ORACLE

Upgrades and Migrations

What's Cooking

Daniel Overby Hansen
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Daniel Overby Hansen

Senior Principal Product Manager
Cloud Migration

https://dohdatabase.com

@dohdatabase

dohdatabase

I have prepared
a **stew**

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Main ingredients:

- Upgrade
- Migration

Seasoning:

- Patching

UPGRADE

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Upgrade to Oracle Database 19c

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Next Long Term Support release

Oracle Database 23c

Upgrade possible only from:

- Oracle Database 19c
- Oracle Database 21c

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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

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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

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Move production database from
one long term support release to the next

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Starting with Oracle Database 21c, installation of non-CDB Oracle Database architecture is no longer supported.

The non-CDB architecture was deprecated in Oracle Database 12c. It is desupported in Oracle Database 21c.

Database 21c, Upgrade Guide, chapter 10

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Oracle Database 19c

Convert

Oracle Database 23c

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```
--Use up to 3 PDBs without
--a license for Multitenant option

alter system set max_pdbs=3;
```


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Non-CDB to PDB conversion is irreversible

What are your fallback options?

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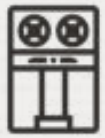
PDB Conversion

FALLBACK



Backup / restore

Ensure you have a recent backup and requires time to restore and recover

Copy data files

Requires time and disk space to hold a copy of the data files

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PDB Conversion

FALLBACK

Backup / restore

Ensure you have a recent backup and requires time to restore and recover

Copy data files

Requires time and disk space to hold a copy of the data files

Refreshable clone

Requires ~~time and~~ disk space to hold a copy of the data files

Requires Oracle Database 12.2 or newer

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Refreshable Clone

CREATE

Create PDB from non-CDB over a database link

REFRESH

Apply redo from non-CDB to keep PDB up-to-date

OUTAGE

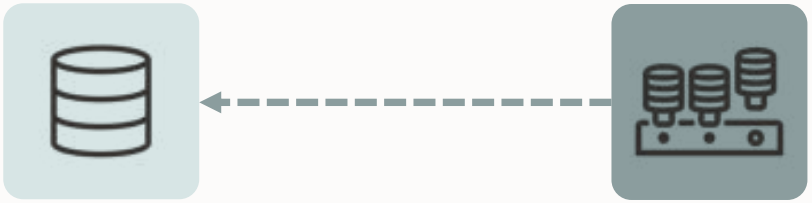
Disconnect users and refresh PDB for the last time

CONVERT

To become a proper PDB, it must be converted

Refreshable Clone

Source non-CDB	Target CDB



```
CREATE USER dblinkuser
       IDENTIFIED BY ... ;

GRANT CREATE SESSION,
      CREATE PLUGGABLE DATABASE,
      SELECT_CATALOG_ROLE TO dblinkuser;

GRANT READ ON sys.enc$ TO dblinkuser;
```

```
CREATE DATABASE LINK CLONEPDB
       CONNECT TO dblinkuser
       IDENTIFIED BY ...
       USING 'noncdb-alias';
```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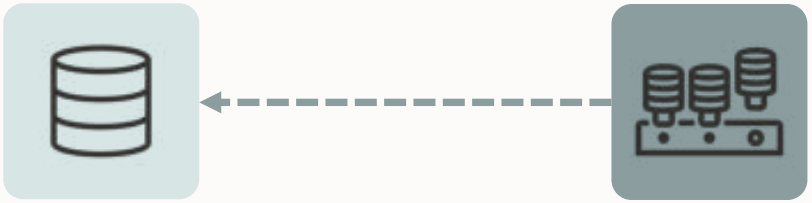
Refreshable Clone

Source non-CDB	Target CDB



```
upg1.source_home=/u01/app/oracle/product/12.2.0.1
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=NONCDB1
upg1.target_cdb=CDB1
upg1.source_dblink.NONCDB1=CLONEPDB
upg1.target_pdb_name.NONCDB1=PDB1
```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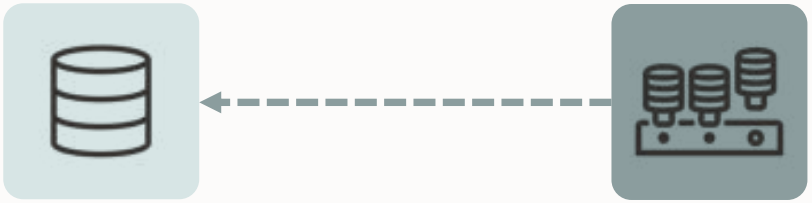
Refreshable Clone

Source non-CDB	Target CDB



```
upg1.source_home=/u01/app/oracle/product/12.2.0.1
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=NONCDB1
upg1.target_cdb=CDB1
upg1.source_dblink.NONCDB1=CLONEPDB 300
upg1.target_pdb_name.NONCDB1=PDB1
```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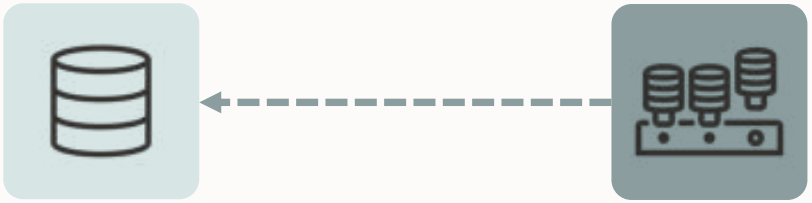
Refreshable Clone

Source non-CDB	Target CDB



```
upg1.source_home=/u01/app/oracle/product/12.2.0.1
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=NONCDB1
upg1.target_cdb=CDB1
upg1.source_dblink.NONCDB1=CLONEPDB 300
upg1.target_pdb_name.NONCDB1=PDB1
upg1.start_time=03/12/2022 02:00:00
--Specify relative start time
--upg1.start_time=+1h30m
```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Refreshable Clone

```
autoupgrade.jar ... -mode deploy
```

```
upg1.start_time=22/10/2022 02:00:00
```


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DEMO

- Upgrade to Oracle Database 19c
- Migrate from non-CDB to PDB
- Using Refreshable Clone PDBs

Watch on YouTube

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The source non-CDB stays intact to allow fallback

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Works for unplug-plug upgrades as well

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Always use the latest version of AutoUpgrade

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MIGRATION

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Apply the Data Pump bundle patch

- Data Pump Recommended Proactive Patches For 19.10 and Above (Doc ID 2819284.1)

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Data Pump bundle patch

Fewer Bugs

Important patches are included.
Monitor for bugs that affects many customers.

Faster Patching

The bundle patch changes the way Data Pump is patched. Subsequent patches apply faster.

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Bug	Description
Bug 28318139	ORA-31003 ERROR WHEN IMPORTING FULL DATABASE IN PARALLEL
Bug 28357349	SCHEMA LEVEL EXPORT/IMPORT CHANGES VIRTUAL COLUMN DEFINITION
Bug 28555193	DBMS_METADATA.GET_DDL CAPTURE INCORRECT STORAGE OPTIONS OF THE XML COLUMN ON GTT
Bug 28771564	DATAPUMP EXPORT INVOKED BY A PRIVILEGE USER EXECUTES A QUERY FOR V$OPEN_CURSOR
Bug 28990738	12.2 DBMS_METADATA.GET_DDL IS SLOW DUE TO SLOW ACCESS ON DICTIONARY VIEWS
Bug 29276889	ATP-D: DATA PUMP IMPORT FROM ATP-D INSTANCE TO A LOCAL DB INSTANCE FAILS
Bug 29543605	18.4 ADWC - ORA-39342: UNABLE TO EXPORT/IMPORT "LONG RAW" DATA TYPE
Bug 29613345	ORA-31684 ORA-39112 WITH FDI 28539085 AND VERSION=11.2
Bug 29959025	EXPDP RUNNING LONG TIME QUERYING KU$_SUBPARTITION_EST_VIEW WHEN PROCESSING TABLE_DATA
Bug 30155338	POSSIBLE DEADLOCK/TIMEOUT ERRORS DURING PARALLEL IMPORT WITH TABLE_EXISTS_ACTION=REPLACE
Bug 30157766	ORA-21560 DBMS_METADATA.FETCH_DDL IN 19C NOT IN 12.2
Bug 30430932	DBMS_METADATA NOT DISPLAYING THE SEMICOLON AND SLASH FOR TYPE SPECIFICATIONS
Bug 30582819	REMAP TABLESPACE IS NOT CONSIDERED FOR LOCAL TEMPORARY TABLESPACE DURING IMPDP
Bug 30662417	IMPDP WORKER TERMINATED WITH ORA-39029 AFTER MULTIPLE ORA-01775
Bug 30783851	IMPDP 11.2 TO 18C OR HIGHER HITS ORA-904 WHEN TABLES HAVE EXTENDED STATISTICS
Bug 30822078	IMPDP VERY SLOW DUE TO PROCESS REORDERING
Bug 30858671	18C DBMS_METADATA.GET_DDL FAILED WITH ORA-16000 IN READ ONLY MODE
Bug 30928455	DATA PUMP EXPORT (HETTING ORA-31637 WHILE RUNNING DATA PUMP-DPLOAD CONCURRENCY TEST IN SAME PDB
Bug 30944402	SELECT FROM MASTER TABLE RUNS SLOW DURING TABLE_DATA EXPORT WHEN THERE ARE MANY SUBPARTITIONS
Bug 30978304	ORA-20000 DURING IMPDP WITH STATS AND THE UNIQUE INDEX FOR THE PK IS NOT CREATED
Bug 31050896	PARALLEL DATAPUMP SLOW ON CONSTRAINTS
Bug 31174337	DBMS_METADATA.GET_DDL GENERATES NO KEYWORDS FOR NOT COMPRESSED INDEXES
Bug 31191614	TTS EXPDP QUERIES V$ENCRYPTED_TABLESPACES FOR EVERY TBS SLOWING DOWN PERFORMANCE
Bug 31200854	ADB-D: IMPORT PERFORMANCE OF PACKAGE_BODY
Bug 31393386	SPIN-OFF OF BUG# 31317961 FOR PARTIAL BACKOUT OF BUG# 27403988 FROM MAIN LABEL
Bug 31402031	DBMS_METADATA_UTIL THROWS AN INVALID CURSOR EXCEPTION
Bug 31412130	ADBD:: COMPLETE FIX FOR 29543805 WHICH INCLUDES ALL THE MISSING FILES
Bug 31424070	APPSST19C: XTTS PDB - TABLE IMPORT/CREATION FAILED WITH ORA-39083 ORA-14334
Bug 31711479	ADB-S: ORA39126 AND ORA01031 WHILE IMPORT USING FA FULL DUMP INTO ADB-S
Bug 31725941	TOTAL ESTIMATION USING BLOCKS METHOD IS MISSING STARTING WITH 12.2
Bug 31830685	ZDM : IMPORT ADW-S DB LINK MIGRATION THROWS INTERNAL ERROR
Bug 32096059	IMPDP TO 19C USING EXPORT DUMP OF 11.2.0.4 HANGS WITH ENQ: TM - CONTENTION
Bug 32370367	EXPDP IN 19.7 THREE TIMES SLOWER THAN IT WAS IN 11.2.0.4
Bug 32452792	DBMS_METADATA.GET_DDL GETS WRONG OUTPUT FROM 12.2.0.1. TESTED T3L1 19.3.0.0
Bug 32512780	PROCOBJ PLSQL SCRIPTS ARE NOT EXCLUDED ON IMPORT WITH EXCLUDE=TAG
Bug 32647307	ADB-D:: PACKAGE BODIES IMPORT SLOWER AFTER AUTONOMOUS REFRESH TO 19.10DBRU
Bug 32710035	ATPD MIGRATION:ORA-04021: TIMEOUT OCCURRED WHILE WAITING TO LOCK OBJECT
Bug 33163877	ATPD MIGRATION:IMPDP HITS TABLE OR VIEW DOES NOT EXIST ON SOME DATAPUMP RELATED TABLES
Bug 33204663	TCH19C :: ORA-39139: DATA PUMP DOES NOT SUPPORT XMLTYPE OBJECTS WHEN DOING XTTS WITH BINARY XML STORAGE
Bug 33297599	UNUSED XMLTYPE/CLOB COLUMNS CAUSE IMPORT FAILURE
Bug 33346378	REWRITE DATA PUMP PATCH LOCKING TEST: TKDPATCHRAC.TSC
Bug 33448450	TCH19C :: ORA-01647: TABLESPACE 'APPS_TS_TX_DATA' IS READ-ONLY, CANNOT ALLOCATE SPACE
Bug 33470563	METADATA API FAILS TO RECOGNIZE TAB CHARACTER AS DELIMETER WHEN PARSING SOURCE LINES OF TYPE OBJECT
Bug 33488804	DATAPUMP IMPORT IGNORES EXCLUDE AND INCLUDE VALUES FOR TAGS FOR IMPORT CALLOUTS
Bug 33660169	CONSOLIDATED BUG FOR DATA PUMP AQ FIXES 31338354, 31844376, 31868843 FOR 19.10 AND LATER
Bug 33720650	TCH19C :: OCI-21500: INTERNAL ERROR CODE [QMCKDIGETQNAMEINPOJ], [14003] IN XMLTYPE COLUMN TYPE
Bug 33735435	TRACKING BUG FOR COMBO OF 32750991 32878145 32919937 32984678 (REPLACEMENT FOR MINI MLR 31407604)
Bug 34052641	END_PUBLISH_BLK OBJECT TYPE MISSING FROM FULL TTS EXPORT WHEN INCLUDE SPECIFIED
Bug 34525626	TRACKING BUG TO MERGE 33599275 AND 33496804 SO CAN BE BACKPORTED TOGETHER TO 19.16

97

fixes

Data Pump Bundle Patch for 19.18.0

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Why are those fixes not included in Release Updates?

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The Data Pump bundle patch is **not** RAC Rolling and Standby-First installable

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Importing a complete application with data goes from almost 2,5 hours to 48 minutes – by just applying the Data Pump bundle patch

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Data Pump Best Practices and Real World Scenarios

April 5 - 16:00 CET Sign up

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PATCHING

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Release Updates now contains all new time zone files

- Relevant only if your application uses `TIMESTAMP WITH TIME ZONE`

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$ ls -l $ORACLE_HOME/oracore/zoneinfo

```
...
./oracore/zoneinfo/timezone_28.dat
./oracore/zoneinfo/timezone_29.dat
./oracore/zoneinfo/timezone_30.dat
./oracore/zoneinfo/timezone_31.dat
./oracore/zoneinfo/timezone_32.dat
./oracore/zoneinfo/timezone_33.dat
./oracore/zoneinfo/timezone_34.dat
./oracore/zoneinfo/timezone_35.dat
./oracore/zoneinfo/timezone_36.dat
./oracore/zoneinfo/timezone_37.dat
./oracore/zoneinfo/timezone_38.dat
./oracore/zoneinfo/timezone_39.dat
./oracore/zoneinfo/timezone_40.dat
```


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When patching my database,
will it also patch my time zone file?

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No, the time zone files are there, but you still need to perform the upgrade manually

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Patches to the Perl interpreter in Oracle Home is included in Release Updates

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```
$ $ORACLE_HOME/perl/bin/perl -version

This is perl 5, version 36, subversion 0 (v5.36.0)
built for x86_64-linux-thread-multi
```


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You still need to update JDK in your Oracle Home

- JDK and PERL Patches for Oracle Database Home and Grid Home (Doc ID 2584628.1)

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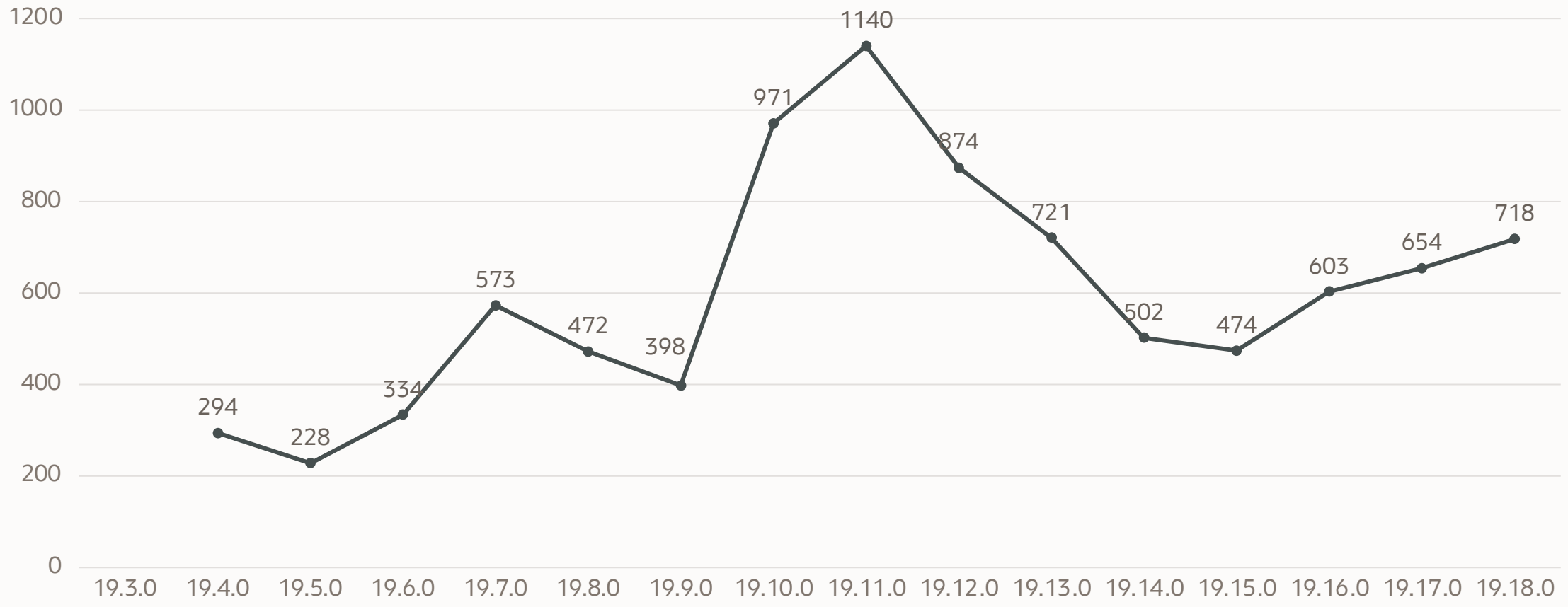
Timeline | Release Updates

	2020				2021				2022				2023		
	January	April	July	October	January	April	July	October	January	April	July	October	January	April	July
19c	19.6.0	19.9.0	19.8.0	19.9.0	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
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

Release Update | Bugs Fixed



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

Monthly Recommended Patches

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

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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

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Monthly Recommended Patches

What kind of patch is it?	It is a merge patch tied to a specific Release Update
Does it change the release number?	No
What is in an MRP?	Important bug fixes from 555.1
Does it contain security fixes?	No, Release Updates are still our way of fixing those
Do I need to patch monthly?	We recommend that
Do I need to re-certify my app?	No, but test like you would do with one-offs
What about databases in OCI?	To be decided

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THANK YOU