Oracle Rac One Node 11gR2
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Who am I

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• Working as independent Consultant/Member of GRID-IT
• Area of attention: HA/RAC/ASM/CRS/MAA
• 12 year experience with Oracle Products
• OCP 8i,9i,10g, 11g and OCE RAC
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• GRID-IT delivers the following trainings: Oracle Data Guard, Oracle Real Application Cluster, ASM, Performance and Tuning workshop, Oracle Security and Oracle VM
Oracle Database types

- **Instance_type = ASM**
  SQL> show parameter instance_type

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>instance_type</td>
<td>string</td>
<td>asm</td>
</tr>
</tbody>
</table>

- **Instance_type = RDBMS**
  SQL> show parameter instance_type

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>instance_type</td>
<td>string</td>
<td>RDBMS</td>
</tr>
</tbody>
</table>

- Single Instance
- Real Application Cluster
- **RAC One node**
What is RAC One Node?

- Oracle Real Application Clusters One Node (Oracle RAC One Node) is a single instance of an Oracle Real Application Clusters (Oracle RAC) database that runs on one node in a cluster. Instead of stopping and starting instances, you use Oracle RAC One Node online database relocation to relocate the Oracle RAC One Node instance to another server.

Source: Oracle® Database 2 Day + Real Application Clusters Guide 11g Release 2 (11.2)
Why use Rac One Node?

Cold failover

Relocate/omotion

Rolling upgrade

Upgrade online to RAC
Requirements

• Build a cluster, minimum of 2 nodes, shared storage, private interconnect
• Install an Operating System
• Download Oracle GRID Infrastructure release 11.2.0.2 or higher
• Download Oracle RDBMS software release 11.2.0.2 or higher
• Select a Cluster file system, advise to use ASM
• Follow the manual: GRID Infrastructure installation Guide
Oracle GRID Infrastructure

Node 1:
- Oracle GRID Infrastructure
- ASM + Clusterware
- Operating System

Node 2:
- Oracle GRID Infrastructure
- ASM + Clusterware
- Operating System

Node 3:
- Oracle GRID Infrastructure
- ASM + Clusterware
- Operating System

Shared storage:
- ASM Cluster file system
- OCR en Voting Disk
- ACFS shared file system

VIPs:
- SCAN VIP1
- SCAN VIP2
- SCAN VIP3
RDBMS software installation

- Install the Oracle RDBMS Software of 11.2.0.2 or higher
- Fully integrated RAC One Node in the software distribution
- Follow the instructions in the manual: RDBMS installation Guide
- Start the DBCA to create an Oracle RDBMS instance of the type Oracle RAC One Node Database
Welcome to the Database Configuration Assistant for Oracle Real Application Clusters.

The Database Configuration Assistant enables you to create, configure, or delete a cluster database and manage database templates. It also enables you to add and delete instances of a cluster database.

Select the database type that you would like to create or administer:

- Oracle Real Application Clusters (RAC) database
- Oracle RAC One Node database
- Oracle single instance database
Select the operation that you want to perform:

- Create a Database
- Configure Database Options
- Delete a Database
- Manage Templates
- Instance Management

ASM configuration operations must be performed using Automatic Storage Manager.
Templates that include datafiles contain pre-created databases. They allow you to create a new database in minutes, as opposed to an hour or more. Use templates without datafiles only when necessary, such as when you need to change attributes like block size, which cannot be altered after database creation.

<table>
<thead>
<tr>
<th>Select</th>
<th>Template</th>
<th>Includes Datafiles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Purpose or Transaction Processing</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Custom Database</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Data Warehouse</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Show Details...
RAC One Node database can be Admin-Managed or Policy-Managed. A Policy-Managed RAC One Node database selects fail-over candidate server from associated server pool. Admin-Managed RAC One Node need specific candidate servers configured for fail over.

Configuration Type:  
- Admin-Managed  
- Policy-Managed

An Oracle database is uniquely identified by a Global Database Name, typically of the form "name.domain".

Global Database Name:  
RAOne

A database is referenced by an Oracle instance on each cluster database node. Specify a prefix to be used to name the cluster database instances.

SID Prefix:  
RAOne

Database Service name is used by applications to connect to RAC One Node database.

Service Name:  
prod

Select the candidate nodes on which you want to create the RAC One Node database. The local node "server2" will always be used, whether or not it is selected.

server1
server2
Database Configuration Assistant, Step 4 of 12: Management Options

Enterprise Manager

- Configure Enterprise Manager
  - Register with Grid Control for centralized management
    - Management Service: No Agents Found

- Configure Database Control for local management
  - Enable Daily Disk Backup to Recovery Area
    - Backup Start Time: [Time field]
  - OS Username: [Field]
  - OS Password: [Field]
For security reasons, you must specify passwords for the following user accounts in the new database.

- Use Different Administrative Passwords

<table>
<thead>
<tr>
<th>User Name</th>
<th>Password</th>
<th>Confirm Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYSTEM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBSNMP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYSMAN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Use the Same Administrative Password for All Accounts

Password: ******
Confirm Password: ******
Database Configuration Assistant, Step 6 of 12: Database File Locations

Specify storage type and locations for database files.

Storage Type: Automatic Storage Management (ASM)

Storage Locations:
- Use Database File Locations from Template
- Use Common Location for All Database Files
- Use Oracle-Managed Files

Database File Location: [blank]

ASM Credentials

Specify ASMSNMP password specific to ASM: ********

File Location Variables...
Choose the recovery options for the database:

- **Specify Fast Recovery Area**
  
  This is used as the default for all disk based backup and recovery operations, and is also required for automatic disk based backup using Enterprise Manager. Oracle recommends that the database files and recovery files be located on physically different disks for data protection and performance.

  **Fast Recovery Area:** +DATA

  **Fast Recovery Area Size:** 4347 M Bytes

- **Enable Archiving**

  - **Edit Archive Mode Parameters...**

  - **File Location Variables...**
Sample Schemas illustrate the use of a layered approach to complexity, and are used by some demonstration programs. Installing this will give you the following schemas in your database: Human Resources, Order Entry, Online Catalog, Product Media, Information Exchange, Sales History. It will also create a tablespace called EXAMPLE. The tablespace will be about 130 MB.

Specify whether or not to add the Sample Schemas to your database.

- [ ] Sample Schemas
### Memory Sizing

**Typical**
- Memory Size (SGA and PGA): **1161 MB**
- Percentage: **40 %**

**Custom**
- Memory Management: **Automatic Shared Memory Management**
- SGA Size: **870 M**
- PGA Size: **290 M**

Total Memory for Oracle: **1160 M Bytes**

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**All Initialization Parameters...**

---

**Buttons:**
- Cancel
- Help
- Back
- Next
- Finish
Database Storage

From the Database Storage page, you can specify storage parameters for database creation. This page displays a tree listing and summary view (multi-column lists) to enable you to change and view the following objects:

- Control files
- Tablespaces
- Datafiles
- Rollback Segments
- Redo Log Groups

From any object type folder, click Create to create a new object. To delete an object, select the specific object from within the object type folder and click Delete.

Important: If you select a database template including data files, then you will not be able to add or remove data files, tablespaces, or rollback segments. Selecting this type of template enables you to change the following:

- Destination of the datafiles
- Control files or log groups.

For more information, refer to the Oracle Database Storage Administrator's Guide.
Select the database creation options:

- [ ] Create Database
- [ ] Generate Database Creation Scripts

Destination Directory: /u01/app/oracle/admin/BCB/scripts

Browse...
DBCA in silent mode

- Possible to use the DBCA in silent mode with a template and additional parameters, also for RAC One Node

```
$ORACLE_HOME/bin/dbca -silent -createDatabase -TEMPLATENAME
"$ORACLE_HOME/assistants/dbca/templates/MYOWN_DBA_TEMPLAT
E.dbt" -gdbName racone -sid racone
-RACOneNode
-RACOneNodeServiceName SERVICE_PROD
-policyManaged
-serverPoolName PRODPOOL -sysPassword "Bassie"
-systemPassword "Adriaan" -storageType ASM
-asmsnmpPassword "B7" -diskGroupName DATA
-recoveryGroupName FRA
```
Oracle RAC One node

Node 1:
- Database instance Racon
- Oracle GRID Infrastructure
- ASM + Clusterware
- Operating System

Node 2:
- Oracle GRID Infrastructure
- ASM + Clusterware
- Operating System

Node 3:
- Oracle GRID Infrastructure
- ASM + Clusterware
- Operating System

VIPs:
- SCAN VIP1
- VIP1
- SCAN VIP2
- VIP2
- SCAN VIP3
- VIP3

Public network:
- Node 1 to Node 2
- Node 1 to Node 3

Cluster interconnect:
- Node 1 to Node 2
- Node 1 to Node 3

Cache to cache:
- Node 1 to Node 2
- Node 1 to Node 3

Shared storage:
- redo logs
- Database files / controlfiles
- OCR en Voting Disk
- ACFS shared file system
Clusterware parameters

$ srvctl config database -d racone
Database unique name: RACone
Database name: RACone
Oracle home: /u01/app/.../dbhome_1
Oracle user: oracle
Spfile: +DATA/RACone/spfileRACone.ora
Domain:
Start options: open
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC

Server pools: RACone
Database instances:
Disk Groups: DATA
Mount point paths:
Services: Apple
Type: RACOneNode
Online relocation timeout: 30
Instance name prefix: RACone
Candidate servers: server1,server2
Database is administrator managed
Instance parameters RAC One node

- Are these parameters RAC One Node specific?

```python
cluster_database = TRUE
cluster_database_instances = 2
instance_name = RACone_1
instance_number = 1
```
Starting Rac One Node

• Use srvctl to start/stop instances, but no guarantee on which node
• Based on candidate node list, ER: 12837648
• To overcome of functionality make user of srvctl –n
• Possible to update candidate node list, but this is not supported
• Using oratab “old fasion”, make use of EasyConnect:

  $ sqlplus system@"cluster1-scan/prod"
  $ sqlplus sys@"cluster1-scan/prod" as sysdba
Relocate instance

• Possible to relocate an instance from one node to another node in the cluster
• Can be done using command line srvctl or Enterprise Manager

[oracle@server1 ~]$ srvctl status database -d racone
Instance racone_2 is running on node server1
Online relocation: INACTIVE

[oracle@server1 ~]$ srvctl relocate database -d racone -n server2

[oracle@server1 ~]$ srvctl status database -d racone
Instance racone_1 is running on node server2
Online relocation: INACTIVE
Oracle RAC One node

Node 1
- Oracle GRID Infrastructure
  - ASM + Clusterware
- Operating System

Node 2
- Database instance Racone
- Oracle GRID Infrastructure
  - ASM + Clusterware
- Operating System

Node 3
- Oracle GRID Infrastructure
  - ASM + Clusterware
- Operating System

VIP 1
- SCAN VIP1

VIP 2
- SCAN VIP2

VIP 3
- SCAN VIP3

Public network

Cluster interconnect
- Cache to cache

Shared storage
- redo logs
- Database files / controlfiles
- OCR en Voting Disk
- ACFS shared file system

Concreet in Oracle oplossingen
Relocate instance

• During relocation `srvctl` status report the relocation is taking place, but what is going on?

```
[oracle@server1 ~]$ srvctl status database -d racone
Instance racone_1 is running on node server2
Online relocation: ACTIVE
Source instance: racone_2 on server1
Destination instance: racone_1 on server2
```
Relocate instance

- New instance is started – reconfiguration takes place
- Full RAC is active, but for how long?
- Shutdown transactional on current instance
- `ALTER SYSTEM SET _shutdown_completion_timeout_mins=30 SCOPE=MEMORY;`
- Timeout based on relocation value
- Shutdown transactional time > timeout shutdown abort is executed
- Timeout between 1 and 720 minutes
Rac One node instance crash

- In case the instance crash the instance will be restarted
- Based on the Oracle Clusterware functionality / Oracle restart
- Current resource target will be restore if possible

```
[oracle@server1]$ crsctl stat res ora.racone.db
NAME=ora.racone.db
TYPE=ora.database.type
TARGET=ONLINE ➙ online so in case of failure restart
STATE=ONLINE on server2

[oracle@server1 trace]$ crsctl stat res ora.racone.prod.svc
NAME=ora.racone.prod.svc
TYPE=ora.service.type
TARGET=ONLINE ➙ online so in case of failure restart
STATE=ONLINE on server2
```
Client and RAC One node

- Rac One Node requires an additional service during creating
- Use this service for client connections
- Registered as resource in clusterware
- Client connection failover will be based on configuration attributes of a service
- Configuration and options similar to configuration of service in Real Application Cluster environments
- Ezconnect, Single Client Access name can be used
Client and RAC One node

[oracle@server2]$ srvctl config service -d racone
Service name: prod
Service is enabled
Server pool: racone
Cardinality: 1
Disconnect: false
Service role: PRIMARY
Management policy: AUTOMATIC
DTP transaction: false
AQ HA notifications: false
**Failover type:** SELECT
**Failover method:** BASIC
TAF failover retries: 0
TAF failover delay: 0
Connection Load Balancing Goal: LONG
Runtime Load Balancing Goal: NONE
**TAF policy specification:** BASIC
Client and RAC One node

• RAC One Node requires an additional service during creating

```
[oracle@server1]$ sqlplus system@"cluster1-scan/prod"

SQL> select service_name,failover_type,failover_method from v$session where sid=29;

<table>
<thead>
<tr>
<th>SERVICE_NAME</th>
<th>FAILOVER_M</th>
<th>FAILOVER_TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>prod</td>
<td>BASIC</td>
<td>SELECT</td>
</tr>
</tbody>
</table>
```
EM console and RAC One Node

- Oracle enterprise Manager 11gR1 not really RAC One Node ready
- Not able to perform a relocate from 11gR1, but possible to perform this from OEM 12c
- 1 instance is report as active, other is reported as inactive
- 11gR1: use MOS note: **RAC One Node Support in Grid Control 11.1 [ID 1308490.1]**
- Destination server in 12c empty, both admin managed/policy managed cluster
EM 12 and RAC One Node
EM and Relocate instance
EM and Relocate instance

Online Database Relocation: Specify Credentials
Specify the following credentials to manage online database relocation settings or perform online database relocation.

Cluster Credentials
Specify the user name and password to log in to the cluster that hosts the RAC One Node database.

Credential Name
- ORACLE_USER

Credential Details
- UserName
- Password

Credential type:
- Host Credentials
  - SYSMAN
  - Global

Last Modified By:
- SYSMAN

Test Successful.
EM and Relocate instance

Online Database Relocation

RAC One Node database can be relocated from one node of a cluster to another node using an online database relocation and sessions to the new instance. The RAC One Node database instance on the previous node will be shut down after a new online database relocation operation or change online database relocation settings from this page.

Online Database Relocation Status: Inactive

Online Database Relocation Timeout: 30

Destination Server

Last Online Database Relocation Job: None
EM and Relocate instance

Online database relocation will start a new instance for the database on the selected node and relocate all database services. The operation is completed. This page gives current status and settings information for online database relocation. Users can start and 720 minutes for online database relocation operation.

If no destination server is specified, Clusterware will designate a server within the database’s server pool.
EM and Relocate instance

Online database relocation job has been successfully submitted.

Status
Online database relocation job has been successfully submitted. The status of the job can be seen by clicking on the View Job button.

<table>
<thead>
<tr>
<th>Name</th>
<th>Targets</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution: racone</td>
<td>racone</td>
<td>Succeeded</td>
</tr>
<tr>
<td>Step: RACOneNodeRelocation</td>
<td>racone</td>
<td>Succeeded</td>
</tr>
</tbody>
</table>
Convert RAC to RAC One node vice versa

• This is available since 11.2.0.3

[oracle@server1 trace] $ srvctl convert -h

The SRVCTL convert command enables the user to convert from RAC One Node database to RAC database and vice versa.

Usage: srvctl convert database -d <db_unique_name> -c RAC [-n <node>]
Usage: srvctl convert database -d <db_unique_name> -c RACONENODE [-i <inst_name>] [-w <timeout>]

Other issues

• Using Recovery Advisor is like RAC, also not possible with RAC
• One node
• Using sqlplus to start the second instance is possible.
• Statspack out of the box is requires additional configurations (blog.grid-it.nl for workaround)
• AWR is working out of the box, use awrgrpt.sql to be able to select snapshots even after a relocation.
Conclusion

• Rac One node is a nice additional option
• Manageability will be increased
• Relocate is very nice and increase availability
• Cluster environment required, together with the proper knowledge
• EM and RAC one node not ready enough
• Due to all the High Availability options a lot of possible choices
• Currently hard to handle resource utilization, QoS in 11.2.0.3 possible option?
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