LAOUC Tour 2023

Database Upgrade Best Practices - Meet the PM

Rodrigo Jorge

Senior Principal Product Manager

Upgrade / Migration / Patching

July / August 2023

- **OCMs 11g / 12c / MAA / Cloud**
- **OCEs 11g / 12c**
- **(…)**

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DBA - Rodrigo Jorge - Oracle Tips and Guides
Blog about Databases, Security and High Availability

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Roy Swonger

Daniel Overby Hansen

William Beauregard

Mike Dietrich

Rodrigo Jorge

Episode 1

Release and Patching Strategy

105 minutes – Feb 4, 2021

Episode 2

AutoUpgrade to Oracle Database 19c

115 minutes – Feb 20, 2021

Episode 3

Performance Stability, Tips and Tricks and Underscores

120 minutes – Mar 4, 2021

Episode 4

Migration to Oracle Multitenant

120 minutes – Mar 16. 2021

Episode 5

Migration Strategies – Insights, Tips and Secrets

120 minutes – Mar 25, 2021

Episode 6

Move to the Cloud – Not only for techies
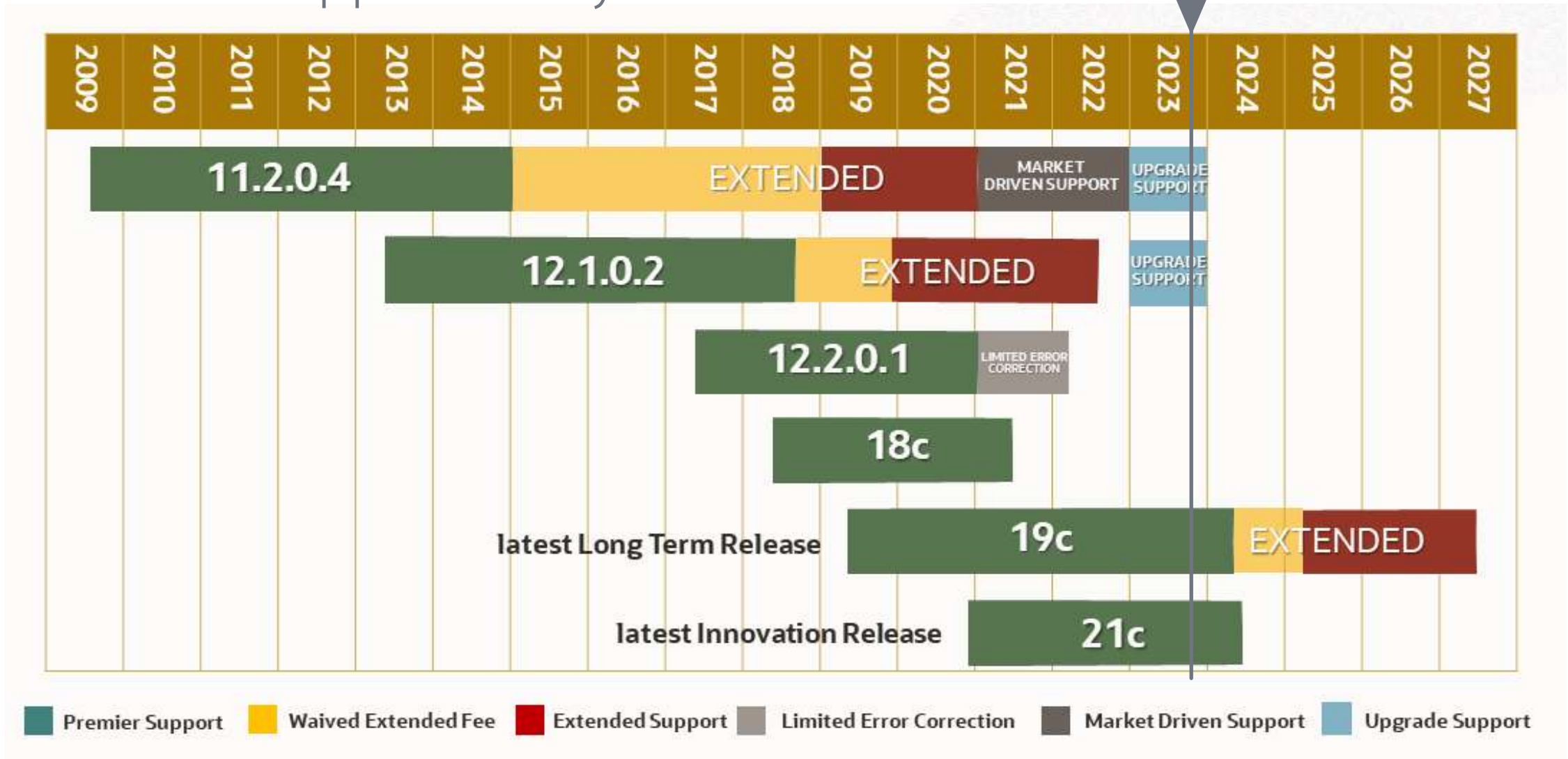
115 minutes – Apr 8, 2021

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Lifetime Support Policy

ORACLE MY ORACLE SUPPORT

PowerView is Off ▾

| **Knowledge** | RCA | DWB | Customer Exceptions | CMS | Service Requests | Patches & Updates | Certifications | Systems | More... ▾ | ⭐▾ | 🔵▾ |

⭐ **Release Schedule of Current Database Releases (Doc ID 742060.1)**

In this Document

Details

    What's New

    Oracle Database Release Roadmap

    Recommended Upgrade Path

    Oracle Database Release Schedule

        Oracle Public Cloud Releases

        On-Premises Engineered Systems

        On-Premises Server Releases (includes client)

        Instant Client-Only Releases

Actions

Contacts

    Change History (2020-2021)

References

Release Types

LONG TERM SUPPORT
5+ years of Premier Support followed by
3+ years of Extended Support

INNOVATION
3 years of Premier Support
No Extended Support

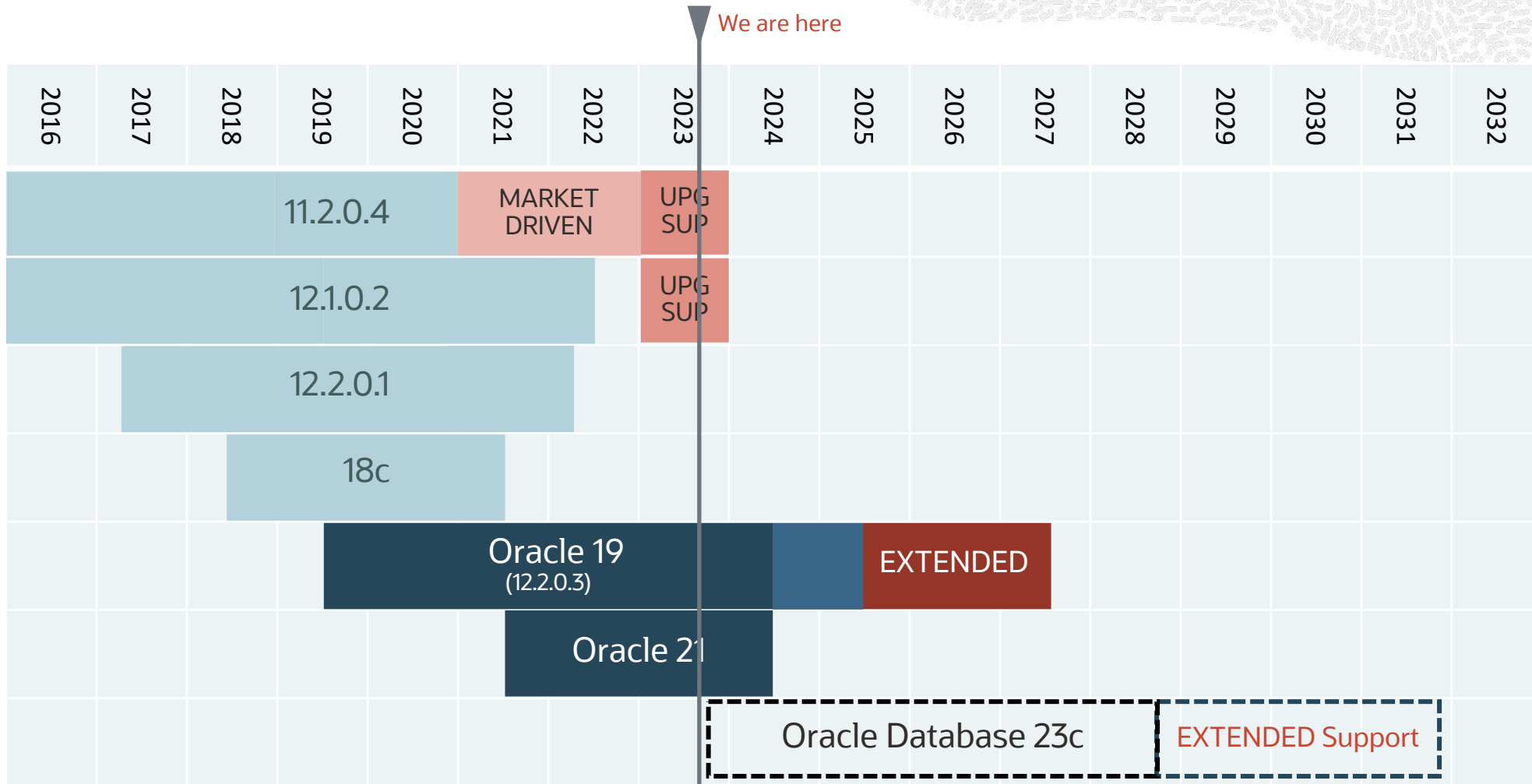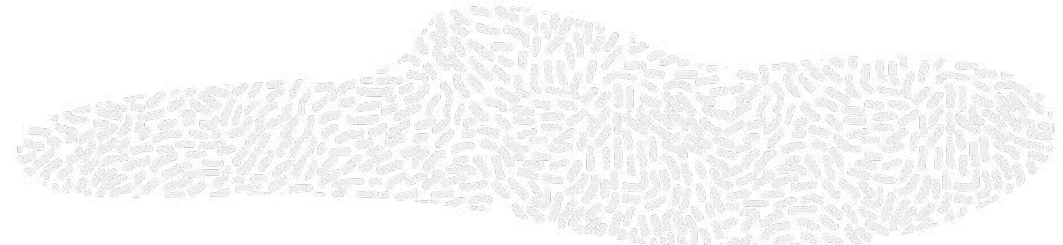| Innovation												

Long Term Support | Extended

Innovation

Long Term Support | Extended

👍 Move production databases from one **Long Term Support** release to the next

Plan YOUR Release Strategy

We are here

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032

11.2.0.4 — MARKET DRIVEN — UPG SUP

12.1.0.2 — UPG SUP

12.2.0.1

18c

Oracle 19 (12.2.0.3) — EXTENDED

Oracle 21

Oracle Database 23c — EXTENDED Support

Next Long Term Support release

Oracle Database 23c

Upgrade possible <u>only</u> from:

- Oracle Database 19c

- Oracle Database 21c

Do you want to upgrade?

Oracle Database 11.2.0.4
Oracle Database 12.1.0.2
Oracle Database 12.2.0.1
Oracle Database 18c

Oracle Database 11.2.0.4
Oracle Database 12.1.0.2
Oracle Database 12.2.0.1
Oracle Database 18c

⇒

Oracle Database 19c

⇒

Oracle Database 23c

Direct upgrade is NOT possible!!

Oracle Database 11.2.0.4
Oracle Database 12.1.0.2
Oracle Database 12.2.0.1
Oracle Database 18c

Everybody must **upgrade to Oracle Database 19c**, with or without Multitenant

3

user-created
pluggable databases

are always included - even in SE2

since **Oracle Database 19c**

Protection

```
alter system set MAX_PDBS=3 scope=both;
```

3 User-Created Pluggable Databases

```
 CON_ID CON_NAME          OPEN MODE   RESTRICTED
------- ------------- ----------- ----------
      2 PDB$SEED        READ ONLY  NO
      3 PDB1            READ WRITE NO
      4 PDB2            READ WRITE NO
      5 PDB3            READ WRITE NO
```

```
SQL> create pluggable database PDB4 ...
ORA-65010: maximum number of pluggable databases created
```

Prepare your upgrades and migrations

1

Install Oracle Home
including RU and MRP

MOS Note: 2118136.2
MOS Note: 555.1
MOS Note: 2781612.2

2

Download and deploy the
most recent AutoUpgrade

MOS Note: 2485457.1

3

Collect performance
information from current
source and test thoroughly

Quarterly Patch Bundles

- https://www.oracle.com/security-alerts/

Critical Patch Updates, Security Alerts and Bulletins

This page lists announcements of security fixes made in Critical Patch Update Advisories, Security Alerts and Bulletins, and it is updated when new Critical Patch Update Advisories, Security Alerts and Bulletins are released.

- Instructions for subscribing to email notifications of Critical Patch Update Advisories and Security Alerts.
- Oracle Corporate Security Blog
- Guidelines for reporting security vulnerabilities

This page contains the following sections:

- Critical Patch Updates
- Security Alerts
- Solaris Third Party Bulletins
- Oracle Linux Bulletins
- Oracle VM Server for x86 Bulletins
- Map of CVE to Advisory/Alert
- Oracle CVEs not published in other Oracle public documents
- CVEs for Oracle open source projects not published in other Oracle public documents
- Policy on information provided in Critical Patch Update Advisories and Security Alerts
- Applicability of Critical Patch Updates and Security Alerts to Oracle Cloud
- References

Critical Patch Updates

Critical Patch Updates provide security patches for supported Oracle on-premises products. They are available to customers with valid support contracts. Starting in April 2022, Critical Patch Updates are released on the third Tuesday of January, April, July, and October (They were previously published on the Tuesday closest to the 17th day of January, April, July, and October). The next four dates are:

- 17 October 2023
- 16 January 2024
- 16 April 2024
- 16 July 2024

- 17 October 2023
- 16 January 2024
- 16 April 2024
- 16 July 2024

Release Update Contents
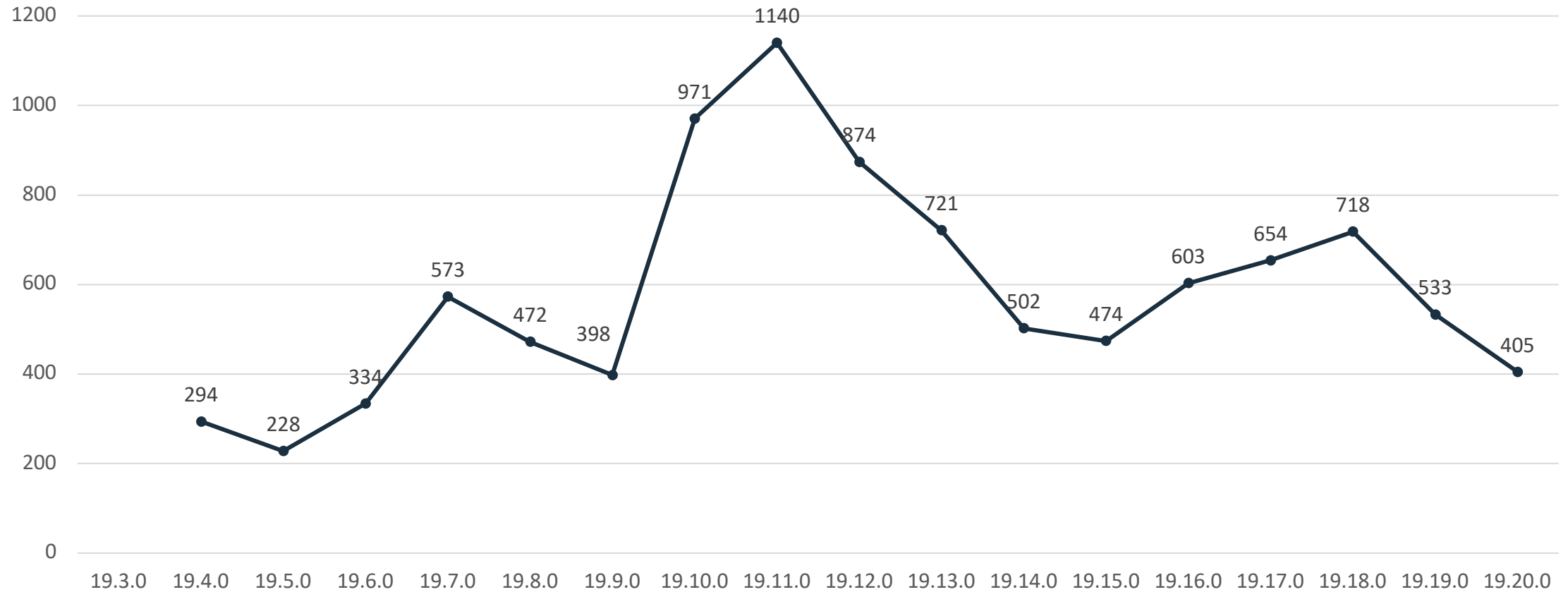
Database 19 Release Updates and Revisions Bugs Fixed Lists (Doc ID 2523220.1)

If you don't apply **one of the most recent Release Updates**, you will miss thousands of fixes – and 230 security fixes

Before upgrading, apply the most important patches

- Consider recommended patches [MOS Note: 555.1](#)

Recommended Patches for 19.18 DB Home

Below is the list of important patches to consider applying on top of 19.18. In addition to the relevant patches listed below, you should also review patches in Database PSU/BP/Update/Revision - Known Issues Primary Note(Doc ID 1227443.1) and Oracle Database Patches to Consider for 19c (Doc ID 2781612.2) which contains patches to consider for specific areas such as Data Pump, Golden gate etc.

Bug	Fixed in RU	Fixed in MRP	Description	Patches	NON ROLLING	Added
35023078 (replaces 34453871)		DBMRP 19.18.0.0.230221, GIMRP 19.18.0.0.230221	GI Patching with FPP to 19.18 from 19.15 or below fails in the root script execution	[list-patches]		08-FEB-2023
34793099 (replaces 30691454)		DBMRP 19.17.0.0.230221, DBMRP 19.18.0.0.230221	CDB creation fails on 19.17 with the ORA-704: bootstrap process failure while opening pdb$seed	[list-patches]		04-FEB-2023
33973908		DBMRP 19.17.0.0.230221, DBMRP 19.18.0.0.230221	DBWR not picking up writes for some time	[list-patches]		18-JAN-2023
34871935		DBMRP 19.18.0.0.230221	Queue Buildup - Sessions Spike With 'gc current request'	[list-patches]		18-JAN-2023
34879016		DBMRP 19.18.0.0.230221	All Sessions Hang Due To inst_rcv Buffer Is Not Getting Write Permission	[list-patches]		18-JAN-2023
34932268		Not Applicable	Linux: ORA-800 / Set Priority / DB Performance Merge Patch for 19.18 (Requires Root Access) - 34286265 34318125	[list-patches]		18-JAN-2023
29213893		Not Applicable	DBMS_STATS Failing With Error Ora-1422 When Gathering Stats for User$ Table	[list-patches]	YES	01-SEP-2021

Before upgrading, apply the most important patches

- Always use the Patches to consider note MOS Note: 2781612.2

Monthly Recommended Patches

A collection of recommended one-off fixes
provided at monthly intervals
via a single downloadable patch

Timeline | Release Updates

| | 2021 | | | | 2022 | | | | 2023 | | | | 2024 | | |
	January	April	July	October	January	April	July	October	January	April	July	October	January	April	July
19c	19.10.0	19.11.0	19.12.0	19.13.0	19.14.0	19.15.0	19.16.0	19.17.0	19.18.0	19.19.0	19.20.0	19.21.0	19.22.0	19.23.0	19.24.0
21c		21.3.0	21.4.0	21.5.0	21.6.0	21.7.0	21.8.0	21.9.0	21.10.0	21.11.0	21.12.0	21.13.0	21.14.0	21.15.0	

Monthly Recommended Patches | Timeline

	2022			2023										
	October	November	December	January	February	March	April	May	June	July	August	September	October	November
19.17.0	19.17.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6							
19.18.0				19.18.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6				
19.19.0							19.19.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6	
19.20.0										19.20.0	MRP1	MRP2	MRP3	MRP4
19.21.0													19.21.0	MRP1

Monthly Recommended Patches | Step-by-Step

	2022			2023										
	October	November	December	January	February	March	April	May	June	July	August	September	October	November
19.17.0	19.17.0	MRP1												
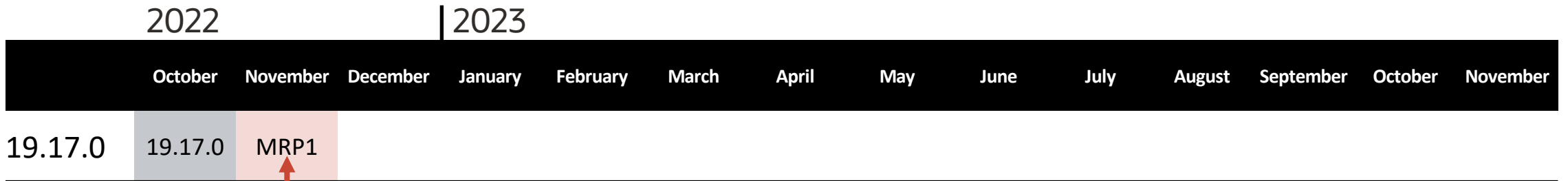
Bug	Fixed in RU	Fixed in MRP	Description	Patches	NON ROLLING	Added
33896423		DBMRP 19.17.0.0.221115	Flush Out Stale Antilocks and Convert kclcls_2 and kclantilock_17 to Soft Assert	[list-patches]		01-SEP-2022
34333986		DBMRP 19.17.0.0.221115	ORA-600 [KTUSCV1:CV Buf Too Big]/ [Kdbblkcheckerror] Block Corruption With Check Code 6127 After Migrating From Solaris to Linux	[list-patches]		28-JUL-2022
30691454		DBMRP 19.17.0.0.221115	DBHOME patching completely hung with kpdbhashtable_find multiple instance hang	[list-patches]		22-JUL-2022

Monthly Recommended Patches | Step-by-Step

	2022			2023										
	October	**November**	**December**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**
19.17.0	19.17.0	MRP1	MRP2											

Bug	Fixed in RU	Fixed in MRP	Description	Patches	NON ROLLING	Added
34649727			Linux: ORA-800 / Set Priority / DB Performance Merge Patch for 19.17 - 34286265 34318125	[list-patches]		18-OCT-2022
33896423		DBMRP 19.17.0.0.221115	Flush Out Stale Antilocks and Convert kclcls_2 and kclantilock_17 to Soft Assert	[list-patches]		01-SEP-2022
34333986		DBMRP 19.17.0.0.221115	ORA-600 [KTUSCV1:CV Buf Too Big]/ [Kdbblkcheckerror] Block Corruption With Check Code 6127 After Migrating From Solaris to Linux	[list-patches]		28-JUL-2022
30691454		DBMRP 19.17.0.0.221115	DBHOME patching completely hung with kpdbhashtable_find multiple instance hang	[list-patches]		22-JUL-2022

Monthly Recommended Patches | Step-by-Step

	2022			2023										
	October	November	December	January	February	March	April	May	June	July	August	September	October	November
19.17.0	19.17.0	MRP1	MRP2	MRP3										
19.18.0				19.18.0										

Monthly Recommended Patches | Step-by-Step

	2022			2023										
	October	November	December	January	February	March	April	May	June	July	August	September	October	November
19.17.0	19.17.0	MRP1	MRP2	MRP3	MRP4									
19.18.0				19.18.0	MRP1									

Monthly Recommended Patches | Step-by-Step

		2022			2023									
	October	**November**	**December**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**
19.17.0	19.17.0	MRP1	MRP2	MRP3	MRP4	MRP5								
19.18.0				19.18.0	MRP1	MRP2								

Monthly Recommended Patches | Step-by-Step

	2022			2023									
	October	November	December	January	February	March	April	May	June	July	August	September	October	November
19.17.0	19.17.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6						
19.18.0				19.18.0	MRP1	MRP2	MRP3						
19.19.0							19.19.0						

Monthly Recommended Patches | Step-by-Step

	2022			2023										
	October	**November**	**December**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**
19.17.0	19.17.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6							
19.18.0				19.18.0	MRP1	MRP2	MRP3	MRP4						
19.19.0							19.19.0	MRP1						

Monthly Recommended Patches | Step-by-Step

	2022			2023										
	October	**November**	**December**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**
19.17.0	19.17.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6							
19.18.0				19.18.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6				
19.19.0							19.19.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6	
19.20.0										19.20.0	MRP1	MRP2	MRP3	MRP4
19.21.0													19.21.0	MRP1

An **MRP is a collection of several one-off patches**. It is a merge patch.

19ᶜ An **MRP will not change** the release number.

MRPs are **cumulative**. But **only within one MRP line**, e.g. 19.17.0 MRP5 contains all previous MRPs done for Oracle 19.17.0.

MRPs are on **Linux only**.

MRPs may contain **security fixes**.

MRPs may be available in the **Cloud** and on **ExaDB-C@C** soon, too.

Release Changes

How can you find out about release and patching changes beforehand?

Available since 08/Aug!

🏠 **Home**

> Parameters
> Users, Roles, etc
> Privileges
> Included Fixes
> Oracle Database Home
> Objects
> Fixed Objects
> Audit
> System
> Scheduler

🐛 Report

⚙ REST Services

ORAdiff

ORAdiff - Find the differences between two Oracle Database releases

ORAdiff allows you to compare two database releases to each other - with or without patch bundles on top.

Get Started

1. Click the menu icon on the upper left corner of the page
2. Select an object type from the left-hand navigation menu
3. Choose the Source and Target versions and patch levels
4. View the report. You may optionally choose a filter
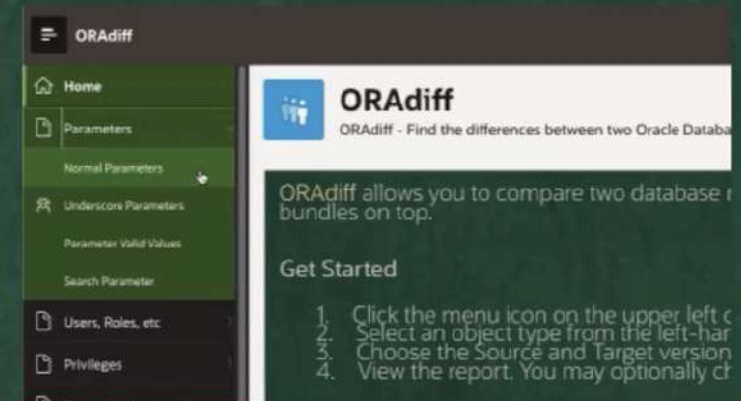
ORAdiff will display the differences such as "new tables", "added parameters", "changed columns", "removed privileges" and much more. ORAdiff search can tell you when a parameter was added and which files changed in your Oracle Home.

ORAdiff data is refreshed when new patch bundles are released to the public.

Questions? Ideas? Enhancement requests? Contact us on: #oradiff-int

Your path to successful database upgrades

1

Install Oracle Home including RU and MRP

MOS Note: 2118136.2
MOS Note: 555.1
MOS Note: 2781612.2

2

Download and deploy the most recent AutoUpgrade

MOS Note: 2485457.1

3

Collect performance information from current source and test thoroughly

AutoUpgrade

11.2.0.4
12.1.0.2
12.2.0.1
18c
19c

1.

2.

3.

12.2.0.1
18c
19c
21c

CONFIG FILE

ANALYZE

UPGRADE

ONE BUTTON APPROACH
But giving you all the control you want

Optionally,
convert to PDB

AutoUpgrade automates your migration to Multitenant completely

**Including Transparent Data Encryption
with AutoUpgrade's new keystore functionality**

Always use the latest version of AutoUpgrade

Download it from
MOS Note 2485457.1

Backwards Compatible

```
$ java -jar autoupgrade.jar -version

build.version 23.1.230224
build.date 2023/02/24 14:53:24 -0500
build.hash a1e2990e
build.hash_date 2023/02/24 14:44:39 -0500
build.supported_target_versions 12.2,18,19,21
build.type production
build.label (HEAD, tag: v23.1, origin/stable_devel, stable_devel)
```

Checklist

—

Essential things to do before you
upgrade or migrate your databases

Execute **database health checks** at least two weeks before an upgrade or migration

Database Health Check

Health check script

- Download from MOS Note: 136697.1
- In Multitenant, it must be run in each PDB separately

ORAchk Upgrade Readiness Assessment

- Part of Autonomous Health Framework (AHF)
- Download from MOS Note: 1457357.1
- Upgrade Readiness Check – MOS Note: 2550798.1

Collect at least **one full month of performance data** before any upgrade or migration

Performance Information

AWR – Automatic Workload Repository

Change the retention to a minimum of 40 days

```
exec
dbms_workload_repository.modify_snapshot_settings
(retention=>57600, interval=>30);
```

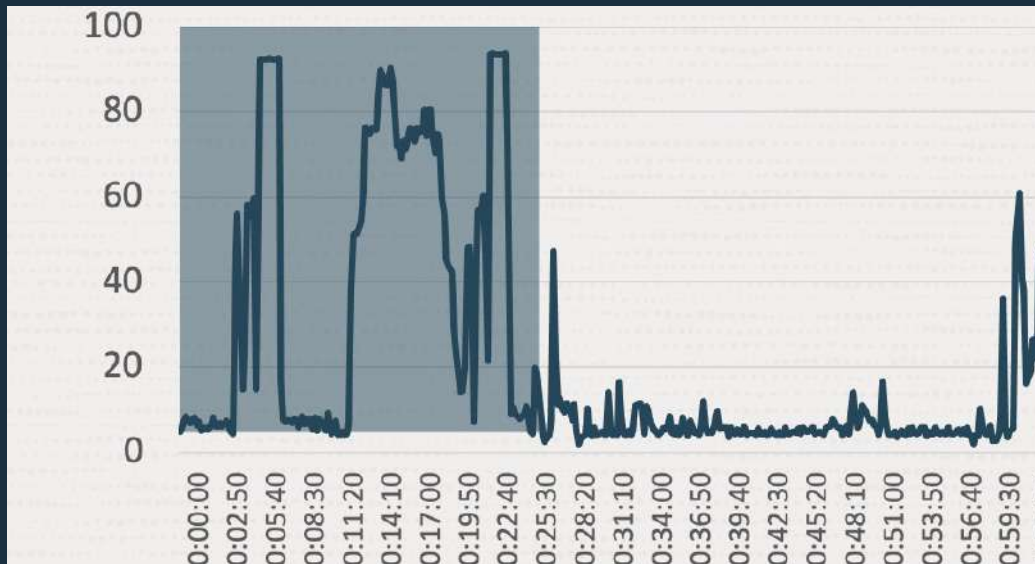### Collect SQL statements and plans

Use AWR as main source

Capture from Cursor Cache for OLTP
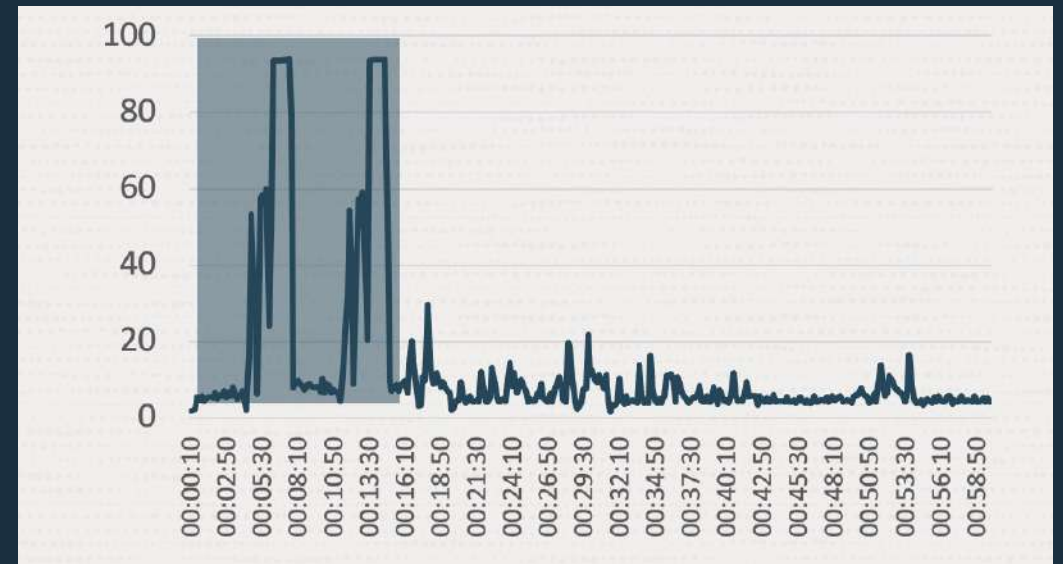
Collect statements, plans and stats in SQL Tuning Sets

Refresh dictionary statistics, especially on `SYS` and `SYSTEM` before upgrade or migration

Gather dictionary and fixed objects stats

Without stats refresh

- Initial upgrade phase: 25 min

With stats refresh

- Initial upgrade phase: 13 min

12 minutes saving in upgrade time

Remove outdated parameters, especially underscores and events, and set recommendations

Try to avoid `optimizer_features_enable`

Do not change **COMPATIBLE** – if possible

Comparison

Fully independent from each other

COMPATIBLE

- Enables features
- Changes on-disk structures

OPTIMIZER_FEATURES_ENABLE

- Just reverts to the parameters used in a previous release
- Avoid using it if possible
- This is not a Swiss Army knife!
- You will turn off a lot of great features

Enable disabled optimizer fixes with `DBMS_OPTIM_BUNDLE` when you upgrade and migrate

Disabled Optimizer Fixes

```
SQL> set serverout on
SQL> execute dbms_optim_bundle.getBugsforBundle;

19.16.0.0.220719DBRU:
    Bug: 28044739,  fix_controls: 28044739
    Bug: 30771009,  fix_controls: 30771009
    Bug: 33636280,  fix_controls: 33636280
    Bug: 33089096,  fix_controls: 31545400
    Bug: 30618406,  fix_controls: 30618406
    Bug: 32614157,  fix_controls: 32614157
    Bug: 33329027,  fix_controls: 33329027
    Bug: 33311488,  fix_controls: 33311488
    Bug: 32396085,  fix_controls: 32396085
    Bug: 32122197,  fix_controls: 29972495
    Bug: 32363981,  fix_controls: 32363981
```

Enable with:

```
execute
dbms_optim_bundle.enable_optim_fixes(
'ON','BOTH','YES')
```

- Consider careful testing
- SQL Performance Analyzer
- Adds lengthy `_fix_control` to SPFILE
- Granular on/off possible

Your path to successful database upgrades

1

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including RU and MRP

MOS Note: 2118136.2
MOS Note: 555.1
MOS Note: 2781612.2

2

Download and deploy the
most recent AutoUpgrade

MOS Note: 24854571

3

Collect performance
information from current
source and test
thoroughly

Virtual Classroom Seminars

Episode 3:
Performance Stability – Tips and Tricks

Episode 9:
Performance Testing in the Cloud

`https://dbarj.com.br/webinars`

Use **SQL Performance Analyzer** to detect failing plans before going live.

Use **SQL Plan Management** and **SQL Tuning Advisor** to fix misbehaving SQL before going live.

Detect and fix misbehaving SQL

1 Capture plans from AWR and Cursor Cache

2 Simulate with SQL Performance Analyzer

3 Fix SQL using binds with SQL Plan Management
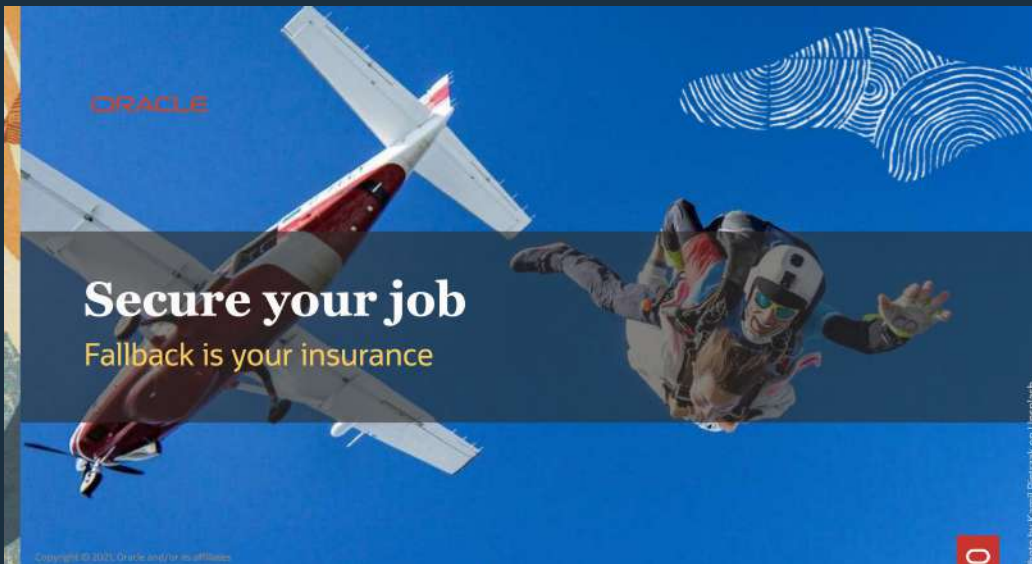- Use captured plan and accept it with **DBMS_SPM** or EM CC

4 Fix SQL using literals with SQL Profiles
- Accept SQL profiles with **FORCE_MATCH=>TRUE**

Never ever upgrade or migrate without evaluating and testing **your rollback and fallback options** successfully

Virtual Classroom Seminars

Episode 10:
Secure your job - Fallback is your insurance

More than 30 hours of pure technical content are available on demand – 24x7

https://dbarj.com.br/webinars

LAOUC Tour 2023

Thank you

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