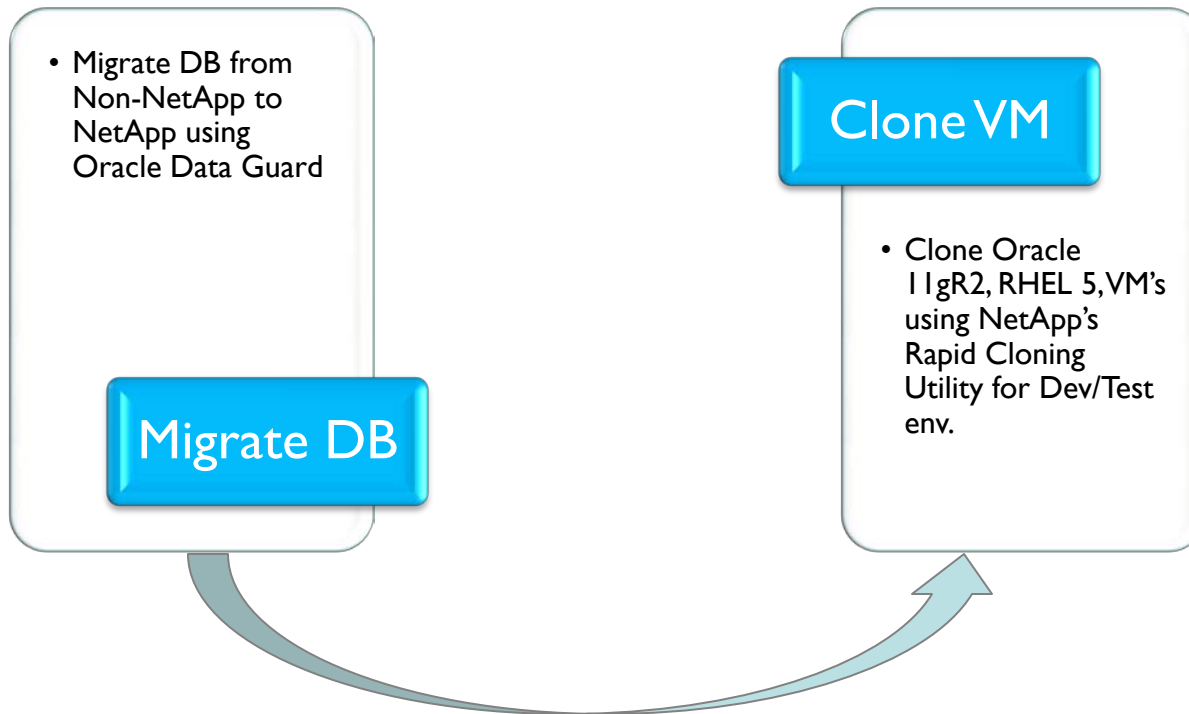


Improve Storage Efficiency on Deploying Oracle Databases for Dev/Test in a Virtualized Environment Over NFS

Bikash Roy Choudhury
NetApp

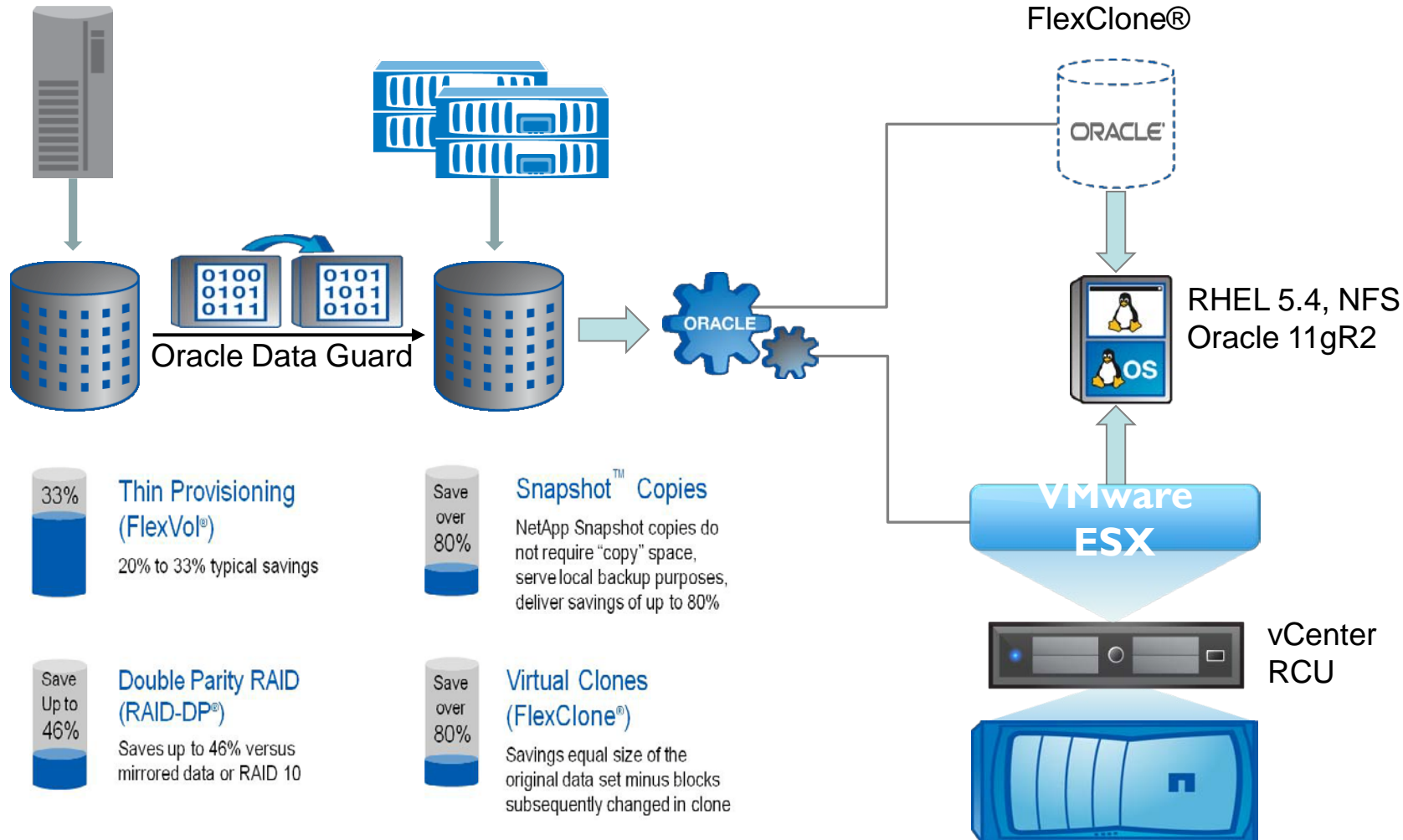
Deployment Steps



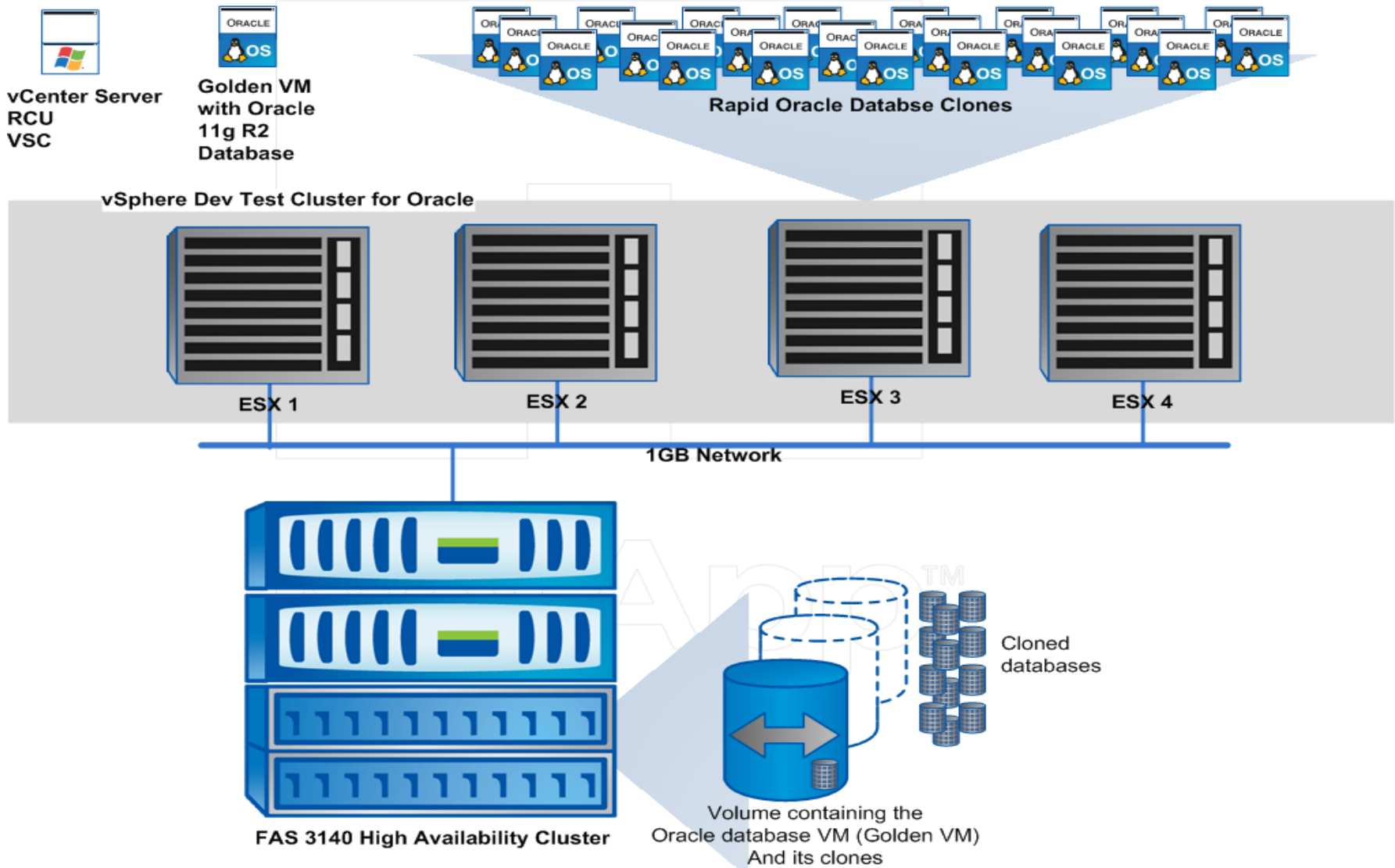
Oracle Dev/Test on VMware

Production Site

Dev/Test Site



Solution Architecture



Design Implementation

- ❑ Create the “Golden VM” on “Golden datastore”
 - ❑ Assign processor, memory and network
 - ❑ Assign a separate datastore for SWAP space
- ❑ Boot the VM with RHEL5.x ISO and install in vmdk-1
- ❑ Create and assign 4 additional vmdk files in “Golden VM” in the Golden datastore

#	vmdk	Size	Purpose	Corresponding Path inside the VM
1	vmdk-2	15 Gb	Oracle binaries	/dev/sdb1
2	vmdk-3	20 Gb	Oracle data	/dev/sdc1
3	vmdk-4	20 Gb	Redo Logs	/dev/sdd1
4	vmdk-5	20 Gb	Archive	/dev/sde1

- ❑ Align all the vmdks' as per documentation TR 3747
- ❑ Format the hard disks using 'fdisk' and create 'ext3' file systems on them using 'mkfs'
- ❑ Mount the hard disks and install the Oracle 11g R2 Database single instance

Golden Datastore Creation

The screenshot shows the vSphere Client interface. On the left, a tree view shows the hierarchy: VCENTERPRIMARY > NBDC > DevTest_ORCL_CLUSTER. The cluster contains four hosts with IP addresses 10.73.69.101, 10.73.69.102, 10.73.69.118, and 10.73.69.241, and a vCenter_101 service. The main pane shows the 'DevTest_ORCL_CLUSTER' with tabs for 'Getting Started', 'Summary', 'Virtual Machines', 'Hosts', and 'Resource Allocation'. A context menu is open over a storage device, listing options: Add Host..., New Virtual Machine..., New Resource Pool..., New vApp..., Rescan for Datastores..., Host Profile, Add Permission..., Alarm, Edit Settings..., Remove, Rename, and NetApp. The 'NetApp' option is expanded, showing a sub-menu with 'Provision datastore...'. On the right, a table shows the status of the hosts:

State	Status
Connected	✓ Normal
Connected	✓ Normal
Connected	✓ Normal
Connected	✓ Normal

The screenshot shows the 'NetApp Datastore Provisioning Wizard' dialog box. The title bar reads 'NetApp Datastore Provisioning Wizard'. The main text says: 'Select the datastore type you would like to create' followed by 'Which of the 2 types of datastores would you like to use?'. On the left, there are navigation links: 'Storage Controller details', 'Datastore type', 'Datastore details', and 'Summary'. The 'Datastore type' section has two radio button options: 'NFS' (which is selected) and 'VMFS'.

SWAP Datastore Creation

Getting Started Summary Virtual Machines Performance Configuration Tasks & Events Alarms Permissions Maps Storage Views NetApp

NetApp Storage Management <<
Virtual Storage Console -

- Overview
- Storage Details - SAN
- Storage Details - NAS
- Data Collection
- Tools
- About

NAS Storage Controllers [Refresh](#) [Update](#)

Datastore	Datastore Capacity	NFS pathname	Access Mode	Storage Status
Controller: btcppe-filer35 (2 Datastores)				
Golden_DataStore	100.00GB	/vol/Golden_DataStore	readWrite	✓ Normal
SWAP_DataStore	25.00GB	/vol/SWAP_DataStore	readWrite	✓ Normal

Details

Storage Controller: **btcppe-filer35** Partner: **btc-ppe-filer36**

NFS

VMFS pathname: /vmfs/volumes/d5738d21-8bef778d
NFS pathname: /vol/Golden_DataStore
Status: **normal**
File System Security: **unix**
Anonymous Username: **N/A**

Host Privileges

[View Read-Only Hosts...](#)
[View Read-Write Hosts...](#)
[View Root Access Hosts...](#)

Deduplication (Advanced Single Instance Storage)

State: **enabled**
Status: **idle**

Capacity

Datastore Usage (0%)

Volume Usage (0%)

Aggregate Usage (76%)

Volume

Name: **Golden_DataStore**
Status: **online**
Type: **flex**
Guarantee: **none**
Aggregate: **VGIBU**
Snapshot Reserve: **0%**
Autogrow Increment: **1.00GB**
Autogrow Max Size: **30.00GB**

SWAP Location

The screenshot shows the vSphere interface. In the top left, a tree view shows the hierarchy: VCENTERPRIMARY > NBDC > DevTest_ORCL_CLUSTER. The cluster contains five hosts with IP addresses: 10.73.69.101, 10.73.69.102, 10.73.69.118, 10.73.69.241, and vCenter_101. A context menu is open over the cluster, listing options such as 'Add Host...', 'New Virtual Machine...', 'New Resource Pool...', 'New vApp...', 'Rescan for Datastores...', 'Host Profile', 'Add Permission...', 'Alarm', 'Edit Settings...', 'Remove', 'Rename', and 'NetApp'. The 'Edit Settings...' option is selected.

The 'DevTest_ORCL_CLUSTER Settings' dialog is open, showing the 'Swapfile Location' tab. The 'Swapfile Policy for Virtual Machines' section has two radio button options:

- Store the swapfile in the same directory as the virtual machine (recommended)
- Store the swapfile in the datastore specified by the host
If not possible, store the swapfile in the same directory as the virtual machine.

A host specified datastore may degrade VMotion performance for the affected virtual machines.

SWAP Location

10.73.69.101 VMware ESX, 4.0.0, 164009

Getting Started | Summary | Virtual Machines | Performance | Configuration | Tasks & Events | Alarms | Permissions | Maps | Storage Views | NetApp

Hardware

- Processors
- Memory
- Storage
- Networking
- Storage Adapters
- Network Adapters
- Advanced Settings

Software

- Licensed Features
- Time Configuration
- DNS and Routing
- Power Management
- Virtual Machine Startup/Shutdown
- ▶ Virtual Machine Swapfile Location
- Security Profile
- System Resource Allocation
- Advanced Settings

Virtual Machine Swapfile Location

The virtual machine swapfiles are stored in the location below. An individual virtual machine can override this setting.

This host is in a cluster which specifies that the virtual machine swapfiles are to be stored in a swapfile datastore. The host inherits this configuration. You can choose to select the swapfile datastore here.

Swapfile Location: No datastore specified. Location defaults to the virtual machine...

Virtual Machine Swapfile Location

Swapfile Location

Store the swapfile in the same directory as the virtual machine.
This is a recommended option.

Store the swapfile in a swapfile datastore selected below.
 This option could degrade VMotion performance for the affected virtual machines.

Name	Capacity	Provisioned	Free	Type	Th
[Golden_DataStore]	20.00 GB	864.00 KB	20.00 GB	NFS	Su
[SWAP_DataStore]	25.00 GB	1.02 MB	25.00 GB	NFS	Su
[Storage1]	135.25 GB	33.98 GB	101.27 GB	VMFS	Su

OK Cancel Help

VMDKs for Oracle

The screenshot shows the vCenter console interface. On the left is a tree view with the following structure:

- VCENTERPRIMARY
 - NBDC
 - DevTest_ORCL_CLUSTER
 - 10.73.69.101
 - 10.73.69.102
 - 10.73.69.118
 - 10.73.69.241
 - Golden_VM
 - vCenter_101

The main window displays the 'Golden_VM' summary page with the following details:

General	
Guest OS:	Red Hat Enterprise Linux 5 (64-bit)
VM Version:	7
CPU:	1 vCPU
Memory:	2048 MB
Memory Overhead:	143.52 MB
VMware Tools:	OK
IP Addresses:	
DNS Name:	goldenvm
State:	Powered On

Resources	
Consumed Host CPU:	255 MHz
Consumed Host Memory:	1434.00 MB
Active Guest Memory:	1495.00 MB
Refresh Storage Usage	
Provisioned Storage:	97.00 GB
Not-shared Storage:	13.60 GB
Used Storage:	13.60 GB

Datstore	Status	Capacity	
Golden_DataStore	Normal	100.00 GB	86.4

The screenshot shows a terminal window titled 'Golden_VM on 10.73.69.102'. The terminal output is as follows:

```
[root@goldenvm ~]# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/mapper/VolGroup00-LogVol00
                16G  2.6G   13G  18% /
/dev/sda1       99M   13M   82M  14% /boot
tmpfs           1006M 524M  483M  53% /dev/shm
/dev/sdb1       15G   4.2G   9.9G  30% /u01/app
/dev/sdc1       20G   1.7G   18G   9% /oradata
/dev/sdd1       20G  323M   19G   2% /redologs
/dev/sde1       20G   1.7G   18G   9% /archive
[root@goldenvm ~]# su - oracle
[oracle@goldenvm ~]$ sqlplus / as sysdba

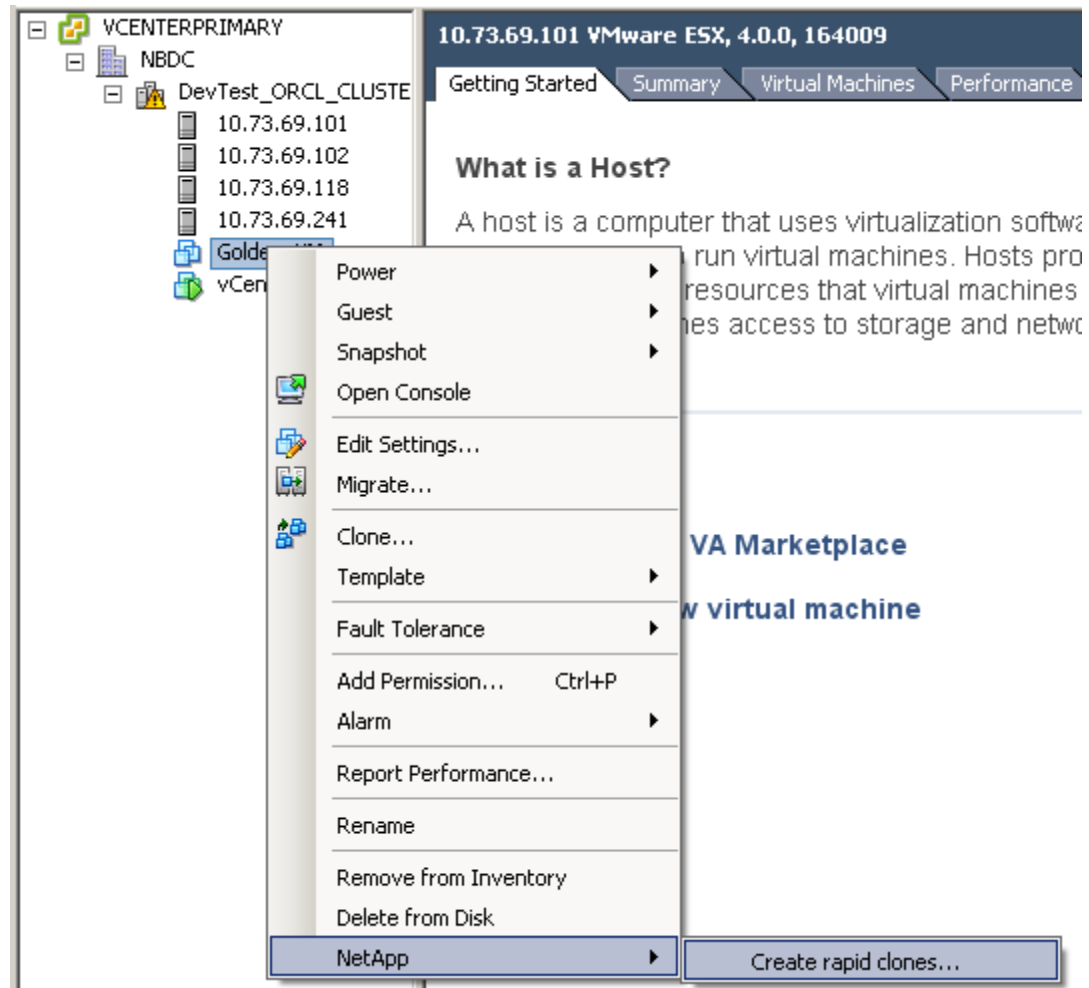
SQL*Plus: Release 11.2.0.1.0 Production on Fri Mar 5 08:57:30 2010

Copyright (c) 1982, 2009, Oracle. All rights reserved.

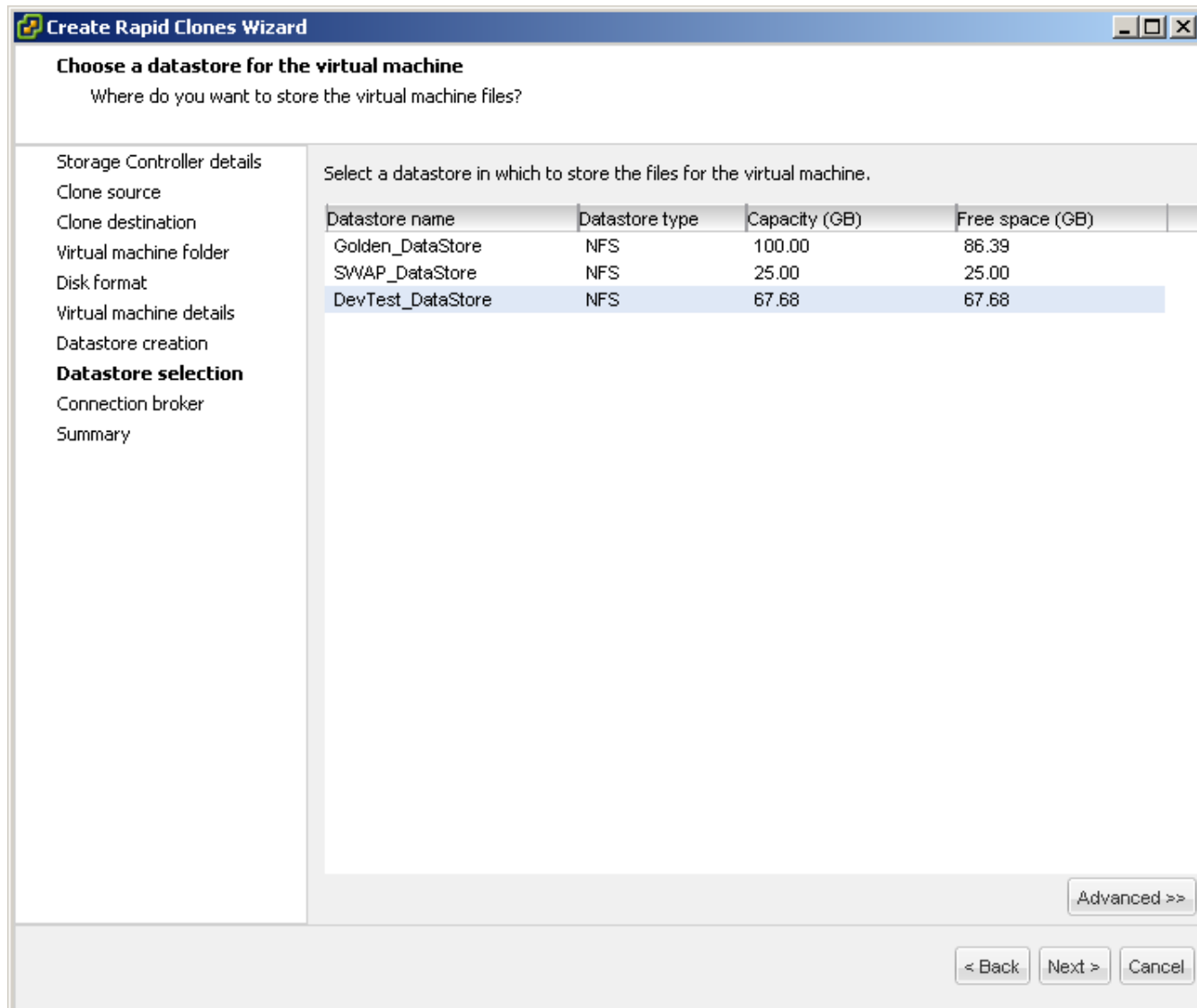
Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL>
```

Cloning the database

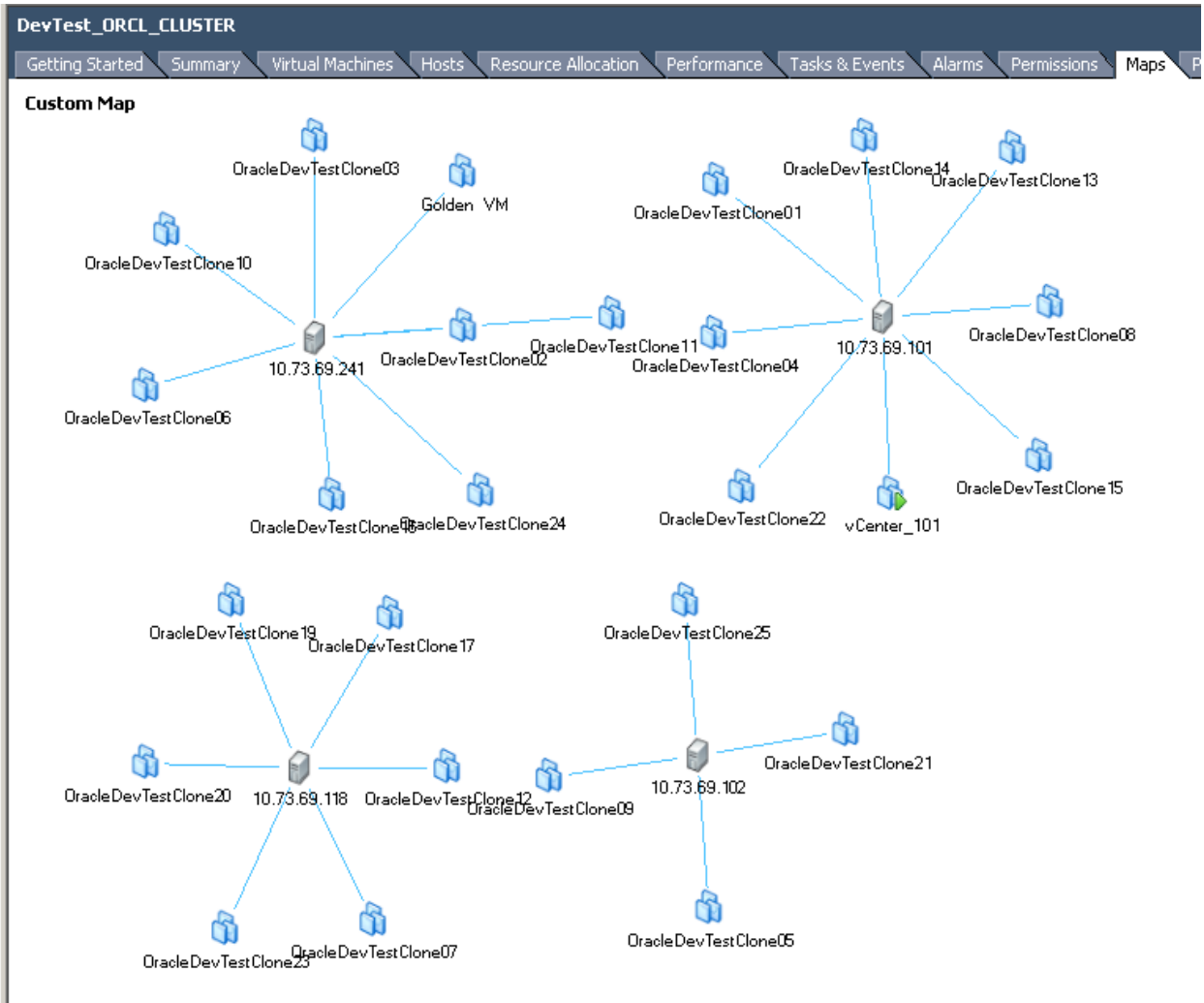


New datastore for clones

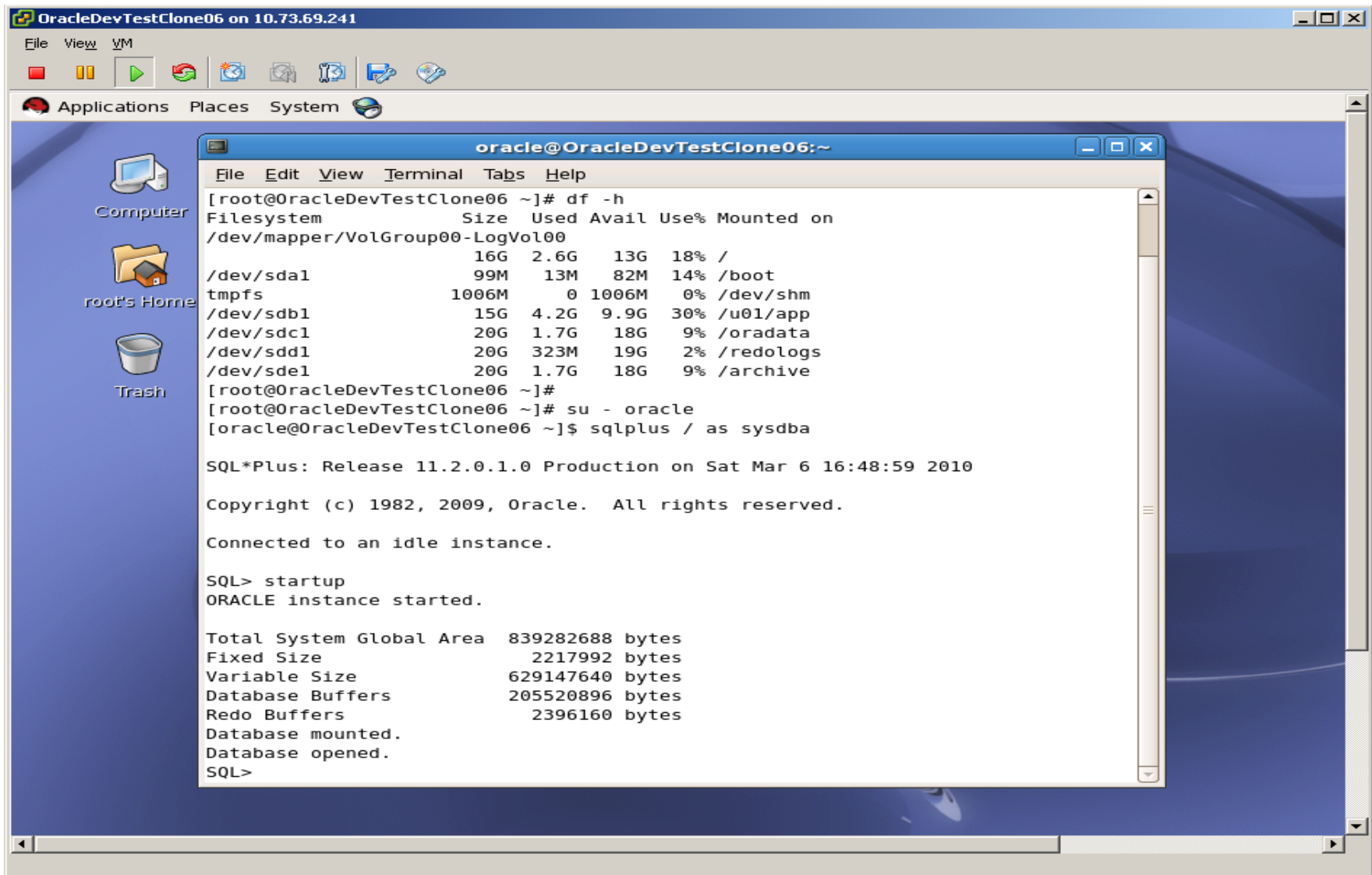


Clones Created

VCENTERPRIMARY
NDBC
DevTest_ORCL_CLUSTER
10.73.69.101
10.73.69.102
10.73.69.118
10.73.69.241
Golden_VM
OracleDevTestClone01
OracleDevTestClone02
OracleDevTestClone03
OracleDevTestClone04
OracleDevTestClone05
OracleDevTestClone06
OracleDevTestClone07
OracleDevTestClone08
OracleDevTestClone09
OracleDevTestClone10
OracleDevTestClone11
OracleDevTestClone12
OracleDevTestClone13
OracleDevTestClone14
OracleDevTestClone15
OracleDevTestClone16
OracleDevTestClone17
OracleDevTestClone19
OracleDevTestClone20
OracleDevTestClone21
OracleDevTestClone22
OracleDevTestClone23
OracleDevTestClone24
OracleDevTestClone25
vCenter_101



Database on Clones



The screenshot shows a virtual machine window titled "OracleDevTestClone06 on 10.73.69.241". Inside the VM, a terminal window is open with the following content:

```
oracle@OracleDevTestClone06:~  
File Edit View Terminal Tabs Help  
[root@OracleDevTestClone06 ~]# df -h  
Filesystem      Size  Used Avail Use% Mounted on  
/dev/mapper/VolGroup00-LogVol00  
                16G  2.6G   13G  18% /  
/dev/sda1       99M   13M   82M  14% /boot  
tmpfs           1006M    0 1006M   0% /dev/shm  
/dev/sdb1       15G  4.2G   9.9G  30% /u01/app  
/dev/sdc1       20G  1.7G   18G   9% /oradata  
/dev/sdd1       20G 323M   19G   2% /redologs  
/dev/sde1       20G  1.7G   18G   9% /archive  
[root@OracleDevTestClone06 ~]#  
[root@OracleDevTestClone06 ~]# su - oracle  
[oracle@OracleDevTestClone06 ~]$ sqlplus / as sysdba  
  
SQL*Plus: Release 11.2.0.1.0 Production on Sat Mar 6 16:48:59 2010  
  
Copyright (c) 1982, 2009, Oracle. All rights reserved.  
  
Connected to an idle instance.  
  
SQL> startup  
ORACLE instance started.  
  
Total System Global Area  839282688 bytes  
Fixed Size                 2217992 bytes  
Variable Size              629147640 bytes  
Database Buffers          205520896 bytes  
Redo Buffers               2396160 bytes  
Database mounted.  
Database opened.  
SQL>
```

Space savings

Getting Started Summary Virtual Machines Performance Configuration Tasks & Events Alarms Permissions Maps Storage Views NetApp

Controller	Datastore	Datastore Capacity	NFS pathname	Access Mode	Storage Status
Controller: btcppe-filer35 (3 Datastores)					
btcppe-filer35	SWAP_DataStore	25.00GB	/vol/SWAP_DataStore	readWrite	Normal
btcppe-filer35	Golden_DataStore	100.00GB	/vol/Golden_DataStore	readWrite	Normal
btcppe-filer35	DevTest_DataStore	67.68GB	/vol/DevTest_DataStore	readWrite	Normal

Details

Storage Controller: **btcppe-filer35** Partner: **btc-pp-e-filer36**

NFS
VMFS pathname: /vmfs/volumes/6f9821e5-0a1e01e6
NFS pathname: /vol/DevTest_DataStore
Status: normal
File System Security: unix
Anonymous Username: II/A

Host Privileges
View Read-Only Hosts...
View Read-Write Hosts...
View Root Access Hosts...

Deduplication (Advanced Single Instance Storage)
State: enabled
Status: idle
Space Savings: 96%
View Mounted Hosts...

Capacity
Datastore Usage (21%)
Volume Usage (21%)
Aggregate Usage (62%)

Volume
Name: DevTest_DataStore
Status: online
Type: flex
Guarantee: none
Aggregate: VGIBU
Snapshot Reserve: 0%
Autogrow Increment: 10.00GB
Autogrow Max Size: 100.00GB
convert_ucose: off
create_ucose: off
no_atime_update: on

- ❑ Oracle dev/test can be done in a virtual environment
 - ❑ With NetApp's flexclone technology cloning is fast, easy and cost effective
 - ❑ Clones can be created and automated through RCU
 - ❑ Faster provisioning times and greater utilization for servers and storage
 - ❑ Great disk space savings for clones with NetApp De-duplication

Thank You!