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Exadata MAA Best Practices Series
Session 12: Exadata Patching & Upgrades

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Exadata and MAA Best Practices

Exadata MAA Best Practices Series

1. E-Business Suite on Exadata
2. Siebel on Exadata
3. PeopleSoft on Exadata
4. Exadata and OLTP Applications
5. Using Resource Manager on Exadata
6. Migrating to Exadata
7. Using DBFS on Exadata
8. Exadata Monitoring
9. Exadata Backup & Recovery
10. Exadata MAA
11. Troubleshooting Exadata
12. Exadata Patching & Upgrades
13. Exadata Health Check

Assumptions and Terminology

- MAA – Oracle Maximum Availability Architecture
- GI – Grid Infrastructure
- RAC – Oracle Real Application Clusters
- ASM – Oracle Automatic Storage Management
- PSU – Patch set update
- CPU – Critical patch update
- BP – Bundle Patch
- MOS – My Oracle Support
- ULN – Unbreakable Linux Network
- OEL – Oracle Enterprise Linux
- IB – InfiniBand
- OFED – OpenFabrics Enterprise Distribution

Key Points

Exadata Patching & Upgrades

1. Exadata has three layers that require software maintenance

2. Develop plan to patch routinely

3. Evaluate patches in a proper test environment

Key Point #1

Exadata has three layers that require software maintenance

Business value

All necessary software to patch Exadata comes from Oracle

Exadata Architecture
Review

Database Grid

Database Servers
- Firmware / OS
- Oracle GI / RDBMS

InfiniBand Network

Switches

Storage Grid

Exadata Storage Servers

Other Components

Ethernet switch
Power distribution
KVM

Exadata Storage Server Patching

- Single patch download
  - Install nothing but this patch
  - README and Support Note
- Convenience Pack for database servers
- patchmgr installed
  - Rolling
  - Non-rolling

Exadata Database Server Patching

Oracle Database Server (RDBMS) and Grid Infrastructure

- Bundle patch (e.g. 11.2.0.1 DB_BP8, GI_BP4)
  - Installs on top of base release + patch set using OPatch
  - Cumulative
  - Includes recent PSU / CPU
  - OPatch installed
- Other patches
  - Recommended patches in 888828.1 (EBS R12 bundle patch)
  - One-offs allowed

Exadata Database Server Patching

Operating System (OEL) and Firmware

- Customer maintained to allow flexibility
  - Any software from any source, however
    - DB software requirements must be met (888828.1)
    - Only shipped images/versions tested
- Convenience Pack (CP)
  - OFED, Firmware, OSW, configuration
  - Requires original kernel version for some updates (OFED)

Exadata Database Server Patching

Operating System (OEL) and Firmware Recommendation

- Keep in step with CP
- Match InfiniBand OFED and HCA
- Do not automatically update database server OS kernel
  - Will break OFED compatibility
  - OFED 1.4.2-14 example kernel-**2.6.18-128.7.1.0.1**.el5.x86_64 requires ofa-**2.6.18-128.7.1.0.1**.el5-1.4.2-14.x86_64

InfiniBand Switch Patching

- Supplied via My Oracle Support
  - Only update via this patch
- Currently no dependency on other components
  - 888828.1 and patch READMEs will indicate dependencies

Key Point #2

Develop a plan to patch routinely

Business value

You receive the benefit of fixes provided to all Exadata customers

Deciding to Patch

- Current version
  - Note 888828.1 (11.2), Note 835032.1 (11.1)
- Patch release frequency (subject to change without notice)
  - Storage – every 3 months
  - Database BP
    - 11.2.0.2 – monthly
    - 11.2.0.1 – every 2 months
  - InfiniBand switch – yearly

Deciding to Patch

- Planning
  - README**s** document fixed issues
  - Support Note 888828.1 – Exadata Critical Issues

Stage	General Recommendation
Production and late pre-production	Every patch not mandatory Wait for field experience to grow
Early pre-production or evaluation	Keep current with latest release

Key Point #3

Evaluate patches in a proper test environment

Business value

Proper patch testing ensures predictable installation and stability

Patch Installation and Testing Guidelines

1. Review patch documentation
   - README and referenced Support Notes
2. Validate in test environment
   - Verify patch installation (HealthCheck Note 1070954.1)
   - Verify functionality and performance
   - Automate
   - Define and test fallback plans
3. Apply in production environment
   - Data Guard Standby-First Patch Apply
   - Monitor for regressions

Support Note 1262380.1

README Gems

“This patch is RAC Rolling Installable“
“This patch is Data Guard Standby-First Installable“
“This will replace the dostep.sh file with a new file containing work around for the two bugs”
“9654983 DATABASE PSU 11.2.0.1.2 (INCLUDES CPUJUL2010) “
“Do not edit any log file or open them in writable mode.”
“This will cause the patch application to fail and corrupt the Cell.”

Test Environment

- Ideal characteristics
  - Equivalent to production environment
    - Primary database
    - Standby database
    - Middle tier
  - Full data set w/ identical schema stats
  - Workload framework to mimic production

Test Environment

- Not ideal, but still useful

Test Env	Comments
Shared DBM	Shared test resource for multiple production
Smaller DBM	No production scale performance test
Older DBM	No production scale performance test No firmware patching test
Non-DBM	Allows only database server patch installation test No Exadata Storage Server patch test

Patch Installation Methods

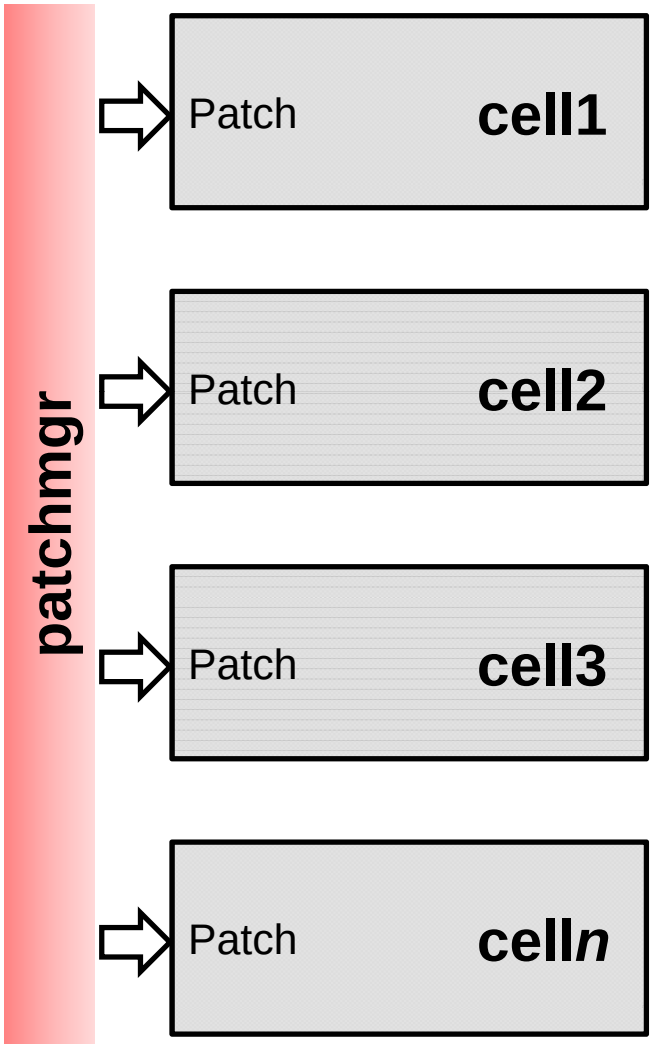
- Exadata Storage Server software
  - Rolling patch apply
  - Non-rolling patch apply
- Database Server Oracle software
  - RAC Rolling Installable
  - OPatch Automation
  - Enterprise Manager Installable
  - Data Guard Standby-First Installable

Cell Patch Installation

- patchmgr installed (up to 2 hours per cell)

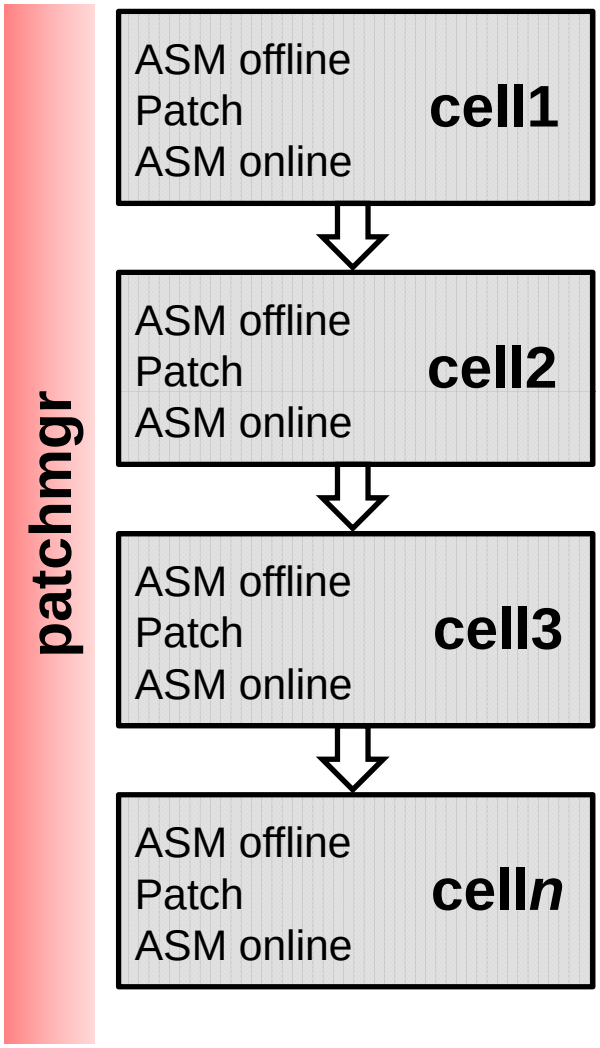
Method	Downtime	Patching time
Rolling	None	Up to 2 hours per cell
Non-Rolling	Up to 2 hours total	Up to 2 hours total

Non-Rolling Patch Apply



- Benefits
  - Least total patching time
  - No risk to single disk failure
- Consider
  - Database outage
  - Failed patch install on multiple cells

Rolling Patch Apply

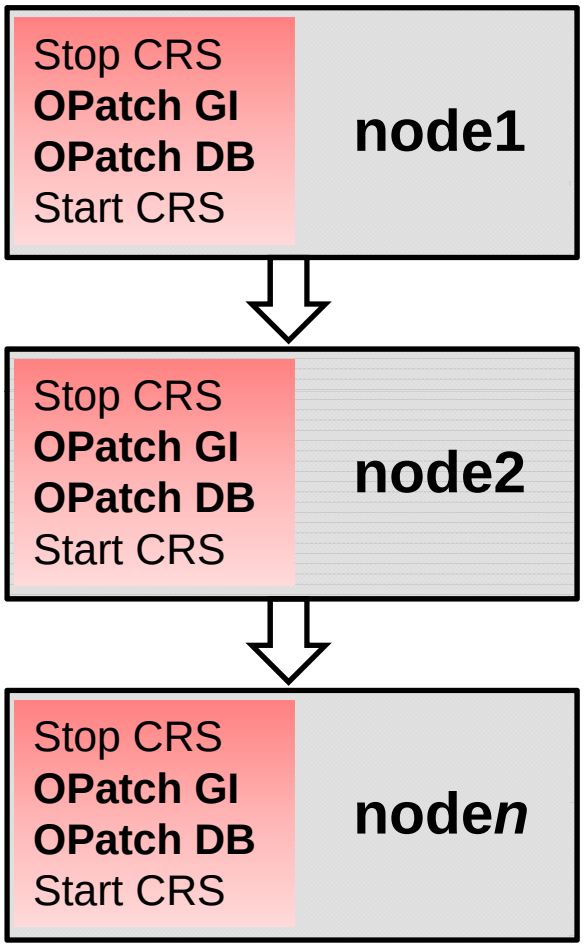


- Benefits
  - No database downtime
  - No extra free space required
- Consider
  - ASM high redundancy to reduce risk of disk failure
  - Up to 2 hours per cell
  - Requires
    - 11.2.0.2 or
    - 11.2.0.1 DB_BP6 + GI_BP4

Database Bundle Patch Installation

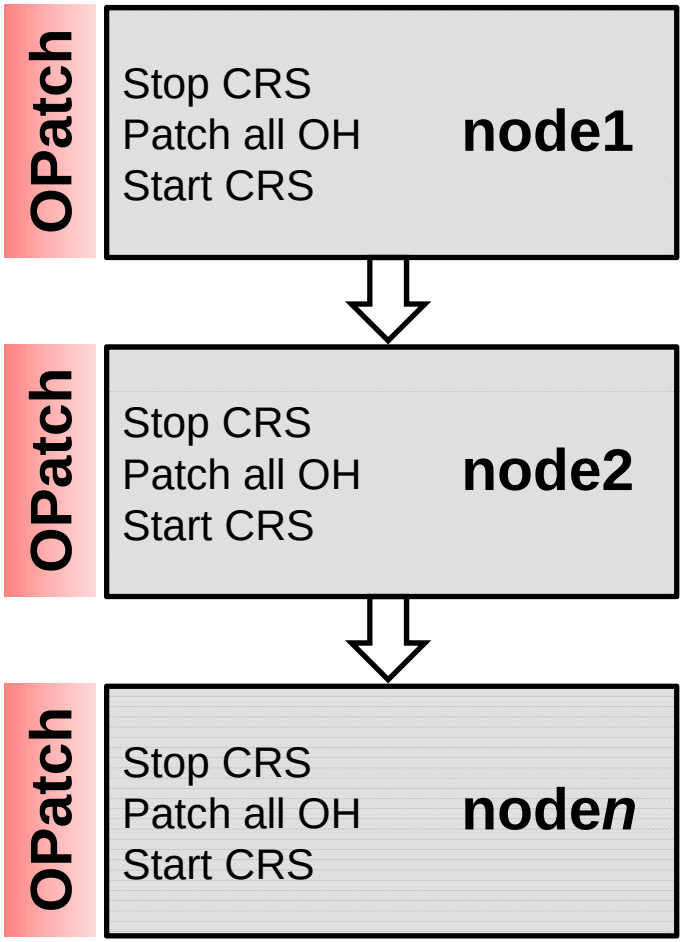
- OPatch installed
- Reduce downtime and risk
  - RAC Rolling
  - OPatch automation
  - Enterprise Manager
  - Data Guard Standby-First
- Automatic Workload Management
  - Configure services and connection failover

RAC Rolling Installable



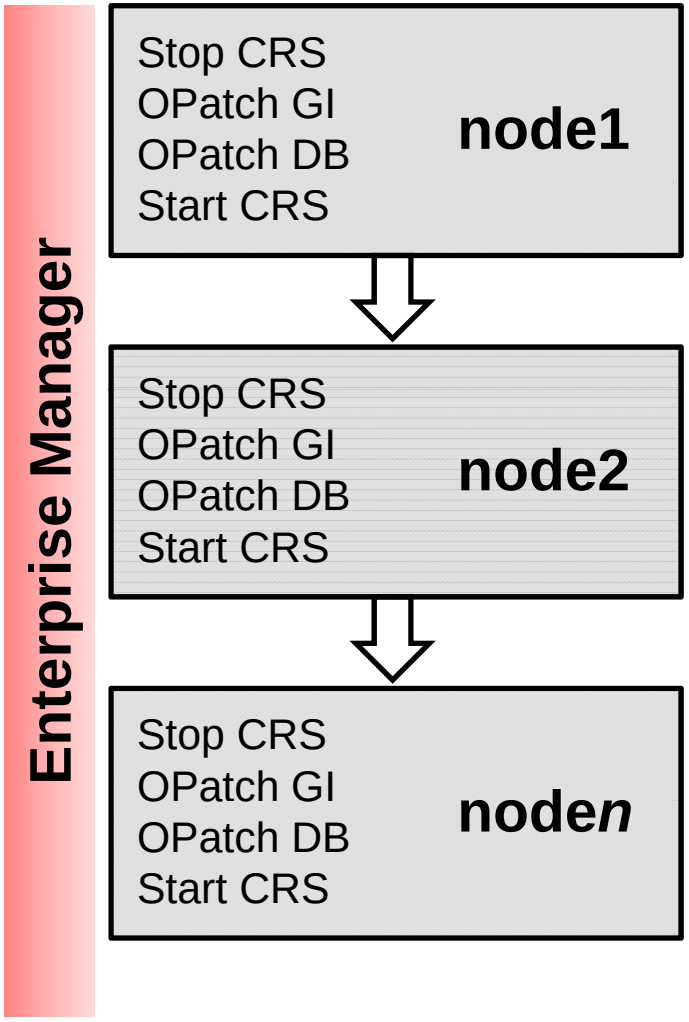
- Benefits
  - No database-wide downtime
- Consider
  - All 11.2.0.2 BPs
  - 11.2.0.1
    - Starting with DB_BP7, on top of DB_BP5 or later

OPatch Automation



- Benefits
  - No database-wide downtime
  - Single command per node
- Consider
  - 11.2.0.2 BP2 or later

Enterprise Manager Installable



- Benefits
  - No database-wide downtime
  - EM managed using Provisioning Pack
- Consider
  - Support Note 1265998.1

Data Guard Standby-First Installable

- Data Guard Standby-First Installable
  - Apply BP to standby and test before applying to primary
  - Support Note 1265700.1
- Snapshot standby and Real Application Testing
  - Evaluate patch on read write database and simulate production workload

Patch Installation

Recommendations

- Run Exadata Healthcheck after patching.
- Patch during low workload.
- Use ASM high redundancy.
- Configure Automatic Workload Management

Key Points and Business Takeaways

Exadata Patching & Upgrades

Key Points

1. Exadata has three layers that require software maintenance

2. Develop plan to patch routinely

3. Evaluate patches in a proper test environment

Exadata Patching & Upgrades

Business Takeaways

- #1: All necessary software to patch Exadata comes from Oracle
- #2: You receive the benefit of fixes provided to all Exadata customers
- #3: Proper patch testing ensures predictable installation and stability

Exadata Patching & Upgrades

Resources and References

- Latest Exadata software (Note 888828.1)
- Exadata Testing and Patching Practices (Note 1262380.1)
- Exadata Healthcheck (Note 1070954.1)
- Data Guard Standby-First Patch Apply (Note 1265700.1)
- Enterprise Manager Patch Apply (Note 1265998.1)
- Patch READMEs

Best Practices

Additional Resources sponsored by MAA and X-Team

- MAA and Exadata OTN website contains best practices and different architectural solutions
  - MAA OTN website: http://www.oracle.com/technetwork/database/features/availability/maa-090890.html
  - Sun Oracle Database Machine and Exadata OTN website http://www.oracle.com/technetwork/database/exadata/index-089737.html
- Openworld presentations
  - **http://openworld.vportal.net**

Sponsors

Exadata MAA Team and X Team

- Operational and Configuration best practices
  - Optimized and integrated for Exadata
  - Generic practices for other platforms
  - Examples: Migration, Backup/Recovery, Monitoring, Troubleshooting, Patching, MAA, Consolidation, Active Data Guard, Cloning/Reporting, Application Failover
- Applications MAA and Scalability
  - Optimized and integrated for Exadata and Exalogic
  - Examples: E-Business Suite, Siebel, Peoplesoft, Fusion Middleware
- Exadata Strategic Reference Program

Hardware and Software
Engineered to Work Together