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Upgrading to E-Business Suite R12 – Best Practices

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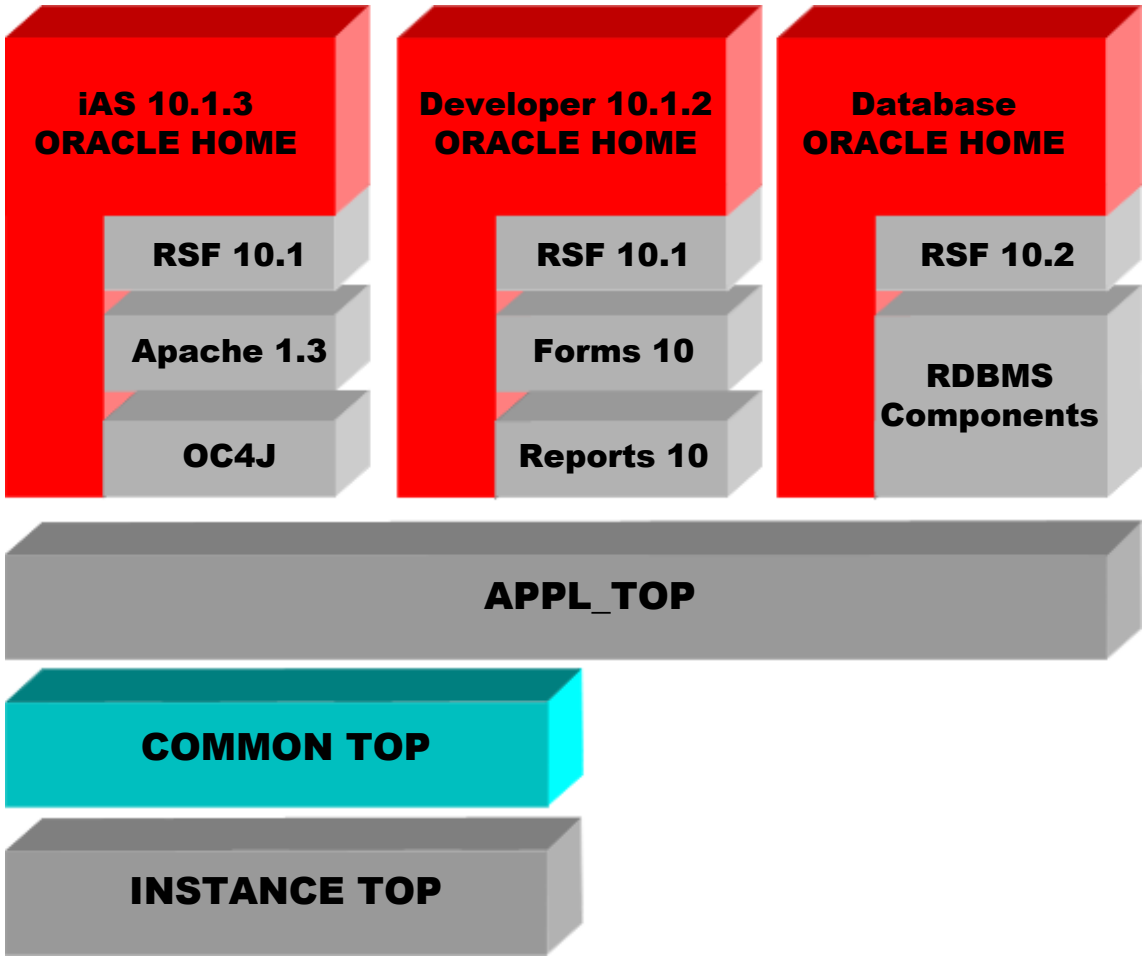
Objectives

- Provide an overview of E-Business Suite R12 upgrade process
- Discuss the best practices of E-Business Suite R12 upgrade including downtime reduction techniques (based on multiple test upgrades on customer volume E-Business Suite databases and internal E-Business Suite databases)
- Share experiences of upgrading internal Oracle Global Single Instance to E-Business Suite R12 using best practices

Agenda

- Overview of R12 Upgrade
  - R12 File System
  - Supported Upgrade Paths
  - R12 Upgrade Flow
  - Technology Improvements
  - Upgrade by Request
- Best Practices
- GSI Upgrade Overview and Experiences
- Summary
- Q&A

Overview - R12 File System

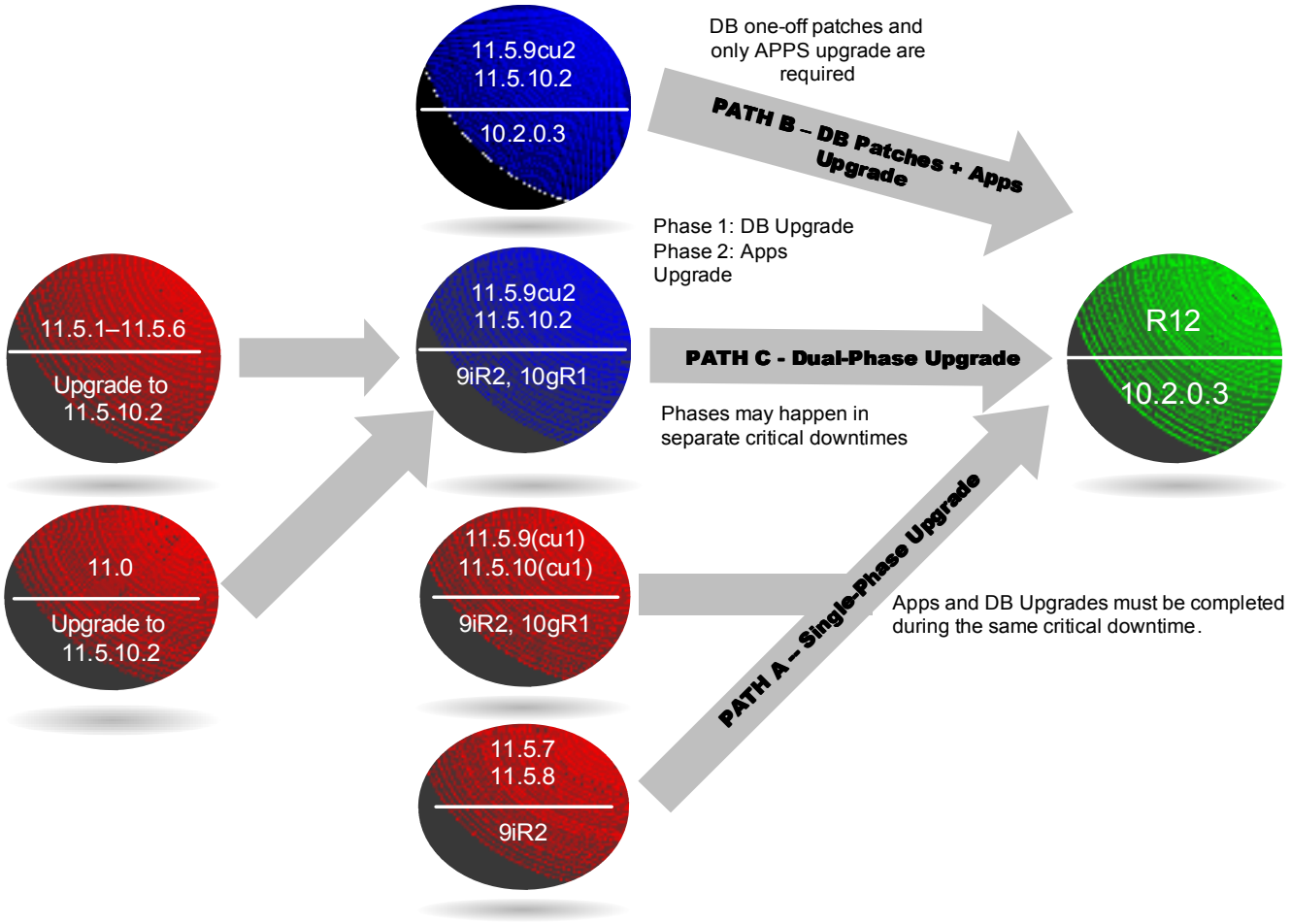


MAJOR COMPONENTS

- **Java Home: 10.1-based**
  iAS 10.1.3 – new
- **C Home: 10.1-based**
  Developer 10 standalone install of AS 10.1.2
  phase2 – new
- Database Home: 10.2
- Appl Top: Applications' code staging area
- Common Top: Runtime location for Java, HTML
- **Instance Top: configuration and run-time generated files – new**

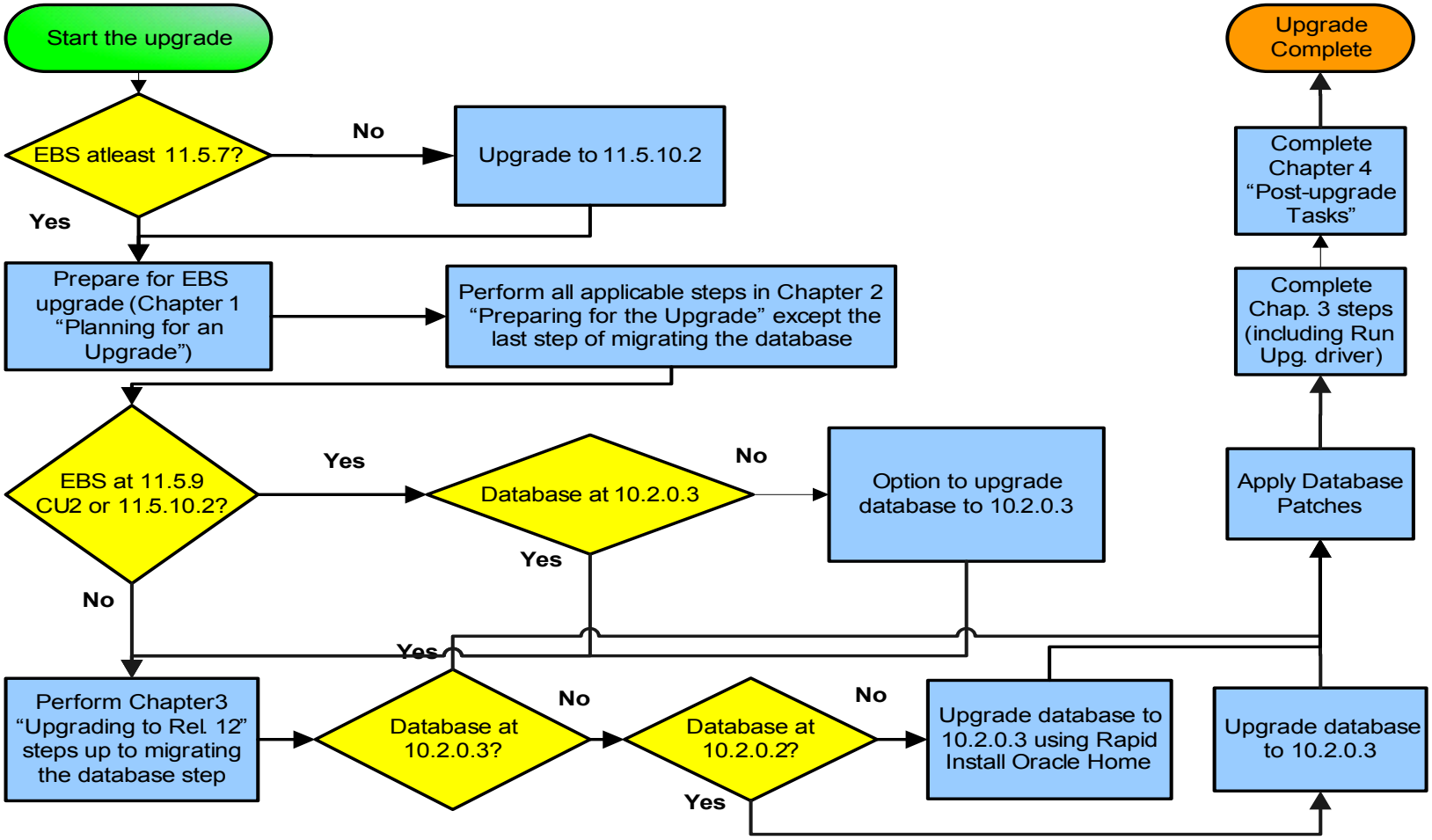
  Multiple instances can easily share the middle-tier home

Overview - Supported Upgrade Paths

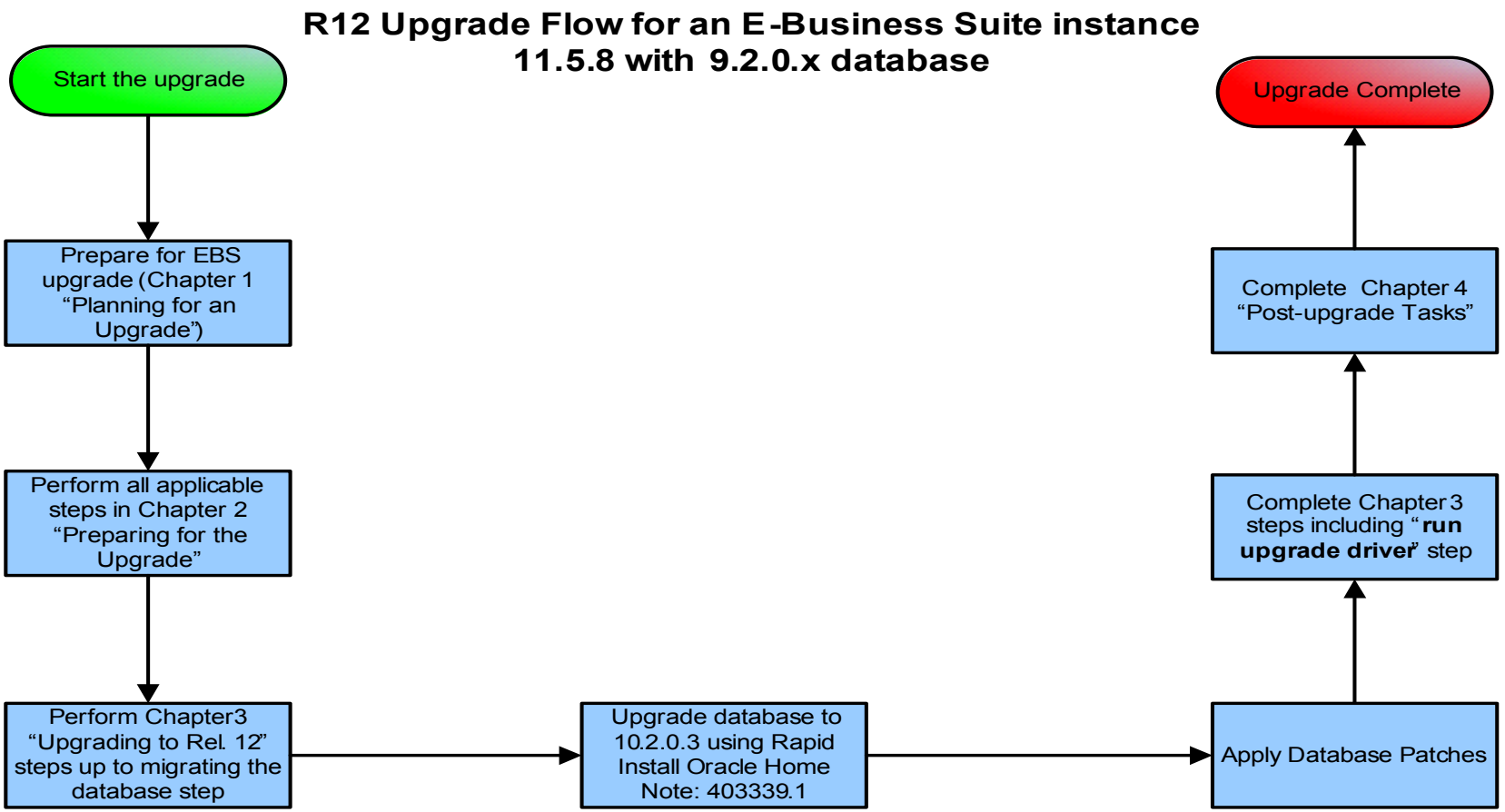


Notes:
1) Please see Metalink Note 403339.1 for supported combinations of Apps and RDBMS for R12 upgrade.
2) Release 11.5.10.2 includes systems installed with Rapid Install 11.5.10.2 and those upgraded by using the 11.5.10 CU2 maintenance pack.

Overview – R12 Upgrade Flow



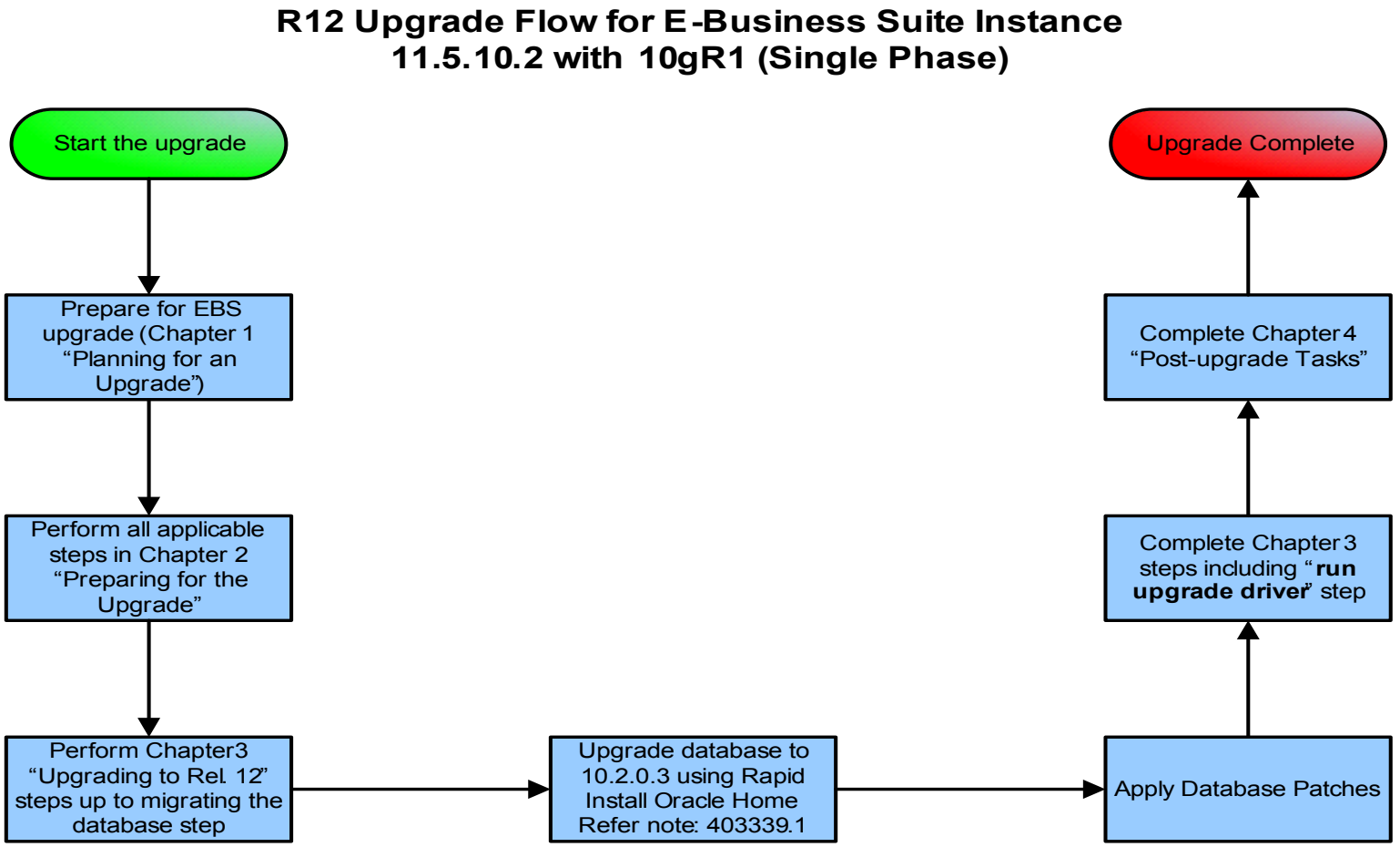
Overview – R12 Upgrade Flow (cont'd)



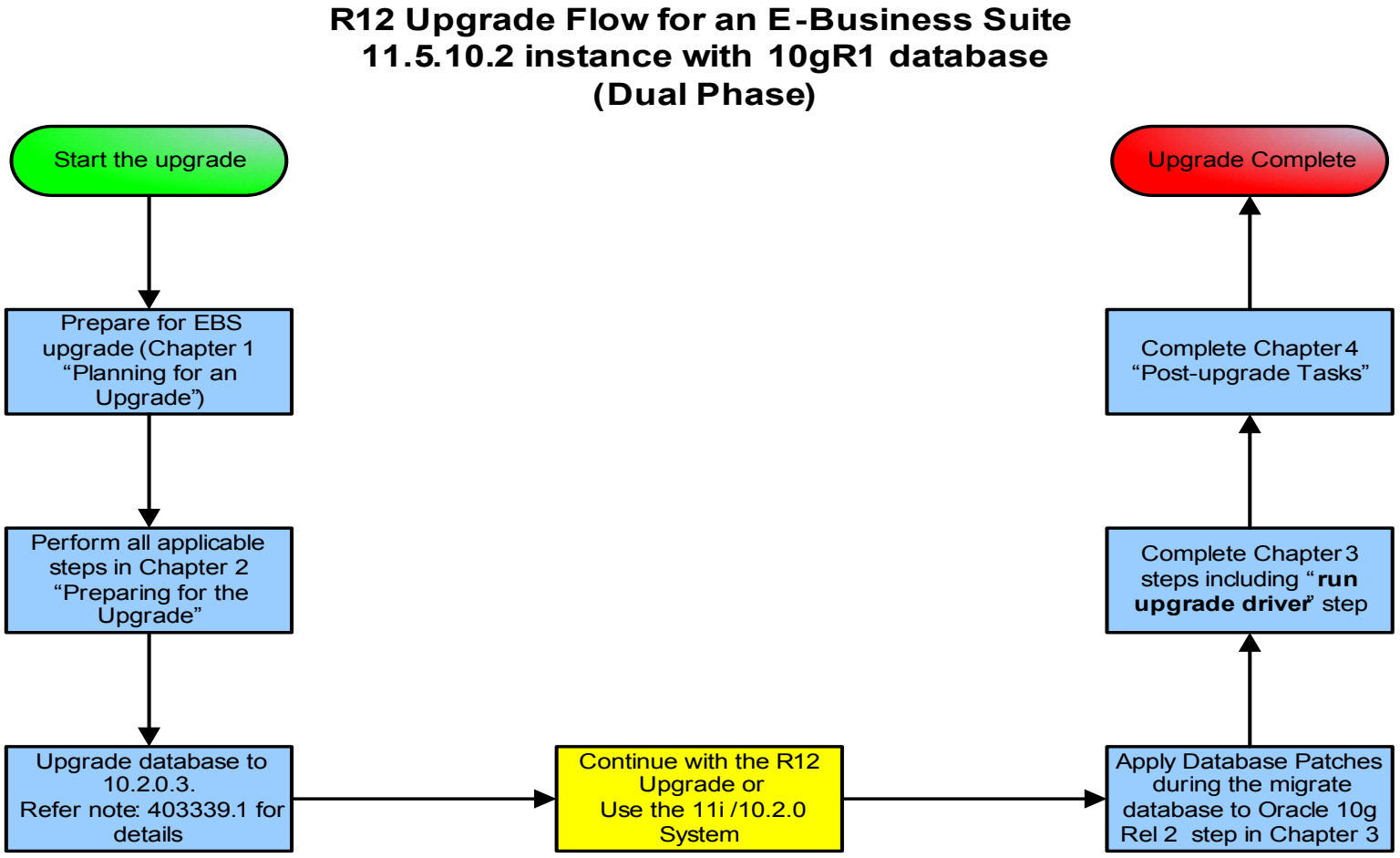
Overview – R12 Upgrade Flow (cont'd)

R12 Upgrade Flow for an E-Business Suite Instance
11.5.10.2 with 10.2.0.3 database

Overview – R12 Upgrade Flow



Overview – R12 Upgrade Flow (cont'd)



Overview – Technology Improvements

Applications DBA (AD) Improvements

- AutoPatch replaces AutoUpgrade tool
- AD parallel infrastructure improvements for work distribution of Large Table Update
  - Divides large table into chunks
  - Use separate processes in parallel to update each chunk of data
- Inclusion of Gather Auto Stats job in R12 Upgrade driver itself to keep statistics up-to-date after the upgrade

Overview – Technology Improvements

Applications DBA (AD) Improvements (continued)

- Check file and check file equivalence
- sqlplus_parallel directive to eliminate the contention between jobs executing parallel query

Overview – Technology Improvements

Performance Improvements

- Optimizer dynamic sampling (for objects with no statistics)
- Gather Auto option for Gather stats program to gather only new or changed statistics using table monitoring feature
- Converted non-critical jobs as concurrent manager requests to reduce overall downtime
- R12 unified upgrade driver provides an option to defer compilation of PL/SQL packages during creation

Overview – Upgrade by Request

- Option to additionally upgrade historical data that has not been upgraded during the initial upgrade process (which upgrades by default one fiscal year worth of data)
- Historical data can be upgraded anytime when system is up or down
- Following products historical data can be upgraded at a later date
  - Financials and Procurement
  - Projects
  - Supply Chain Management
  - CRM (run scripts manually)

Overview – Upgrade by Request (cont'd)

- Upgrade of historical data depends on product. For some products only SLA data will be upgraded and for others both transactions and accounting data will be upgraded.
- Implementation is a two step process:
  1. Set range of periods of the historical data to be upgraded before R12 Upgrade and run pre-upgrade concurrent program
  2. Run SLA post upgrade (upgrade by request option) after R12 upgrade
- Review Appendix G in R12 upgrade manual for more details

Best Practices

Best Practices – Project Planning

Involve Right People

Project Manager

- Project owner
- Decision maker
- Task & staff coordinator

Functional Owner

- Functional Impact
- New feature uptake
- Testing
- Upgrade testing

DBA

- AD utilities
- Database administration
- Technology stack updates
- Upgrade steps

IT Developer

- Functional impact
- Customization impact
- Customization development

Best Practices – Project Planning (cont'd)

- Review appropriate documentation (Doc id: 394692.1) to gather information on
  - Upgrade process
  - Tools required
  - Number and types of tasks involved
  - How your system and products will look in Release 12

Best Practices – Project Planning (cont'd)

- Plan to run multiple test upgrades
- Test upgrade provides
  - Baseline for upgrade execution times
  - Opportunity to workout any upgrade issues ahead of time
    - e.g. data issues
- Plan to test key features
  - e.g. Upgrade by request
- Choose hardware closely matches with that of production during test upgrade

Best Practices – Pre-Upgrade

- Use TUMS to eliminate the tasks that are not relevant for your system
- Use Shared file system for Multi-node
- Use Distributed AD for Multi-node
- Estimate tablespace sizes for test upgrade using Doc id: 399362.1

Best Practices – Pre-Upgrade (cont'd)

- Modify following parameters for the duration of the upgrade. Performance of some upgrade scripts can be significantly improved by doing this:
  - db_file_multiblock_read_count (do not set -- remove)
  - _db_file_optimizer_read_count (do not set – remove)
  - job_queue_processes
  - parallel_max_servers
  - pga_aggregate_target
  - recyclebin

See Database Initialization Parameters in Chapter 1, "Planning for an Upgrade" of R12 Upgrade manual for more information on above parameters.

Best Practices – Pre-Upgrade (cont'd)

- Perform following key tasks which substantially reduce the downtime during upgrade
  - Functional tasks listed in Reducing downtime section (Appendix E) in R12 Upgrade manual
  - "Upgrade by Request" section (Appendix G) in R12 upgrade manual
- Perform following tasks in advance to reduce extended downtime
  - Convert to Multi Org
  - Convert to OATM
  - Upgrade database to 10.2.0.3

Best Practices – Pre-Upgrade (cont'd)

- Gather statistics before upgrade using Gather schema statistics concurrent program
  - Use Gather Auto option if your DB is already at 10g
- Record timing for each step during test upgrade
- Make sure you have good backup before R12 upgrade and also before database upgrade

Best Practices – Pre-Upgrade (cont'd)

- Add PL/SQL no compile option in R12 upgrade driver to save time during upgrade
  - Add "extension plsql_no compile yes" line in upgrade driver file to enable PL/SQL no compile option

    extension patch_type software base
    extension plsql_no compile yes
    extension patchinfo maintpack 12.0.0

  - Saved 3 to 4 hours of upgrade downtime during internal test upgrades

Best Practices – Running Upgrade

- Choose proper batchsize and number of workers for AutoPatch during upgrade
  - For a 24 CPU database server, following parameters were used for AutoPatch on internal environment
    - Batchsize=10000
    - Workers=30
- To determine optimal number of workers, test with the following goals:
  - Between 1*CPUs and 1.5*CPUs
  - Average IO response times below 10-15 milliseconds
  - Average CPU usage below 100%

Best Practices – Post-Upgrade

- Make sure you reset the following init.ora parameters after completion of R12 upgrade driver
  - recyclebin
  - parallel_max_servers
  - job_queue_processes
- Merge all the NLS patches and apply them as single merged patch
- Isolate post upgrade concurrent programs to a separate manager queue as mentioned in the best practices Doc id: 399362.1

GSI Upgrade Overview and Experiences

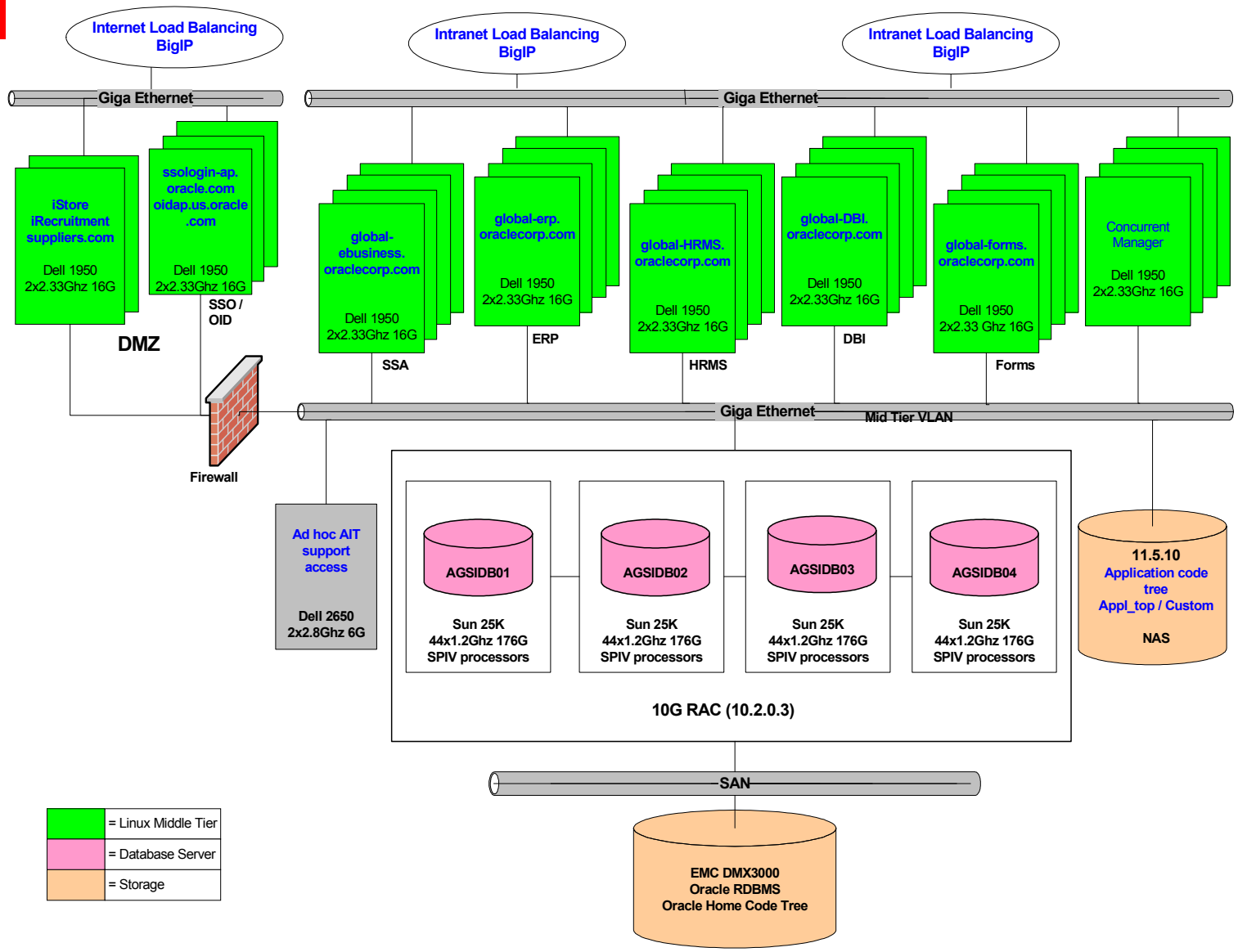
GSI Upgrade Overview and Experiences

- Introduction
- Overview of GSIAP Architecture
- Overview of GSIAP Statistics
- Applications Supported by AIT
- Project Planning
- Pre-Upgrade Planning
- Running the Upgrade
- Post-upgrade Planning
- Keys to Success of GSI R12 Project

Introduction

- Applications IT has a dual role
  - Responsible for implementing and supporting application solutions, which allow Oracle to run its business and day-to-day operations.
  - Uptake new Oracle releases (such as R12) very early in the release cycle and work with Product Development to resolve issues.
- This presentation shares our experiences from the GSI R12 project.
- The experiences highlighted are appropriate for Oracle's internal implementation and therefore may not be applicable for all upgrades.

GSI Production Architecture - Austin Data Center



Global Single Instance

Data Statistics before R12 upgrade

Data Statistics for Global Single Instance – May 2007 (11.5.10.CU2)	
10.5 Terabytes	286,000 Projects
25.8 Billion rows of data	9.3 Million AR Invoices
104 Operating Units	60 Million AR Invoice lines
665 Sets of Books	15 Million AP Invoices
1.27 Million People	5.7 Million Sales Orders
20 Years of SLA Data	10 Languages
382,000 Vendors	619 Million GL lines

Applications Supported by AIT

Customer Data Management
- Customers Online

Financials
- Assets
- Cash Management
- Collections
- Financial Intelligence
- General Ledger
- Global Accounting Engine
- iAssets
- Internal Controls Manager
- iPayment
- Oracle Property Manager
- Payables
- Receivables
- Treasury

Human Resources
- Advanced Benefits
- Human Resources
- Human Resources Intelligence
- Learning Management
- Payroll
- SSP
- Time and Labor
- Time and Labor Engine

Interaction Center Technology
- Advanced Outbound Telephony
- Interaction Center Intelligence
- Universal Work Queue

Logistics
- Inventory
- Warehouse Management

Manufacturing
- Bills of Material
- Engineering
- Master Scheduling/MRP
- Work In Process

Marketing and Sales
- Advanced Pricing
- Incentive Compensation
- Marketing
- Marketing Intelligence
- Partner Management
- Proposals
- Quoting
- Sales
- Sales Foundation
- Sales Intelligence
- Sales Online
- Telesales
- Trade Management

Order Management
- Configurator
- Contracts Core
- Contracts Intelligence
- iStore
- Order Management
- Shipping Execution

Procurement
- iSupplier Portal
- Purchasing
- Purchasing Intelligence
- Sourcing

Product Lifecycle Management
- Advanced Product Catalog

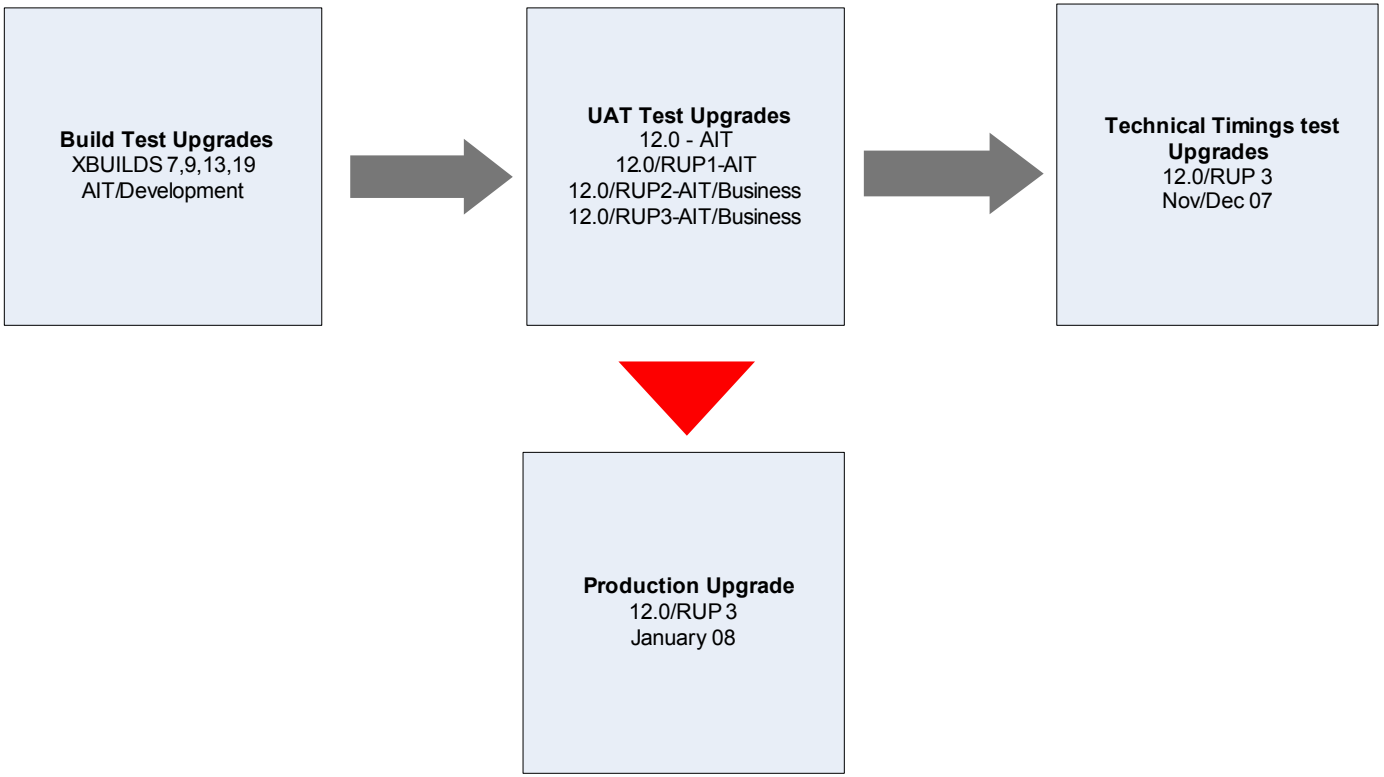
Projects
- Project Intelligence
- Projects
- Resource Management System

Service
- Install Base
- Service Contracts
- Service Intelligence

Supply Chain Intelligence
- Supply Chain Intelligence

Technology
- Alert
- Application Object Library
- CRM Foundation
- e-Commerce Gateway
- Report Manager
- Self-Service Web Applications
- System Administration
- Web Applications Desktop Integrator
- XML Gateway
- XML Publisher

GSI R12 Project Planning



GSI R12 Project Planning

Project Management and Testing Strategy

- Project team consists of overall project manager to liaise with Technical and Functional teams
- AIT POC for modules testing, POC for business testing
- Full End to End testing

GSI R12 Project Planning

Project Management and Testing Strategy (continued)

- Weekly meetings and status reports :
  - review status reports with functional testers (% of testing completed per module, critical issues highlighted, clear status for each module, bugs open with development)
  - team meetings of core project management team
  - Highlighting of status/issues to Division Executive management
  - Review testing status with business
  - Meeting with development to discuss status/issues
  - Weekly status reports are sent to wide audience to highlight status and issues

GSI R12 Project Planning

- Environments
  - Weekly patching windows to apply patches to Build Test environment mid-week. If no issues with patch, it's approved and applied to UAT environment at the weekend
- Upgrade By Request
  - We migrated 8 out of 20 years of SLA data and have no specific plans to migrate remaining 12 years of data.
  - Saves on downtime and first stage of planned project to archive old transactional data
- Convert Custom Oracle Reports to XML Publisher
  - Not technically required for R12

GSI R12 Pre-upgrade Planning

Tasks performed prior to production outage

- Long Term pre-upgrade Tasks
  - Upgrade to 10.2.0.3 in advance (check Metalink for latest RDBMS patches prior to upgrade)
  - Rebuild mid tiers with OEL 4 O/S
  - Prepare master appl_top in test rounds (R12 Rapidinstall & NLS)
- Short Term Pre-upgrade tasks
  - Apply patches for Pre-upgrade steps at 11i
  - Perform Pre-upgrade tasks and reducing downtime tasks
  - Analyze any stale objects prior to upgrade
  - Add space based on test runs using OATM model and auto-allocate for extent size (1.3 tbytes)

GSI R12 Pre-upgrade Planning

Tablespace Name	Size
APPS_TS_QUEUES	1 * 4gb datafile
APPS_TS_ARCHIVE	2 * 4gb datafile
APPS_TS_INTERFACE	1 * 4gb datafile
APPS_TS_MEDIA	1 * 4gb datafile
APPS_TS_NOLOGGING	1 * 4gb datafile
APPS_TS_SEED	1 * 4gb datafile
APPS_TS_TOOLS	1 * 4gb datafile
APPS_TS_SUMMARY	10 * 4gb datafile
APPS_TS_TX_IDX	31* 13gb datafile
APPS_TS_TX_DATA	48 * 13gb datafile

GSI R12 Pre-upgrade Planning

- Transition pre-upgrade tasks
  - Archive log (turn off or monitor space usage)
  - Disable flashback DB if enabled
  - Setup space monitoring for during the upgrade
  - Use “upgrade” listener rather than production listener and shutdown production listener
  - Review and disable runtime production monitoring (eg EM Monitors, kill scripts for “runaway” processes, long running sessions)
  - Modify init.ora parameters. In test rounds, modify init.ora parameters to reflect production

GSI R12 Pre-upgrade Planning

Init.ora parameter changes for R12 upgrade	value
parallel_max_servers	80
log_buffer	32010240
job_queue_processes	40
db_block_checking	False
Recyclebin	Off
_db_handles_cached (for ar120trxl.sql)	16
log_archive_max_processes	8
pga_aggregate_target	16 gbytes
_db_file_optimizer_read_count	REMOVE
db_file_multiblock_read_count	REMOVE

GSI R12 Pre-upgrade Planning

- Transition pre-upgrade Tasks (continued)
  - Put scheduled concurrent jobs on hold
  - Run any data fixes required based on test runs
  - Update u4440000.drv to include no compile option
  - Create separate concurrent manager queue to process concurrent programs submitted by upgrade

GSI R12 Running the Upgrade

- Number of workers – 60 workers across 4 mid tiers
- adpatch options used on main mid tier

  options=nocompilejsp,noautoconfig,nocopyportion,
  nogenerateportion
  batchsize=10000, workers=60, localworkers=15
  adctrl distributed=y on other 3 mid tiers
- Monitor space in new R12 tablespaces, session waits, alert log, archive space

GSI R12 Post-upgrade Planning

- Run hrglobal before NLS (Note:145837.1 & 414434.1)
- Merge standard patches to save time
- Reset init.ora parameters to original pre-upgrade values except for db_file_multiblock_read_count and _db_file_optimizer_read_count and restore sga and pga to original value in test runs
- DBA steps (start up 4 nodes,FNDCPASS,enable flashback) before testing
- Apply merged NLS D Driver in parallel with US Language Testing
- Migrate CUSTOM library (custom.pll)
- Functional post-upgrade steps/verification
- Take concurrent scheduled jobs off-hold and ensure production monitoring is re-enabled.

Keys to Success of GSI R12 Project

- Detailed project planning and extensive communication
- Multiple test upgrades
- Comprehensive functional testing and preparation for impact of new features
- Completion of pre-upgrade tasks in advance
  - Long Term (RDBMS, Architecture)
  - Short Term
  - Transition

Summary

Summary

In this presentation, we have discussed following topics:

- Overview of R12 Upgrade
- Best Practices
- GSI Upgrade Overview and Experiences


Q&A

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