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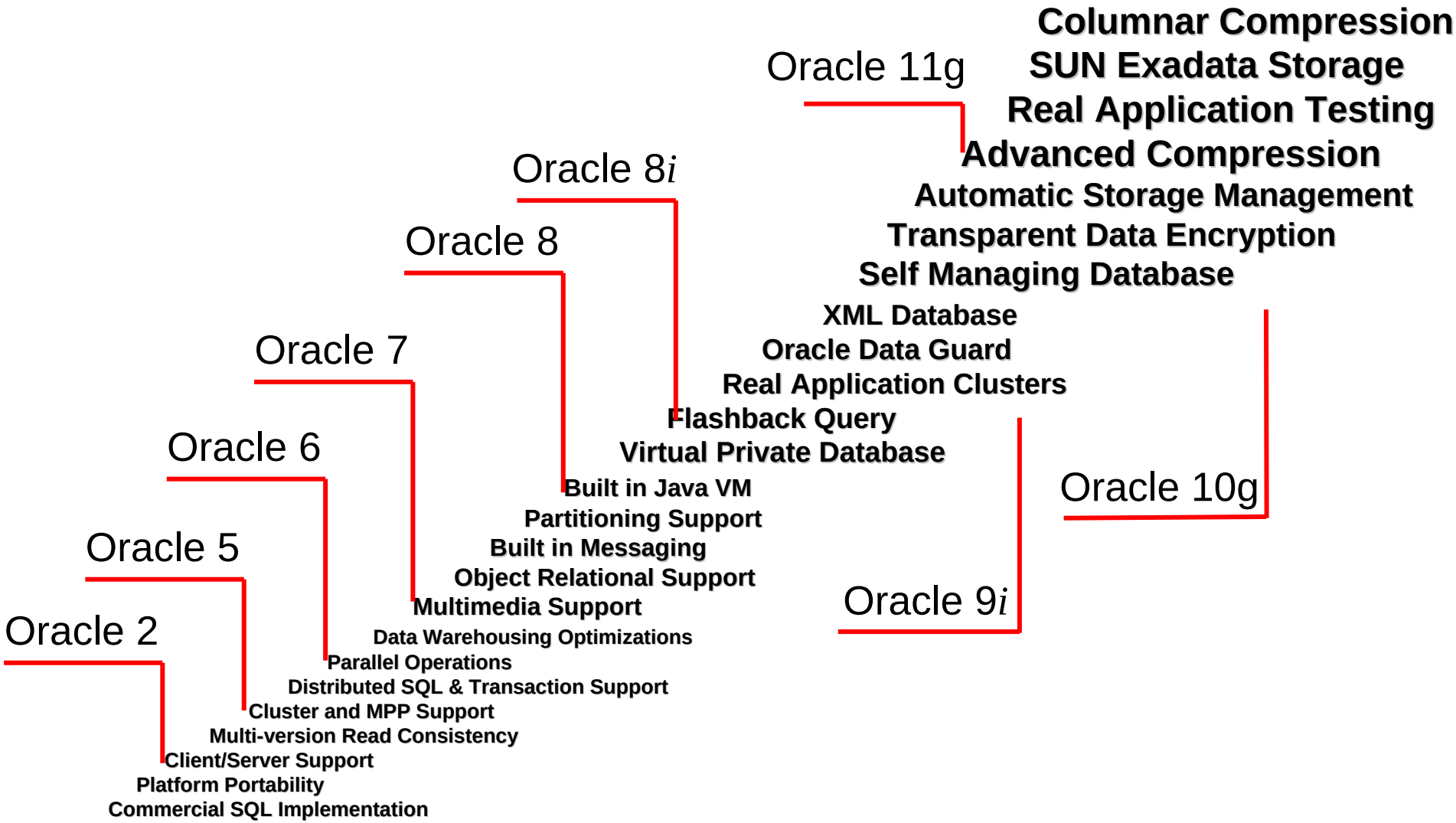
The Good Gets Even Better
Oracle 11g Release 2

Roland Aussermeier
Director Database Technologies

More than 30 Years…



Gartner: Oracle is the #1 relational database → 49%

Motivation: Oracle Database 11*g* Release 2

- More Business – More Data → **Development**
- Best “Quality of Service” → **High Availability**
- More Speed, decide fast → **DWH & Performance**
- Less Complex Systems → **Manageability**

Save Resources → Lower IT Costs!

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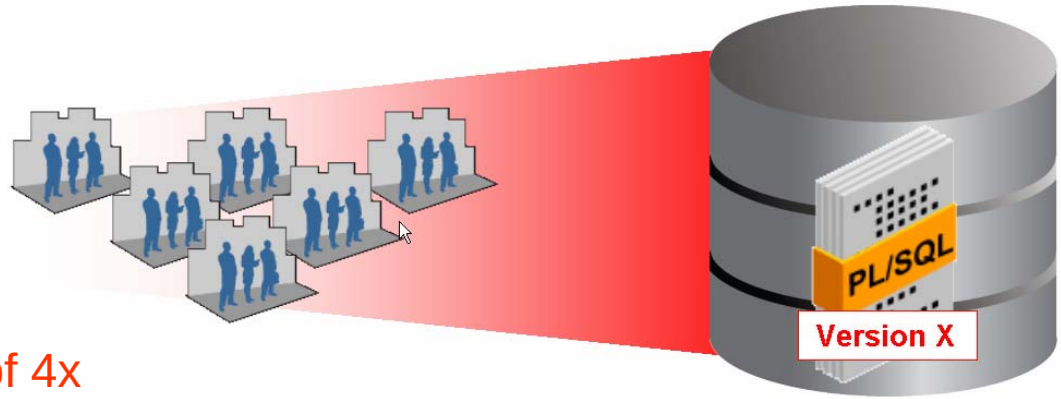
Online Application Upgrade

also known as "Editions"

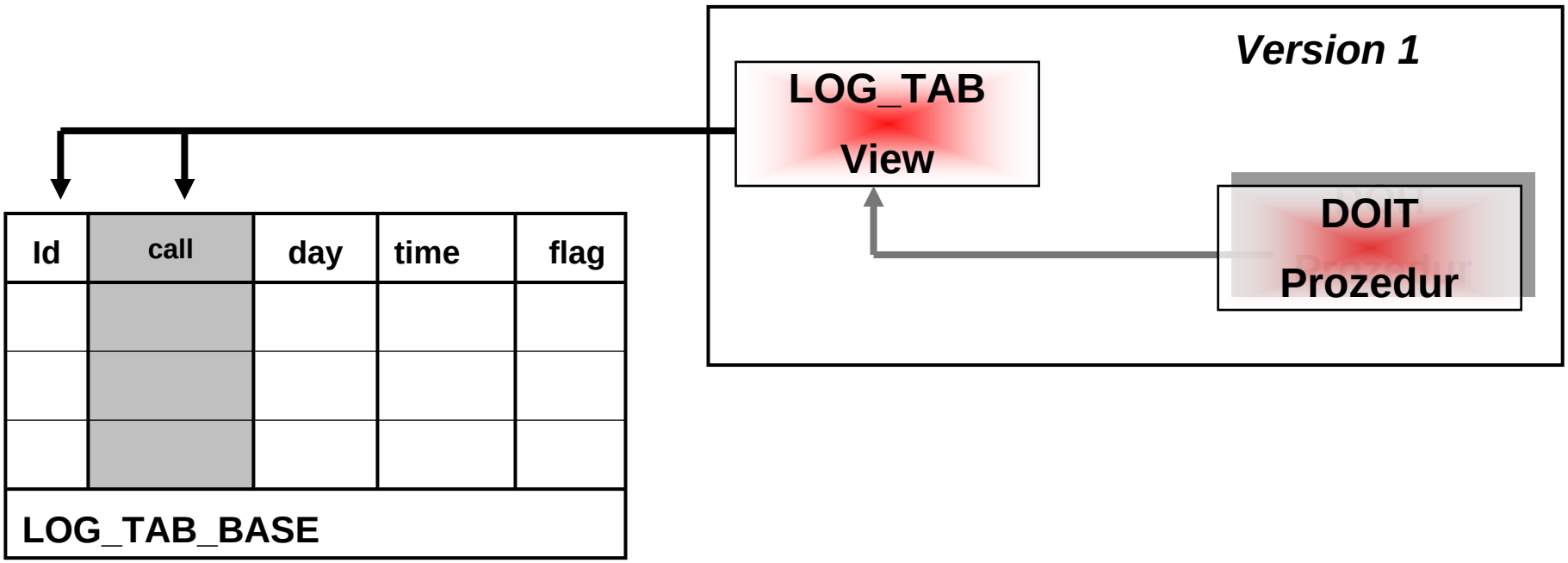
- Change PL/SQL-Code online
  - No downtime
  - Versions management inside 11gR2
  - Editions can work in parallel
  - Old edition can be „retired“
- Target Audience: Developer (Coding necessary)



Reduce upgrade costs by a factor of 4x

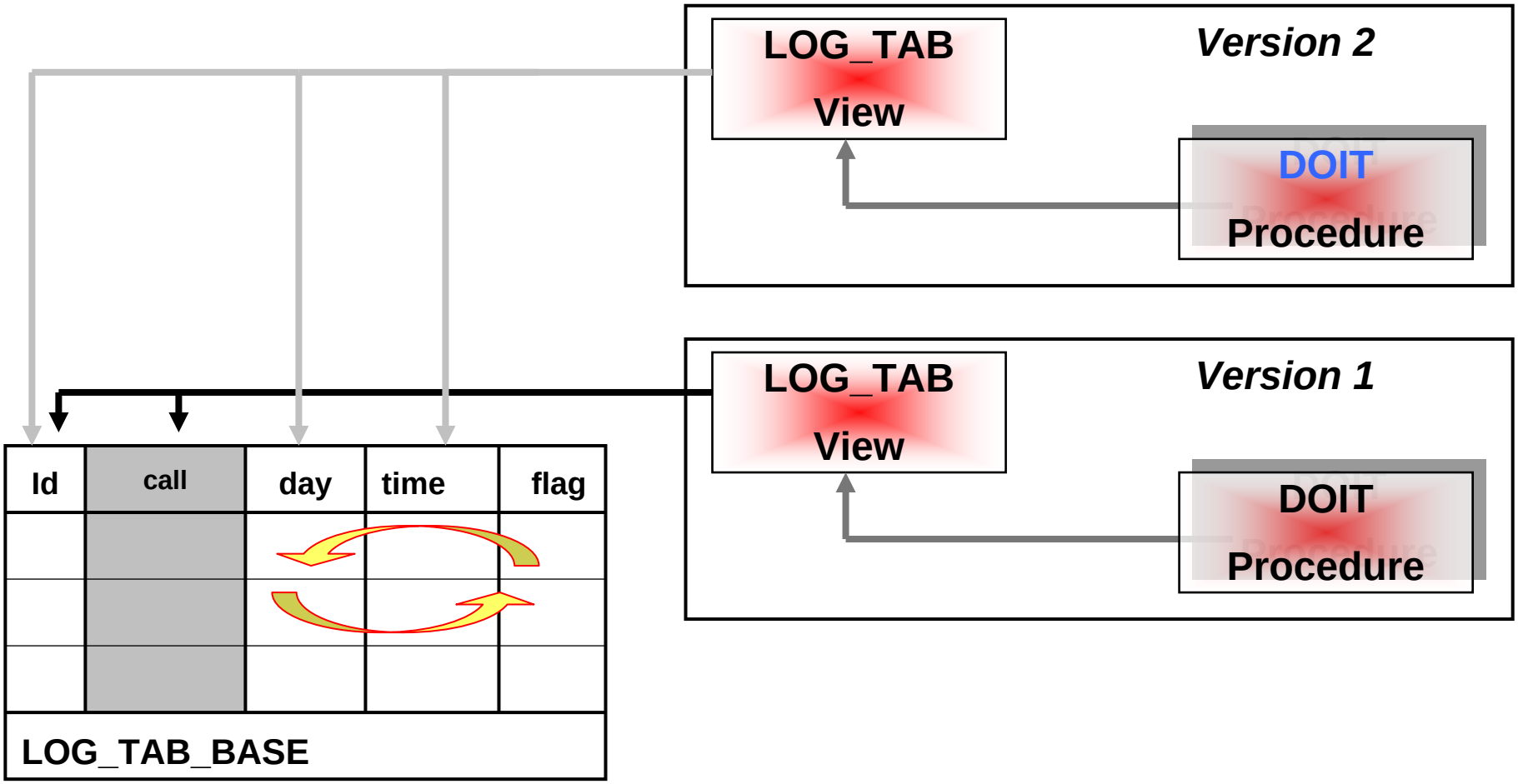
Online Application Upgrade
Versioning an application

- PL/SQL-Procedur works with *Editioning View*
- Base table can be expanded (new columns)



Online Application Upgrade

Importing Version 2



SQL-News ...

LISTAGG Function: aggregates VARCHAR2

- New aggregate function for CHAR Strings
- Example (Tabelle EMP)

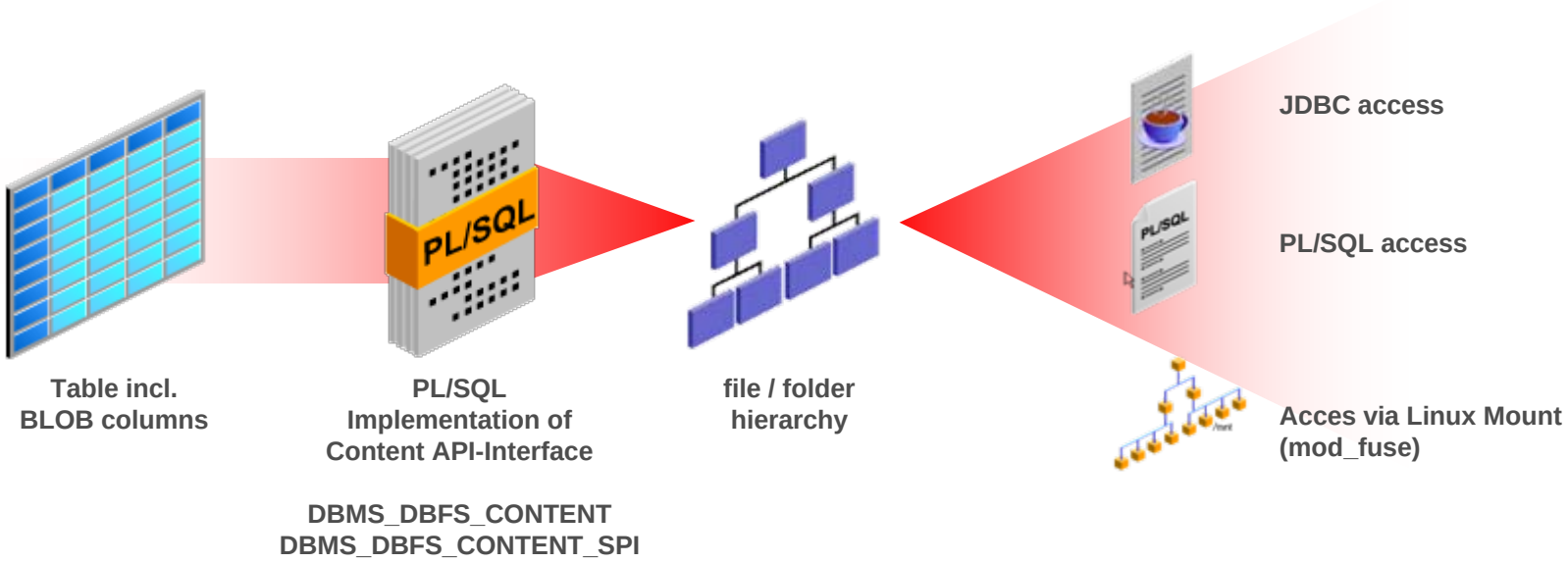
```
select
 deptno,
listagg(ename, ':') within group (order by ename) ename_list
from emp
group by deptno

    DEPTNO ENAME_LIST
---------- ----------------------------------------
        10 CLARK:KING:MILLER
        20 ADAMS:FORD:JONES:SCOTT:SMITH
        30 ALLEN:BLAKE:JAMES:MARTIN:TURNER:WARD
```

Oracle Content API

When a table looks like a file system

- File system View at a table with LOB values
  - Files and folders hierarchy
  - Can be mounted as a file system under LINUX (mod_fuse)



Deferred Segment Creation

Allocate storage when needed ...

- During table creation, segments are not created for table, lob, index segments
- Oracle Apps and SAP create thousands of tables
  - Only a small subset is used by any customer

```
create table testtab (
  col1 number,
  :
)
segment creation deferred
/

SQL> select blocks, bytes from user_segments
  2 where segment_name = 'TESTTAB';

No rows selected.
```

Deferred Segment Creation

segment creation on demand...

- On first row insertion, all segments are created

```
SQL> select blocks, bytes from user_segments
  2  where segment_name = 'TESTTAB';

Es wurden keine Zeilen ausgewählt.

SQL> insert into testtab values (1);

Eine Zeile wurde erstellt.

SQL> select blocks, bytes from user_segments
  2  where segment_name = 'TESTTAB';

BLOCKS BYTES
------ -----
     8 65536
```

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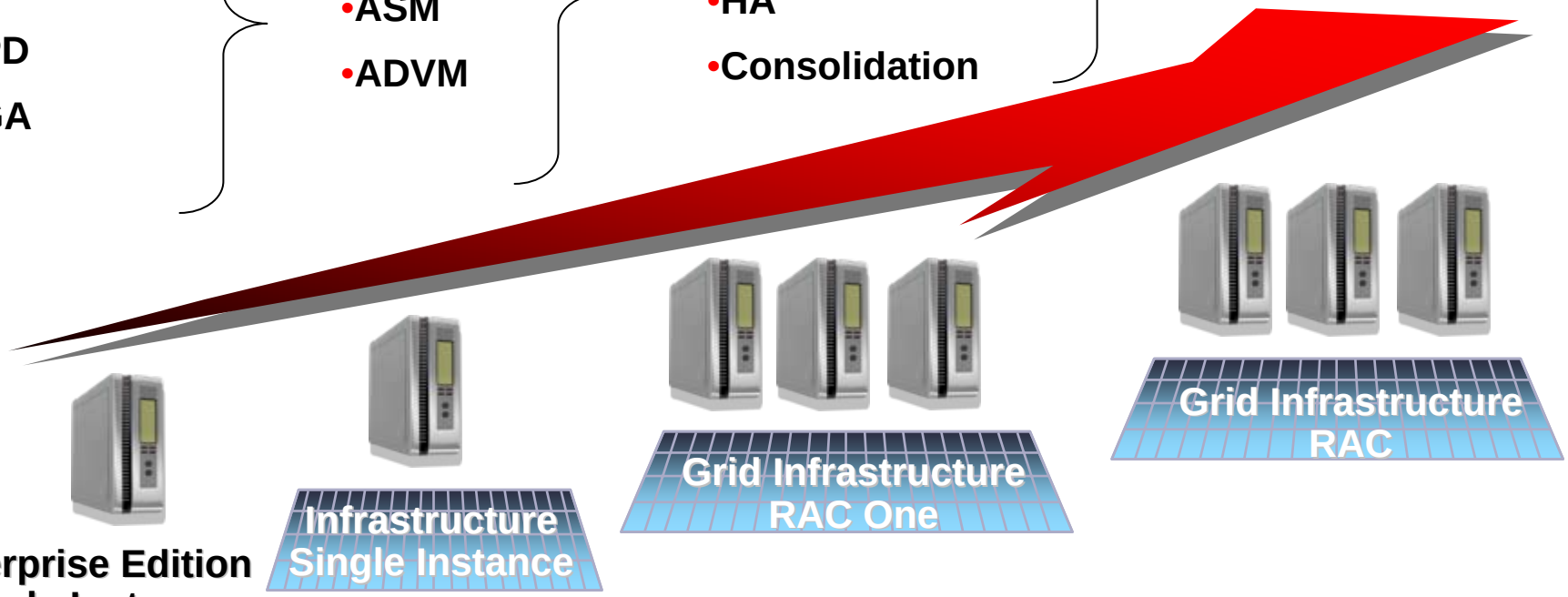
Evolution Grid

- Data Guard
- Options
- VPD
- FGA
- ...

- Oracle Restart
- ASM
- ADVM

- RAC One
- OMotion
- ACFS
- SCAN
- GPnP
- HA
- Consolidation

- Server Pools
- GNS
- Flexibility
- Scalability



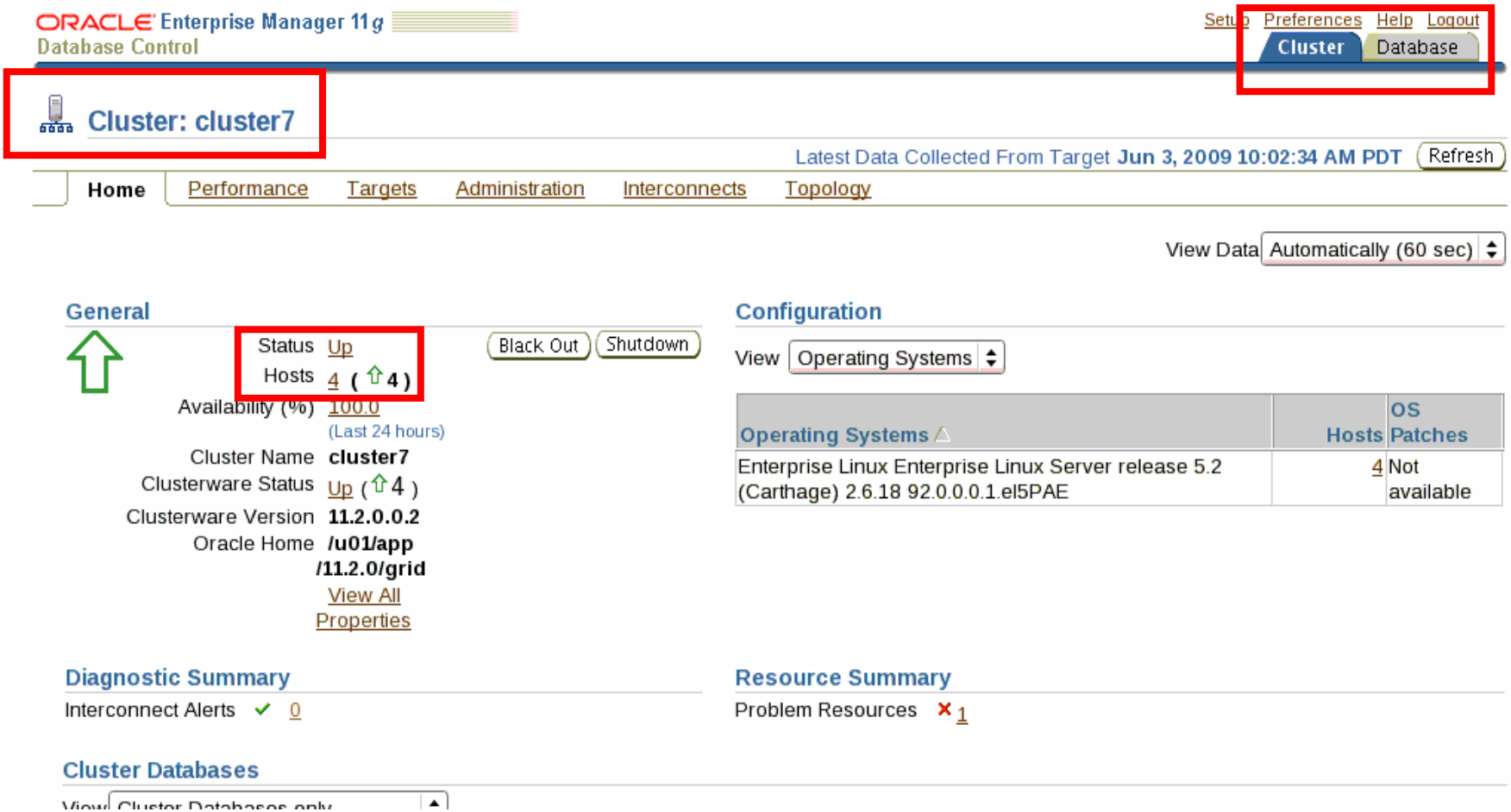
Resource Management in a Grid
Server Pools

- Old days: **Administrator Managed**
  - Administrator asigns databases to nodes
    - Static Server List
    - Static Instance Allocation
    - Static Service definition (Preferred/Available/None)

- Oracle11g Release 2: **Policy Managed**
  - Just specify required resources (# servers)
  - The GRID looks after # databases/instances/apps
  - Goal: Flexibility
    - Elimination of dependencies
      Node ⇔ Instance ⇔ Node ⇔ Service

Cluster Management

Database Control



Oracle Database 11g Release 2

Dynamic Cluster Partitioning via Server Pools

- Dynamically assigns the server resources required to run specific workloads
- Both Application and Database Pools
- Policy Managed
  - Min and Max Servers
  - Relative Importance
- Unassigned Servers go to Free Pool
- If a server pool falls below its MIN the cluster reconfigures

Server Pool	Min	Max	Imp
AS	3	5	3
OLTP	2	3	3
Batch	1	3	2
DW	3	4	1
Free		1	0

Oracle Database 11g Release 2

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Grid Plug and Play (GPnP)

Simplified Provisioning

mycluster.hroug.hr

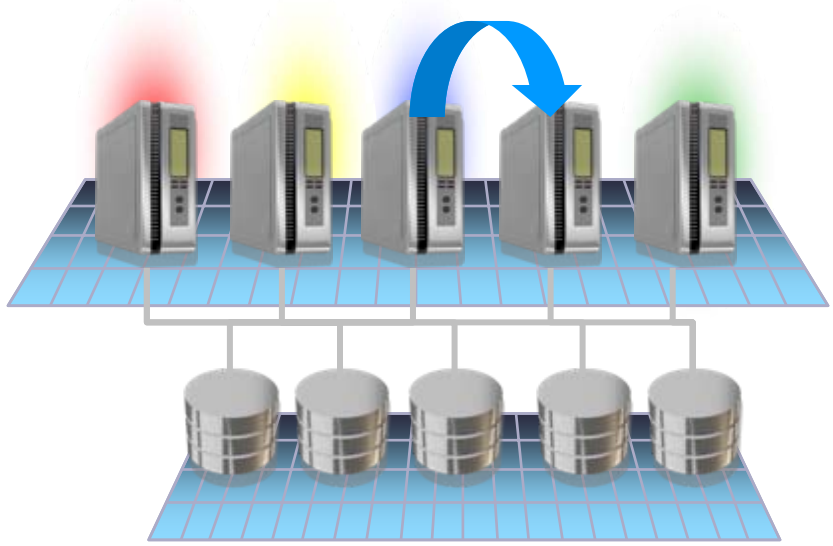
- New intelligent installer
  - 40% fewer steps to install RAC
- Nodes can be easily repurposed
  - Network and storage information read from profile and configured automatically
  - **Profiles** can be exchanged
  - No need to manually prepare a node.
  - Nodes can be dynamically added or removed from the cluster
- Dissociation of installation & configuration
- Dynamic Naming Server (GNS)
- Single Client Access Name

RAC One

The „one“ node Real Application Clusters (RAC)

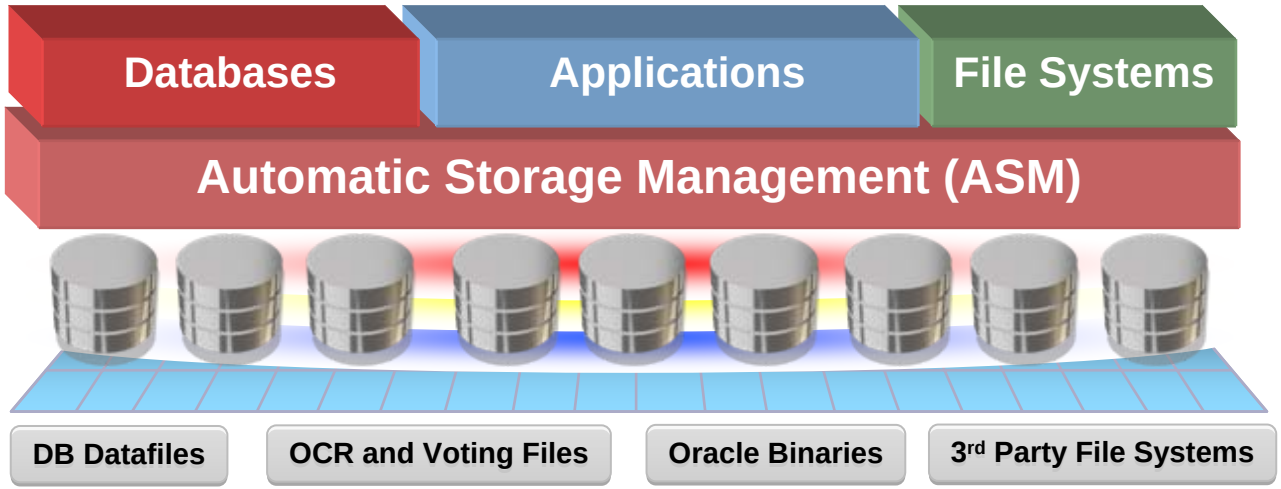
- **New Option!**
- RAC-Features for "*Single Instance*"
  - Common Infrastructure for all databases
  - Automated failover when node goes down
  - Online migration of the database
  - Online Rolling Upgrades
  - Server Pools

  ➢ ASM Cluster Filesystem



Grid Infrastructure: ASM for all your Data

ASM Cluster File System (ACFS)

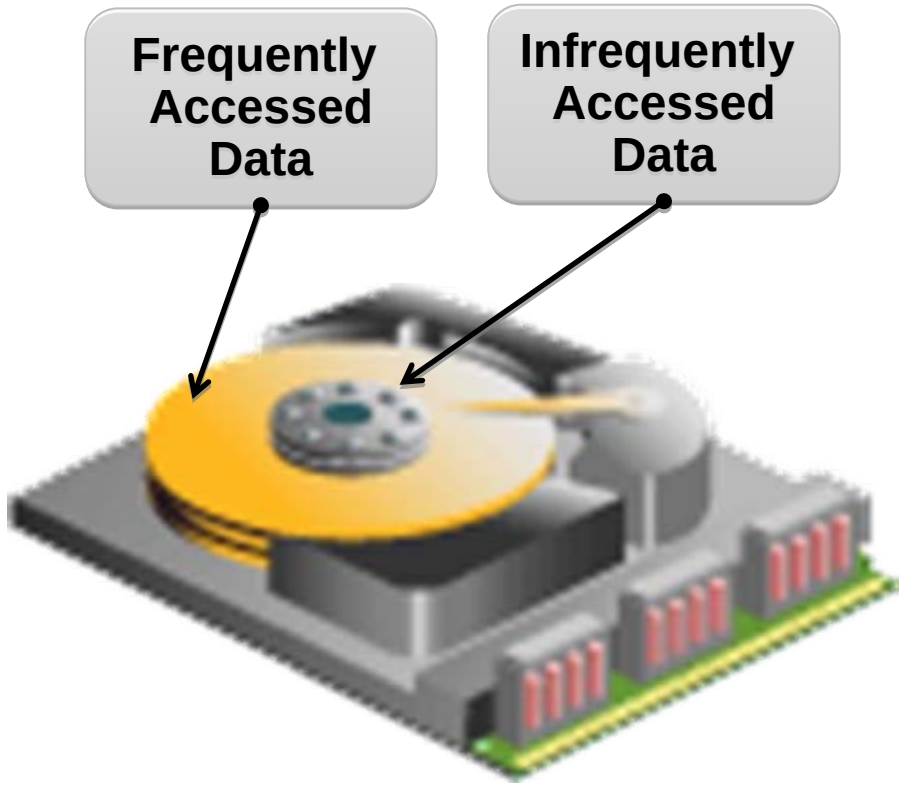


- Database Files
- ASM adequate Volume Manager
  - Standard Filesysteme in ASM (ext3, NTFS)
  - ASM Cluster Filesystem
- Clusterware Configuration Files: OCR and Voting disk
- **Snapshots for fast backups**

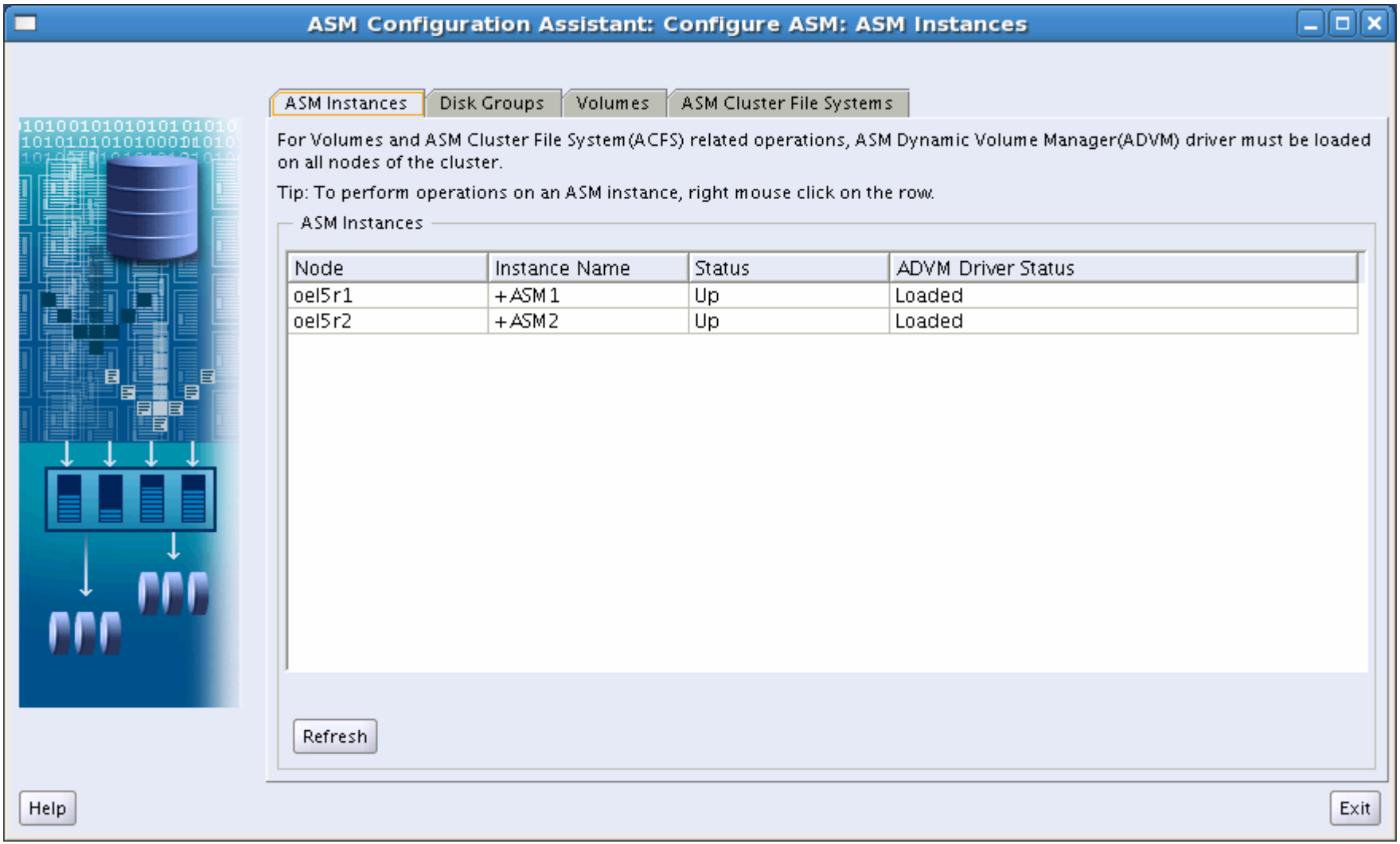
Oracle Database 11g Release 2

Other ASM Enhancements (a classic!)

- Improved Management
  - ASM Install & Configuration Assistant (ASMCA)
  - Full Featured ASMCMD
  - ASM File Access Control
  - ASM Disk Group Rename
  - Datafile to Disk Mapping
- Tunable Performance
  - Intelligent Data Placement



ASM Configuration Assistant (ASMCA)



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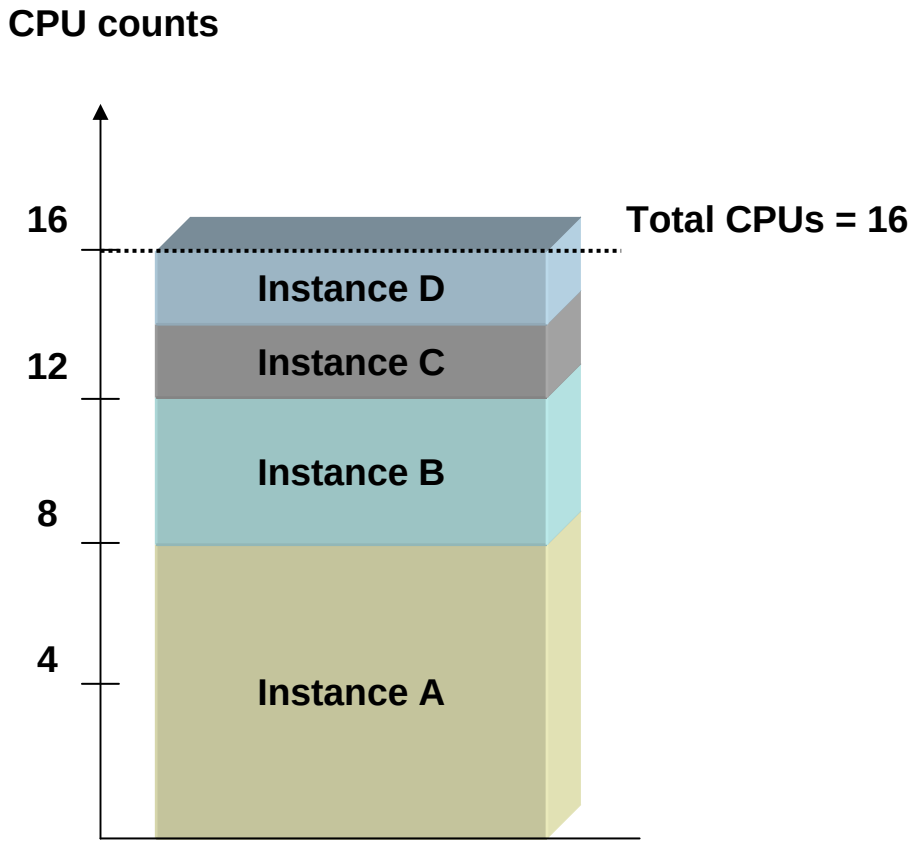
Save Resources → Lower IT Costs!

Instance Caging
define your CPU usage

- More flexible alternative to server partitioning
- Wider platform support than operating system resource managers
- Lower administration overhead than virtualization
- Set CPU_COUNT per instance and enable resource manager



Automated Degree of Parallelism

using Treshold

SQL statement

Statement is hard parsed
And optimizer determines the execution plan

If estimated time greater than threshold

Optimizer determines ideal DOP

Actual DOP = MIN(default DOP, ideal DOP)

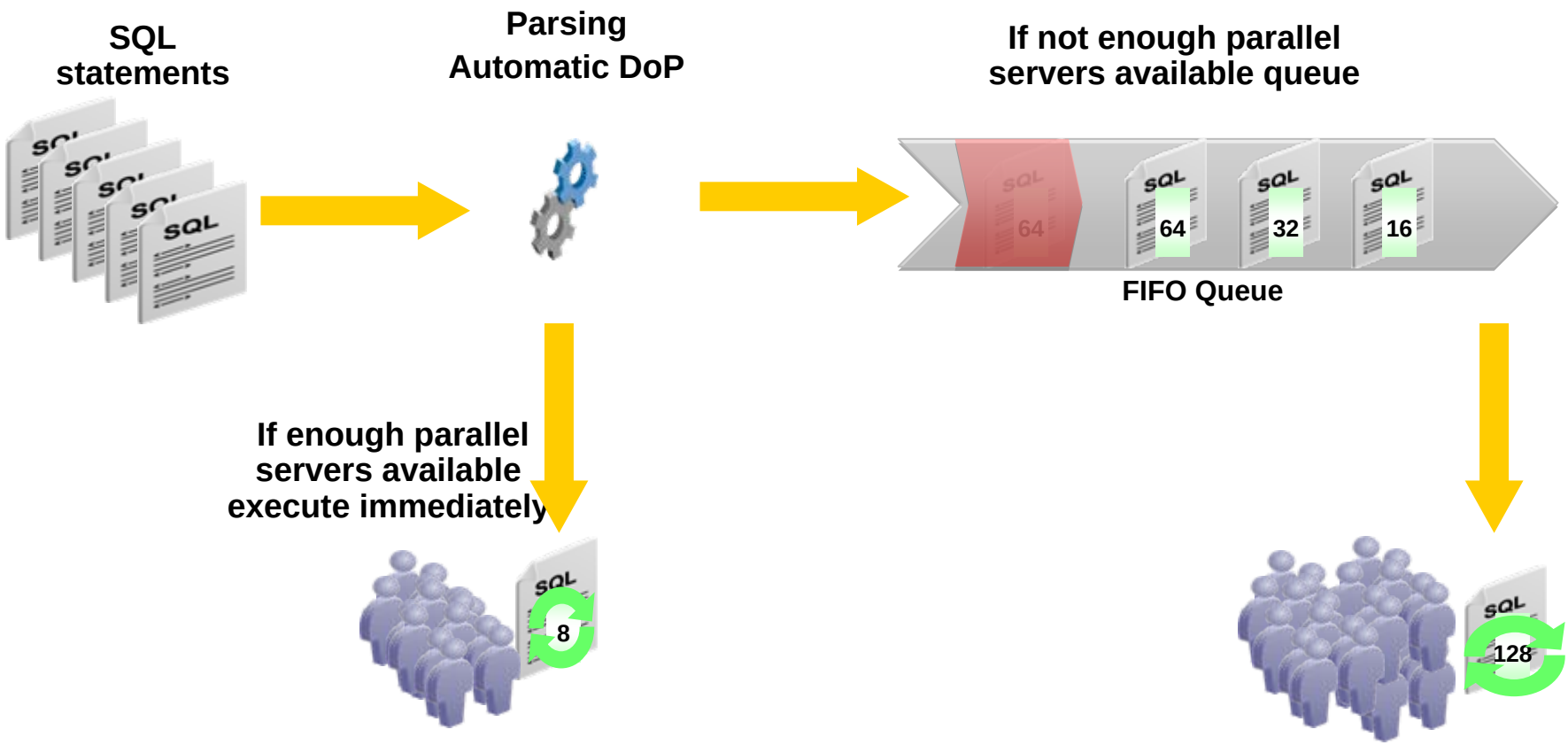
If estimated time less than threshold
PARALLEL_MIN_TIME_THRESHOLD

Statement executes serially

Statement executes in parallel

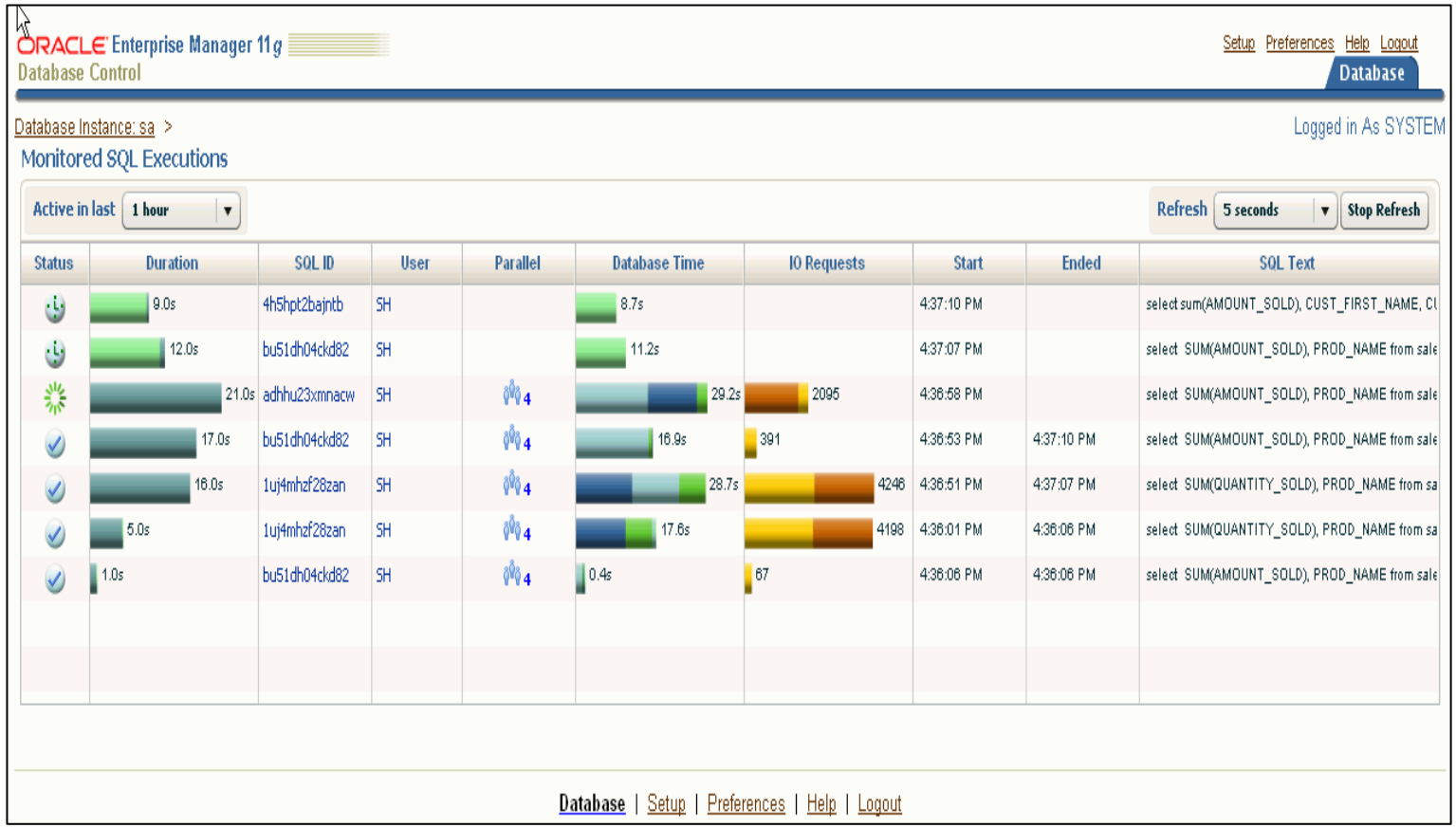
Parallel Statement Queuing

First In First Out



Parallel Statement Queuing

Monitoring in Enterprise Manager



Sun Oracle Database Machine & 11.2

Get on the Grid Faster - OLTP & Data Warehousing

Oracle Database Server Grid

- 8 Database Servers
  - 64 Cores
  - 400 GB DRAM

Exadata Storage Server Grid

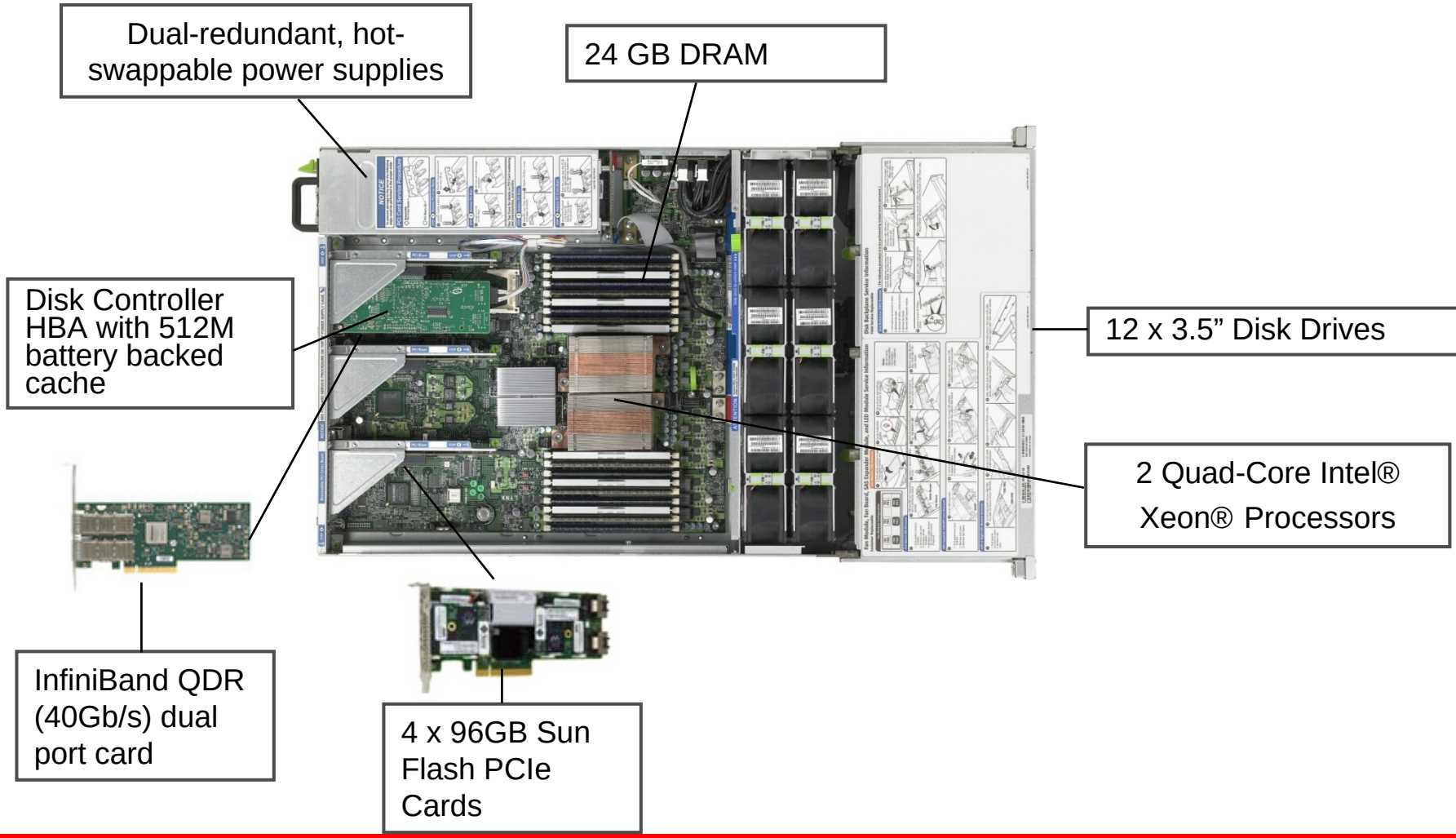
- 14 Storage Servers
  - 5TB Smart Flash Cache
  - 336 TB Disk Storage

Unified Server/Storage Network

- 40 Gb/sec Infiniband Links
  - 880 Gb/sec Aggregate Throughput

Completely Fault Tolerant

Sun Exadata Storage Server Hardware



Start Small and Grow

Basic System	Quarter Rack	Half Rack	Full Rack
$110,000	$350,000	$650,000	$1.15M

Oracle's Grid Computing Architecture

Unlock Moore's law

2 Sun Oracle
Database Machines

$2,300,000

IBM Power 595

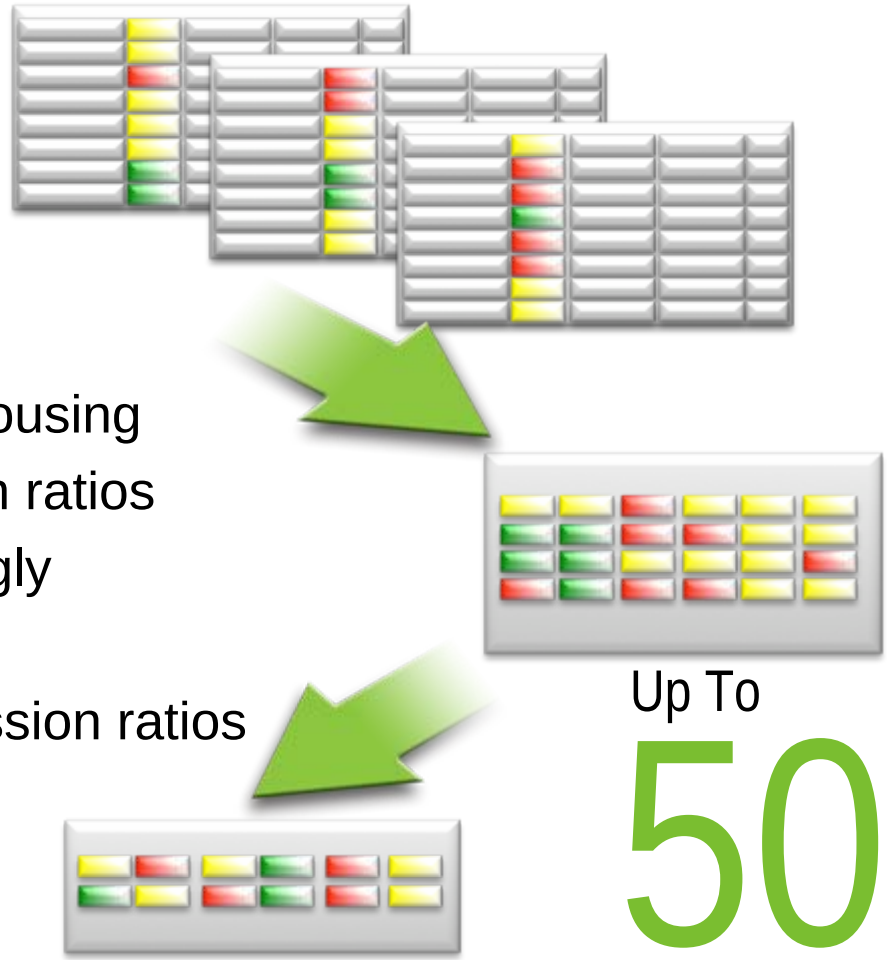
$10,700,000

8 IBM DS8300 Turbo

Sun Oracle Exadata Storage Server

Hybrid Columnar Compression

- Data stored by column and then compressed
- Useful for data that is bulk loaded or moved
- **Query mode** for data warehousing
  - Typical 10X compression ratios
  - Scans improve accordingly
- **Archival mode** for old data
  - Typical 15- 50X compression ratios



Up To

50X

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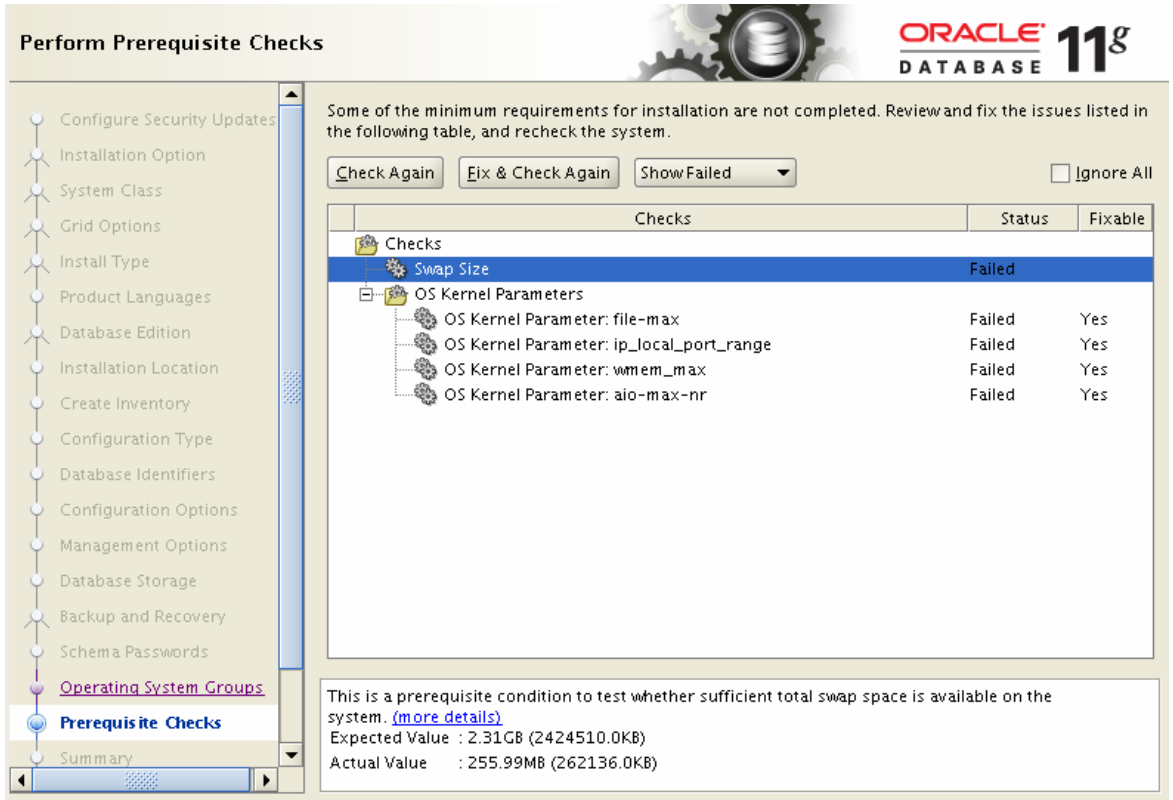
At First Sight: New Installer

- FixUp scripts
- Integration of Cluster Verify Utility
- Software Only-Install for Clusterware
- SSH

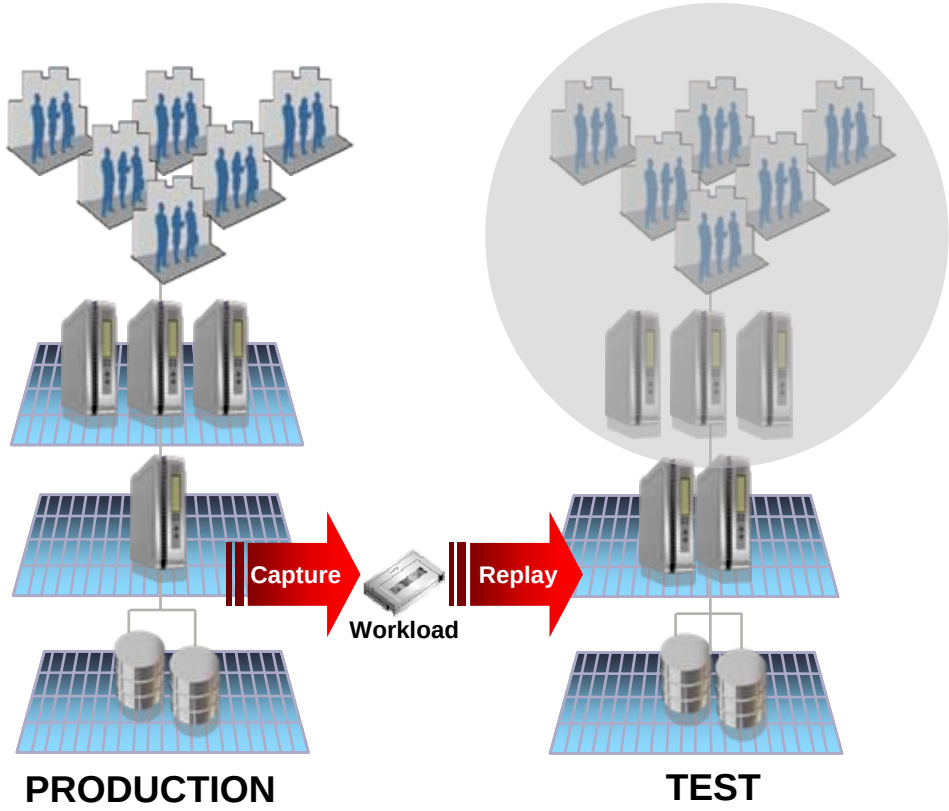


EM: Enhanced Advisors

Real Application Testing in 11gR2

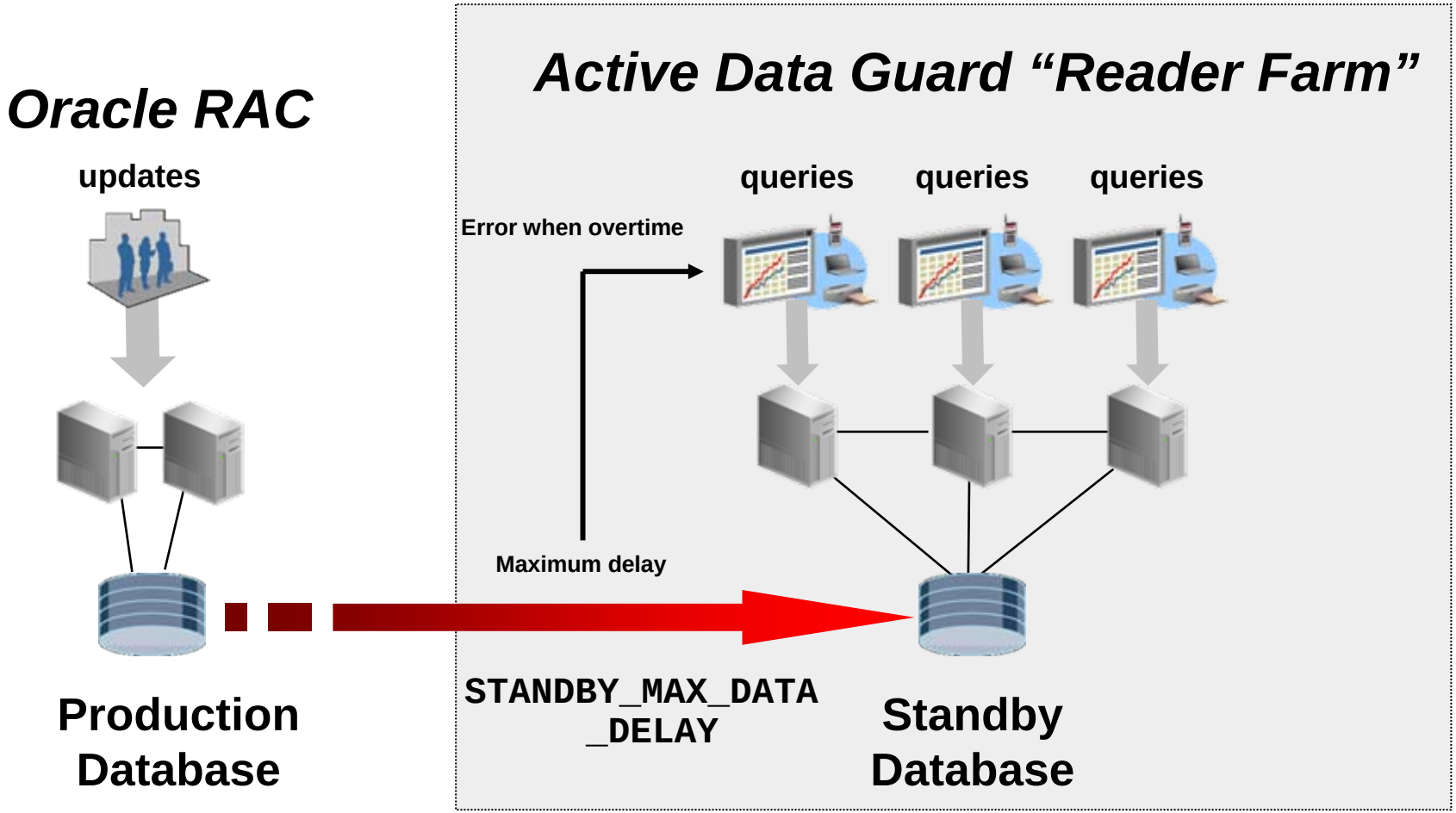
Database Replay Enhancements

- Now Supports
  - Shared Server (MTS)
  - Streams
- Replay Filter
- Advanced Reporting



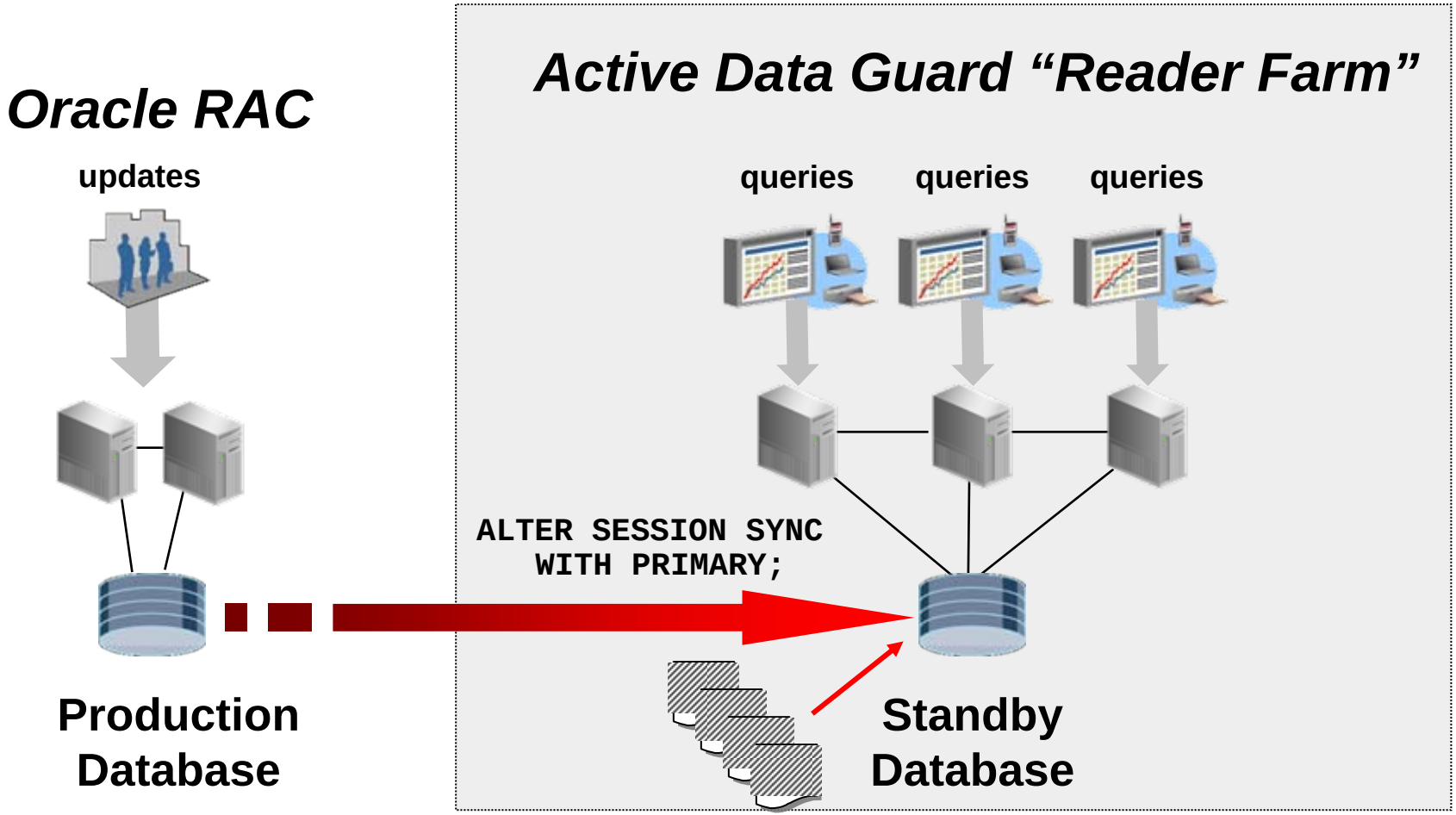
Active Data Guard 11*g R2*

Quality of Service, Performance



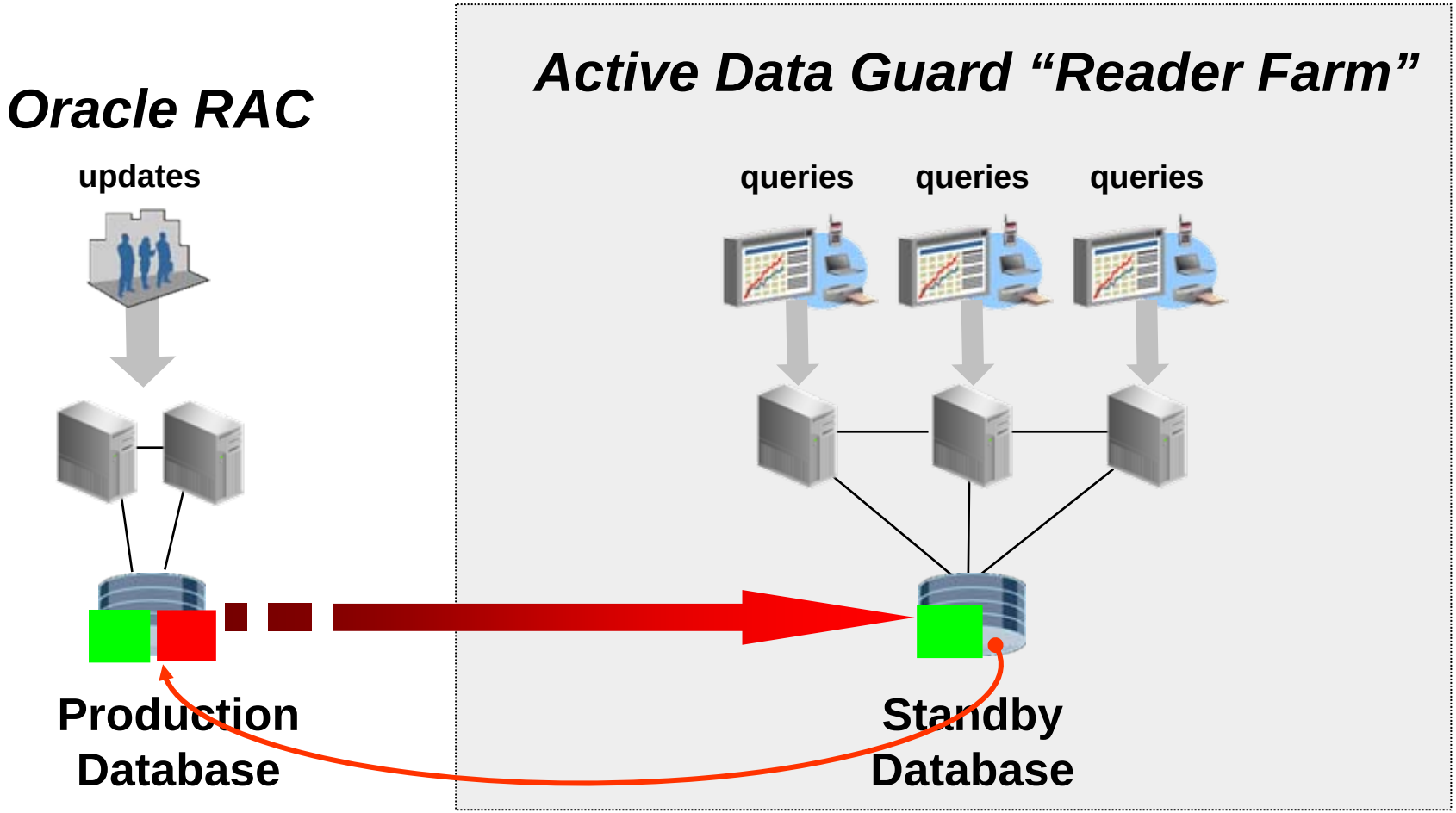
Active Data Guard 11*g R2*

Quality of Service, Performance



Active Data Guard 11*g R2*

Automatic Block Repair

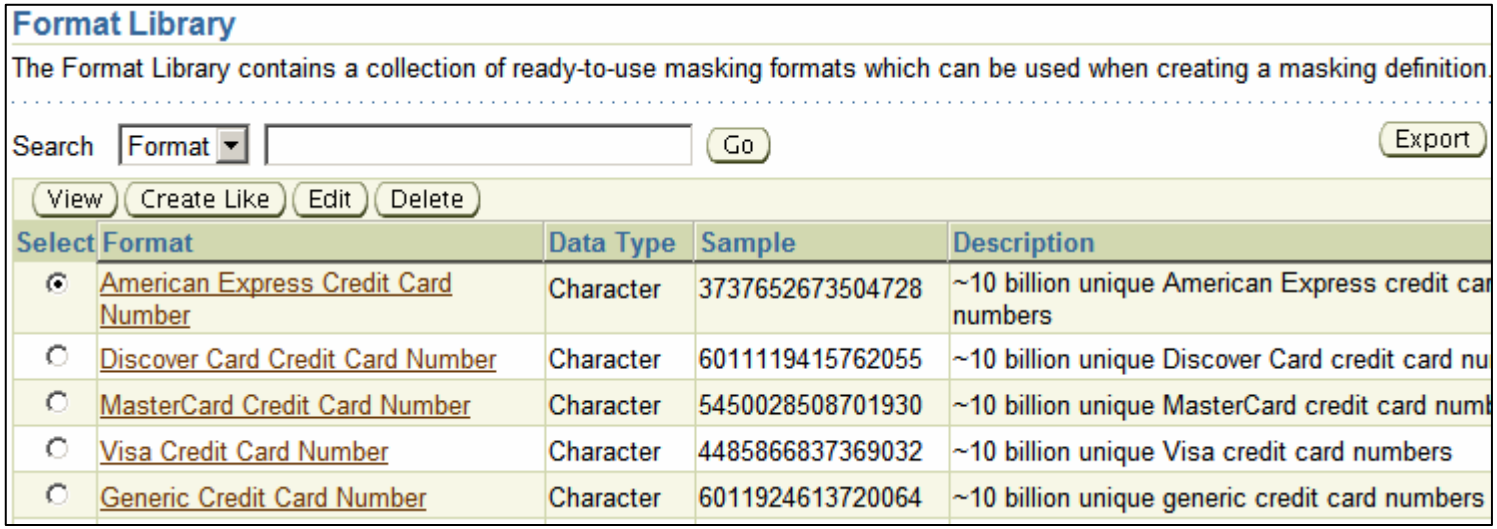


Oracle Database 11g Release 2

Data Guard Enhancements

- Active Data Guard - Quality of Service
  - Standby Query SLA configurable from zero to “n” seconds
    - Set maximum allowable data delay at standby database
    - Database returns error to application if maximum is exceeded
    - Application can redirect query to primary database
  - Automatic block repair
    - Bad blocks detected and fixed using good version from standby
- Data Guard - network utilization
    - Transport **compression**

Data Masking Pack
in Dabase Control



Format Library

The Format Library contains a collection of ready-to-use masking formats which can be used when creating a masking definition.

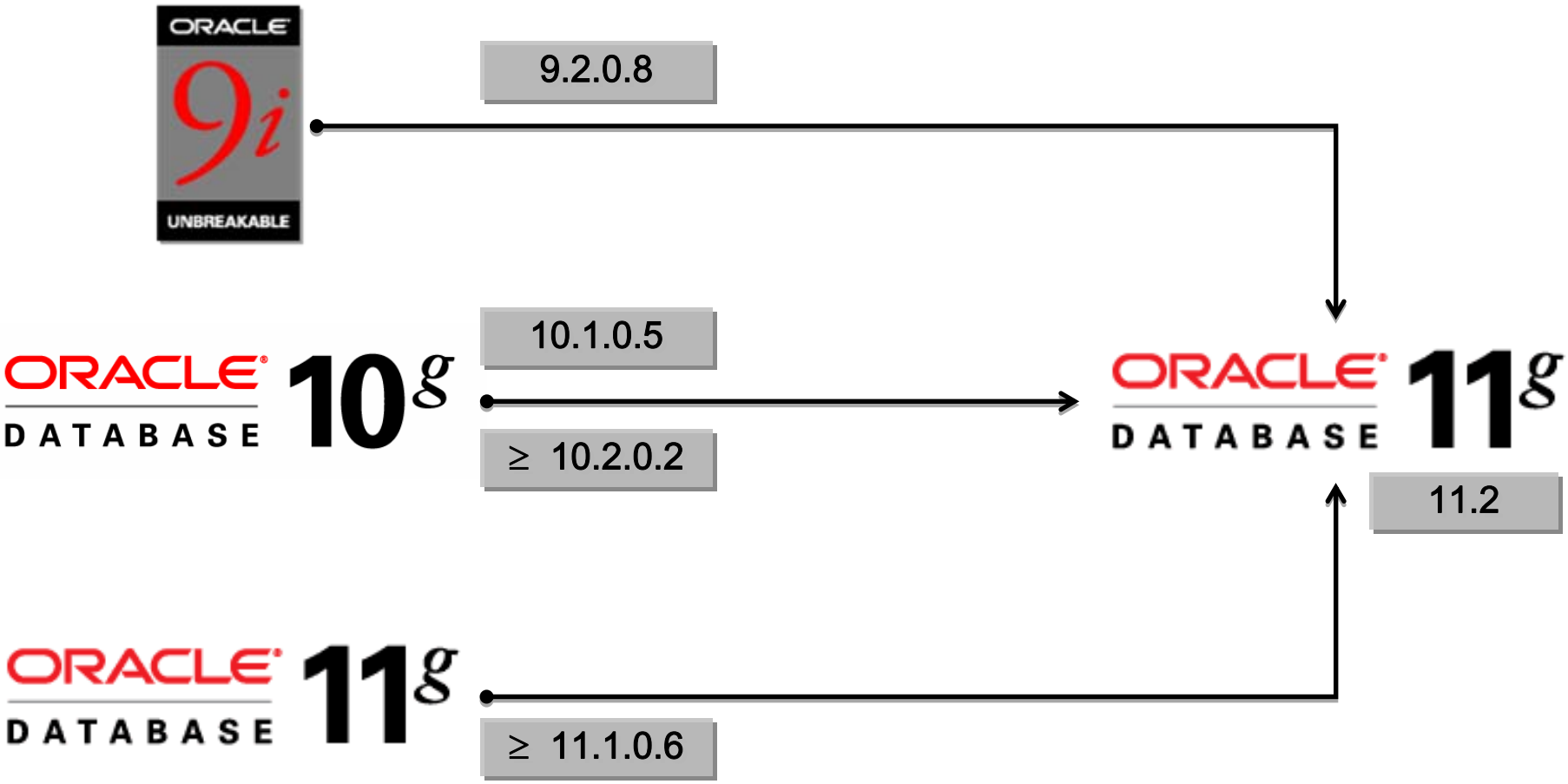
Search Format Go Export

View Create Like Edit Delete

Select	Format	Data Type	Sample	Description
◉	American Express Credit Card Number	Character	3737652673504728	~10 billion unique American Express credit car numbers
○	Discover Card Credit Card Number	Character	6011119415762055	~10 billion unique Discover Card credit card nu
○	MasterCard Credit Card Number	Character	5450028508701930	~10 billion unique MasterCard credit card numb
○	Visa Credit Card Number	Character	4485866837369032	~10 billion unique Visa credit card numbers
○	Generic Credit Card Number	Character	6011924613720064	~10 billion unique generic credit card numbers

- Out of box mask formats for commonly masked data
- Condition-based and intelligent Masking
- Compound Masks
- Integrated Clone + Mask workflow
- Deterministic masking support

Oracle Database 11g Release 2



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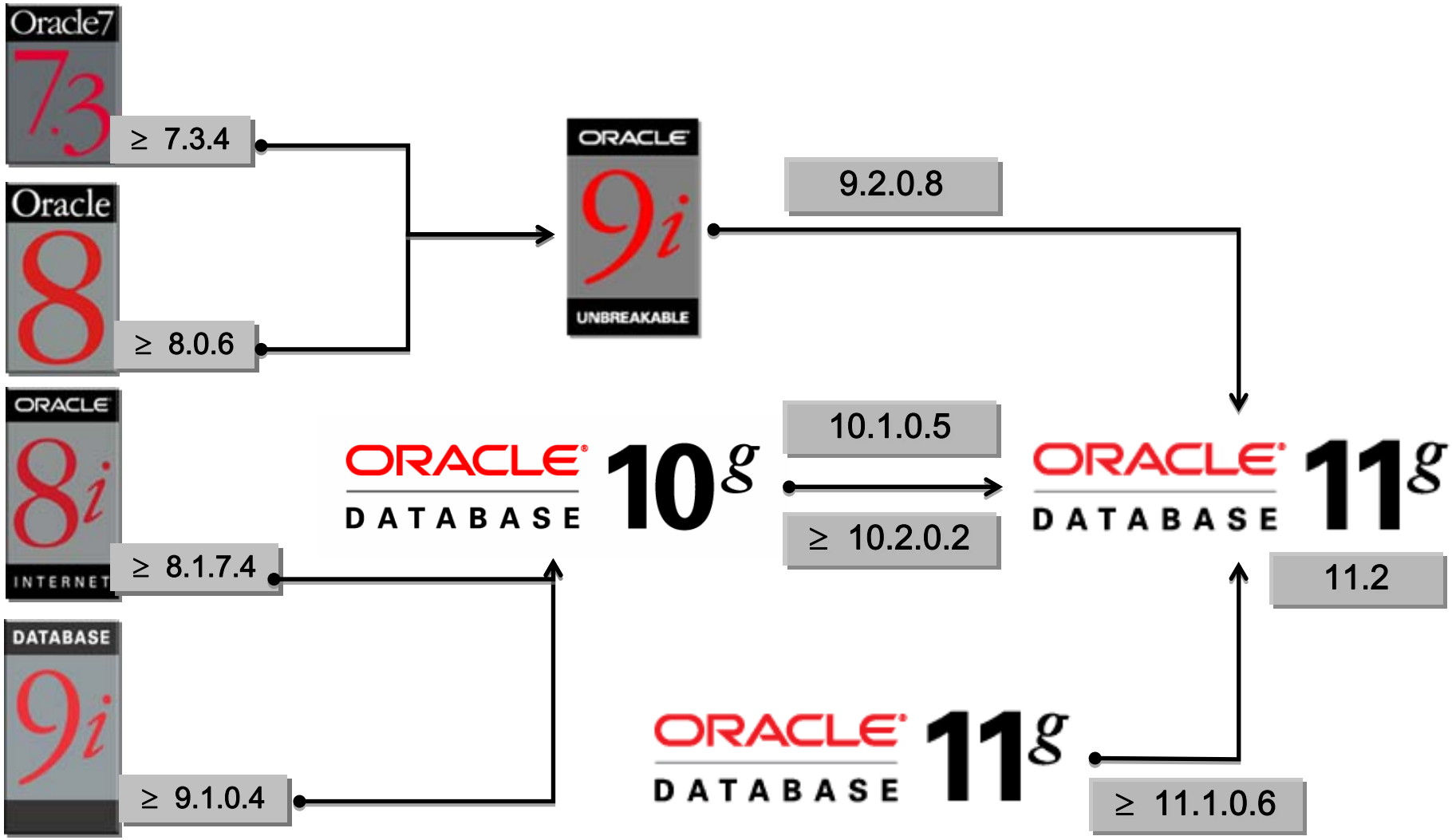
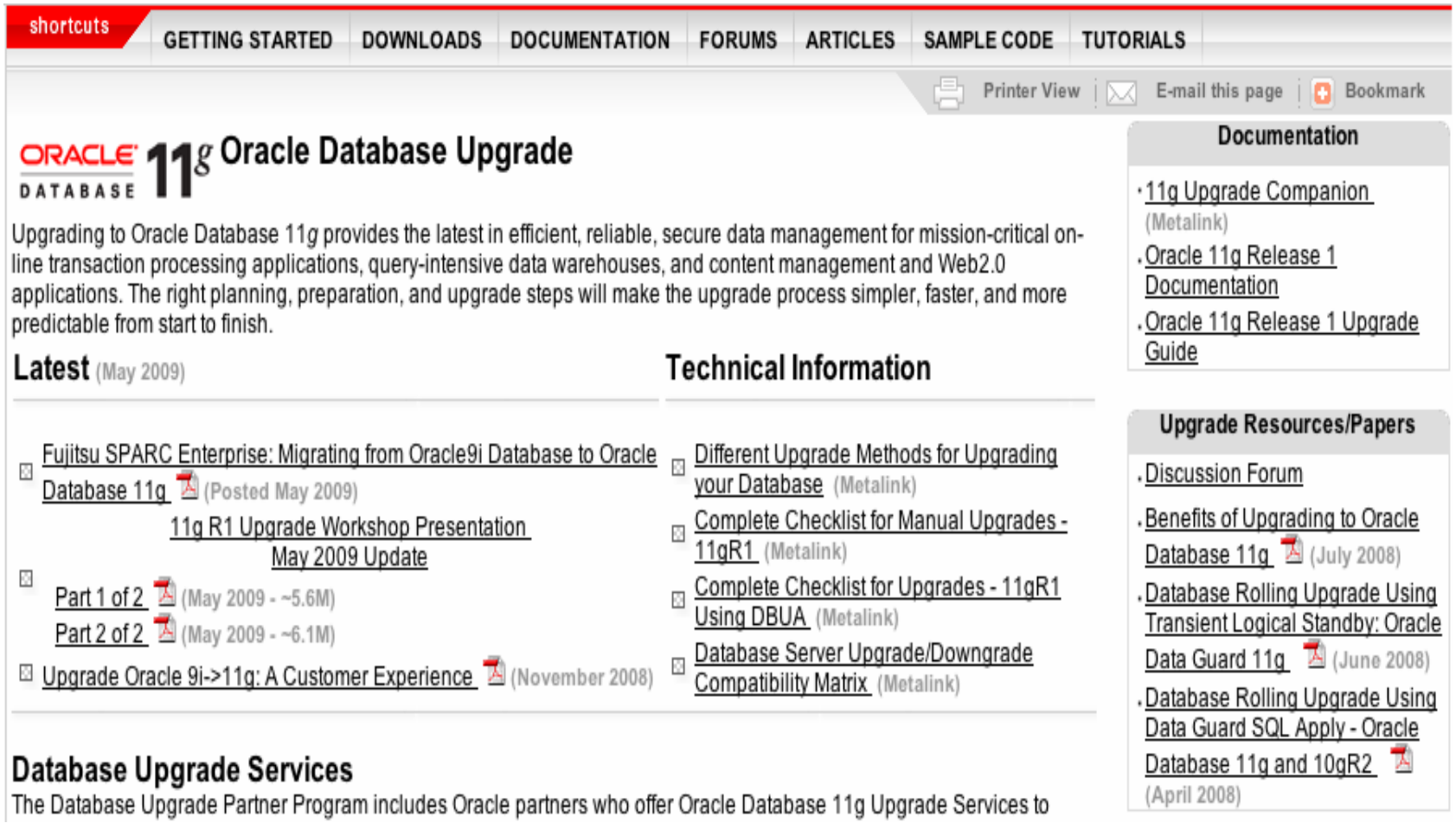


More Information in OTN

http://www.oracle.com/technology/products/database/oracle11g/upgrade/index.html



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ORACLE DATABASE 11g Oracle Database Upgrade

Upgrading to Oracle Database 11g provides the latest in efficient, reliable, secure data management for mission-critical on-line transaction processing applications, query-intensive data warehouses, and content management and Web2.0 applications. The right planning, preparation, and upgrade steps will make the upgrade process simpler, faster, and more predictable from start to finish.

Latest (May 2009)

- Fujitsu SPARC Enterprise: Migrating from Oracle9i Database to Oracle Database 11g (Posted May 2009)
- 11g R1 Upgrade Workshop Presentation May 2009 Update
  - Part 1 of 2 (May 2009 - ~5.6M)
  - Part 2 of 2 (May 2009 - ~6.1M)
- Upgrade Oracle 9i->11g: A Customer Experience (November 2008)

Technical Information

- Different Upgrade Methods for Upgrading your Database (Metalink)
- Complete Checklist for Manual Upgrades - 11gR1 (Metalink)
- Complete Checklist for Upgrades - 11gR1 Using DBUA (Metalink)
- Database Server Upgrade/Downgrade Compatibility Matrix (Metalink)

Database Upgrade Services

The Database Upgrade Partner Program includes Oracle partners who offer Oracle Database 11g Upgrade Services to

Documentation

- 11g Upgrade Companion (Metalink)
- Oracle 11g Release 1 Documentation
- Oracle 11g Release 1 Upgrade Guide

Upgrade Resources/Papers

- Discussion Forum
- Benefits of Upgrading to Oracle Database 11g (July 2008)
- Database Rolling Upgrade Using Transient Logical Standby: Oracle Data Guard 11g (June 2008)
- Database Rolling Upgrade Using Data Guard SQL Apply - Oracle Database 11g and 10gR2 (April 2008)

Why Oracle Database 11g Release 2 ?

- Reduce hardware capital costs by factor of 5x
- Improve performance by at least 10x
- Reduce storage costs by factor of 10x
- Eliminate downtime AND unused redundancy
- Raise DBA productivity by at least 2x
- Considerably simplify your software stack
- Reduce upgrade costs by a factor of 4x

Save Resources → Lower IT Costs!

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Puno hvala. Zelim vam ljepu konferenciju!

Roland Aussermeier
Director Database Technologies