representing the uptime of the disk in milliseconds for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_IO_RATEDEV_F_OPCNT

This contains a value representing the average number of I/O requests per second to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_IO_RATE_TALLY (Derived)

This contains the sum of the values representing the average I/O rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_IO_RATE_THRESHOLD (Derived)

This contains a value representing the disk I/O rate threshold for the current disk during the current interval. This value is obtained from the threshold TD_Tn_xxxx where n is the disk type model number found in STARLET ($DCDEF) for the current disk, and xxxx is its type (e.g., TD_T21_RA81).

Data Type:	NUMERIC
Domains:	CLU

DISK_IS_SERVED (Derived)

This contains a Boolean value indicating whether the current disk is MSCP served during the current interval.

Data Type:	NUMERIC
Domains:	CLU

DISK_MAP_CACHE_SIZEDEV_F_MAPSIZE

This contains a value representing the number of entries in the bitmap cache for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_MAX_BLOCKSDEV_F_MAXBLOCK

This contains a value representing the maximum number of blocks on the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_MOST_FULL_X (Derived)

This contains an index pointing to the disk subrecord experiencing excessively limited free space on a disk on the local node for the current interval. It is set up when the cell ANY_DISK_FULL becomes true.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_MSCP_IO_RATEDEV_F_MSCPOP

This contains a value representing the average number of MSCP served I/O requests per second to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_MSCP_IO_RATE_TALLY (Derived)

This contains the sum of the values representing the average MSCP served I/O rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_MSCP_PAGING_IO_RATEDEV_F_MSCPPG

This contains a value representing the average number of MSCP served paging I/O requests per second to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_MSCP_PAGING_IO_TALLY (Derived)

This contains the sum of the values representing the average MSCP served paging I/O rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_MSCP_THRUPUT_RATEDEV_F_MSCPIO

This contains a value representing the average number of bytes per second transferred to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_MSCP_THRUPUT_TALLY (Derived)

This contains the sum of the values representing the average MSCP served throughput rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_OVER_QL_THRESHOLD_X (Derived)

This contains an index pointing to the disk subrecord experiencing an excessive queue length on a disk on the local node for the current interval. It is set up when the cell ANY_DISK_OVER_QL_THRESHOLD becomes true.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_OVER_THRESHOLD_X (Derived)

This contains an index pointing to the disk subrecord experiencing an excessive operations rate on a disk on the local node for the current interval. It is set up when the cell ANY_DISK_OVER_THRESHOLD becomes true.

Data Type:	INDEX

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_PAGING_IO_RATEDEV_F_PAGOP

This contains a value representing the average number of paging I/O requests per second to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_PAGING_IO_RATE_TALLY (Derived)

This contains the sum of the values representing the average paging I/O rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_PAGING_THRUPUT_RATEDEV_F_PAGIO

This contains a value representing the average number of bytes per second for paging I/Os transferred to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_PAGING_THRUPUT_TALLY (Derived)

This contains the sum of the values representing the average paging throughput rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_QUEUE_AT_SERVER (Derived)

This contains a value representing the OpenVMS node server queue length for the local disk during the current interval. For an HSC based disk, this cell This contains the highest queue for all nodes on the CI.

Data Type:	NUMERIC
Domains:	CLU

DISK_QUEUE_LENGTHDEV_F_QLEN

This contains a value representing the average number of outstanding I/O requests for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_QUEUE_LENGTH_TALLY (Derived)

This contains the sum of the values representing the average queue length for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_QUOTA_CACHE_SIZEDEV_F_QUOSIZE

This contains a value representing the number of entries in the quota cache for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_READ_IO_RATEDEV_F_RDCNT

This contains a value representing the average number of read I/O requests per second from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_READ_IO_RATE_TALLY (Derived)

This contains the sum of the values representing the average read I/O rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_SCAN (Derived)

Provides the count of disk subrecords for which the specified rule condition is true. The condition will be evaluated for each disk subrecord.

Data Type:	SCAN
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_SERVER_HWNAMEDEV_A_HWNAME

This contains a string indicating the hardware name of the Integrity server, or Alpha node which serves the current disk to the local node for the current interval. If the server is an HSC, this field is blank.

Data Type:	STRING
Domains:	DSK

DISK_SERVER_HWTYPEDEV_A_HWTYPE

This contains a string indicating the hardware type of the cluster node which serves the current disk's data to the local node for the current interval (e.g., HS50, ALPHA, IA64).

Data Type:	STRING
Domains:	DSK

DISK_SERVER_NODENAMEDEV_A_NODENAME

This contains a string indicating the cluster node name of the node which serves the current disk's data to the local node for the current interval.

Data Type:	STRING
Domains:	DSK

DISK_SERVICE_TIMEDEV_F_SERVICE

This contains a value representing the average number of milliseconds between the I/O events START-IO and END-IO for all I/Os for the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_SERVICE_TIME_TALLY (Derived)

This contains the sum of the values representing the average number of milliseconds between the I/O events START-IO and END-IO for all I/Os for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_SPLIT_IO_RATEDEV_F_SPLIT

This contains a value representing the average number of split I/O requests per second to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_SPLIT_IO_TALLY (Derived)

This contains the sum of the values representing the average split I/O rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_SWAPPING_IO_RATEDEV_F_SWPOP

This contains a value representing the average number of swapping I/O requests per second to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_SWAPPING_IO_TALLY (Derived)

This contains the sum of the values representing the average swapper I/O rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_SWAPPING_THRUPUT_RATEDEV_F_SWPIO

This contains a value representing the average number of bytes per second (for swapping I/Os) transferred to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_SWAPPING_THRUPUT_TALLY (Derived)

This contains the sum of the values representing the average swapper throughput rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_THRUPUT_RATEDEV_F_IOCNT

This contains a value representing the average number of bytes per second transferred to and from the current disk on the local node for the current interval.

Data Type:	NUMERIC
Domains:	DSK

DISK_THRUPUT_RATE_THRESHOLD (Derived)

This contains a value representing the disk throughput rate threshold for the current disk. This value is obtained from the threshold TD_In_xxxx where n is the disk type model number found in STARLET ($DCDEF) for the current disk, and xxxx is its type (e.g., TD_I21_RA81).

Data Type:	NUMERIC
Domains:	CLU

DISK_THRUPUT_TALLY (Derived)

This contains the sum of the values representing the average throughput rate for the current disk subrecords which were selected by the most recent DISK_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

DISK_TOP_OPERATION_FILE_X (Derived)

This contains an index specifier identifying the hot file subrecord for the hottest file in terms of I/O operations per second on the current disk on the local node for the current interval.

Data Type:	INDEX
Domains:	DSK
Target Domains:	FIL

DISK_TOP_SPLIT_IO_FILE_X (Derived)

This contains an index specifier identifying the hot file subrecord for the hottest file in terms of split I/O operations per second on the current disk on the local node for the current interval.

Data Type:	INDEX
Domains:	DSK
Target Domains:	FIL

DYN_EXPANSION_COUNT (Derived)

A count of the number of times nonpaged pool is increased, for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

DYN_MAXLEN (Derived)

The maximum number of bytes in nonpaged pool for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

ENQUEUE_LOCKS_NOT_QUEUED_RATEMET_F_ENQNOTQD

This contains the number of enqueue lock requests not queued per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

ENQUE_LOCKS_FORCED_TO_WAIT_RATEMET_F_ENQWAIT)

This contains the number of enqueue lock requests per second that had to enter the lock wait queue for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

ERASE_QIO_RATEMET_F_ERASEIO

Average erase QIO rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

EXCESS_THRUPUT_ON_ANY_CHANNEL (Derived)

This contains a Boolean value of zero or one; one (true) represents the presence of excessive throughput on an I/O channel on the local node for the current interval. This is determined if the channel I/O exceeds the amount indicated by the appropriate threshold, TD_MASSBUS_CHANNEL_IO, TD_UNIBUS_CHANNEL_IO, TD_KDA_CHANNEL_IO, TD_KDB_CHANNEL_IO, or TD_CI_PORT_IO.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

EXECMET_F_EXEC

Average percentage of CPU time spent in Executive mode for all processors in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FAMILY_NAMEPRO_A_FAMILY

This contains a string indicating the family name for which the current process subrecord pertains on the local node. This filled in when the data is supplied from a history file, otherwise it is blank.

Data Type:	STRING
Domains:	PRO

FASTER_TERMINAL_IO (Derived)

This contains a value representing the sum of terminal operations rate to all but TTx terminals on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FILE_DEVICEFIL_A_DEVICE

This contains a string indicating the disk device on which the current file in the hot file subrecord is located.

Data Type:	STRING
Domains:	FIL

FILE_DIRECTORYFIL_A_DIRECTORY

This contains a string indicating the disk directory in which the current file in the hot file subrecord is located.

Data Type:	STRING
Domains:	FIL

FILE_EXTENT_CACHE_AR (Derived)

Attempt rate per second to the extent cache for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FILE_EXTENT_CACHE_HR (Derived)

Hit ratio to the extent cache for the local node for the current interval record. Calculated by dividing the number of extent cache hits by the number of extent cache attempts (hits + misses), times 100.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FILE_HEADER_CACHE_AR (Derived)

Attempt rate per second to the file header cache for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FILE_HEADER_CACHE_HR (Derived)

Hit ratio to the file header cache for the local node for the current interval record. Calculated by dividing the number of file header cache hits by the number of file header cache attempts (hits + misses), times 100.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FILE_ID_CACHE_AR (Derived)

Attempt rate per second to the file ID cache for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FILE_ID_CACHE_HR (Derived)

Hit ratio to the file ID cache for the local node for the current interval record. Calculated by dividing the number of file ID cache hits by the number of file ID cache attempts (hits + misses), times 100.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FILE_MSCP_IO_RATEFIL_F_MSCPOP

This contains a value indicating the number of MSCP (served) I/O operations per second issued to the file (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current interval.

Data Type:	NUMERIC
Domains:	FIL

FILE_NAMEFIL_A_FILE

This contains a string indicating the name of the file for which the current hot file subrecord pertains, in domain FILE.

Data Type:	STRING
Domains:	FIL

FILE_OPEN_RATEMET_F_OPENS

Average file open rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FILE_OPERATION_RATEFIL_F_OPCNT

This contains a value indicating the number of I/O operations per second issued to the file (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current interval.

Data Type:	NUMERIC
Domains:	FIL

FILE_OPERATION_TALLY (Derived)

This contains the sum of the values indicating the number of I/Os per second transferred to and from all hot files (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current hot file subrecords which were selected by the most recent FILE_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	FIL

FILE_PAGING_IO_RATEFIL_F_PAGOP

This contains a value indicating the number of paging I/O operations per second issued to the file (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current interval.

Data Type:	NUMERIC
Domains:	FIL

FILE_PAGING_IO_TALLY (Derived)

This contains the sum of the values indicating the number of Paging I/Os per second transferred to and from all hot files (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current hot file subrecords which were selected by the most recent FILE_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	FIL

FILE_READ_RATEFIL_F_RDCNT

This contains a value indicating the number of read I/O operations per second issued to the file (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current interval.

Data Type:	NUMERIC
Domains:	FIL

FILE_READ_TALLY (Derived)

This contains the sum of the values indicating the number of Read I/Os per second transferred from all hot files (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current hot file subrecords which were selected by the most recent FILE_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	FIL

FILE_SCAN (Derived)

Provides the count of hot file subrecords for which the specified rule condition is true. The condition will be evaluated for each hot file subrecord.

Data Type:	SCAN
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	FIL

FILE_SPLIT_IO_RATEFIL_F_SPLITS

This contains a value indicating the number of split I/O operations per second issued to the file (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current interval.

Data Type:	NUMERIC

Domains:	FIL

FILE_SPLIT_IO_TALLY (Derived)

This contains the sum of the values indicating the number of Split I/Os per second transferred to and from all hot files (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current hot file subrecords which were selected by the most recent FILE_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	FIL

FILE_SWAPPING_IO_RATEFIL_F_SWPOP

This contains a value indicating the number of I/O operations per second issued by the SWAPPER to the file (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current interval.

Data Type:	NUMERIC
Domains:	FIL

FILE_SWAPPING_IO_TALLY (Derived)

This contains the sum of the values indicating the number of swapping I/Os per second transferred to and from all hot files (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current hot file subrecords which were selected by the most recent FILE_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	FIL

FILE_THROUGHPUTFIL_F_IOCNT

This contains a value indicating the number of bytes per second transferred to and from the file (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current interval.

Data Type:	NUMERIC
Domains:	FIL

FILE_THROUGHPUT_TALLY (Derived)

This contains the sum of the values indicating the number of bytes per second transferred to and from all hot files (indicated by FILE_DEVICE, FILE_DIRECTORY and FILE_NAME) for the current hot file subrecords which were selected by the most recent FILE_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	FIL

FREELIST_FAULT_RATEMET_F_FREFLTS

Average number of page faults per second from the free page list for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

FREE_BALANCE_SET_SLOTS (Derived)

This contains a value representing the number of balance set slots on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

GLOBALPAGE_FAULT_RATEMET_F_GVALID

Average number of global page faults per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

GLOBAL_PGS_TALLY (Derived)

This contains the sum of the values representing the number of global pages in the working sets for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

HARD_FAULT_RATE (Derived)

Average number of hard page faults per second for the local node for the current interval record. This is derived from the sum of MET_F_PREADIO and MET_F_PWRITIO.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

HARD_FAULT_SCALING (Derived)

This contains a value representing scaling factor for the hard page fault rate for the local node. The value is obtained from the threshold TD_HARD_FAULT_SCALING_n where n is the hardware model number of the local node. By default, if the local node is a VAX 11-780, the value would be 1.0. The value of this data cell can be modified using a threshold construct.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

HEAD_IN_SWAP_RATEMET_F_HISWPCNT

Average process header inswap rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

HEAD_OUT_SWAP_RATEMET_F_HOSWPCNT

Average process header outswap rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

HIGHEST_IO_RATE_DISK_X (Derived)

This contains an index pointing to the disk subrecord that has the highest I/O operations rate on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

HIGHEST_QUEUE_DISK_X (Derived)

This contains an index pointing to the disk subrecord that has the highest queue on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

HIGHEST_SPLITIO_RATE_DISK_X (Derived)

This contains an index pointing to the disk subrecord that has the highest split I/O operations rate on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

HIGH_IMG_ACTIVATIONS_PID_X (Derived)

This contains an index pointing to the process subrecord whose PID has the highest number of image activations on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

HSC_IO_RATE (Derived)

This contains a value representing the disk operations rate of the current HSC controller.

Data Type:	NUMERIC
Domains:	CLU

HSC_NODE_NAME (Derived)

This contains a text string representing the node name of the current HSC controller.

Data Type:	STRING
Domains:	CLU

HSC_THRUPUT_RATE (Derived)

This contains a value representing the disk throughput rate in bytes per second of the current HSC controller.

Data Type:	NUMERIC
Domains:	CLU

HSC_TYPE_HSC40 (Derived)

This contains a Boolean value 1 if the current HSC controller is an HSC40.

Data Type:	NUMERIC
Domains:	CLU

HSC_TYPE_HSC50 (Derived)

This contains a Boolean value 1 if the current HSC controller is an HSC50.

Data Type:	NUMERIC
Domains:	CLU

HSC_TYPE_HSC60 (Derived)

This contains a Boolean value 1 if the current HSC controller is an HSC60.

Data Type:	NUMERIC
Domains:	CLU

HSC_TYPE_HSC65 (Derived)

This contains a Boolean value 1 if the current HSC controller is an HSC65.

Data Type:	NUMERIC
Domains:	CLU

HSC_TYPE_HSC70 (Derived)

This contains a Boolean value 1 if the current HSC controller is an HSC70.

Data Type:	NUMERIC
Domains:	CLU

HSC_TYPE_HSC90 (Derived)

This contains a Boolean value 1 if the current HSC controller is an HSC90.

Data Type:	NUMERIC

Domains:	CLU

HSC_TYPE_HSC95 (Derived)

This contains a Boolean value 1 if the current HSC controller is an HSC95.

Data Type:	NUMERIC
Domains:	CLU

IDLEMET_F_IDLE

Average percentage of CPU idle time for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IDLE_PROC_WITH_BIG_WS (Derived)

This contains a Boolean value representing the presence of one or more idle processes with overly large working sets on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IMAGE_ACTIVATION_RATEMET_F_IMGACTS

This contains the number of image activations per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IMAGE_HUNG_IN_MWAIT_NOT_RWAST (Derived)

This contains a Boolean value of zero or one, one (true) representing the presence of an image hung in an MWAIT state other than an AST resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IMAGE_HUNG_IN_RWAST (Derived)

This contains a Boolean value of zero or one, one (true) representing the presence of an image hung in an RWAST resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IMAGE_NAMEPRO_A_IMAGENAME

This contains a string indicating the image name for which the current process subrecord pertains on the local node for the current interval.

Data Type:	STRING
Domains:	PRO

IMAGE_TERMINATION_RATEMET_F_IMGTRMS

This contains the number of image terminations per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IMG_ACTIVATIONS_PER_PID (Derived)

This contains a value representing the average image activation rate for the PID indicated by the process subrecord indexed by the cell HIGH_IMAGE_ACTIVATIONS_PID_X on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IMG_ACT_RATE_SCALING (Derived)

This contains a value representing scaling factor for the image activation rate for the local node. The value is obtained from the threshold TD_IMG_ACT_SCALING_n where n is the hardware model number of the local node. By default, if the local node is a VAX 11-780, the value would be 1.0. The value of this data cell can be modified using a threshold construct.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

INCOMING_BLOCKING_AST_RATEMET_F_BLK_IN

This contains the number of incoming blocking ASTs queued per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

INCOMING_DEADLOCK_MESSAGE_RATEMET_F_DLCKMSGS_IN

This contains the number of incoming deadlock detection messages per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

INCOMING_DIRECTORY_FUNCT_RATEMET_F_DIR_IN

This contains the number of incoming directory operations per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

INCOMING_LOCK_CONVERSION_RATEMET_F_ENQCVT_IN

This contains the number of incoming enqueue lock conversion requests per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

INCOMING_LOCK_DEQUEUE_RATEMET_F_DEQ_IN

This contains the number of incoming dequeue lock requests per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

INCOMING_LOCK_ENQUEUE_RATEMET_F_ENQNEW_IN

This contains the number of new incoming enqueue requests per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

INTERACTIVE_COUNTMET_F_INTERACTIVE

This contains a value representing the average number of interactive processes on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

INTERRUPT_STACKMET_F_INTSTK

Average percentage of CPU time on the Interrupt Stack for all processors in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IN_SWAP_RATEMET_F_ISWPCNT

Average inswap rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IO_ONLYMET_F_SPMIOONLY

Percentage of time that the CPU or all CPUs in a multiprocessing system were idle and at least one disk device was busy for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IRPS_IN_LISTMET_F_IRP_MAX

This contains the total number of IRPs for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IRPS_IN_USEMET_F_IRP_CNT

This contains the number of IRPs in use for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

IRP_EXPANSION_COUNT (Derived)

A count of the number of times that the number of intermediate request packets needed to be increased, for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

IRP_MAXLEN (Derived)

The maximum size of the IRP list for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

IS_AN_ALPHA (Derived)

This contains a one if the hardware model is an Alpha (zero if not) for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

IS_AN_IA64 (Derived)

This contains a one if the hardware model is an Integrity server (zero if not) for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

IS_A_VAX (Derived)

This contains a one if the hardware model is a VAX (zero if not) for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

KB_MAPPEDSCS_F_KBYTMAPD

This contains the value representing the number of kilobytes mapped per second between the local node and the remote node (indicated by the cell SCS_NODENAME) for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

KB_MAPPED_TALLY (Derived)

This contains the sum of the values representing the number of kilobytes transferred per second between the local node and the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

KB_RECEIVED_VIA_REQST_DATASSCS_F_KBYTREQD

This contains the value representing the number of kilobytes transferred per second via request data's to the local node from the remote node for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

KB_RECVD_VIA_REQST_DATAS_TALLY (Derived)

This contains the sum of the values representing the number of kilobytes transferred per second via request data's from the local node to the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

KB_SENT_VIA_SEND_DATASSCS_F_KBYTSENT

This contains the value representing the number of kilobytes transferred per second via send data's from the local node to the remote node for the current configuration record and interval.

Data Type:	NUMERIC

Domains:	CFG

KB_SENT_VIA_SEND_DATAS_TALLY (Derived)

This contains the sum of the values representing the number of kilobytes transferred per second via sent data's from the local node to the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

KERNELMET_F_KERNEL

Average percentage of CPU time spent in Kernel mode for all processors in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LARGEST_BLK_IN_NONPAGED_POOLMET_F_NP_MAX_BLOCK

This contains the number of bytes in the largest block in non-paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LARGEST_BLK_IN_PAGED_POOLMET_F_PG_MAX_BLOCK

This contains the number of bytes the largest block in paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LARGEST_WS_PROC_X (Derived)

This contains an index pointing to the process subrecord, for a unique username, with the largest working set on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

LARGE_BATCH_PROCESSES_EXISTS (Derived)

This contains a Boolean value representing the presence of one or more large batch processes on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LARGE_COM_PROCESS_EXISTS (Derived)

This contains a Boolean value representing the presence of a large process in computable state, on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LARGE_NOSWAP_PROCESS_EXISTS (Derived)

This contains a Boolean value representing the presence of a large process where the PSWAPM privilege inhibited swapping on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LARGE_NOSWAP_PROCESS_X (Derived)

This contains an index pointing to the process subrecord, for a unique username, for a large process with the PSWAPM privilege enabled on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

LARGE_PROCESSES_EXIST (Derived)

This contains a Boolean value representing the presence of one or more large processes on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LCK_EXPANSION_COUNT (Derived)

A count of the number of times the LOCKIDTBL needed to be extended when the system ran out of LOCKIDTBL entries, for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

LCK_MAXLEN (Derived)

The maximum number of entries in the Lock ID table for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

LOCAL_BLOCKING_AST_RATEMET_F_BLK_LOC

This contains the number of local blocking ASTs queued per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LOCAL_LOCK_CONVERSION_RATEMET_F_ENQCVT_LOC

This contains the number of new local enqueue lock conversion requests per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LOCAL_LOCK_DEQUEUE_RATEMET_F_DEQ_LOC

This contains the number of local dequeue lock requests per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LOCAL_LOCK_ENQUEUE_RATEMET_F_ENQNEW_LOC

This contains the number of new local enque requests per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LOCKIDS_IN_USEMET_F_LOCK_CNT

This contains the number lock IDs for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LOCKID_TABLE_SIZEMET_F_LOCK_MAX

This contains the lock ID table length in entries. for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LOCK_RESOURCES_IN_USEMET_F_RESOURCE_CNT

This contains the number lock resources known by the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LOGICAL_NAME_TRANSLATION_RATEMET_F_LOGNAM

Average logical name translation rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LRPS_IN_LISTMET_F_LRP_MAX

This contains the total number of LRPs for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LRPS_IN_USEMET_F_LRP_CNT

This contains the number of LRPs in use for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

LRP_EXPANSION_COUNT (Derived)

A count of the number of times that the number of large request packets needed to be increased, for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

LRP_MAXLEN (Derived)

The maximum size of the LRP list for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

MAILBOX_READ_RATEMET_F_MBREADS

Average mailbox read rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

MAILBOX_WRITE_RATEMET_F_MBWRITES

Average mailbox write rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

MASTER_PIDPRO_L_MPID

This contains a hexadecimal representation of the master PID for the current process subrecord on the local node for the current interval record.

Data Type:	NUMERIC
Domains:	PRO

MAXIMUM_DISK_QUEUE (Derived)

This contains a value representing the maximum queue length for the current disk for all cluster members during the current interval.

Data Type:	NUMERIC
Domains:	CLU

MAXIMUM_IRPS_INUSE (Derived)

This contains a value representing the maximum number of IRPs in use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

MAXIMUM_LOCKS_INUSE (Derived)

This contains a value representing the maximum number of locks in use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

MAXIMUM_LRPS_INUSE (Derived)

A count of the maximum number of large request packs in use for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

MAXIMUM_RESOURCES_INUSE (Derived)

This contains a value representing the maximum number of resources known by the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

MAXIMUM_SRPS_INUSE (Derived)

This contains a value representing the maximum number of SRPs in use on the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

MAXIMUM_WORKING_SET_SIZE (Derived)

This contains the value of the maximum working set size of all processes for the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

MAX_NONPAGEDPOOLBYTES_INUSE (Derived)

This contains a value representing the maximum number of non-paged pool bytes in use on the local node of all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

MEMORY_PAGES_NOT_ALLOC_TO_VMSMET_F_USERPAGES

This contains the number of user memory pages for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

MODIFIEDLIST_FAULT_RATEMET_F_MFYFLTS

Average number of pagefaults per second from the modified page list for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

MP_SYNCHMET_F_MP_SYNCH

Average percentage of CPU time spent in MP synchronization for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

MULTI_IOMET_F_SPMIOBUSY

Percentage of time that two or more of the disk devices were busy for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NETWORK_COUNTMET_F_NETWORK

This contains a value representing the average number of network processes on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NODENAME (Derived)

Name of the local node that the other data cells in the same domains refer.

Data Type:	STRING
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NODE_INDX (Derived)

This contains a sequence value representing the current node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NONPRIMARY_IDLE (Derived)

Average percentage of CPU time idle for the processors other than the primary processor in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWAST (Derived)

This contains a value representing the count of images seen by the data collector in an AST resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWBRK (Derived)

This contains a value representing the count of images seen by the data collector in a breakthrough resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWCLU (Derived)

This contains a value representing the count of images seen by the data collector in a cluster transition resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWIMG (Derived)

This contains a value representing the count of images seen by the data collector in an image activation lock resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWLCK (Derived)

This contains a value representing the count of images seen by the data collector in a lock ID resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWMBX (Derived)

This contains a value representing the count of images seen by the data collector in a mailbox resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWMPB (Derived)

This contains a value representing the count of images seen by the data collector in a modified page list busy resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWMPE (Derived)

This contains a value representing the count of images seen by the data collector in a modified page list empty resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWNPG (Derived)

This contains a value representing the count of images seen by the data collector in a nonpaged dynamic memory resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWPAG (Derived)

This contains a value representing the count of images seen by the data collector in a paged dynamic memory resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWPFF (Derived)

This contains a value representing the count of images seen by the data collector in a paging file resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWQUO (Derived)

This contains a value representing the count of images seen by the data collector in a job quota resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWSCS (Derived)

This contains a value representing the count of images seen by the data collector in an SCS resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NO_IMAGES_SEEN_IN_RWSWP (Derived)

This contains a value representing the count of images seen by the data collector in a swapping file resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NUMBER_OF_INSWAPPED_PROCESSES (Derived)

This contains a value representing the number of processes in the balance set on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NUMBER_OF_OUTSWAPPED_PROCESSES (Derived)

This contains a value representing the number of processes not in the balance set on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NUMBER_OF_PROCESSESMET_F_PROCCNT

This contains a value representing the average number of processes on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

NUM_PROCS_NOT_USING_WS_LOANS (Derived)

This contains the value indicating a count of processes not using working set loans on the local node for the current interval.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

OPEN_FILESMET_F_OPEN_FILES

Average number of open files for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

OUTGOING_BLOCKING_AST_RATEMET_F_BLK_OUT

This contains the number of outgoing blocking ASTs queued per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

OUTGOING_DEADLOCK_MESSAGE_RATEMET_F_DLCKMSGS_OUT

This contains the number of outgoing deadlock detection messages per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

OUTGOING_DIRECTORY_FUNCT_RATEMET_F_DIR_OUT

This contains the number of outgoing directory operations per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

OUTGOING_LOCK_CONVERSION_RATEMET_F_ENQCVT_OUT

This contains the number of outgoing enqueue lock conversion requests per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

OUTGOING_LOCK_DEQUEUE_RATEMET_F_DEQ_OUT

This contains the number of outgoing dequeue lock requests per second for the current interval for the local node.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

OUTGOING_LOCK_ENQUEUE_RATEMET_F_ENQNEW_OUT

This contains the number of new outgoing enqueue lock requests per second for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

OUT_SWAP_RATEMET_F_OSWPCNT

Average outswap rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PAGEFILE_PAGE_READ_RATEMET_F_PREADS

Average number of pages per second read from the page files for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PAGEFILE_PAGE_WRITE_RATEMET_F_PWRITES

Average number of pages per second written to the page files for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PAGEFILE_READ_IO_RATEMET_F_PREADIO

Average number of reads per second from the page files for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PAGEFILE_UTILIZATION (Derived)

This contains the ratio of used (not free) to total pages in all paging files for the current interval for the local node.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PAGEFILE_WRITE_IO_RATEMET_F_PWRITIO

Average number of writes per second to the page files for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PAGES_ON_FREELISTMET_F_FREECNT

Average number pages on the free page list for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PAGES_ON_MODIFIEDLISTMET_F_MFYCNT

Average number pages on the modified page list for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PAGE_CONVERT (Derived)

This contains a one if the hardware model is a VAX (2 if not), necessary to scale rules which depend on CPU-specific page counts, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

PAGE_WAITMET_F_SPMPAGEWAIT

Percentage of time that the CPU was idle and at least one disk device had paging I/O in progress for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PERCENT_CPU_TIME_IN_FILE_SYSTEMMET_F_FILECPU

Average percentage of CPU time spent in the file system on the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PGLET_CONVERT (Derived)

This contains a one if the hardware model is a VAX (16 if not), necessary to adjust rules which mix page and pagelet parameters, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

PORT_KB_MAPPED (Derived)

This contains the value representing the number of kilobytes mapped per second from the local node's port to all other nodes for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

PORT_MESSAGES (Derived)

This contains the value representing the number of messages sent and received per second from the local node's port to all other nodes for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

PRIMARY_IDLE (Derived)

Average percentage of CPU time idle for the primary processor in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PRIMARY_INTERRUPT_STACK (Derived)

Average percentage of CPU time on the Interrupt Stack for the primary processor in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PRIORITY_LOCKOUT (Derived)

This contains a Boolean value representing the presence of a priority lockout of a computable process by another with excessive CPU utilization on the local node for the current interval. The process's priority which is causing the lockout must have a priority larger than DEFPRI.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PRIVATE_PGS_TALLY (Derived)

This contains the sum of the values representing the number of physical private pages in the working sets for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESSES_IN_CEFMET_F_CEF

This contains a value representing the average number of processes in common event flag wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_COLPGMET_F_COLPG

This contains a value representing the average number of processes in collided page wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_COMMET_F_COM

This contains a value representing the average number of processes in the computable state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_COMOMET_F_COMO

This contains a value representing the average number of processes in the outswapped computable state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_CURMET_F_CUR

This contains a value representing the average number of processes in the currently executing state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_FPGMET_F_FPG

This contains a value representing the average number of processes in free page wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_HIBMET_F_HIB

This contains a value representing the average number of processes in hibernate wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_HIBOMET_F_HIBO

This contains a value representing the average number of processes in outswapped hibernate wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_LEFMET_F_LEF

This contains a value representing the average number of processes in local event flag wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_LEFOMET_F_LEFO

This contains a value representing the average number of processes in outswapped local event flag wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_MWAITMET_F_MWAIT

This contains a value representing the average number of processes in MUTEX or resource wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_PFWMET_F_PFW

This contains a value representing the average number of processes in page fault wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_SUSPMET_F_SUSP

This contains a value representing the average number of processes in suspend wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_IN_SUSPOMET_F_SUSPO

This contains a value representing the average number of processes in outswapped suspend wait state on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_NEED_MORE_EXTENT (Derived)

This contains a Boolean value representing the presence of one or more processes which need larger working set extents on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_NEED_MORE_WSMAX (Derived)

This contains a Boolean value representing the presence of one or more processes which need larger working set maximums on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESSES_WAIT_IN_RWSWP (Derived)

This contains a Boolean value representing the presence of processes waiting in a swapping file resource wait state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESS_BASE_PRIORITYPRO_B_PRIB

This contains a value representing the process's base priority. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_BUFFERED_IO_RATEPRO_F_BUFIOS

This contains a value representing the buffered I/O rate of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_BUFFERED_IO_TALLY (Derived)

This contains the sum of the values representing the buffered I/O rate for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_COMMAND_WAITPRO_F_COMMAND_WAIT

This contains a value representing the number of milliseconds elapsed from the start of the most recent terminal read request to the end of the current interval represented by this record.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_COM_PERCENTPRO_F_COMPU

This contains a value representing the percent of time in the computable state over the processes uptime for the current process subrecord on the local node for the current interval. (Sampled every 5 seconds)

Data Type:	NUMERIC
Domains:	PRO

PROCESS_COM_PERCENT_TALLY (Derived)

This contains the sum of the values representing the percent of time in the computable state for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_CPUTIMEPRO_F_CPUTIM

This contains a value representing the CPU time in milliseconds for the current process subrecord on the local node.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_CPUTIME_TALLY (Derived)

This contains the sum of the values representing the amount of CPU time of all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_CURRENT_PRIORITYPRO_B_PRIB

This contains a value representing the process's current priority. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_DIRECT_IO_RATEPRO_F_DIRIOS

This contains a value representing the direct I/O rate of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_DIRECT_IO_TALLY (Derived)

This contains the sum of the values representing the direct I/O rate for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_DISABLED_ADJUSTMENTPRO_B_AWSA

This contains a Boolean value where a 1 means the process has working set adjustment disabled. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_DISK_IO_RATEPRO_F_OPS

This contains a value representing the disk I/O rate of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_DISK_IO_TALLY (Derived)

This contains the sum of the values representing the disk I/O rate for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_DISK_THRUPUTPRO_F_THRUPUT

This contains a value representing the disk throughput of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_DISK_THRUPUT_TALLY (Derived)

This contains the sum of the values representing the disk throughput for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_IMAGE_ACTIVATIONPRO_B_IMGACT

This contains a Boolean value where for .CPD data, a 1 means the process's activated the image during the current interval, and for History data, a 1 means that one or more activations took place for data summarized into this process subrecord. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_IMAGE_ACTS_TALLY (Derived)

This contains the sum of the values representing the image activation rate for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_IMAGE_ACT_RATEPRO_F_IMGACTS

This contains a value representing the image activation rate of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_IMAGE_LOGINPRO_B_LOGIN

This contains a Boolean value where a 1 means the process logged in. For history data, it means one or more processes. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_IMAGE_LOGOUTPRO_B_LOGOUT

This contains a Boolean value where a 1 means the process logged out. For history data, it means one or more processes. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_IMAGE_TERMINATIONPRO_B_IMGTRM

This contains a Boolean value where for .CPD data, a 1 means the process's terminated the image which triggered the creation of this subrecord, and for History data, a 1 means that one or more image terminations took place for data summarized into this process subrecord. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_RESPONSE_WAITPRO_F_RESPONSE_WAIT

This contains a value representing the number of milliseconds elapsed from the completion of the most recent terminal read to the end of the current interval represented by this record.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_SCAN (Derived)

Provides the count of process subrecords for which the specified rule expression is true on the local node for the current interval.

Data Type:	SCAN
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_STATEPROA_A_STATE

This contains a string representing the process's scheduling state at the end of the sampling interval. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	STRING
Domains:	PRO

PROCESS_STATUSPRO_B_STATUS

This contains a code representing the process's status where 0 means interactive, 1 means batch, and 2 means network. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_TAPE_IO_RATEPRO_F_TAPE_IO

This contains a value representing the tape I/O rate of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_TAPE_THRUPUTPRO_F_TAPE_THRUPUT

This contains a value representing the tape throughput rate of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_TERM_INPUTPRO_F_TERM_INPUT

This contains a value representing the rate of terminal inputs for the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_TERM_RESPONSE_TIMEPRO_F_RESPONSE_TIME

This contains a value representing the average number of milliseconds between the completion of a read I/O request and the start of the next I/O on the user's terminal, for the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_TERM_RESPONSE_TIME2PRO_F_RESPONSE_TIME2

This contains a value representing the average number of milliseconds between the completion of a read I/O request and the start of the next read I/O on the user's terminal, for the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_TERM_THINK_TIMEPRO_F_THINK_TIME

This contains a value representing the average number of milliseconds between the start of a read I/O request to the user's terminal, and the completion of that I/O, for the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_TERM_THRUPUTPRO_F_TERM_THRUPUT

This contains a value representing the I/O rate in bytes to terminal devices for the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_UPTIMEPRO_F_UPTIME

This contains a value representing the uptime in seconds of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_UPTIME_TALLY (Derived)

This contains the sum of the values representing the uptime for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROCESS_VIRTUAL_PAGESPRO_F_VA_USED

This contains a value representing the number of virtual pages used by this process. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_CEFPRO_V_SSS_CEF

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the common event flag wait scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_COLPGPRO_V_SSS_COLPG

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the collided page wait scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_COMPRO_V_SSS_COM

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the compute queue. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_COMOPRO_V_SSS_COMO

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the compute outswapped queue. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_CURPRO_V_SSS_CUR

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in as the current process scheduled. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_FPGPRO_V_SSS_FPG

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the free page wait scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_HIBPRO_V_SSS_HIB

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the hibernate scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_HIBOPRO_V_SSS_HIBO

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the outswapped hibernate scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_LEFPRO_V_SSS_LEF

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the local event flag wait scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC

Domains:	PRO

PROCESS_WAS_IN_LEFOPRO_V_SSS_LEFO

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the outswapped local event flag wait scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_MWAITPRO_V_SSS_MWAIT

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the mutex wait scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_PFWPRO_V_SSS_PFW

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the page fault wait scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWASTPRO_V_RSN_ASTWAIT

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWAST mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWBRKPRO_V_RSN_BRKTHRU

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWBRK mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWCLUPRO_V_RSN_CLU

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWCLU mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWIMGPRO_V_RSN_IACLOCK

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWIMG mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWLCKPRO_V_RSN_LOCKID

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWLCK mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWMBXPRO_V_RSN_MAILBOX

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWMBX mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC

Domains:	PRO

PROCESS_WAS_IN_RWMPBPRO_V_RSN_MPWBUSY

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWMPB mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWMPEPRO_V_RSN_MPLEMPTY

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWMPE mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWNPGPRO_V_RSN_NPDYNMEM

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWNPG mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWPAGPRO_V_RSN_PGDYNMEM

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWPAG mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWPFFPRO_V_RSN_PGFILE

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWPFF mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWQUOPRO_V_RSN_JQUOTA

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWQUO mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWSCSPRO_V_RSN_SCS

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWSCS mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_RWSWPPRO_V_RSN_SWPFILE

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the RWSWP mwait state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WAS_IN_SUSPPRO_V_SSS_SUSP

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the suspended scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC

Domains:	PRO

PROCESS_WAS_IN_SUSPOPRO_V_SSS_SUSPO

This contains a Boolean value where 1 represents the fact that this process was seen at least once by the Performance Manager in the outswapped suspended scheduler state. This cell pertains to the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

PROCESS_WS_GTR_QUOTA_EXIST (Derived)

This contains a Boolean value representing the presence of one or more processes where the working set is greater than its WSQUOTA on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

PROCESS_WS_GTR_QUOTA_PROC_X (Derived)

This contains an index pointing to the process subrecord, for a unique username, for processes where the working set is greater than its WSQUOTA on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROC_NOT_USING_WS_LOAN_X (Derived)

This contains an index pointing to a process subrecord not using its working set loans on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

PROC_TYPEPRO_L_PROCTYPE

This contains a hexadecimal representation of the type of process (bit 0 = interactive, bit 1 = batch, bit 2 = network, bit 3 = detached, bit 4 = subprocess) for the current process subrecord on the local node for the current interval record.

Data Type:	NUMERIC
Domains:	PRO

PSWP_WAITMET_F_SPMMMGWAIT

Percentage of time that the CPU was idle and at least one disk device had either paging I/O or swapping I/O in progress for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

QUOTA_CACHE_AR (Derived)

Attempt rate per second to the quota cache for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

QUOTA_CACHE_HR (Derived)

Hit ratio to the quota cache for the local node for the current interval record. Calculated by dividing the number of quota cache hits by the number of quota cache attempts (hits + misses), times 100.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

RDTS_IN_LISTMET_F_RDT_MAX

This contains the total number entries in the I/O request descriptor table for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

RDT_WAIT_RATEMET_F_RDT_QUE

This contains the number entries in the I/O request descriptor table in a wait queue for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SCS_ADAPTERNAMECFG_A_ADAPTER

This contains the adapter name string of the remote node's adapter for the current configuration subrecord (e.g., "CIXCD").

Data Type:	INDEX
Domains:	CFG

SCS_ADAPTER_IDCFG_L_ADAPTER_ID

This contains the adapter code of the remote node's adapter for the current configuration subrecord. See PSPA$LIB for a list of known codes.

Data Type:	NUMERIC
Domains:	CFG

SCS_NODENAMECFG_A_NODENAME

This contains the name of the remote node in the cluster system configuration for the current configuration subrecord.

Data Type:	STRING
Domains:	CFG

SCS_NODE_HWNAMECFG_A_HWNAME

This contains the hardware type string of the remote node for the current configuration subrecord.

Data Type:	STRING
Domains:	CFG

SCS_NODE_IS_HSCCFG_V_STATUS_HSC

This contains a Boolean of either the values 1, if the hardware type of the remote node for the current configuration subrecord is a HSC, or a 0 if it is not an HSC.

Data Type:	NUMERIC
Domains:	CFG

SCS_NODE_IS_MEMBERCFG_V_STATUS_MEMBER

This contains a Boolean of either the values 1, if the remote node for the current configuration subrecord is a cluster member, or a 0 if it is not a member.

Data Type:	NUMERIC
Domains:	CFG

SCS_NODE_IS_VAXCFG_V_STATUS_VAXNODE

This contains a Boolean of either the values 1, if the remote node for the current configuration subrecord is a VAX, or a 0 if it is not a VAX.

Data Type:	NUMERIC
Domains:	CFG

SCS_NODE_ON_CICFG_V_STATUS_CI

This contains a Boolean of either the values 1, if the remote node for the current configuration subrecord is accessed over the CI, or a 0 if it is not.

Data Type:	NUMERIC
Domains:	CFG

SCS_NODE_ON_NICFG_V_STATUS_NI

This contains a Boolean of either the values 1, if the remote node for the current configuration subrecord is accessed over the NI, or a 0 if it is not.

Data Type:	NUMERIC
Domains:	CFG

SCS_NODE_ON_RFCFG_V_STATUS_RF

This contains a Boolean of either the values 1, if the remote node for the current configuration subrecord is accessed over an RF controller, or a 0 if it is not.

Data Type:	NUMERIC
Domains:	CFG

SCS_PATHNAMECFG_A_PATH

This contains the device name string for the path over which the local node has SCS communications with the remote node indicated by SCS_NODENAME for the current configuration subrecord (e.g., PAA0 or PEA0).

Data Type:	STRING
Domains:	CFG

SEND_CREDIT_QUEUE_RATESCS_F_QCR_CNT

This contains the value representing the number of times per second that SCS messages had to be queued on the local node that were destined for the remote node indicated by SCS_NODENAME for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

SEND_CREDIT_QUEUE_TALLY (Derived)

This contains the sum of the values representing the number of times per second that an SCS message had to be queued on the local node that was destined for the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

SEQUENCED_MESSAGES_RECD_TALLY (Derived)

This contains the sum of the values representing the number of messages received per second on the local node from the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

SEQUENCED_MESSAGES_RECEIVEDSCS_F_MSGRCVD

SEQUENCED_MESSAGES_RECEIVED This contains the value representing the number of messages received per second on the local node from the remote.

Data Type:	NUMERIC

Domains:	CFG

SEQUENCED_MESSAGES_SENTSCS_F_MSGSENT

This contains the value representing the number of messages sent per second from the local node to the remote node for the current configuration record and interval.

Data Type:	NUMERIC
Domains:	CFG

SEQUENCED_MESSAGES_SENT_TALLY (Derived)

This contains the sum of the values representing the number of messages sent per second from the local node to the remote node for all the current configuration subrecords which were selected by the most recent CONFIGURATION_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

SMALLEST_BLK_IN_NONPAGED_POOLMET_F_NP_MIN_BLOCK

This contains the number of bytes in the smallest block in non-paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SMALLEST_BLK_IN_PAGED_POOLMET_F_PG_MIN_BLOCK

This contains the number of bytes the smallest block in paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SMALL_BLKS_FREE_NONPAGED_POOLMET_F_NP_FREE_LEQU_32

This contains the number of free blocks less than or equal to 32 bytes in non-paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SMALL_BLKS_FREE_PAGED_POOLMET_F_PG_FREE_LEQU_32S

This contains the number of free blocks less than or equal to 32 in paged pool for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SOFT_FAULT_RATE (Derived)

Average number of soft pagefaults per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SOFT_FAULT_SCALING (Derived)

This contains a value representing scaling factor for the soft page fault rate for the local node. The value is obtained from the threshold TD_SOFT_FAULT_SCALING_n where n is the hardware model number of the local node. By default, if the local node is a VAX 11-780, the value would be 1.0. The value of this data cell can be modified using a threshold construct.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SPLIT_IO_RATEMET_F_SPLIT

Average split I/O rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SRPS_IN_LISTMET_F_SRP_MAX

This contains the total number of SRPs for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SRPS_IN_USEMET_F_SRP_CNT

This contains the number of SRPs in use for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SRP_EXPANSION_COUNT (Derived)

A count of the number of times that the number of small request packets needed to be increased, for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

SRP_MAXLEN (Derived)

The maximum size of the SRP list for the local node for all of the intervals.

Data Type:	NUMERIC
Domains:	SUMMARY

STORAGE_MAP_CACHE_AR (Derived)

Attempt rate per second to the storage bit map cache for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

STORAGE_MAP_CACHE_HR (Derived)

Hit ratio to the storage bit map cache for the local node for the current interval record. Calculated by dividing the number of storage bit map cache hits by the number of storage bit map cache attempts (hits + misses), times 100.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SUPERMET_F_SUPER

Average percentage of CPU time spent in Supervisor mode for all processors in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SWAPPER_TRIMMING_TOO_SEVERE (Derived)

This contains a Boolean value representing severe swapper trimming on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SWAP_BUSYMET_F_SPMSWPBUSY

Percentage of time that the Swapper was busy for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SWAP_WAITMET_F_SPMSWAPWAIT

Percentage of time that the CPU was idle and at least one disk device had swapping I/O in progress for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

SYSGEN_ACP_DINDXCACHEPAR_F_ACP_DINDXCACHE

The value of the SYSGEN parameter ACP_DINDXCACHE which controls the size (blocks) of the directory index cache and the number of buffers used on a cache-wide basis, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_ACP_DIRCACHEPAR_F_ACP_DIRCACHE

The value of the SYSGEN parameter ACP_DIRCACHE which sets the number of pages (blocks) for caching directory blocks, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_ACP_EXTCACHEPAR_F_ACP_EXTCACHE

The value of the SYSGEN parameter ACP_EXTCACHE which sets the number of entries in the extent cache, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_ACP_EXTLIMITPAR_F_ACP_EXTLIMIT

The value of the SYSGEN parameter ACP_EXTLIMIT which specifies the maximum amount of free space to which the extent cache can point, expressed in thousandths of the currently available free blocks on the disk, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_ACP_FIDCACHEPAR_F_ACP_FIDCACHE

The value of the SYSGEN parameter ACP_FIDCACHE which sets the number of file identification slots cached, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_ACP_HDRCACHEPAR_F_ACP_HDRCACHE

The value of the SYSGEN parameter ACP_HDRCACHE which sets the number of pages (blocks) for caching file header blocks, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_ACP_MAPCACHEPAR_F_ACP_MAPCACHE

The value of the SYSGEN parameter ACP_MAPCACHE which sets the number of pages (blocks) for caching index file bit map blocks, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_ACP_QUOCACHEPAR_F_ACP_QUOCACHE

The value of the SYSGEN parameter ACP_QUOCACHE which sets the number of quota file entries cached, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_ACP_WORKSETPAR_F_ACP_WORKSET

The value of the SYSGEN parameter ACP_WORKSET which sets the default size (pagelets) of a working set for an ACP, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_AWSMINPAR_F_AWSMIN

The value of the SYSGEN parameter AWSMIN which establishes the lowest number of pages (pagelets) to which a working set limit can be decreased by automatic working set adjustment, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_AWSTIMEPAR_F_AWSTIME

The value of the SYSGEN parameter AWSTIME which specifies the minimum amount of processor time that must elapse for the system to collect a significant sample of a working set's page fault rate, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_BALSETCNTPAR_F_BALSETCNT

The value of the SYSGEN parameter BALSETCNT which is the number of working sets which determines the maximum number of processes that can be concurrently resident for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_BORROWLIMPAR_F_BORROWLIM

The value of the SYSGEN parameter BORROWLIM which defines the minimum number of pages required on the free page list before the system will permit process growth beyond the working set quota (WSQUOTA) for the process, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_CACHE_STATEPAR_F_CACHE_STATE

The value of the SYSGEN parameter VCC_FLAGS in combination with the state of the cluster and OpenVMS version, allow this data cell to reflect one of the following states for the virtual IO Cache: (1) indicates the cache is enabled, (2) a heterogeneous cluster disables the cache, (4) disabled cache, (8) in determinant cache state; cannot decode data structures, (16) XFC is operating in FULL mode, (32) XFC is operating in REDUCED mode.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_DEADLOCK_WAITPAR_F_DEADLOCK_WAIT

The value of the SYSGEN parameter DEADLOCK_WAIT which defines the number of seconds that a lock request must wait before the system initiates a deadlock search on behalf of that lock, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_DEFPRIPAR_F_DEFPRI

The value of the SYSGEN parameter DEFPRI which is the default priority for job initiations for the current interval for the local node.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_DORMANTWAITPAR_F_DORMANTWAIT

The value of the SYSGEN parameter DORMANTWAIT which indicates the number of seconds that may elapse without a significant event before the system treats a low priority computable process as a dormant process for scheduling purposes for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_FREEGOALPAR_F_FREEGOAL

The value of the SYSGEN parameter FREEGOAL which establishes the number of pages that you want to reestablish on the free page list following a system memory shortage, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_FREELIMPAR_F_FREELIM

The value of the SYSGEN parameter FREELIM which sets the minimum number of pages that must be on the free page list, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_GBLPAGEPSPAR_F_GBLPAGES

The value of the SYSGEN parameter GBLPAGES which is the global page table entry count which establishes the size of the global page table and the limit for the total number of global pages that can be created for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_GBLSECTIONPSPAR_F_GBLSECTIONS

The value of the SYSGEN parameter GBLSECTIONS which sets the number of global section descriptors allocated in the system header at bootstrap time, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_GROWLIMPAR_F_GROWLIM

The value of the SYSGEN parameter GROWLIM which sets the number of pages that the system must have on the free page list so that a process can add a page to its working set when it is above quota, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_IOTAPAR_F_IOTA

The value of the SYSGEN parameter IOTA which sets the I/O time allowance (in 10 millisecond units) used to charge the current residence quantum for each voluntary wait, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_IRPCOUNTPAR_F_IRPCOUNT

The value of the SYSGEN parameter IRPCOUNT which sets the number of pre-allocated intermediate request packets, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_IRPCOUNTVPAR_F_IRPCOUNTV

The value of the SYSGEN parameter IRPCOUNTV which is the virtual IRP count which is the number of intermediate request packets to which the IRP list may be extended for the current interval for the local node.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_LCKMGR_MODEPAR_F_LCKMGR_MODE

The value of the SYSGEN parameter LCKMGR_MODE, which controls the use of the Dedicated CPU Lock Manager, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_LOAD_SYS_IMAGEPSPAR_F_LOAD_SYS_IMAGES

The value of the SYSGEN parameter LOAD_SYS_IMAGES, which controls the loading of system images described in the system image data file VMS$SYSTEM_IMAGES, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_LOCKDIRWTPAR_F_LOCKDIRWT

The value of the SYSGEN parameter LOCKDIRWT which is the lock manager directory system weight which determines the portion of the lock manager directory which will be handled by this system for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_LOCKIDTBLPAR_F_LOCKIDTBL

The value of the SYSGEN parameter LOCKIDTBL which sets the initial number of entries in the system Lock ID table and defines the amount by which the Lock ID table is extended whenever the system runs out of locks, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_LONGWAITPAR_F_LONGWAIT

The value of the SYSGEN parameter LONGWAIT that defines how much real time (in seconds) must elapse before the swapper considers a process to be temporarily idle. This applies to the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_LRPCOUNTPAR_F_LRPCOUNT

The value of the SYSGEN parameter LRPCOUNT which sets the number of pre-allocated large request packets, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_LRPCOUNTVPAR_F_LRPCOUNTV

The value of the SYSGEN parameter LRPCOUNTV which establishes the upper limit to which LRPCOUNT can be automatically increased by the system, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_LRPSIZEPAR_F_LRPSIZE

The value of the SYSGEN parameter LRPSIZE which indicates the size (in bytes) of the large request packets, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MAXPROCESSCNTPAR_F_MAXPROCESSCNT

The value of the SYSGEN parameter MAXPROCESSCNT which is the maximum number of processes allowed on the system for the current interval for the local node.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MINWSCNTPAR_F_MINWSCNT

The value of the SYSGEN parameter MINWSCNT which is the minimum working set size - the minimum number of fluid pages not locked in a working set required for the execution of a process for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MMG_CTLFLAGPSPAR_F_CTLFLAGS

The value of the SYSGEN parameter MMG_CTLFLAGS which sets the target system memory management control settings, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MPW_HILIMITPAR_F_MPW_HILIMIT

The value of the SYSGEN parameter MPW_HILIMIT which sets un upper limit for the modified page list, for the local node for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MPW_LOLIMITPAR_F_MPW_LOLIMIT

The value of the SYSGEN parameter MPW_LOLIMIT which sets the lower limit for the modified page list, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MPW_THRESHPAR_F_MPW_THRESH

The value of the SYSGEN parameter MPW_THRESH which sets the lower bound of pages that must exist on the modified page list before the swapper writes this list to acquire free pages, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MPW_WAITLIMITPAR_F_MPW_WAITLIMIT

The value of the SYSGEN parameter MPW_WAITLIMIT which sets the number of pages on the modified page list that will cause a process to wait until the next time the modified page writer writes the modified list, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MPW_WRTCLUSTERPAR_F_MPW_WRTCLUSTER

The value of the SYSGEN parameter MPW_WRTCLUSTER which sets the number of pages to be written during one I/O operation from the modified page list to the page file or a section file, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MULTIPROCESSINGPAR_F_MULTIPROC

The value of the SYSGEN parameter MULTIPROCESSING which enables full-checking synchronization for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_MULTITHREADPAR_F_MULTITHREAD

The value of the SYSGEN parameter MULTITHREAD, which controls the availability of kernel threads functions, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_NPAGEDYNPAR_F_NPAGEDYN

The value of the SYSGEN parameter NPAGEDYN which sets the size of nonpaged dynamic pool in bytes, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_NPAGEVIRPAR_F_NPAGEVIR

The value of the SYSGEN parameter NPAGEVIR which defines the maximum size to which NPAGEDYN can be increased, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PAGEDYNPAR_F_PAGEDYN

The value of the SYSGEN parameter PAGEDYN which sets the size of the paged dynamic pool in bytes, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PFCDEFAULTPAR_F_PFCDEFAULT

The value of the SYSGEN parameter PFCDEFAULT which sets the page fault cluster size for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PFRATHPAR_F_PFRATH

The value of the SYSGEN parameter PFRATH which specifies the page fault rate above which the limit of a working set is automatically increased, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PFRATLPAR_F_PFRATL

The value of the SYSGEN parameter PFRATL which specifies the page fault rate below which the limit of a working set is automatically decreased, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PHYSICALPAGEPSPAR_F_PHYSICALPAGES

The value of the SYSGEN parameter PHYSICALPAGES which sets the maximum number of physical pages to be used for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PIXSCANPAR_F_PIXSCAN

The value of the SYSGEN parameter PIXSCAN which determines the maximum number of processes to scan for priority boosting, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_POOLCHECKPAR_F_POOLCHECK

The value of the SYSGEN parameter POOLCHECK which enables a reserved debugging aid in locating problems within OpenVMS data structures by verifying memory allocations and deallocations for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PQL_DWSDEFAULTPAR_F_PQL_DWSDEFAULT

The value of the SYSGEN parameter PQL_DWSDEFAULT, which sets the default working set size for a process created by the Create Process ($CREPRC) system service or the DCL command RUN (Process), for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PQL_DWSEXTENTPAR_F_PQL_DWSEXTENT

The value of the SYSGEN parameter PQL_DWSEXTENT, which sets the default working set extent for a process created by the Create Process ($CREPRC) system service or the DCL command RUN (Process), for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PQL_DWSQUOTAPAR_F_PQL_DWSQUOTA

The value of the SYSGEN parameter PQL_DWSQUOTA, sets the default working set quota for a process created by the Create Process ($CREPRC) system service or the DCL command RUN (Process), for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PQL_MWSDEFAULTPAR_F_PQL_MWSDEFAULT

The value of the SYSGEN parameter PQL_MWSDEFAULT, which sets the minimum default working set size for a process created by the Create Process ($CREPRC) system service or the DCL command RUN (Process), for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PQL_MWSEXTENTPAR_F_PQL_MWSEXTENT

The value of the SYSGEN parameter PQL_MWSEXTENT, which sets the minimum working set extent for a process created by the Create Process ($CREPRC) system service or the DCL command RUN (Process), for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_PQL_MWSQUOTAPAR_F_PQL_MWSQUOTA

The value of the SYSGEN parameter PQL_MWSQUOTA, which sets the minimum working set quota for a process created by the Create Process ($CREPRC) system service or the DCL command RUN (Process), for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_QUANTUMPAR_F_QUANTUM

The value of the SYSGEN parameter QUANTUM which defines the maximum amount of processor time a process can receive before control passes to another process of equal priority that is ready to compute, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_RESHASHTBLPAR_F_RESHASHTBL

The value of the SYSGEN parameter RESHASHTBL which defines the number of entries in the lock management resource name hash table, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SMP_CPUPSPAR_F_SMP_CPUS

The value of the SYSGEN parameter SMP_CPUS, which sets which secondary processors, if available, are to be booted into the multiprocessing system at boot time, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SPTREQPAR_F_SPTREQ

The value of the SYSGEN parameter SPTREQ which sets the number of system page table (SPT) entries required for mapping the OpenVMS Executive image, RMS image, SYSMSG.EXE file, multiport memory structures, and other OpenVMS components, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SRPCOUNTPAR_F_SRPCOUNT

The value of the SYSGEN parameter SRPCOUNT which sets the number of pre-allocated small request packets, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SRPCOUNTVPAR_F_SRPCOUNTV

The value of the SYSGEN parameter SRPCOUNTV which establishes the upper limit to which SRPCOUNT can be automatically increased by the system, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SRPSIZEPAR_F_SRPSIZE

The value of the SYSGEN parameter SRPSIZE which indicates the size (in bytes) of the small request packets, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SWPALLOCINCPAR_F_SWPALLOCINC

The value of the SYSGEN parameter SWPALLOCINC which sets the swap file allocation increment value (in blocks), used to backup swap file allocation space in the swap or page file, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SWPOUTPGCNTPAR_F_SWPOUTPGCNT

The value of the SYSGEN parameter SWPOUTPGCNT which defines the minimum number of pages (pagelets) to which the swapper should attempt to reduce a process before swapping it out, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SWPRATEPAR_F_SWPRATE

The value of the SYSGEN parameter SWPRATE which sets the swapping rate and serves to limit the consumption of disk bandwidth by swapping, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_SYSMWCNTPAR_F_SYSMWCNT

The value of the SYSGEN parameter SYSMWCNT which is the system working set count which establishes the number of pages for the working set containing the currently resident pages of pageable system space for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_VBSS_ENABLEPAR_F_VBSSENA

The value of the SYSGEN parameter VBSS_ENABLE which determines whether Virtual Balance Slots (available with OpenVMS V6.0 and above) are enabled for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_WSDECPAR_F_WSDEC

The value of the SYSGEN parameter WSDEC that specifies the number of pages (pagelets) by which the limit of a working set is automatically decreased at each adjustment interval. This value applies to the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_WSINCPAR_F_WSINC

The value of the SYSGEN parameter WSINC which specifies the number of pages (pagelets) by which the limit of a working set is automatically increased at each adjustment interval, for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSGEN_WSMAXPAR_F_WSMAX

The value of the SYSGEN parameter WSMAX which is the maximum size of the process working set which determines the system wide maximum size of a process working set regardless of process quota for the current interval for the local node.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

SYSTEM_FAULT_RATEMET_F_SYSFAULTS

Average number of system page faults per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TAPE_CONTROLLERMAG_A_CTLR_NAME

This contains hardware controller type string of the tape drive for the current tape record in TAPE domain (e.g., MUA).

Data Type:	STRING
Domains:	TAP

TAPE_DEVNAMEMAG_A_DEVNAME

This contains the OpenVMS device name string for the current tape record in TAPE domain (e.g., 2MUA1).

Data Type:	STRING
Domains:	TAP

TAPE_ERROR_COUNTMAG_F_ERRCNT

This contains the number of errors accumulated over the current interval for the current tape record in TAPE domain.

Data Type:	NUMERIC
Domains:	TAP

TAPE_ERROR_TALLY (Derived)

This contains the sum of the ERROR counts for tape drives for all the tape subrecords which were selected by the most recent TAPE_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	TAP

TAPE_IO_RATEMAG_F_OPCNT

This contains the number of I/O's per second for the current tape record in TAPE domain.

Data Type:	NUMERIC
Domains:	TAP

TAPE_IO_TALLY (Derived)

This contains the sum of all I/O rates to tape drives for all the tape subrecords which were selected by the most recent TAPE_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	TAP

TAPE_SCAN (Derived)

Provides the count of tape subrecords for which the specified rule condition is true. The condition will be evaluated for each tape subrecord.

Data Type:	SCAN
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	TAP

TAPE_SERVER_HWTYPEMAG_A_HWTYPE

This contains hardware type string of the node which serves the tape drive to the cluster, for the current tape record in TAPE domain.

Data Type:	STRING
Domains:	TAP

TAPE_SERVER_NODENAMEMAG_A_NODENAME

This contains nodename string of the node which serves the tape drive to the cluster, for the current tape record in TAPE domain.

Data Type:	STRING
Domains:	TAP

TERMINAL_IO (Derived)

This contains a value representing the sum of terminal operations rate to all communications terminals on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TICKER_IS_ON (Derived)

The value of the SYSGEN parameter MMG_CTLFLAGS has bit zero set for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

TIME (Derived)

This contains the date and time associated with the current interval for either the local node, or the cluster wide I/O data cells.

Data Type:	TIME
Domains:	COM,CFG,CLU,CPU,DSK,FIL,LOC,PRO,TAP

TOP_BDTW_SCS_NODE_X (Derived)

This contains an index pointing to the configuration subrecord, for the SCS node with the most BDT waits on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

TOP_BUFIO_PROCESS_X (Derived)

This contains an index pointing to the process subrecord that has the highest buffered I/O operations rate on the local node for the current interval.

Data Type:	INDEX

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_COM_PROC_BPRI (Derived)

This contains a value representing the base priority of the process subrecord with the most time in the COM state on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TOP_COM_PROC_BPRI_A (Derived)

This contains a value representing the base priority of the process subrecord with the most time in the COM state. If PRIORITY_LOCKOUT is true (1.0), this cell will contain the base priority of the process which is probably unable to utilize the CPU because of a priority lockout, and pointed to by the cell TOP_COM_PROC_X_A.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TOP_COM_PROC_X (Derived)

This contains an index pointing to the process subrecord with the most time spent in the scheduler computable state on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_COM_PROC_X_A (Derived)

This contains an index pointing to the process subrecord with the highest percentage of time being computable. If PRIORITY_LOCKOUT is true (1.0), this cell will point to the most computable process subrecord which has a lower priority than the high priority process. This process is probably unable to utilize the CPU because of a priority lockout.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_CPU_PROC_BPRI (Derived)

This contains a value representing the base priority of the process subrecord with the highest CPU utilization on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TOP_CPU_PROC_CPU (Derived)

This contains a value representing the percent of CPU utilization of the process with the highest CPU utilization on the local node for the current interval. TOP_CPU_PROC_X indicates this process.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TOP_CPU_PROC_X (Derived)

This contains an index pointing to a process subrecord whose process has the highest CPU utilization on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_CW_SCS_NODE_X (Derived)

This contains an index pointing to the configuration subrecord for the remote SCS node for which the local node suffered the highest rate of credit waits for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	CFG

TOP_DIRIO_PROCESS_DIRIO (Derived)

This contains a value representing the highest direct I/O operations rate for a process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TOP_DIRIO_PROCESS_X (Derived)

This contains an index pointing to the process subrecord that has the highest direct I/O operations rate on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_DIRIO_PROC_TOPDSK_X (Derived)

This contains an index pointing to the disk record with the highest operations rate for the process subrecord that has the highest direct I/O operations rate on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

TOP_DISKS_PROCESS_X (Derived)

This contains an index pointing to the process subrecord that has the highest I/O operations rate to the highest I/O rate disk, on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_DSKIO_PROCESS_DSKIO (Derived)

This contains a value representing the highest disk I/O operations rate for a process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TOP_DSKIO_PROCESS_X (Derived)

This contains an index pointing to the process subrecord that has the highest disk I/O operations rate on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_DSKIO_PROC_TOPDSK_X (Derived)

This contains an index pointing to the disk record with the highest operations rate for the process subrecord that has the highest disk I/O operations rate on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	DSK

TOP_HF_IMAGE_X (Derived)

This contains an index pointing to the process subrecord, whose image, has the highest hard page fault rate of all process subrecords on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_HF_USER_X (Derived)

This contains an index pointing to the process subrecord, whose user has the highest hard page fault rate of all process subrecords on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOP_QLEN_DISKS_PROCESS_X (Derived)

This contains an index pointing to the process subrecord that has the highest I/O operations rate to the disk with the highest queue length, on the local node for the current interval.

Data Type:	INDEX
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

TOTAL_FAULT_RATEMET_F_FAULTS

This contains a number representing the total page faults per second for the local node for the current interval record.

Data Type:	NUMERIC

Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TOTAL_OF_WS_SIZES (Derived)

This contains the value representing the total number of pages (PPGCNT+GPGCNT) that all processes are using on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TRANSITION_FAULT_RATEMET_F_TRANSFLTS

Average number of global page faults per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

TROLLER_IS_ON (Derived)

The value of the SYSGEN parameter MMG_CTLFLAGS has bit 1 set for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

USERMET_F_USER

Average percentage of CPU time spent in User mode for all processors in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

USER_NAMEPRO_A_USERNAME

This contains a string indicating the user name for which the current process subrecord pertains on the local node for the current interval.

Data Type:	STRING
Domains:	PRO

VBS_INTSTKMET_F_VBSSCPUTICK

Average percentage of CPU time on the Interrupt Stack spent on behalf of VBS (Virtual Balance Set) transitions only for all processors in the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

VMS543_OR_LATER (Derived)

This contains a one if the version of OpenVMS is V5.4-3 or later (zero if not) for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

VMS60_OR_LATER (Derived)

This contains a one if the version of OpenVMS is V6.0 or later (zero if not) for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

VMS732_OR_LATER (Derived)

This contains a one if the version is OpenVMS 7.3-2 or later (zero if not) for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

VMS82_OR_LATER (Derived)

This contains a one if the version is OpenVMS 8.2 or later (zero if not) for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

VMS83_OR_LATER (Derived)

This contains a one if the version is OpenVMS 8.3 or later (zero if not) for the local node for the current interval record in LOCAL domain, and for the local node for the last interval record in SUMMARY domain.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,SUM,TAP

VOLUME_NAMEDEV_A_VOLNAME

This contains a string indicating the volume label of the disk for which the current disk subrecord pertains, in domain DISK.

Data Type:	STRING
Domains:	DSK

WINDOW_TURN_RATEMET_F_FCPTURN

Average window turn rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

WORKING_SET_DEFAULTPRO_F_DFWSCNT

This contains a value representing the UAF parameter WSDEF of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

WORKING_SET_DEFAULT_TALLY (Derived)

This contains the sum of the values representing the number of pages allocated as working set defaults for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

WORKING_SET_EXTENTPRO_F_WSEXTENT

This contains a value representing the current working set extent of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

WORKING_SET_EXTENT_TALLY (Derived)

This contains the sum of the values representing the number of pages allocated as working set extents for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

WORKING_SET_FAULT_IO_RATEPRO_F_PGFLTIO

This contains a value representing the hard page fault rate per CPU second for the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

WORKING_SET_FAULT_IO_TALLY (Derived)

This contains the sum of the values representing the hard page fault rate per CPU second for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

WORKING_SET_FAULT_RATEPRO_F_PAGEFLTS

This contains a value representing the soft page fault rate per CPU second for the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

WORKING_SET_FAULT_TALLY (Derived)

This contains the sum of the values representing the soft page fault rate per CPU second for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

WORKING_SET_GLOBAL_PGSPRO_F_GPGCNT

This contains a value representing the number of physical global pages in the current working set of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

WORKING_SET_LISTPRO_F_WSSIZE

This contains a value representing the number of pages allowed in the current working set of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

WORKING_SET_LIST_TALLY (Derived)

This contains the sum of the values representing the number of total pages in the working sets for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

WORKING_SET_PRIVATE_PGSPRO_F_PPGCNT

This contains a value representing the number of physical private pages in the current working set of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

WORKING_SET_QUOTAPRO_F_WSQUOTA

This contains a value representing the current working set quota of the current process subrecord on the local node for the current interval.

Data Type:	NUMERIC
Domains:	PRO

WORKING_SET_QUOTA_TALLY (Derived)

This contains the sum of the values representing the number of pages allocated as working set quotas for all of the current process subrecords which were selected by the most recent PROCESS_SCAN routine operation.

Data Type:	TALLY
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP
Target Domains:	PRO

WORKLOAD_NAMEPRO_A_WORKLOAD

This contains a string indicating the workload name for which the current process subrecord pertains on the local node. This filled in when the data is supplied from a history file, otherwise it is blank.

Data Type:	STRING
Domains:	PRO

WRITE_IN_PROGRESS_FAULT_RATEMET_F_WRTINPROG

Average number of write-in-progress page faults per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

WS_DECREMENTING_NEEDED (Derived)

This contains a Boolean value detecting a condition warranting working set decrementing on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

WS_DECREMENTING_TOO_SEVERE (Derived)

This contains a Boolean value representing severe working set decrementing on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_ACCESS_LOCK_RATEMET_F_ACCLCK

Average XQP access lock rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_ACCESS_LOCK_WAIT_RATEMET_F_XQPCACHEWAIT

Average XQP access lock wait rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_CACHE_HIT_RATEMET_F_HIT

Average XQP cache hit rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_CACHE_HIT_RATIO (Derived)

This contains a value representing the ratio of disk cache hits to misses on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_CACHE_MISSEDIO_RATE (Derived)

This contains a value representing the disk cache miss rate on the local node for the current interval.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_VOL_AND_DIR_LOCK_WAIT_RATEMET_F_SYNCHWAIT

Average XQP directory and volume synchronization lock wait rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_VOL_AND_DIR_SYNCH_LOCK_RATEMET_F_SYNCHLCK

Average XQP directory and volume synchronization lock rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_VOL_SYNCH_LOCK_RATEMET_F_VOLLCK

Average XQP volume synchronization lock rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

XQP_VOL_SYNCH_LOCK_WAIT_RATEMET_F_VOLWAIT

Average XQP volume synchronization lock wait rate per second for the local node for the current interval record.

Data Type:	NUMERIC
Domains:	COM,CFG,CPU,DSK,FIL,LOC,PRO,TAP

Appendix D: Estimate Virtual Memory Needs

This appendix helps you to estimate the virtual memory requirements for the Performance Manager when performing the following tasks:

- Generating Reports and Graphs using the DCL user interface
- Selecting daily or history data using the Command Mode interface
- Selecting daily or history data using the DECwindows interface

The virtual address space that a process may use is governed by smallest of either the process quota PGFLQUOTA, or the SYSGEN Parameter VIRTUALPAGECNT. Since an image is generally forced to exit when its virtual address space is exhausted, it is best to plan to have a sufficient amount for the desired task.

This section contains the following topics:

How Performance Manager Uses Virtual Memory

Performance Manager uses process virtual address space to accumulate, summarize, and sort performance data for the presentation of graphs and reports. The input data that is provided to PA for reporting or graphing determines the amount of memory required. You may either count or estimate the number of items you have in the input data files to make an estimate for the amount of virtual memory needed.

Process data is generally the most likely category of performance data that occupies process virtual address space. PA allows you to save process data at various levels of detail, from process_mode (interactive, batch, network, or detached) to the most detailed level, by process ID (PID). If you choose the most detailed level of reporting or graphing, more virtual memory is required.

The following estimates assume a page size of 512 bytes. On OpenVMS I64 and Alpha systems, these would be considered *pagelets*.

For Graphs

To estimate the process virtual pages needed for ALL graphs

- Use the following formula:

```
Pages required for graphing =
 (xp / 128) * nn *
 (126 +
 18 * (nu + ni + nw) +
 28 * nd +
 8 * nf +
 2 * nuid)
```

xp

# of x-points

nu

# of users

n

# of images

nw

# of workloads

nd

# of disks

nf

# of hotfiles

nuid

# of activity entries for users and images of specific disks.

nn

number of nodes + 1
(set to 1, if BY-NODE graph option is off)

For Reports

For the Performance Evaluation/Process Statistics, and the Tabular Report/Process Metrics section,

To estimate the process virtual pages needed for the process reports:

- Use the following formula:

```
Pages required for reporting =
 number of process instances * 0.43
```

The number of process instances is the number of unique occurrences of a process PID, imagename, username, processname, accountname, UIC group, and execution mode. Each of these item keys may be disabled by selecting reports or report options that do not require that level.

Performance Manager provides a set of default processing options that is designed to provide a medium amount of detail for the reporting and graphing functions, but that would require significantly less memory than if all processing options were enabled.

For Integrity Servers and Alpha Systems

When selecting data for both reporting and graphing from either Command Mode or DECwindows,

To estimate the number of pages needed (pagelets on Integrity and Alpha systems)

- Use the following formula:

```
Pages required for reporting +
Pages required for graphing + 20000
```

A safe approach is to provide as much process PFGLQUOTA as possible for the Performance Manager process since any unneeded pages are not wasted.

Appendix E: Output Format for ASCII-CSV Data

This appendix describes the format of the data file you create when you use the ADVISE PERFORMANCE EXPORT/TYPE=ASCII command. The appendix shows examples of each data record followed by a table showing each example value, data item, and a description of each item. The data is in CSV (Comma Separated Variable) format with each item appearing as a fixed length field within the record.

In an actual data file, the version record appears first indicating the node processed, data version, and image. Each subsequent data record appears on a line beginning with the record header. In the examples where a single data record line is too long to show here, the record appears on several lines.

The records are described in the following sections:

- Record Header
- Version Data Record
- Memory Statistics
- CPU Statistics Data Record
- Secondary CPU Statistics Data Record
- Page Statistics Data Record
- I/O Statistics Data Record
- XQP Statistics Data Record
- System Communications Services Data Record
- Lock Statistics Data Record
- Device Statistics Data Record
- Disk Statistics Data Record

- Service Statistics Data Record
- Process Metric Statistics Data Record

This section contains the following topics:

Record Header

This record header appears at the beginning of each data record.

```
"14-JAN-1997 10:00:00.00","14-JAN-1997 10:02:00.00","SNOLPD ","PROC", 120.0
```

Where "PROC" could be "CPU ", "DEVI", "DISK", "IO ", "LOCK", "MEMO", "PAGE", "PROC", "SYST", or "XQP".

Example	Data item	Description	Position	Length
"14-JAN-1997 10:00:00.00"	start_time	interval start time	2	23
"14-JAN-1997 10:02:00.00"	end_time	interval end time	29	23
"SNOLPD "	system_name	cluster node name	56	15
"PROC"	data_type	type of data in this record	75	4
120.0	seconds	seconds of data in this interval	82	7

Version Data Record

The version record appears as the first record in the data file.

```
"Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD"
```

Example	Data item	Description	Position	Length
"Vx.x"	image	image version	92	7
"REPORT=LOG_FILE"	report_program	type of report - LOG_FILE/HISTORY	103	17
"Vx.x"	data_vers	version of data file	122	7
"CPD"	input_source_1	file - HISTORY or LOGFILE	133	22

Memory Statistics Data Record

The following example commands show how to export and display memory statistics.

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.MEM/CLASS=(NODEFAULT, MEMORY)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE EXP.MEM
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD
" "26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "MEMO",
160.0, 327680, 78.5, 282821, 44859, 5000, 277821, 16352.0,
 70438, 6.5, 2.0, 122.0, 89.2, 219.7, 0.0, 217.7,
 0.0, 0.0, 0.0, 0.0
$
```

Example	Data item	Description	Position	Length
160.0	mbytes	megabytes of phys memory available	91	7
327680	pfn_phypgcnt	pages of physical memory available	100	7
78.5	mem_util	percentage of total memory in use	109	7
282821	paged	# of pgs for pageable memory	118	7

Example	Data item	Description	Position	Length
44859	nonpaged	# of pgs for non-paged memory	122	7
5000	sys_workset	# of pgs for the system workingset	131	7
277821	user_workset	# of pgs avail for user workingsets	140	7
16352.0	modifyp	size of the modified page list	149	7
70438	freep	size of the free page list	158	7
6.5	net_proc	# of network processes	167	7
2.0	bat_proc	# of batch processes	176	7
122.0	other_proc	# of other types of processes	185	7
	inter_proc	# of interactive processes	194	7
219.7	total_proc	total process count	203	7
0.0	como_state	# of procs in comp outswap state	212	7
217.7	balance_set	# of procs in the balance set	221	7
0.0	inswp_count	# of inswap operations	230	7
0.0	outswp_count	# of outswap operations	239	7
0.0	hdr_inswp	# of header inswap operations	248	7
0.0	hdr_outswp	# of header outswap operations	257	7

CPU Statistics Data Record

The following example commands show how to export and display CPU statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.CPU/CLASS=(NODEFAULT, CPU)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE
EXP.CPU
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "CPU",
56.8, 0.9, 0.3, 0.0, 1.3, 0.0, 40.4, 58.0,
 1.3, 2315.0, 34.4, 0.1, 4.8, 35.1, 9.8, 0.0,
 9.8, 42.9, 22.0, 12.4, 22.7, 0.15, 1, 0.3
$
```

Example	Data item	Description	Position	Length
56.8	interrupt	% of time in interrupt mode	91	7
0.9	kernel	% of time in kernel mode	100	7
0.3	exec	% of time in executive mode	109	7
0.0	super	% of time in supervisor mode	118	7
1.3	user	% of time in user mode	127	7
0.0	compat	% of time in compatibility mode	136	7
40.0	idle	% of time in idle mode	145	7
58.0	system_cpu	% of time in system mode (I+K+E)	154	7
1.3	task_cpu	% of time in task mode (S+U+C)	163	7
2315.0	extcpu_samples	number of extended CPU samples	172	7
34.4	cpu_busy	% of time CPU found busy	181	7
0.1	swap_busy	% of time swapper busy	190	7
4.8	multio_busy	% of time more than 1 disk busy	199	7

Example	Data item	Description	Position	Length
35.1	anyio_busy	% of time when at least 1 disk busy	208	7
9.8	pagewait	% of idle time with page i/o outstand.	217	7
0.0	swapwait	% of idle time with swap i/o outstand.	226	7
9.8	mmgwait	% of idle time with page or swap i/o outstanding	235	7
42.9	sysidle	% of time CPU and disks idle	244	7
22.0	cpu_only	% of time CPU busy and disks idle	253	7
12.4	cpu_io	% of time CPU busy and at least 1 disk busy	262	7
22.7	io_only	% of time at least 1 disk busy and CPU idle	272	7
0	com_state	number of processes in computable state	280	7
1	cpu_id	CPU id number, e.g., BI node number CPU board(s)	289	3
0.3	busy_wait	% of time in busy wait (spin time)	294	7

Secondary CPU Statistics Data Record

The following example output shows these Secondary CPU statistics:

```
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "SECO",
0.8, 10.2, 1.6, 0.1, 2.9, 0.0, 76.1, 12.6,
 3.0, 2, 8.3
```

Example	Data item	Description	Position	Length
0.8	sec_interrupt	% of time in interrupt mode	91	7
10.2	sec_kernel	% of time in kernel mode	100	7

Example	Data item	Description	Position	Length
1.6	sec_exec	% of time in executive mode	109	7
0.1	sec_super	% of time in supervisor mode	118	7
2.9	sec_user	% of time in user mode	127	7
0.0	sec_compat	% of time in compatibility mode	136	7
76.1	sec_idle	% of time in idle mode	145	7
12.6	sec_system_cpu	% of time in system mode (I+K+E)	154	7
3.0	sec_task_cpu	% of time in task mode (S+U+C)	163	7
	fill_1	Obsolete		
	fill_2	Obsolete		
2	sec_cpu_id	CPU id number	190	3
8.3	sec_busy_wait	% of time in a busy wait (spintime)	195	7

Page Statistics Data Record

The following example commands show how to export and display page statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.PAGE/CLASS=(NODEFAULT, PAGE)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE EXP.PAGE
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "PAGE",
118.4, 0.0, 3.5, 28.9, 0.0, 33.5, 56.8, 18.0,
 6.3, 0.0, 0.0, 0.1, 3.0, 97.0, 0.0
$
```

Example	Data item	Description	Position	Length
118.4	tot_faults	total page faults/second	91	7
0.0	pwrite_faults	pages write I/Os/second	100	7

Example	Data item	Description	Position	Length
3.5	readio_faults	page read I/Os/second	109	7
28.9	pages_read	number pages read/second	118	7
0.0	pages_written	number pages written/second	127	7
33.5	dzro_faults	demand zero faults/second	136	7
56.8	gvalid_faults	global valid faults/second	145	7
18.0	modify_faults	modified list faults/second	154	7
6.3	free_faults	free list faults/second	163	7
0.0	sys_faults	system page faults/second	172	7
0.0	bad_faults	bad list faults/second	181	7
0.1	trans_faults	transition state faults/second	190	7
3.0	hard_faults	% of total faults which were hard	199	7
97.0	soft_faults	% of total faults which were soft	208	7
0.0	write_in_prog	write in progress faults/second	217	7

I/O Statistics Data Record

The following example commands show how to export and display I/O statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.IO/CLASS=(NODEFAULT, IO)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE EXP.IO
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "IO",
1.4, 0.2, 15.8, 91.6, 1066.0, 1.2, 13.8, 97.0,
 45.4, 3.2, 3.2, 0.0
$
```

Example	Data item	Description	Position	Length
1.4	w_turns	window turn operations/second	91	7
0.2	splits	split I/O operations/second	100	7
15.8	w_hits	window hits/second	109	7
91.6	w_hitr	window hits+turns/window hits	118	7
1066.0	openf	number of open files	127	7
1.2	opens	number of file open ops/sec	136	7
13.8	dirio	direct I/O operations/second	145	7
97.0	bufio	buffered I/O operations/second	154	7
45.4	lognam	logical name translations/second	163	7
3.2	mbxread	mailbox read operations/second	172	7
3.2	mbxwrites	mailbox write operations/second	181	7
0.0	erase_ios	erase I/O operations/second	190	7

XQP Statistics Data Record

The following example commands show how to export and display XQP statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.XQP/CLASS=(NODEFAULT, XQP)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE EXP.XQP
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "XQP",
99.7, 3.0, 100.0, 0.1, 100.0, 0.2, 100.0, 0.3,
 80.8, 5.5, 88.7, 4.5, 0.0, 0.0
$
```

Example	Data item	Description	Position	Length
99.7	dir_hit	% directory FCB entries found in cache	91	7
3.0	dir_rate	directory FCB cache lookups/second	100	7
100.0	quota_hit	percent quota entries found in cache	109	7
0.1	quota_rate	quota cache lookups/second	118	7
100.0	fid_hit	percent file id entries found in cache	127	7
0.2	fid_rate	file id cache lookups/second	136	7
100.0	extent_hit	percent extent entries found in cache	145	7
0.3	extent_rate	extent cache lookups/second	154	7
80.8	filhdr_hit	% file header entries found in cache	163	7
5.5	filhdr_rate	file header cache lookups/second	172	7
88.7	dirdata_hit	% directory data entries found in cache	181	7
4.5	dirdata_rate	directory data cache lookups/second	190	7

Example	Data item	Description	Position	Length
0.0	stormap_hit	storage bitmap entries found in cache	199	7
0.0	stormap_rate	storage bitmap cache lookups/second	208	7

System Communication Services Data Record

The following example commands show how to export and display system communication statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=SNOLPD/OUTPUT=EXP.SYS –
_$ /CLASS=(NODEFAULT, SYSTEM_COMMUNICATION)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE EXP.SYS "SNOLPD ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "SNOLPD ", "SYST",
 120.2, "SNOLPD ", 0.0, 0.0, 0.0, 10.2, 0.0,
 0.0, 4.5, 4.5, 0.0, 0.0, 0.0, 0.0
$
```

Example	Data item	Description	Position	Length
"SNOLPD "	scs_node	name of node	92	17
0.0	data_gs_recvd	data gram msg received/sec	111	7
0.0	data_gs_sent	data gram msg sent/sec	120	7
0.0	data_gs_discd	data gram msg discarded	129	7
10.2	k_bytes_mapd	KB of buffer space to receive-send data from this node by local node	138	7
0.0	k_bytes_requst	KBytes of info to receive from some remote node by local node	147	7

Example	Data item	Description	Position	Length
0.0	k_bytes_sent	KBytes of info to send to some remote node from local node	156	7
4.5	msgs_recvd	# of msg received from this node by local node	165	7
4.5	msgs_sent	# of msg send by local node to this node	174	7
0.0	qd_buf_descrs	# of times/sec buffer descriptor entry not available	183	7
0.0	qd_buf_credit	# of times/sec local node had to wait for "credits" on remote node	192	7
0.0	reqst_data	"read" ops/sec initiated by local node for some remote node	201	7
0.0	sent_data	"write" ops/sec initiated by local node for some remote node	210	7

Lock Statistics Data Record

The following example commands show how to export and display lock statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.LOCK/CLASS=(NODEFAULT, LOCK)
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE
EXP.LOCK
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD" "26-JAN-1997
14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "LOCK",
23.2, 12.6, 0.0, 19.8, 4.6, 0.0, 24.0, 12.8,
 0.0, 0.1, 0.0, 0.1, 9.5, 0.0, 0.0, 0.0,
 44.0, 0.0, 0.0, 0.0, 10308.0, 4835.0
$
```

Example	Data item	Description	Position	Length
23.2	enq_local	enq ops/sec by lcl node for lcl lcks	91	7
12.6	enq_in	enq ops/sec req by rem node for lcl lcks	100	7
0.0	enq_out	enq ops/sec req by lcl node for rem lcks	109	7
19.8	cvtenq_local	conv ops/sec by lcl node for lcl lcks	118	7
4.6	cvtenq_in	conv ops/sec by rem nodes for lcl lcks	127	7
0.0	cvtenq_out	conv ops/sec by lcl node for remote lcks	136	7
24.0	deq_local	deq ops/sec by lcl node for lcl lcks	145	7
12.8	deq_in	deq ops/sec by remote nodes for lcl lcks	154	7
0.0	deq_out	deq ops/sec by lcl node for remote lcks	163	7
0.1	blkast_local	blking ast/sec by lcl node for lcl lcks	172	7
0.0	blkast_in	blking ast/sec by rem nodes for lcl lcks	181	7
0.1	blkast_out	blking ast/sec by lcl node for rem lcks	190	7

Example	Data item	Description	Position	Length
9.5	dirfunc_in	lcks/sec for directory ops by remote node for lcl directories	199	7
0.0	dirfunc_out	lcks/sec for directory ops by lcl node for lcl directories	208	7
0.0	dlckmsg_in	deadlock msg/sec received from rem nodes	217	7
0.0	dlckmsg_out	deadlock msg/sec sent to remote nodes	226	7
44.0	enq_wait	# of times lock unavailable and process waited	235	7
0.0	enq_notqd	# of times lock unavailable and process did not wait	244	7
0.0	dlck_search	# of times a deadlock search initiated by lcl system	253	7
0.0	dlck_find	# of times a deadlock condition was found by lcl system	262	7
10308.0	tot_locks	total # of lcks outstanding	271	7
4835.0	tot_resources	total # of resources that can be locked	280	7

Device Statistics Data Record

The following example commands show how to export and display device statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.DEV/CLASS=(NODEFAULT, DEVICE)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE EXP.DEV
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "DEVI",
"$1$DAD0 ", 0.0
$
```

Example	Data item	Description	Position	Length
"1DAD0 "	device_name	device name	92	20
0.0	device_rate	I/O operations/second to device	115	7

Disk Statistics Data Record

The following example commands show how to export and display disk statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.DISK/CLASS=(NODEFAULT, DISK)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE
EXP.DISK
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
“26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "DISK",
"$1$DUA30 ", 0.0, 0.0, 0.0, 0.0, -1.0,
 0.0, -1.0, -1.0, 0.0, 0.0, 0.0, 0.0, 44.2,
 2376153, 1324938, 0.0
$
```

Example	Data item	Description	Position	Length
"1DUA30 "	disk_name	device name	92	20
0.0	work_avail	% of time work was available for disk	115	7
0.0	total_work	total # of work request	124	7

Example	Data item	Description	Position	Length
0.0	remote_work	# of work requests from remote systems	133	7
0.0	disk_paging	% of total work marked as pagio	142	7
-1.0	rem_paging	% of total work marked as pagio from remote systems	151	7
0.0	disk_swping	% of total work marked as swapio	160	7
-1.0	rem_swping	% of total work marked as swapio from remote systems	169	7
-1.0	server	% of server's work charged to this disk	178	7
0.0	disk_rate	I/O rate/second	187	7
0.0	service_time	service time in ms	196	7
0.0	response_time	response time in ms	205	7
0.0	que_length	average queue length	214	7
44.2	space_used	average % space used	223	7
2376153	max_blocks	average maximum space for use	232	7
1324938	free_blocks	average free space	241	7
0.0	read_cdrps	read operations for this disk	250	7

Server Statistics Data Record

The following example shows the server records that follow the Disk statistics (shown in the Disk Statistics Data Record section) in the exported file:

```
$ TYPE EXP.SERV
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "SERV",
"HSC0 ", "HS70", 1, 0.2, 0.0, 0.0, 0.0
$
```

Example	Data item	Description	Position	Length
"HSC0 "	srv_name	name	92	16
"HS70"	srv_type	type	112	4
1	srv_alloc_cls	allocation class	119	7
0.2	srv_work_avail	% of time work was avail for server	128	7
0.0	srv_paging	% of server's work marked as pagio	137	7
0.0	srv_swping	% of server's work marked as swapio	146	7
0.0	srv_que_length	average length of server work queue	155	7

Process Metric Statistics Data Record

The following example commands show how to export and display process statistics:

```
$ ADVISE PERFORMANCE EXPORT /NODE=ULTRA/OUTPUT=EXP.PROC -
_$ /CLASS=(NODEFAULT, PROCESS)-
_$ /BEGINNING=26-JAN-1997:14:00:00.00/ENDING=26-JAN-1997:14:02:00.00
$ TYPE EXP.PROC
"ULTRA ", "VERS", "Vx.x", "REPORT=LOG_FILE", "Vx.x", "CPD "
"26-JAN-1997 14:00:00.00", "26-JAN-1997 14:02:00.00", "ULTRA ", "PROC",
26E00824, "MACNEIL ", "[00750,000021]", 4, "LEF ", 0.0, 0.0,
 0.0, 0.0, 0.0, 0.0, 408.0, 408.0, 408.0, "I",
"MACNEIL ", "CC_Y4Y ", 156.0, 156.0, 156.0, 252.0, 252.0,
 252.0, 1024.0, 4096.0, 16000.0, 4620.0, 4620.0,
 4620.0, "$1$DUA3: ","[SYS5.SYSCOMMON.][SYSEXE] ","SET "
$
```

Example	Data item	Description	Position	Length
26E00824	PID	Process ID	91	8
"MACNEIL "	proc_name	process name	102	16
"[00750,000021]"	asc_uic	ASCII UIC	121	14
4	priority	software priority	138	2
"LEF "	proc_state	process_state	144	5
0.0	image_count	image count	152	7
0.0	cpu_time	CPU time in minutes	161	7
0.0	dir_io	direct i/o rate/second	170	7
0.0	buf_io	buffered i/o rate/second	179	7
0.0	faults	page faults/second	188	7
0.0	fault_io	page fault i/os/second	197	7
408.0	min_ws	minimum working set size	206	7

Example	Data item	Description	Position	Length
408.0	ave_ws	average working set size	215	7
408.0	max_ws	maximum working set size	224	7
"I"	mode	process mode - interactive,batch,network,detached, other	233	1
"MACNEIL "	user_name	user name	239	12
"CC_Y4Y "	account	account	255	8
156.0	min_gbl_pgs	minimum global pages	266	7
156.0	ave_gbl_pgs	average global pages	275	7
156.0	max_gbl_pgs	maximum global pages	284	7
252.0	min_prv_pgs	minimum private pages	293	7
252.0	ave_prv_pgs	average private pages	302	7
252.0	max_prv_pgs	maximum private pages	311	7
1024.0	ws_default	working set default	320	7
4096.0	ws_quota	working set quota	329	7
16000.0	ws_extent	working set extent	338	7
4620.0	min_virt	minimum virtual size	347	7
4620.0	ave_virt	average virtual size	356	7
4620.0	max_virt	maximum virtual size	365	7

Example	Data item	Description	Position	Length
"1DUA3: "	image_dev	image device name	375	25
"[SYS5.SYSCOM-MON.][SYSEXE] "	image.dir	image name directory	404	37
"SET "	image_name	image file name	445	39
"UTILITIES "	workload_name	the workload name provided with /CLASSIFY qualifier	488	18

Appendix F: How You Graph Seven or More CPUs

Performance Manager can graph six CPUs per command. If you need to create a graph that displays seven or more CPUs for a node, you need to write CSV files for 6 CPUs at a time, manually create a merged CSV file, move the file to a Windows® machine, and then use Microsoft Excel® to create a graph.

To graph seven or more CPU's complete the following tasks in order:

1. Create a CSV file
2. Create More CSV Files as Necessary
3. Create a Single CSV File
4. Send the CSV file to a Windows Machine
5. Create the graph in Excel

This section contains the following topics:

Step 1: Create a CSV file

You need to create a CSV file that contains the custom graph data for first set of six CPUs. The ADVISE PERFORM GRAPH command has a CUSTOM type option.

Use this command with the following options:

```
$ ADVISE PERFORM GRAPH /NODE=nodename -
/OUT=nodename_cpus_nn1_nn2.CSV /FORMAT=CSV -
/BEGIN=dd-mmm-yyyy:hh:mm /END=dd-mmm-yyyy:hh:mm -
/TYPE=CUSTOM=(CPU_METRICS=P_BUSY, -
SELECTION=(cpuid,cpuid,cpuid,cpuid,cpuid,cpuid))
```

For example, the command for the first six CPUs of node RX8620

```
$ ADVISE PERFORM GRAPH /NODE=RX8620 -
/OUT=RX8620_CPUS_0_5.CSV /FORMAT=CSV -
/BEGIN=15-JAN-2008:13:00 -
/END=15-JAN-2008:13:10 -
/TYPE=CUSTOM=(CPU_METRICS=P_BUSY, SELECTION= -
(RX8620-0,RX8620-1,RX8620-2,RX8620-3,RX8620-4,RX8620-5))
```

Step 2: Create More CSV Files as Necessary

Repeat step 1 for each set of CPUs. Ensure you add no more than six CPUs to each file.

Step 3: Create a Single CSV File

You need to append the CPU data for the same collection interval to the existing record, and keep the order of the CPUs in each record.

To create a single CSV file

1. Edit the first file.
2. Open the second file.
3. Append the CPU ids to the end of the "Time" record.
4. Append the CPU data for each collection interval to the end of the record for that collection interval.
5. Repeat for any additional files.
6. Insert a second comma after "Time" in the time record.
7. Edit the format of the time fields for best display in the Excel graph. Change the quoted string to comma-separated values.

   For example, change

   "15-JAN-2008 13:00"
   To
   15-JAN-2008,13:00

For example, for two files with a total of 12 CPUs

File 1

```
"PSPA CUSTOM GRAPH"
"Node: RX8620"
"Date: 15-JAN-2008 13:00-13:10"
"Metric Values are Stacked (eg. Added to the left)"
"Units:   %PROCESSOR Total Busy"
"Time","RX8620-0","RX8620-1","RX8620-2","RX8620-3","RX8620-4","RX8620-5"
"15-JAN-2008 13:00",0.9183,0.2475,0.1250,0.1250,0.1108,0.0033
"15-JAN-2008 13:02",0.9192,0.2450,0.1233,0.1233,0.1100,0.0025
"15-JAN-2008 13:04",0.9192,0.2458,0.1250,0.1250,0.1058,0.0008
"15-JAN-2008 13:06",1.1150,0.3717,0.2358,0.2208,0.1892,0.0175
"15-JAN-2008 13:08",0.9175,0.2433,0.1242,0.1242,0.1067,0.0000
```

File 2

```
"PSPA CUSTOM GRAPH"
"Node: RX8620"
"Date: 15-JAN-2008 13:00-13:10"
"Metric Values are Stacked (eg. Added to the left)"
"Units:   %PROCESSOR Total Busy"
"Time","RX8620-6","RX8620-7","RX8620-8","RX8620-9","RX8620-10","RX8620-11"
"15-JAN-2008 13:00",0.0092,0.005,0,0,0,0
"15-JAN-2008 13:02",0.0092,0.005,0,0,0,0
"15-JAN-2008 13:04",0.0075,0.0017,0,0,0,0
"15-JAN-2008 13:06",0.1425,0.1233,0.1067,0.0425,0.0292, 0.015
"15-JAN-2008 13:08",0.0075,0.0017,0,0,0,0
```

Resulting File After Merge and Edits

```
"PSPA CUSTOM GRAPH"
"Node: RX8620"
"Date: 15-JAN-2008 13:00-13:10"
"Metric Values are Stacked (eg. Added to the left)"
"Units:   %PROCESSOR Total Busy"
"Time",,"RX8620-0","RX8620-1","RX8620-2","RX8620-3","RX8620-4","RX8620-
5","RX8620-6","RX8620-7","RX8620-8","RX8620-9","RX8620-10","RX8620-11"
15-JAN-2008,13:00,0.9183,0.2475,0.1250,0.1250,0.1108,0.0033,0.0092,0.005,0,0,0,0
15-JAN-2008,13:02,0.9192,0.2450,0.1233,0.1233,0.1100,0.0025,0.0092,0.005,0,0,0,0
15-JAN-2008,13:04,0.9192,0.2458,0.1250,0.1250,0.1058,0.0008,0.0075,0.0017,0,0,0,0
15-JAN-
2008,13:06,1.1150,0.3717,0.2358,0.2208,0.1892,0.0175,0.1425,0.1233,0.1067,0.0425,
0.0292, 0.015
15-JAN-2008,13:08,0.9175,0.2433,0.1242,0.1242,0.1067,0.0000,0.0075,0.0017,0,0,0,0
```

Step 4: Send the CSV File to a Windows Machine

Send the CSV file to a Windows machine. Utilize whatever method works best for you; FTP, for example.

Step 5: Create the Graph in Excel

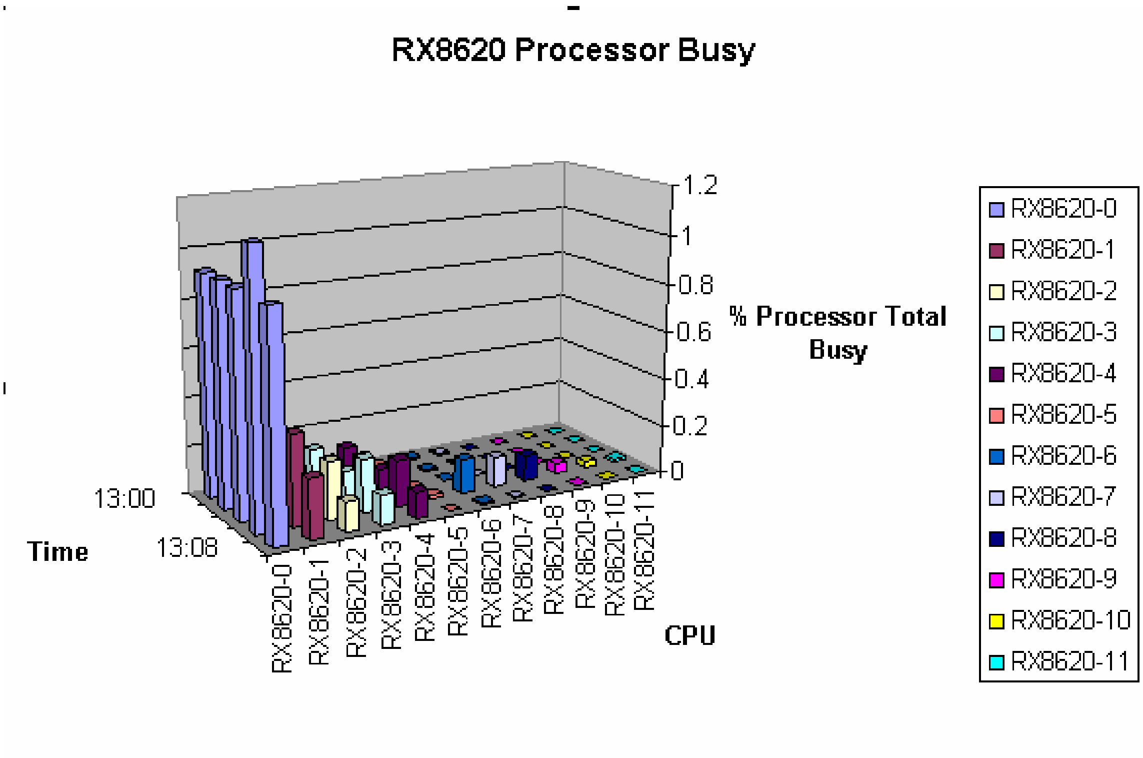
To create the graph in Excel

1. Open the .CSV file in Excel.
2. Select the data beginning with cell A6 through the lower right cell you want to graph.
3. Click the Chart Wizard
   OR
   From the Worksheet Menu Bar, click *Insert*, *Chart*.
4. Select Chart Type *Column* with chart sub-type from row three, left sub-type *3-D Column*, and then click *Next*.
5. Select *Columns* and then click *Next*.
6. Enter the title *Processor Busy*.

7. Set the X-axis as *Time*, the Y-axis as *CPU, and the* Z-axis as *% Processor Total Busy*, and then click *Next*.

8. In Step 4 of the wizard, click *As a new sheet* for the chart location, and then click *Finish*.

   The chart appears on a new sheet in the current Excel file, as shown in this example:



9. To adjust the chart, right click in the chart and choose an option from the pop-up menu.

Tips for viewing your data in the Excel Chart:

- Use the 3-D View to rotate the chart.
- If the collection intervals are all on a single day, you can choose to omit Column A from your graph selection. Add the date to the worksheet title for the chart, or to the Chart Title.

Glossary

Actual or real workload

The *actual or real workload* is the work actually performed by the computer system. Ideally, the actual workload is identical to the business workload.

Adapter

An *adapter* is a hardware interface between a device controller and a system backplane or bus.

Analysis report

An *analysis report* is a report that identifies the effects of system parameter settings, hardware configurations, and workload mixes on the performance of any cluster node or the entire cluster system. This report provides conclusions with supporting evidence and makes recommendations.

Analysis summary

The *analysis summary* is a short summary appearing in the analysis report after each node analysis. The summary contains the following information:
- Number of Performance Manager records analyzed for the specific reporting period
- Number of Performance Manager records that satisfied any rules
- Number of Performance Manager records that did not satisfy any rules
- Number of conclusions generated for the node being analyzed

Archive

Archive is the act of compressing Performance Manager daily data records into history files, which can be used in place of daily data to create reports, models, and graphs.

Auxiliary knowledge base

Auxiliary knowledge base is A collection of user-defined site-specific rules and thresholds that have been compiled with the rules compiler (name.KB) and used to augment the factory supplied rules.

Auxiliary rules

Auxiliary rules are the source files containing user-defined site-specific rules and thresholds that collectively comprises the auxiliary knowledge base.

Baseline load

A *Baseline load* is the Performance Manager's measurements of your existing system or cluster System. This data is stored in a model input file (.MDL).

Baseline model

A *baseline model* is a model generated from historic or daily Performance Manager data. The model output provides a workload characterization report. An unmodified .MDL file, the baseline load, represents Performance Manager measurements of your existing system. The model generated from this file is known as the baseline model.

Buffered I/O operation

A *buffered I/O operation* occurs each time an intermediate system buffer is used in place of the process context buffer.

Business workload

A *business workload* is the work the business expects its computer to perform.

Computer system

The *computer system* is all of the computer hardware on which business work is performed.

Conclusions

Conclusions are Text displayed in an analysis report.

CPU branch explicit

In a modeling context, the *CPU branch explicit* is the probable distribution of load across CPUs for a workload or transaction class. Probabilities must sum to one. This data is included in the model input file.

Custom graph

A *custom graph* is a graph type which allows you to specify which Performance Manager data items to graph.

Daily data files

Daily data files are created by the Performance Manager CPD data collector, one for each node in the cluster, each day. The filename has the following format:

```
PSDC$DATABASE:PSDC$nodename_yyyymmmdd.CPD
```

Data cell

A *data cell* is the basic unit of data used to create analysis reports. This data is either retrieved directly from a field in a subrecord of a daily data record or derived from it. The data cell is typically used as a variable in a rule expression.

Data collection error log

The *data collection error log* is an ASCII file common to the entire cluster system called PSDC$DATABASE:PSDC$DC.LOG. Errors that occur during data collection are recorded in this file.

Data collection schedule

The *data collection schedule* is a user-defined schedule by which the Performance Agent determines when to record data and what data to record for each node in the cluster.

Data collection synchronization

Data collection synchronization is a method used to correlate intervals measured on different nodes within a cluster system; those intervals must represent the same real time to make analysis effective.

Data files

Data files are the files containing performance data from which reports and graphs are constructed.

Data record

The *data record* contains performance data written by the data collector. The CPD data collector writes one data record for each two-minute interval.

Database directory

The *database directory* is a directory located on a permanently mounted disk, accessible to every node in the cluster. The data collection process writes the daily data files to this area. Performance Manager software references this area via the system wide logical name PSDC$DATABASE.

Dates file

The *dates file* contains a list of dates used to select data.

Device

A *device* is a piece of hardware in the computer system. It performs measurable units of work.

Direct I/O

The number of *direct I/O* operations performed per second. This illustration is tallied at the $QIO application interface layer.

Disk branch by source

In a modeling context, *disk branch by source* is the probable distribution of load across disks by originating CPU for a workload or a transaction class. Probabilities must sum to one. This data is included in the model input file.

Disk I/O

Disk I/O is the number of I/O operations per second for the device. This illustration is tallied at the physical device driver layer.

Dump report

A *dump report* contains formatted output of data fields for each record of a Performance Manager daily data file or history file.

Evidence

Evidence supports lines of performance data displayed in an analysis report.

Factory rules

Factory rules are the performance rules supplied with the Performance Manager in the PSPA$EXAMPLES area in the file named PSPA$KB.VPR.

Family name

Family name is an identifier for a group of workload definitions, also known as a workload (transaction or usergroup) family.

Family type

There are two *family types*
- Usergroup families contain workload definitions based on user criteria.
- Transaction families contain workload definitions based on image and process data.

Specify either family with the /CLASSIFY_BY qualifier to control use of the family for the reporting facility.

File type

A *file type* is specified by one of the following extensions in its name:
- .COM Various command files
- .CPD Cluster Performance Data file
- .DAT Parameters and schedule file
- .EXE Various image files
- .HLB Parameter Editor help file
- .KB Compiled rules Knowledge Base file
- .LIB Model library file
- .LIS A report file
- .LOG Data collection process error log file
- .MAR Sample macro application file
- .MDL Model file
- .name History file, *name* is history file descriptor; also, alternate data file name
- .name_JOU History journal file
- .REG A ReGIS graph written to a disk file
- .TXT Holidays and message files
- .VPR Performance Rules source file

Granularity

Granularity is a Performance Manager parameter file element that specifies for each history file descriptor how often a history file is created.

Hard page fault

A *hard page fault* occurs each time a process references a virtual page that is not in its working set and requires a read operation from disk, a hard page fault is generated.

Histogram

A *histogram* is a (ASCII) graphic chronological chart showing resource use.

History database

The *history database* is reduced data from the daily data files, which resides in the history files.

History file

The *history file* contains data archived from the daily data files. The number of history files created and maintained depends upon the number of history file descriptors and the associated granularity. The filename has the form PSDC$DATABASE:PSDC$nodename_dd-mmm-yyyy_dd-mmm-yyyy.name.

History file descriptor

The *history file descriptor* contains the description that Performance Manager uses to determine how to archive data to the file.

Holidays file

The *holidays file* contains a list of holiday dates. The Performance Agent uses the holiday schedule on these dates. The file name is PSDC$HOLIDAYS.TXT.

Hot files

Hot files are the most frequently accessed files on each disk. The Performance Agent collects hot file data when the length of a disk queue exceeds the HOTFILE_QUEUE setting.

Interaction

An *interaction* with a device is a two-step process. First, a unit of work to be done (job, user, process, and so forth) enters the queue of the device. Then, the unit of work is serviced by the device (in a manner dependent on the queueing discipline) and departs the device. The concept may be generalized to the system as a whole. The set of device interactions required to process each unit of work is called a transaction.

Interval

In the context of a history file, *interval* is an ADVISE EDIT ADD/HISTORY qualifier and a Performance Manager parameter file element.
In the context of a daily CPD data file, the interval for writing records is fixed at two minutes.
In the context of real-time displays, the interval is user-defined (default interval=10 seconds, minimum=1 second).

Journal file

The *journal file* is when Performance Agent software creates one history journal file for each history file. These are used by the update process in conjunction with the daily data files to recreate corrupt or deleted history files. The filename has the form PSDC$DATABASE:PSDC$nodename_dd-mmm-yyyy_dd-mmm-yyyy.name_JOU. Do not delete these files. If they exist they are needed.

Knowledge base

The *knowledge base* is a file consisting of Performance Manager performance rules used to analyze daily or historic Performance Manager data. It may be augmented using an auxiliary knowledge base.

Measured workload

The *measured workload* is the workload that can be observed on the system. Ideally, the measured workload is identical to the actual workload, but specified in different terms.
The measured workload is specified by the resource demands it places on the actual system. These demands, or loadings, are given as the service times of the users at each device along with the number of expected transactions at each device.

Model

A *model* is an abstraction of a system focusing on high-level performance characteristics.

MODEL_TRANSACTIONS

Model_transactions are a default workload family defined in the parameters file. It can be used to characterize workloads in the transaction class for modeling.

MODEL_USERGROUPS

Model_usergroups is a default workload family defined in the parameters file. It can be used to characterize workloads in the user group class for modeling.

Modeling

Modeling is the process of gathering, organizing, and evaluating principal components of a system and the ways in which they interact for the purposes of understanding and predicting system behavior.

MSCP

MSCP-Mass Storage Control Protocol. A software protocol used to communicate between a VAX or Alpha processor and a disk controller such as an HSC.

OpenVMS Cluster

An OpenVMS Cluster is a highly integrated organization of AlphaServer and HP Integrity server system–or VAX and HP AlphaServer system–applications, operating systems, and storage devices.

OTHER

All workload families have the catch-all workload *OTHER* to absorb process data that does not match the selection criteria of any defined workload.

Parameters file

PSDC$PARAMS.DAT is the *parameters file* resides in the PSDC$DATABASE area and serves as a repository for workload characterizations, history file descriptors and other Performance Manager parameters.

Performance Agent

The *Performance Agent* is a detached process that collects and records performance data for specified nodes in the cluster system according to a weekly schedule.

Performance evaluation report

The *performance evaluation report* is a statistical report that helps you determine whether changes that you implemented (based on recommendations in the Analysis Report) improved or degraded system performance.

Periodicity

Periodicity is a parameter file element for a history file descriptor that specifies how often the averaging cycle is restarted.

Predefined graph

A *predefined graph* is a graph in which the Performance Manager defines the metrics plotted.

Queue length

Queue length is the average number of outstanding requests, either waiting for or receiving service.

Queueing network model

Queueing network model is a mathematical abstraction of a system where the computer system is represented as a network of queues. Each queue in the network is evaluated analytically.

Raw data file

Recommendation

A *recommendation* is the text presented in an analysis report that offers system tuning advice based on rules firing. See *Rule conclusion*.

Residence time

Residence time is the time, in seconds, between image activation and image termination. Average time that a request spends while waiting for and receiving service.

Response time

Response time is the elapsed time between the arrival of a request and the moment of completion. In the context of modeling, the interval between the moment a request arrives at a device and request completion at a device.

Rule

A *rule* is one or more rule conditions that are evaluated when Performance Manager Analysis reports are generated. Rules are applied to daily or historic data. If all conditions for a rule are true then there is a rule occurrence. Rules are defined to expose areas of potential system problems. See *Rule firing*.

Rule conclusion

A *rule conclusion* is a rule element. The conclusions are Performance Manager recommendations based on the conclusion text element of a rules file rule construct.

Rule condition

A rule element. A rule condition is made up of one or more rule expressions. Describes the circumstances that must be true to cause a rule occurrence.

Rule elements

The seven rule elements that can exist in a rule construct are as follows:

Brief Conclusion element

Conclusion element

Domain element

Evidence element

Occurrence element

Rule condition element

Rule ID element

Rule evidence

A rule element. Data satisfying a rule occurrence in a Performance Manager analysis report. The evidence consists of data cell names and values. Typically these data cells are some of those contained in the rule expressions.

Rule expressions

Components of rule conditions which may include the following:

Decimal values

Literal symbols

Tally data cells

Numeric data cells

Boolean data cells

Scan routine data cells

String operators

Numeric binary operators

Parentheses for precedence

Rule firing

After all the data has been processed, when creating a report, the Performance Manager examines the number of rule occurrences for each rule. If the rule occurrence threshold is met for a particular rule, the rule is said to fire. For each rule that fires, an entry is made in the Analysis report. The entry may include evidence and conclusions.

Rule identifier

A rule element. A five-character alphanumeric code enclosed in braces, for example, {M0010} which uniquely identifies a rule. (A zero for the second character is reserved for Digital use only.)

Rule occurrence

Each time all the rule conditions for a given rule are true, there is one *rule occurrence*. See *Rule firing*.

Rules compiler

The *rules compiler* generates a binary knowledge base file (name.KB)from an ASCII rules source file (name.VPR).

Rules file

The *rules file* is a compiled knowledge base file (name.KB). A Performance Manager rules source file (name.VPR).

Rules file constructs

The following five *constructs* can exist in a *Rules File*:
- Comment construct
- Disable construct
- Literal construct
- Rule construct
- Threshold construct

Saturation

Saturation is the point at which response time at a device becomes substantially higher than the service time.

Schedule file

The *schedule file* is a file, PSDC$SCHEDULE.DAT, that resides in the PSDC$DATABASE area and controls when Performance Manager daily data is recorded.

Shadow set

A *shadow set* is one or more compatible physical disk volumes connected together for volume shadowing and represented by a virtual unit. Thus, the term shadow set refers to the physical unit *and* the virtual unit.

Soft page fault

Each time a process references a virtual page that is not in its working set but is in memory, a *soft page fault* is generated.

Split I/O

Split I/O is the number of additional physical disk I/O operations required to complete a single user's I/O request, which could not be satisfied in a single I/O to a device.

Transaction

A *transaction* is a quantifiable unit of work that typically delineates a single processing step in computer systems.

Transaction class

A *transaction class* is a group of related transactions. They may be related by the function they perform, by the users who initiate them, or by other quantities you define. Transactions may also be determined by the system resource demands. The Performance Manager software generally refers to a transaction class as a workload.

Transaction class workload

A *transaction class workload* is a workload that contains data bucketed by a workload definition defined in terms of images.

Transaction workload family

A *transaction workload family* is a set of image based workload definitions.

User defined graph

Usergroup workload family

A *usergroup workload family* is a set of user based workload definitions.

Utilization

The percentage of a resource's capacity being used.

VAXcluster system

A multipurpose system configured by interconnecting or *clustering* VAX processors and storage controllers to provide increased capabilities for sharing data, distributing workloads, and providing greater system and data availability.

VUP

VAX unit of processing speed. The VUP rating measures the CPU power of a system compared to a VAX 11/780. A VAX 11/780 has a VUP rating of 1.0.

Wait time

Wait time, or queueing time, is the average time each request spends waiting in a queue for service. During this time, the request accomplishes no useful work. Wait time may be derived specifically for each device in the system or for the system as a whole.

Workload

A representation of the actual system's resource demands. Performance Manager software reports graphs and capacity plans based on workloads. Workload definitions specify to Performance Manager software how to organize the system load into workloads.

Workload definition

A workload definition can be one or more users, image names, or processes that represent units of work on the system. Workload definitions are identified and stored in the Performance Manager parameters file. The goal is to express the system's total workload in manageable and meaningful units against which Performance Manager can report. Use ADVISE EDIT to create, modify and delete workload definitions.

A *Transaction* workload definition contains at least one image name. Typically this workload will contain images with similar resource demands.

A *Usergroup* workload definition contains a user specifier (such as accountname, username, processname, UIC code). Typically this workload will contain a group of users who belong to the same business unit, such as a department.

Transaction and *Usergroup* are terms applied to a workload by the /CLASSIFY_BY qualifier.

Workload family

A *workload family* is a collection of workload definitions collectively representing the entire work on a computer system.

Workload family name

A *workload family name* is a name that identifies a group of workloads that collectively constitute a unit called a family.

Workload name

A *workload name* is a name that identifies a workload or workload definition.

Workload selection criteria

A *workload selection criteria* is the criteria by which process data is assigned to a workload. A workload is selected when process data matches on either or both of a user specifier or image name.

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