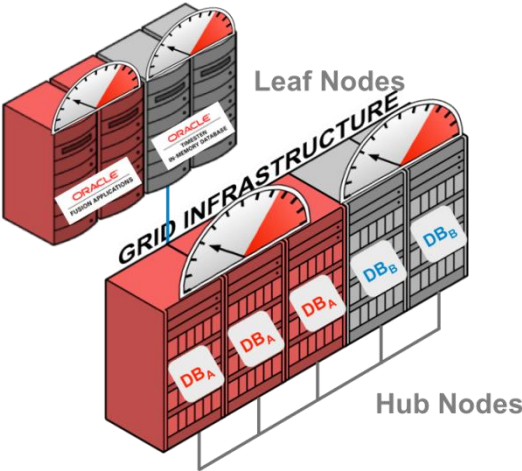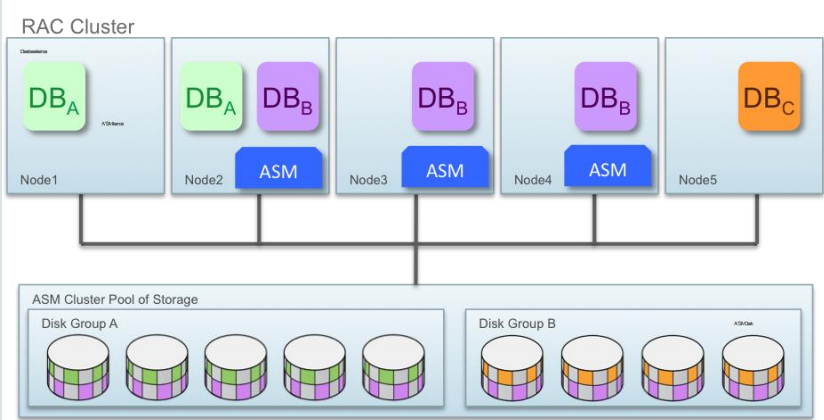# What's Next with Oracle RAC?

Sandesh Rao
Senior Director, Oracle Real Application Clusters (RAC)
Database Development
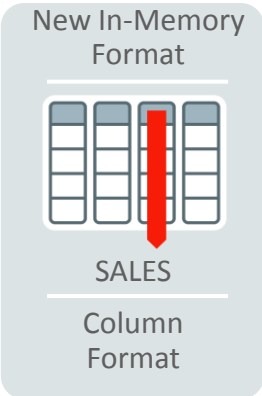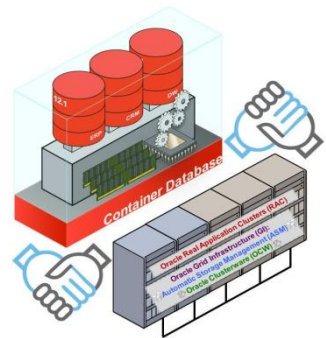
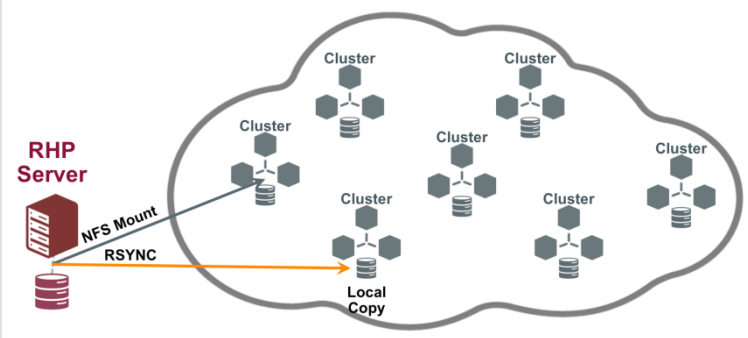# Oracle RAC 12*c* Rel. 1 Features – The Standard Going Forward

Flex Cluster

Flex ASM

Full Oracle Multitenant & In-Memory Support
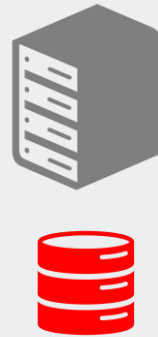
Rapid Home Provisioning (RHP)

http://www.slideshare.net/MarkusMichalewicz/oracle-database-inmemory-meets-oracle-rac

Gold Images and their working copies

Working copies maintain lineage with gold image

RHP Server

Apps

- WLS 12.2.1
- WLS 12.1.3
- CRM 8.1.1

Generic DB	SAP DB	Generic DB
11.2.0.4 PSU1	11.2.0.4 SAP-1	12.1.0.2
11.2.0.4 PSU2	11.2.0.4 SAP-2	12.1.0.2 PSU1
11.2.0.4 PSU3		12.1.0.2 PSU2

RHP Targets

Provision New Database

1. Working copy is created
2. Database files are instantiated

12102 PSU1 WCPY

Provision New Home

1. Working copy is created

12102 PSU2 WCPY

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Expanded Oracle Stack Coverage by EXAchk/ORAchk

- **Engineered Systems**
  - Oracle Exadata Database Machine
  - Oracle SuperCluster
  - Oracle Private Cloud Appliance
  - Oracle Database Appliance
  - Oracle Big Data Appliance
  - Oracle Exalogic Elastic Cloud
  - Oracle Exalytics In-Memory Machine
  - Oracle Zero Data Loss Recovery Appliance
  - Oracle ZFS Storage Appliance
- **ASR**
- **Systems**
  - Oracle Solaris
  - Solaris Cluster
  - Oracle Virtual Networking(OVN)

- **Oracle Database**
  - Standalone Database
  - Grid Infrastructure & RAC
  - Maximum Availability Architecture (MAA) Scorecard
  - Upgrade Readiness Validation
  - Golden Gate
- **Enterprise Manager Cloud Control**
  - Repository
  - Agent
  - OMS
- **Middleware**
  - Application Continuity
  - Oracle Identify and Access Management Suite (Oracle IAM)

- **E-Business Suite**
  - Oracle Payables
  - Oracle Workflow
  - Oracle Purchasing
  - Oracle Order Management
  - Oracle Process Manufacturing
  - Oracle Receivables
  - Oracle Fixed Assets
  - Oracle HCM
  - Oracle CRM
  - Oracle Project Billing
- **Siebel**
  - Database best practices
- **PeopleSoft**
  - Database best practices
- **SAP**
  - EXAdata best practices

Oracle Confidential –

Oracle 12c ORAchk/Exachk

Baseline and Maintain Entire Oracle Stack

- **Proactively scan** for the most impactful known problems

- Receive built-in email notifications and diff reporting via new Daemon Mode

- Investigate and analyzes known issues

- See your system health risks in reports

- Drill down into specific problems and understand their resolutions

- Use **ORAchk Collection Manager** dashboard for managing multiple systems

Oracle Exadata Assessment Report

System Health Score is 89 out of 100 (detail)

Cluster Summary

Cluster Name	cluster-clu1
OS/Kernel Version	LINUX X86-64 OELRHEL 5 2.6.39-400.124.1.el5uek
CRS Home - Version	/u01/app/11.2.0.4/grid - 11.2.0.4.1
DB Home - Version - Names	/u01/app/oracle/product/11.2.0.4/dbhome_1 - 11.2.0.4.1 - dbm
EM Agent Home	/u01/app/oracle/em/agent_haem/core/12.1.0.5.0
Exadata Version	11.2.3.3.0
Number of nodes	9
Database Servers	2
Storage Servers	3
IB Switches	4
exachk Version	12.1.0.2.6(BETA)_20160125
Collection	exachk_randomadm07_dbm_012516_141503.zip
Duration	10 mins, 49 seconds
Executed by	root
Collection Date	25-Jan-2016 14:15:39

Note! This version of exachk is considered valid for 120 days from today or until a new version is available

NOTE : exachk is only one part of the MAA Best Practices recommendation methodology. My Oracle Support "Oracle Exadata Best Practices (Doc ID757552.1)" should be reviewed thoroughly as it is the driver for exachk and contains additional operational and diagnostic guidance that is not programmed within exachk.

WARNING! The data collection activity appears to be incomplete for this exachk run. Please review the "Killed Processes" and / or "Skipped Checks" section and refer to "Appendix A - Troubleshooting Scenarios" of the "Exachk User Guide" for corrective actions.

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View OraChk/EXAchk Report

- Table of content

- Controls for report features
  - Checks which passed are not shown by default
  - Quickly show or hide checks based on their status
  - Show or hide major sections of the report
  - Collapse or expand check findings
  - Show check Ids
  - Remove the findings from the report – This doesn't change the report but optionally hides findings on a check by check basis
  - Display a printable view

Table of Contents

Report Feature

- ☐ Show Failed checks only

- Show checks with the following status:
  ☑ Fail ☑ Warning ☑ Info ☐ Pass

- Show details of the following regions:
  ☑ Maximum Availability Architecture (MAA) Scorecard
  ☑ Infrastructure Software and Configuration Summary
  ☑ Platinum Certification
  ☑ Findings needing further review
  ☑ Systemwide Automatic Service Request (ASR) healthcheck
  ☑ Skipped Checks
  ☑ Top 10 Time Consuming Checks

- Show details of the checks:
  ◯ Expand All ◉ Collapse All

- Show Check Ids

- Remove finding from report

- Printable View

View Orachk/EXAchk Findings

- Check status

- Type of Check

- Check Message

- Where the check was run

- Link to expand details

Database Server

Status	Type	Message	Status On	Details
FAIL	SQL Parameter Check	ASM parameter SGA_TARGET is NOT set according to recommended value.	All Instances	View
WARNING	Patch Check	Patch 16618055 not is applied on RDBMS_HOME	All Homes	View
WARNING	OS Check	Database parameter _enable_NUMA_support should be set to recommended value	All Database Servers	View
INFO	SQL Check	Direct NFS Client is NOT enabled	All Databases	View

Storage Server

Status	Type	Message	Status On	Details
FAIL	Storage Server Check	Active system values should match those defined in configuration file "cell.conf"	All Storage Servers	View

InfiniBand Switch

Status	Type	Message	Status On	Details
WARNING	Switch Check	Subnet manager daemon is not running	randomsw-iba0	View
WARNING	Switch Check	sm_priority is not set to recommended value	randomsw-ib01, randomsw-ibs0	View

Cluster Wide

Status	Type	Message	Status On	Details
FAIL	Cluster Wide Check	Firmware version does not match on all Infiniband switches	Cluster Wide	View
FAIL	Cluster Wide Check	Localtime configuration does not match on all Infiniband switches	Cluster Wide	View

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View Recommendations

- What to do to solve the problem

- Links to relevant Knowledge docs

- Where recommendation applies

- Where problem doesn't apply

- Example of data the recommendation is based on

Database Server

Status	Type	Message	Status On	Details
FAIL	SQL Parameter Check	ASM parameter SGA_TARGET is NOT set according to recommended value.	All Instances	View
WARNING	Patch Check	Patch 16618055 not is applied on RDBMS_HOME	All Homes	View
WARNING	OS Check	Database parameter _enable_NUMA_support should be set to recommended value	All Database Servers	Hide

Verify database parameter _enable_NUMA_support

Recommendation	NUMA enabled in the database on all Exadata 8 socket servers boosts overall application performance. NUMA enabled in the database on Exadata generation X5 2 socket servers boosts performance of memory scan intensive workloads, for example IMDB. As of Oracle RDBMS release 12.1.0.2.6 and above, the enabling of NUMA in the database is automatic so no action is necessary on any Exadata platform. For any Exadata platform using 12.1.0.5 or lower, please reference the recommended value. NUMA support in the database should always be off on Exadata OVM.
Needs attention on	randomadm07
Passed on	-

Status on randomadm07:
WARNING => Database parameter _enable_NUMA_support should be set to recommended value

DATA FROM RANDOMADM07 - DBM DATABASE - VERIFY DATABASE PARAMETER _ENABLE_NUMA_SUPPORT

_enable_NUMA_support = FALSE
isdefault = FALSE

| INFO | SQL Check | Direct NFS Client is NOT enabled | All Databases | View |

ORACLE®

Oracle 12c ORAchk – Collection Manager
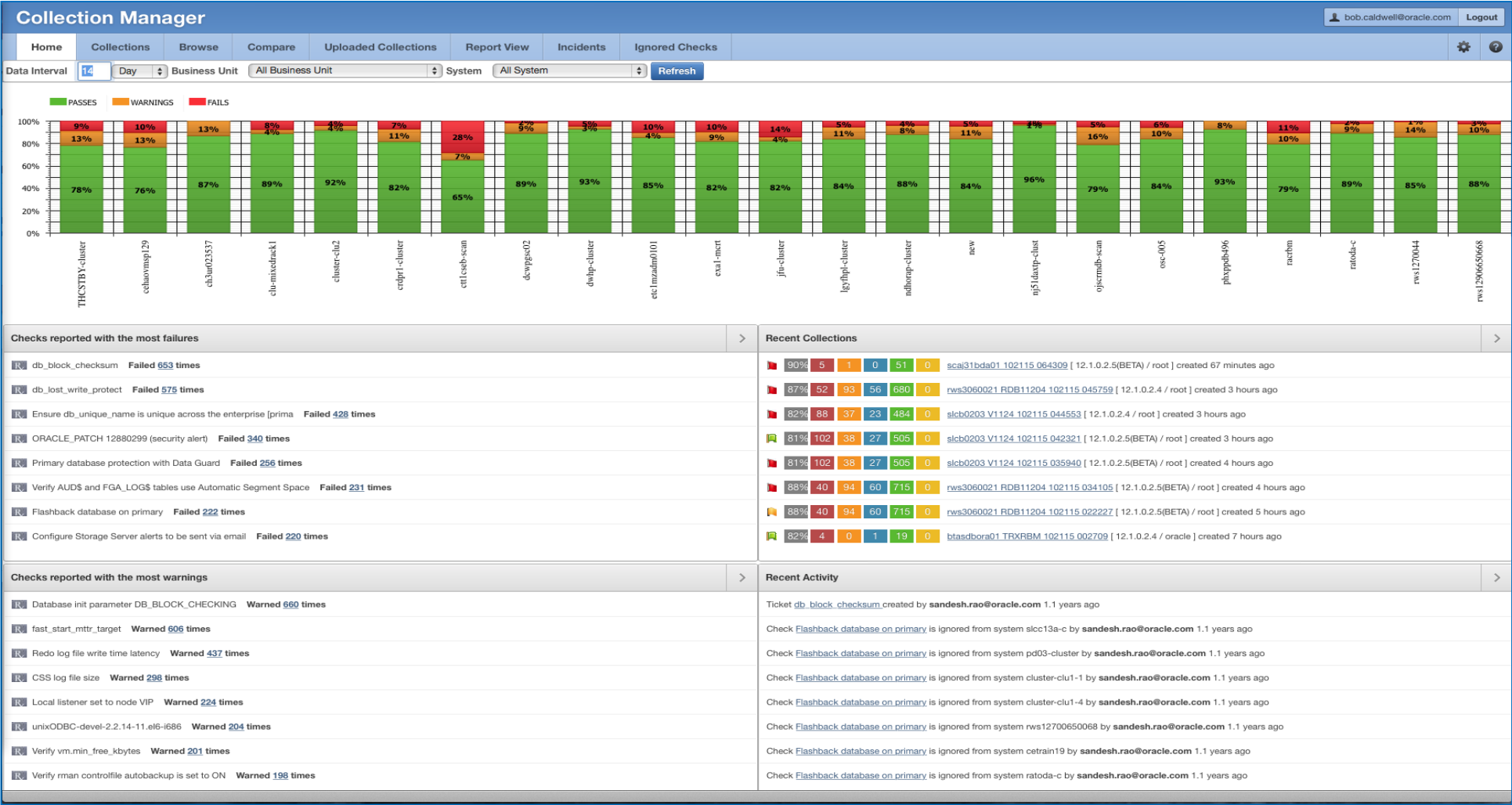
Main Collections Dashboard

Oracle 12c ORAchk – Collection Manager

Collections List View

Oracle 12c ORAchk – Collection Manager

Compare Baselines View

Oracle 12c ORAchk – Collection Manager

Administration Console

Cluster Health Monitor (CHM)
Diagnostic Metric View of Cluster and Databases

- Always on - Enabled by default
- Detailed OS Resource Metrics
- Node eviction analysis
- Local logging of process data
- User defined pinned processes

12c Grid Infrastructure
Management Repository
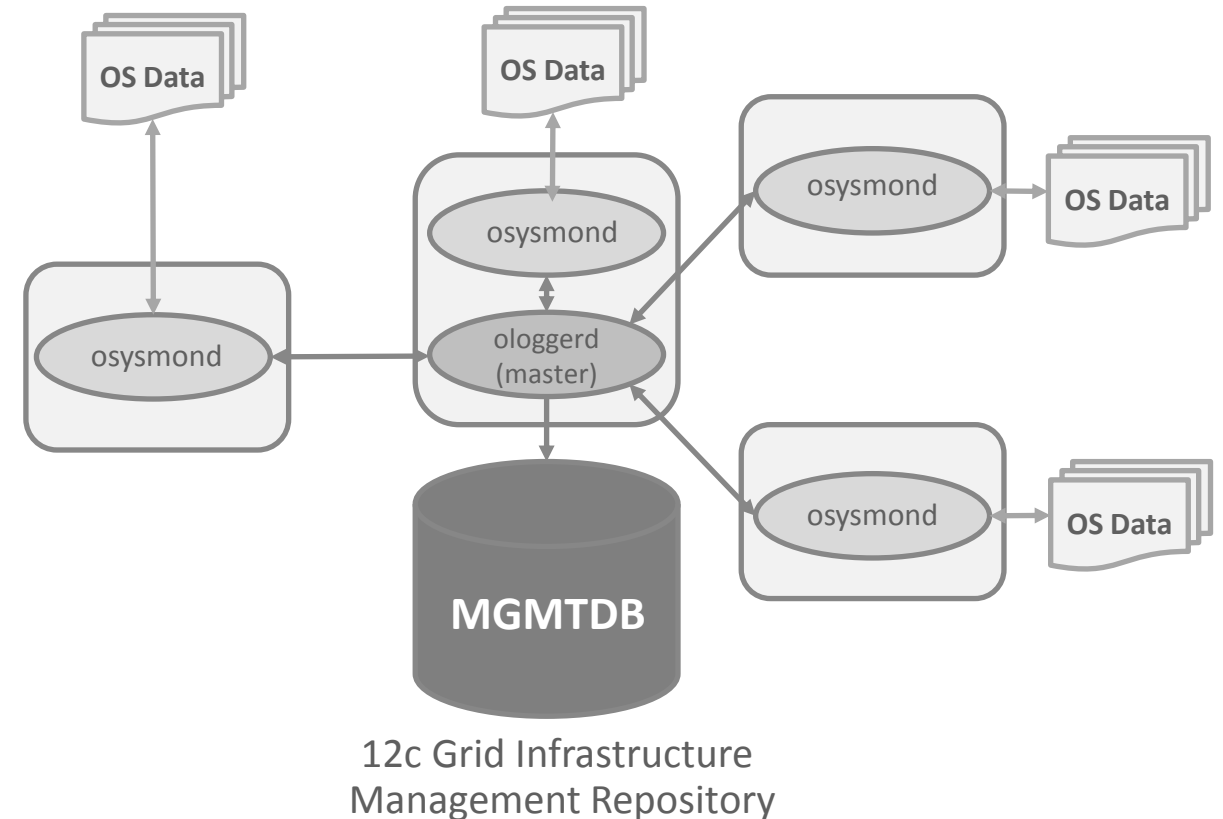
Oracle 12c Trace File Analyzer Collector

Speeds Issue Diagnosis and Resolution

- Always on – Enabled by default

- Improved comprehensive first failure diagnostics collection

- Efficient collection, packaging and transfer of data for Customers to Support

- Reduce round trips between Customers and Oracle

- Supports Database 10.2 and above

- Included in the 11.2.0.4 and 12.1.0.2 patchsets, PSUs and future versions

```
$ tfactl diagcollect

Collecting data for the last 4 hours for all components...
Collecting data for all nodes

Collection Id :
                 $ tfactl analyze –type generic –since 24h
Repository Locat INFO: analyzing all (Alert and Unix System Logs) logs for the last 1440 minutes...  Please wait...
2014/09/24 11:36 INFO: analyzing host: myHost1
2014/09/24 11:36
2014/09/24 11:36                        Report title: Analysis of Alert,System Logs
2014/09/24 11:36                   Report date range: last ~1 day(s)
2014/09/24 11:36          Report (default) time zone: PST - Pacific Standard Time
2014/09/24 11:36                Analysis started at: 25-Sep-2014 01:52:01 PM PDT
2014/09/24 11:36               Elapsed analysis time: 1 second(s).
2014/09/24 11:36                  Configuration file: /u01/tfa/myHost1/tfa_home/ext/tnt/conf/tnt.prop
2014/09/24 11:36                 Configuration group: all
2014/09/24 11:36                 Total message count:          4,539, from 30-Jul-2014 11:59:39 PM PDT to 25-Sep-2014 01:51:54 PM PDT
2014/09/24 11:36     Messages matching last ~1 day(s):          258, from 24-Sep-2014 01:54:53 PM PDT to 25-Sep-2014 01:51:54 PM PDT
2014/09/24 11:36          last ~1 day(s) generic count:          258, from 24-Sep-2014 01:54:53 PM PDT to 25-Sep-2014 01:51:54 PM PDT
2014/09/24 11:36  last ~1 day(s) ignored generic count:            0
2014/09/24 11:36   last ~1 day(s) unique generic count:           39
2014/09/24 11:36
2014/09/24 11:36 Message types for last ~1 day(s)
2014/09/24 11:37     Occurrences percent  server name         type
2014/09/24 11:37     ----------- ------- ------------------- -----
2014/09/24 11:37             258  100.0% myHost1             generic
2014/09/24 11:37     ----------- -------
2014/09/24 11:37             258  100.0%
2014/09/24 11:37
2014/09/24 11:37 Unique generic messages for last ~1 day(s)
2014/09/24 11:37     Occurrences percent  server name           generic
2014/09/24 11:37     ----------- ------- ------------------- -----
2014/09/24 11:37             216   83.7% myHost1             myHost1 init: Id "co" respawning too fast: disabled for 5 minutes
                           3    1.2% myHost1             myHost1 CLSD: The clock on host myHost1 has been updated by the Cluster Time
Synchronization Service to be synchronous with the mean cluster time.
                           3    1.2% myHost1             [OCTSSD(12358)]CRS-2408: The clock on host myHost1 has been updated by the Cluster
Time Synchronization Service to be synchronous with the mean cluster time.
                           1    0.4% myHost1             Thread 2 advanced to log sequence 232 (LGWR switch)
                                                          Current log# 4 seq# 232 mem# 0:
+DATA12102/CDB12102/ONLINELOG/group_4.270.854340625
                           1    0.4% myHost1             myHost1 kernel: cgrep[7720]: segfault at 0 ip 000000004e7365cc sp 00000000ff8bfe3c
error 4 in libc-2.5.so[4e6df000+152000]
                           1    0.4% myHost1             Thread 2 advanced to log sequence 235 (LGWR switch)
                                                          Current log# 3 seq# 235 mem# 0:
+DATA12102/CDB12102/ONLINELOG/group_3.269.854340625
                           1    0.4% myHost1             [CLSECHO(2332)]CRS-10001: 24-Sep-14 14:40 AFD-9204: false
                           1    0.4% myHost1             [CLSECHO(27286)]CRS-10001: 24-Sep-14 20:40 AFD-9204: false
                           1    0.4% myHost1             TABLE SYS.WRP$_REPORTS: ADDED INTERVAL PARTITION SYS_P816 (1729) VALUES LESS THAN
(TO_DATE(' 2014-09-26 01:00:00', 'SYYYY-MM-DD HH24:MI:SS', 'NLS_CALENDAR=GREGORIAN'))
                                                          TABLE SYS.WRP$_REPORTS_DETAILS: ADDED INTERVAL PARTITION SYS_P817 (1729) VALUES
LESS THAN (TO_DATE(' 2014-09-26 01:00:00', 'SYYYY-MM-DD HH24:MI:SS', 'NLS_CALENDAR=GREGORIAN'))
```

Oracle 12c Hang Manager

Autonomously preserve Your Database Performance

- Always on - Enabled by default

- Reliably detects database hangs and deadlocks

- Autonomously resolves them

- Supports QoS Performance Classes, Ranks and Policies to maintain SLAs

- Logs all detections and resolutions
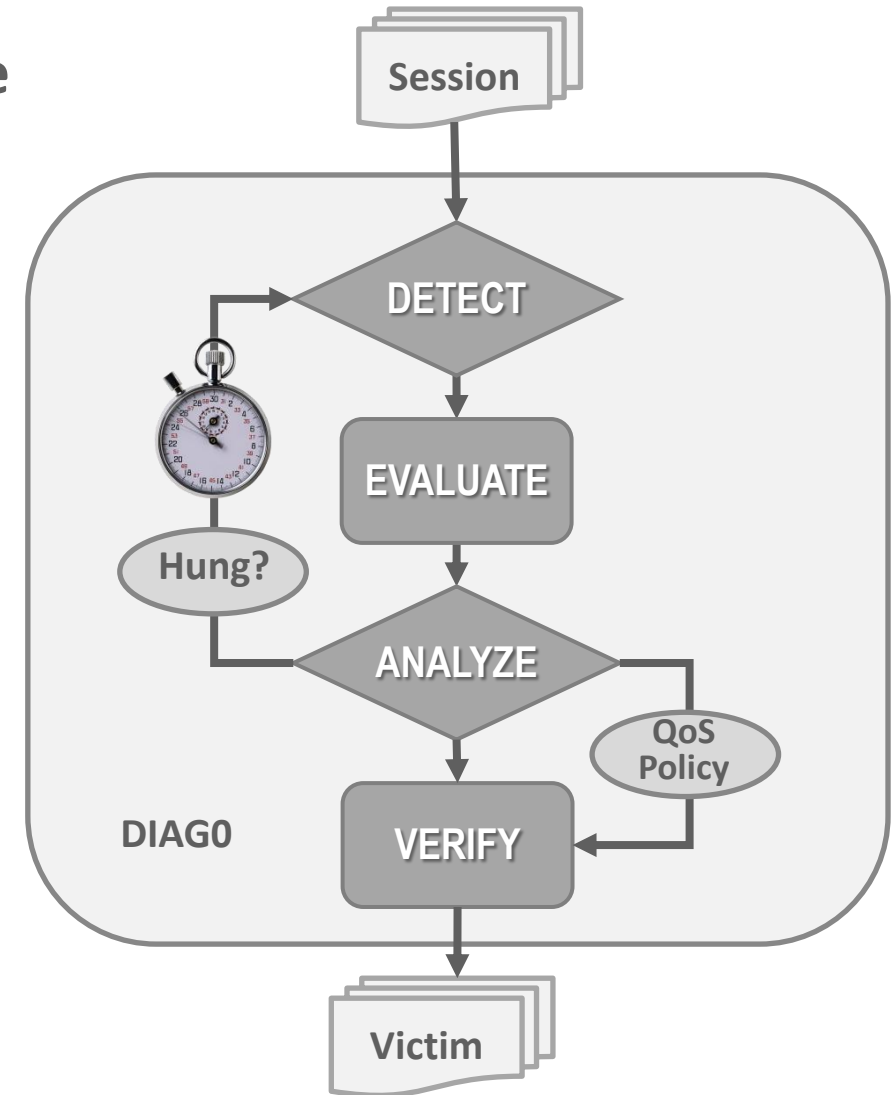
Oracle 12c Hang Manager
Full Resolution Dump Trace File and DB Alert Log Audit Reports

Dump file …/diag/rdbms/hm6/hm62/incident/incdir_5753/hm62_dia0_12656_i5753.trc
Oracle Database 12c Enterprise Edition Release 12.2.0.0.0 - 64bit Beta
With the Partitioning, Real Application Clusters, OLAP, Advanced Analytics
and Real Application Testing options
Build label: RDBMS_MAIN_LINUX.X64_151013
ORACLE_HOME: …/3775268204/oracle
System name: Linux
Node name: slc05kyr
Release: 2.6.39-400.211.1.el6uek.x86_64
Version: #1 SMP Fri Nov 15 13:39:16 PST 2013
Machine: x86_64
VM name: Xen Version: 3.4 (PVM)
Instance name: hm62
Redo thread mounted by this instance: 2
Oracle process number: 19
Unix process pid: 12656, image: oracle@slc05kyr (DIA0)

*** 2015-10-13T16:47:59.541509+17:00
*** SESSION ID:(96.41299) 2015-10-13T16:47:59.541519+17:00
*** CLIENT ID:() 2015-10-13T16:47:59.541529+17:00
*** SERVICE NAME:(SYS$BACKGROUND) 2015-10-13T16:47:59.541538+17:00
*** MODULE NAME:() 2015-10-13T16:47:59.541547+17:00
*** ACTION NAME:() 2015-10-13T16:47:59.541556+17:00
*** CLIENT DRIVER:() 2015-10-13T16:47:59.541565+17:00

2015-10-13T16:47:59.435039+17:00
Errors in file /oracle/log/diag/rdbms/hm6/hm6/trace/hm6_dia0_12433.trc (incident=7353):
ORA-32701: Possible hangs up to hang ID=1 detected
Incident details in: …/diag/rdbms/hm6/hm6/incident/incdir_7353/hm6_dia0_12433_i7353.trc
2015-10-13T16:47:59.506775+17:00
DIA0 requesting termination of session sid:40 with serial # 43179 (ospid:13031) on instance 2
    due to a GLOBAL, HIGH confidence hang with ID=1.
    Hang Resolution Reason: Automatic hang resolution was performed to free a
    significant number of affected sessions.
DIA0: Examine the alert log on instance 2 for session termination status of hang with ID=1.

In the alert log on the instance local to the session (instance 2 in this case),
we see the following:

2015-10-13T16:47:59.538673+17:00
Errors in file …/diag/rdbms/hm6/hm62/trace/hm62_dia0_12656.trc (incident=5753):
ORA-32701: Possible hangs up to hang ID=1 detected
Incident details in: …/diag/rdbms/hm6/hm62/incident/incdir_5753/hm62_dia0_12656_i5753.trc

2015-10-13T16:48:04.222661+17:00
DIA0 terminating blocker (ospid: 13031 sid: 40 ser#: 43179) of hang with ID = 1
    requested by master DIA0 process on instance 1
    Hang Resolution Reason: Automatic hang resolution was performed to free a
    significant number of affected sessions.
    by terminating session sid:40 with serial # 43179 (ospid:13031)

For Further Information

- [Oracle 12c Clusterware Admin Guide](#)
- [Oracle Clusterware on OTN](#)
- [Oracle QoS Management 12c Documentation](#)
- [Oracle QoS Management on OTN](#)
- [Oracle 12c ORAchk](#)
- [Oracle 12c Trace File Analyzer](#)