ORACLE

MAA Best Practices - Reducing Downtime For Planned Maintenance Operations using Oracle Database 10g HA Features

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What is target or allocated downtime for planned maintenance for your key application?

>= 100 hours? (approx 4 days)

< 100 hours? 100% of audience of 300

<10 hours? 20% of audience

< 1 hour? 10% of audience

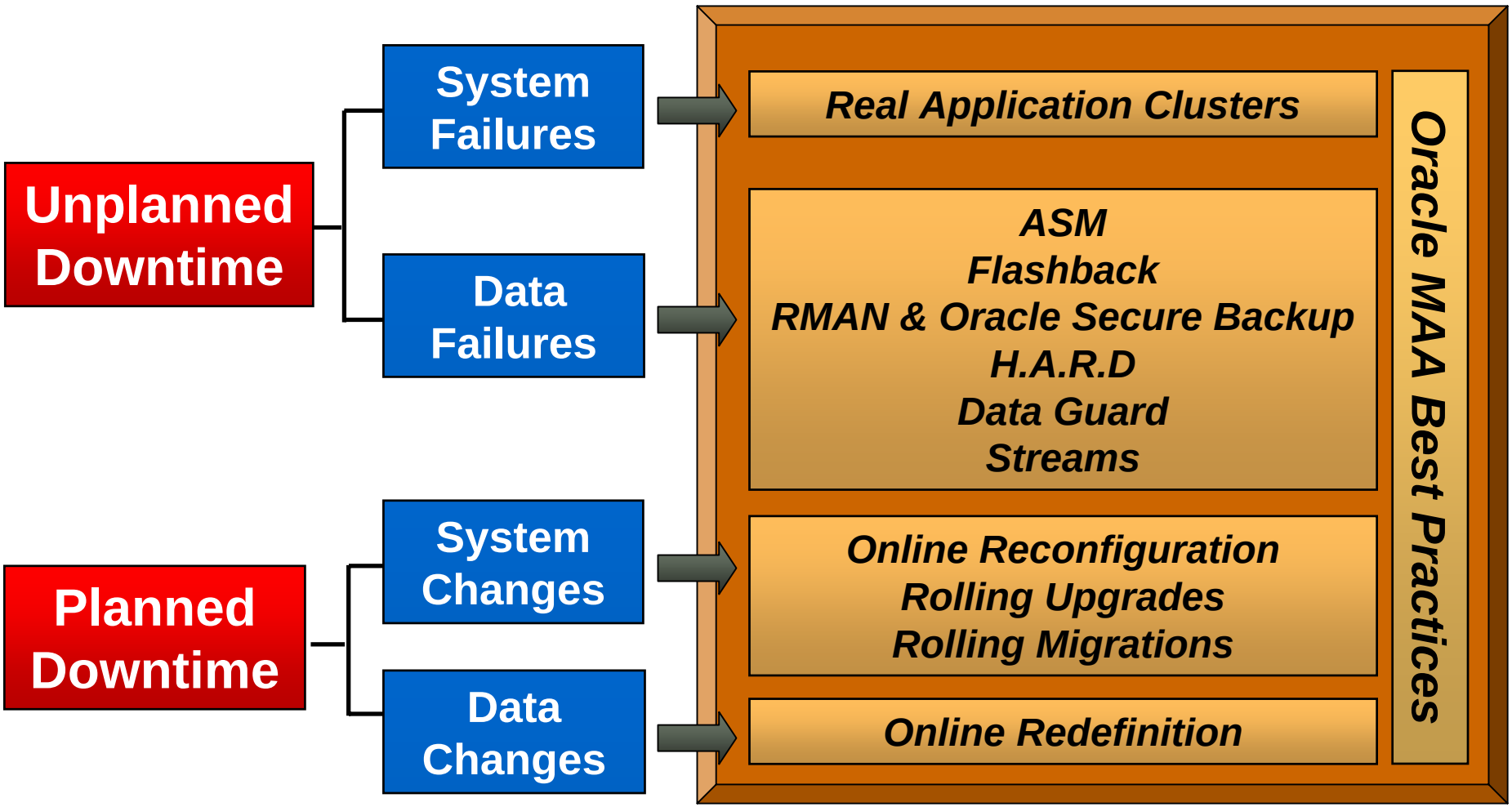
< 10 minutes? 3-5 people

< 1 minute? 1 person

Agenda

- Maximum Availability Architecture (MAA)
- Customer Challenges
- Overview of MAA Planned Maintenance Solutions
- Rolling Upgrade solutions with
  - Real Application Clusters
  - Data Guard
  - Streams
  - Transportable Technologies
- Customer Case Studies
  - Amadeus: Oracle9i to Oracle Database 10g Migration Optimizations
  - Thomson Legal & Regulatory: Oracle Database 10g Rolling Upgrade including migration to new servers & storage

Oracle's Integrated HA Solution Set



Maximum Availability Architecture

- Oracle Best Practices Blueprint for High Availability
  - Database, Application Server, Oracle Applications, Collaboration Suite and Enterprise Manager
- MAA home page on OTN

  http://www.oracle.com/technology/deploy/availability/htdocs/maa.htm

  Oracle Database High Availability Overview 10g Release 2 - Documentation

  Oracle Database High Availability Best Practices 10g Release 2 - Documentation
- Detailed Best Practice Papers for the subjects covered in this presentation will be published in the future on the MAA page on OTN (first url above)

Customer Challenges

- Smaller window for planned maintenance
- Patches, bug fixes or patchsets required for stability
- New features and capabilities required
- Migration to new storage or platform architecture
- Application changes during upgrade
- Real world evaluation phase is required
- Fallback is required

MAA Planned Maintenance Solutions

Activity	Oracle Solution	Downtime
Add and remove processors and nodes	Dynamic Resource Management	Zero
Grow and shrink memory	Automatic Shared Memory Management	Zero
•Add and remove disks •Migrate to new storage •Rebalance IO •Move data files	Automatic Storage Management (ASM)	Zero

MAA Planned Maintenance Solutions

Activity	Oracle Solution	Downtime
•System and hardware upgrades •Operating system upgrades •Qualified one-off patches •CRS upgrades	Real Application Clusters (RAC)	Zero for database Brownout for sessions
•System, HW and cluster upgrades •Patchset or database upgrade •ASM upgrades •HP PA RISC to Itanium	Data Guard	< 2 mins

MAA Planned Maintenance Solutions

Activity	Oracle Solution	Downtime
•Database upgrades •Cross platform migration •Application upgrades	Oracle Streams	< 1 minute
•Database upgrades •Same endianness and cross endianness platform migration	Transportable Technologies	dependent on data file conversion time

MAA Planned Maintenance Solutions

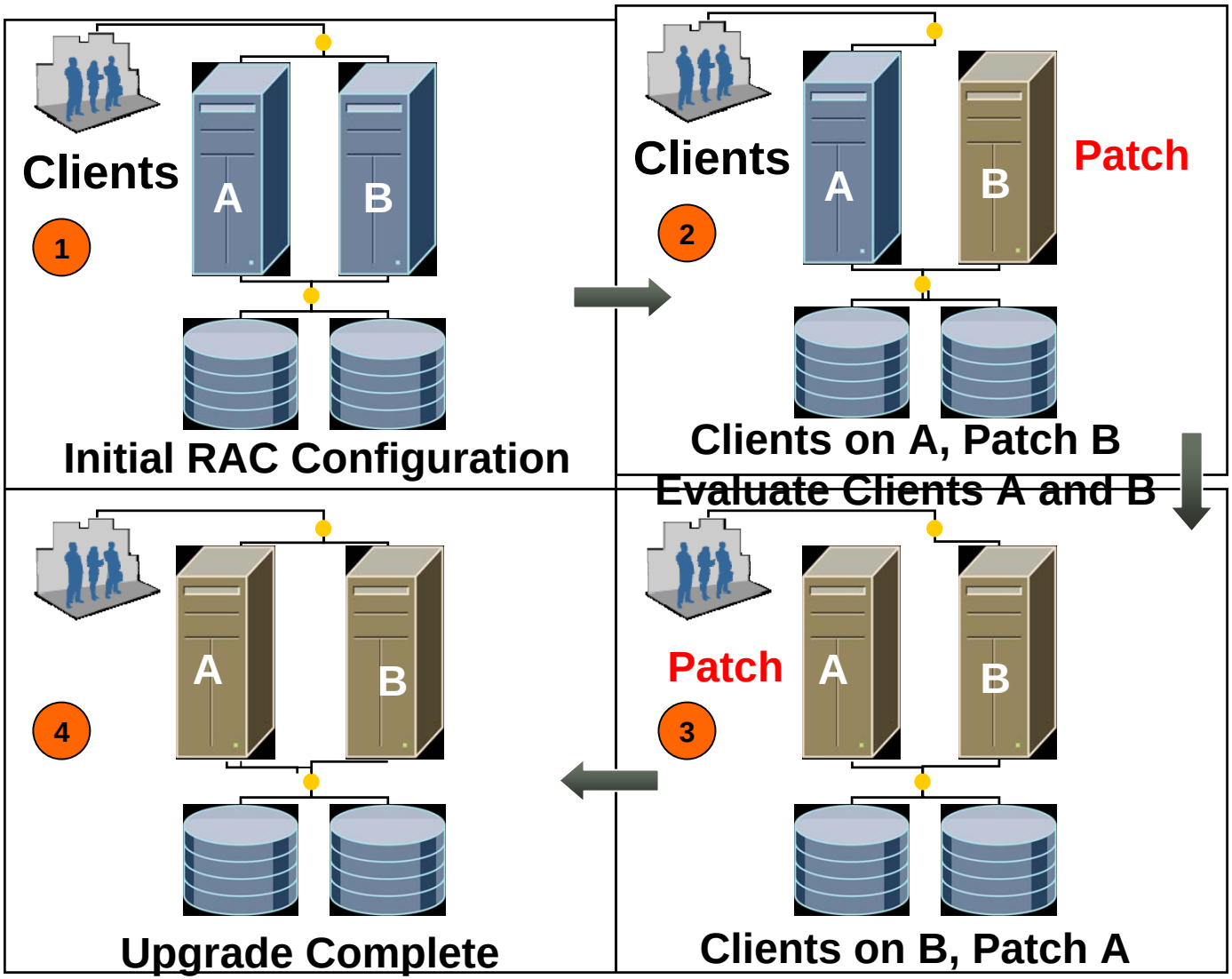
Activity	Oracle Solution	Downtime
•Reorganize and redefine tables and its attributes •Add, delete or change column names, types and sizes •Create, rebuild, coalesce, move and analyze indexes •Convert LONG and LONG RAW columns to LOB •Change table without recompilation •Reorganize single partition, advanced queue and clustered tables, table containing ADT	Online Redefinition	secs

RAC Rolling Upgrade

Preferred solution for

- System and hardware upgrades
- Operating system upgrades
- Qualified one-off patches
- CRS upgrades

Rolling Patch Upgrade using RAC



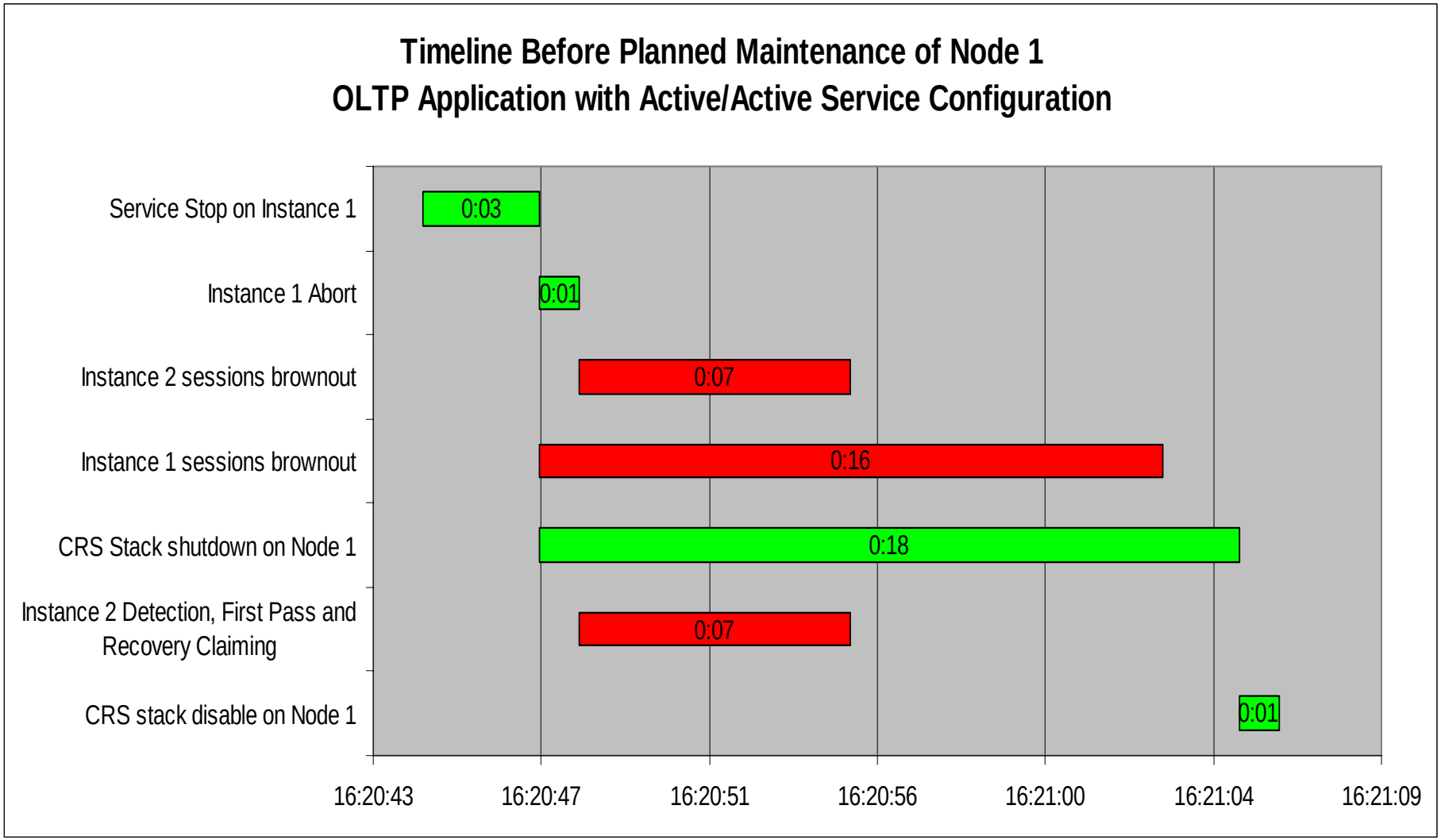
Rolling upgrade with RAC

- Expected downtime
  - Zero Database Downtime
  - Brownout of < 20 seconds for affected sessions
  - Brownout of < 10 seconds for other sessions
  - Brownouts of minutes without best practices
- Best Practice Configuration
  - Configure for services, fast application notification, fast connection failover, connection load balancing
  - Tune _fast_start_instance_recovery_target to bound instance recovery
  - Configure for listener throttling with 10.2.0.3 for environments that experience logon storms

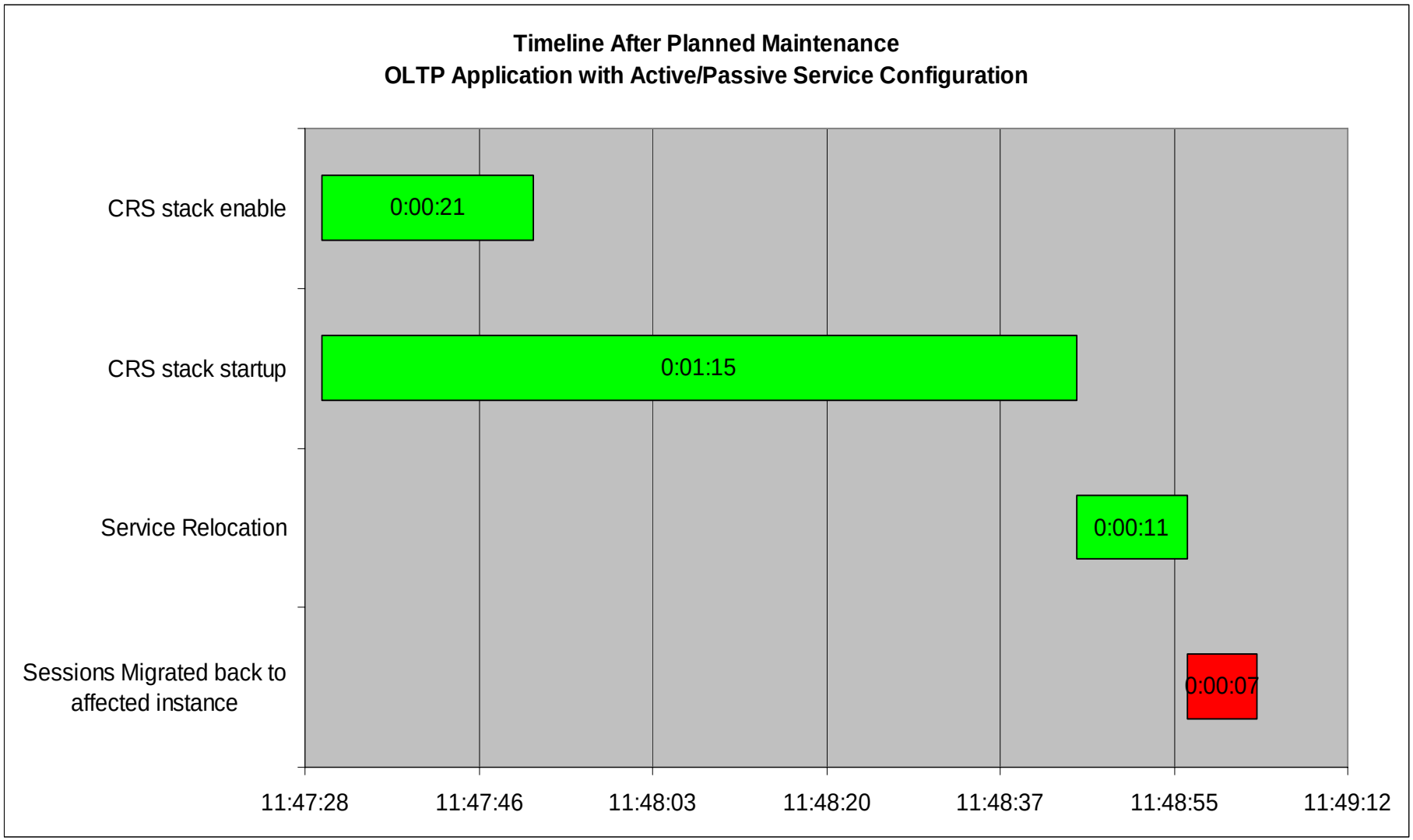
Rolling upgrade with RAC - continued

- Best Practice Process – performed one node at a time
  - Phase 1:Qualification for RAC rolling upgrade
  - Phase 2 Relocate services and sessions (*srvctl stop* or *srvctl relocate*)
  - Phase 3: Shutdown abort or immediate the targeted instance/node for upgrade
    - Shutdown and then disable CRS stack with *crsctl stop crs* (< 1 minute)
  - Phase 4: Perform upgrade activity
    - hardware/OS maintenance, qualified one-off Oracle patch, or CRS upgrade
  - Phase 5: Switchback to normal mode
    - Startup the CRS stack with *crsctl start crs* (< 3 minutes)
    - For active/active environments, services are enabled and sessions relocated automatically
  - Phase 6: Evaluate performance and repeat until all nodes/instances are upgraded
- Fallback = RAC switchback to instances/nodes with previous stack

Rolling upgrade with RAC



Switchback to Active/Active



Rolling Upgrade and Migration with Data Guard (Physical Standby)

Preferred Solution for

- System, HW and cluster upgrades that cannot leverage RAC rolling upgrade
- ASM upgrades
- Fast migration path to RAC and ASM
- "selected" platform migration such as HP PA RISC to Itanium, Supported Linux Distributions with same processor architecture, AMD64 to Intel64 on same OS

Rolling upgrade using physical standby

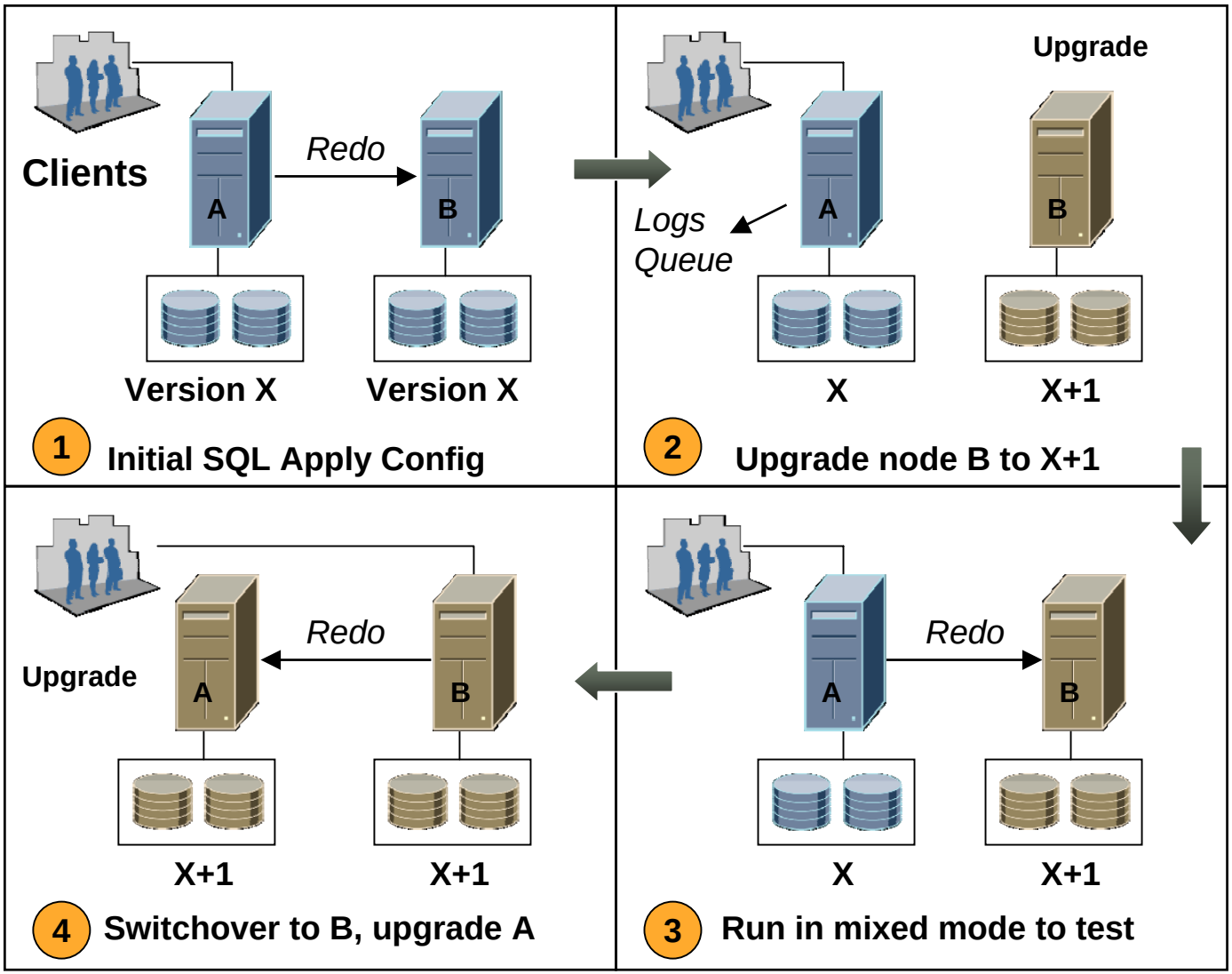
- Expected Downtime < 2 minutes
- Best Practice Process
  - Only relevant for operating system, cluster, hardware upgrades, or migrating to ASM or RAC or migration from HP PA RISC to Itanium
  - Phase 1: Confirm Oracle Software and Hardware Compatibility
  - Phase 2: Upgrade physical standby environment
  - Phase 3: Evaluate behavior of physical standby and environment
    - Activate and Evaluate, Flashback and revert to physical standby
  - Phase 4: Ensure physical standby is caught up
  - Phase 5: Data Guard switchover with automatic client failover
    - Prerequisites:
      - Restart physical standby if it was previously opened read only
      - Use real time apply with no delay
      - Setup automatic client failover with services, fast application notifications, client connection timeouts and retries
  - Fallback: Data Guard switchover to previous configuration

Database Upgrade with Data Guard (Logical Standby)

Preferred Solution for

- Patchset or database upgrade
- ASM upgrades

SQL Apply – Rolling Database Upgrades



Patch Set Upgrades

Major Release Upgrades

Cluster Software & Hardware Upgrades

Rolling upgrade with logical standby

- Expected Downtime < 2 minutes
- Refer to Thomson Legal & Regulatory Case Study
- Best Practice Process
  - Only relevant for 10.1.0.3 or higher
  - Phase 1: Confirm Object and Data Type support for use SQL Apply
  - Phase 2: Convert physical, upgrade logical and evaluate new release
  - Phase 3: Perform switchover to new release and evaluate
    - Prerequisites
      - Use real time apply and no gaps
      - Setup automatic client failover with enabling services automatically and client connection timeouts and retries
      - Disable threads, shutdown abort all other RAC instances, do switchover
  - For disaster protection until standby is upgraded, create a temporarily archive repository to ship redo to standby
  - Upgrade standby database and switchback if required
  - Fallback: shutdown and downgrade database

Tip – How to use Logical Standby Rolling Upgrades with a Physical Standby Database

Initial Primary	Initial Standby
Check Prerequisites, Enable Flashback Database, Supplemental Logging	
Create standby controlfiles Create guaranteed restore point	Convert Physical to Logical Upgrade Logical and Evaluate
Switchover: New Logical Standby	Switchover: New Primary
Flashback, Convert to Physical Standby and Restart recovery	
Upgrade and then Switchback if required	

Database Upgrade or Platform Migration with Streams

Solution with the lowest downtime

- Database upgrade
- Platform migration to different hardware or operating system
- Application upgrades

Database Upgrade and Platform Migration with Streams

- Expected Downtime < 1 minute
- Best Practice Process
  - Phase 1: Create shadow tables for data type conflicts
  - Phase 2: Create replica database using new release or platform
    - If same platform,
      - use physical standby and convert to Streams
      - use downstream capture to eliminate overhead
  - Phase 3: Evaluate and Catch Up of the replica
  - Phase 4: Streams switchover by enabling services
  - Phase 5: Replicate changes back to old primary until evaluation phase is completed.
  - Fallback: Apply all changes and utilize initial primary

Database Upgrade or Platform Migration with Transportable Technologies

Option for

- Platform migration to different hardware or operating system
- Database upgrade

Platform Migration with Transportable Technologies

- Expected Downtime dependent on data file conversion time + file transfer time
- If migrating to same endian format and Oracle 10g Release 2
  - Use Transportable Database
- If migrating to different endian format
  - Use Transportable Tablespace
- Best Practices
  - Avoid network transfer time by using shared network storage to rezone the volumes from source to target for some platforms
  - If migrating a large database to new platform (but same OS & hardware architecture) at another data center, Data Guard can be leveraged to eliminate WAN data file transfer during outage
  - Reduce conversion time by running data file converts in parallel and on system with ample I/O bandwidth
  - Use Data Pump network transfer to reduce steps and time for transportable tablespace only

Platform Migration to Same Endian Format Platform

- Best Practice Process
  - Phase 1: Perform Transportable Database checks
    - DBMS_TDB.CHECK_DB to verify database can be transported
    - DBMS_TDB.CHECK_EXTERNAL to identify external objects
  - Phase 2: Run RMAN CONVERT DATABASE
    - Creates transport script, convert script, and PFILE
  - Phase 3: Move datafiles, external files, and scripts to target system
    - Move datafiles to target system
      - if possible re-zone the volumes to the target system
    - For fallback, create a separate copy or create a backup
  - Phase 4: Finish migration on target system
    - Run convert script on target system to convert datafiles (configure RMAN parallelism to speed up conversion)
    - Run transport script to complete migration
  - Phase 5: Validate database

Platform Migration to Different Endian Format Platform

- Best Practice Process
  - Phase 1: Create target database and load necessary metadata
  - Phase 2: Prepare source database for transport
    - Export full metadata from source database (prevent further DDL)
    - Run DBMS_TTS.TRANSPORT_SET_CHECK and fix violations
  - Phase 3: Transport tablespaces
    - Perform Data Pump transportable export from source database, move files to target system, and CONVERT to new platform (simultaneous)
    - Perform Data Pump transportable import into target database
  - Phase 4: Finish migration
    - Import full metadata into target database
    - Compile invalid PL/SQL modules
  - Phase 5: Validate target database

Database Upgrade with Transportable Tablespace

- Expected Downtime < 30 minutes
- Refer to Amadeus Case Study for best practice process upgrading from Oracle9i to Oracle Database 10g
- When to consider using TTS
  - Metadata export/import + full system import time is significantly faster than normal upgrade
  - Application objects in SYSTEM or owned by SYSTEM or SYS makes this more complicated
- Best Practices
  - Use physical standby to eliminate data file copy and retain fallback
  - Use different system resource to reduce source database impact
  - Use Data Pump network mode to eliminate need for dump file

Amadeus Case Study

Oracle9i to Oracle Database 10g - Migration Optimization for Minimal Downtime

Vitor Pacheco
Database Manager
Amadeus

Thomson Case Study

Oracle Upgrade, Database Changes, Server & Storage Migration – Using Data Guard Rolling Upgrades

Dan Dressel
Database Architect
Thomson Legal & Regulatory

Strategic MAA Partners

- Servers
  - HP, Sun, Dell
- Network
  - F5, Qlogic, Foundry Networks
- Storage
  - Apple, Engenio, NetApp, HP, EMC

For More Information

http://search.oracle.com

Maximum Availability Architecture 

or

http://www.oracle.com/technology/deploy/availability/htdocs/maa.htm

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