Nov. 3rd, 2007

DATA SOFTECH INC.

Complete Database Solution Provider

ORACLE 11g Automatic Diagnostic Repository

Fault Management Infrastructure

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President

Agenda

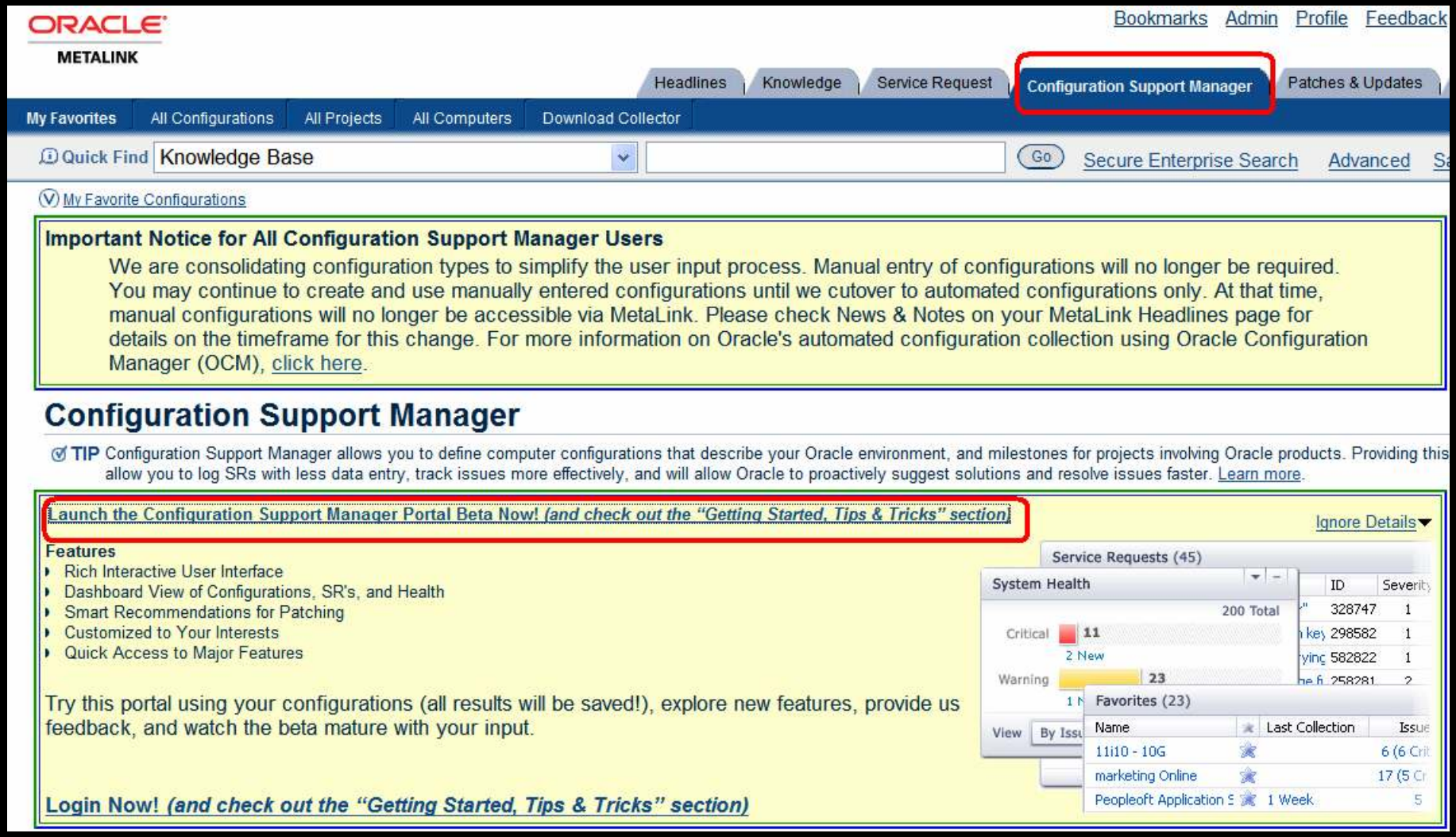
- 11g Fault Management Framework Overview
- 11g Fault Management Framework Components
- ADR Overview
- ADR location
- ADR Layout
- ADRCI command Line utility
- Alert Logs in ADR
- Trace & Dump files in ADR
- OEM Support Workbench
- Q&A

11g Fault Management Framework

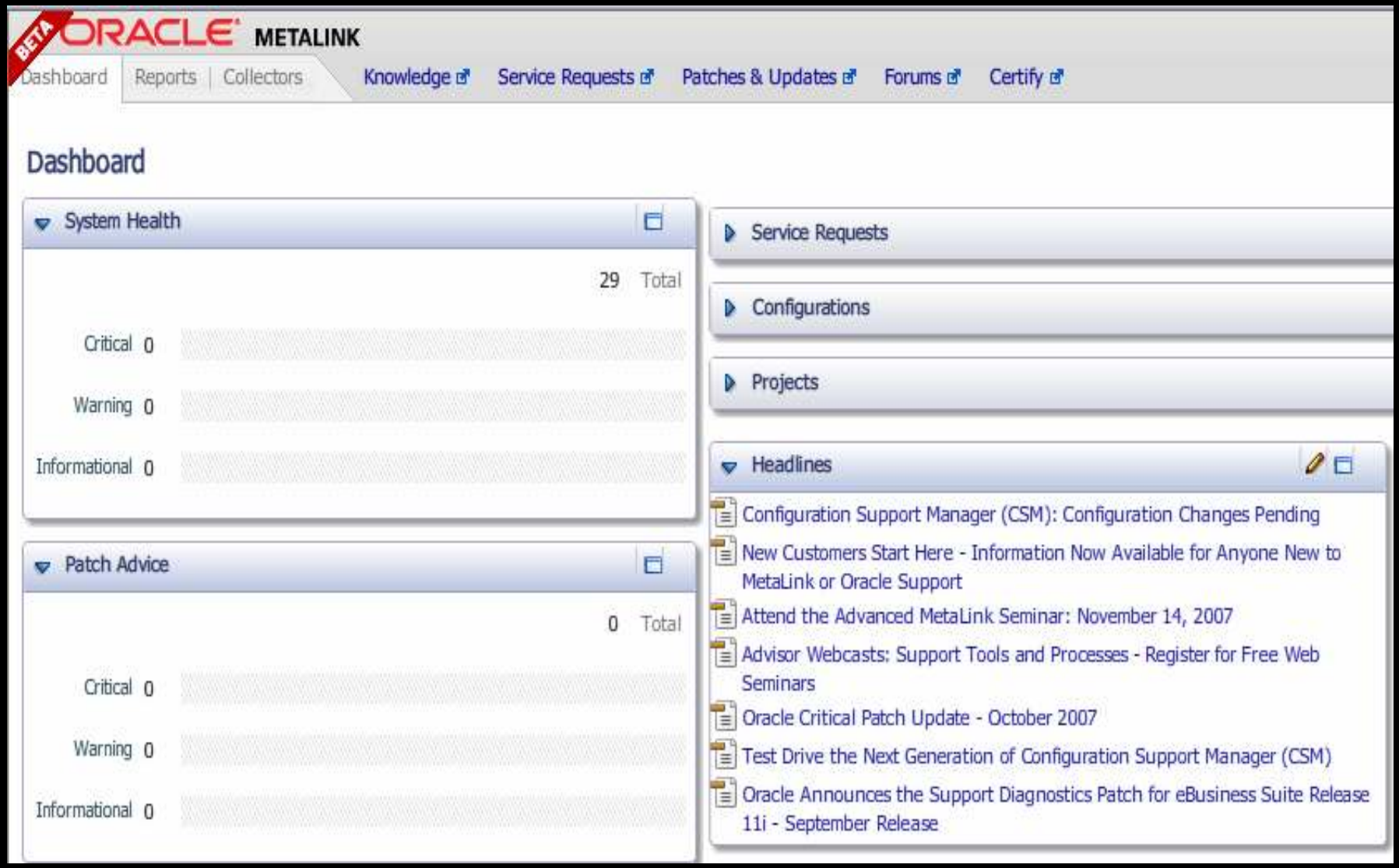
- Prevent, detect, diagnose and resolve database problems
- Main goal is to Reduce TIME of Resolution
- Prevention
  - Change Assurance - Lower the risk of change
  - Automatic Health Check - using Oracle Configuration Manager and is part of Metalink service
- Resolution
  - Reduce Diagnostic Time
  - Reduce Resolution Time
  - Proactive Patching

Oracle Configuration Manager

11g Fault Mgmt. Framework - Prevention

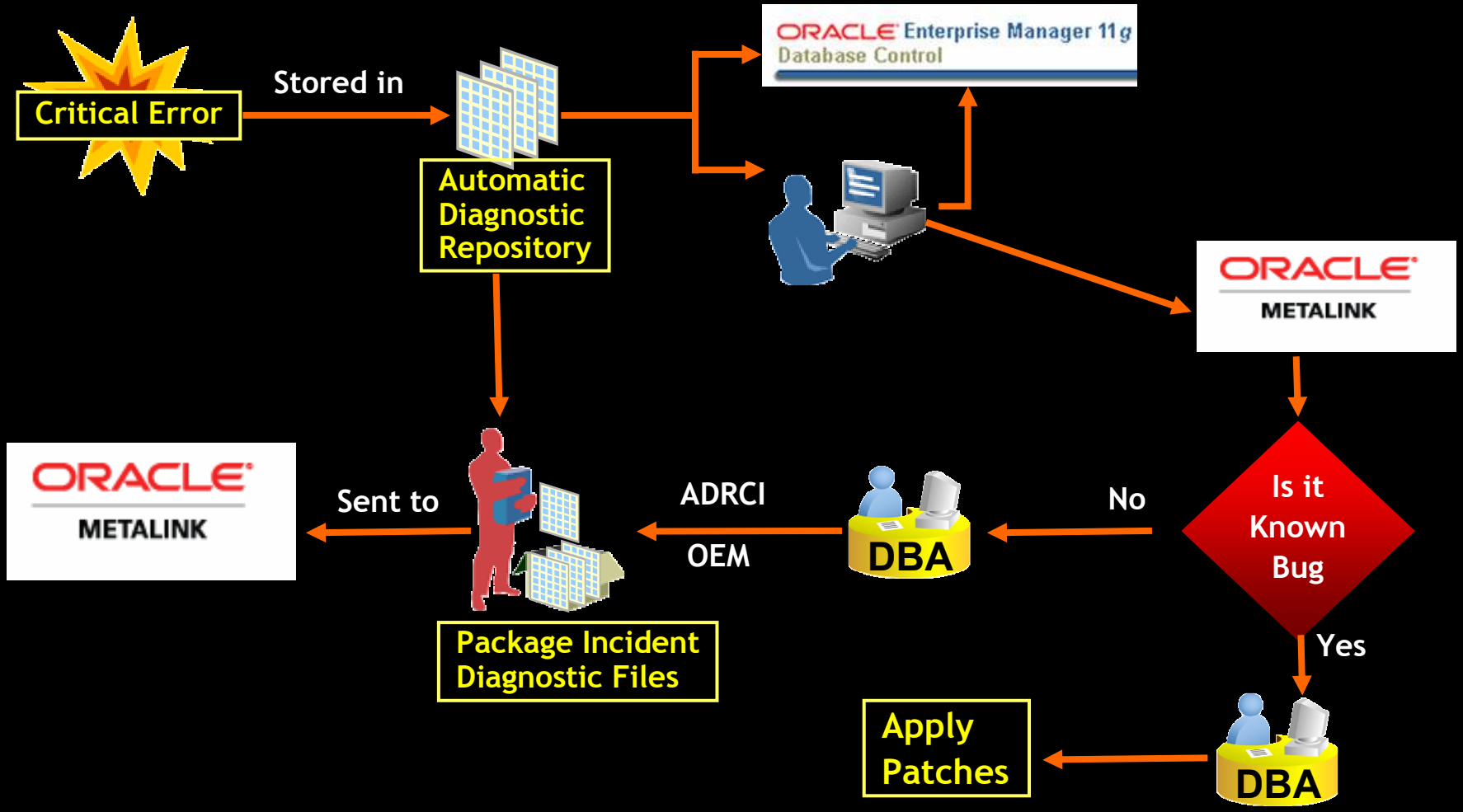


11g Fault Mgmt. Framework - Prevention



11g Fault Mgmt. Framework - Prevention

- Reduce Diagnostic Time



11g Fault Mgmt. Framework Components

- **Automatic Diagnostic Repository (ADR)**
- ADRCI Command Line Utility
- Alert Log
- Trace Files, Dumps, and Core Files
- Enterprise Manager Support Workbench

Automatic Diagnostic Repository - Overview

- ADR is the core of 11g Fault Management Framework
- Black box for Database error handling
- File-based repository for database diagnostic data
  - Alert Log
  - Core Dumps and Traces and more
-

```
-bash-3.00$ cd $ORACLE_BASE/diag
-bash-3.00$ ls -ltr
total 36
drwxrwxr-x  2 oracle oinstall 4096 Sep 20 11:40 ofm
drwxrwxr-x  2 oracle oinstall 4096 Sep 20 11:40 netcman
drwxrwxr-x  2 oracle oinstall 4096 Sep 20 11:40 lsnrctl
drwxrwxr-x  2 oracle oinstall 4096 Sep 20 11:40 diagtool
drwxrwxr-x  2 oracle oinstall 4096 Sep 20 11:40 crs
drwxrwxr-x  2 oracle oinstall 4096 Sep 20 11:40 clients
drwxrwxr-x  3 oracle oinstall 4096 Sep 21 11:24 tnslsnr
drwxrwxr-x  3 oracle oinstall 4096 Sep 21 11:26 asm
drwxrwxr-x  4 oracle oinstall 4096 Oct  3 14:36 rdbms
```

-

Automatic Diagnostic Repository - Location

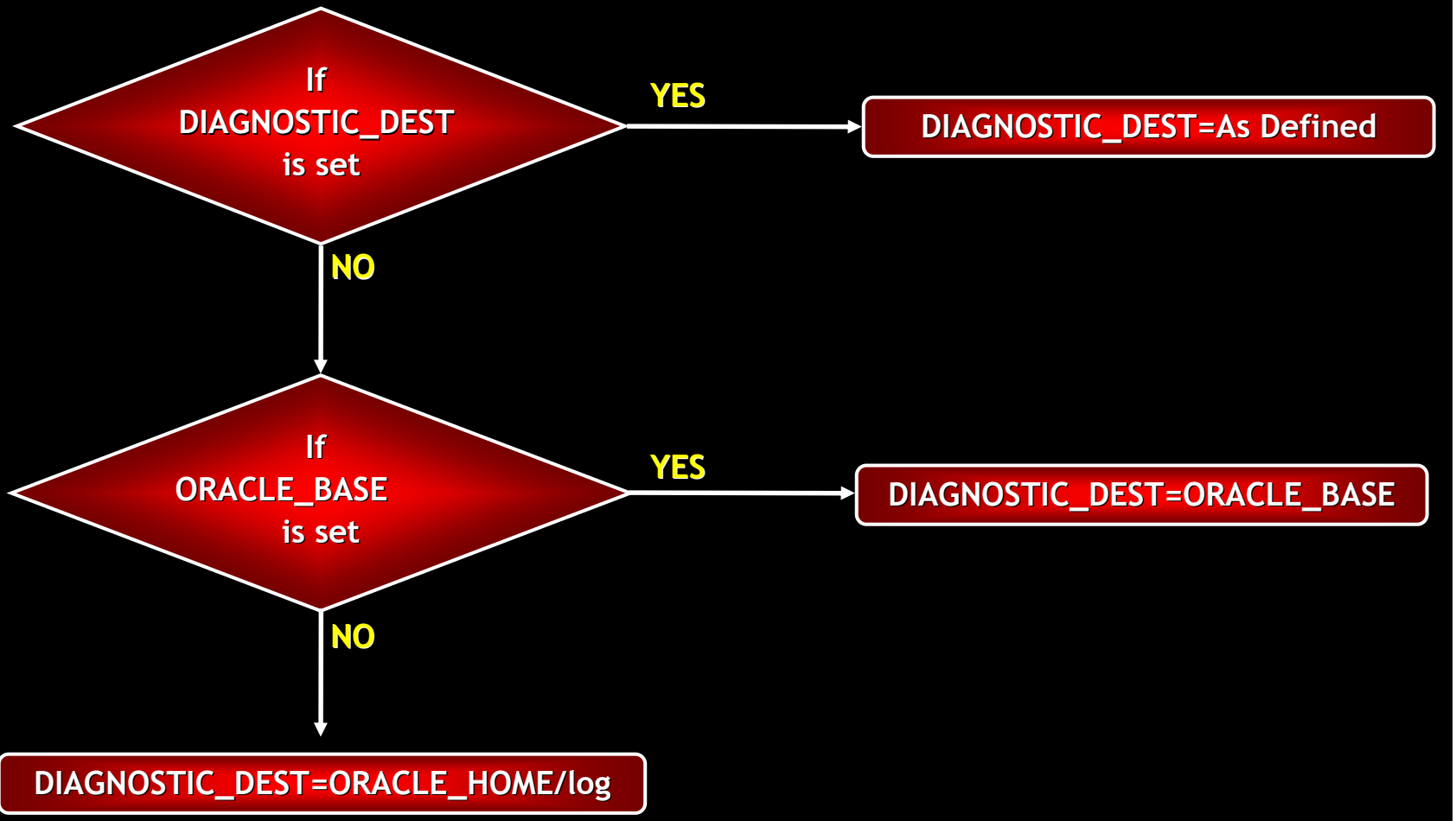
- 11g Deprecated old initialization parameters

  [BACKGROUND | USER | CORE]_DUMP_DEST

- 11g new initialization parameter

  DIAGNOSTIC_DEST

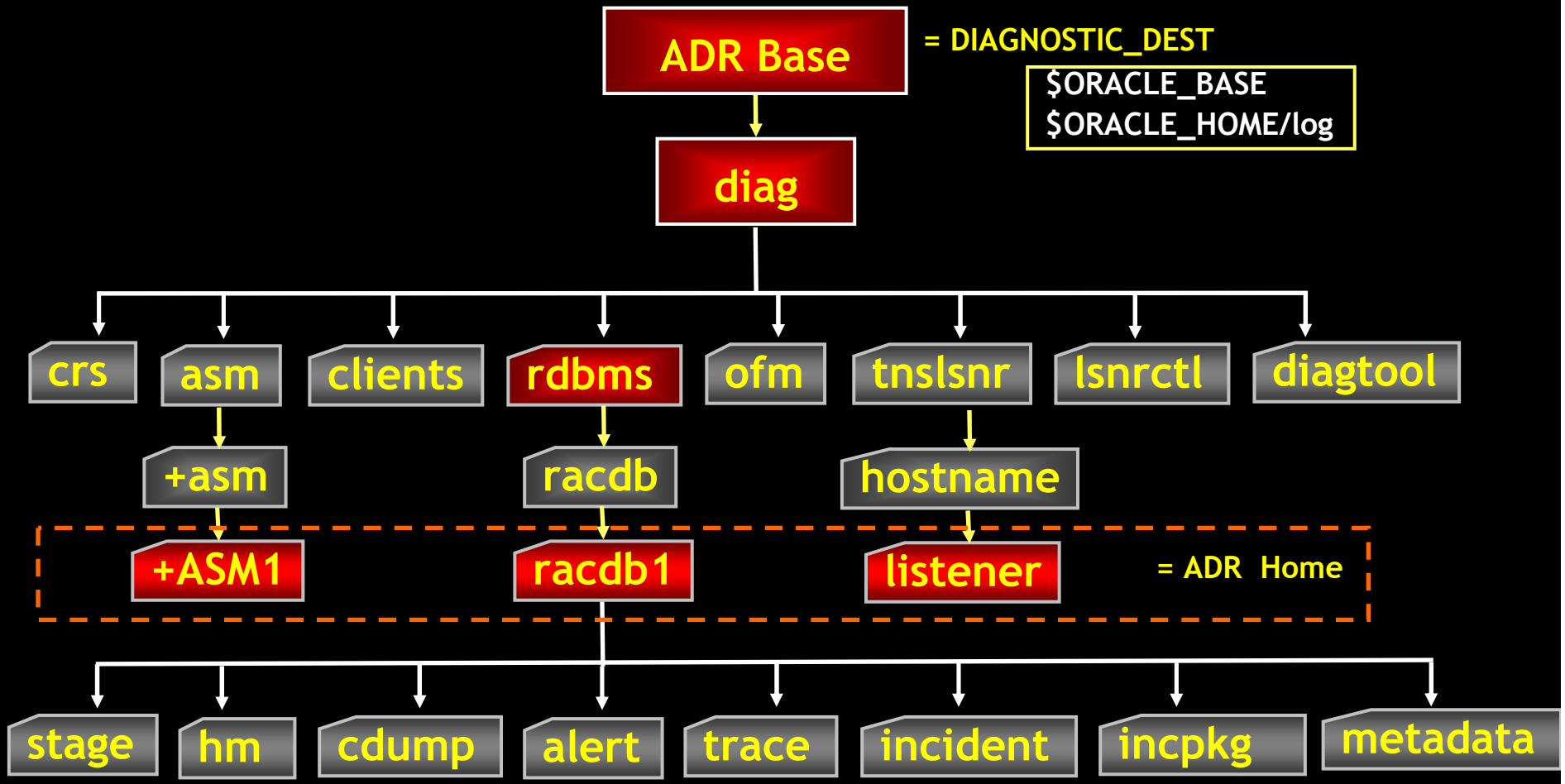
Automatic Diagnostic Repository - Location



Automatic Diagnostic Repository - Location

```
SQL> show parameter diag
NAME                                 TYPE        VALUE
------------------------------------ ----------- ------------------------------
diagnostic_dest                      string      /oracle

SQL> alter system set diagnostic_dest='/oracle/III';
alter system set diagnostic_dest='/oracle/III'
*
ERROR at line 1:
ORA-02097: parameter cannot be modified because specified value is invalid
ORA-48108: invalid value given for the diagnostic_dest init.ora parameter
ORA-48140: the specified ADR Base directory does not exist [/oracle/III]
ORA-48187: specified directory does not exist
Linux Error: 2: No such file or directory
Additional information: 1

SQL> !mkdir /oracle/III
SQL> alter system set diagnostic_dest='/oracle/III';
```

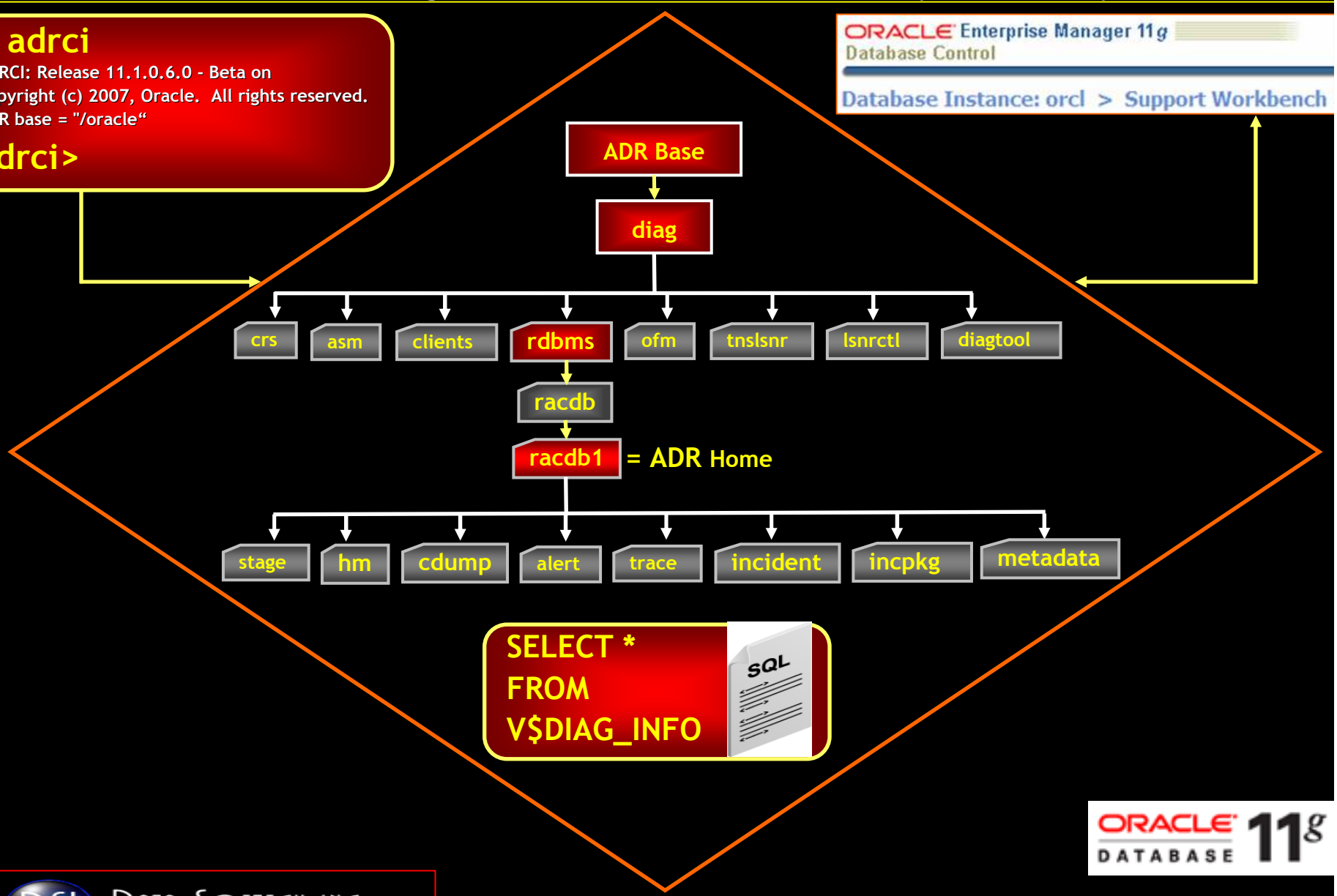
Automatic Diagnostic Repository - Layout



Automatic Diagnostic Repository - Layout

```
$ adrci
ADRCI: Release 11.1.0.6.0 - Beta on
Copyright (c) 2007, Oracle.  All rights reserved.
ADR base = "/oracle"
adrci>
```

ORACLE Enterprise Manager 11g
Database Control
Database Instance: orcl > Support Workbench



ORACLE 11g DATABASE

Automatic Diagnostic Repository - Layout

```
SQL> select * from v$diag_info order by name;

   INST_ID NAME                      VALUE
---------- ------------------------- ----------------------------------------------------------------
         2 ADR Base                  /oracle
         2 ADR Home                  /oracle/diag/rdbms/sunny/sunny2
         2 Active Incident Count     0
         2 Active Problem Count      0
         2 Default Trace File        /oracle/diag/rdbms/sunny/sunny2/trace/sunny2_ora_18868.trc
         2 Diag Alert                /oracle/diag/rdbms/sunny/sunny2/alert
         2 Diag Cdump                /oracle/diag/rdbms/sunny/sunny2/cdump
         2 Diag Enabled              TRUE
         2 Diag Incident             /oracle/diag/rdbms/sunny/sunny2/incident
         2 Diag Trace                /oracle/diag/rdbms/sunny/sunny2/trace
         2 Health Monitor            /oracle/diag/rdbms/sunny/sunny2/hm

11 rows selected.
```

11g Fault Mgmt. Framework Components

- ✓ Automatic Diagnostic Repository (ADR)
- ✓ ADRCI Command Line Utility
- Alert Log
- Trace Files, Dumps, and Core Files
- Enterprise Manager Support Workbench
- ADRCI Command Line Utility

ADR – ADRCI utility

```
$ adrci
ADRCI: Release 11.1.0.6.0 - Beta on Wed Oct 31 13:16:53 2007
Copyright (c) 1982, 2007, Oracle.  All rights reserved.
ADR base = "/oracle"

adrci> show base
ADR base is "/oracle
```

```
adrci> show home
ADR Homes:
diag/rdbms/wdp/wdp
diag/rdbms/wdp/WDP
diag/rdbms/sunny/sunny2
diag/asm/+asm/+ASM2
diag/tnslsnr/prnhs-db01pn/sunny_prnhs-db01pn
diag/tnslsnr/prnhs-db01pn/listener_prnhs-db01pn
```

ADR – ADRCI utility

```
adrci> help
HELP [topic]
   Available Topics:
         CREATE REPORT                    ECHO
         EXIT                             HELP
         HOST                             IPS
         PURGE                            RUN
         SET BASE                         SET BROWSER
         SET CONTROL                      SET ECHO
         SET EDITOR                       SET HOMES | HOME | HOMEPATH
         SET TERMOUT                      SHOW ALERT
         SHOW BASE                        SHOW CONTROL
         SHOW HM_RUN                      SHOW HOMES | HOME | HOMEPATH
         SHOW INCDIR                      SHOW INCIDENT
         SHOW PROBLEM                     SHOW REPORT
         SHOW TRACEFILE                   SPOOL
```

ADR – ADRCI utility

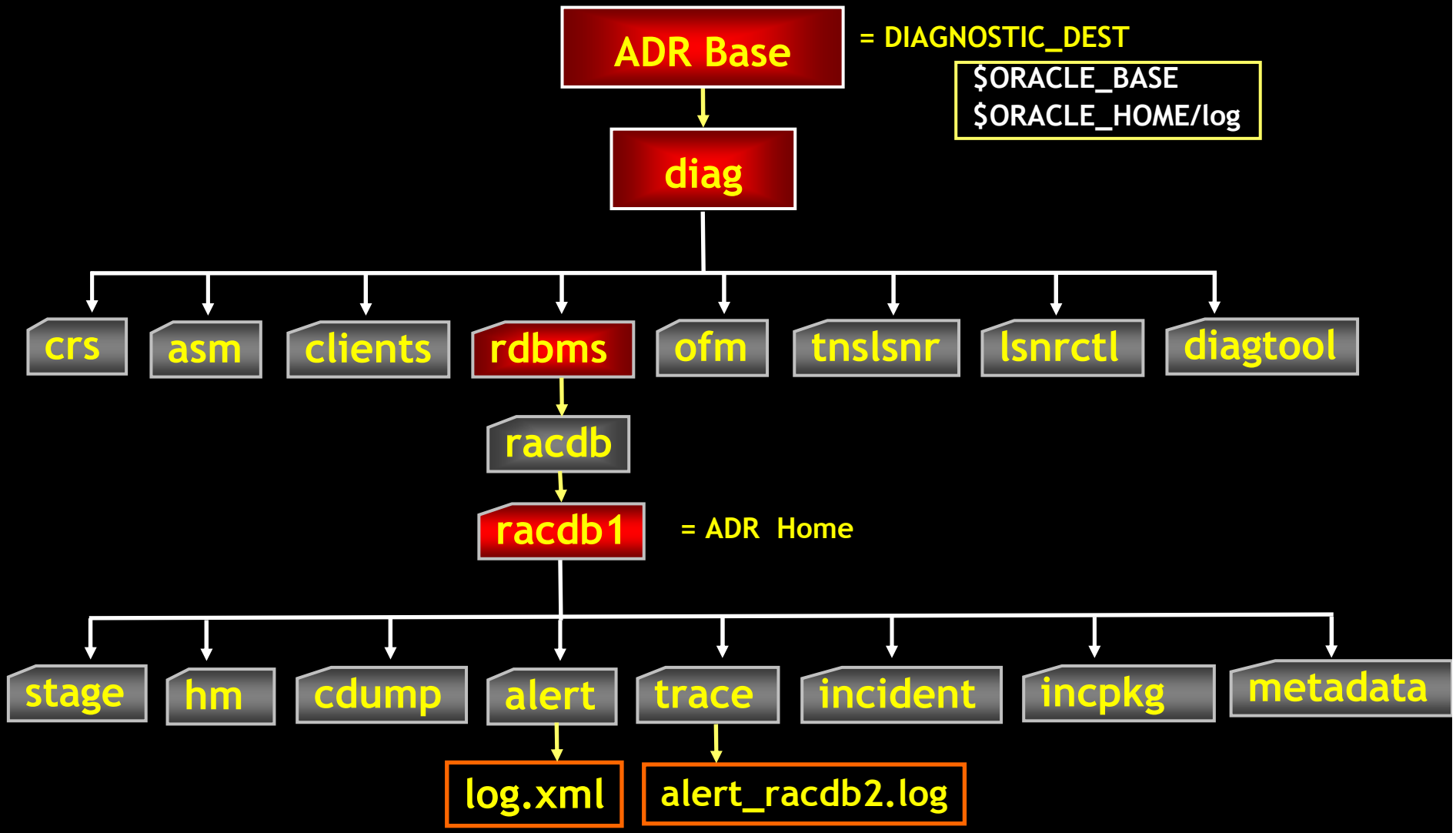
- Data in ADR is not intended to be secure - No Login Id is required
- Data in ADR can be secure using OS permission on ADR directories

11g Fault Mgmt. Framework Components

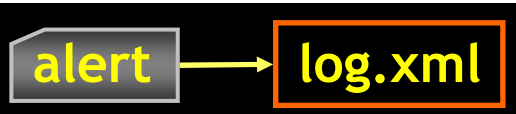
- ✓ Automatic Diagnostic Repository (ADR)
- ✓ ADRCI Command Line Utility
- ✓ Alert Log
- Trace Files, Dumps, and Core Files
- Enterprise Manager Support Workbench
- ADRCI Command Line Utility

ADR Home/alert/log.xml	→ XML Format alert log file
ADR Home/trace/alert_SID.log	→ Traditional alert Log file

ADR – Alert Logs



ADR – Alert Logs

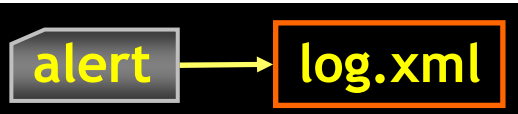



```
$ adrci
ADRCI: Release 11.1.0.6.0 - Beta on Wed Oct 31 13:16:53 2007
Copyright (c) 1982, 2007, Oracle.  All rights reserved.
ADR base = "/oracle"

adrci> show alert
Choose the alert log from the following homes to view:

1: diag/rdbms/wdp/wdp
2: diag/rdbms/wdp/WDP
3: diag/rdbms/sunny/sunny2
4: diag/asm/+asm/+ASM2
5: diag/tnslsnr/prnhs-db01pn/sunny_prnhs-db01pn
6: diag/tnslsnr/prnhs-db01pn/listener_prnhs-db01pn
Q: to quit

Please select option:
```

ADR – Alert Logs

```
Please select option: 3

2007-09-21 12:51:37.107000 -04:00
Starting ORACLE instance (normal)
2007-09-21 12:51:38.209000 -04:00
LICENSE_MAX_SESSION = 0
LICENSE_SESSIONS_WARNING = 0
Interface type 1 eth0 172.30.106.0 configured from OCR for use as  a public interface
Shared memory segment for instance monitoring created
Picked latch-free SCN scheme 2
Using LOG_ARCHIVE_DEST_1 parameter default value as /oracle/apps/11.1.0/db/dbs/arch
Autotune of undo retention is turned on.
LICENSE_MAX_USERS = 0
SYS auditing is disabled
Starting up ORACLE RDBMS Version: 11.1.0.6.0.
Using parameter settings in server-side spfile +SUNNYDG/sunny/spfilesunny.ora
System parameters with non-default values:
  processes                = 150
  spfile                   = "+SUNNYDG/sunny/spfilesunny.ora"
  memory_target            = 6496M
  control_files            = "+SUNNYDG/sunny/controlfile/current.260.633875941"
  db_block_size            = 8192
  compatible               = "11.1.0.0.0"
  cluster_database         = TRUE
  cluster_database_instances= 2
  "/tmp/alert_22473_3086_sunny2_1.ado" 1442L, 60098C
```

ADR – Alert Logs

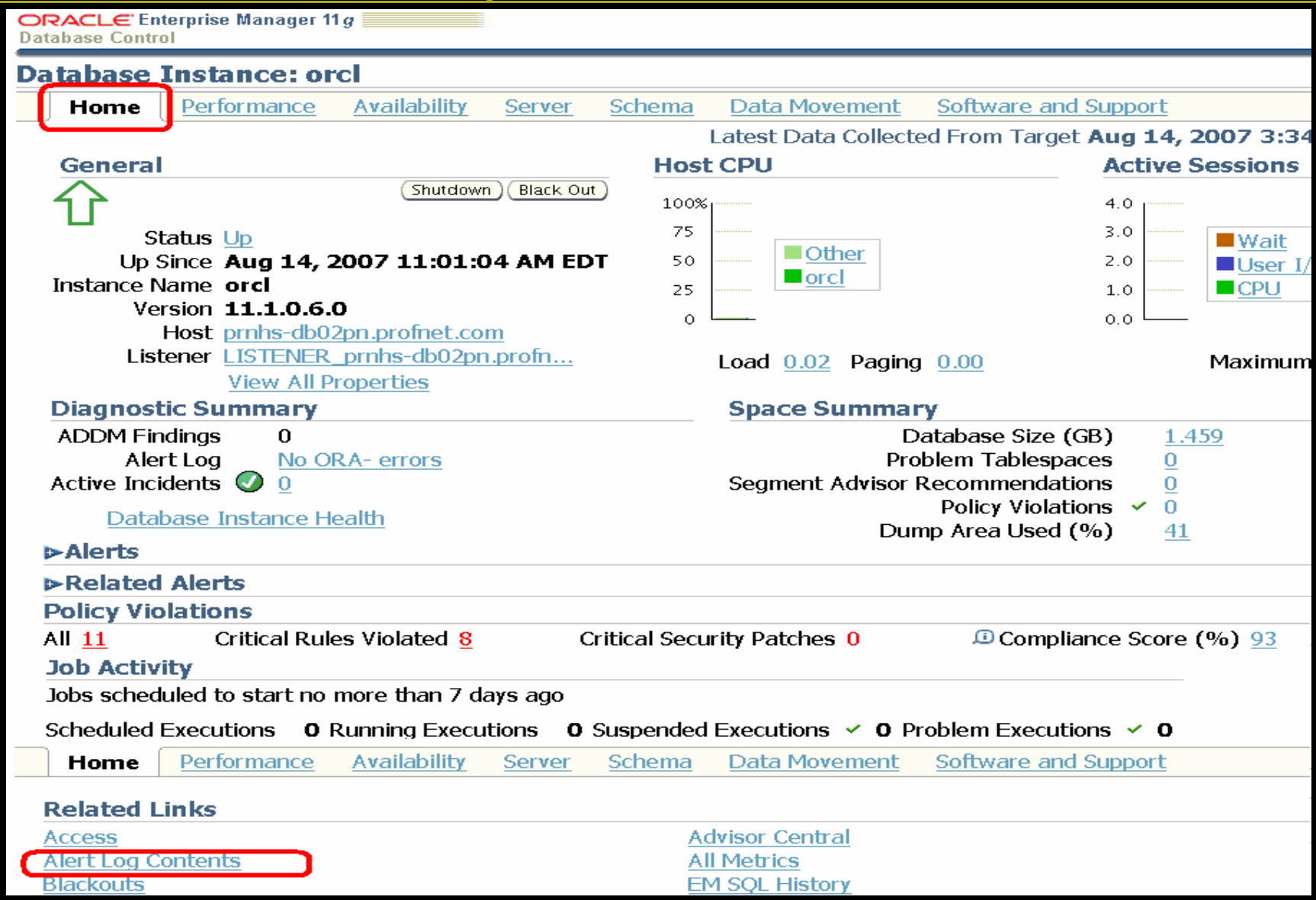



```
adrci> show alert
adrci> set editor vi
adrci> show alert
adrci> show alert  -tail          →Display last 10 entries of Alert Log.
adrci> show alert  -tail 50       →Display last 50 entries of Alert Log.
adrci> show alert  -tail  -f      →Work like Unix "tail -f" command

adrci> show alert -p "message_text like '%ORA-1507%'"
ADR Home = /home/oracle/app/diag/rdbms/orcl/orcl:
*************************************************************************
Output the results to file: /tmp/alert_627_308637_orcl_1.ado
2007-08-14 11:01:00.885000 -04:00
ORA-1507 signalled during: ALTER DATABASE CLOSE NORMAL...
```

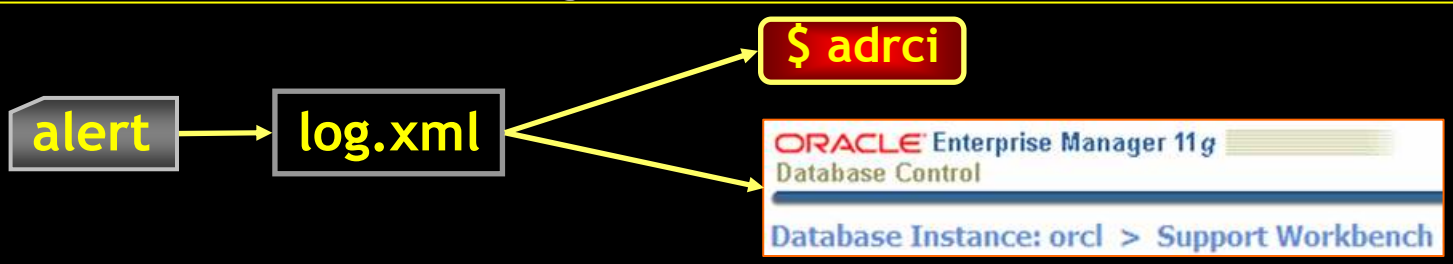
Will open Vi editor with all ORA error listed in temp file as shown below

```
adrci> show alert -p "message_text like '%ORA%'"
```

ADR – Alert Logs – OEM



ADR – Alert Logs – XML format



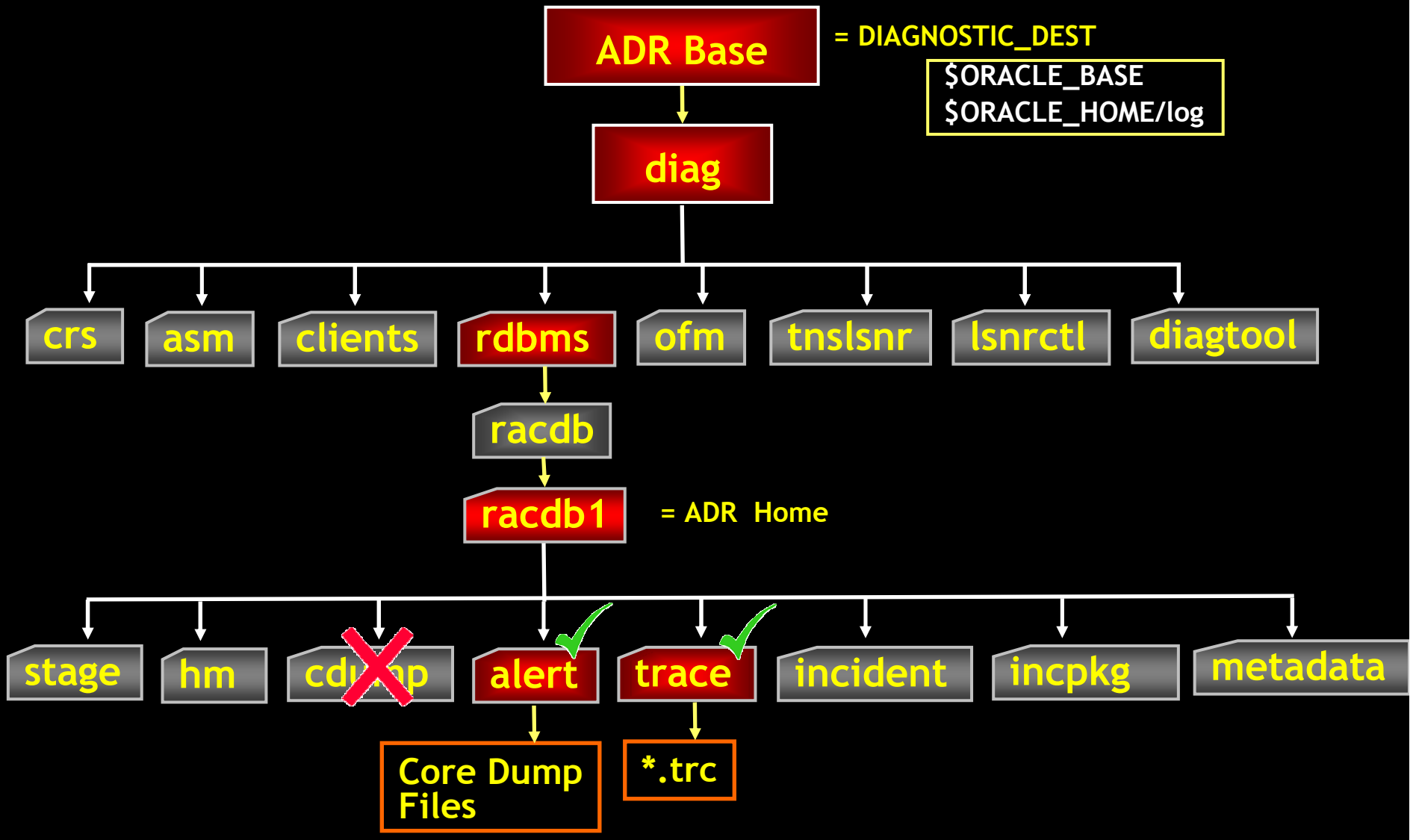
Sample Alert log.xml

```
<msg time='2007-08-13T10:41:06.668-04:00' org_id='oracle' comp_id='rdbms'
 client_id='' type='UNKNOWN' level='16'
 module='' pid='18527'>
 <txt>Stopping background process VKTM:
 </txt>
</msg>
```

11g Fault Mgmt. Framework Components

- ✓ Automatic Diagnostic Repository (ADR)
- ✓ ADRCI Command Line Utility
- ✓ Alert Log
- ✓ Trace Files, Dumps, and Core Files
- Enterprise Manager Support Workbench

ADR – Trace and Dump files



ADR – Trace and Dump files

```
$ adrci
ADRCI: Release 11.1.0.6.0 - Beta on Wed Oct 31 13:16:53 2007
Copyright (c) 1982, 2007, Oracle.  All rights reserved.
ADR base = "/oracle"

adrci> show tracefile
     diag/rdbms/wdp/wdp/trace/wdp_diag_21872.trc
     diag/rdbms/wdp/wdp/trace/wdp_ping_30092.trc
     ...
     ...
```

11g ADR – Trace and Dump files

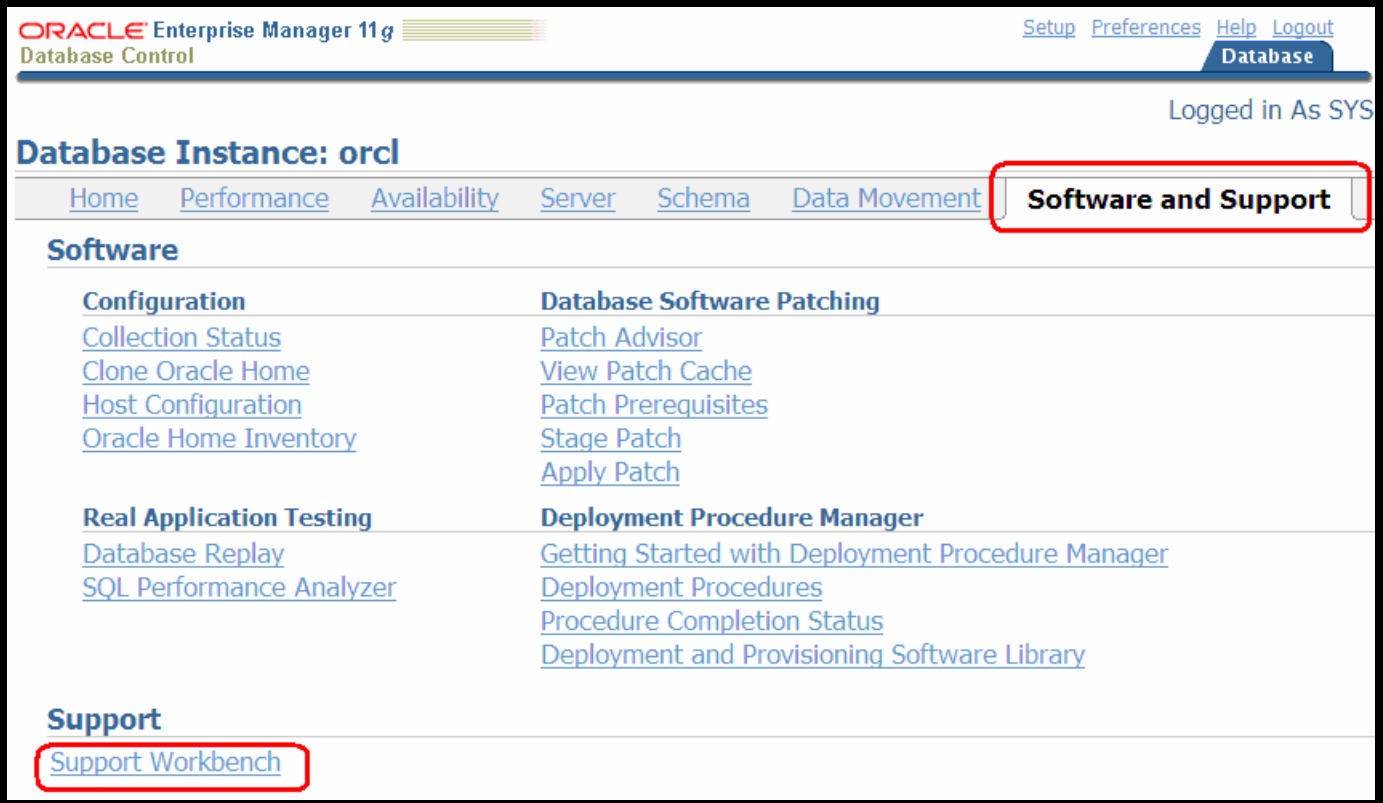
DIAGNOSTIC Data Types	ORACLE DATABASE 10g	ORACLE DATABASE 11g
Foreground Process Traces	USER_DUMP_DEST	ADR_HOME/trace
Background Process Traces	BACKGROUND_DUMP_DEST	ADR_HOME/trace
Core Dumps files	CORE_DUMP_DEST	ADR_HOME/cdump
Alert Log Data	BACKGROUND_DUMP_DEST	ADR_HOME/trace & alert
Incident Dumps	USER | BACKGROUND_DUMP_DEST	ADR_HOME/incident/incdir_n

Here ADR_HOME is not a variable but meant for
ADR Base / diag / rdbms / db_name / ORACLE_SID

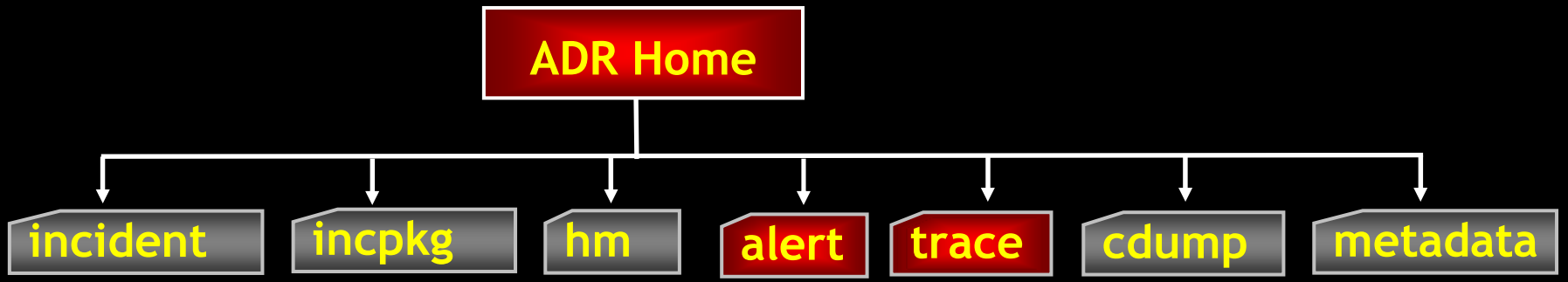
11g Fault Mgmt. Framework Components

- Automatic Diagnostic Repository (ADR)
- ADRCI Command Line Utility
- Alert Log
- Trace Files, Dumps, and Core Files
- Enterprise Manager Support Workbench

EM Support Workbench



Problem and Incident



11g introduced two new terms to critical errors in the database

- Problem
- Incident

Problem

- It is critical error in the database tracked in ADR
- Common Critical errors are

ORA-00600	- Internal Errors
ORA-07445	- Operating System Exception
ORA-4020	- Deadlock on Library object
ORA-1578	- Data block Corruption
ORA-353	- Log Corruption
ORA-4030	- Out of Process Memory
ORA-8103	- Object no Longer exists

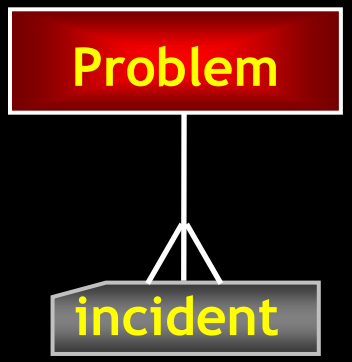
- Each Problem has
  - Unique Number called Problem Id
  - Text String called Problem Key like "ORA 600 [xxxxx]" along with some argument [if any]
- You can look for Problem ID and Problem Key using ADRCI utility

Problem

```
adrci> show problem
ADR Home = /home/oracle/app/diag/rdbms/test11g/test11g:
*************************************************************************
0 rows fetched

ADR Home = /home/oracle/app/diag/rdbms/orcl/orcl:
*************************************************************************
PROBLEM_ID   PROBLEM_KEY         LAST_INCIDENT        LASTINC_TIME
------------ ------------------- -------------- ------------------------------
1             ORA 1578             14775          2007-08-15 09:08:54.202548 -04:00
1 rows fetched
```

Incident

- It is single occurrence of the problem.
- It is created as soon as problem is detected in the database
- Each Incident is assigned a unique number called incident Id in ADR
- Incidents are time stamped and tracked in the ADR along with Problem Key
- If the same problem or critical error occurred several times, each one will have unique Incident ID



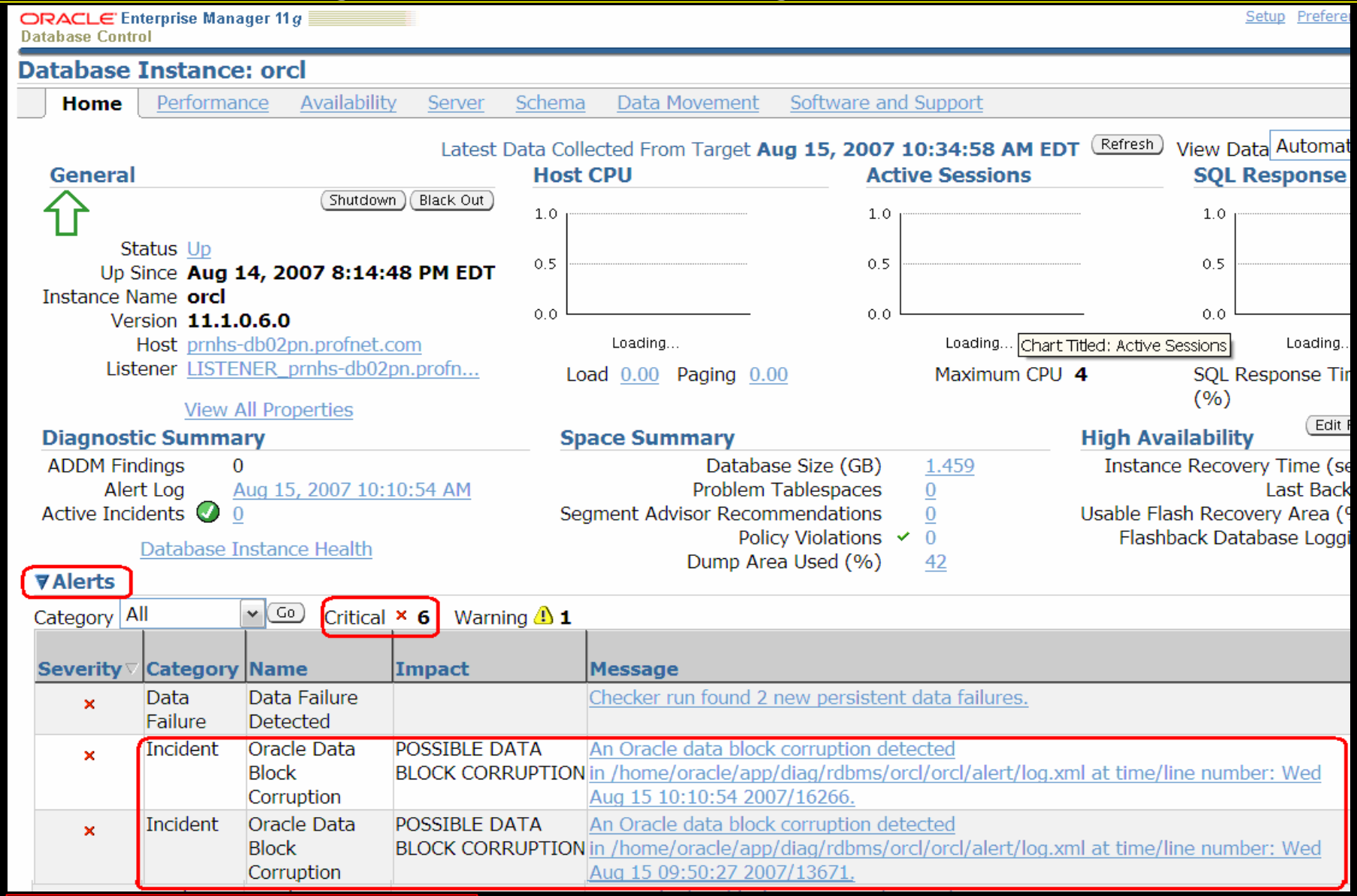
Incident

```
adrci> show incident
ADR Home = /home/oracle/app/diag/rdbms/test11g/test11g:
*************************************************************************
0 rows fetched

ADR Home = /home/oracle/app/diag/rdbms/orcl/orcl:
*************************************************************************
INCIDENT_ID    PROBLEM_KEY                      CREATE_TIME
-------------- -------------------------------- ---------------------------------
14773          ORA 1578                         2007-08-15 09:08:51.749759 -04:00
14772          ORA 1578                         2007-08-15 09:08:41.329081 -04:00
14771          ORA 1578                         2007-08-15 09:08:39.554096 -04:00
3 rows fetched

adrci> show incdir

ADR Home = /home/oracle/app/diag/rdbms/orcl/orcl:
*************************************************************************
diag/rdbms/orcl/orcl/incident/incdir_14771/orcl_ora_13914_i14771.trc
diag/rdbms/orcl/orcl/incident/incdir_14770/orcl_ora_13914_i14770.trc
```

Flood Controlled Incident

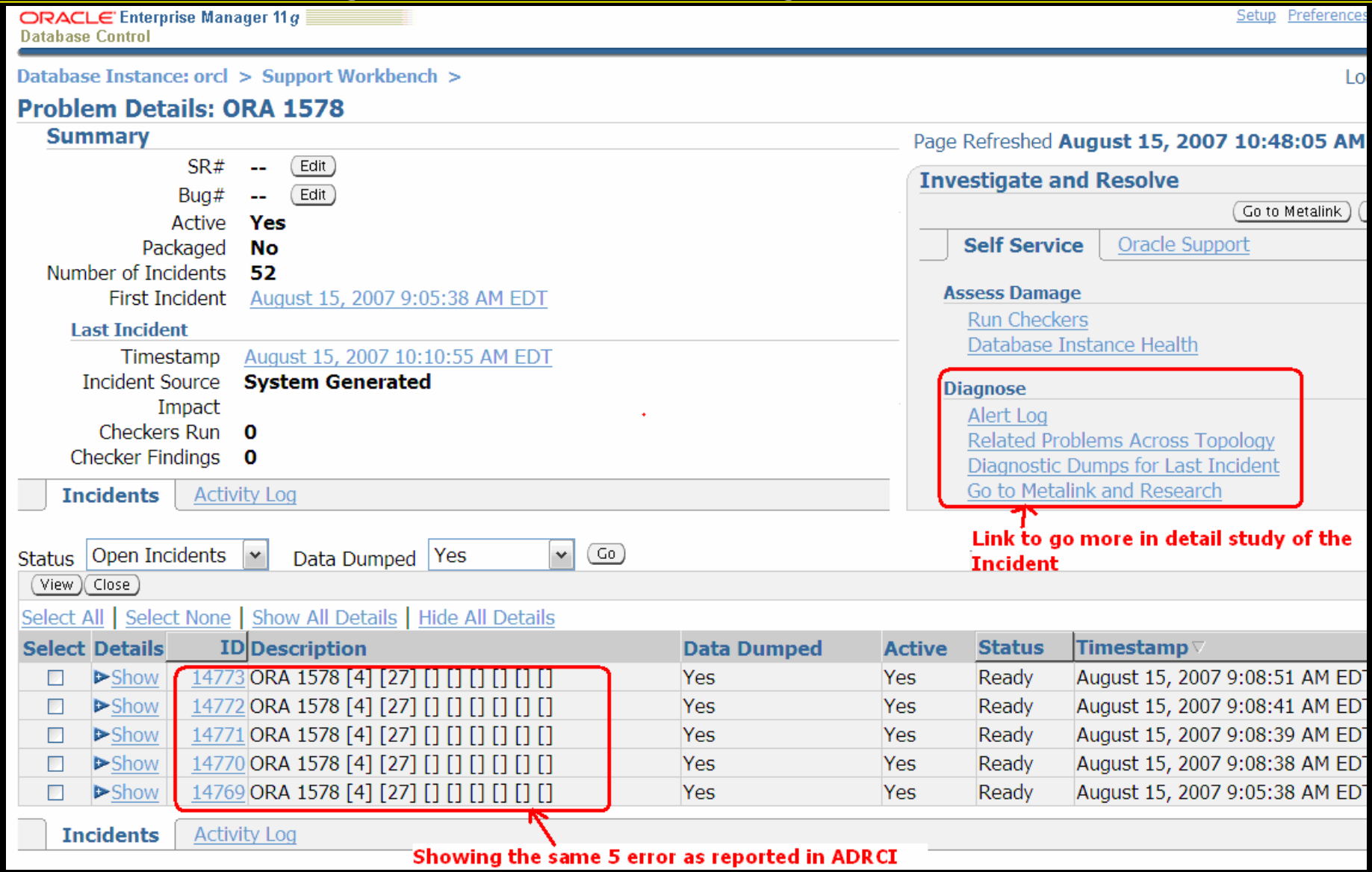
- As Incident is created for each critical error in the database, 11g controlled the flood of files in ADR.
- Flood controlled incident are
  - Recorded in alert.log
  - Recorded in ADR
  - Does not generate incident dump in ADR
- An incident is considered as Flood controlled incident
  - If same incident occurred 5 times in an hour.Normal recoding begins after an hour
  - If same incident occurred more than 25 times in a day. Normal recording restart again next day
- If same incident occurred more than 50 times in an hour OR 250 times in a day, it will no longer recorded in ADR

Monitoring Incident using OEM



Monitoring Incident using OEM

Monitoring Incident using OEM



Flood Controlled Incident

Whenever a problem occurs, the database performs the following

- Add an entry in the alert.log
- Deliver the incident alert to EM Home Page
- Gather Diagnostic data like trace files etc. about the incident
- Tag an Incident Id to the collected Diagnostic Data
- Stores all the Gathered data in

  $ADR_HOME/incident/Incident_Id subdirectory.

  Here Incident_Id is the unique ID assigned to the Incident

Flood Controlled Incident

F-Secure SSH - [Defaults.ssh]

File Edit View Tools Help

```
2007-08-15 09:05:38.925000 -04:00
Hex dump of (file 4, block 27) in trace file /home/oracle/app/diag/rdbms/orcl/orcl/trace/orcl_ora_13914.trc
Corrupt block relative dba: 0x0100001b (file 4, block 27)
Completely zero block found during buffer read
Reread of rdba: 0x0100001b (file 4, block 27) found same corrupted data
Errors in file /home/oracle/app/diag/rdbms/orcl/orcl/trace/orcl_ora_13914.trc  (incident=14769):
ORA-01578: ORACLE data block corrupted (file # 4, block # 27)
ORA-01110: data file 4: '/home/oracle/app/oradata/orcl/users01.dbf'
Incident details in: /home/oracle/app/diag/rdbms/orcl/orcl/incident/incdir_14769/orcl_ora_13914_i14769.trc
Corrupt Block Found
         TSN = 4, TSNAME = USERS
         RFN = 4, BLK = 27, RDBA = 16777243
         OBJN = 69515, OBJD = 69515, OBJECT = EMP, SUBOBJECT =
         SEGMENT OWNER = SCOTT, SEGMENT TYPE = Table Segment
Checker run found 2 new persistent data failures
2007-08-15 09:05:40.530000 -04:00
Hex dump of (file 4, block 1) in trace file /home/oracle/app/diag/rdbms/orcl/orcl/incident/incdir_14769/orcl_ora_13914_i1476
9.trc
Corrupt block relative dba: 0x00000001 (file 4, block 1)
Completely zero block found during validating datafile for block range
Reread of blocknum=1, file=/home/oracle/app/oradata/orcl/users01.dbf. found same corrupt data
Reread of blocknum=1, file=/home/oracle/app/oradata/orcl/users01.dbf. found same corrupt data
Reread of blocknum=1, file=/home/oracle/app/oradata/orcl/users01.dbf. found same corrupt data
Reread of blocknum=1, file=/home/oracle/app/oradata/orcl/users01.dbf. found same corrupt data
Reread of blocknum=1, file=/home/oracle/app/oradata/orcl/users01.dbf. found same corrupt data
Errors in file /home/oracle/app/diag/rdbms/orcl/orcl/incident/incdir_14769/orcl_ora_13914_i14769.trc:
ORA-19563: datafile header validation failed for file /home/oracle/app/oradata/orcl/users01.dbf
ORA-01251: Unknown File Header Version read for file number 4
ORA-01578: ORACLE data block corrupted (file # 4, block # 27)
ORA-01110: data file 4: '/home/oracle/app/oradata/orcl/users01.dbf'
Trace dumping is performing id=[cdmp_20070815090540]
2007-08-15 09:05:42.942000 -04:00
Sweep Incident[14769]: completed
```

An Entry to Alert Log is Started

Gather Diagnostic Data like Trace file

Tag an Incident ID to collected Trace data

Stores all the Gathered data in
$ADR_HOME/incident/Incident_Id
Where
ADR_HOME=/home/oracle/app/diag/rdbms/orcl/orcl
Incident_ID=incdir_14769

ADR Retention Policy

No More manual deletion of Trace and Core dumps files in 11g.

- The incident metadata retention policy - It controls how long the metadata is kept in ADR. Default setting is one Year
- The incident files and dumps retention policy - It controls how long generated dump files are kept in ADR. Default setting is one Month.

Incident

```
adrci> show control
ADR Home = /home/oracle/app/diag/rdbms/orcl/orcl:
*************************************************************************

ADRID      SHORTP_POLICY  LONGP_POLICY  LAST_MOD_TIME
      LAST_AUTOPRG_TIME  LAST_MANUPRG_TIME  ADRDIR_VERSION  ADRSCHM_VERSION
      ADRSCHMV_SUMMARY     ADRALERT_VERSION    CREATE_TIME

1335663986   720->30days   8760->1yr  2007-08-13 10:39:52.325010 -04:00
                        1           2           0           1           2007-08-13
      10:39:52.325010 -04:00

1 rows fetched
adrci> set control (SHORTP_POLICY = 168)
adrci> set control (LONGP_POLICY = 720)
adrci> show control
ADR Home = /home/oracle/app/diag/rdbms/orcl/orcl:
*************************************************************************

ADRID      SHORTP_POLICY  LONGP_POLICY  LAST_MOD_TIME
      LAST_AUTOPRG_TIME  LAST_MANUPRG_TIME  ADRDIR_VERSION  ADRSCHM_VERSION
      ADRSCHMV_SUMMARY     ADRALERT_VERSION    CREATE_TIME

1335663986   168->7days   720->30days  2007-08-13 11:46:04.886562 -04:00
                        1           2           0           1           2007-08-13
      10:39:52.325010 -04:00

1 rows fetched
```

Create Incident package for Oracle support

```
adrci> show incident
ADR Home = /home/oracle/app/diag/rdbms/orcl/orcl:
*************************************************************************
INCIDENT_ID          PROBLEM_KEY                     CREATE_TIME
-------------------- ------------------------------ ---------------------------------
14773                ORA 1578                       2007-08-15 09:08:51.749759 -04:00
14772                ORA 1578                       2007-08-15 09:08:41.329081 -04:00

adrci> ips add incident 14772 package 1
Added incident 14769 to package 1

adrci> host "ls -ltr /home/oracle/app/diag/rdbms/orcl/orcl/incident/incdir_14773"
total 2068
-rw-r-----  1 oracle oinstall   52536 Aug 15 09:08 orcl_ora_13914_i14773.trm
-rw-r-----  1 oracle oinstall 2053004 Aug 15 09:08 orcl_ora_13914_i14773.trc

adrci> ips add file <ADR_HOME>/trace/alert_orcl.log package 1
Added file <ADR_HOME>/trace/alert_orcl.log to package 1
adrci> ips generate package 1 in /tmp
Generated package 1 in file /tmp/ORA1578_20070815125445_COM_1.zip, mode complete
```

ADR –Health Monitor Report

- $ADR_HOME/hm contains report generated by health monitor
- Health Monitor examine following database components
  - DB Structure Integrity Check
  - Data Block Integrity Check
  - Redo Integrity Check
  - Logical Block Check

  ....

  - Dictionary Integrity Check etc

You can get the complete list using the below query
Select name from v$hm_check;

ADR –Health Monitor Report

```
adrci> show hm_run
ADR Home = /home/oracle/app/diag/rdbms/test11g/test11g:
*************************************************************************
HM RUN RECORD 1
*************************************************************************
...
*************************************************************************
 RUN RECORD 30
*************************************************************************
   RUN_ID                        621
   RUN_NAME                      HM_RUN_621
   CHECK_NAME                    DB Structure Integrity Check
   NAME_ID                       2
   MODE                          2
   START_TIME                    2007-08-15 13:40:26.219314 -04:00
   RESUME_TIME                   <NULL>
   END_TIME                      2007-08-15 13:40:26.246310 -04:00
   MODIFIED_TIME                 2007-08-15 13:40:26.246310 -04:00
   TIMEOUT                       0
   FLAGS                         0
   STATUS                        5
   SRC_INCIDENT_ID               0
   NUM_INCIDENTS                 0
   ERR_NUMBER                    0
   REPORT_FILE                   <NULL>
30 rows fetched
```

ADR –Health Monitor Report

```
adrci> create report hm_run HM_RUN_621
adrci>  show report hm_run HM_RUN_621
<?xml version="1.0" encoding="US-ASCII"?>
<HM-REPORT REPORT_ID="HM_RUN_661">
    <TITLE>HM Report: HM_RUN_661</TITLE>
    <RUN_INFO>
        <CHECK_NAME>DB Structure Integrity Check</CHECK_NAME>
        <RUN_ID>661</RUN_ID>
        <RUN_NAME>HM_RUN_661</RUN_NAME>
        <RUN_MODE>REACTIVE</RUN_MODE>
        <RUN_STATUS>COMPLETED</RUN_STATUS>
        <RUN_ERROR_NUM>0</RUN_ERROR_NUM>
        <SOURCE_INCIDENT_ID>0</SOURCE_INCIDENT_ID>
        <NUM_INCIDENTS_CREATED>0</NUM_INCIDENTS_CREATED>
        <RUN_START_TIME>2007-08-15 13:43:22.215671 -04:00</RUN_START_TIME>
        <RUN_END_TIME>2007-08-15 13:43:22.240171 -04:00</RUN_END_TIME>
    </RUN_INFO>
    <RUN_PARAMETERS/>
    <RUN-FINDINGS/>

adrci> host "ls -ltr /home/oracle/app/diag/rdbms/orcl/orcl/hm/HMREPORT_HM_RUN_621.hm"
-rw-r-----  1 oracle oinstall 711 Aug 15 13:50
/home/oracle/app/diag/rdbms/orcl/orcl/hm/HMREPORT_HM_RUN_661.hm
```

QUESTIONS
&
ANSWERS

THANKS

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