

Last updated: 04-JAN-2011

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## **Move to Oracle Database 11g – The whole Story**

# Agenda

- Preparation
- Installation
- Upgrade
- News and Task List
- Diagnostics & Tuning
- Performance Testing
- Best Practices

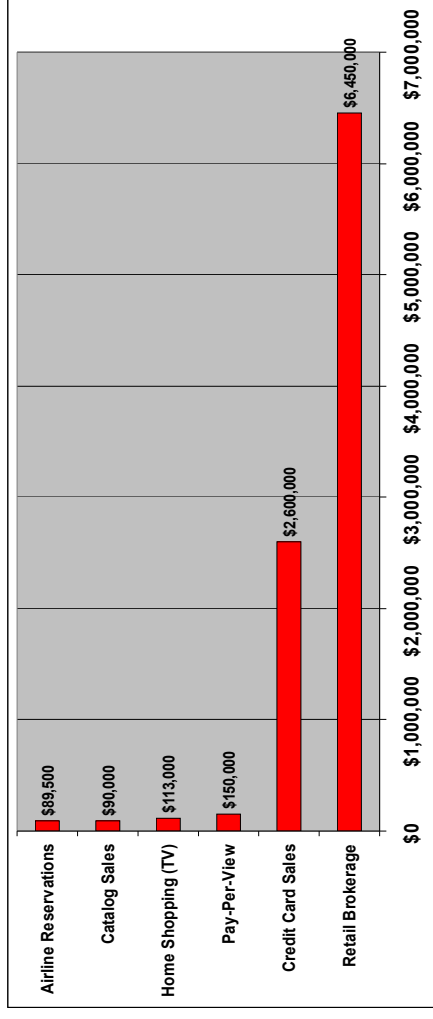


# Total Business Dependence On Information

## What is Needed

- Greater availability
  - Innovative answers to downtime
    - Planned or Unplanned
  - Lower cost, raise usefulness
- Improved security
  - Variety of access control options
  - Data encryption with application transparency

## The Cost of Downtime



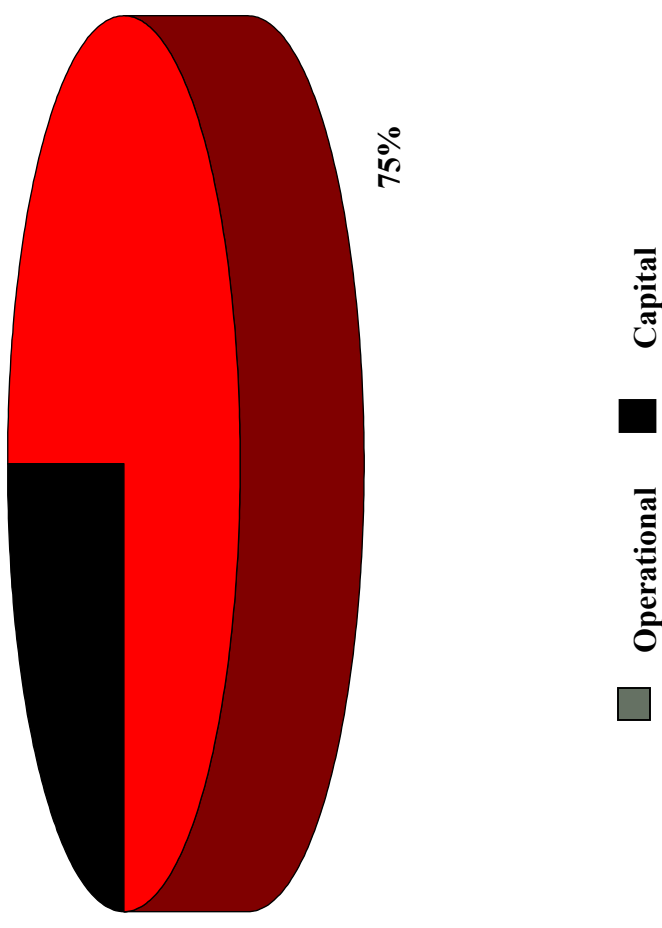
Source: Gartner Group and Contingency Planning Research



# The Cost of information Management

- “Eight out of ten dollars that companies spend on IT is dead money” – Gartner Group Oct 2006
- Personnel costs are between 37-42% of IT budgets – META Group
- Average server utilization rate is 5-10% - IDC & Gartner
- Storage Growth Averages 7%/Month (110% CAGR) – EMC

Where IT Budgets are Spent

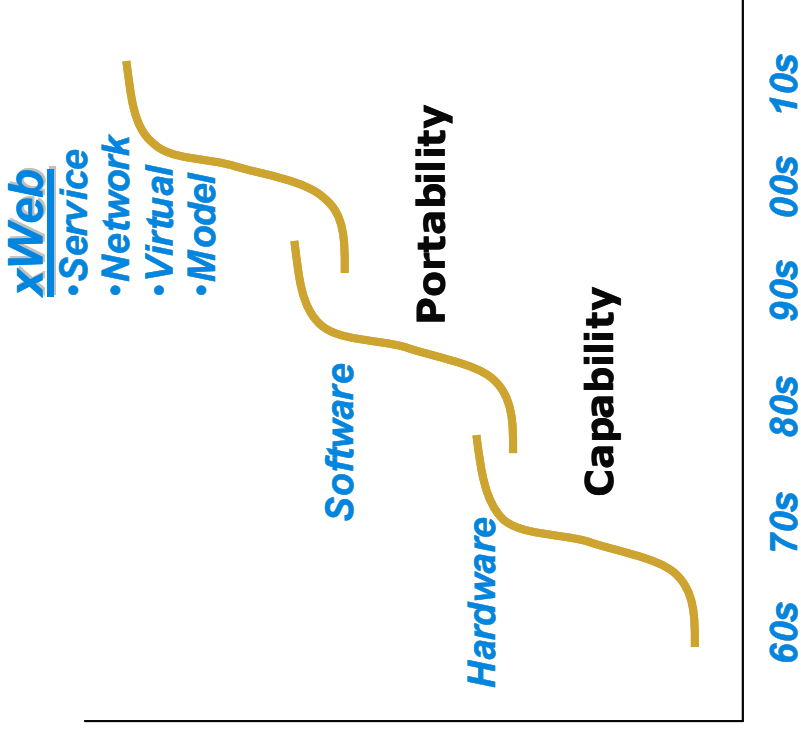


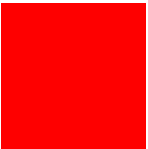
\* Source:: Gartner Oct 2006



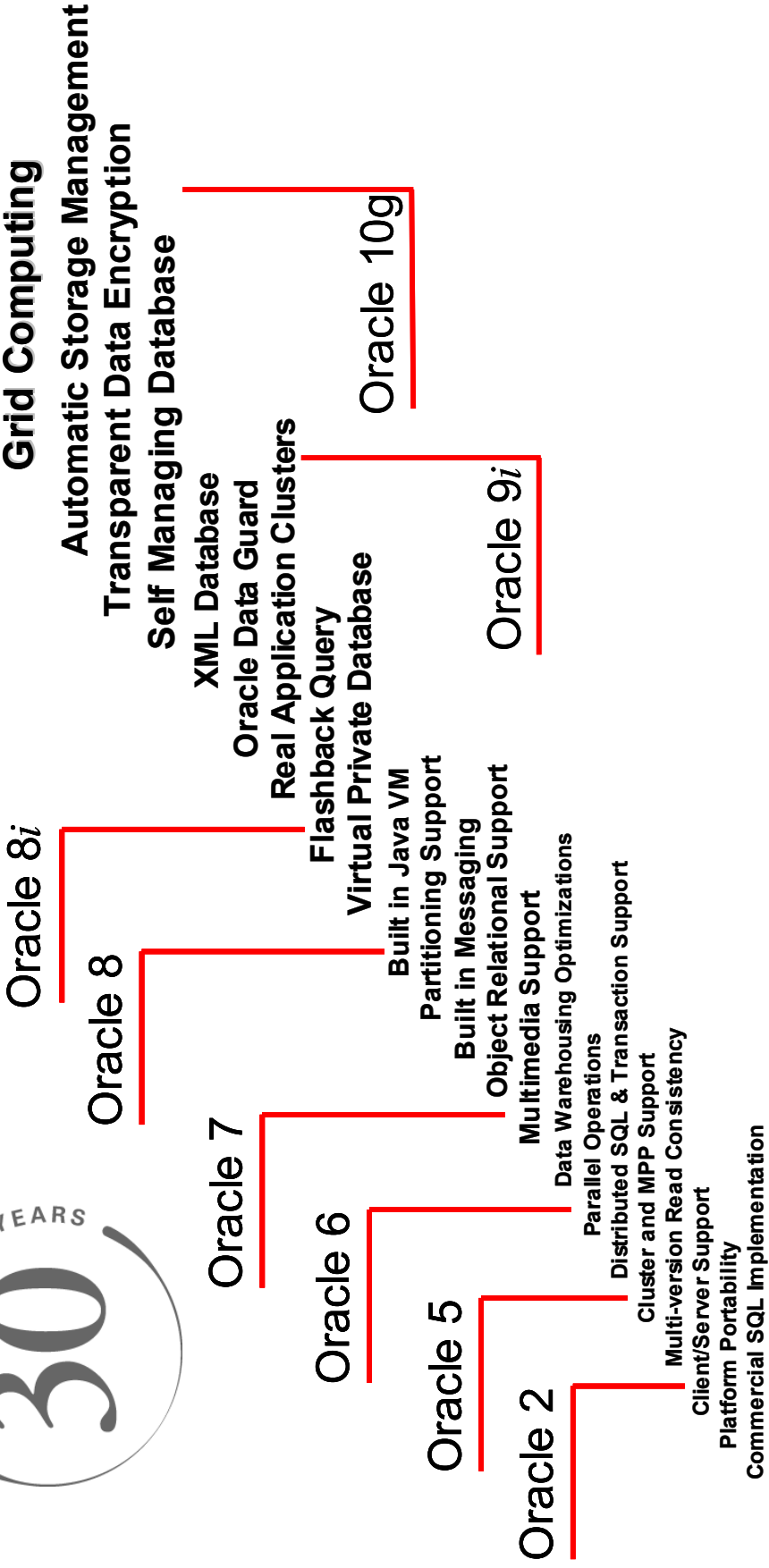
# Technology Advances

- Hardware cost declines
  - Moore's Law (processing)
  - Gilder's Law (bandwidth)
  - Shugart's Law (storage)
- New paradigms and maturing standards
  - SOAP
  - XML
  - Web services



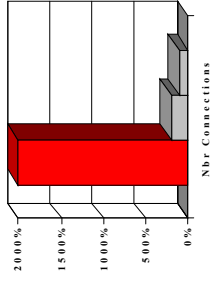


# Oracle's Alignment With Key Business Challenges



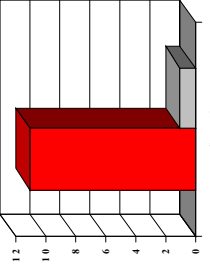
# Example 11g vs 10g

**Database Resident Connection Pool**



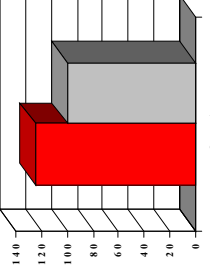
**Up to  
20 x connections**

**Java Just-In-Time Compiler**



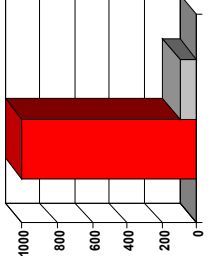
**Up to  
11 x Faster**

**Query Result Caching**



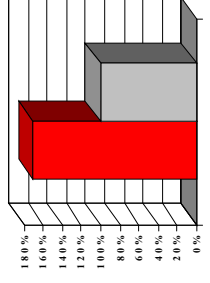
**Up to  
25% Faster**

**TimesTen Cache**



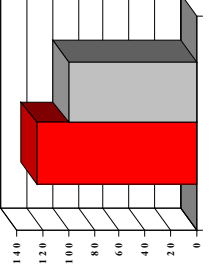
**Up to  
10 x Faster**

**RAC Performance Enhancements**



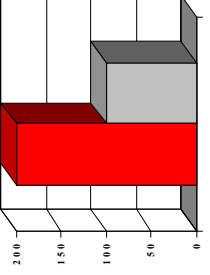
**Up to  
70% Faster**

**Oracle Secure Backup**



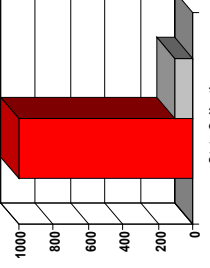
**Up to  
25% Faster**

**Oracle Streams Enhancements**



**Up to  
2 x Faster**

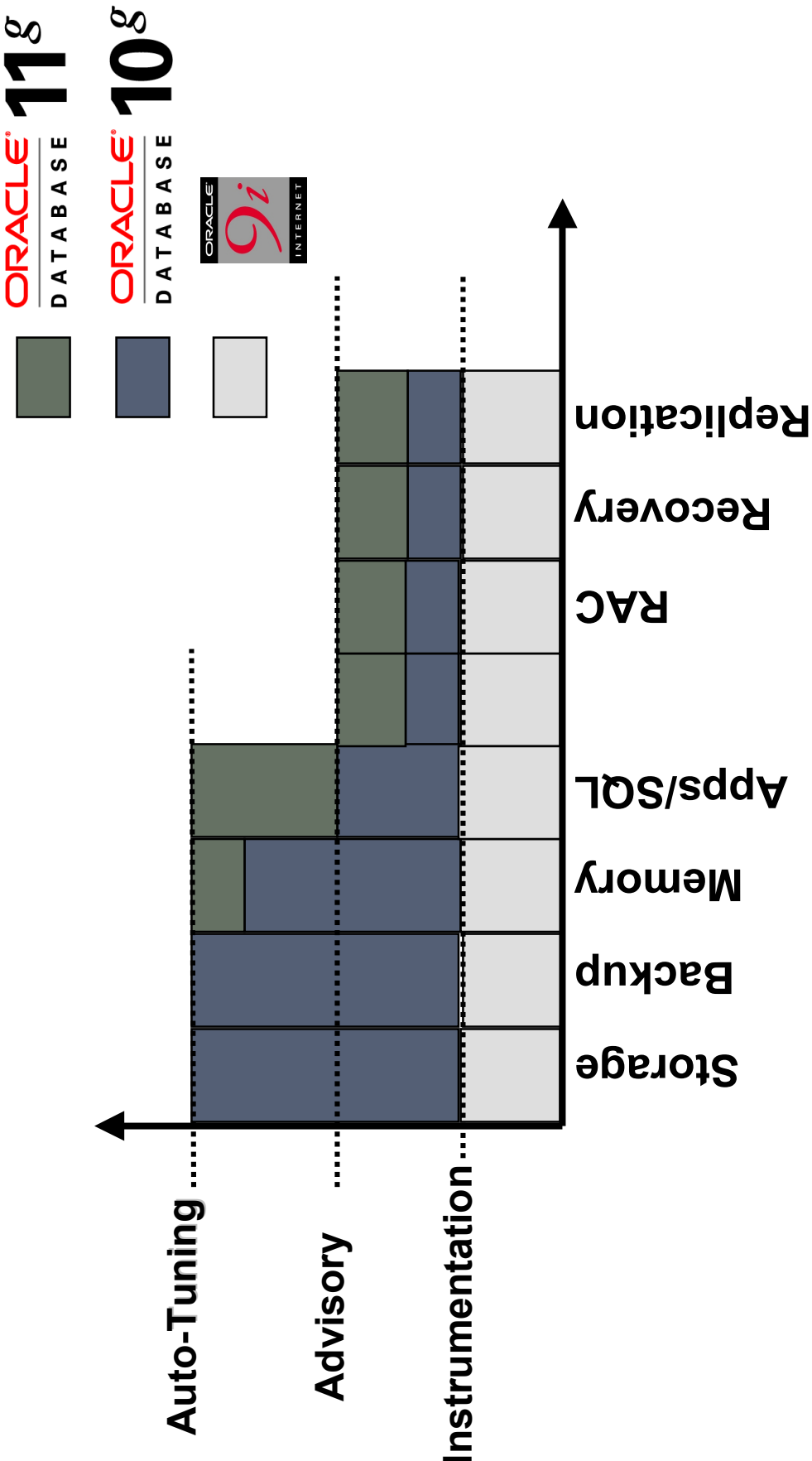
**Optimizer Stats Collection**



**Up to  
10 x Faster**

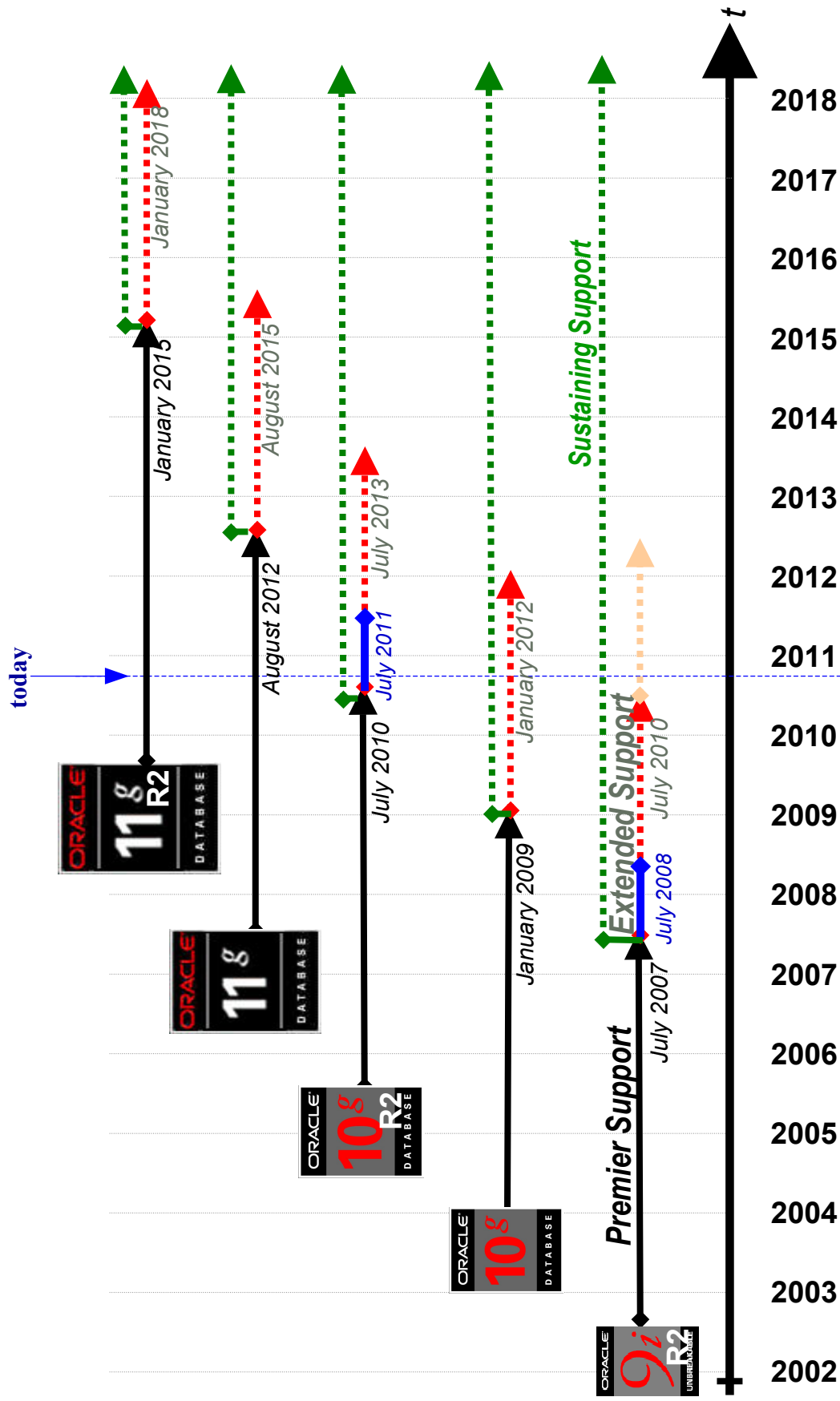


# Self Managing Database





# Lifetime Support Policy

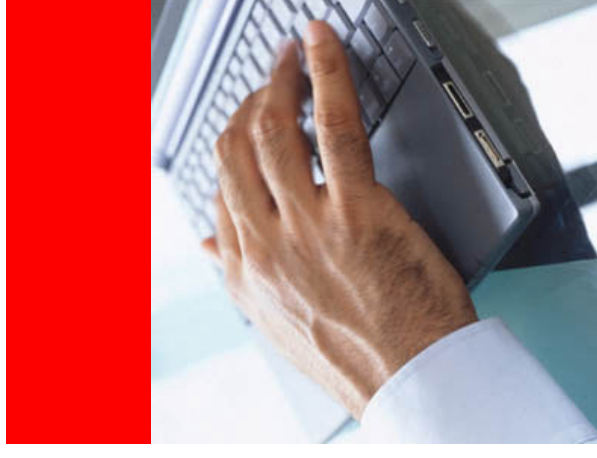


# Lifetime Support Policy

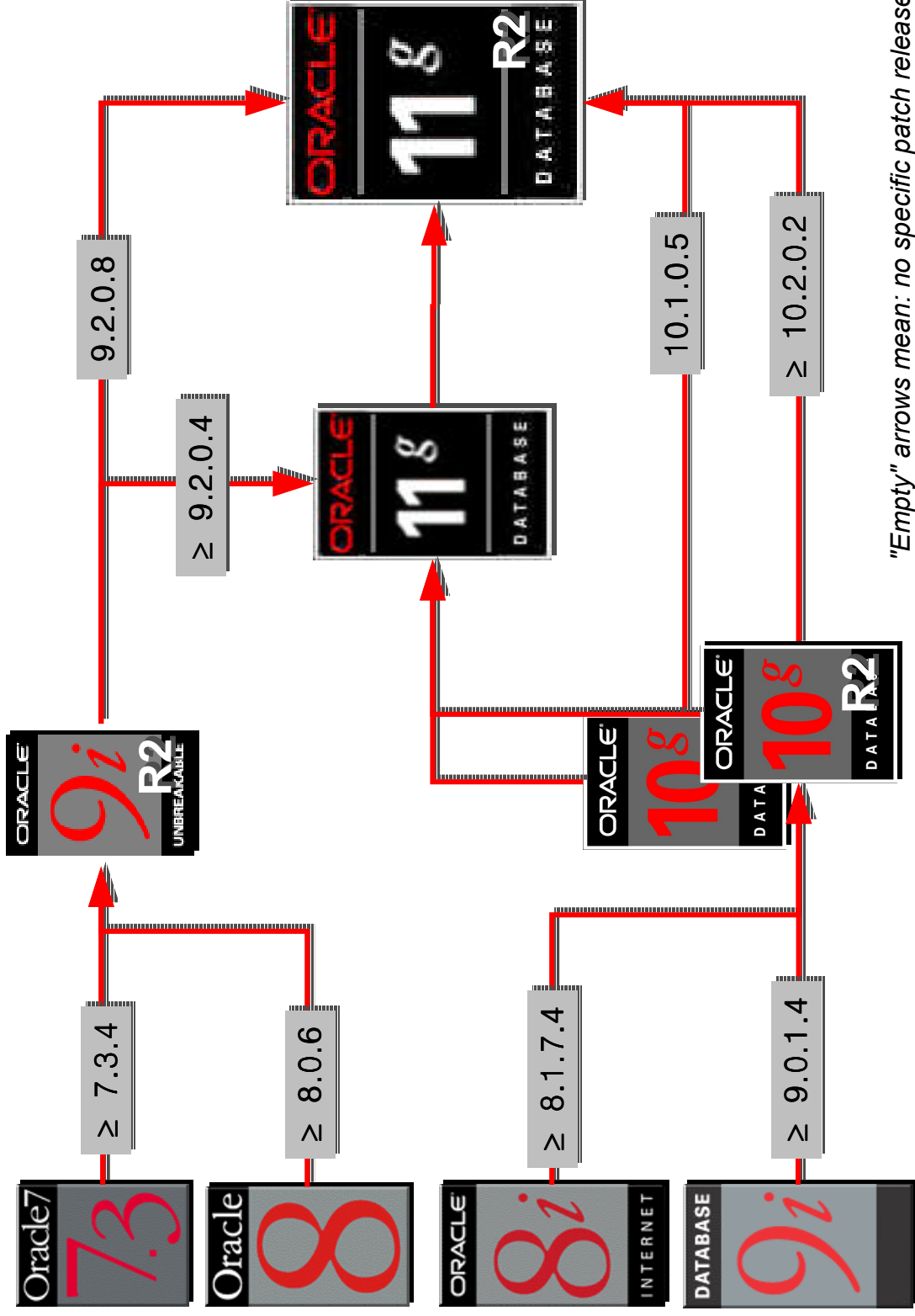
Feature	Premier Support	Extended Support	Sustaining Support
Major Product and Technology Releases	✓	✓	✓
Technical Support	✓	✓	✓
Access to Knowledge Base (Metalink/Customer Connection/SupportWeb)	✓	✓	✓
Updates, Fixes, Security Alerts and Critical Patch Updates	✓	✓	Pre-existing Only
Tax, Legal and Regulatory Updates	✓	✓	No
Upgrade Scripts	✓	✓	No
Certification with existing Third Party Products/Versions	✓	✓	No
Certification with New Third Party Products/Versions	✓	No	No
Certification with new Oracle Products	✓	✓	No

# Agenda

- Preparation
  - Support Policy
  - Certification
  - Documentation
  - References
  - Upgrade paths
  - Sanity operations
  - Preparation
- Installation
- Upgrade
- News and Task List
- Diagnostics & Tuning
- Performance Testing
- Best Practices



# Upgrade to Oracle Database 11g



"Empty" arrows mean: no specific patch release required



# Upgrade Length

- How long will the upgrade take to complete?
  - **Independent** of:
    - Size of the database
    - Used datatypes
  - **Dependent** mainly on:
    - The number of installed components and options
    - Valid and non-stale data dictionary statistics
    - Number of synonyms – they'll get recompiled (upgrade from 9*i*)
    - Number of user objects in XDB (upgrade from 10.2)
    - At a very low rate, if `COMPATIBLE` is increased:
      - Number of datafiles
      - Size of redo logs



# Upgrade Length

- Speed up your upgrade performance by:
- Truncating the auditing table SYS.AUD\$

```
SQL> truncate table SYS.AUD$ drop storage;
```

- Possibly switch off archiving
- Make sure this will comply with your business rules
- **Creating dictionary statistics** right before the upgrade
- Oracle 9i:

```
SQL> exec DBMS_STATS.GATHER_SCHEMA_STATS  
('SYS', options => 'GATHER', estimate_percent =>  
DBMS_STATS.AUTO_SAMPLE_SIZE, method_opt => 'FOR  
ALL COLUMNS SIZE AUTO', cascade => TRUE);
```

- Oracle 10g/11g:

```
SQL> exec DBMS_STATS.GATHER_DICTIONARY_STATS;
```



# Upgrade is easier!

- The upgrade to Oracle Database 11g is much easier than any upgrades to earlier Oracle releases
- Size of Upgrade guides:
  - **8.1.7** - 512 pages
  - **9.0.1** - 484 pages – 111 steps for an RDBMS with 9 components
  - **9.2.0** - 344 pages
  - **10.1.0** - 170 pages
  - **10.2.0** - 140 pages
  - **11.1.0** - 186 pages
  - **11.2.0** - 178 pages

# Documentation

- [Note:250.1 Upgrade Advisors](#)

## Upgrade Advisors

The following upgrade advisors are currently available. Please note that for each advisor there is a specific scope defined. If your environment does not match the listed conditions, please let us know so we can work on expanding our content.

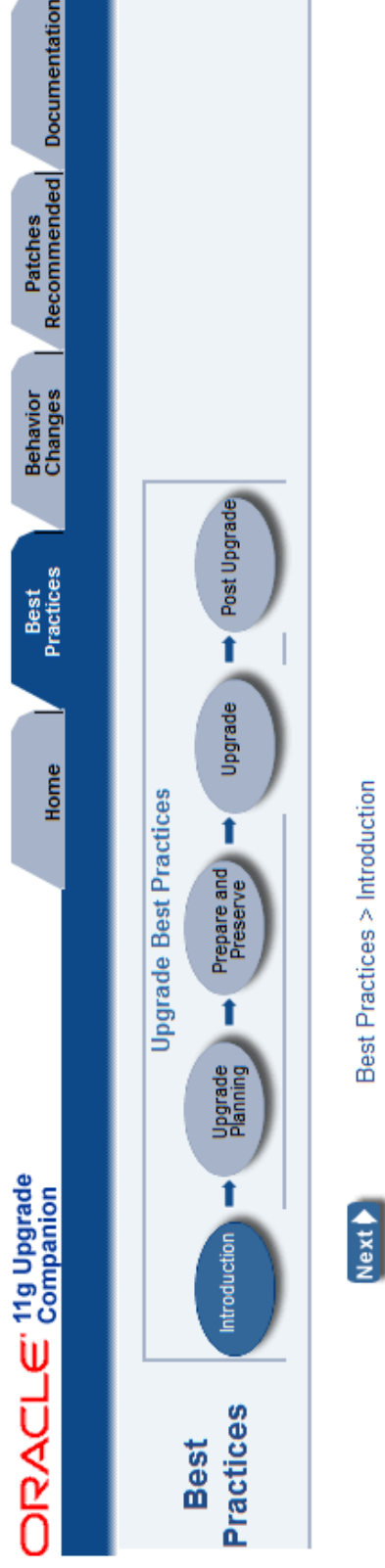
[View All](#) [Oracle Database](#) [Fusion Middleware](#) [JD Edwards](#) [E-Business Suite](#) [PeopleSoft](#) [Siebel](#)

Upgrade Advisor	Description	Document
Database Upgrade from 10.2 to 11.2	This document is intended to guide customers on the path to plan for and execute an upgrade of their Oracle Database from Oracle Database 10g release 2 (10.2) to Oracle Database 11g release 2 (11.2). Customers wishing to upgrade from 9.2 Database version (up to 11.2) may consult the Database 9i release 2 (9.2) to Oracle Database 11g release 2 (11.2) Upgrade Advisor [ <a href="#">264.1</a> ].	<a href="#">251.1</a>
Database Upgrade from 9.2 to 11.2	This document is intended to guide customers on the path to plan for and execute an upgrade of their Oracle Database from Oracle Database 9i release 2 (9.2) to Oracle Database 11g release 2 (11.2).	<a href="#">264.1</a>



# Documentation

- [Note:785351.1](#) Upgrade Companion 11g



## Introduction

The Best Practices section is not a replacement for the *Oracle Database Upgrade Guide* but rather a companion document that emphasizes and elaborates on database upgrade recommendations and requirements. The Best Practices are derived by Oracle technical staff and offer an accumulation of real-world knowledge and experience obtained while working with our customers.

## Usage

The Best Practices tab is organized by the following major steps in the Upgrade Methodology:

- **Upgrade Planning:** Important information related to planning the DB configuration, and testing
- **Prepare and Preserve:** Information related to preserving and preparing the source environment for the Oracle Database 11g Upgrade
- **Upgrade:** Final reminders and information required for the actual upgrade
- **Post Upgrade:** Testing and analysis which should be performed after upgrading your test and production databases to Oracle Database 11g

# OTN Upgrade Forum

• <http://forums.oracle.com/forums/forum.jspa?forumID=583&start=0>

[Forum Home](#) [Database](#) [Database - Upgrade](#)

## Forum: Database - Upgrade

Discuss all aspects of database upgrade from planning and testing through execution and troubleshooting. Also, information about helpful tools and utilities, documentation, and other information to make your database upgrade easier, faster, and less risky.

[Post New Thread](#) [Back to Category](#)

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**Popular Tags**

**10g 11g** 11gr2 9i  
**database** dba error export  
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	Thread	Author	Replies	Last Post
	<b>OTN Database Upgrade Page</b> Posted By: Brian.McCarthy -- Aug 4, 2008 2:44 PM			
	<a href="#">Migration from Oracle 9i.32 bit to Oracle 10g 64 bit on Windows 2003 Server</a>	<a href="#">user6367891</a>	8	Nov 7, 2010 3:14 AM Last Post By: <a href="#">788394</a> »
	<a href="#">Is 11.2.0.2 Patch Set for windows available yet?</a>	<a href="#">david021810</a>	2	Nov 5, 2010 4:44 PM Last Post By: <a href="#">david021810</a> »
	<a href="#">connection from vb.net gives error --ORA-12154: TNS:could not resolve the co</a>	<a href="#">user12158503</a>	1	Nov 5, 2010 12:02 PM Last Post By: <a href="#">schavali</a> »
	<a href="#">Migration - Oracle 9i to Oracle 9.2.0.5</a>	<a href="#">Zombie</a>	3	Nov 4, 2010 12:15 PM Last Post By: <a href="#">Zombie</a> »
	<a href="#">Upgrade from 10.2.0.4 to 10.2.0.5</a>	<a href="#">user611494</a>	0	Nov 4, 2010 11:32 AM Last Post By: <a href="#">user611494</a> »
	<a href="#">oracle upgrade from 10.2.0.1 to 10.2.0.5 and/or with latest patch for 10.2</a>	<a href="#">807486</a>	1	Nov 4, 2010 1:13 AM Last Post By: <a href="#">ora_tech</a> »
	<a href="#">audit public database link by session</a>	<a href="#">susieg</a>	1	Nov 3, 2010 2:46 PM Last Post By: <a href="#">ora_tech</a> »
	<a href="#">upgrade from 10g to 11g</a>	<a href="#">Jimmie_M</a>	7	Nov 3, 2010 1:19 PM Last Post By: <a href="#">moasperiwra</a> »
	<a href="#">upgrade 10.2.0.2 to 10.2.0.5</a>	<a href="#">user11939013</a>	6	Nov 3, 2010 12:18 PM Last Post By: <a href="#">Lynne</a> »
	<a href="#">ORA-06512: at "DBSNMP.BSLN_INTERNAL" -- After 11g Upgrade</a>	<a href="#">user12263759</a>	2	Nov 3, 2010 7:45 AM Last Post By: <a href="#">user12263759</a> »
	<a href="#">upgrade 10.2.0.5 on linux from 10.2.0.1</a>	<a href="#">fmo4222299</a>	7	Nov 3, 2010 5:23 AM Last Post By: <a href="#">fmo4222299</a> »
	<a href="#">running catcpu.sql after installing patch2 10.2.0.5.0</a>	<a href="#">mtumansery</a>	3	Nov 3, 2010 1:10 AM Last Post By: <a href="#">ora_tech</a> »



# Upgrade Blog: [blogs.oracle.com/UPGRADE](http://blogs.oracle.com/UPGRADE)

## Upgrade your Database - NOW!

Ease your Oracle Database upgrades - Best Practices, Workshops, Projects ...

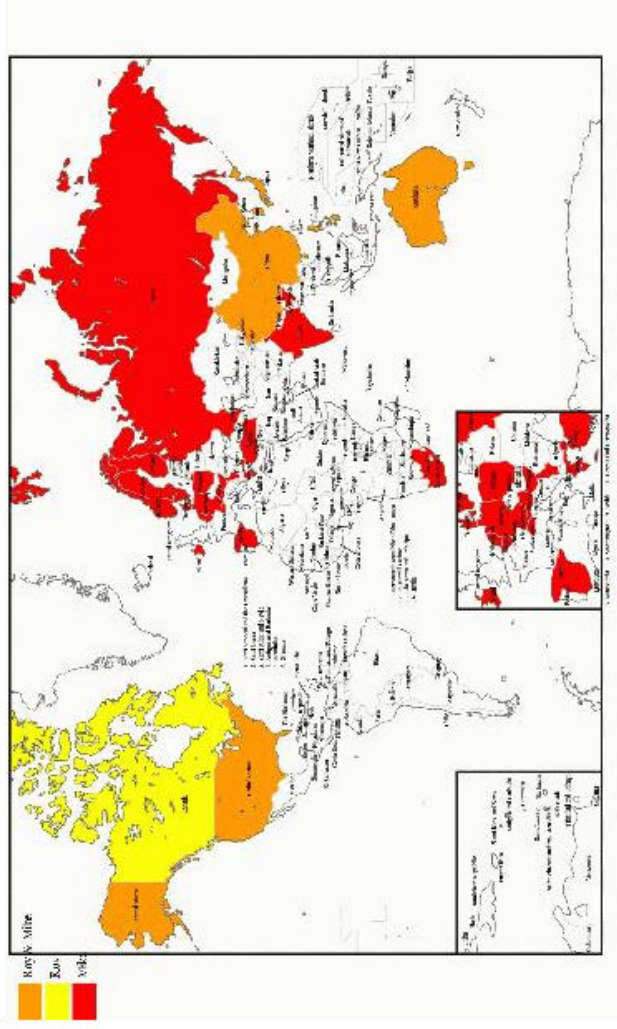
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### Thank you for your support throughout 2010!!

By Mike Dietrich on December 23, 2010 6:40 PM

Now as the calendar year 2010 is close to its end, it's time for a quick wrap-up. The TV stations have shown all their flashbacks already in early December but we'll wait until end of the year ;-) )

I will post some pictures done by Roy or me throughout our travel in the next days. We've visited a lot of countries - and did more than 60 full-day Upgrade Workshops in 28 different countries:



About



Mike Dietrich  
Consulting Member Technical Staff  
Database Upgrade Development  
ORACLE Corporation

Working out of the Oracle's Munich office in Germany acting as interlink between customers and Oracle's Upgrade Development.  
You'd like to connect with me? [LinkedIn](#) or [XING](#) :-)

Slide Downloads

Upgrade to Oracle 11.2  
Upgrade Workshop +500 Slides  
Keyword: upgrade112

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# Anybody live on Oracle Database 11g?

- Currently:
  - 62 external Oracle Database 11g Release 2 references
  - 92 external Oracle Database 11g Release 1 references



# 62 External 11.2 References (1/4)

Ref	Name	Country	Industry	System Name	Platform	OS	Release	Nodes	System Status	Application Provider
✓	<a href="#">AUSTRALIAN FINANCE GROUP LTD</a>	Australia	Financial Services	AUSTRALIAN FINANCE GROUP LTD	Sun	Linux	11gR2	2	Production	Oracle, Siebel
✓	<a href="#">AVEA ILETISIM HIZMETLERI AS</a>	Turkey	Telecommunications	AVEA ILETISIM HIZMETLERI A.S - FULL SAS	Sun	Linux	11gR2	8	Production	Custom
✓	<a href="#">Allegro Group</a>	Poland	Consumer/Retail /Distribution	SUN DB MACHINE	Sun	Linux	11gR2	8	Production	-
✓	<a href="#">BANCO AZTECA S.A. INSTITUCION DE BANCA MULTIPLE</a>	Mexico	Financial Services	BANCO AZTECA - SUN DB MACHINE - FULL RACK SAS	Sun	Linux	11gR2	8	Installation	-
✓	<a href="#">BNP PARIBAS</a>	France	Financial Services	BNP PARIBAS - BUSSY ST GEORGE - 1/2 SAS	Sun	Linux	11gR2	4	Production	-
✓	<a href="#">BNP PARIBAS</a>	France	Financial Services	BNP PARIBAS - ST DENIS - 1/2 SAS	Sun	Linux	11gR2	-	Installation	-
✓	<a href="#">BNP PARIBAS</a>	France	Financial Services	BNP PARIBAS - ST DENIS - 2 SATA STORAGE SVRS	Sun	Linux	11gR2	4	Installation	-
✓	<a href="#">Banca Transilvania / Romania</a>	Romania	Financial Services	BANCA TRANSILVANIA S.A. - SUN DB MACHINE - 1/2 SAS RACK	Sun	Linux	11gR2	4	Installation	-
✓	<a href="#">Bank of America</a>	United States	Financial Services	BANK OF AMERICA - 1/2 RACK SAS - KANSAS CITY, MO	Sun	Linux	11gR2	4	Production	-
✓	<a href="#">Bank of America</a>	United States	Financial Services	BANK OF AMERICA - 1/2 RACK SAS - RICHMOND	Sun	Linux	11gR2	4	Installation	-
✓	<a href="#">Bayer (Bayer Health Care -Japan)</a>	Singapore	Pharmaceutical/Biotech	begspps	Sun	Linux	11gR2	2	Test	-
✓	<a href="#">Cardinal Health</a>	United States	Healthcare	CARDINAL HEALTH	Sun	Linux	11gR2	4	Planning	-
✓	<a href="#">Cardinal Health</a>	United States	Healthcare	Exadata	Sun	Linux	11gR2	4	Project Initiation	-
✓	<a href="#">Commonwealth Bank of Australia</a>	Australia	Financial Services	COMMONWEALTH BANK OF AUSTRALIA - FULL SAS	Sun	Linux	11gR2	8	Production	-
✓	<a href="#">Commonwealth Bank of Australia</a>	Australia	Financial Services	COMMONWEALTH BANK OF AUSTRALIA - SUN DB MACHINE - 1/2 RACK SAS	Sun	Linux	11gR2	4	Installation	-

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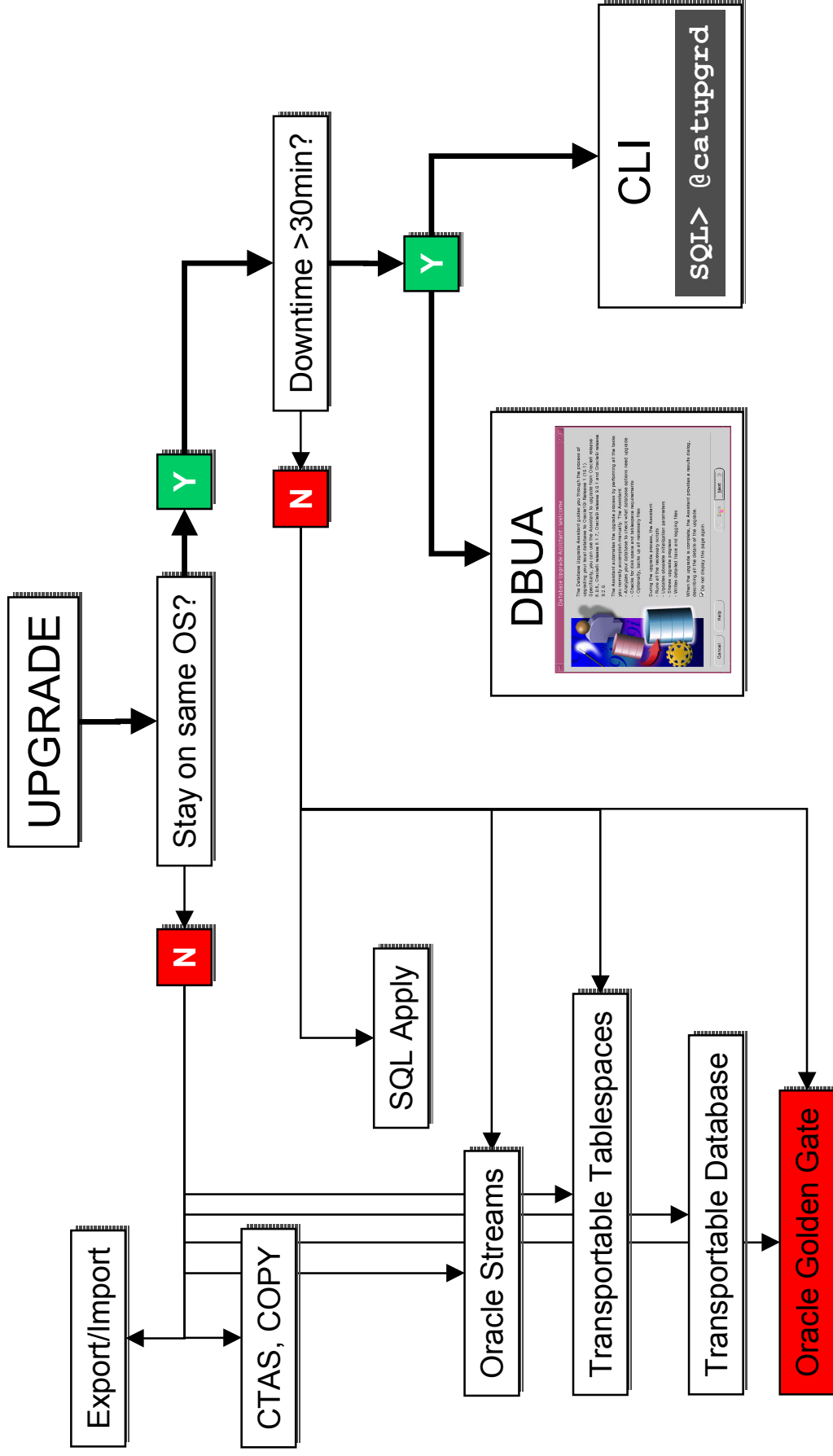
# 92 External 11.1 References (1/6)

Ref	Name	Country	Industry	System Name	Platform	OS	Release	Nodes	System Status	Application Provider
✓	<a href="#">1-800-Flowers (BloomNet)</a>	United States	Consumer/Retail /Distribution	eBusiness Suite (R12)	Sun	Solaris	11gR1	1	Production	Oracle EBS
✓	<a href="#">ATHENS INTERNATIONAL AIRPORT</a>	Greece	Travel and Transportation	CBIS	Sun	Solaris	11gR1	2	Production	Oracle EBS
✓	<a href="#">Advance America</a>	United States	Financial Services	Advance America	IBM	AIX	11gR1	4	Production	Custom
✓	<a href="#">Allstate</a>	United States	Services	OPDS (Oracle PODS)	Sun	Solaris	11gR1	4	Production	Custom
✓	<a href="#">AmTrust (Ohio Savings Bank)</a>	United States	Financial Services	AmTrust Bank 11g EAP	HP	Linux	11gR1	4	Test	Custom
✓	<a href="#">Amazon</a>	United States	Consumer/Retail /Distribution	Multiple Databases	Other Vendor	Linux	11gR1	1	Production	Custom
✓	<a href="#">Amtrak</a>	United States	Travel and Transportation	AMTRAK - DB MACHINE - 2 X 1/2 SATA RACKS - DLVRD	HP	Linux	11gR1	-	Installation	-
✓	<a href="#">Amtrak</a>	United States	Travel and Transportation	EDW	Other Vendor	Linux	11gR1	4	Project Initiation	Informatica
✓	<a href="#">An Garda Síochána</a>	Ireland	Public Services	PULSE	Dell	Linux	11gR1	3	Production	Accenture
✓	<a href="#">Anritsu</a>	Italy	Telecommunications	MasterClaw	HP	Linux	11gR1	1	Production	Custom
✓	<a href="#">Apple Computer Inc</a>	United States	High Technology	APPLE - DB MACHINE - 1 SAS RACK - DLVRD	HP	Linux	11gR1	8	Production	-
✓	<a href="#">Apple Computer Inc</a>	United States	High Technology	APPLE - DB MACHINE - 1/2 SAS RACK - DLVRD	HP	Linux	11gR1	4	Production	-
✓	<a href="#">Apple Computer Inc</a>	United States	High Technology	iTunes & other Web apps - reader farm	Sun	Solaris	11gR1	1	Production	-
✓	<a href="#">Bielefeld University</a>	Germany	Education	HRZD	Sun	Solaris	11gR1	2	Production	-
✓	<a href="#">City of Albuquerque</a>	United States	Government	PeopleSoft	Sun	Solaris	11gR1	1	Production	Peoplesoft
✓	<a href="#">Comic Relief - RNDO/S</a>	United Kingdom	Not for Profit	Donation Processing	HP	Linux	11gR1	2	Production	Custom
✓	<a href="#">CoreLogic Spatial Solutions (formerly First American American Spatial Solutions)</a>	United States	High Technology	Parcel Point	HP	Linux	11gR1	1	Production	-
✓	<a href="#">Credit Suisse (Zuerich)</a>	Switzerland	Financial Services	NZV	Sun	Solaris	11gR1	2	Production	-

Last updated: 23-OC7-2010

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# Upgrade Paths



# Sanity Operations

- Always check for INVALID objects:

```
SQL> SELECT UNIQUE object_name, object_type, owner  
FROM dba_objects WHERE status='INVALID';
```

- **Fix all INVALID objects BEFORE the upgrade!!!!**
- There should be no invalid objects in SYS and SYSTEM user schema
  - Recompile invalid objects with `utlrp.sql` before the upgrade
  - Compare invalid objects from before and after the upgrade
    - Beginning with 11.1.0.7 the comparison has been made easier
    - Run the pre-upgrade check script `utlu12i.sql`
    - Afterwards find invalid objects in `registry$sys_inv_objs` and `registry$nonsys_inv_objs`
    - Compare after the upgrade with: `utluiobj.sql`
    - The view `DBA_INVALID_OBJECTS` contains a list of invalid objects after the upgrade



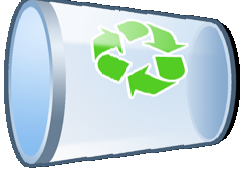


# Sanity Operations



- If upgrading from 10g or 11g, purge the **recyclebin**

```
SQL> purge DBA_RECYCLEBIN;
```



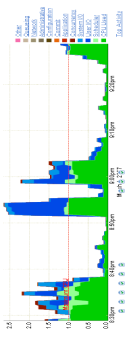


# Sanity Operations

- Remove "old" parameters, underscores and events from your init.ora/spfile
- Examples:

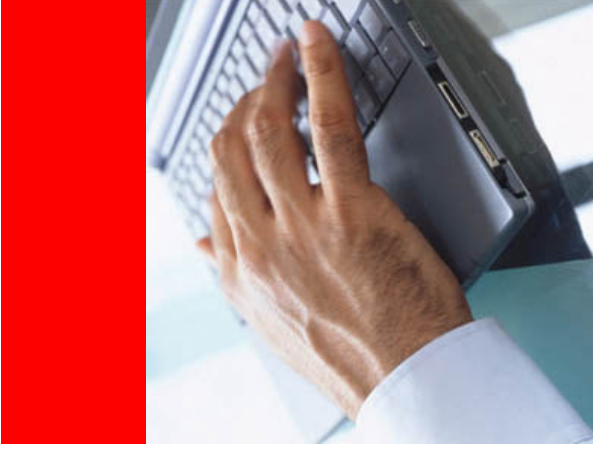
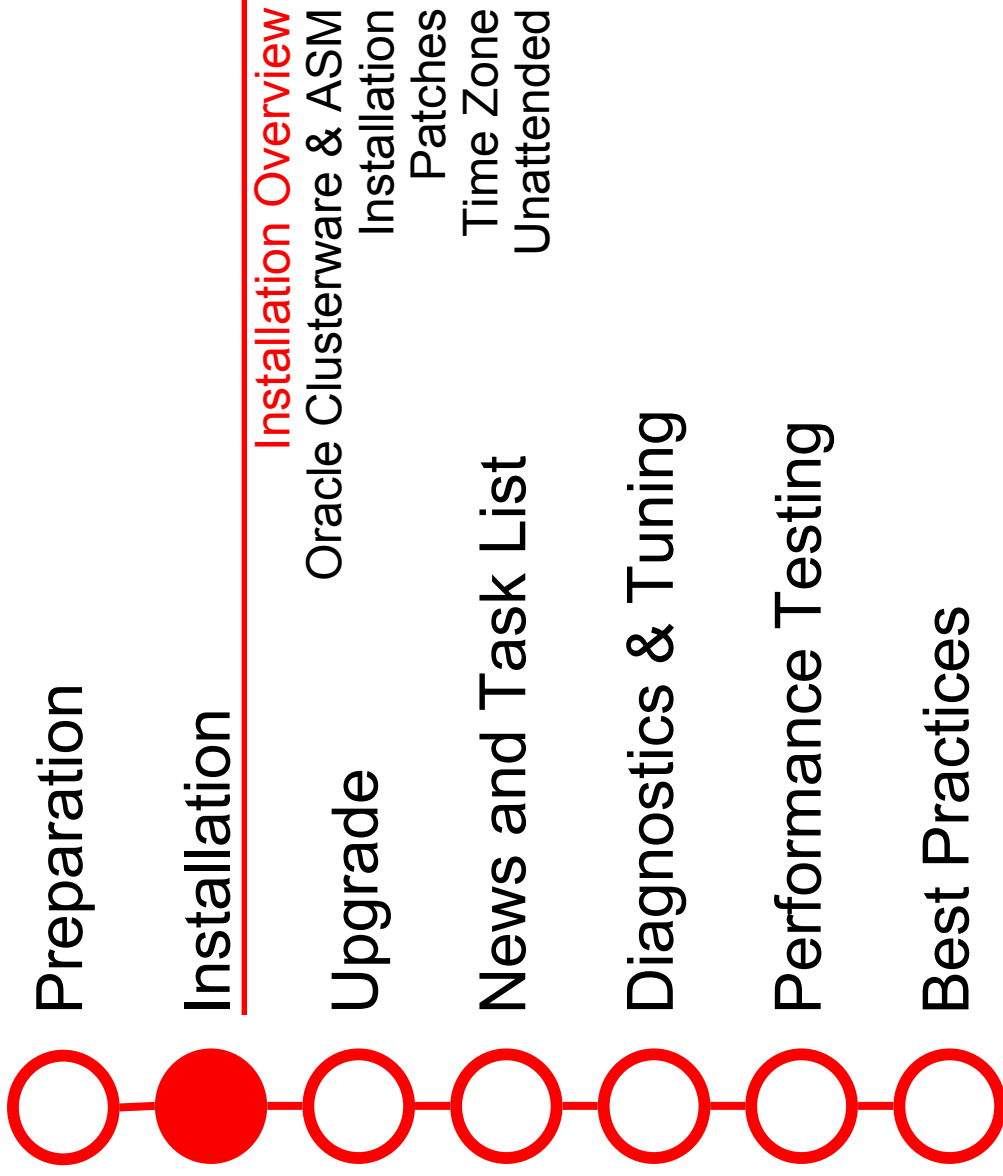
```
init.ora:  
<...>  
_always_semi_join=off  
_unnest_subquery=false  
<...>  
optimizer_features_enable=9.0.1  
<...>  
event = "10061 trace name context forever, level 10"  
<...>
```

# Preparation



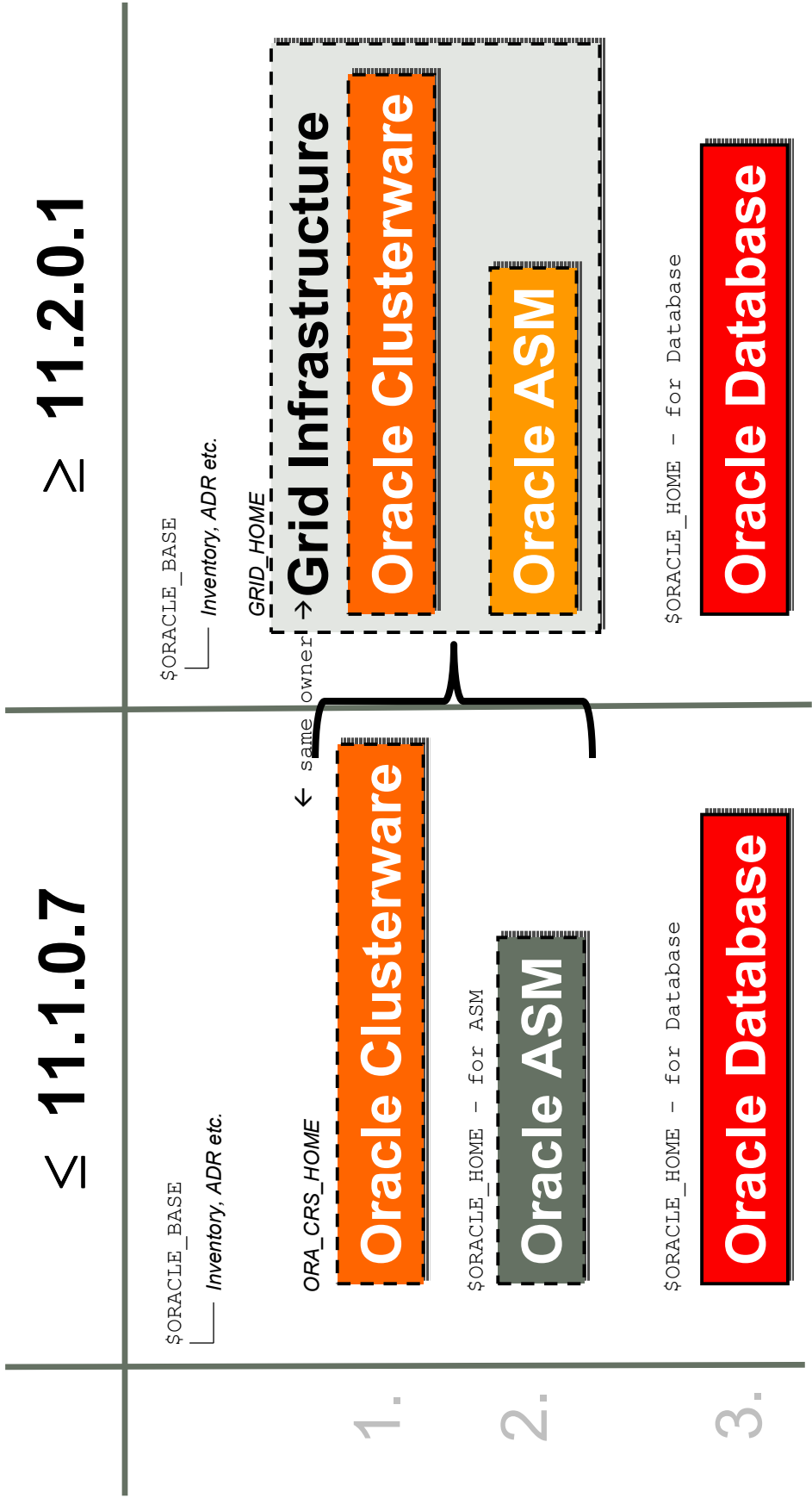
- Collecting sufficient performance data prior to the upgrade is of vital importance
  - Sufficient means: Starting at least 4 weeks before the upgrade
  - Gather accurate performance statistics
  - In Oracle 8i/9i:
    - Use **STATSPACK**
      - Export the PERFSTAT user right before the upgrade
      - [Note:466350.1](#) STATSPACK before/after upgrade
  - In Oracle 10g/11g:
    - Use **AWR**
      - Take snapshots every 30-60 minutes – retention: >30 days
      - Extract the AWR with: `SQL> @?/rdbms/admin/awr_ext.sql`
      - => For 10.1 only use: `DBMS_SWRF_INTERNAL.EXTRACT_AWR`
      - Use AWR DIFF reports to compare before & after upgrade performance:  
`DBMS_WORKLOAD_REPOSITORY.AWR_DIFF_REPORT_HTML`

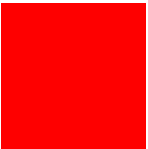
# Agenda



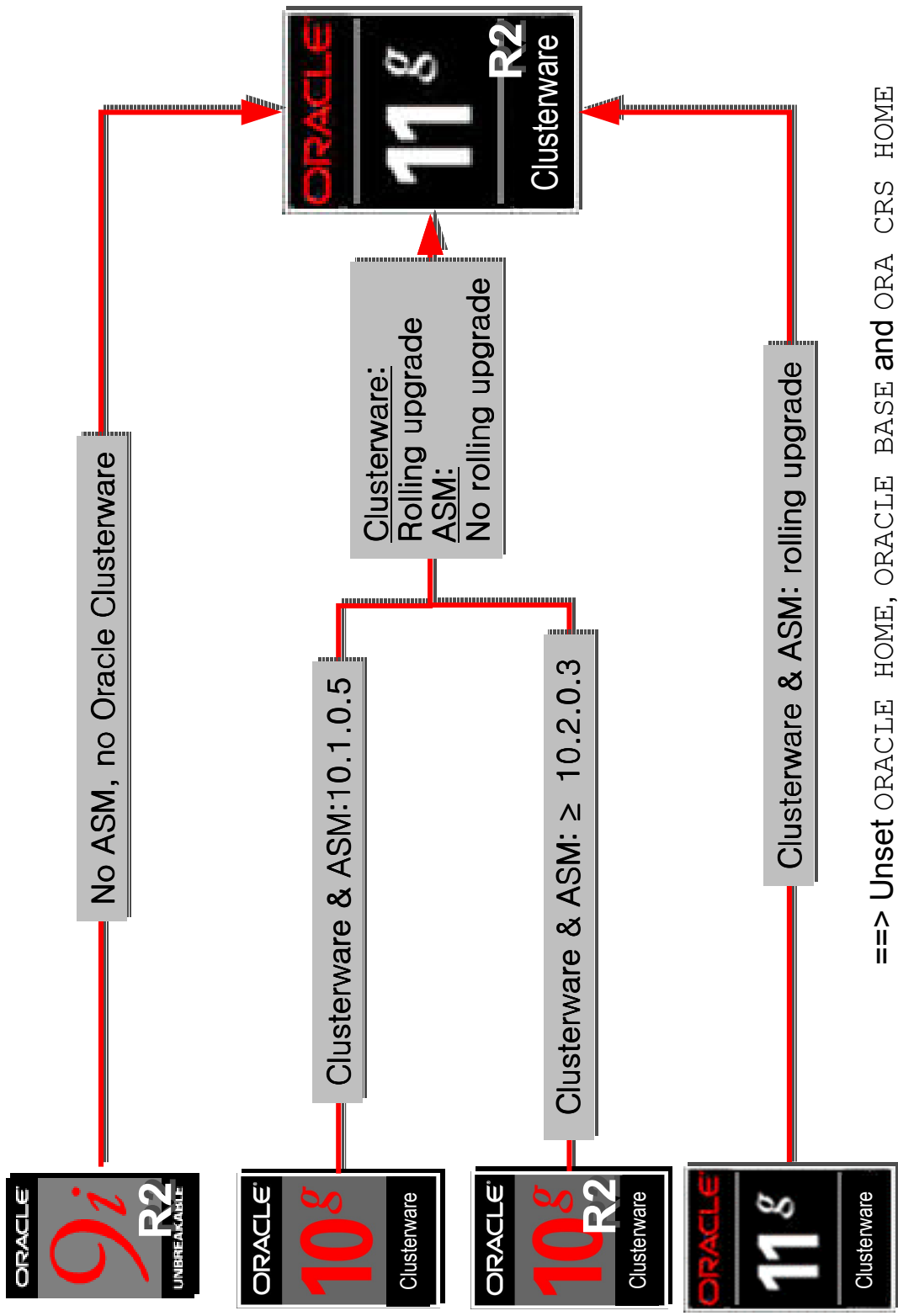


# Installation overview





# Oracle Clusterware Upgrade 11g Release 2

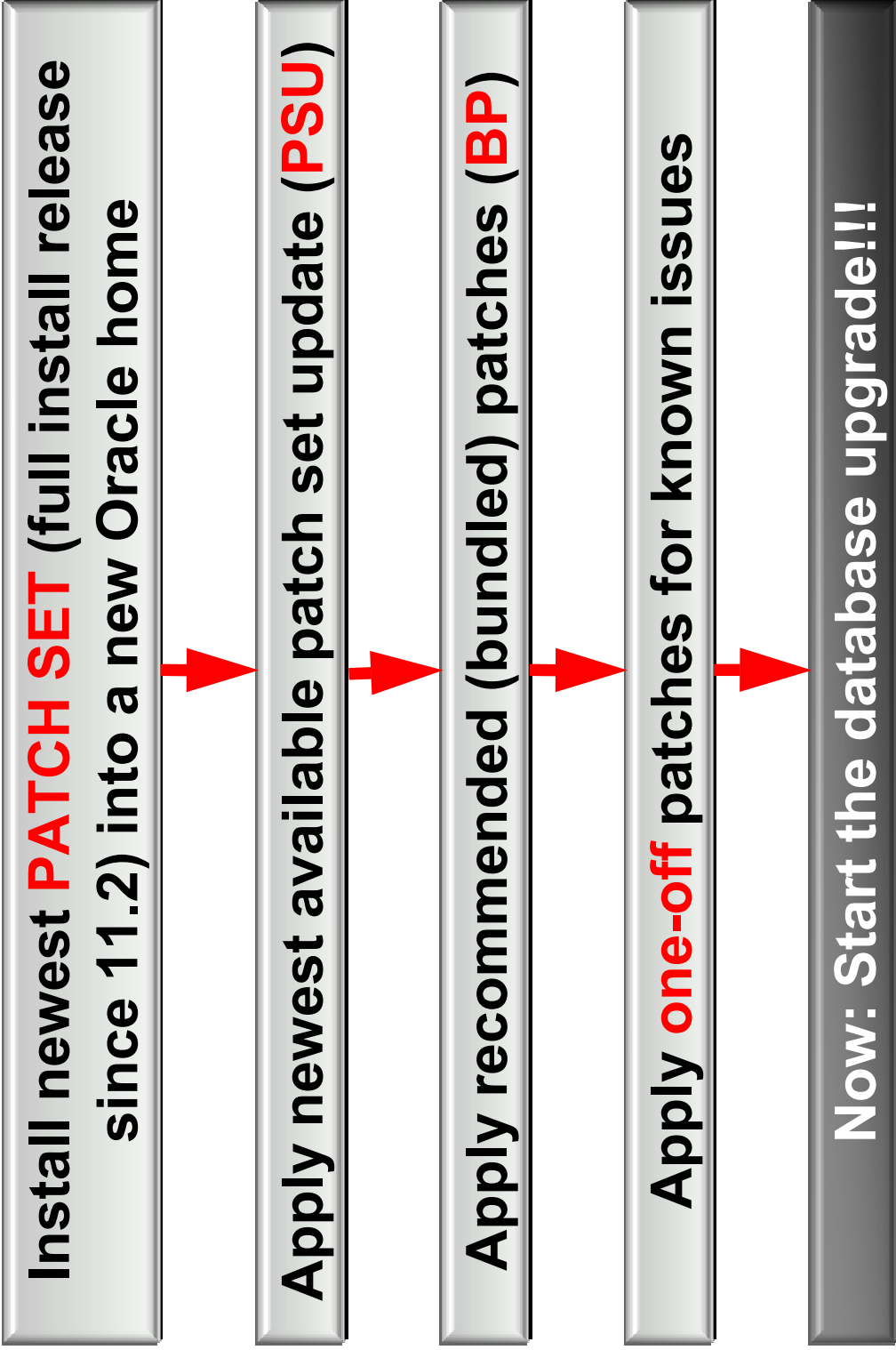


==> Unset ORACLE\_HOME, ORACLE\_BASE and ORA\_CRS\_HOME





# Installation Database Home **11.2**



# Unattended Installation/Configuration

- Two options:
  - **Oracle Universal Installer OUI**
    - Until Oracle 11.1
      - `./runInstaller -record -destinationFile ...`
      - `./runInstaller -silent -noconsole -responseFile ...`
        - ⇒ But this has to be done for a patch set, too
    - Oracle 11.2 – see [Note:885643.1](#)
      - SAVE RESPONSEFILE option in OUI available
      - Or: Start OUI “silent” with all required parameters
  - **Home Cloning (script or Provisioning Pack)**
    - Prepare a fully patched Oracle Home
    - Create an archive consisting of all files
      - Exclude `*log, *dbf, tnsnames/listener/sqlnet.ora`
    - Unpack archive and then `./runInstaller -silent -clone -...`
  - **Listener Configuration**
    - `./netca /silent /responseFile $OH/inventory/response/netca.rsp`





# Database Upgrade Assistant (GUI)

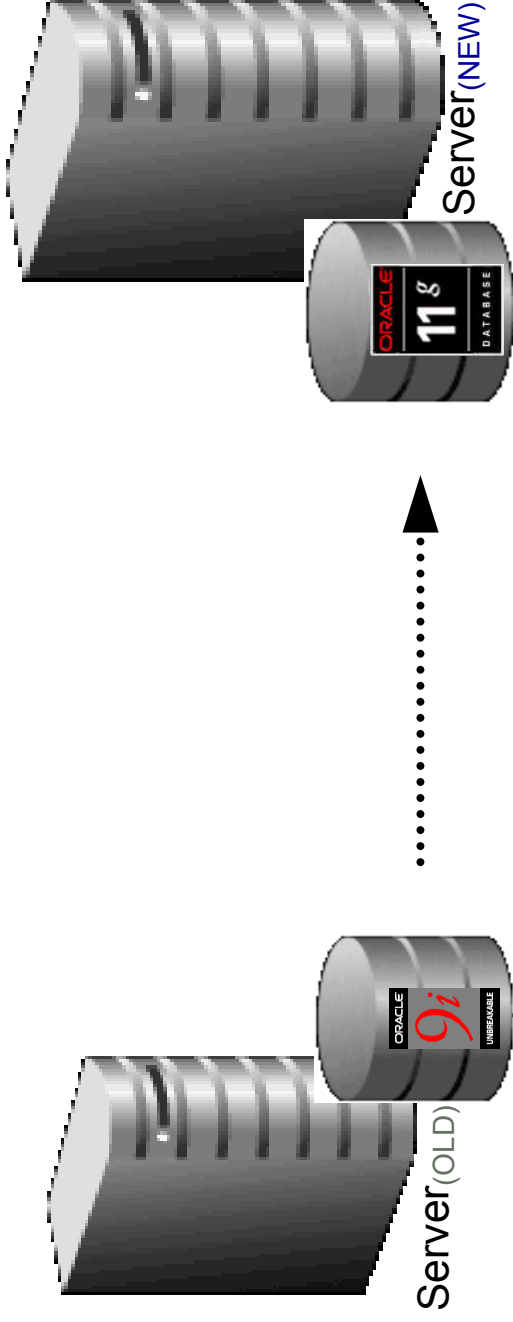


- Features:
  - Graphically led upgrade
  - Lots of important checks
  - RAC aware - inclusion of all nodes
    - for RAC (almost) a must !!!
  - Offline Backup and Restore possible
  - ASM upgrade (until 11.1)
  - Oracle XE upgrade
  - Patch upgrades
- Logs:
  - `$ORACLE_HOME/cfgtoollogs/dbua`
- Documentation:
  - Oracle® Database Upgrade Guide  
[http://download.oracle.com/docs/cd/E11882\\_01/server.112/e17222/toc.htm](http://download.oracle.com/docs/cd/E11882_01/server.112/e17222/toc.htm)



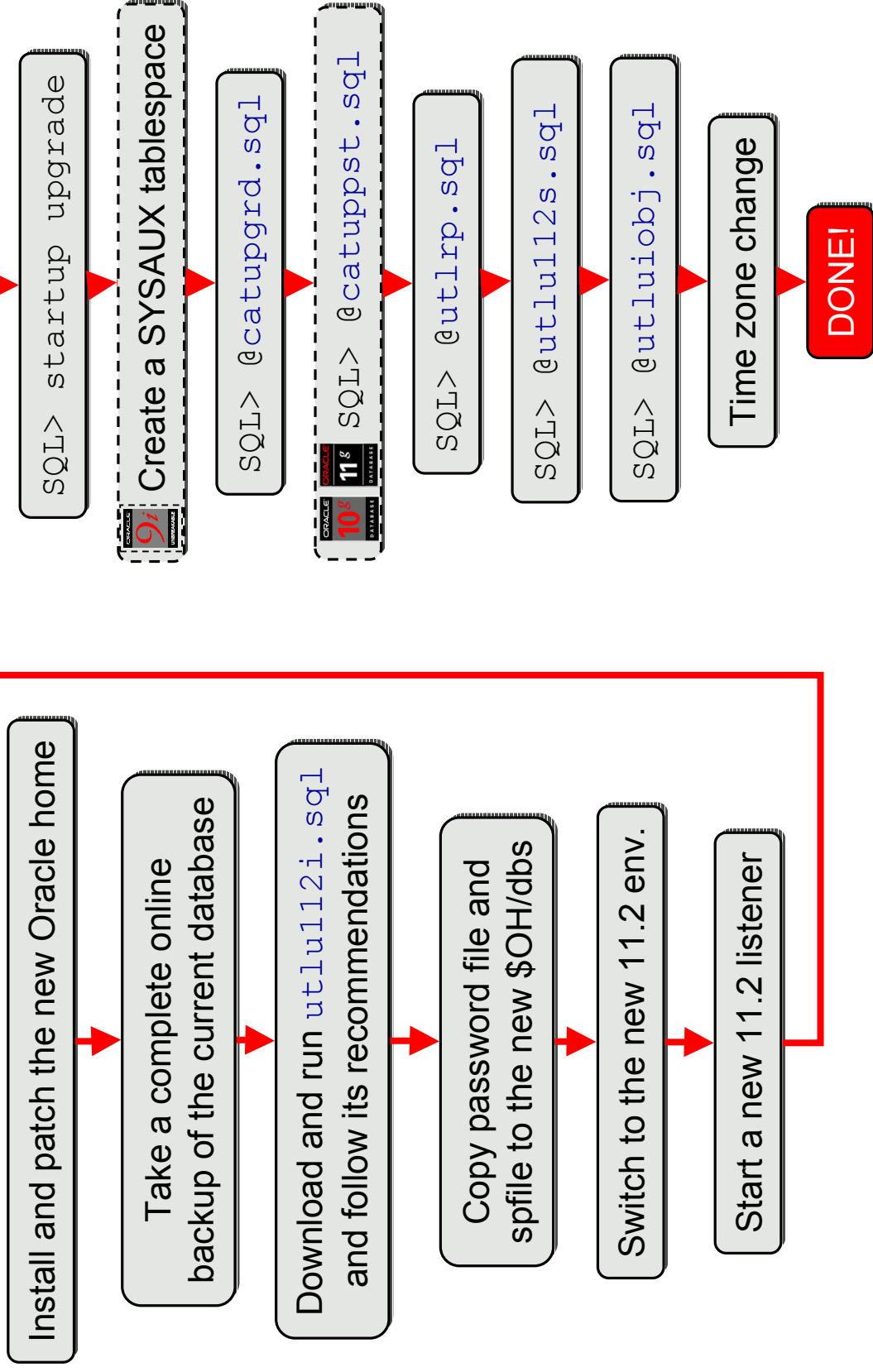
# Command Line Upgrade

- Typical scenario: e.g. changing to a new server



- 1) Install Oracle11g software
- 2) Copy `utlu112i.sql`
- 3) Run `utlu112i.sql`
- 4) Shutdown database
- 5) Copy all relevant files  
(*dbf, ctl, log, spfile, orapw*)
- 6) Apply suggested changes
- 7) Start the upgrade process

# Command Line Upgrade – Step-by-Step



# Post Upgrade - SPFILE

Best Practice

- Always **create an editable init.ora** from the current SPFILE after the upgrade has been finished
- Prevents rewrite in case of setting wrong parameters or forced edit
- Keep in mind:
  - The SPFILE is binary file!! Don't edit it!! Default since Oracle 9.0
  - It simply will exist after using DBUA or DBCA

```
SQL> create pfile='/tmp/initDB.ora' from spfile;  
<< Now edit init.ora with any editor >>  
SQL> startup force pfile=/tmp/initDB.ora  
SQL> create spfile from pfile;
```

- Parameter can be changed by:

```
SQL> alter system set PARAMETER=VALUE scope=both;
```

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# Post Upgrade Task – time zone

**Only in 11g Release 2**

- Adjust time zone data in the database to **DST V11** or higher:

```
startup upgrade
exec dbms_dst.begin_upgrade(new_version => 14) ;
shutdown immediate;

startup;
set serveroutput on;
declare
  num_of_failures number;
begin
  dbms_dst.upgrade_database(num_of_failures) ;
  dbms_output.put_line(num_of_failures) ;
  dbms_dst.end_upgrade(num_of_failures) ;
  dbms_output.put_line(num_of_failures) ;
end;
/
```

- For more information see the Globalization Doc:

[http://download.oracle.com/docs/cd/E11882\\_01/server.112/e10729/ch4datetime.htm#NISPG261](http://download.oracle.com/docs/cd/E11882_01/server.112/e10729/ch4datetime.htm#NISPG261)

# Gather Workload Statistics

Best Practice

- Gather **system statistics** during a regular workload period - otherwise non-appropriate values for the CBO will be used:

```
SQL> EXECUTE dbms_stats.gather_system_stats('start');  
      << Run it for several hours on a workload – does not generate overhead!!! >>  
SQL> EXECUTE dbms_stats.gather_system_stats('stop');
```

```
SQL> select pname NAME, pval1 VALUE, pval2 INFO  
       from aux_stats$;
```

NAME	VALUE	INFO
STATUS		COMPLETED
DSTART		04-03-2010 12:30
DSTOP		05-03-2010 12:30
FLAGS	1	
CPUSPEEDNW	2498,65	
IOSEEKTIM	11,405	
IOTFRSPED	25595,605	
...		



# Parameter COMPATIBLE

- COMPATIBLE has to be at least 10.1.0 for an 11g database
- No way back once  $\geq 11.1.0$  has been enabled
  - Supported release downgrade to 10.1.0.5,  $\geq 10.2.0.2$ ,  $\geq 11.1.0.6$
  - No ALTER DATABASE RESET COMPATIBILITY command anymore



COMPATIBLE = 10.0/1/2.0



COMPATIBLE = 11.0.0



# New 11g Parameters

- **New in 11.1.0.6:**

- ASM PREFERRED\_READ\_FAILURE\_GROUPS  
CLIENT\_RESULT\_CACHE\_LAG  
CLIENT\_RESULT\_CACHE\_SIZE  
COMMIT\_LOGGING  
COMMIT\_WAIT  
CONTROL\_MANAGEMENT\_PACK\_ACCESS  
DB\_LOST\_WRITE\_PROTECT  
DB\_SECUREFILE  
DB\_ULTRA\_SAFE  
DDL\_LOCK\_TIMEOUT  
DIAGNOSTIC\_DEST  
GLOBAL\_TXN\_PROCESSES  
JAVA\_JIT\_ENABLED  
LDAP\_DIRECTORY\_SYSAUTH  
MEMORY\_MAX\_TARGET  
MEMORY\_TARGET  
OPTIMIZER\_CAPTURE\_SQL\_PLAN\_BASELINES  
OPTIMIZER\_USE\_INVISIBLE\_INDEXES  
OPTIMIZER\_USE\_PENDING\_STATISTICS  
OPTIMIZER\_USE\_SQL\_PLAN\_BASELINES

- **New in 11.1.0.7 (for Exadata/SAGE):**

- CELL\_OFFLOAD\_PROCESSING  
CELL\_OFFLOAD\_DECRYPTION  
CELL\_OFFLOAD\_PARAMETERS

- PARALLEL\_IO\_CAP\_ENABLED  
PLSCOPE\_SETTINGS  
REDO\_TRANSPORT\_USER  
RESOURCE\_MANAGER\_CPU\_ALLOCATION  
RESULT\_CACHE\_MAX\_RESULT  
RESULT\_CACHE\_MAX\_SIZE  
RESULT\_CACHE\_MODE  
RESULT\_CACHE\_REMOTE\_EXPIRATION  
SEC\_CASE\_SENSITIVE\_LOGON  
SEC\_MAX\_FAILED\_LOGIN\_ATTEMPTS  
SEC\_PROTOCOL\_ERROR\_FURTHER\_ACTION  
SEC\_PROTOCOL\_ERROR\_TRACE\_ACTION  
SEC\_RETURN\_SERVER\_RELEASE\_BANNER  
XML\_DB\_EVENTS

- CELL\_OFFLOAD\_COMPACTION  
CELL\_OFFLOAD\_PLAN\_DISPLAY



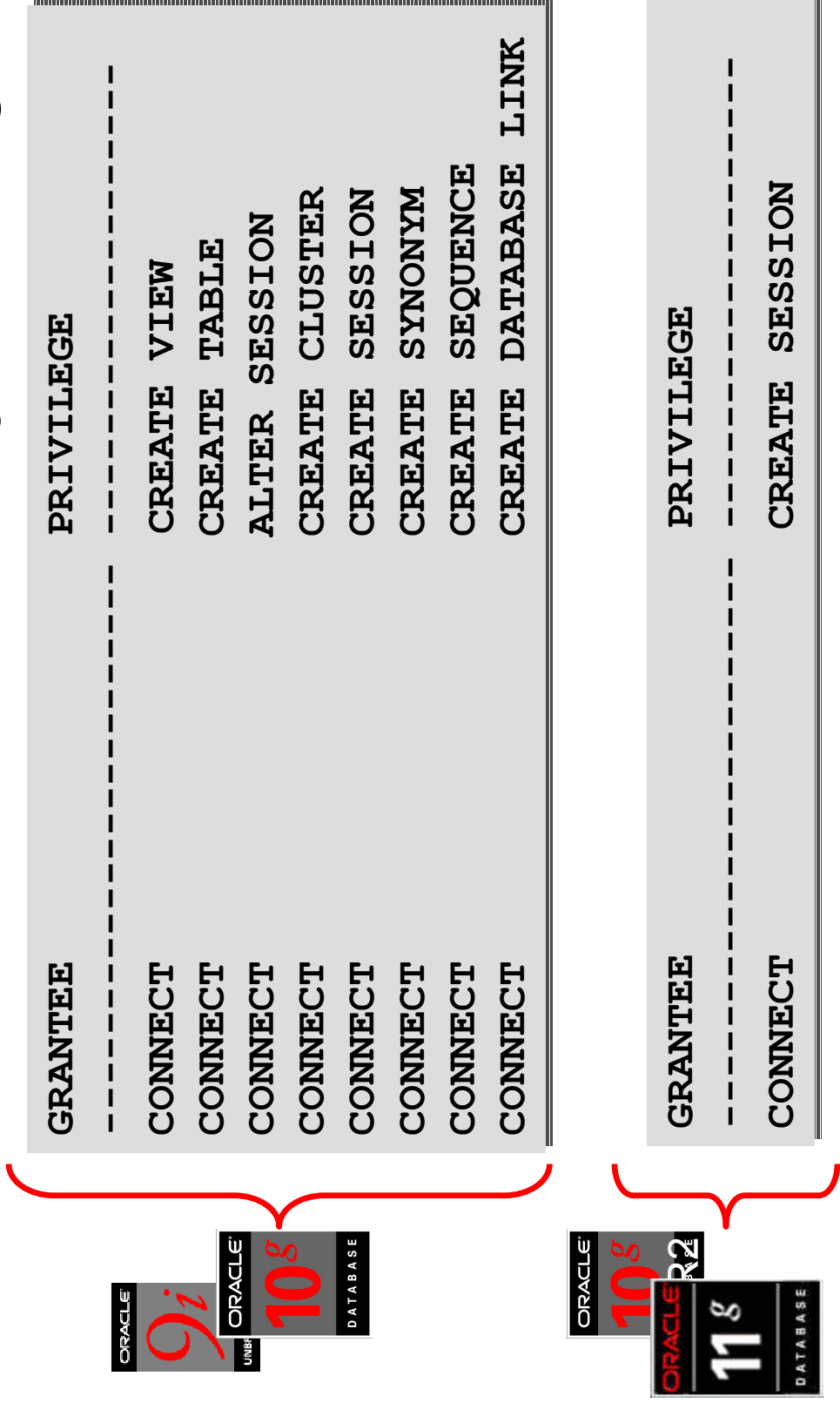
# New Background Processes

Process Name	Description	Found
<b>ACMS</b>	In an RAC environment, this per-instance process (Atomic Controlfile to Memory Service) is an agent which contributes to ensuring a distributed SGA memory update is either globally committed on success or globally aborted in the event of a failure.	<b>RAC</b>
<b>DIA0</b>	Responsible for hang detection and deadlock resolution.	<b>ALL</b>
<b>DIAG</b>	Performs diagnostic dumps and executes global oradebug commands.	<b>ALL</b>
<b>DBRM</b>	The Resource Manager process is responsible for setting Resource Plans and other Resource Manager related tasks.	<b>ALL</b>
<b>EMNC / e0xx</b>	The Event Monitor Coordinator coordinates the event management and notification activity in the database which includes Streams Event Notifications, Continuous Query Notifications and Fast Application Notifications.	<b>ALL with any registered event activity (optional non-fatal)</b>
<b>FBDA</b>	The process archives historical rows for tracked tables into flashback data archives and manages the flashback archives.	<b>ALL</b>
<b>GEN0</b>	General Task Execution Process. Performs required tasks including SQL and DML.	<b>ALL</b>
<b>GMON</b>	Maintains disk membership in ASM disk groups	<b>ASM</b>
<b>GTX0-j</b>	Provides transparent support for XA global transactions in a RAC environment. The database autotunes the number of these processes based on the workload of XA global transactions.	<b>RAC only</b>



# CONNECT Role

- The CONNECT Role has been changed since 10gR2:



# GROUP BY results: unsorted

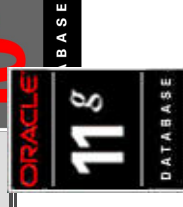
- Hash Group by aggregation which allows a hash algorithm to process group by statements
  - For sorts ORDER BY has to be used

```
select sum(sal), deptno from scott.emp group by deptno;
```

```
SUM(SAL)  DEPTNO
-----  -
      8750         10
     10875         20
      9400         30
```

```
SUM(SAL)  DEPTNO
-----  -
      9400         30
     10875         20
      8750         10
```

- Description see [Note:345048.1](#)
  - `_gby_hash_aggregation_enabled=false`





# Instant Client

- Universal. small footprint Oracle client
  - Works with OCI, OCCI, Pro\*C, ODBC, JDBC, ODP.NET, ASP.NET, OLE DB and OO4O applications
  - No OUI Oracle Client installation necessary anymore
- Easy and simple deployment
  - Download it from OTN
  - Copy it to the target/client system(s)
  - Add its directory to `PATH/LD_LIBRARY_PATH` and set `TNS_ADMIN`
    - For ODBC run the provided batch script
  - Patching? Just deploy the current version
- More Information on OTN:  
<http://www.oracle.com/technetwork/database/features/instant-client/index-100365.html>

# Enterprise Manager 11g

- Database Control for all database administration tasks

The screenshot displays the Oracle Enterprise Manager 11g Database Control interface. At the top, it shows the instance name 'HUGO' and the user 'User SYS logged on from stadd57'. The main navigation bar includes 'Home', 'Performance', 'Availability', 'Server', 'Schema', 'Data Movement', 'Software and Support', and 'Database'. The 'General' tab is active, showing a 'Status Up' indicator and a 'Up Since' of 'Sep 6, 2009 10:25:04 AM EDT'. Below this, there are several charts: 'Host CPU' (showing 0% usage for 'Other' and 'HUGO'), 'Active Sessions' (showing 2.00 sessions for 'Wait', 'User I/O', and 'CPU'), and 'SQL Response Time' (showing 0.00 seconds). A 'Diagnostic Summary' section on the right lists 'ADDM Findings' (0), 'Alert Log' (No ORA- errors), 'Active Incidents' (1), and 'Key SQL Profiles' (1). At the bottom, an 'Alerts' section shows a 'Warning' for 'User SYS logged on from stadd57'.

- Grid Control as an IT system administration tool
- Supports Oracle and non-Oracle IT infrastructures
- Grid Control 11g has been available since 22-APR-2010
- Be sure to upgrade the agents when you upgrade to a new version of GC!



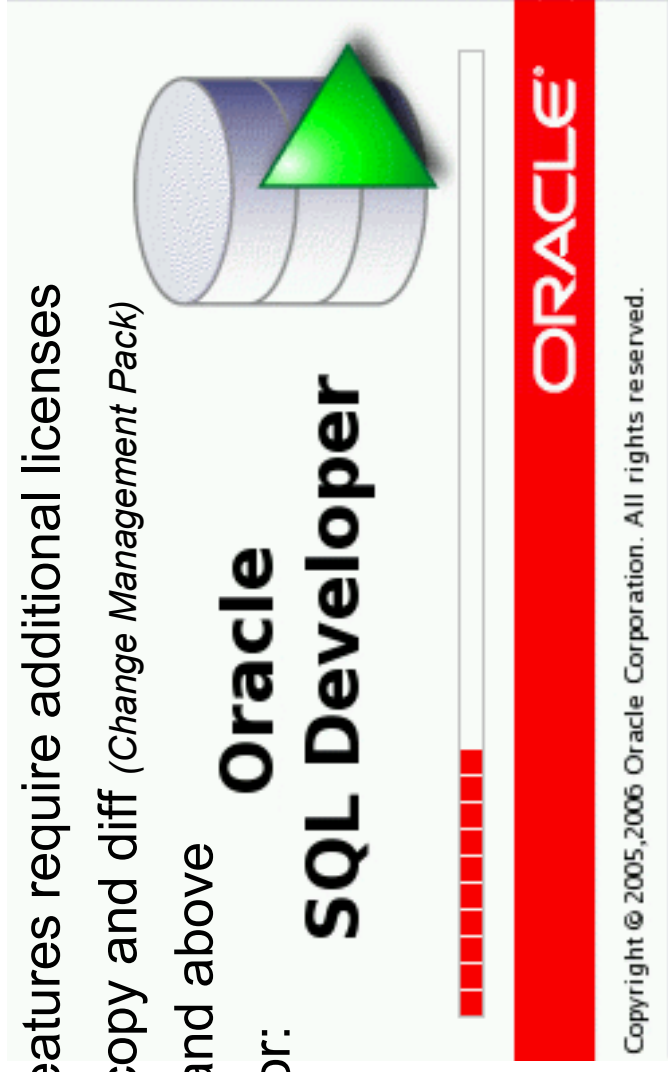
# SQL Developer



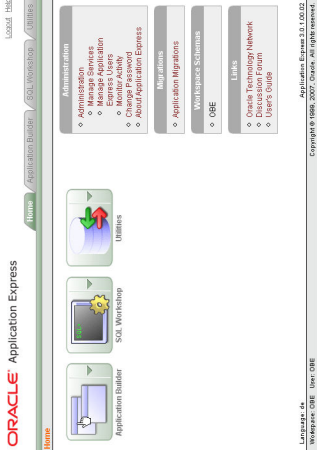
- Developer tool at no extra cost

<http://www.oracle.com/technetwork/developer-tools/sql-developer/overview/index.html>

- Key Features:
  - Excellent PL/SQL development and debugging
  - Extremely fast object browser
  - Base tool free, some features require additional licenses
    - Schema/database copy and diff (*Change Management Pack*)
  - Supports Oracle 9iR2 and above
  - Migration workbench for:
    - MS SQL-Server
    - MS Access
    - MySQL
  - Current version:
    - 2.1.1



# APEX



- APEX = Application Express = ex-HTMLDB
- GUI development environment
- Easy to use - wizard driven
- Forms conversion assistant
- APEX is available by default
- No additional installation or license necessary
- Oracle Database 11.2 ships with APEX 3.2
  - No webserver necessary – XDB gateway used for http
  - APEX 4.0 available
  - HTTP via APEX Listener
    - <http://www.oracle.com/technetwork/developer-tools/apex-listener/overview/index.html>
- Two configuration steps:
  - `$ORACLE_HOME/apex/apxconf.sql`
  - `ALTER USER anonymous ACCOUNT UNLOCK;`



# LONG ⇔ LOB Conversion

- Conversion:

```
ALTER TABLE long_tab MODIFY ( long_col CLOB );
```

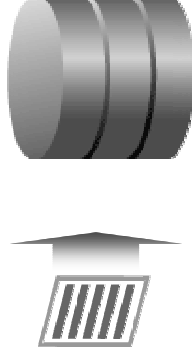
- Online Table Redefinition

- Available for LONG/LOB since 10g
- Package: DBMS\_REDEFINITION
- Regulation:
  - LONG ⇔ CLOB
  - LONG RAW ⇔ BLOB
- Conversion is done implicitly
- For scripted examples see: [Note:251417.1](#), [Note:556283.1](#) and [Note:1012454.7](#)
- Advantage:
  - Source table is available during the whole process



# SecureFiles

- Securefiles = new LOB storage technology
  - Better performance
  - Additional features: deduplication, encryption
- Examples:



```
CREATE TABLE t1 (a CLOB) LOB(a) STORE AS SECUREFILE;  
CREATE TABLE t2 (a CLOB) LOB(a) STORE AS SECUREFILE  
(DEDUPLICATE);  
CREATE TABLE t3 (a CLOB ENCRYPT USING 'AES128')  
LOB(a) STORE AS SECUREFILE (CACHE);
```

- Tablespace must be ASSM managed
- Initialization parameter

```
DB_SECUREFILE = [NEVER | PERMITTED | ALWAYS | IGNORE]  
→ CREATE TABLE t1 (a CLOB); -- this will be a Securefile!!
```

# Agenda

○ Preparation

○ Installation

○ Upgrade

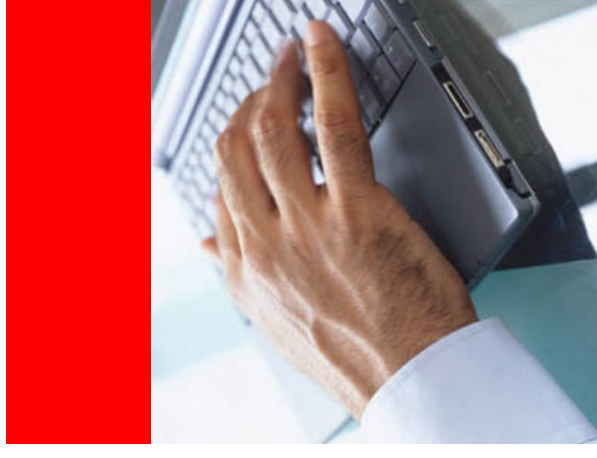
○ News and Task List

● Diagnostics & Tuning

○ Performance Testing

○ Best Practices

Object Statistics  
Monitoring  
SQL Tuning



# Tuning with the right tools ...

Oracle Enterprise Manager 10g Database Control

Database Instance: TEST

Home Performance Administration Maintenance

Page Refreshed Aug 10, 2005 6:14:29 PM (Refresh) View Data Automatically (60 sec)

Logged in As SYS

**General** [ShutDown](#)

Status Up  
 Up Since **Aug 10, 2005 5:00:57 PM CEST**  
 Instance Name **TEST**  
 Version **10.2.0.1.0**  
 Host **dllcc-munchi-140-86-199-137...**  
 Listener **LISTENER\_dllcc-munchi-140-86...**

**Host CPU**

Lead **0.19** Paging **0.00** Maximum CPU **1**

**Active Sessions**

SQL Response Time **Baseline is empty** [Reset Baseline](#)

**Space Summary**

Database Size (GB) **0.63**  
 Problem Tablespaces **0**  
 Segment Advisors **0**  
 Recommendations **0**  
 Space Reclaimers **0**  
 Dump Area Used (%) **64**

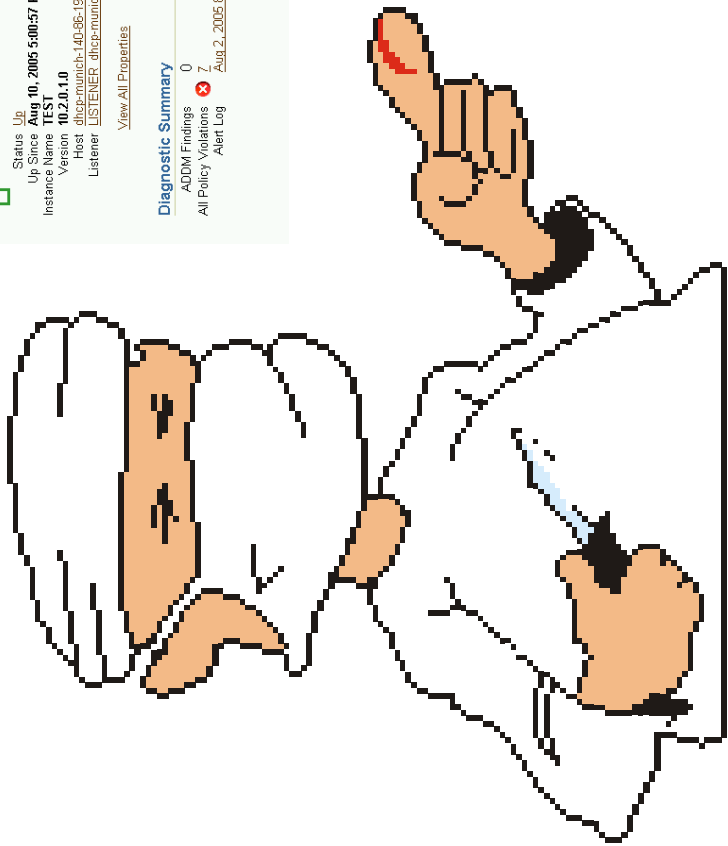
**High Availability**

Instance Recovery Time (sec) **28**  
 Last Backup **n/a**  
 Usable Flash Recovery Area (%) **63.36**  
 Flashback Time **AUG31,2005 12:24:56 AM**

**Diagnostic Summary**

ADDM Findings **0**  
 All Policy Violations **0**  
 Alert Log **Aug 2, 2005 8:27:26 PM**

**View All Properties**



```
SQL> set autotrace traceonly explain
SQL> select +
2 from emp, dept
3 where emp.deptno = dept.deptno
4 and emp.job = 'CLERK';
Execution Plan
-----
Plan hash value: 877088642

   1  |  Operation              |  Name                |  Rows  |  Bytes  |  Cost  |  (cpu)
-----|-----|-----|-----|-----|-----|-----
   1  |  SELECT STATEMENT       |                      |        |         |        |
   * 1  |  HASH JOIN              |                      |    4   |    468  |    7   |  (15)
   * 2  |  TABLE ACCESS FULL     | EMP                  |    4   |    348  |    3   |  (0)
   * 3  |  TABLE ACCESS FULL     | DEPT                 |    120  |         |    3   |  (0)
-----|-----|-----|-----|-----|-----|-----
Predicate Information (identified by operation id):
-----
   1 - access("EMP"."DEPTNO"="DEPT"."DEPTNO")
   2 - filter("EMP"."JOB"='CLERK')
-----
Note
-----
   - dynamic sampling used for this statement
```



# Challenges

- >90% of so-called upgrade problems aren't really upgrade problems but performance issues after the upgrade
  - It's important to use sufficient test scenarios and methods
  - Typical problem areas:
    - Optimizer - execution plans
      - Queries are slow
      - Reports or batches take longer to complete
    - Increased resource requirements
    - Code path changes

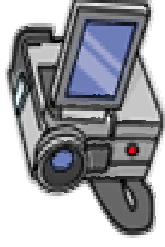


# Real Application Testing

- Goal:
  - Record and replay a real workload to see how the new system performs
  - Find regressions and changing plans **before** the upgrade
- Licensable database pack "Real Application Testing"
  - ⇒ Available since Oracle Database 11.1.0.6
  - ⇒ Available with patch set 10.2.0.4/5
  - ⇒ Available as single patch for 9.2.0.8 and 10.2.0.2/3
    - ⇒ For patch numbers please see [Note:560977.1](#)

# Database Replay

- Replay actual production database workload in test environment
- Identify, analyze and fix potential instabilities before making changes to production
- **Capture Workload in Production**
  - Capture full production workload with real load, timing & concurrency characteristics
  - Move the captured workload to test system



- **Replay Workload in Test**
  - Make the desired changes in test system
  - Replay workload with full production characteristics
  - Honor commit ordering

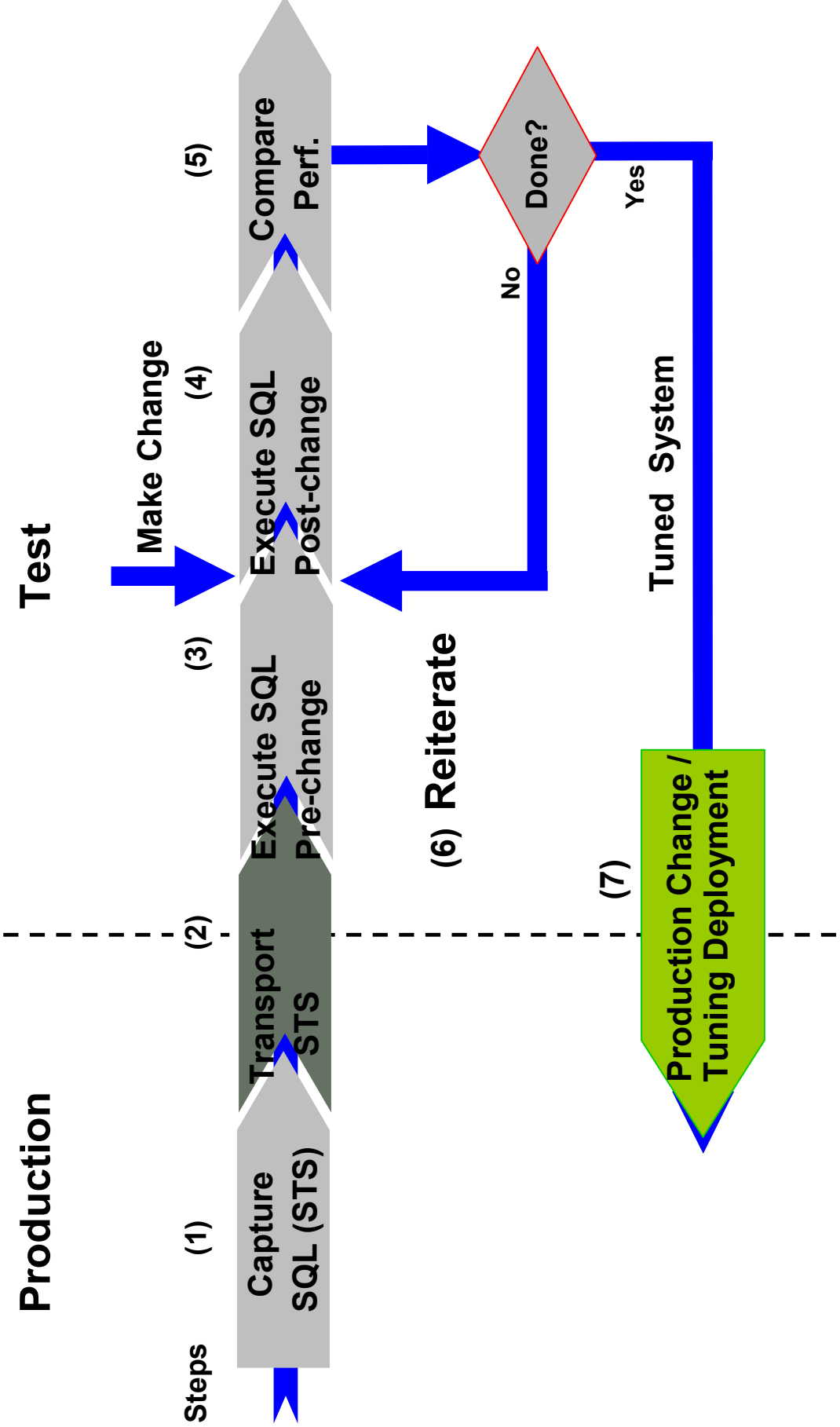
- **Analyze & Report**

- Errors
- Data divergence
- Performance divergence





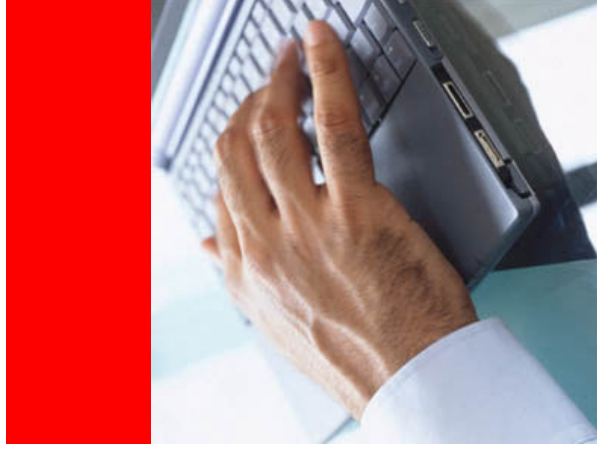
# SQL Performance Analyzer: Workflow



# Agenda

- Preparation
- Installation
- Upgrade
- News and Task List
- Diagnostics & Tuning
- Performance Testing
- Best Practices

Fallback Strategies  
Guidelines  
Real World Experiences



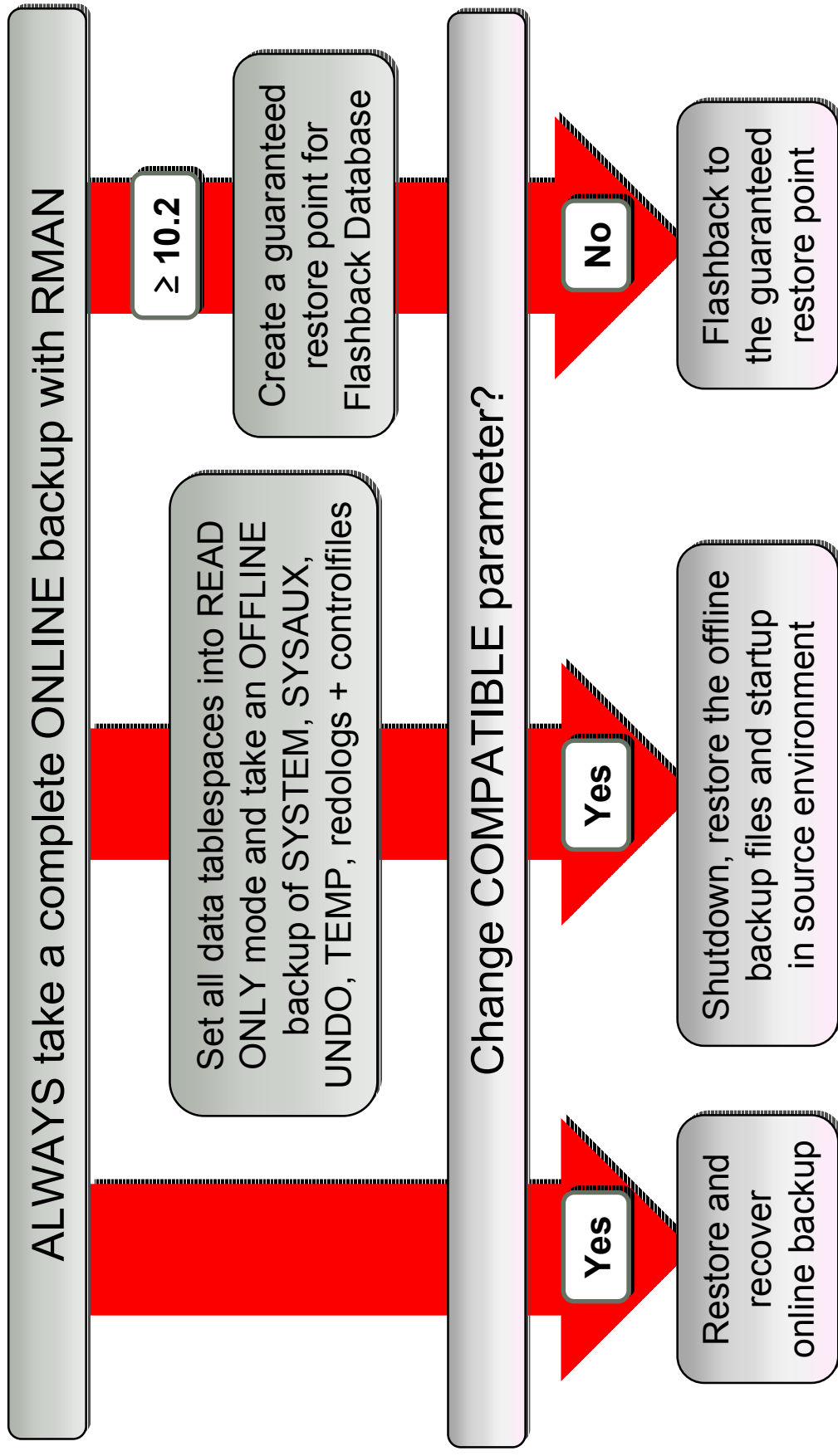




# Fallback Strategy - Concepts

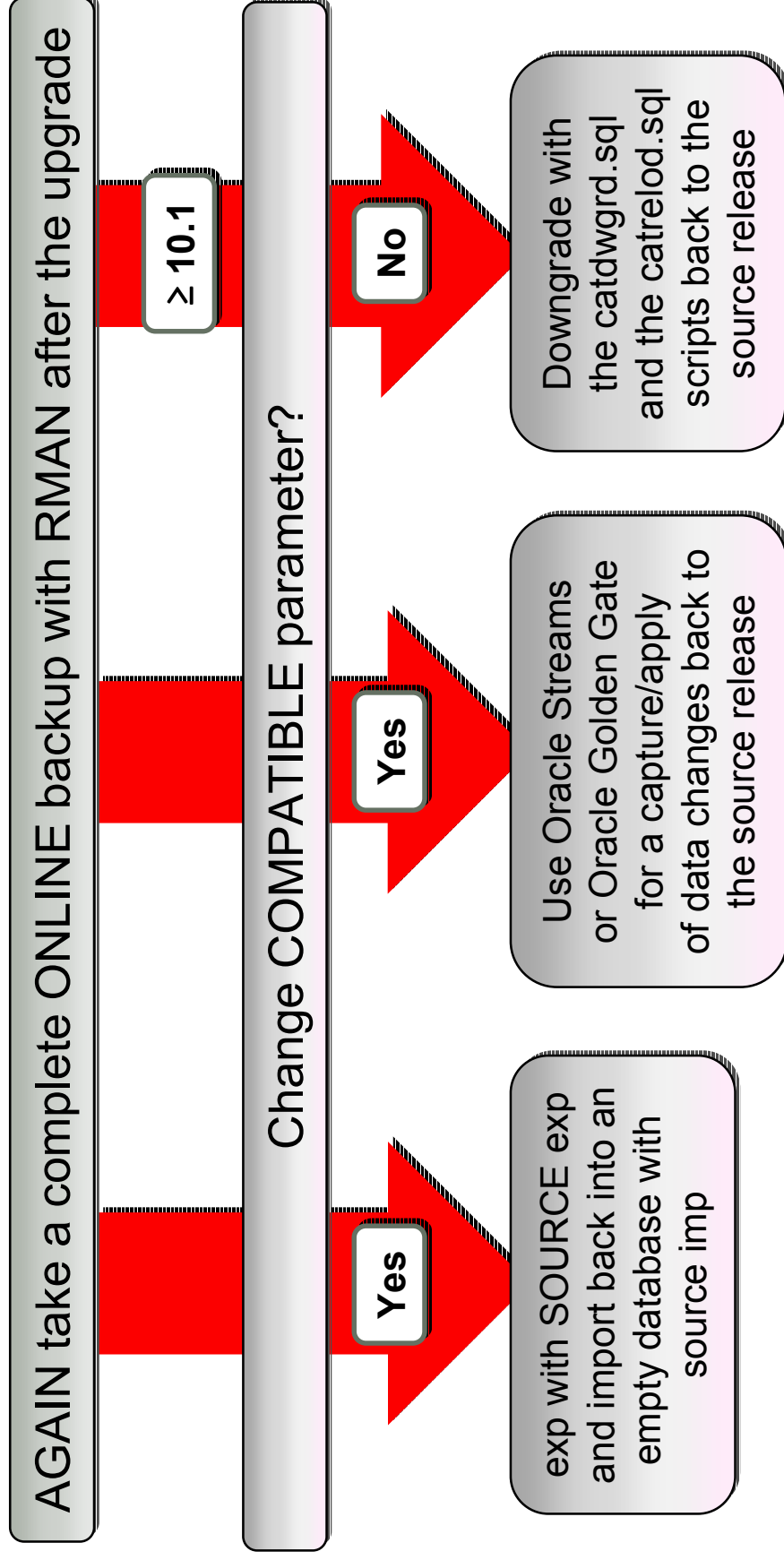
- Fallback concepts:
  - Always take a complete online backup first!
  - Differentiate between fallback concepts:
    - Are you allowed to lose data in case of a fallback?
    - Deal with problems ...
      - ... encountered during the upgrade
      - ... found days *after* the upgrade
    - Will you get additional downtime to change COMPATIBLE?
    - Fallback requirements in minutes/hours?

# Fallback Strategy - Issues during upgrade



# Fallback Strategy – Issues **after** upgrade

- Assumption: No data loss allowed



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