



Oracle Standard Edition – Why not?

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CarajanDB GmbH



ORACLE
ACE

- Oracle professionals with more than 25 years of experience
- Located near Cologne
- Specialized in
 - Oracle Database Administration
 - High Availability (RAC, Data Guard, Failsafe, etc.)
 - Oracle Standard Edition
 - Oracle Migrations (i.e. Unicode, Standard Edition)
 - Replication (Goldengate, SharePlex, Dbvisit)
 - Performance Optimization
 - Database Cloning (Actifio, Delphix, CloneDB)
- Trainings and Workshops (Oracle, Toad)



- **Oracle Professional since 1992**
 - 1992: Presales at Oracle
 - 1999: Project Manager at Herrmann & Lenz Services
 - 2005: Technical Director ADM Presales at Quest Software
 - 2011: Managing Director CarajanDB GmbH
- **2011 → Oracle ACE Award**
- **Author of several well known textbooks (in German):**
 - “Oracle9i für den DBA”, “Oracle10g für den DBA”, “Oracle 11g Release 2 für den DBA”
- **Responsible for Database Administration related topics at DOAG**
- **Hobbies:**
 - Kiting and esp. Indoorkiting
 - Motorbike



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Standard Edition 2

Oracle Database Standard Edition 2 may only be licensed on servers that have a maximum capacity of 2 sockets. When used with Oracle Real Application Clusters, Oracle Database Standard Edition 2 may only be licensed on a maximum of 2 one-socket servers. In addition, notwithstanding any provision in Your Oracle license agreement to the contrary, each Oracle Database Standard Edition 2 database may use a maximum of 16 CPU threads at any time. When used with Oracle Real Application Clusters, each Oracle Database Standard Edition 2 database may use a maximum of 8 CPU threads per instance at any time. The minimums when licensing by Named User Plus (NUP) metric are 10 NUP licenses per server. (<http://www.oracle.com/us/corporate/pricing/databaselicensing-070584.pdf>)

- Available since September 1st 2015
- Maximum 2 Sockets
 - The number of sockets in the server must not exceed 2 – no matter if empty or occupied
- Maximum 16 CPU Threads
 - Hyperthreading counts
- Oracle RAC included (but again for a max of only 2 sockets)

Comparison

	Standard Edition Two	Standard Edition	Standard Edition One
Named User Plus	\$ 350,00	\$ 350,00	\$ 180,00
NUPs per Server	10	5	5
Processor Price	\$ 17,500.00	\$ 17,500.00	\$ 5,800.00
Max. Number of Sockets	2	4	2
Max. Number Threads	16*	unlimited	unlimited
Max. RAM	unlimited	unlimited	unlimited
Max. Database size	unlimited	unlimited	unlimited
RAC	YES	YES	NO
RAC One Node	NO	NO	NO
Support until	unlimited	31-Aug-2016	31-Aug-2016
Version	All	<= 12.1.0.1	<= 12.1.0.1

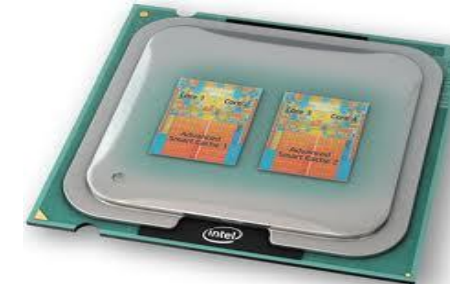
*Per Database

- Starting with the release of Oracle Database 12.1.0.2, Oracle Database Standard Edition 2 (SE2) has been released.
- Beginning with the release of Oracle Database 12.1.0.2, Oracle Database Standard Edition (SE) and Oracle Database Standard Edition One (SE1) are no longer being released. 12.1.0.1 was the final edition that we will produce for SE and SE1.

- **Standard Edition and Standard Edition One**
 - 11.2.0.4: „Free Extended Support“ until May 2017
 - Originally January 2016
 - 12.1.0.1: One year after 12.1.0.2 has been released ➔ August 2016
 - Originally 6 Month after a new Release
- **Standard Edition 2**
 - 11.2.0.4
 - 12.1.0.1
 - 12.1.0.2
 - ...

What is a processor?

- In Hardware it might look like this...



- For Oracle:

Processor: shall be defined as all processors where the Oracle programs are installed and/or running. Programs licensed on a processor basis may be accessed by your internal users (including agents and contractors) and by your third party users. The number of required licenses shall be determined by multiplying the total number of cores of the processor by a core processor licensing factor specified on the Oracle Processor Core Factor Table which can be accessed at <http://oracle.com/contracts>. All cores on all multicore chips for each licensed program are to be aggregated before multiplying by the appropriate core processor licensing factor and all fractions of a number are to be rounded up to the next whole number. When licensing Oracle programs with Standard Edition One or Standard Edition in the product name (with the exception of YESva SE Support, YESva SE Advanced, and YESva SE Suite), a processor is counted equivalent to an occupied socket; however, in the case of multi-chip modules, each chip in the multi-chip module is counted as one occupied socket.

→ So for Standard Edition 2: Processor = Socket

Core Processor Licensing Factor Table

- For Enterprise Edition you need a Core Factor table
- Intel Processor has a licensing factor of

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Oracle Processor Core Factor Table

Effective Date: March 16, 2009

Vendor and Processor	Core Processor Licensing Factor
Sun and Fujitsu UltraSPARC T1 processor (1.0 or 1.2 GHz)	0.25
Only named servers including: Sun Fire T1000 Server, SPARC Enterprise T1000 Server*, with 6 or 8-core 1.0 GHz UltraSPARC T1 processor	
Sun Fire T2000 Server, SPARC Enterprise T2000 Server*, with 4, 6, or 8-core 1.0 GHz, or 8 core 1.2 GHz UltraSPARC T1 processor	
Sun Netra T2000, 1.0 or 1.2 GHz UltraSPARC T1 processor	
SPARC T3 processor	0.25
Sun and Fujitsu UltraSPARC T1 1.4 GHz	0.5
Only named servers including: Sun Fire T2000 Server and SPARC Enterprise T2000 Server*, with 8-core, 1.4 GHz UltraSPARC T1 processor	
Sun T6300, 1.4 GHz UltraSPARC T1 processor	0.5
AMD Opteron Models 13XX, 23XX, 24XX, 41XX, 61XX, 83XX, 84XX or earlier Multicore chips	0.5
Intel Xeon Series 56XX, Series 65XX, Series 75XX, Series E7-28XX, Series E7-48XX, Series E7-88XX or earlier Multicore chips	0.5
Intel Itanium Series 93XX or earlier Multicore chips (For servers purchased prior to Dec 1st, 2010)	0.5
Intel or AMD Desktop, Laptop/Notebook, or Netbook Multicore chips	0.5
Sun UltraSPARC T2+	0.5
SPARC64 VII+	0.5
SPARC T4 processor	0.5
Sun and Fujitsu SPARC64 VI, VII	0.75

What does 16 Threads mean?

- Oracle Resource Manager will automatically limit the „cpu_count“
 - Identical to Instance caging
- Background processes are not included
- Counts per database
 - RAC → 8 Threads per Instance
 - Database Consolidation → individual threads for every database

What are two Sockets?

- The server must not have more than two Sockets
 - Regardless if they are empty or occupied
 - You only have to license the occupied sockets
- **Difficult for RAC**
 - A maximum of two sockets for RAC would imply that you have to by single socket servers
 - Hard to find
 - Oracle allows a two socket server for RAC if one socket is left empty
- **Alternative**
 - Use a hypervisor which supports hard partitioning

Oracle Database Appliance X6-2



- New Series of ODAs
- Fast installation and configuration
- Full Software Stack Patching
- CPUs with 10 cores each
- Flash / SSD

Comparison Matrix



Component	ODA X6-25	ODA X6-2M	ODA X6-2L	ODA X5-2	ODA X6-2HA
Nodes	1	1	1	2	2
CPUs / Cores per Node	1 / 10	1 / 10	2 / 10	2 / 18	2 / 10
Storage (TB) Standard (raw / Net) Ext (raw / net 2 / net 3)	NVM2 6.4 / 3.2 12.8 / 6.4 / 4.2	NVM2 6.4 / 3.2 12.8 / 6.4 / 4.2	NVMe 19.2 / 9.6 / 6.4 28.2 / 14.4 / 9.6	SAS 128 / 64 / 42.7 256 / 128 / 85 + 4 x 400 GB SSD + 4 x 200 GB SSD	SSD (Storage Shelf) 12 / 6 / 4 24 / 12 / 8 48 / 24 / 16 + SSD for Redo
Boot Disk (mirrored)	SSD 480 GB	SSD 480 GB	SSD 480 GB	SAS 600 GB	SSD 480 GB
Network	2 x 10 GB / 2 FC	4 x 10 GB / 2 FC	5 x 10 GB / 2 FC	4 x 10 GB Infiniband IC	4 x 10 GB Infiniband IC
Capacity on Demand	2,4,6,8,10	2,4,...18,20	2,4,...18,20	2,4,...34,36	2,4,...18,20
Enterprise Edition	Yes	Yes	Yes	Yes	Yes
Standard Edition	Yes	Yes	Yes	No	No
OracleVM	No	No	No	Yes	Yes
RAC	No	No	No	Yes	Yes

- Oracle Standard Edition
 - No additional costs
- Oracle Standard Edition One
 - 20% Uplift to the actual support fee (e.g. \$ 1.276,00 → \$ 1.531,20)
- All licenses must have been migrated if you want to use 12.1.0.2 or following

Example DELL PowerEdge M820

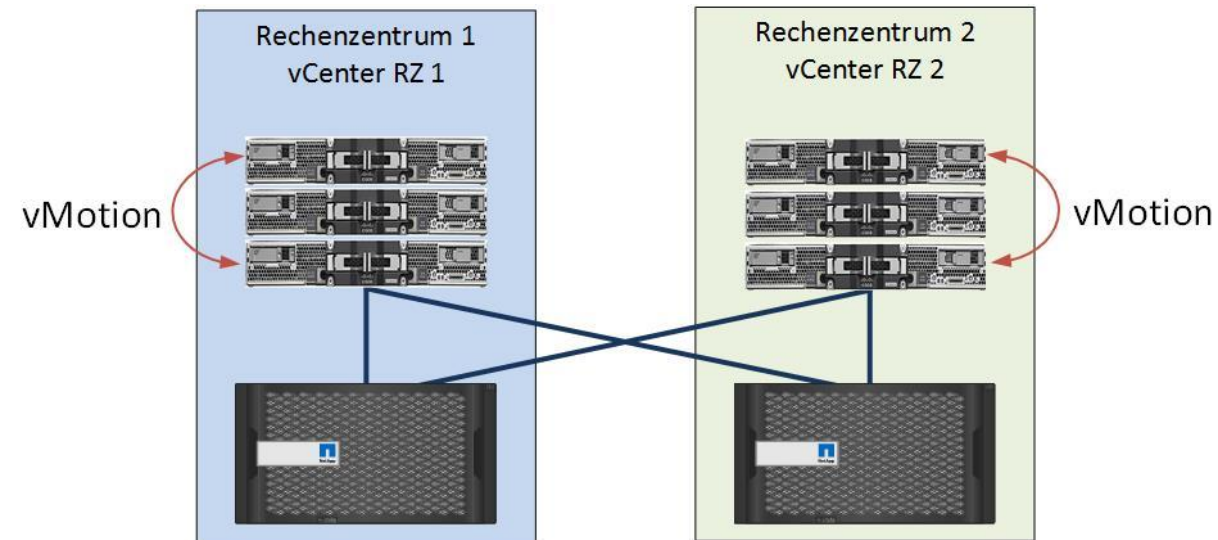
- **4 Sockets**
- Up to 12 Cores
- With Standard Edition:
 - $4 \times \$ 17.500,00 = \$ 70.000,00$
- With Enterprise Edition (Example with 8 cores):
 - $4 * 8 * 0,5 * \$ 47.500,00 = \$ 760.000,00$

Example ODA X6-2L

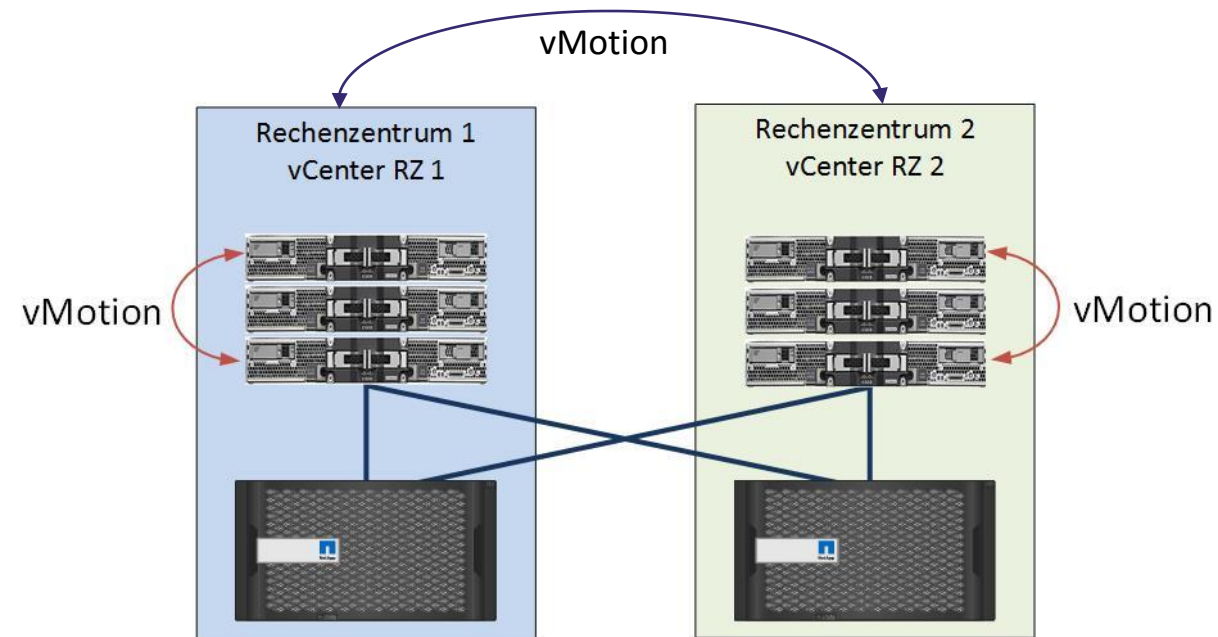
- 2 Sockets
- Up to 20 Cores
- With Standard Edition:
 - Begin (10 Cores): $1 \times \$ 17,500.00 = \$ 17,500.00$
 - End (20 Cores): $2 \times \$ 17,500.00 = \$ 35,000.00$
- With Enterprise Edition:
 - Begin (2 Cores): $1 \times 47,500.00 = 47,500.00$
 - End (20 Cores): $20 * 0,5 * 47,500.00 = 475,000.00$

- DOAG Licensing Center:
 - The entire cluster must be licensed! This is the fundamental rule for soft partitioning like VMware and HyperV. It doesn't matter which automatism will be used (e.g. VMware HA). If any of the servers in the cluster does not exceed the maximum of two sockets, SE1 can be licensed (and now SE2). But all occupied sockets in the cluster will count.
<http://www.doag.org/de/doag/competence-center/lizenz/fragen-und-antworten.html>

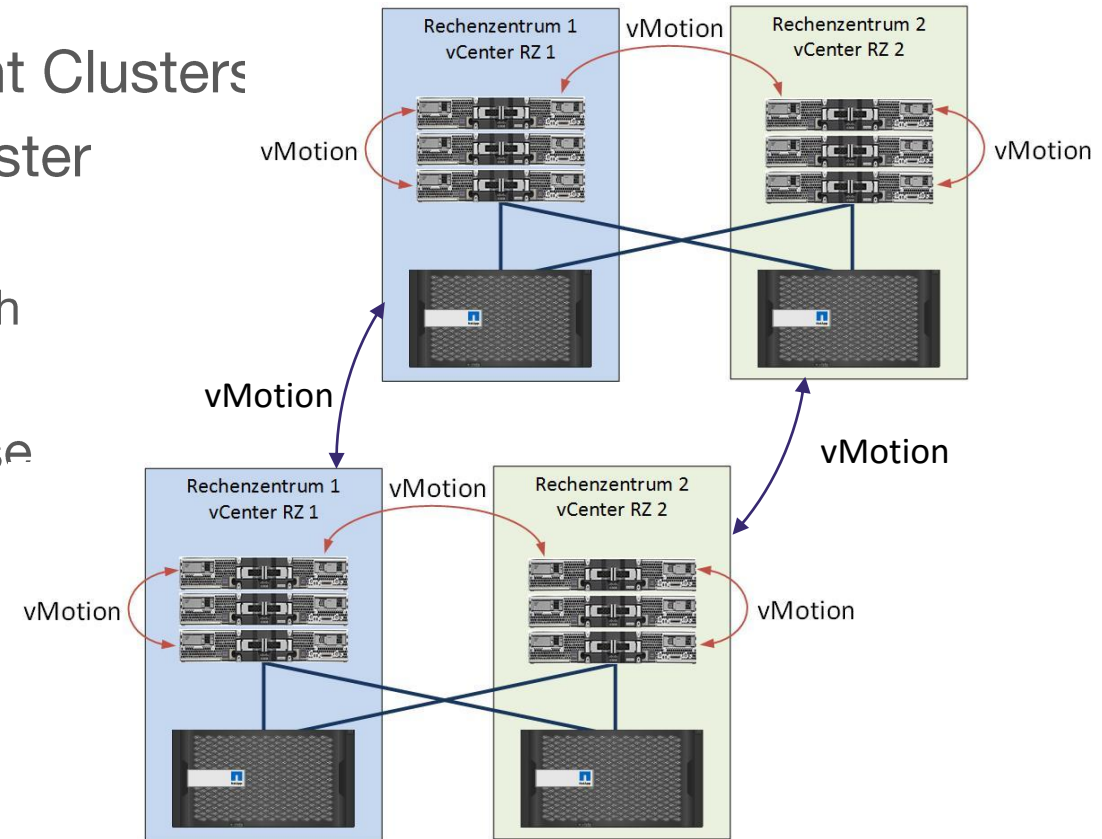
- VMware HA within one vCenter
 - Virtual guests might move within one vCenter
 - Oracle → License all Servers within one vCenter
 - Example:
 - 2 vCenter with 3 Servers each
 - One Oracle database in DC1 (RZ 1)
 - 3 servers must be licensed as the data might run on any of these



- VMware HA within one Cluster
 - Virtual guests might move between different vCenters in one Cluster
 - Oracle → License all Servers within the cluster
 - Example:
 - 2 vCenter with 3 Servers each
 - One Oracle database in DC1 (RZ 1)
 - 6 servers must be licensed as the data might run on any of these

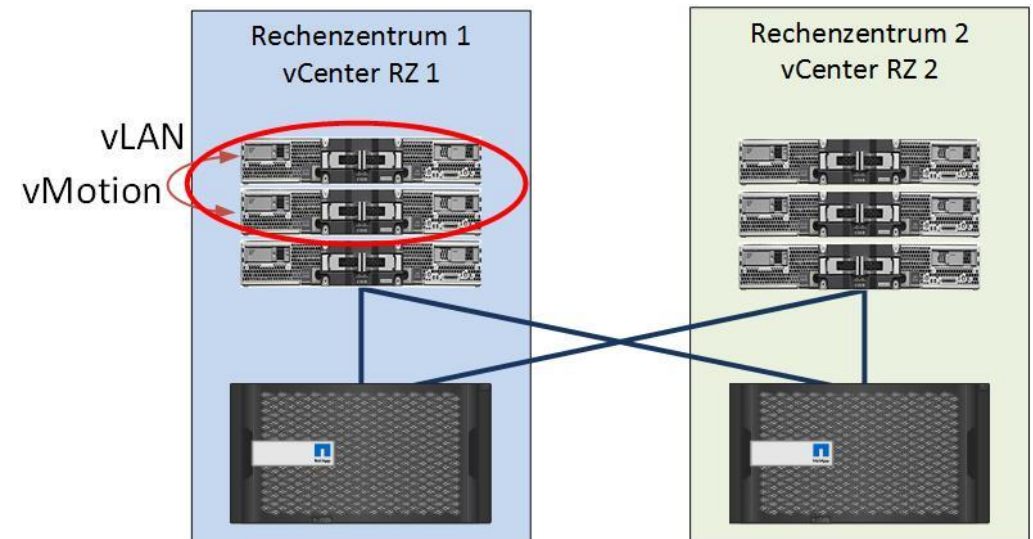


- VMware HA between different Clusters
 - Virtual guests might move between different Clusters
 - Oracle → License all Servers within the cluster
 - Example:
 - 2 Clusters with 2 vCenter with 3 Servers each
 - One Oracle database in DC1 (RZ 1)
 - 12 servers must be licensed as the database might run on any of these



DOAG Negotiation with Oracle (Nov. 2015)

- Segmentation by means of vLans for Oracle Databases
- VMware HA only within one vLAN
 - Guests can only move around within one vLAN
 - Oracle → Licensing of servers within one vLAN
 - Example:
 - 2 vCenter with 3 Servers each
 - One Oracle database in DC1 (RZ 1)
 - vLAN with two Servers in DC1 (RZ1)
 - Only two Servers must be licensed!
- Currently single approval with Oracle required



- Presently, depending on the applied *Hypervisor* version, it is required to license either the cluster, all hosts within reach of the Management Console, or the complete virtual infrastructure. For VMware up to version 5.0 this implies the *cluster*, from version 5.1 the *vCenter*, and from version 6.0 the complete virtual infrastructure has to be licensed.
- According to Mendelsohn there are signs that the segmentation of the Hypervisor or VM environment by means of VLAN technology is increasingly being accepted.
The advantage of segmenting virtual nets into logical groups is a separation of the environments without affecting data communication. The VLAN can therefore be taken as a limitation of the range subject to licensing, which means that only the host server within a VLAN has to be licensed, since it is not possible with known Hypervisor technologies to shift virtual machines in operation beyond the edge of a VLAN.
Analogously, the VLAN solution applies to all Hypervisor providers that allow the shifting of virtual machines in operation beyond cluster boundaries.
- Currently, this has to be approved by Oracle by means of a single approval procedure.

Standard Edition and VMware



- High Availability with VMware HA
- Flexibility with vLANs
- Maximum two Sockets per Server (occupied or not)
- Competitive solution to consolidate databases



Functionality

Feature Comparison

Feature	Express Edition	Standard Edition Two	Enterprise Edition
Data Guard	NO	NO	YES
Active Data Guard	NO	NO	Option
Online Table and Index Rebuild	NO	NO	YES
Parallel DML and DDL	NO	NO	YES
Flashback Query	YES	YES	YES
Flashback Table, Database, Transaction Query	NO	NO	YES
Flashback Data Archive (Total Recall)	YES	YES	YES
Failsafe	NO	YES	YES
Online und Incremental Backup and Recovery	YES	YES	YES
Clusterware	NO	YES	YES
Bitmapped Index and Bitmapped Join Index	NO	NO	YES
Oracle Real Application Clusters	NO	YES	Option
Automatic Workload Management	NO	YES	YES
AWR, ADDM, ASH	NO	NO	Option

<http://www.oracle.com/us/products/database/standard-edition/comparisons/index.html>

Features in Standard Edition 2

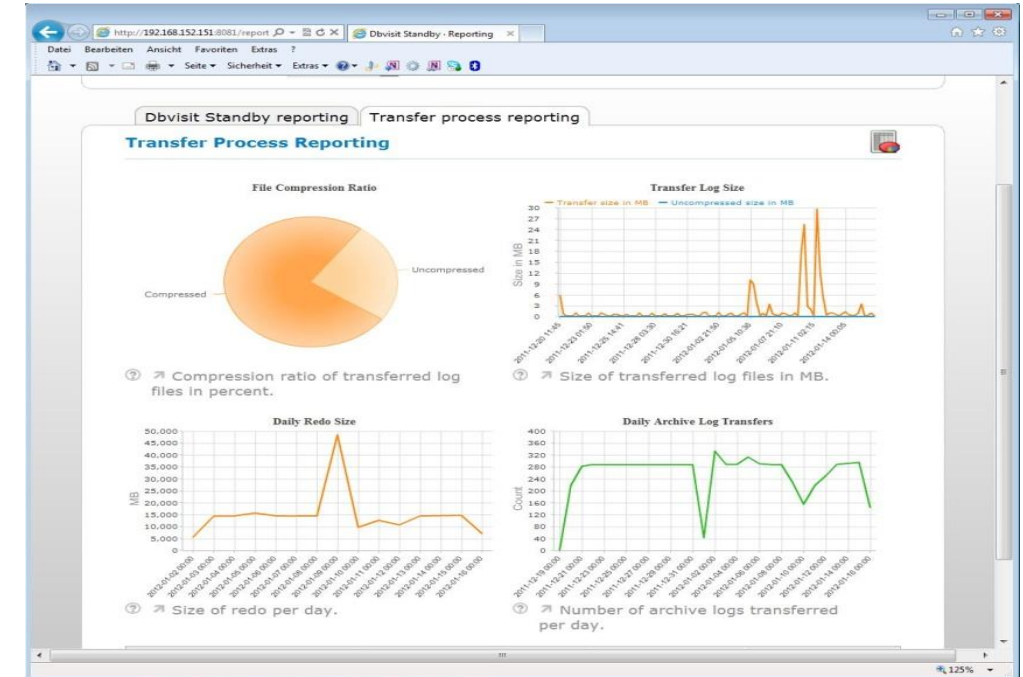


- Oracle Fail Safe
- Oracle Real Application Clusters
- Flashback Data Archive
- Goldengate
 - Heterogeneous Replication
 - Additional Costs
- Oracle Secure Backup
 - Independent Backup Solution for Tape and Disk Backups
 - No Encryption for SE2
 - Additional Costs

- **Oracle Data Guard**
 - Alternative: dbvisit Standby
- **Grid Control Tuning and Diagnostic Pack**
 - Alternative: Toad for Oracle, Spotlight on Oracle, ...
 - Statspack
 - OraSASH
- **Backup Performance**
 - Parallel Backup must be replaced with Tablespace Level Backup
 - Incremental Backup without Block Change Tracking
- **Flashback Database**
 - Flashback Database through RMAN Restore and Forward Recovery
 - Alternative: dbvisit Replicate or Standby

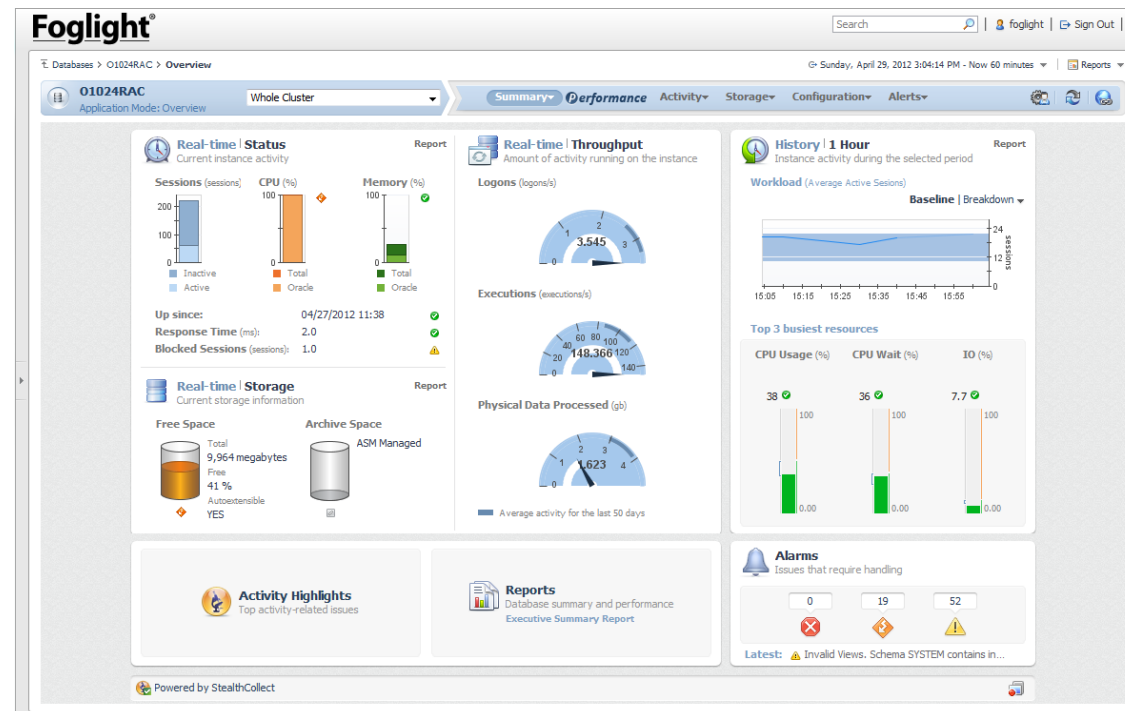
Data Guard Alternative

- Dbvisit Standby
 - Standby Datenbank
 - Easy to install and to configure
 - Graphical interface
 - Low pricetag
- www.dbvisit.com



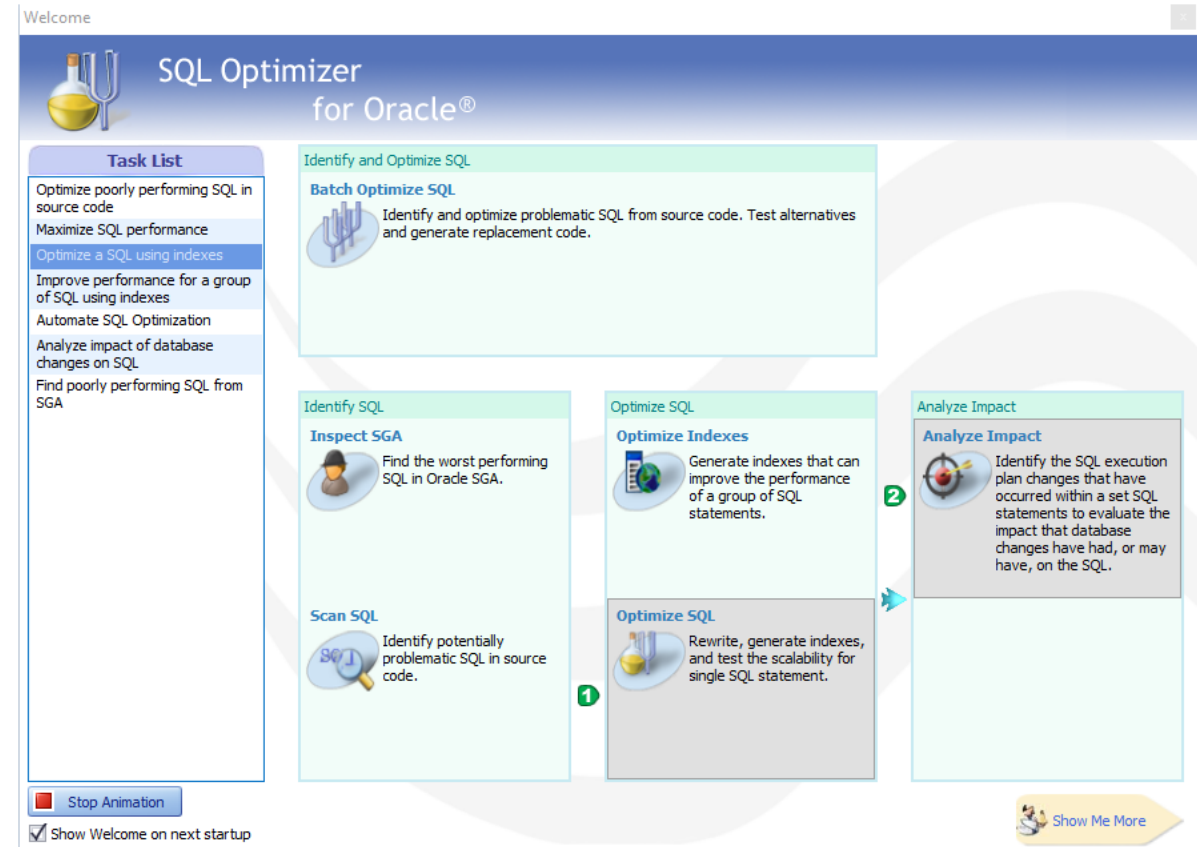
Diagnostic Pack Alternative

- Alternative 1: DELL Spotlight On Oracle
- Alternative 2: DELL Foglight → Monitoring
- Alternative 3: Herrmann & Lenz Monitoring Module



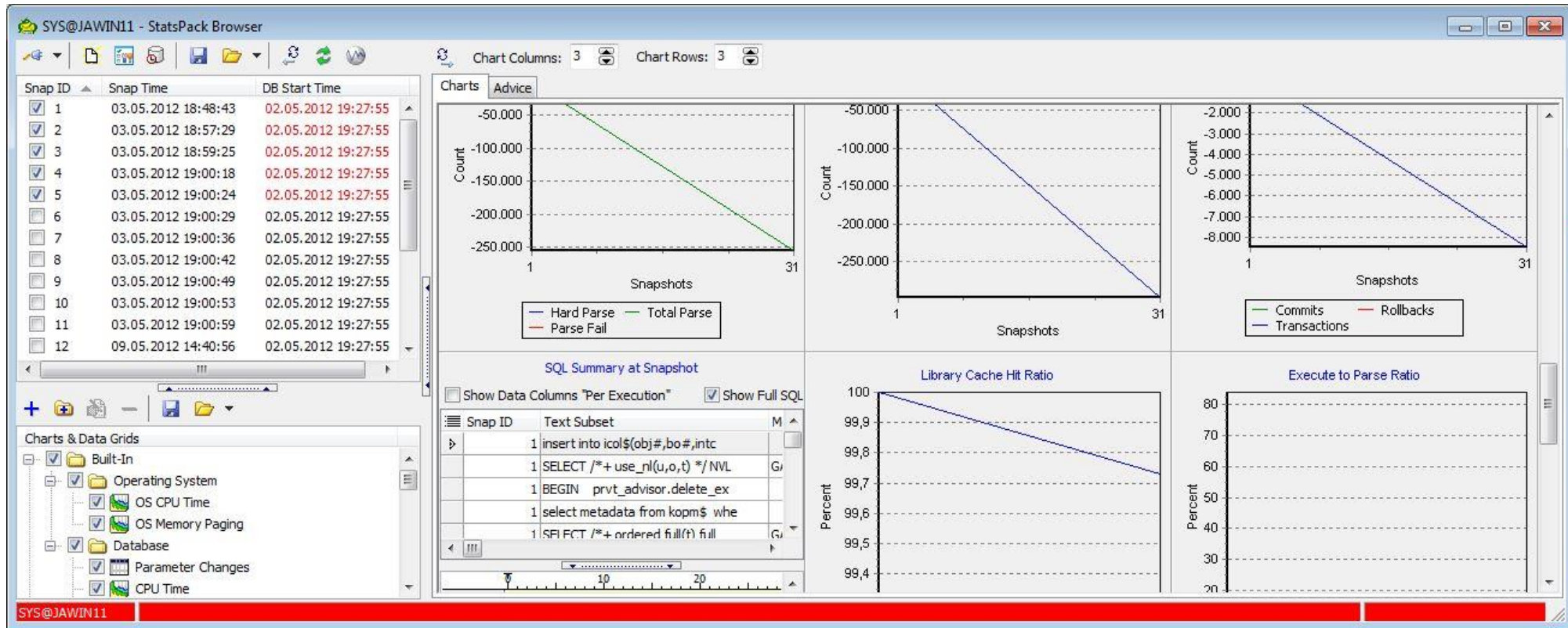
Tuning Pack Alternative

- Alternative: Statspack
- But:
 - No SQL Baselines
 - No SQL Profiles
- Toad SQL Optimizer for Oracle



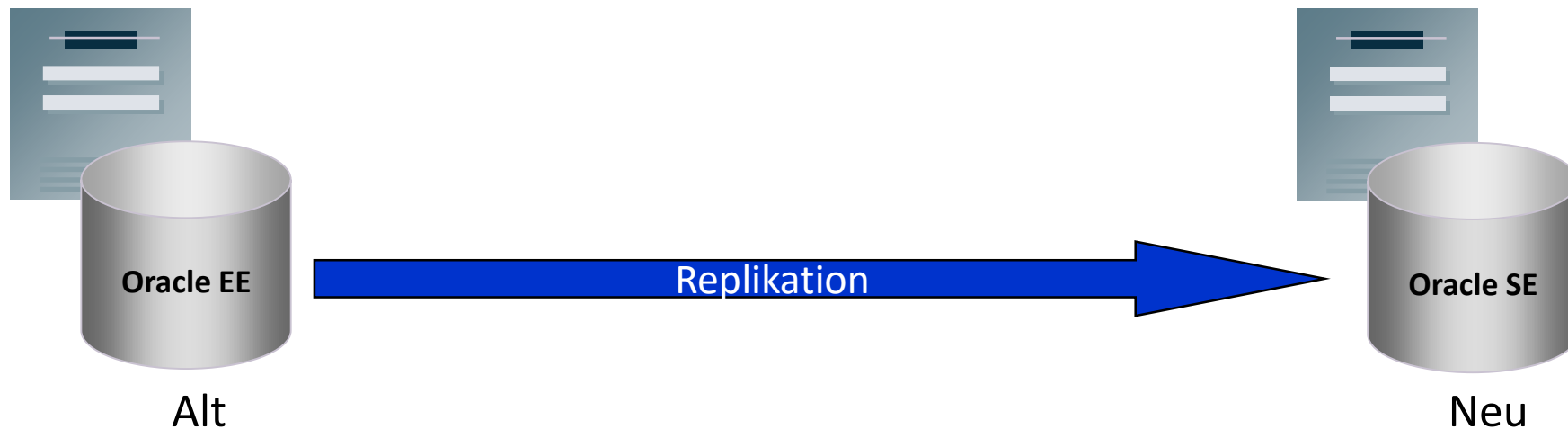
- **Installation (Default User PERFSTAT)**
 - `sqlplus / as sysdba`
 - `SQL> @?/rdbms/admin/spcreate`
- **Statistic Snapshot**
 - `sqlplus perfstat/<pwd>`
 - `SQL> execute statspack.snap`
- **Statistics Job (using dbms_jobs – not the scheduler)**
 - `sqlplus perfstat/<pwd>`
 - `SQL> @?/rdbms/admin/spauto`
 - Default: once per hour

Toad Statspack Browser



Replication and Migration

- Oracle Goldengate
- DELL SharePlex
- Dbvisit Replicate



- Don't change the parameter `CONTROL_MANAGEMENT_PACK_ACCESS = NONE`
- Partitioning:
 - Allowed for internal usage (e.g. Flashback Data Archive)
 - User usage: „ORA-00439: feature not enabled: Partitioning“
- Compression:
 - ORA-00439: feature not enabled: Basic Compression
- Flashback Database:
 - ORA-00439: feature not enabled: Flashback Database
- RMAN Compression (Basic) – is allowed!
- Parallelism – Not allowed but no error message!

- Included in Oracle Enterprise Edition
 - Does not Require Tuning or Diagnostic Pack (or any other option)
- Included in Oracle Standard Edition
 - Not allowed to use
 - Risk for License Misl

Feature Availability by Edition

Table 1-1 lists feature availability for Oracle Database Standard Edition One (SE1), Standard Edition (SE), and Enterprise Edition (EE). The Y value in a column means that the feature is available in the specified release; N means that it is unavailable. This table can help you understand the difference between the editions and determine whether you require Enterprise Edition (or Personal Edition for a single-user environment).

Note that Oracle Database XE is a separate product from the rest of the Oracle Database product family. The features available with Oracle Database XE are documented in *Oracle Database Express Edition Licensing Information*, which is installed along with the product itself.

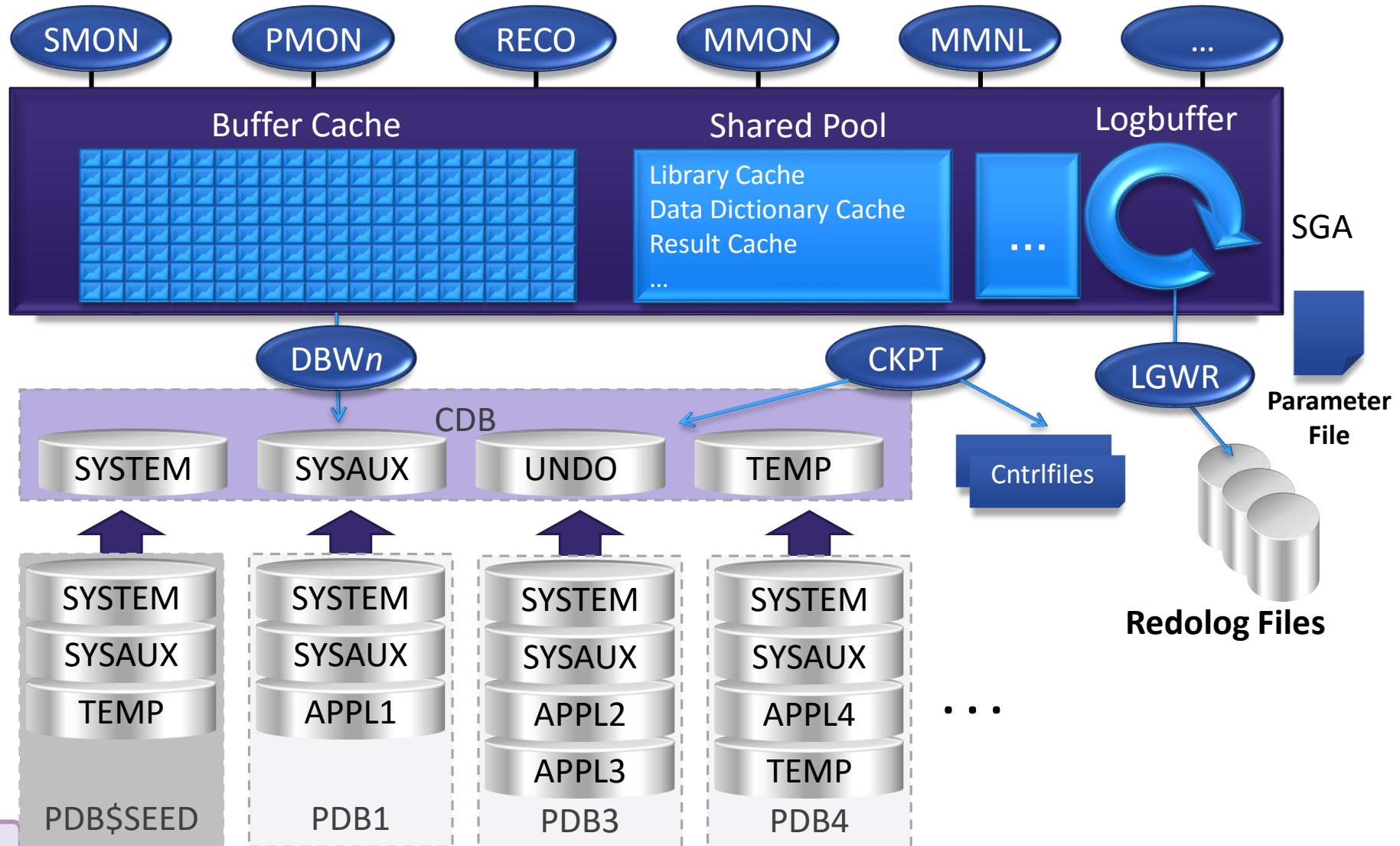
Table 1-1 Feature Availability for Oracle Database Editions

Feature/Option	SE1	SE	EE	Notes
Instance Caging	N	N	Y	
SQL Plan Management	N	N	Y	

Oracle 12.1 Installation and Upgrade → Database Licensing Information

- Table with used features (mainly Enterprise Edition)
 - Refresh with auto scheduler job
 - Default: every 7 days (604800 Seconds)
 - **Warning: is not always showing the correct values**
 - E.g. My Oracle Support ID 1381022.1
- „Query against DBA_FEATURE_USAGE_STATISTICS is not a true test for use of SDO”*

Multitenant Database



- Costly Option for Enterprise Edition
- Single-Tenant Database allowed in all Editions

"The non-CDB architecture is deprecated in Oracle Database 12c, and may be desupported and unavailable in a later Oracle Database release. Oracle recommends use of the CDB architecture." (Oracle 12c Database Upgrade Guide, Chapter 8.1.1)

Advantages CDB vs. NON-CDB



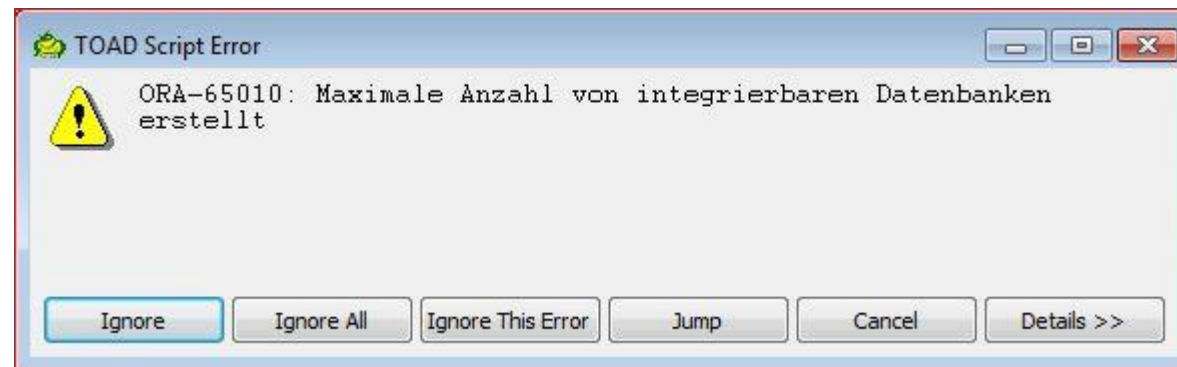
- **Simple Upgrade Process**
 - Create a new CDB
 - Unplug the PDB from the current CDB
 - Plugin the PDB into the new CDB
 - Not entirely implemented yet
 - It's still required to patch the PDB
- **Segregation of Duties**
 - CDB Administrator vs. PDB Administrator
 - E.g. Development → PDB Administrator can manage Users, Tablespaces etc.
 - PDB size can be limited
- **Template and versioning**
 - Use a bunch of PDBs for development while opening only one at a time

No more PDBs allowed!

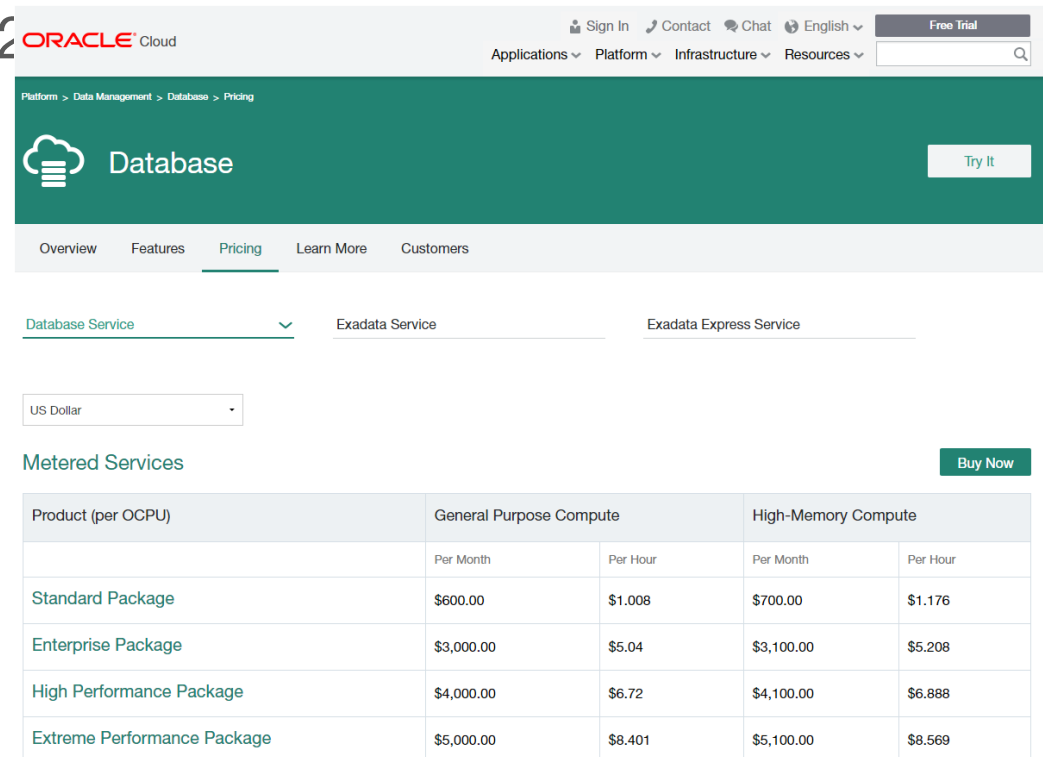
```
SQL> create pluggable database JOHN2 admin user pdb_admin identified by manager;  
create pluggable database JOHN2 admin user pdb_admin identified by manager  
*
```

ERROR at line 1:

ORA-65010: maximum number of pluggable databases created



- Database Cloud Service available since Nov. 11st 2016
 - Standard Package using SE2
 - Release 12.2
 - \$ 600.00 per Month
 - \$ 1.006 per Hour



The screenshot shows the Oracle Cloud Database Pricing page. The header includes navigation links for Sign In, Contact, Chat, and English, along with a Free Trial button. The main content area features a green banner with the Oracle Cloud logo and the word 'Database'. Below the banner are tabs for Overview, Features, Pricing (selected), Learn More, and Customers. The Pricing tab is active, showing a dropdown menu for Database Service, Exadata Service, and Exadata Express Service. A currency selector is set to US Dollar. The 'Metered Services' section is highlighted, and a 'Buy Now' button is visible. The pricing table below lists four packages: Standard Package, Enterprise Package, High Performance Package, and Extreme Performance Package, with their respective monthly and hourly costs.

Product (per OCPU)	General Purpose Compute		High-Memory Compute	
	Per Month	Per Hour	Per Month	Per Hour
Standard Package	\$600.00	\$1.008	\$700.00	\$1.176
Enterprise Package	\$3,000.00	\$5.04	\$3,100.00	\$5.208
High Performance Package	\$4,000.00	\$6.72	\$4,100.00	\$6.888
Extreme Performance Package	\$5,000.00	\$8.401	\$5,100.00	\$8.569

- All packages include Oracle Database Transparent Data Encryption. Standard package includes the Oracle Database Standard Edition. Enterprise package includes the Oracle Database Enterprise Edition. High Performance extends the Enterprise package with the following options: Multitenant, Partitioning, Real Application Testing, Advanced Compression, Advanced Security, Label Security, Database Vault, OLAP, Advanced Analytics, Spatial & Graph, Diagnostics Pack, Tuning Pack, Database Lifecycle Management Pack, Data Masking and Subsetting Pack and Cloud Management Pack for Oracle Database. Extreme Performance package extends the High Performance package with the following options: RAC (Real Application Clusters), In-Memory Database, Active Data Guard.
- This bundled metered service allows you to set and activate the offerings currently available for Oracle Database Cloud Service. Note that the purchase of the 'Pay as you go' service does not require any upfront payment; monthly invoice will be generated based on usage. Discounted pre-paid option is available, learn more [here](#).
- For Compute shapes, see [here](#).
- For more information on Database versions, review the [documentation](#).
- Pricing is based on each individual service. For Database Backup Service and Storage Service charges, review [Database Backup Service pricing](#) and [Storage Service pricing](#).

- Standard Edition 2 is still a cheap alternative to Enterprise Edition
- Be careful with empty sockets
- Be careful with features which might require Enterprise Edition
- 16 Threads are most of the time sufficient
- Vmware with vLAN as a cheap HA solution
- Optimal for database consolidation
- Single tenant for development with versioning



Questions?

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