Oracle Database World – São Paulo

Database Upgrade and Migration Best Practices

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April 2023

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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
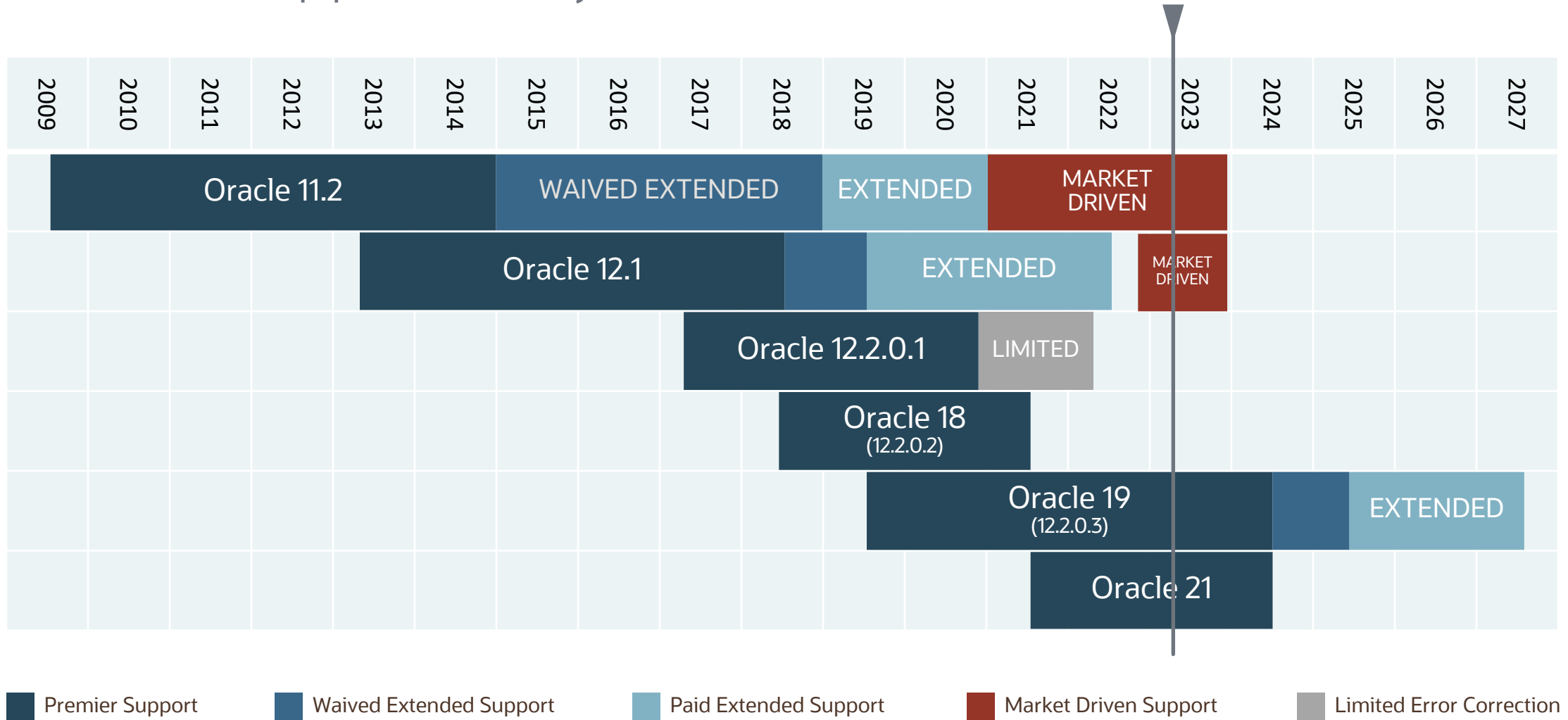
115 minutes – Apr 8, 2021

Recorded Web Seminars

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

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Lifetime Support Policy

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |

Oracle 11.2 — WAIVED EXTENDED — EXTENDED — MARKET DRIVEN

Oracle 12.1 — EXTENDED — MARKET DRIVEN

Oracle 12.2.0.1 — LIMITED

Oracle 18 (12.2.0.2)

Oracle 19 (12.2.0.3) — EXTENDED

Oracle 21

Legend:
- Premier Support
- Waived Extended Support
- Paid Extended Support
- Market Driven Support
- Limited Error Correction

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

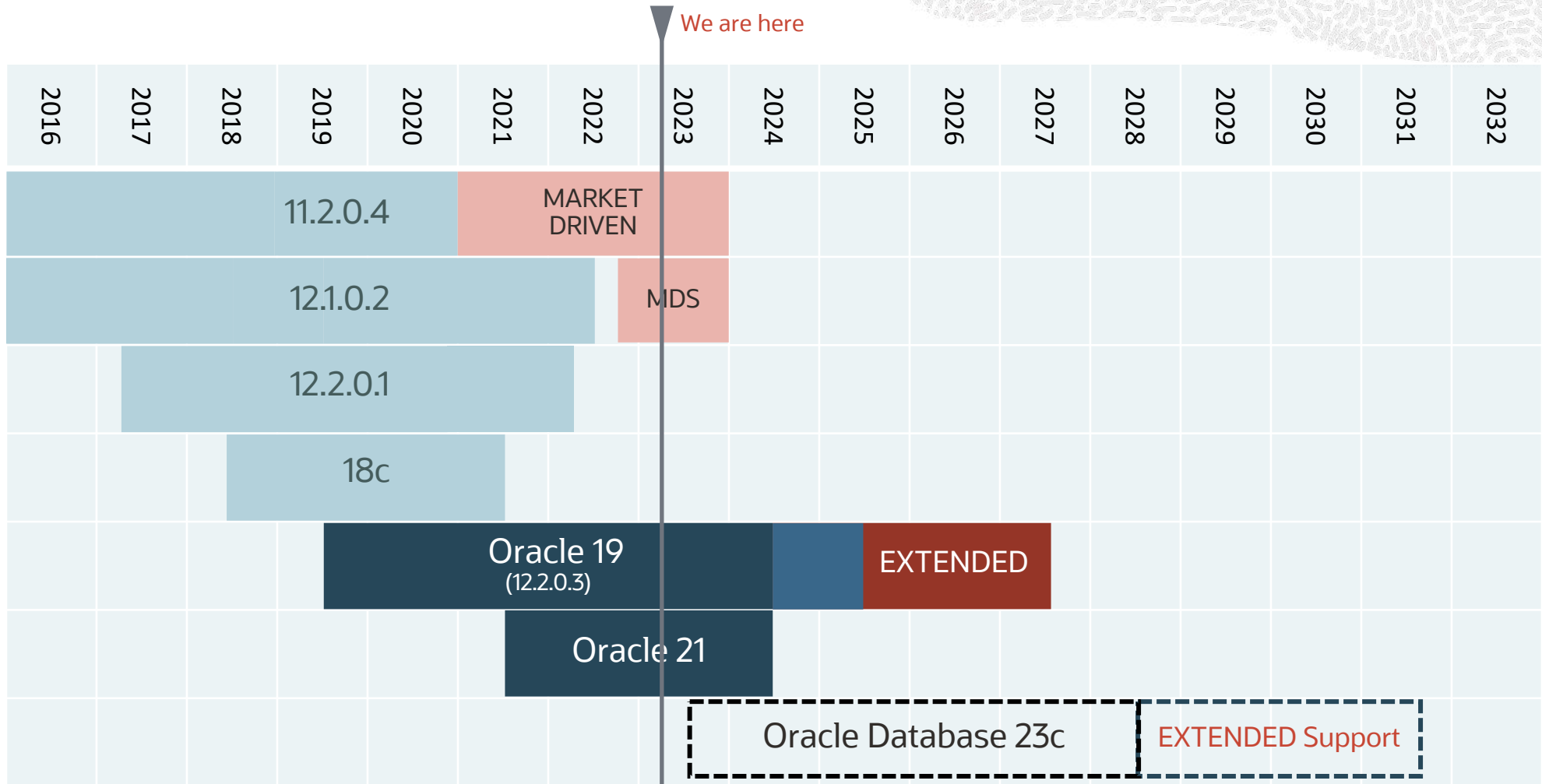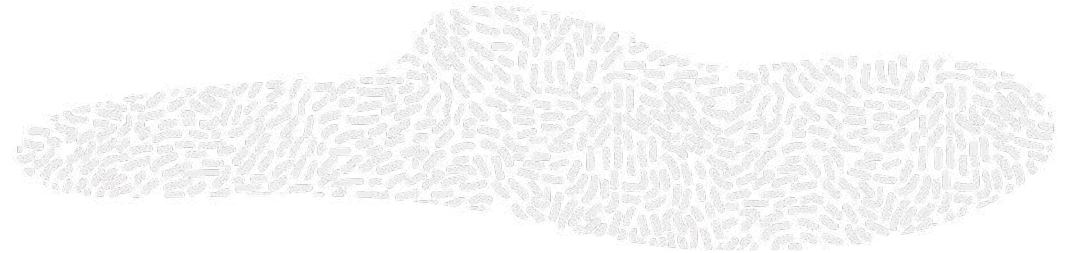| Innovation					
	Long Term Support	Extended			
	Innovation				
		Long Term Support	Extended		

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

12.1.0.2 — MDS

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

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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

$\Rightarrow$

Oracle Database 19c

$\Rightarrow$

Oracle Database 23c

Direct upgrade is NOT possible!!

Oracle Database 11.2.0.4
Oracle Database 12.1.0.2
Oracle Database 12.2
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**

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

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	

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

1. CONFIG FILE

2. ANALYZE

3. UPGRADE

11.2.0.4
12.1.0.2
12.2.0.1
18c
19c

12.2.0.1
18c
19c
21c

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)
```

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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
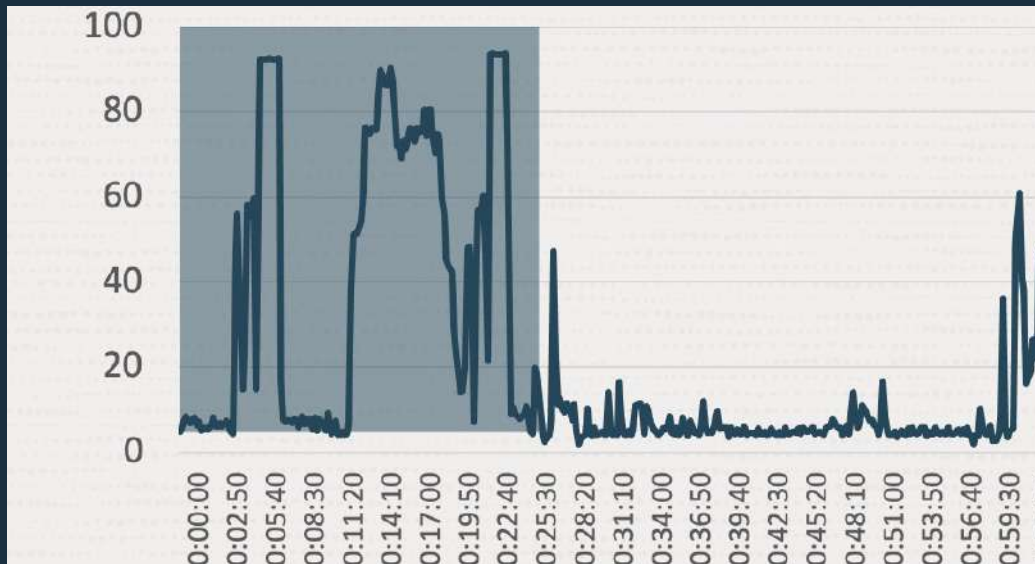
Use AWR as main source

Capture from Cursor Cache for OLTP

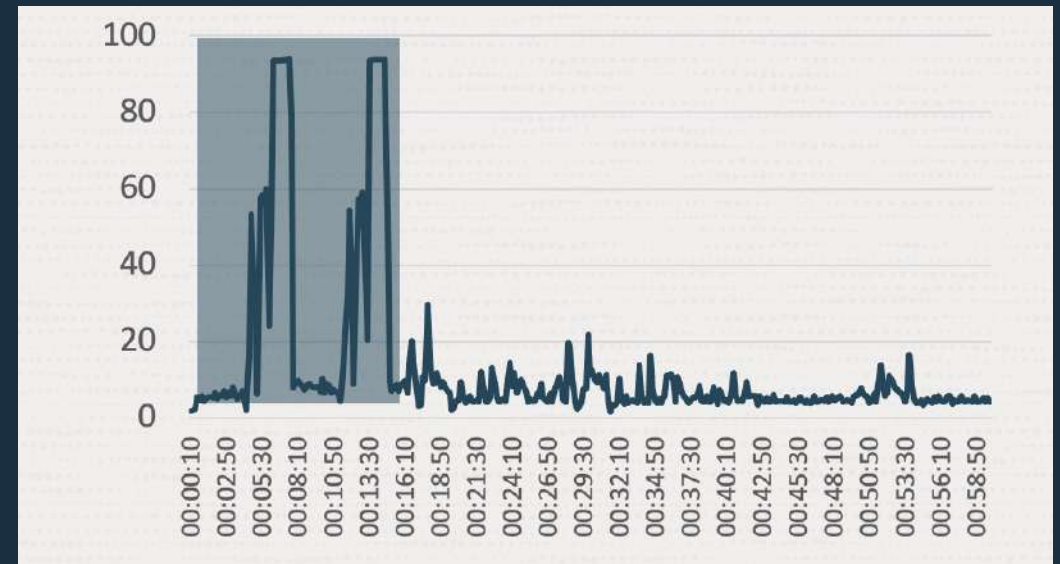Collect statements, plans and stats in SQL Tuning Sets

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

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

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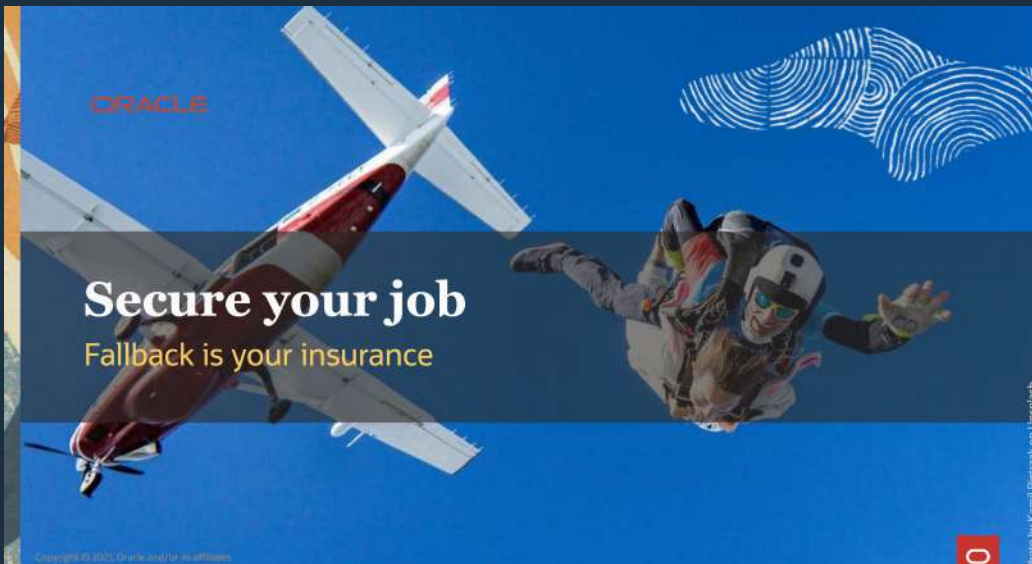
4 Fix SQL using literals with SQL Profiles
- Accept SQL profiles with **FORCE_MATCH=>TRUE**

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

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Release Changes

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

Coming soon

Oracle Account ⚑ ? ∨ ☺ rodrigo.r.jorge@oracle.com ∨

- ⌂ Home
- › Parameters ›
- › Users, Roles, etc ›
- › Privileges ›
- › Included Fixes ›
- › Oracle Database Home ›
- › **Objects** ∨
  - All Objects
  - Code Objects
  - **Columns**
  - Directories
  - Procedures & Functions
  - Synonyms
  - Triggers
  - Search Object
- › Fixed Objects ›

Version Selector

Source Version	Source Patch level
19c ∨	19.14.0 ∨

Target Version	Target Patch level
19c ∨	19.18.0 ∨

List Mode
⬤○ ?

DBA_TAB_COLUMNS

Added   Removed   Changed

🔍∨ [   ] Go   Actions ∨

Owner	Table Name	Column Name	Data Type	Data Type Mod	Data Type Owner	Data Length	Data Precision	Data Scale	Nullable	Column Id	Default Length	Character Set Name	Char Col Decl Length	Default On Null	Identi Colun
MDSYS	SDO_DIST_METADATA_TABLE	SID	NUMBER			22			Y	33				NO	NO
SYS	DB_NOTIFICATIONS	ID	NUMBER			22			N	1				NO	NO
SYS	DB_NOTIFICATIONS	TYPE	VARCHAR2			32			Y	2		CHAR_CS	32	NO	NO
SYS	DB_NOTIFICATIONS	TIME	TIMESTAMP(6) WITH TIME ZONE			13		6	N	3				NO	NO
SYS	DB_NOTIFICATIONS	EXPECTED_START_DATE	TIMESTAMP(6) WITH TIME ZONE			13		6	Y	4				NO	NO

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Thank you