Technical Upgrade Best Practices for Oracle E-Business Suite

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Program Agenda

1 R12.1/R12.2 Upgrade Overview

2 R12.1/R12.2 Supported Upgrade Paths

3 R12.1/R12.2 Upgrade Resources

4 Upgrade Best Practices to minimize downtime

5 References

Safe Harbor Statement

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R12.1/R12.2 Upgrade Overview

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R12.1 Rapid Install (RI)
R12.1 Maintenance Pack (MP)

- R12.1 was generally available (GA) in May 2009
  - Via Oracle Software Delivery Cloud (OSDC, formerly known as Electronic Product Delivery (EPD)) and Oracle Stores

- Can be used by new and upgrading customers (11.5.9 and above) to go directly to R12.1
  - If you are on R11i, use R12.1 RI from the software delivery cloud. Follow instructions from the "Upgrade Guide: 11i to 12.1" and "12.1.1 Release notes"
  - If you are on R12.0.X, use R12.1 MP (7303030) from My Oracle Support (MOS). Follow instructions from "R12.1 Maintenance Pack Install Instructions (**MOS ID 752619.1**)"
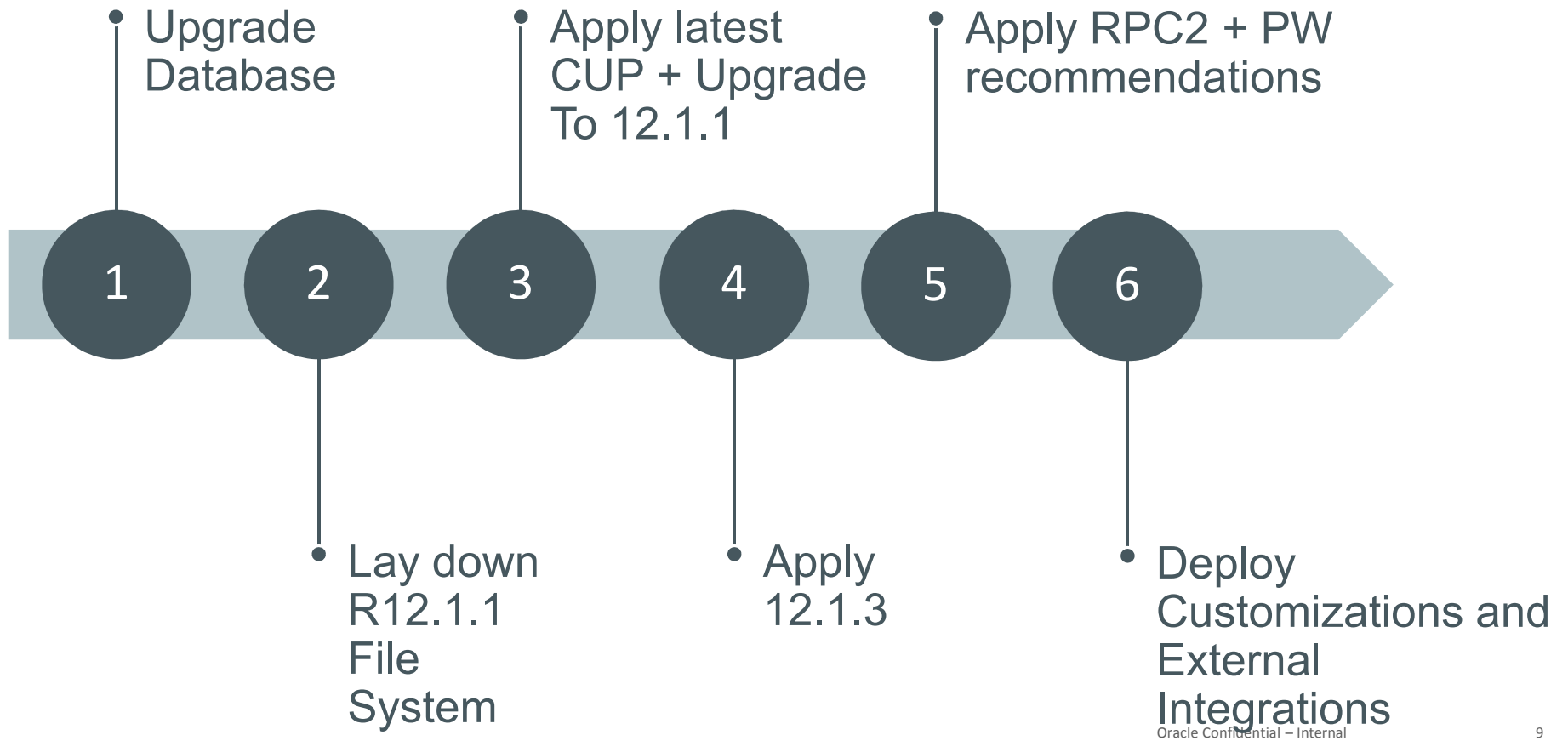
EBS R12.1 Release Update Pack (RUP) 3 (12.1.3) Release

- EBS 12.1.3 was released in Jul 2010 and delivers bug fixes and targeted functionality enhancements

- Available from My Oracle Support (MOS) as a patch

- **Can ONLY be applied after upgrade to R12.1**

- Currently, EBS 12.1.3 is the latest suite wide RUP available for R12.1

- EBS 12.1.3 Installation instructions : **MOS ID 1080973.1**

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R12.1.3+ EBS Recommended Patch Collection (RPC)2

- Consolidation at suite wide level of "recommended" patches on top of 12.1.3 as of July 2013 (**MOS ID 1920628.1**)

- Helps avoid known issues and reach "go-live" quicker

- A "must have" patch for customers upgrading to R12.1.3

- Use Patch wizard filter "Recommended and Consolidated Maintenance Patches" to identify additional patches for your upgrade and apply post-upgrade

- Patch Wizard has been enhanced to display an optimized list of recommended patches (**MOS ID 1267768.1**)

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High Level Overview of the 11i => R12.1 Upgrade Process

1 Upgrade Database

2 Lay down R12.1.1 File System

3 Apply latest CUP + Upgrade To 12.1.1

4 Apply 12.1.3

5 Apply RPC2 + PW recommendations

6 Deploy Customizations and External Integrations

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R12.2 Rapid Install (RI)

- Available as RI Only from OSDC. No Maintenance Pack available from MOS. Upgrade your 11i, R12.0.4 or R12.1.X instance by following the upgrade guide meant for your current EBS release
  - For 11i, you must be on 11i10CU2 and satisfy the minimum baseline patch level (MBL) requirements for extended support (**MOS ID 883202.1**) for a direct upgrade to R12.2
  - Apply patch 13543062:R12.AD.C as an additional step to enable edition based redefinition (EBR) after US upgrade driver is complete.
  - All patches beyond this step MUST be applied using ADOP (online patching compatible version of adpatch)
  - **The EBS upgrade to R12.2 itself is NOT an Online Patch**
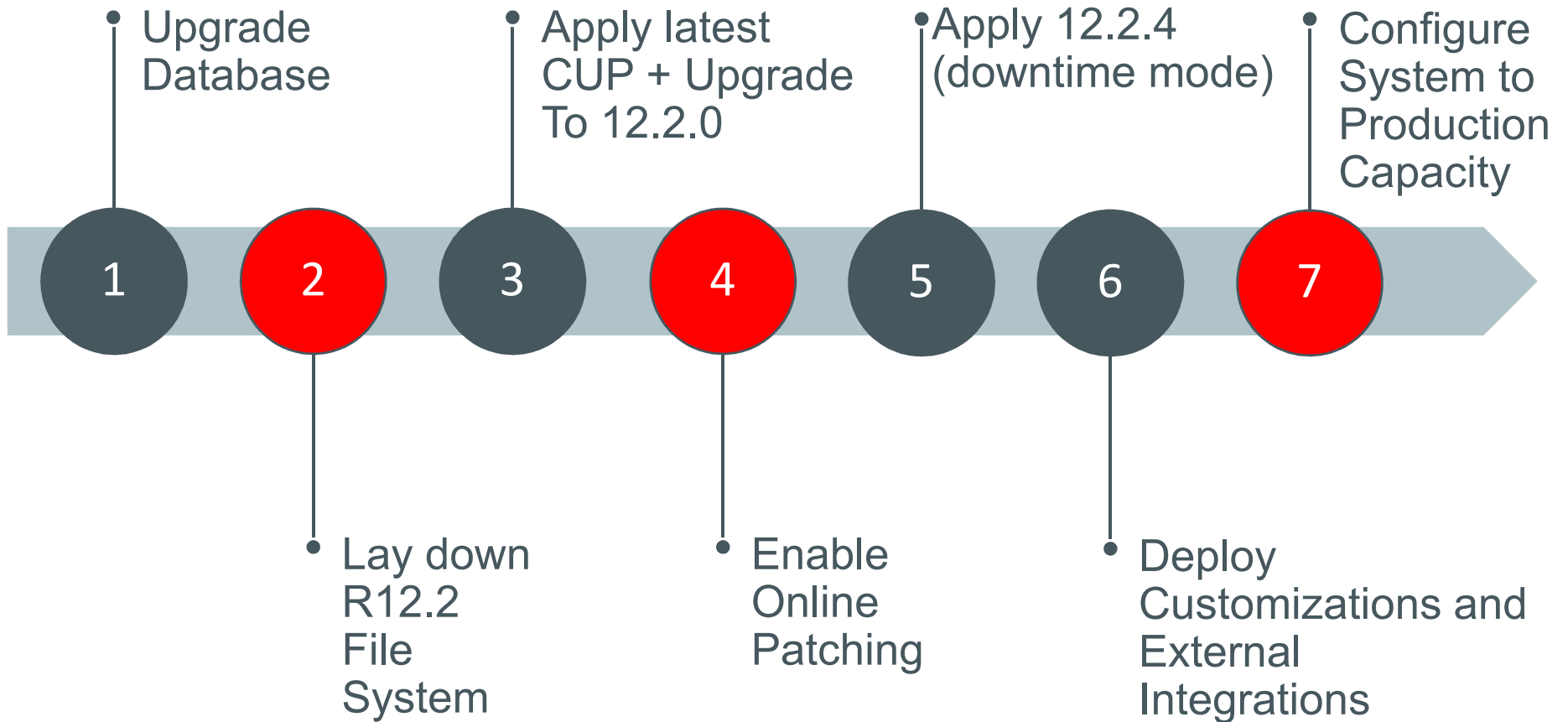
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EBS R12.2 Release Update Pack (RUP) 2 (R12.2.2) Release

- EBS R12.2.2 (16207672) is the **minimum required** RUP level for running R12.2 in a production instance
- Available on My Oracle Support (MOS) as a patch for existing customers and on OSDC for new customers
- **Can ONLY be applied after upgrade to R12.2.0**
- EBS R12.2.2 Installation instructions : **MOS ID 1506669.1**

EBS R12.2 Release Update Pack (RUP) 4 (R12.2.4) Release & Latest AD/TXK RUPs

- R12.2.4 (most recent recommended RUP)
  - EBS R12.2.4 (17919161) RUP was released in July 2014 (**MOS ID 1617458.1**)
  - Suite wide and family level granularity unlike 12.2.3/12.2.2
  - Apply R12.2.4 RUP using "downtime" mode
    - adop phase=apply apply_mode=downtime
- R12.2 AD / TXK RUPs (most recent R12.AD.C.delta.5 / R12.TXK.C.delta.5)
  - Expect more frequent updates of 12.2 Technology Stack (TXK) and Applications DBA (AD) suite of administrative tools
  - It is strongly recommended to apply the latest AD/TXK RUPs.
  - E-Business Suite RUP, AD and TXK RUP Information **(MOS ID 1583092.1)**

High Level Overview of the R12.2 Upgrade Process

1 Upgrade Database

2 Lay down R12.2 File System

3 Apply latest CUP + Upgrade To 12.2.0

4 Enable Online Patching

5 Apply 12.2.4 (downtime mode)

6 Deploy Customizations and External Integrations

7 Configure System to Production Capacity

R12.1 / R12.2 Technology Stack

TECHNOLOGY COMPONENT	VERSION INCLUDED 11i10CU2	VERSION INCLUDED 12.0.4 RI	VERSION INCLUDED 12.1 RI	VERSION INCLUDED 12.2.0 RI
• Apps Mid tier-Forms/Reports	6.0.8.25	10.1.2.2	**10.1.2.3**	**10.1.2.3**
• Apps Mid tier- Java Oracle Home/ • Apps Mid tier-JDK	1.0.2.2/1.4.2	10.1.3.0/1.5	**10.1.3.4/1.6.0**	**FMW 11.1.1.6/ 1.6** **[1.7 with startCD 47]**
• Database	9.2.0.6	10.2.0.3	**11.1.0.7**	**11.2.0.3 (minimum required)**

R12.1 / R12.2 Key Facts

|	11i10CU2	R12.0.4 RI	R12.1 RI	12.1.3 RUP	12.2.0 RI	12.2.2 RUP	12.2.4 RUP
# Product Schemas	209	195 (25 removed,11 added)	201 (25 removed,17 added)	No changes	173 (54 removed,18 added)	No changes	2 added (YMS,CMI)
#calls in DB driver	104242	144940	156622	23408	142074	16066	24016
PROD db size **File system size**	31 GB 26 GB	45 GB 28 GB	50 GB 28 GB	NA	90 GB 64 GB (Patch+Run)	NA	NA
#of Jobs (Changed + New) in DB portion of the U driver	NA	~95488 (Vs 11.5.10.2)	~**113337** (Vs 11iCU2) ~**31843** (Vs 12.0.4)	~**23474** (Vs 12.1.1)	~**108049** (Vs 11iMBL) ~55575 (Vs 12.0.4) **32166** (Vs 12.1.3)	**17375** (Vs 12.2.0)	**23536** (Vs 12.2.0)

R12.1/R12.2 Supported Upgrade Paths

R12.1 Upgrade Paths

- Minimum EBS suite level for direct upgrade to R12.1
  - 11i9 or above
  - R12.0 and above

- Minimum EBS suite level required for database versions
  - 10.2.0.4 requires 11i9CU2
  - 10.2.0.5/11.1.0.7/11.2.0.3/11.2.0.4 require 11i10CU2/12.0.4
  - 12.1.0.1 require 11i10CU2/R12.0.6

- Certified upgrade path options as per DB prep guide **MOS ID 761570.1**
  - A. Upgrade database and EBS level in a single downtime
  - B. Upgrade database and EBS level in separate downtimes
  - C. Apply upgrade interoperability DB patches and then upgrade EBS

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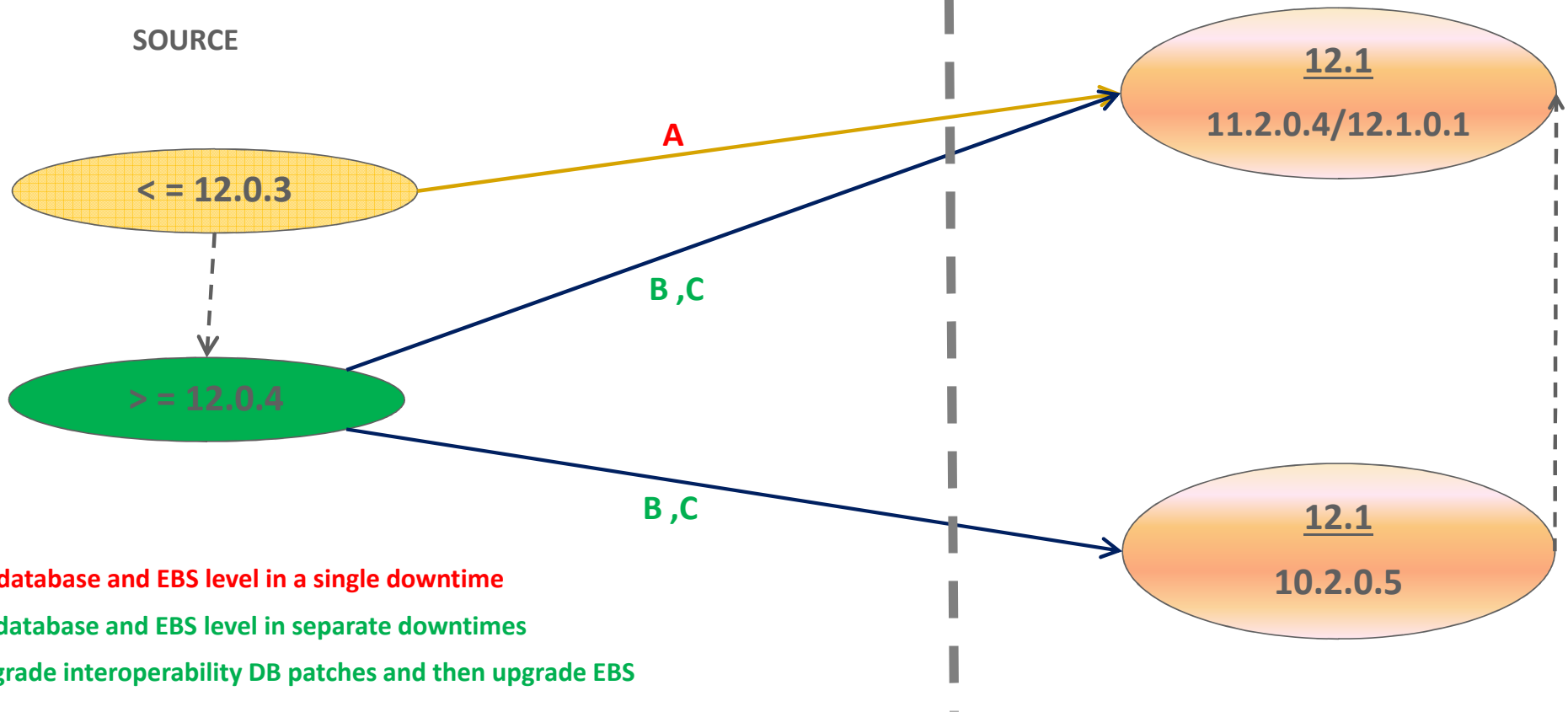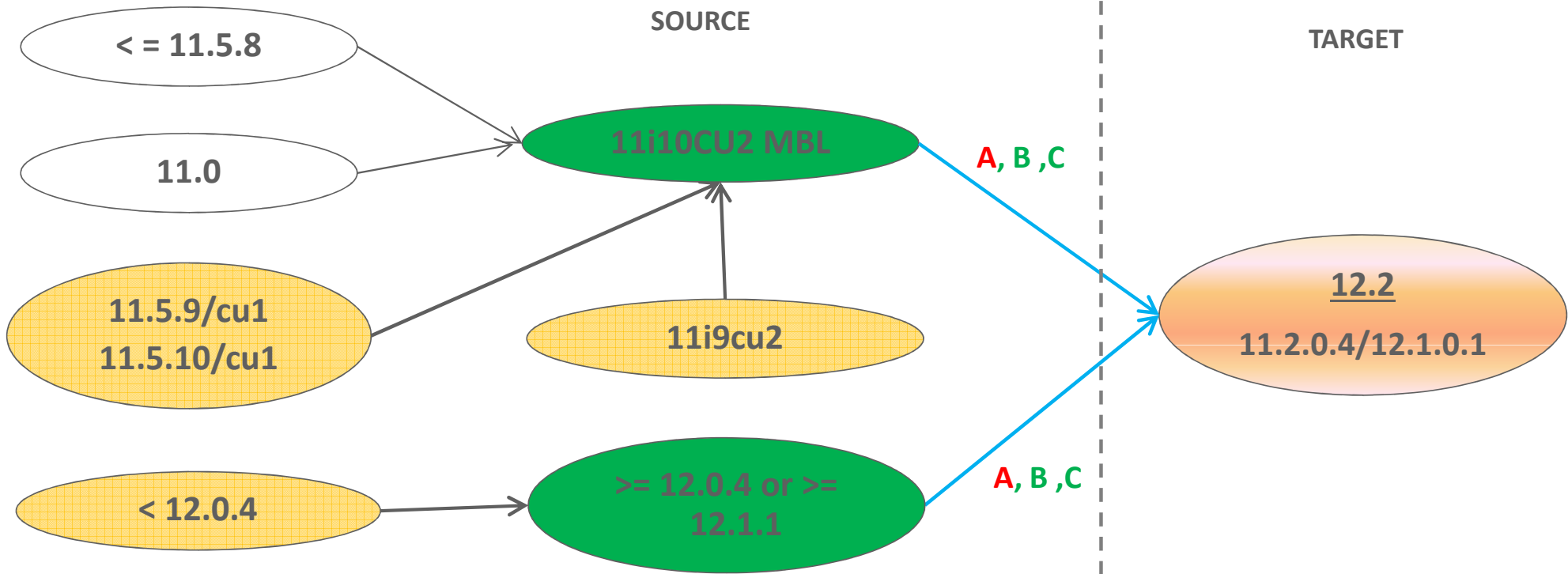# R12.1 Upgrade Paths Continued..
11.0/11i.X => 12.1

TARGET

SOURCE

< = 11.5.8

11.0

11i10cu2

11i9cu2

A

11.5.9/cu1
11.5.10/cu1

A

B ,C

B ,C

12.1
11.2.0.4/ 12.1.0.1

12.1
10.2.0.5

A. **Upgrade database and EBS level in a single downtime**

B. **Upgrade database and EBS level in separate downtimes**

C. **Apply upgrade interoperability DB patches and then upgrade EBS**
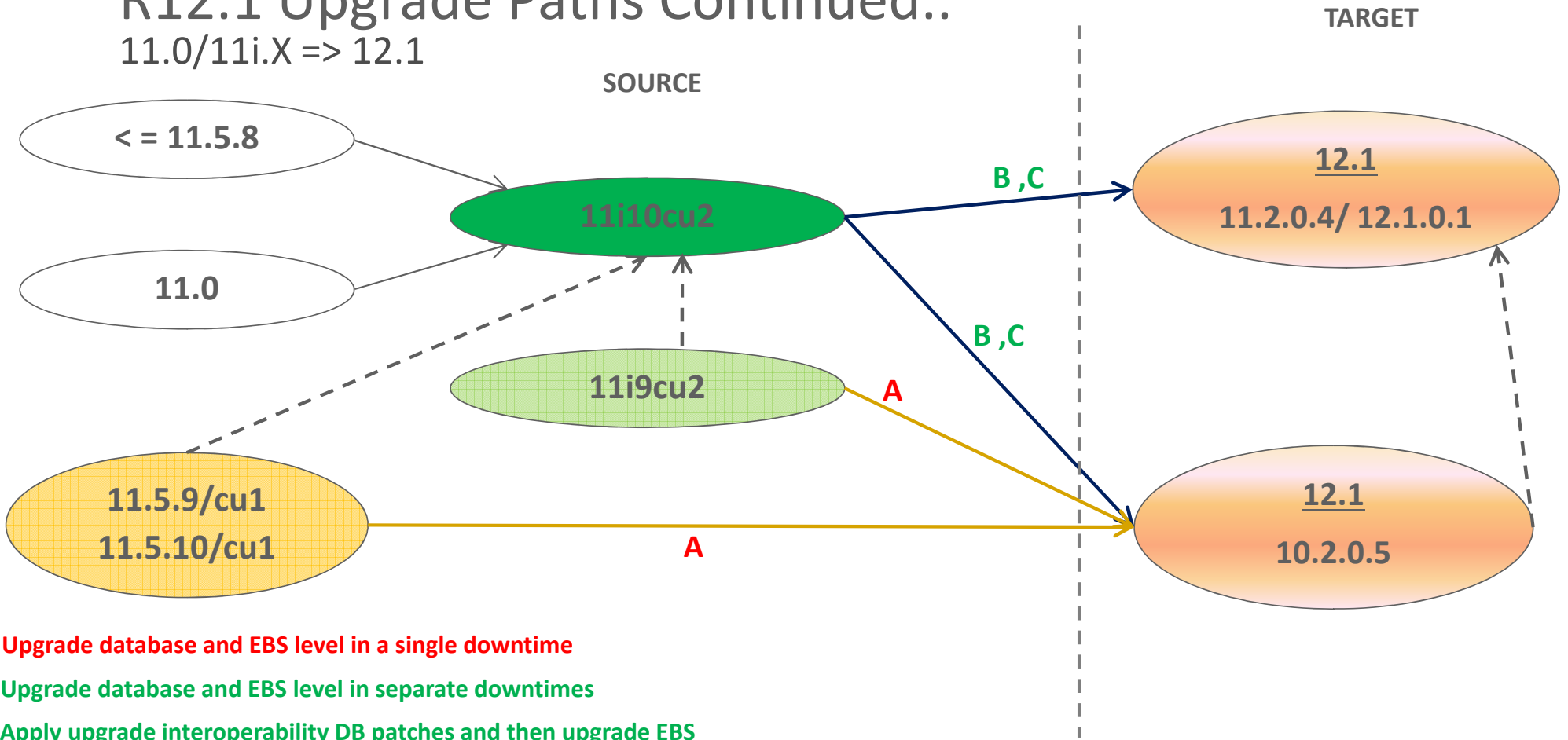
# R12.1 Upgrade Paths Continued..
12.0.X => 12.1

SOURCE

A

12.1

11.2.0.4/12.1.0.1

< = 12.0.3

B ,C

> = 12.0.4

B ,C

12.1

10.2.0.5

A. **Upgrade database and EBS level in a single downtime**

B. **Upgrade database and EBS level in separate downtimes**

C. **Apply upgrade interoperability DB patches and then upgrade EBS**

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R12.2 Upgrade Paths (DB Prep Guide 1349240.1)

SOURCE

TARGET

< = 11.5.8

11.0

11.5.9/cu1
11.5.10/cu1

11i10CU2 MBL

11i9cu2

A, B ,C

< 12.0.4

>= 12.0.4 or >=
12.1.1

A, B ,C

12.2
11.2.0.4/12.1.0.1

A. **Upgrade database and EBS level in a single downtime**

B. **Upgrade database and EBS level in separate downtimes**

C. **Apply upgrade interoperability DB patches and then upgrade EBS**

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R12.1/R12.2 Upgrade Resources

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EBS Data Model Comparison Report

- Per product database object comparison between two releases for the following object types (**MOS ID 1290886.1**)

  - Regular tables, Partitioned tables, Index organized tables, Global temporary tables, Queued tables
  - Views, Materialized views, Materialized view logs
  - Indexes, Sequences, Advanced queues, Packages, Triggers

- R12.1.3 and R12.2.2/R12.2.3 comparison with prior EBS releases available

  - Customers can focus on what has changed
  - Easier to analyze impact on customizations, planned test coverage
  - Differences viewable for all products in the same report via simple UI

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R12.1.3 EBS ATG Seed Data Comparison Report

- Per product EBS ATG Seed data type comparison between two releases (**MOS ID 1327399.1**)
  - Supports most of the EBS delivered seed data types. e.g. Menus, Functions, Profiles and many more
- R12.1.3 and R12.2.2/R12.2.3 comparison with prior EBS releases available
- Benefits
  - Meant for Advanced user with prior knowledge about EBS Seed data delivery
  - Easier for developers/consultants/testing team to analyze impact on customizations, planned/desired test coverage
  - Post Go-live, to answer end-user questions

EBS File Comparison Report (**MOS ID 1446430.1**)

- EBS file system comparison per product
  - Supports most of the file types found in EBS file system
  - ASCII files: new, removed and changed files compared to prior release
  - Binary files: new, removed files compared to prior release

- R12.1.3 and R12.2.2/R12.2.3 comparison with prior EBS releases available
  - In upgrade planning phase, customers can get information about new, removed and changed files
  - Assistance in analyzing impact on customizations, personalization and planning functional flow tests
  - Differences viewable for all products in the same report via a simple UI

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EBS "pre-install" Patches Report (**MOS ID 1448102.1**)

- ## What is a pre-install patch ?
  - Any patch that fixes upgrade itself (critical upgrade failures, upgrade performance issues). Must be applied to the R12.1 RI file system using "adpatch preinstall=y" option
  - **16791553:12.1.0** is the latest consolidated upgrade patch 2 (CUP 2) and includes recommended preinstall patches as of July 2013.

- ## EBS level Report (revised bi-monthly) logistics and usage
  - Merge patches listed with 12.1/12.2 latest CUP and apply. Then apply merged upgrade driver. Helps avoid time/effort chasing individual SRs for known upgrade fixes

- **For R12.2, a CUP is planned to be released per EBS 12.2 RUP.**

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Reference: Please see MOS note: 1448102.1

Product Family: E Business Suite (EBS) ▼

PJ	Upgrade script failure	Data corruption	Performance issue	Upgrade integrity fix	TOTAL
PJC	2	-	-	-	2
PJB	1	-	-	-	1
TOTAL	3	0	0	0	3

FIN	Upgrade script failure	Data corruption	Performance issue	Upgrade integrity fix	TOTAL
AP	15	9	9	1	34
AR	-	2	-	-	2
CE	-	1	-	-	1
FUN	1	1	-	1	3
IBY	1	2	-	-	3
IGI	1	-	-	-	1
JAI	6	-	1	-	7
JE	1	-	-	-	1
JG	2	3	1	-	6
OKL	-	-	1	-	1
XLA	5	2	1	1	9
XLE	1	-	-	-	1
ZX	21	7	-	1	29

NOTE: New patches compared to the prior version of the report are displayed with a different background color.

Upgrade script failure--EBS

SL.NO	PRODUCT	PATCH	RELEASED_DATE	PATCH_ABSTRACT
01	ZX	12586435	2011-06-03	PROCESS RESULTS NOT MIGRATED WHEN MULTIPLE RULES EXIST IN 11I SAME RULE NAME
02	AP	11653739	2011-05-25	RCA : RCA FOR DUPLICATE PARTY SITES AFTER UPGRADE
03	JAI	11857072	2011-05-24	SUPPLIER ADDITIONAL INFORMATION, EXCEPTION SETTING AT SUPPLIER LEVEL
04	XLE	12533427	2011-05-18	QRE1220.3:UPG:XLE.XLE.SQL:SKIPPED JOB:XLEUPG01 SQL
05	JAI	12369104	2011-05-11	TDS FINANCIAL YEAR INFORMAION IS NOT COMPLETED UPGRADED (11.5. TO 12.1.3)
06	PJC	12347791	2011-04-28	1OFF:11841086:12.1.1:PATCH 6678700 FAILS 1602 ORACLE WORKFLOW DEFINITION
07	XLA	11829821	2011-03-11	LAST UPDATE BY CHANGE TO A INVALID VALUE AFTER UPGRADE
08	ZX	11785680	2011-02-22	FAILURE DURING 12.1.1 UPGRADE ON ZXMISSINGLOCVAL.SQL
09	XLA	10198811	2011-02-01	R12 UPGRADE DRIVER FAILES WITH ORA-01400: CANNOT INSERT NULL I
10	ZX	10395967	2011-01-25	11i LOCATION BASED ITEM EXEMPTIONS ARE NOT EVALUATED IN R12
11	AP	11071399	2011-01-18	RCA UPGRADED PAYMENT XDL HAS INCORRECT APPLIED TO COLUMS
12	ZX	10433704	2011-01-12	ZXMIGREPENTITIES.SQL FAILS DURING R12.1.1 UPGRADE
13	ZX	10430502	2011-01-12	RAISED "NAME IS ALREADY USED BY AN EXISTING OBJECT" WHILE RUNNI ZXMIGFORMULA.SQL
14	AP	10359715	2010-12-20	Unable to properly purge upgraded invoices
15	INV	10413599	2010-12-20	BALANCE MIGRATION FAILS DUE TO STATUS ERROR UNABLE TO GET DEF STATUS ID FOR

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Upgrade Best Practices

Performance and Downtime

Plan, Prepare, Test and Upgrade

- As with most planned production maintenance activities, a successful upgrade is highly dependent on how well-defined the upgrade plan is.

- Pre-production testing and validation on an comparable system prior to the actual upgrade is key to minimizing unforeseen contingencies.

- Optimizing the upgrade process is all about making the right choices at the planning stage and verifying these choices with a test environment before production.

Planning Your Oracle E-Business Suite (EBS) Upgrade from Release 11i to Release 12 (MOS ID 1406960.1)

Best Practices for Minimizing Oracle E-Business Suite Release 12 Upgrade Downtime (MOS ID 1581549.1)

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Plan: Prepare Platform

Plan for Platform Migration as a Separate Down Time

- Performing a Database migration to a new platform first, if being considered as part of an EBS upgrade, is recommended as customers would typically be able to perform this in a separate earlier downtime

- Regardless of whether this migration is done in a separate earlier downtime or as part of a single downtime, performance gains would be expected due to the fact that the upgrade of the Applications to R12 will run on newer and faster hardware

    Oracle E-Business Suite Upgrades and Platform Migration (MOS ID 1377213.1)

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Plan: Prepare Database

Plan for Database Upgrade as a Separate Down time

• Upgrade RDBMS version to latest certified for the current APPS level.

• The latest database certified is 12.1.0.1 (11.2.0.4 is the latest for 11gR2)

    https://blogs.oracle.com/stevenChan/entry/12_1_0_1_ebs

• **Tune Init.ora Parameters:**

    – Ensure mandatory init.ora parameters are set correctly.

    – **MOS ID 396009.1 & 216205.1** (R12 & 11i respectively)

• **Apply Required Patches & Fixes/Workarounds for Known Issues**

    – Recommended Performance Patches - **MOS ID 244040.1**

    – Required Patching – Interoperability Notes

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Plan: Manage Data Volumes

Purge Old and/or Transient Data

- Purge Portal
  - Purge Portal introduced in 11i10
  - Single purge/archive management console
  - Purge programs can be configured, initiated and monitored
  - Set the execution frequency as well view history of purge programs.
- Accessing the Purge Portal
  - System Administrator > Oracle Applications Manager >Purging/Critical Activities

Plan: Manage Data Volumes

Purge Old and/or Transient Data

- Use OAM to configure, initiate and monitor purge programs
  - Set the execution frequency and view program history
  - Programs tagged with the "Purge" program type

  System Administrator >Oracle Applications Manager >Purging/Critical Activities

Plan: Manage Data Volumes

Purge Old and/or Transient Data

- **Archive/Purge Product Information**
  - Product User guides – GL/AP/AR/FA/OM
  - Support Notes:
    - **(MOS ID 138264.1)** – General Ledger Archive/Purge FAQ
    - **(MOD ID 144431.1)** – Fixed Assets Archive/Purge FAQ
    - **(MOS ID 136919.1)** – General Ledger Archive/Purge Setup and Usage

- **(MOS ID 752322.1) : Reducing Oracle E-Business Suite Data Footprint**

Prepare: Identify Patches/Tasks

Identify Required Patches/Tasks

- Prepare a complete list of pre and post patches and recommended code levels
  - Keep the system current on AD/ATG/OAM code e.g. latest AD/ATG RUPs on 11i/R12.0 and once on R12.1/R12.2
  - For 12.2, review Oracle E-Business Suite Release 12.2: Consolidated List of Patches and Technology Bug Fixes (1594274.1)
  - High priority patches from MOS.
  - Consolidated Upgrade Patches (CUP)
    - Latest EBS CUP for your target release
      - R12.1 Release notes **MOS ID** 798258.1
      - R12.2 Release notes **MOS ID** 1320300.1
    - Latest pre-install patches **MOS ID 1448102.1**
  - Review "Known-issues" sections from key "living" documents such as Release notes, MP Install Instructions
- Use TUMS ("The Upgrade Manual Script") To avoid running tasks not relevant to your system

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Prepare: Identify Patches/Tasks

Identify Required Patches/Tasks

- Identify and execute tasks that could be completed in a <u>separate</u> downtime period, prior to the production upgrade

  - Use applicable steps mentioned in the "Downtime reduction" and "Upgrade By Request" appendices E and G of the R12.1 upgrade guide

- Minimize historical data to be upgraded as per business requirements "Upgrade By Request"

  - Post-upgrade "hot-patch" of additional historical data outlined in
    MOS ID 604893.1

  - Assign post upgrade jobs to specialized CM queue (by request_type)
    MOS ID 399362.1

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Prepare: Identify Patches/Tasks

Upgrade By Request (MOS ID 604893.1)

- Use this option to defer the upgrade of historical data from the initial upgrade process (critical downtime window), to post upgrade

- Historical data can be upgraded anytime when system is up

- Implementation is a two step process:
  - Set range of historical data to be upgraded before R12.1/R12.2 upgrade and run the pre-upgrade concurrent program
  - Run the post-upgrade concurrent program (as needed for additional historical data)

- Utilize Parallel Concurrent Processing (PCP) for post-upgrade concurrent jobs to leverage the Cluster (RAC).
  - For RAC and PCP refer to (**MOS ID1359612.1)**
  - Starting from 12.1, you can define node affinity at the program level

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Prepare: Identify Patches/Tasks

Patch merging, sequencing and adpatch options

- Applicable for 12.1 and 12.2 pre online patch enablement
  - Use non-interactive patching
  - Merge patches (**MOS ID 228779.1**). Merge NLS patches per language.
  - Use adpatch options such as nomaintainmrc, phtofile, nolink, nogenform, nogenrep, nocompile jsp, noautoconfig, novalidate (**MOS ID 1078973.1**) (12.1 only)

- Perform uptime maintenance when possible
  - Use Hot patching of iHelp, NLS patches, upload patch history
  - Apply HRGLOBAL as a hot patch for 12.1 upgrade (**MOS ID 1330470.1**)
  - Apply HRGLOBAL in "downtime" mode for 12.2

Prepare: Manage Customizations

Check Custom Code

For the duration of the upgrade, consider…

- Check and review customizations that business might not be using.

- Review new Product Features or New Technology to Migrate to.

- Review and disable custom triggers and business events.

- Review and disable custom VPD policies as needed.

- Review and eliminate redundant custom indexes.

**Upgrading your Customizations to Oracle E-Business Suite Release 12.1
(MOS ID: 1435894.1)**

**Developing and deploying Customizations in Oracle E-Business Suite Release 12.2
(MOS ID: 157766.1)**

Prepare: Manage Customizations

Identify and fix custom code to comply to online patching standards.

- Use "Online Patching readiness Reports" to identify issues in custom data base objects that will be fixed automatically Vs needing manual intervention.

- Use Global Standards compliance checker script to scan your file system custom code and fix reported issues.

- Detailed instructions : "EBS Technical Planning Guide" and
  MOS ID 1531121.1

- Download Patch 16236081:R12.AD.X for your current EBS Release (11i, 12.0 or 12.1) and use the scripts and generate the reports.

Prepare: Pre-Upgrade Tasks

Remove Unnecessary Workloads / Overheads

- Remove TDE (Transparent Data Encryption) from high volume tables (for the duration of the upgrade)

- Review and disable all debug or logging; do this at all levels (site, responsibility, user level etc.)

- Purge all old data that is no longer needed prior to the upgrade. **MOS ID 752322.**

- Flush all the interfaces, such as Auto Invoice, Journal Entry Import, Order Import etc.

Prepare: Pre-Upgrade Tasks

Remove Unnecessary Workloads / Overheads

- Drop MRC Schema if it still exists.

- Convert to OATM (Oracle Applications Tablespace Model).
  MOS ID 248857.1

- Convert to the new Multiple Organizations (Multi-Org) architecture
  MOS ID 210193.1

- If possible run in noarchivelog mode

- Disable flashback DB (for the duration of the upgrade).

- Disable auditing if enabled (for the duration of the upgrade)

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Prepare: Database Tier

Gather Schema Statistics

- Gather CBO statistics for all Oracle E-Business Suite schemas with GATHER_AUTO option using FND_STATS (or gather statistics concurrent program)
- If the adsstats.sql job is taking a long time during the upgrade check the following:
  - Check that parallel execution is being used effectively (with parallel_max_servers set to a suitable value, such as 2 x number of cores).
  - Sample specific long running tables at a lower percentage
- If the adsstats.sql script is **still** taking a significant amount of time, reduce the upgrade time by:
  - Exporting schema statistics gathered during test runs (by adsstats.sql)
  - Importing these statistics instead of running adsstats.sql.

Prepare: Database Tier

Gather Dictionary and Fixed Stats

- Gather dictionary object statistics when there is a significant change in dictionary, for example, lot of new objects created.
  exec dbms_stats.gather_dictionary_stats;

- Gather fixed object statistics with reasonable load on the system
   exec dbms_stats.gather_fixed_objects_stats

- Dictionary and Fixed stats should be gather manually as they are not gathered automatically in the Release 12 upgrade by adstats.sql or any other method.

Prepare: Database Tier

Gather Dictionary and Fixed Stats

• Fixed Object Statistics should be gathered:

– After any associated platform or database upgrade that is part of the overall Oracle E-Business Suite upgrade.

– After any SGA/PGA parameters have changed.

– After Release 12 upgrade, when there is representative activity on the system.

• Dictionary Statistics should be gathered:

– After any associated platform or DB upgrade that is part of the overall Oracle E-Business Suite upgrade.

– After the Release 12 upgrade.

– After move to OATM

Prepare: Database Tier

Properly Size SGA/PGA Memory

- Maximize SGA and PGA sizing:
  - Review the Advisory sections in AWR (from test runs) to fine tune SGA & PGA.
  - Some starting rules of thumb are:
    - log buffer = 30 to 100 Mb
    - shared pool = 1 to 4 GB
    - pga target = 3 to 20 GB
    - SGA/buffer cache = multi GB
    - be generous without causing excessive paging.
- Use Large/Huge pages. For example on Linux HugePages – **See MOS ID 744769.1**
  - **MOS ID 361468.1, "HugePages on Oracle Linux 64-bit"** describes how to configure hugepages. When running the recommended script provided with Note 401749.1, make sure that all database instances are started.
  - Only SGA allocation benefits from large/huge pages, PGA allocation does not.

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Prepare: Database Tier

Upgrade and Initialization Parameters

- For 32 cores or fewer initially set:
  - parallel_max_servers = 2 x number of CPU cores.
  - AD Parallel workers – start with 1 x number of CPU cores. Possibly increase to 1.5 x number of CPU cores.
  - job_queue_processes = number of CPU cores
- For more than 32 cores, start with:
  - parallel_max_servers = 1 x number of CPU cores.
  - AD Parallel workers = between 0.5 and 1.0 x number of CPU cores.
- Based on the performance diagnostics, these values can be changed based on the level of contention and resource (CPU/IO) usage (in AWR).
- Shutdown other RAC instances

# Prepare: Database Tier

Upgrade and Initialization Parameters

- If specified, remove db_file_multiblock_read_count. This is the recommended value for normal operation of Oracle E-Business Suite.

- Set optimizer_dynamic_sampling level to the value of 4 during the Release 12 Upgrade, revert to the default value of 2 (or remove) after the upgrade.

- The values of the initialization parameters above (except db_file_multiblock_read_count) may be different from the values used for normal operation. So be sure to revert after the Release 12 upgrade has completed.

- For other initialization parameters, refer to **MOS ID 396009.1**, "Database Initialization Parameters for Oracle E-Business Suite Release 12".

Prepare: Application Tier

Upgrade and autoconfig

- Run autoconfig in parallel on a multi-node system (**MOS ID 387859.1**)
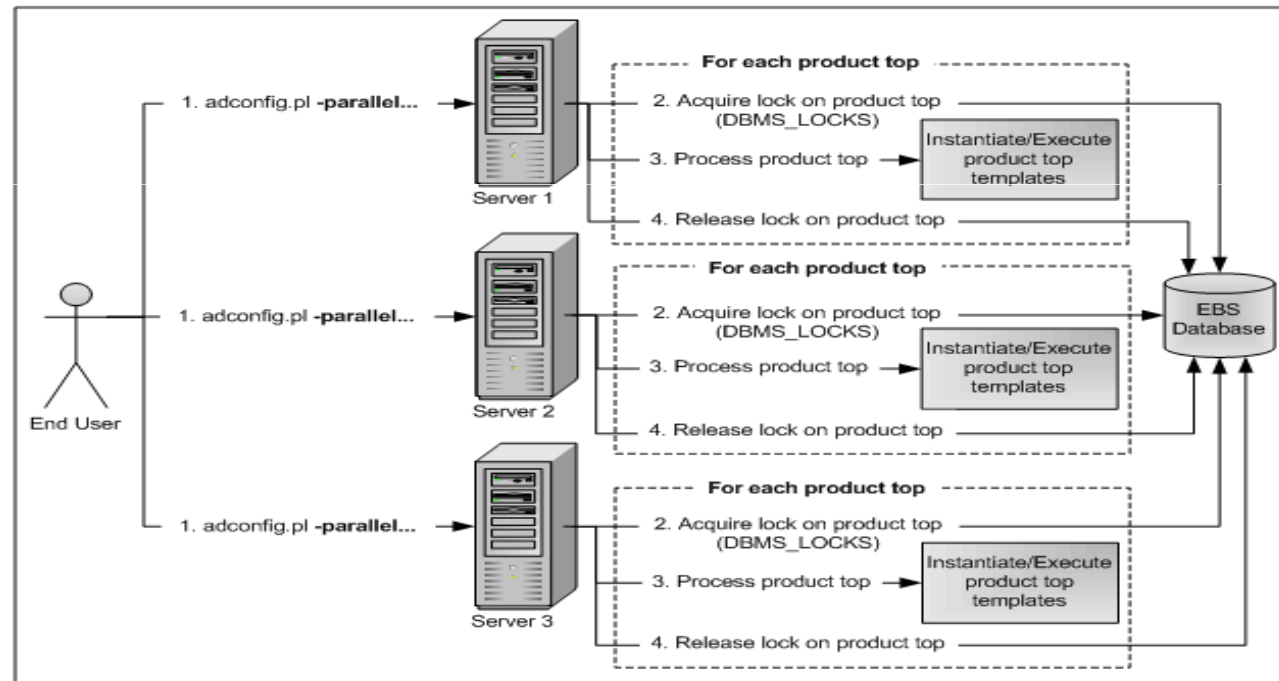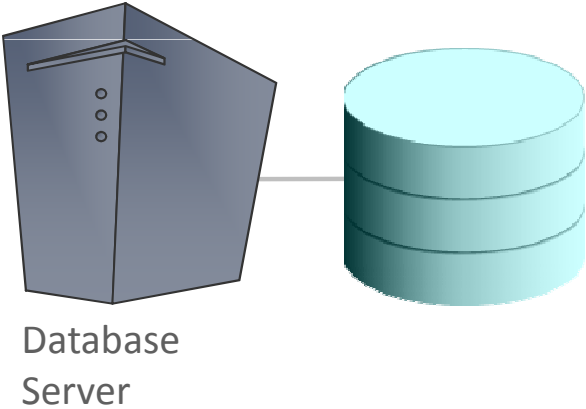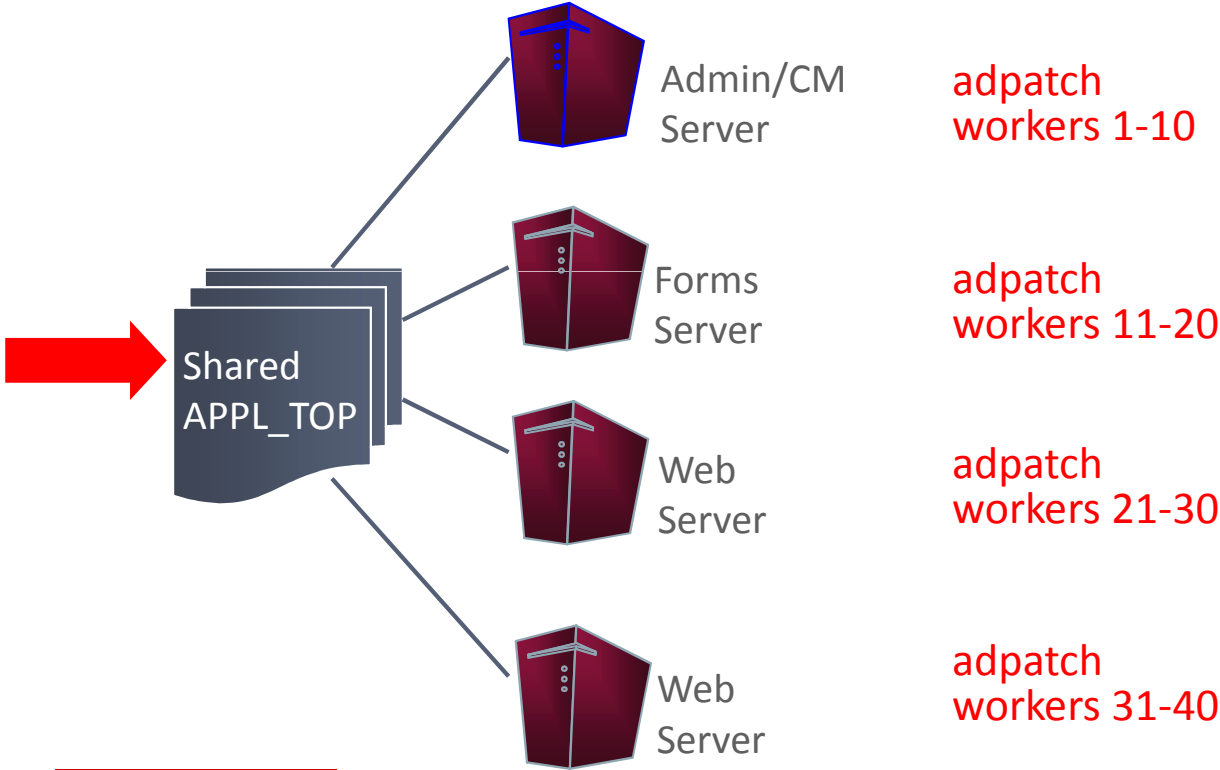
Prepare: Application Tier

Shared APPL_TOP and Distributed AD

- Use "Shared APPL_TOP" (**MOS ID384248.1**) with "Distributed AD" for (**MOS ID 236469.1**) upgrades and regular maintenance for multi-node instances

  – No need to apply the same patch on multiple tiers

  – Distributed AD adds to the degree of parallelism by distributing AD workers across application tier nodes and improves timing for D/G portion of the patch driver.

  – Using Distributed AD and Shared APPL_TOP gives more visible benefits when the workload is not database centric (inserts/updates).

  – Do not get tempted to use more workers than necessary. Avoid high worker counts that might lead to contention issues.

Prepare: Application Tier

Staged APPL_TOP

- Use "Staged APPL_TOP" for regular maintenance and upgrade (**MOS ID 734025.1**)

  – Saves time to patch the file system (C/G portion) by using a patched up copy of production

  – Use in 11i => R12.1 to avoid applying NLS C/G

  – Can use for R12.0.X => R12.1 upgrade and once on R12.1

1. Clone

3. Sync APPL_TOP

Production

1. Clone

4. Sync Patch History

3. Update DB

2. Upgrade DB

Stage

2. Upgrade to R12.1

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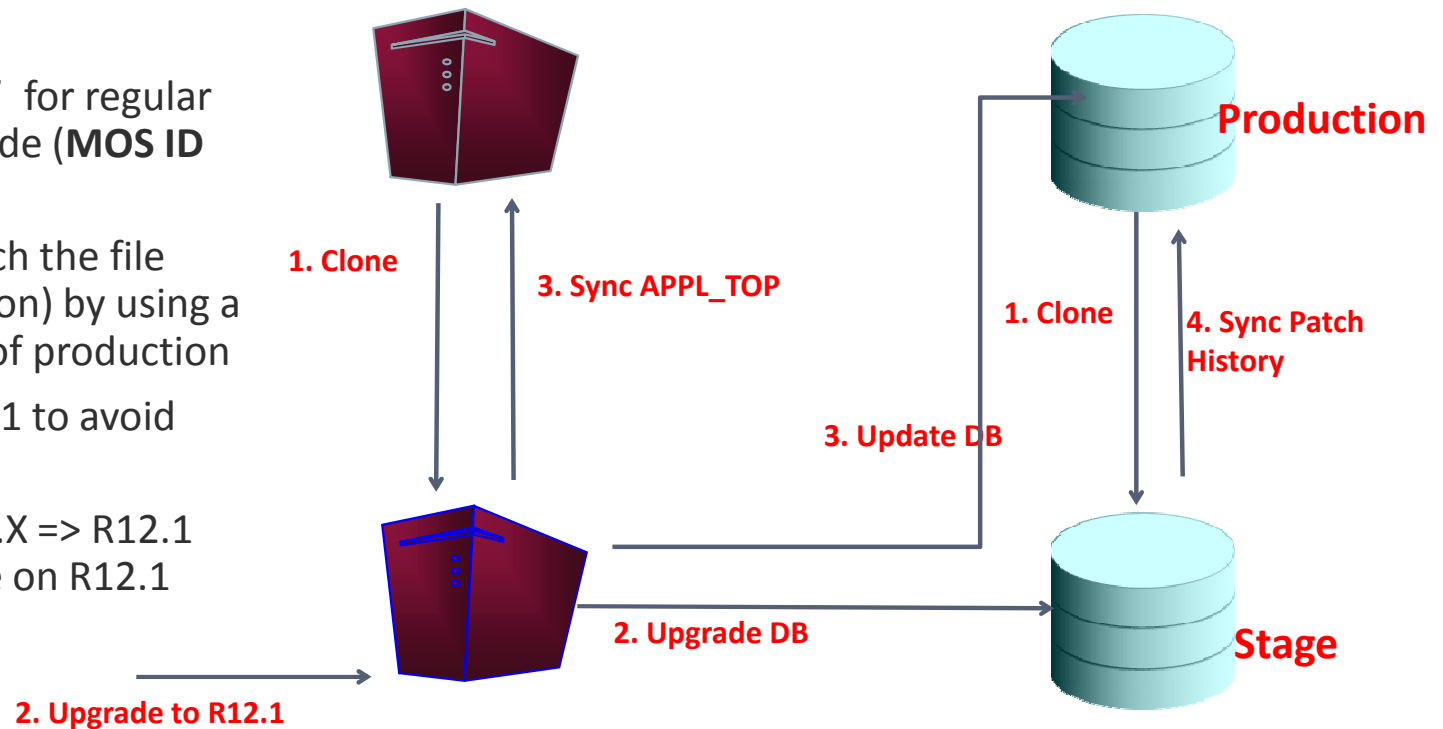
Prepare: Application Tier

12.2 Middle Tier Sizing Guidelines

- Managed instances JVM sizing should consider both memory and CPU domains.

- On 64bit environment, we do not recommend allocating huge heap sizes, but rather have more managed instances in the cluster to scale up to the target concurrency levels.

- For Admin Server sizing, the default size of 512M is not enough for most installations, we recommend setting the XMS to at least 1 GB and the XMX to 2GB

- An initial guidance on sizing can be found in the "Oracle E-Business Suite Installation Guide: Using Rapid Install"

http://docs.oracle.com/cd/E26401_01/doc.122/e22950/T422699i4773.htm#T610671

Managing Configuration of Oracle HTTP Server and Oacore, Oafm, Forms and Forms-c4ws Applications in Oracle E-Business Suite Release 12.2 (Doc ID 1905593.1)

Test: Pre-Production Testing

Testing and Final Run Planning

- Testing should be done on a comparable system that has the same CPU, IO and memory capacity as the target production system

- It is critical to do multiple rounds of testing with different settings to maximize server utilization, while considering the following

  - Memory utilization (no swapping/ excessive paging)

  - CPU utilization (scale down if at 100%)

  - I/O response times (scale down if averages > 20 ms)

- When analyzing Release 12 Upgrade performance issues, the goal is prevent wasted test iterations by maximizing the number of performance issues resolved.

- Testing timings along with system resource utilization should be used to plan the final upgrade with a 20% contingency factor.

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Test: Pre-Production Testing

Get the Timings

- **AD Job Timing Reports:** The job timing report (adtimrpt.sql) reports the top 100 time consuming jobs.

- **AD Utility and Worker Logs:** The AD utility and worker logs can also be useful for diagnostics, giving you more detail about what happened and when. The AD workers logs (adworknnn.log) will give you the activities carried out by each worker and the timings.

- **AD Parallel tables:** The AD_PARALLEL_UPDATES, AD_PARALLEL_UPDATE_UNITS tables can give information on the actual rows processed, the number of batches, progress over time, and long running batches (that might indicate locks/sleeps or data distribution issues).

- **AD_TASK_TIMING:** gives start and end times of jobs and workers, which can help identify all long running jobs, and match long running SQL and performance issues (on AWR) with specific jobs.

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Test: Pre-Production Testing

Get the Diagnostic Data

- **Start with** Express Diagnosis of Oracle E-Business Suite Release 12 Upgrade Performance Issues **(MOS ID 1583752.1)**

• **SQL Tuning**
    • **Trace files**
    • **SQLT output (MOS ID: 215187.1)**
    • **Trace Analyzer (MOS ID: 224270.1)**
    • **AWR Report (MOS ID: 748642.1)**
    • **11g SQL Monitor Report**
    • **AWR SQL Report (awrsqrpt.sql)**
	• **Database Tuning**
	    • **AWR Report (MOS ID: 748642.1)**
	    • **ADDM report (MOS ID: 250655.1)**
	    • **Active Session History (ASH)**
	
	• **OS - OSWatcher (MOS ID: 301137.1) Q**

- Correlate AWR, system vitals and expensive SQLs. Start with the top events and top SQLs sections in the AWR reports.

- Use the advisory sections to size SGA, and PGA Properly

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Test: Pre-Production Testing

Common Optimizations

- Use statistics_level=ALL during the testing/diagnosis phase. Make sure to reset to TYPICAL afterwards. This will help capture runtime Execution plans with row counts & row source stats.

- For long running SQLs - Display cursor report (with ALL +ALLSTATS) can be used to while SQL/job is running which massively speeds up the identification of sub-optimal execution plans and their solution.

- The other alternative is SQL Trace - for which the trace can be enabled on the Job or that particular SQL level.

Test: Pre-Production Testing

Common Optimizations

- For long running jobs or SQLs, it is best to start by investigating if good execution plans are being used. A poor execution plan (or even just one that is moderately sub-optimal) can be the root cause of contention, especially if that contention only occurs during a particular job.

- Create custom indexes for long running jobs where a new index could significantly improve the execution plan and performance

- For long running jobs with high level of contention on particular index segments , consider dropping the index before the job and recreating afterwards. Ensure that indexes are recreated in parallel and with exactly the same definition. And remember to ALTER INDEX to revert the degree of parallel (NOPARALLEL).

Test: Pre-Production Testing

Common Optimizations

- For long-running xdf or odf jobs **creating materialized views (MV)**, consider cleaning up or truncating of any large MV logs (**this requires MV complete refresh**)

- For high level of waits associated with redo log, especially "log buffer space" and "log file sync", consider:

  – Change the configuration of redo logs

  – Move to faster filer

  – Increase redo log file sizes, increase the number of files or increase the log parallelism (hidden parameter _log_parallelism_max).

Test: Pre-Production Testing

Common Optimizations

- Once you have identified the long running jobs and SQL, you can check My Oracle Support for known issues and potential solutions or workarounds.

- However, bear in mind that the fix or workaround may not necessarily fix your particular problem.

- If you cannot confirm that you have exactly the same issue (from the diagnostics) you may still apply the fix, but should continue to gather diagnostics and search for a solution until the issue is fully resolved.

- If you have identified that a long running job has an inefficient execution plan, you could use an SQL Profile to apply hints that will help the CBO choose a better execution plan. You will need SQL tuning expertise to do this.

Customer Upgrade Snapshots

Customer Upgrade Snapshots Continued…
11i to 12.1.3

- **Toyota Motor Europe**
  - Release: 11.5.9+ on IBM AIX to R12.1.3 on Oracle Linux 5 Appl tier
  - DB size: 800 GB
  - #Workers: 32
  - #CPUs on DB server: 8 cores
  - Downtime reduction measures
    - Online NLS patch application
  - #hrs for the 12.1.1 D driver: 21 hrs
  - #hrs for the 12.1.3 US upgrade: 4 hrs
  - #hrs for the 4 languages NLS patching 11 hrs

Customer Upgrade Snapshots
11i to 12.1

- **CPS (Chicago Public Schools)**
  - Release: 11.5.10.2 to 12.1
  - DB size: 900GB
  - #Workers and batch size: 32, 10000
  - #CPUs on DB server: 2 node RAC, 8 CPUs per node
  - Downtime reduction measures
    - Distributed AD
    - Upgrade RDBMS to 10.2.0.4 in a separate downtime
    - # hrs for the D driver: 22 hrs
  - Customer snapshot

    http://www.oracle.com/customers/snapshots/chicago-public-schools-ebs-snapshot.pdf

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Customer Upgrade Snapshots Continued…
11i to 12.0.6

- **Cisco**
  - Release: 11i to R12.0.6
  - DB size: 600GB
  - #Workers and batch size: 32, 20000
  - #CPUs on DB server: 16
  - Downtime reduction measures
    - Distributed AD
  - #hrs for the D driver: 5.5 hrs

Customer Upgrade Snapshots Continued...
11i to 12.1.3

- **Dell**
  - Release: 11i10 to R12.1.3
  - DB size: 15TB , 16 node RAC Cluster
  - #Workers and batch size: 32, 10000
  - #CPUs on DB server: 8
  - Downtime reduction measures
    - Distributed AD
    - Pre-create large indexes
  - #hrs for the D driver: ~30 hrs

Customer Upgrade Snapshots Continued...
11i to 12.1

- **GE**

    - Large EBS HRMS Implementation (~300K employees,10 Lang)

    - Release:11.5.10.2 to R12.1.3, DB size: 838 G

    - Hardware: App Tier- 2 SUN T5240's(64x64),

                                DB Tier - SUN M8000 (12 Dual Cores)

    - #Workers and batch size per App Server: 48, 10000

    - Downtime reduction measures

        - Distributed AD, Staged APPL_TOP

    - #hrs for D driver:~10 hrs US, ~13 hrs NLS   (11.5.10.2 -> R12.1.1)

    - #hrs for DB Portion:~2.5 hrs US, ~1 hr NLS (R12.1.1 -> R12.1.3)

Customer Upgrade Snapshots Continued...
12.0 to 12.1

- **Zebra Technologies Corporation**
    - Release: 12.0.6 to 12.1
    - DB Size: 106GB
    - #Workers and batch size: 32, 10000
    - #CPUs on DB server: 8
    - Downtime reduction measures
        - Staged APPL_TOP
    - #hrs for the U driver: 12 hrs
    - Customer snapshot

        http://www.oracle.com/customers/snapshots/zebra-technologies-corporation-ebs-snapshot.pdf

Customer Upgrade Snapshots Continued...
12.0 to 12.1

- **Oracle GSI**
  - Release: 12.0.3+ to R12.1
  - DB size: 17TB
  - #Workers and batch size: 60, 10000
  - #CPUs on DB server: 88 processors
  - Downtime reduction measures
    - Staged APPL_TOP for US and ten languages
    - Ran data fixes for problems found in test upgrades prior to production upgrade to minimize stoppages
    - Distributed AD (4 servers,15 workers each)
    - #hrs for the D driver: 14 hrs

Customer Upgrade Snapshots Continued...
12.1 to 12.1.3

- **Oracle GSI**
  - Release: 12.1+ to R12.1.3
  - DB size: 17TB
  - #Workers and batch size: 200, 10000
  - #CPUs on DB server: 150 processors
  - Downtime reduction measures
    - Staged APPL_TOP for US and ten languages
    - Ran data fixes for problems found in test upgrades prior to production upgrade to minimize stoppages
    - Distributed AD (4 servers, 50 workers each)
    - #hrs for the D driver: 4 hrs

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Customer Upgrade Snapshots Continued...
12.0 to 12.1.2

- **AT&T**
  - Release: 12.0+ to R12.1.2
  - DB size: 10 TB
  - #Workers and batch size: 40, 10000
  - #CPUs on DB server: 32 Processors
  - Downtime reduction measures
    - Staged APPL_TOP for US and ten languages
    - Distributed AD
  - #hrs for the D driver: 9 hrs

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References

References

- R12.1 documentation roadmap (790942.1)

- Oracle E-Business Suite Release 12.1 Info center (806593.1)

- Database preparation guidelines for R12.1 upgrade (761570.1)

- Recommended Performance Fixes (244040.1)

- R12 Upgrade Sizing & Best Practices (399362.1)

- R12.1 EBS pre-install patches Report (1448102.1)

References

- Oracle E-Business Suite Release 12.2 Info center (1581299.1)

- Oracle E-Business Suite Release Notes, Release 12.2 (1320300.1)

- DB Preparation Guidelines for an E-Business Suite Release 12.2 Upgrade (1349240.1)

- Using the Online Patching Readiness Report in Oracle E-Business Suite Release 12.2 (1531121.1)

- Oracle E-Business Suite Release 12.2: Upgrade Sizing and Best Practices (1597531.1)

- Oracle E-Business Suite Release 12.2: Consolidated List of Patches and Technology Bug Fixes (1594274.1)

Additional Resources

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Additional Resources

- EBS Upgrade related Reports

    – **EBS Data Model Comparison Report (**1290886.1)

    – EBS ATG Seed Data Comparison Report (1327399.1)

    – EBS File Comparison Report (1446430.1)

- White paper

    – Planning Your Oracle E-Business Suite Upgrade from Release 11i to Release 12 (1406960.1)

    – Oracle E-Business Suite Upgrades and Platform Migration (1377213.1)

- Have Upgrade questions ? Please post on OTN R12 upgrade forum

    http://forums.oracle.com/forums/forum.jspa?forumID=395&start=0

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