

Oracle Database Day

Database Upgrade and Migrations

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Upgrade / Migration / Patching

July 2023





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<https://dohdatabase.com>



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



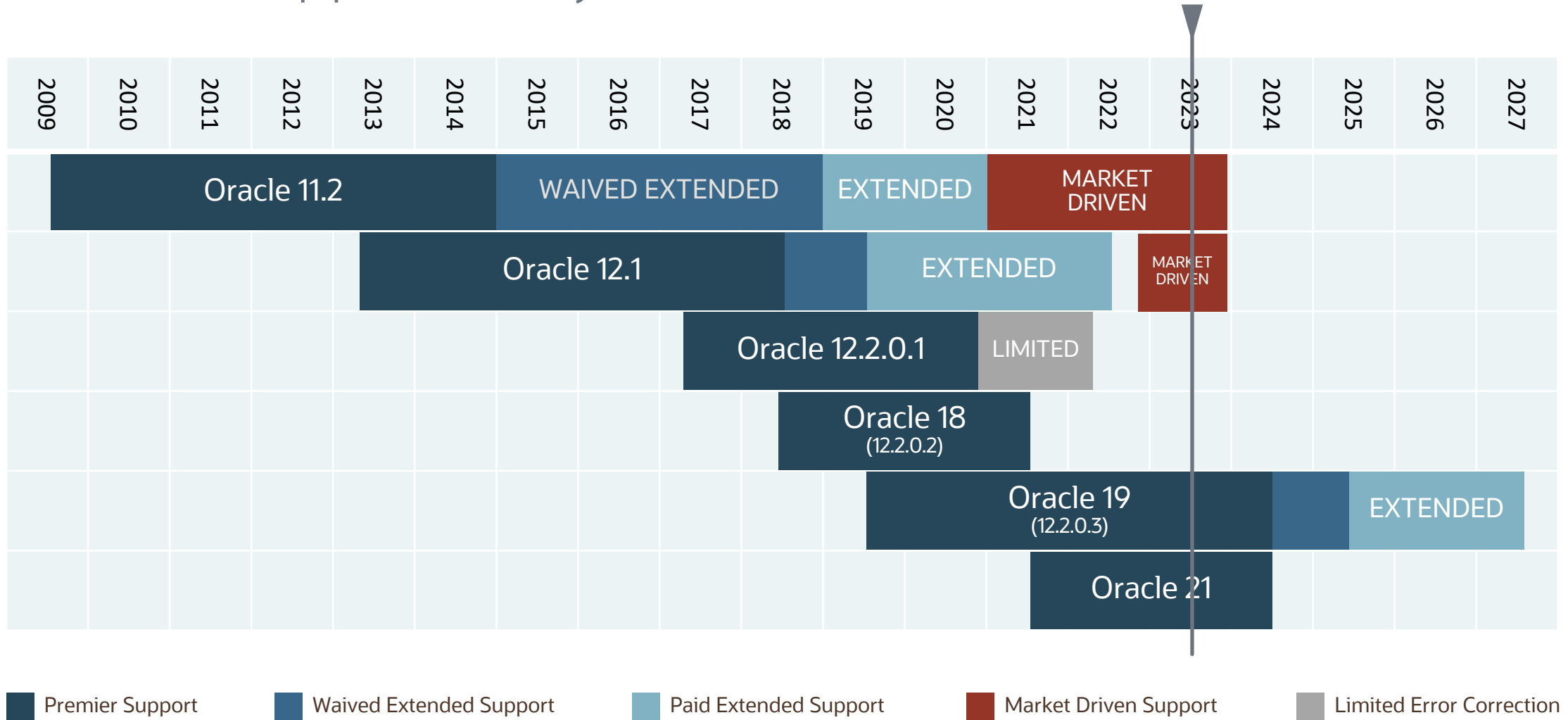
Recorded Webinars

<https://MikeDietrichDE.com/videos>

More than 30 hours of technical content,
on-demand, anytime, anywhere



Lifetime Support Policy



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★ Release Schedule of Current Database Releases (Doc ID 742060.1)

In this Document

[Details](#)

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[On-Premises Engineered Systems](#)

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[Instant Client-Only Releases](#)

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[Change History \(2020-2021\)](#)

[References](#)

Lifetime Support Policy

Different Support Periods

- Premier Support
 - Bug fixing support regardless of severity
- Paid Extended Support
 - Extra cost extension, **10% / 20% extra cost**
 - Included in ULA/PULA contracts
- Waived Extended Support
 - Extended support gets waived to everybody having a valid Support contract for the product
- Market Driven Support
 - Extra cost extension after Extended Support
 - Fixes done only for critical and security issues
- Limited Error Correction
 - Extension for Oracle 12.2.0.1 at **no extra cost**
 - Only applicable for Sev.1 and security issues
- Sustaining Support
 - Oracle Support assists as long as the customer is using the product – but no new fixes will be delivered

Release Types



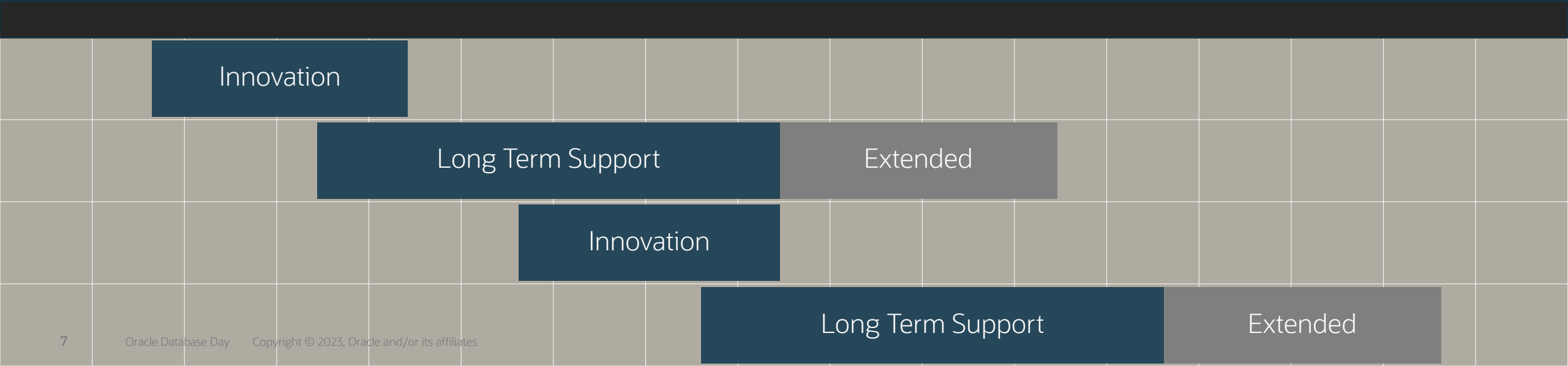
LONG TERM SUPPORT

5+ years of Premier Support followed by
3+ years of Extended Support



INNOVATION

2 years of Premier Support
No Extended Support

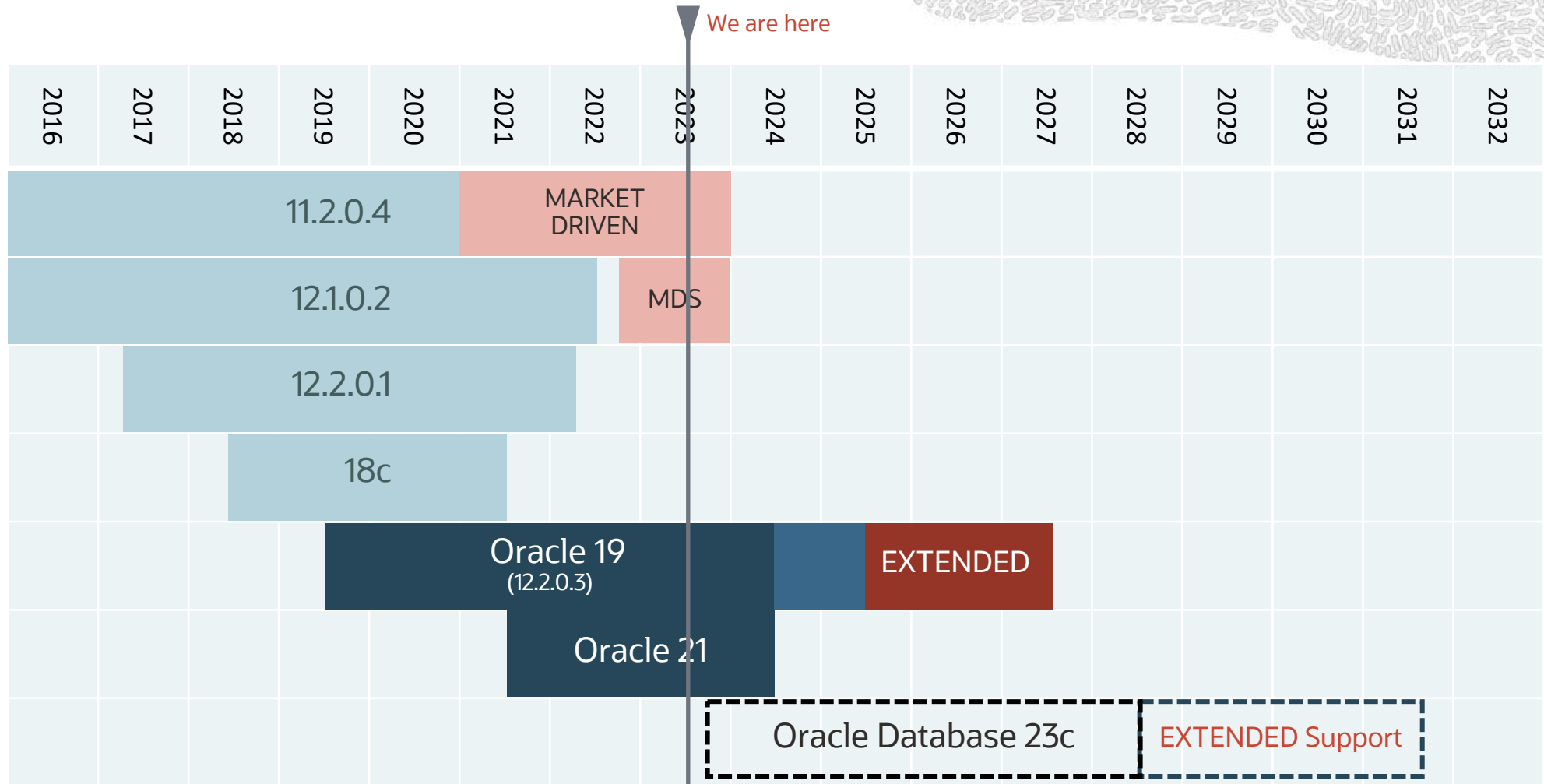




Move production databases from one
Long Term Support release to the next



Plan YOUR Release Strategy



Next Long Term Support release

Oracle Database 23c

Upgrade possible only 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



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



```
alter system set max_pdb=3;
```


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

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](#)

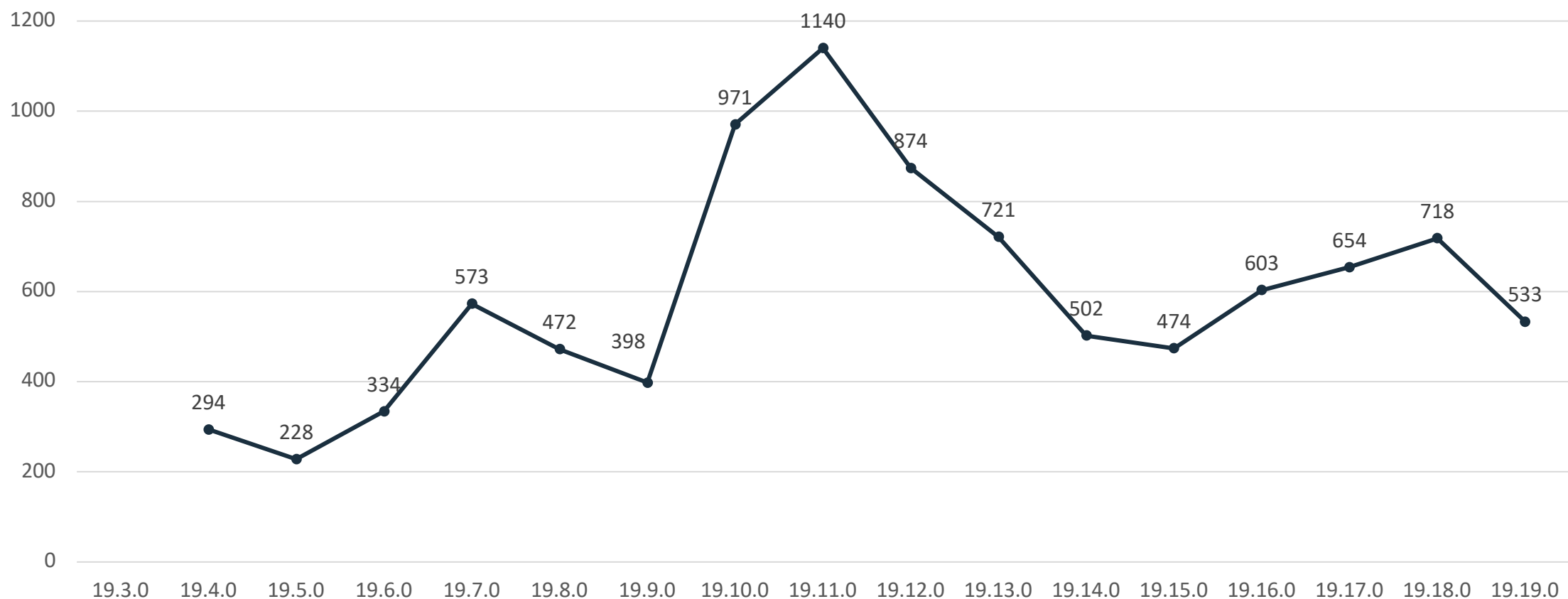
Critical Patch Updates

Critical Patch Updates are collections of security fixes for Oracle products. They are available to customers with valid support contracts. Starting in April 2022, Critical Patch Updates will be 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:

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

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

Release Update Contents



[Database 19 Release Updates and Revisions Bugs Fixed Lists \(Doc ID 2523220.1\)](#)





Failure to install a recent Release Update,
means missing out on **thousands of fixes**
and **200+ 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](#)

 **Oracle Database Patches to Consider for 19c (Doc ID 2781612.2)**

Visibility: EXTERNAL  (4)

Getting Started

Performance

GoldenGate

Oracle Text

Platform Specific

HA

DNFS

Data Pump

Search This Document

When applying Database patches, Oracle recommends that you take a 3-tiered step-by-step approach.

LEVEL 1: Apply latest quarterly patches:

- Apply latest quarterly updates using [Master Note for Database Proactive Patch Program \(Doc ID 888.1\)](#)

LEVEL 2: Apply Critical/Recommended patches:

- - For Exadata environments: [Exadata Critical Issues \(Doc ID 1270094.1\)](#)
 - For Database environments:
 - Customers on Linux x86-64 - Apply the latest [Monthly Recommended Patches - MRP \(Doc ID 2898740.1\)](#) for the specific RU
 - For customers on other platforms, apply critical patches using [Oracle Database 19c Important Recommended One-off Patches \(Doc ID 555.1\)](#)

LEVEL 3: Apply additional patches based on features or focus areas:

- Use the tabs in this document for quick access to additional feature based patches



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

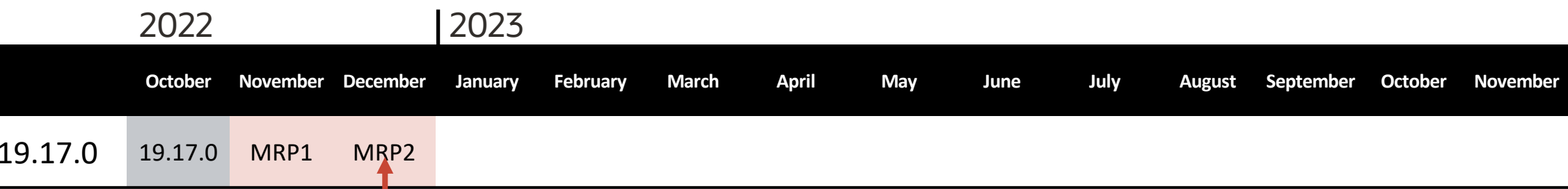
2022				2023										
	October	November	December	January	February	March	April	May	June	July	August	September	October	November
19.17.0	19.17.0	MRP1												



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



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	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

- Delivered via a merge patch
- Included patches must be RAC Rolling Installable



An MRP does not change
the release number

- Like `v$instance.version_full`



MRP content is cumulative but only within one MRP line

- Example:
19.18.0 MRP6 contains all previous MRPs done for Oracle 19.18.0
- MRPs are not bundle patches,
so to install a newer MRP you must roll off previous MRPs





MRPs can contain security fixes

- Release Updates remain the primary security fix delivery mechanism



In OCI, include MRPs
by creating a *Database Software Image*

MRP Facts | More Information?

- [Introducing Monthly Recommended Patches \(MRPs\) and FAQ \(Doc ID 2898740.1\)](#)
- [Patching News: RURs are gone – long live MRPs \(Blog Post\)](#)
- [Oracle Database 19c Important Recommended One-off Patches \(Doc ID 555.1\)](#)
- [Oracle Database Patch Maintenance](#)



Release Changes

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

Coming soon



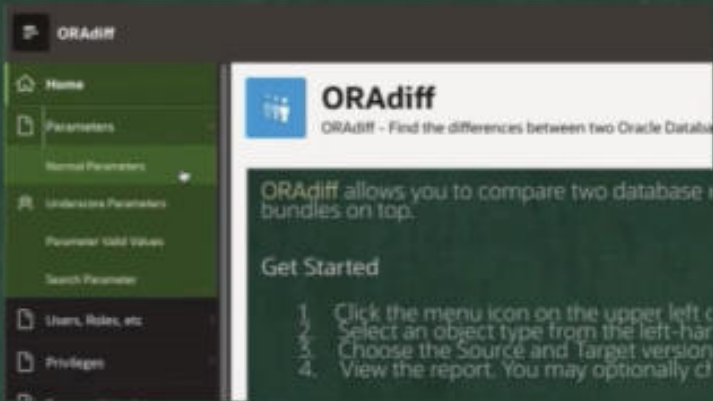
ORAdiff

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



AutoUpgrade automates your migration to Multitenant completely

Including Transparent Data Encryption



Always use the latest
version of AutoUpgrade

Download it from
[MOS Note 2485457.1](#)

Backwards Compatible

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

```
build.version 23.2.230626
```

```
build.date 2023/06/26 17:18:24 -0400
```

```
build.hash 1ed12c06
```

```
build.hash_date 2023/06/26 11:55:17 -0400
```

```
build.supported_target_versions 12.2,18,19,21
```


Oracle Database Day

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

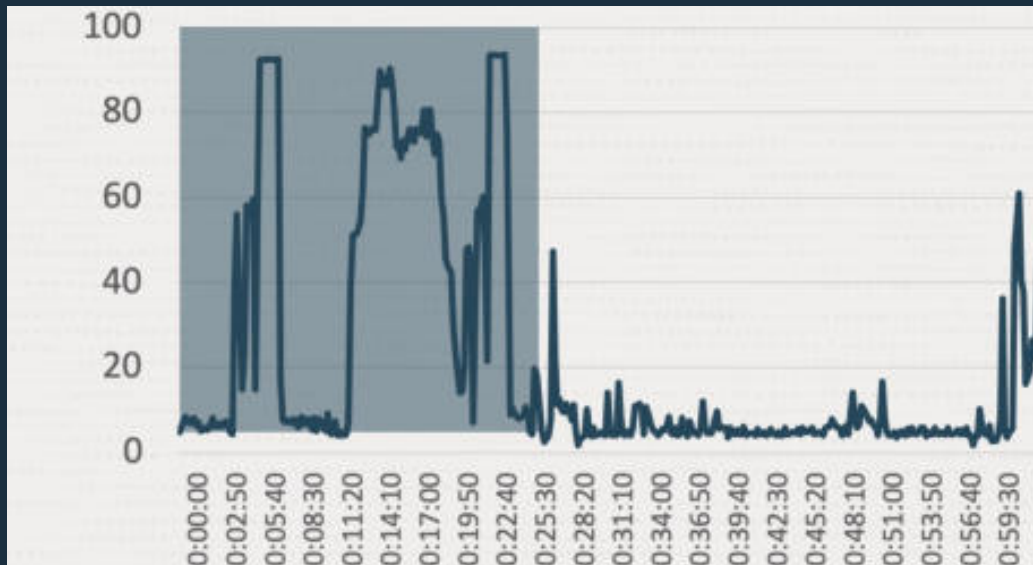
Collect statements, plans and stats in SQL Tuning Sets



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

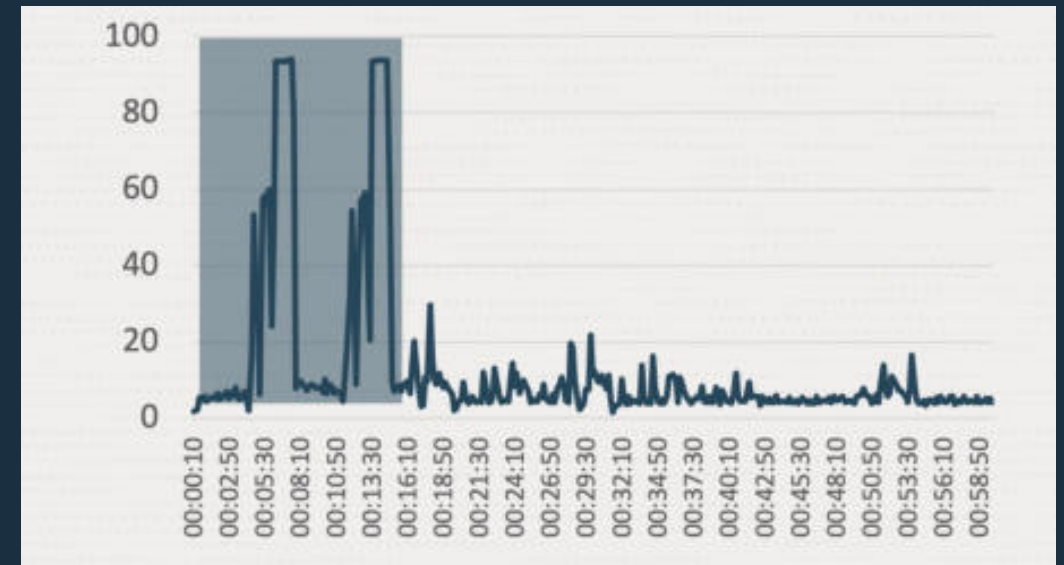


Gather dictionary and fixed objects stats



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



Questionable Parameters



Questionable Parameters



`deferred_segment_creation=FALSE`

Disable it!

[MOS Note 1216282.1 – DEFERRED_SEGMENT_CREATION](#)

`memory_target` and `memory_max_target`

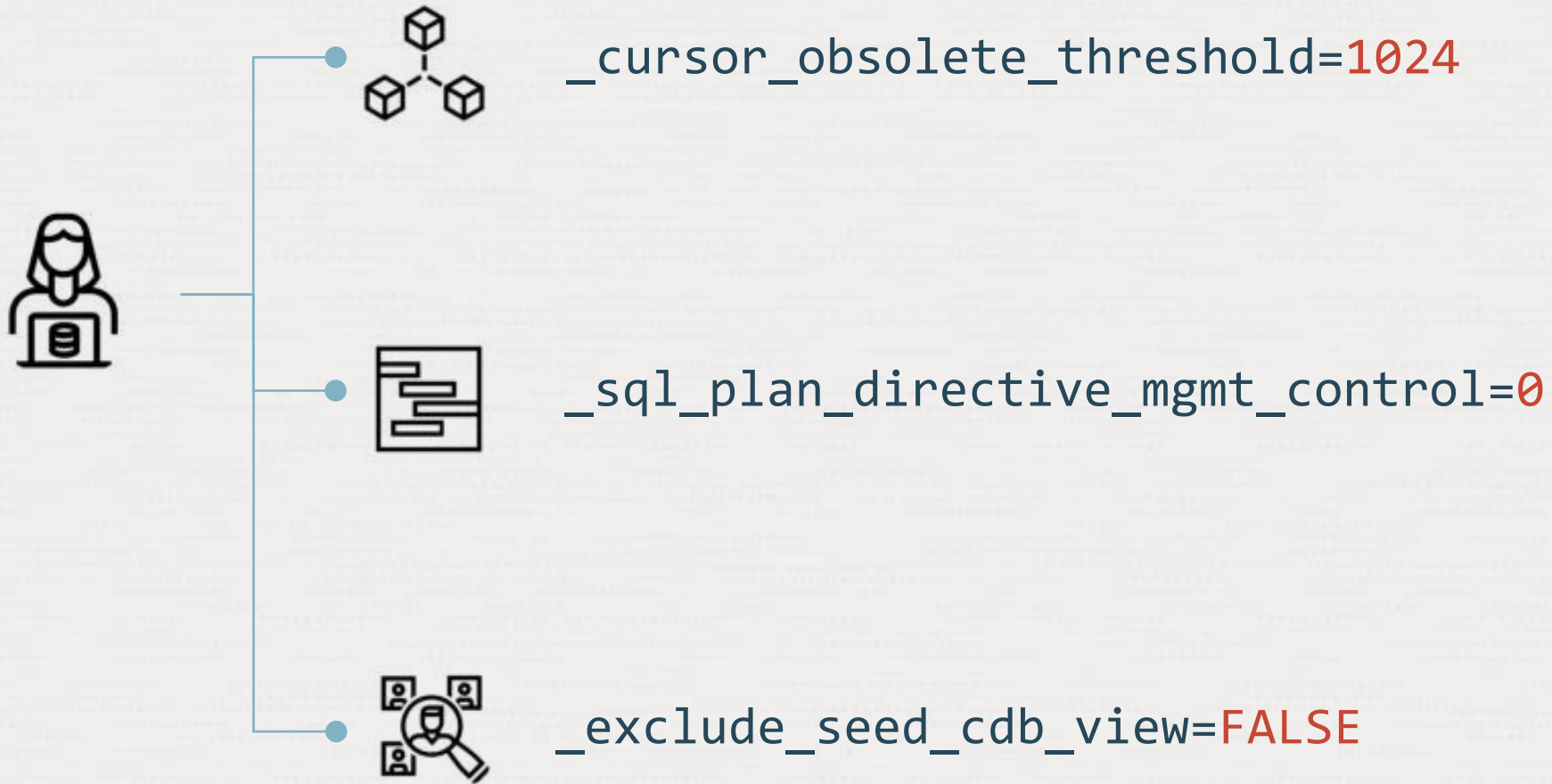
Avoid whenever possible

- Disables huge pages
- Can *rob* SGA memory
- Overhead on memory resizing operations
- Only very few platforms support AMM

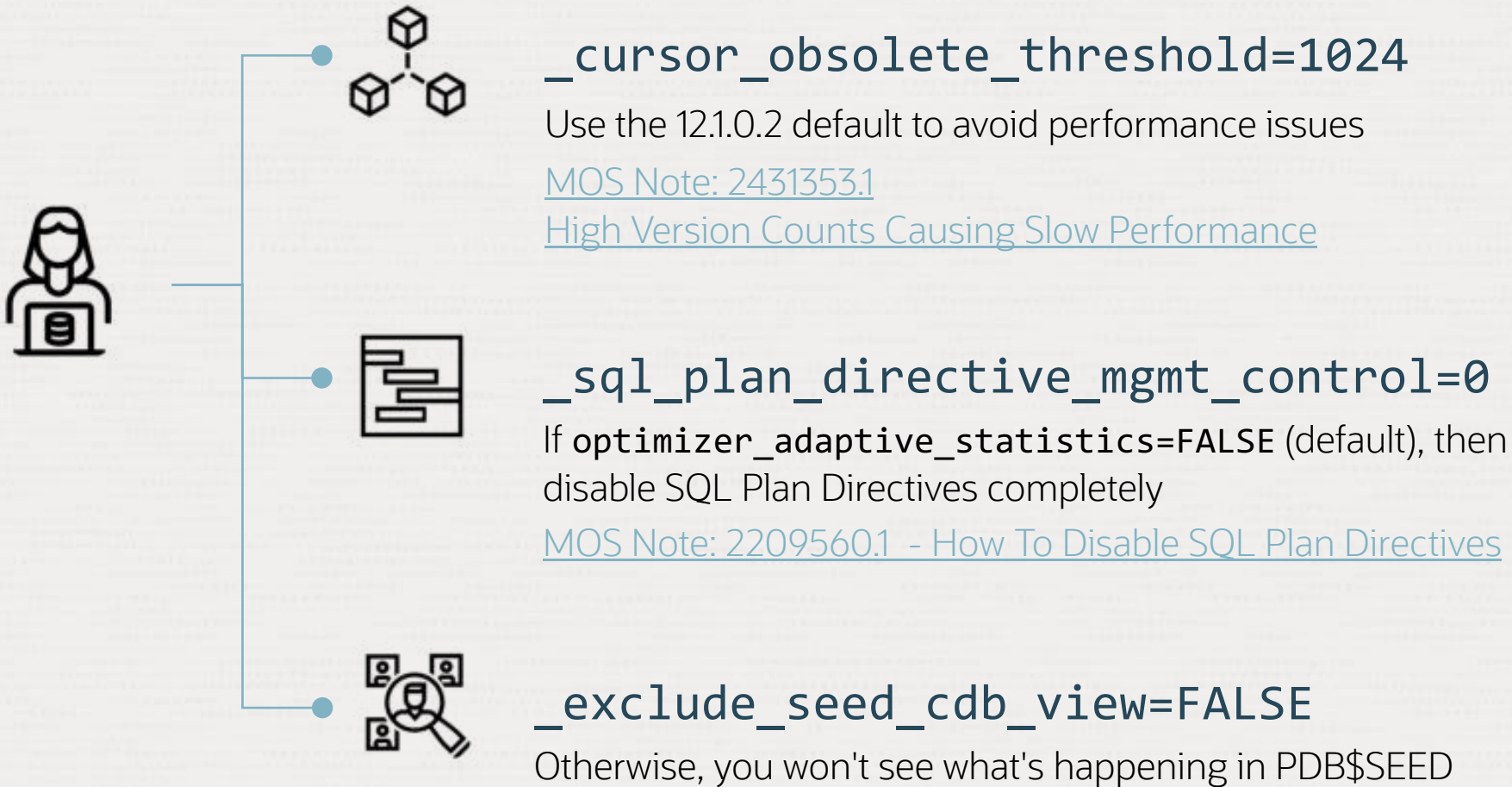
`recyclebin=OFF`

Disable it if not used. ON by default.

Essential Underscore Parameters



Essential Underscore Parameters





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



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

”

Modifying the `OPTIMIZER_FEATURES_ENABLE` parameter generally is strongly discouraged and should only be used as a short-term measure at the suggestion of Oracle Global Support.

[Use Caution if Changing the OPTIMIZER_FEATURES_ENABLE Parameter After an Upgrade \(Doc ID 1362332.1\)](#)





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





Transporting statistics via a staging table
is often **faster** than regathering statistics



Your path to successful database upgrades

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most recent AutoUpgrade

MOS Note: 2485457.1

3

Collect performance
information from current
source and test
thoroughly





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

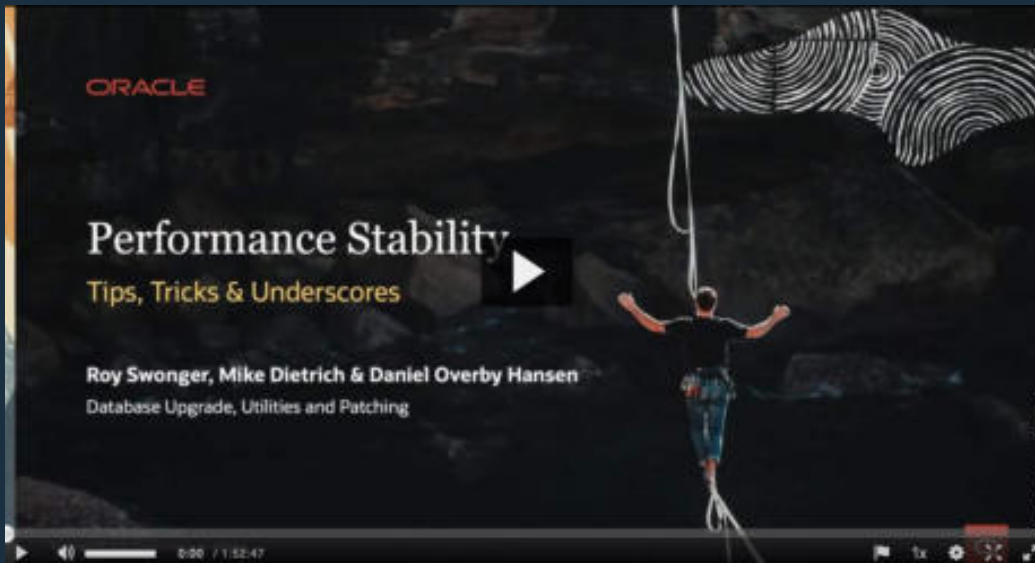
4

Fix SQL using literals with SQL Profiles

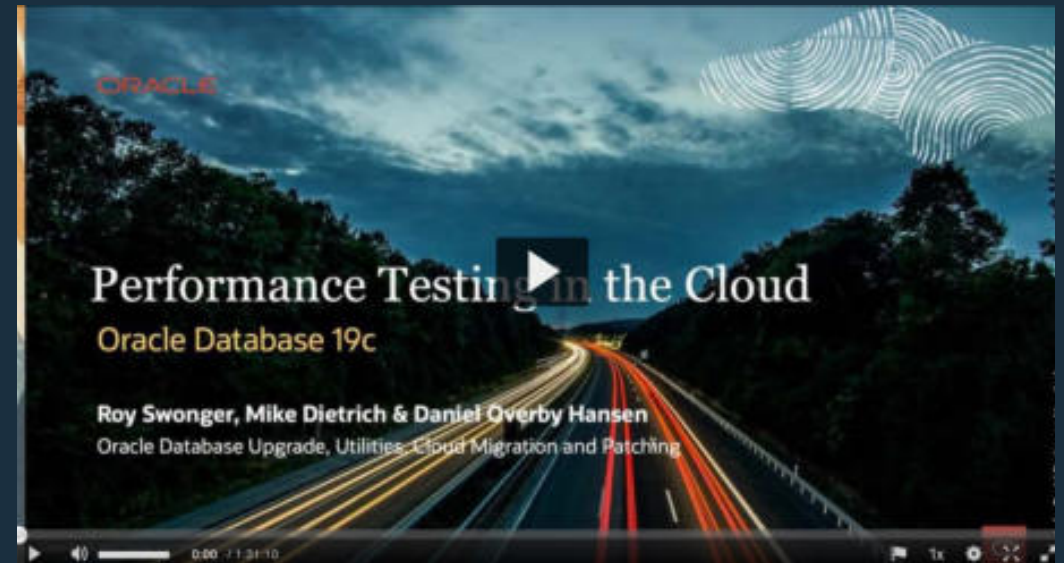
- Accept SQL profiles with **FORCE_MATCH=>TRUE**



Virtual Classroom Seminars



Episode 3:
Performance Stability – Tips and Tricks



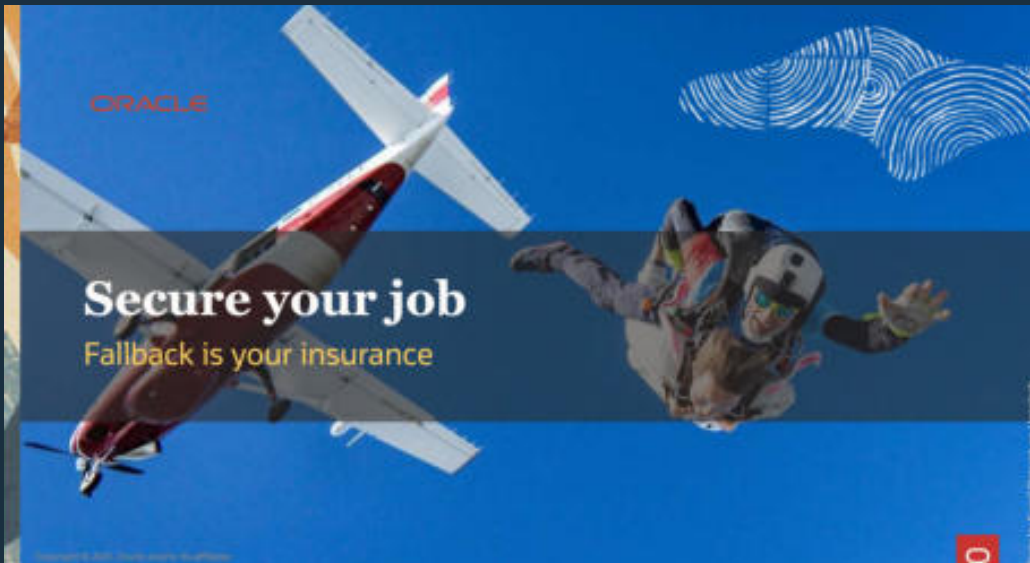
Episode 9:
Performance Testing in the Cloud

<https://MikeDietrichDE.com/videos>



Never 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://MikeDietrichDE.com/videos>

Oracle Database Day

Thank you

