# Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

# Agenda – Oracle Rdb Product Family Update

- Support Dates

- Recent Releases

- What's Under Development

- Oracle Rdb and OpenVMS in the Oracle Cloud

- Roadmap

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# What Products Make up The Rdb Product Family?

- Oracle Rdb Server
- Oracle CODASYL DBMS
- Oracle Trace
- Oracle CDD/Repository
- Oracle JDBC for Rdb
- Oracle Rdb Developer Tools for Visual Studio

- Oracle Rdb Connectivity Manager
- Oracle Rdb Extension for SQL Developer
- Oracle Rdb Extension for Oracle Enterprise Manager
- Oracle ODBC Driver for Rdb
- Oracle SQL/Services & OCI Services for Oracle Rdb
- Oracle Replication Option

# Rdb Product Family Lifetime Support Dates

**Oracle Rdb Database Releases**

| Release | GA Date | Premier Support Ends | Extended Support Ends | Sustaining Support Ends |
|---------|---------|----------------------|-----------------------|-------------------------|
| 7.0 | Oct 1996 | Aug 2007 | Aug 2009 | Indefinite |
| 7.1 | Jul 2001 | Dec 2007 | Dec 2010 | Indefinite |
| 7.2 | Jan 2006 | Jul 2015 | Jul 2017 | Indefinite |
| 7.3 | Mar 2011 | Sep 2020 | Sep 2023 | Indefinite |
| 7.4 | Aug 2020 | Dec 2025 | Not Available | Indefinite |

See: http://www.oracle.com/us/support/library/lifetime-support-technology-069183.pdf

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# Rdb Product Family Lifetime Support Dates

**Oracle CODASYL DBMS Database Release**

| Release | GA Date | Premier Support Ends | Extended Support Ends | Sustaining Support Ends |
|---------|---------|----------------------|------------------------|-------------------------|
| 7.0 | Oct 1996 | Aug 2007 | Aug 2009 | Indefinite |
| 7.1 | Jul 2001 | Dec 2007 | Dec 2010 | Indefinite |
| 7.2 | Jan 2006 | Jul 2015 | Jul 2017 | Indefinite |
| 7.3 | Mar 2011 | Sep 2020 | Sep 2023 | Indefinite |
| 7.4 | Nov 2021 | Dec 2025 | Not Available | Indefinite |

See: http://www.oracle.com/us/support/library/lifetime-support-technology-069183.pdf

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# Rdb Product Family Releases Over the Past 2 Years

- **Rdb 7.4.1.3, June 2024**

- **CODASYL DBMS 7.4.1.3, June 2024**

- **Rdb 7.3.4.0, July 2023**

- **Rdb Developer Tools for Visual Studio 7.4.1.0, February 2023**

- **Rdb 7.4.1.2, August 2022**

# Rdb 7.4.1.3, June 2024

- Available on My Oracle Support with the following patch set numbers:
  - I64:       36710977
  - Alpha:   36710989
- Software Errors fixed (partial list)
  - Row Cache Fails with CANTMAPSHMEM, NOSUCHSEC Error
  - Unexpected SQL-F-BUGCHK When Using SAVEPOINT Statement
  - Hash Join Behavior Mismatch
  - System Space Buffers not Freed Up After an RMU Close command
  - Unexpected Failure of RMU Convert Commit Command
  - CAST Function Converted Blank Strings to a Numeric Value

# Oracle Rdb 7.4.1.3 Available for Download

☆ **Patch 36710977: ORACLE RDB RELEASE 7.4.1.3.0 (IMV)**

Last Updated     07-Jun-2024 18:54 (1+ month ago)

Product   Oracle Rdb Server on OpenVMS

Release   Oracle Rdb Server 7.4.1.3.0

Platform   HP OpenVMS Itanium

Size   90.2 MB

Download Access   Software

Classification   General

Patch Tag

**Bugs Resolved by This Patch**

List of bugs fixed is not available. Consult the Readme.

**View Related Knowledge to this Patch**

# CODASYL DBMS 7.4.1.3, June 2024

- Available on My Oracle Support with the following patch set numbers:
  - I64:        36695838
  - Alpha:    36695849

- New Features (partial list)
  - The /LOCK_TIMEOUT Qualifier Can Now be Used With All DBO/RECLAIM Qualifiers
  - Updated Diagnostics for the DBO/MOVE_AREA Command
  - IEEE Floating Point Now Used For DBO/ANALYZE

- Problems Fixed (partial list)
  - Error From Disk Write Results in Hang
  - Unexpected COSI-F-EXQUOTA Error Using Buffer Objects
  - System Space Buffers not Freed Up After a DBO/CLOSE

# Oracle CODASYL DBMS 7.4.1.3 Available for Download

**Patch 36695838: ORACLE CODASYL DBMS 7.4.1.3.0 FOR OPENVMS ITANIUM**

Last Updated    04-Jun-2024 19:24 (2+ months ago)

Product   Oracle CODASYL DBMS

Release   Oracle CODASYL DBMS 7.4.1.3.0

Platform   HP OpenVMS Itanium

Size   64.1 MB

Download Access   Software

Classification   General

Patch Tag

## Bugs Resolved by This Patch

List of bugs fixed is not available. Consult the Readme.

## View Related Knowledge to this Patch

# Rdb 7.3.4.0, July 2023

- Available on My Oracle Support with the following patch set numbers:
  - I64:      35586554
  - Alpha:   35586577

- Problems Fixed (partial list)
  - Long Running Delete Does Not Advance After-Image Journal Checkpoint
  - Long Running Query Blocks Other Queries
  - Unexpected Bugcheck When Using DROP STORAGE AREA CASCADE
  - Unexpected Bugcheck when query contained multiple COUNT(*) aggregate functions
  - Unexpected RMU/UNLOAD/AFTER Bugcheck at AIJEXT$QSORT_RELEASE_REC
  - Journal Backed Up While RMU/UNLOAD/AFTER/CONTINUOUS Extracting Journal
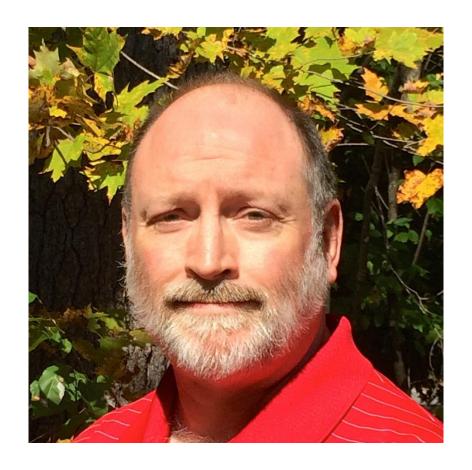
# What's Under Development

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# Next Rdb Versions

- Rdb and CODASYL DBMS X86 Beta kits

- CDD 7.4.1.0

- Trace 7.4.1.0

- Oracle Replication Option 7.4.1.0

# Over to Ian Smith...

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# Porting Oracle Rdb and Friends to OpenVMS x86-64

**Ian Smith**

# Credentials

- VMS X1.5

- Use PIP to copy

- RSX compatibility mode

- Hey you can use IF THEN ELSE in DCL

- ***I've been using VMS since 1978***

- What happened to F$LOGICAL?

- DBMS and DATATRIEVE consultant

- VAX-11 Rdb

- Rdb/VMS

- DEC Rdb now with SQL interface

- I've been using Rdb since 1984

- ***Started working in DEC's Rdb engineering 1989***

- Moved to Oracle… and Oracle Rdb Server

- 40 years later!  Still Here!

# Context

- Oracle Rdb product family
  - Oracle Rdb Server
  - Oracle CODASYL DBMS
  - Oracle Trace
  - Oracle CDD/Repository
  - Oracle Replication Option
  - Oracle JDBC for Rdb
  - etc.

- Large code base, written using several languages
- A single code source is used for all platforms with conditional compilation for platform specific features, or dependencies.
- Plus…

# Context...

- Many tools used for building and testing

- Many tests for applications running Rdb, CDD, DBMS, etc

- Using FORTRAN, COBOL, C, C++, BASIC, Pascal, etc

# Project started in 2018

- The Oracle Rdb team have a close working relationship with VMS engineering
- Face-to-face meetings with VSI Engineers and Management to talk though Oracle dependencies
- VSI described strategy for compilers and VMS releases

- Oracle highlighted our need for C++ (central backbone for SQL/Rdb)
- Oracle highlighted our need for the GEM back end for our own SQL$PRE and SQL$MOD compilers

# Phase 0:

- No compilers yet but...

- VSI indicated that F$GETSYI("arch_name") would return "x86_64"

- So we could start adjusting DCL in the build system, and regression test system

- CROSS TOOLS environment coming

- We had done this before for Alpha, and IA64 porting

- So in that environment TOOLS$xxx references CROSS tools, libraries, header files, etc as appropriate

- Build used batch-queue as logical name pointing to a IA-64 system

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# Phase 0

- Review code for conditional compilation.
  - `#if defined(alpha) || defined(ia64)`

- Need to be changed to include `defined(x86_64)` or simply

- `#if defined(OpenVMS)`

- Similar process for DCL procedures

- Look for LINK option dependencies

- Find tools that need to be re-compiled and/or written

# Phase 1: CROSS Compilers

- Execute x86-64 build using CROSS compilers, linker, set command/object, message/object...

- Initially no OS for testing but we had to review new warnings and errors from compilers.

- Several modules included PIC PSECT attributes that were ignored by Alpha and IA-64

- X86-64 compilers displayed many new warnings. So we dealt with them...

- Some changes to the LINK options files were required (different names for libraries, etc)

# Phase 1.5: Cross compilers and native SQL$PRE/SQL$MOD

- SQL$PRE and SQL$MOD x86 build
- **Special thanks to the VSI compiler team for helping us build SQL$PRE and SQL$MOD** that we needed to build our own products
- True VMS compilers that use the GEM backend for code generation
- Now on x86_64 it uses the GEM to LLVM backend

- A small number of changes were needed for SQL
- We use these compilers to build our own products

- V9.0 arrives so we can deploy images to run on our virtual systems

# Phase 1.5: Cross compilers and native CXX (challenge)

- No CROSS CXX compiler.

- We were early adopters for clang CXX compiler

- We pushed the compile to x86_64 as a **clang** command line

- Initially no VMS exit status so needed to parse the output from submitted BATCH job to detected errors and warning

```
$  define /user /nolog –
            DECC$ARGV_PARSE_STYLE ENABLE
$  define /user /nolog –
            DECC$EFS_CASE_PRESERVE ENABLE
$
$  clang -g 'p1' 'p5' -o'p4' –
            'optim_qual' 'pointer_size' 'other_quals'
```

# Challenges: CXX

- Note: read the CXX release notes carefully

- *1.4 Differences Between C++ on OpenVMS I64 and OpenVMS x86-64*

- We share header files between C and CXX modules

- The datatypes 'long', 'size_t', 'nullptr_t', 'ptrdiff_t' are 64-bits wide on OpenVMS x86-64 but only 32-bits wide on OpenVMS I64

- The default size for pointers is 64-bits on OpenVMS x86-64 but only 32-bits on OpenVMS I64

- The compiler does not automatically upcase external names like all other OpenVMS compilers

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# Surprises

- During native builds we discovered that some obscure tools were written in **VAX SCAN**

- On Alpha these were run as VESTed images (_TV.EXE)

- On IA64 those VESTed images were AESTed (_AV_TV.EXE)

- So no chance of them being useful on x86-64

- OpenJDK arrived just in time

- Deployed a new JAVA based tool across all platforms to replace those tools

# Technical Challenges: Memory Management

- LARGE MEMORY for GLOBAL BUFFERS

- This kernel level code uses PTE structures (Page Table Entries)

- x86-64 memory mapping is quite different from either Alpha or IA-64

- Expert level work from our team and the VMS kernel engineers

- BUFFER OBJECTS

- Aka SYS$IOPERFORM

- This performance feature required related expertise to complete

- Our close working relationship has been invaluable.

# Phase 2: Full Native Builds

- Now running full native build

- Using CXX command interface to clang

- Amazing transition from clang to CXX.  Kudos to the CXX team

- Tuning our products
  - Memory usage
  - Stack space
  - Resource usage

- 5 x86-64 nodes in our development cluster

- Nightly regression testing

- Adding new compiler updates from VSI into the mix (4 just this week!)

# Deployment

- DBMS was first to run
- No CXX dependency
- Smaller code base

- Shares the same kernel (KODA)
  - Memory management
  - Buffering
  - Locking
  - Page I/O
  - File I/O
  - After Image journaling
  - Recovery unit journaling
  - Show statistics
  - Monitor process

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# DBMS "first boot"

```
$ dbo/show system
Oracle CODASYL DBMS X7.4-00 on node MJNOEL  9-AUG-2021 11:02:11.80
  - monitor started  9-AUG-2021 10:41:41.64 (uptime 0 00:20:30)
  - monitor log filename is "SYS$SYSROOT:[SYSEXE]DBMMON741.LOG;13"
  - no databases are accessed by this node

$ dbo/show statistics parts
%DBM-F-ROOTMAJVER, database format 73.0 is not compatible with software version 74.0

$ dbo/convert parts.roo
DKA100:[X86_FILES]PARTS.ROO;1, CONVERT/COMMIT Rootfile? [N]:Y

$ dbo/show statistics parts
…
```

# Rdb "first boot"

```
$ rmu/show users
Oracle Rdb X7.4-00 on node RDB866 29-SEP-2022 16:39:47.26
    - monitor started 29-SEP-2022 16:28:56.54 (uptime 0 00:10:50)
    - monitor log filename is "SYS$SYSROOT:[SYSEXE]RDMMON741.LOG;1"


database $1$DGA170:[SMITHI.DATABASES.V74]MF_PERSONNEL_SQL.RDB;1
    - opened 29-SEP-2022 16:39:30.29 (elapsed 0 00:00:16)
    - 1 active database user on this node
      - 23E00591:1 - Ian Smith, SMITHI
- attached 29-SEP-2022 16:39:30.36 (elapsed 0 00:00:16)
- image RDB866$DKA0:[SYS0.SYSCOMMON.][SYSEXE]SQL$741.EXE;2
```

# More examples

```
$ rmu/show version $1$DGA170:[SMITHI.DB.V74]MF_PERSONNEL_SQL.RDB
Executing RMU for Oracle Rdb X7.4-00 on OpenVMS x86_64 V9.2
Database $1$DGA170:[SMITHI.DB.V74]MF_PERSONNEL_SQL.RDB;1 requires version 7.4


$ dictionary operator
CDO> show version
Installed version of Oracle CDD/Repository is T7.4-200
CDO>
```

# Final Notes

- On disk format unchanged
  - True for Rdb, DBMS and CDD

- Same after image format (and version) as V7.4.1.3

- Same version of Oracle Rdb Server on Alpha and Integrity can share the database

- Must be running the same release

…back to Kevin Duffy

# Testing on x86

- 8,920 tests out of 9799 tests now running for a 91.2% success rate
  - 97% success of 9191 tests we are running
  - Of the 271 failures, some ACCVIOs which need to be investigated
  - Seeing differences in some query strategies
- 608 tests yet to be run
  - Replication Option, Trace, JDBC, .Net, SQL Services
- Runtime Testing Continues

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# Oracle Rdb in the Oracle Cloud

- The hypervisors in the Oracle Cloud use Oracle Enterprise Linux (OEL) KVM

- Oracle Rdb development is migrating our x86 development environment to OEL KVM

- Alpha customers can run in the Oracle Cloud using emulators
  - Stomasys or AVTWare
  - We've had an OpenVMS Oracle 10g customer running in the Oracle Cloud for several years

# Oracle Rdb Roadmap

| Development Stream | H2CY2024 | H1CY2025 | H2CY2025 | H1CY2026 |
|---|---|---|---|---|

**Rdb 7.3**

**IA64 & Alpha**

Sustaining Support →

**Rdb 7.4**

**IA64, Alpha & x86**

7.4.1.0 CDD and Trace Releases

7.4.2.0
X86 Beta, Production Release

X86 Port →

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# Oracle CODASYL DBMS Roadmap

| Development Stream | H2CY2024 | H1CY2025 | H2CY2025 | H1CY2026 |
|---|---|---|---|---|

**DBMS 7.3**

**IA64 & Alpha**

Sustaining Support →

**DBMS 7.4**

**IA64, Alpha & x86**

7.4.1.0 CDD and Trace Releases

7.4.2.0
X86 Beta, Production Release

X86 Port →

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# Oracle Beta Programs

**Oracle Beta Programs**

## Oracle Beta Programs

Participating in the beta program gives you a unique opportunity to voice your opinion about upcoming features. As a beta tester, you'll get early access to features before they are released. Your feedback will play an important role to help us improve these features for everyone.

NOTE: Application submission requires an Oracle SSO account; you'll need to create an account tied to your corporate email address if you do not have one.

**A separate recruitment form and legal agreement are required per beta program.**

To apply to be a beta tester, follow the steps below:

① Complete and submit the recruitment form using the links below for each beta feature you want to preview. **A separate recruitment form and legal agreement are required per beta program.**

② The Oracle Beta Programs Office will review your application.

③ Execute the legal terms provided.

④ Your company will be notified by email upon acceptance into the beta program.

# QUESTIONS & ANSWERS

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