TECHNICAL REPORT : Cloning Oracle® E-Business Suite Using SnapMirror®

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1. Executive Summary

This technical report covers cloning Oracle E-Business Suite 11*i* using Network Appliance™ SnapMirror and Oracle's Rapid Clone. It describes the configuration and steps to clone an E-Business Suite 11*i* in a simple, fast, accurate, and cost-effective method. In today's competitive world, any advantage provides an edge, and any efficiency gained by simplifying your day-to-day operating environment is a huge advantage, and this is what this paper provides.

2. Background

Network Appliance and Oracle have mutual customers that require a solution for Oracle E-Business Suite 11*i* cloning, which is needed to maintain various company activities such as reporting, testing, custom development, and data fixes. The following is a simple, fast, and cost-effective joint Network Appliance and Oracle solution for mutual customers. It uses technology from both companies, Network Appliance SnapMirror and Oracle's Rapid Clone.

There are a myriad of reasons why companies that have implemented E-Business Suite need to clone the apps environment:

- Custom development

- Testing and integration activities with periodic refresh from production

- Data reporting from an instance other than production with reasonably current data

- Preserving month-end and year-end instances for reporting and other purposes

- Testing a data fix before doing it on the production system

- Testing migration or upgrade procedures

Being able to accomplish these tasks without impacting production is done by cloning the production environment and using the clone in place of production. Being able to clone quickly,

reliably, and accurately while maintaining cost effectiveness provides for operational efficiency and boosts competitive advantages by having the production system continuously available for the business while simultaneously being able to work on the cloned system. The fact that cloning is done every day and maybe even multiple times daily magnifies the need to streamline the cloning process.

3. E-Business Suite Cloning Overview

Cloning is simply making an identical copy of an existing E-Business Suite system, usually the current production system. With Oracle E-Business Suite 11*i*, simply copying all of the components does not yield a working clone. There are a number of configuration files in the applications layer and within the database that need to be modified before the clone system will work as desired.

Moreover, depending on the system configuration available, cloning can be any of the following:

- From a multinode system to a similarly configured multinode system

- From a single-node system to a multinode system

- From a single-node system to a single-node system

Each configuration represents a different challenge to the cloning process. However, with Oracle's Rapid Clone technology, all these configurations are handled with accuracy and ease. The 11.5.8 Rapid Install creates an E-Business Suite system that is Rapid Clone enabled. Pre-release 11.5.8 systems can be configured to use Rapid Clone by migrating to AutoConfig, installing Rapid Clone, and applying other prerequisite patches on the source system. Read Oracle's white paper "Cloning Oracle Applications Release 11*i* with Rapid Clone" for detailed information about Oracle's Rapid Clone technology. Also read Oracle MetaLink note 230672.1 with the same title, which describes the prerequisites and steps of the Rapid Clone process. The white paper and MetaLink note are available from the Oracle Web site and are requirements for successfully cloning Oracle E-Business Suite systems.

Another useful document is the "Oracle Applications Maintenance Procedures Release 11*i* (11.5.9)," part no. B10641-01, a manual that comes with the distribution CDs. Chapter 4 covers application cloning and includes cloning procedures and requirements .
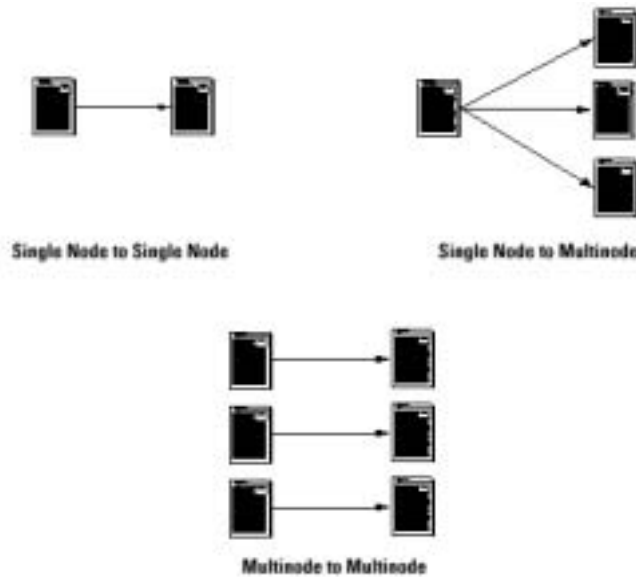
**Figure 1. Different Server Geometry Configuration Options for
E-Business Suite Cloning**

If you are using Network Appliance fabric-attached storage (FAS) as your storage for Oracle E-Business Suite, then use Network Appliance SnapMirror in place of copying files in the steps of the Rapid Clone process. Using SnapMirror allows you to create copies of files at the storage level, quickly, efficiently, and independently of the server. Using SnapMirror eliminates the impact of the copying on the source host and thus maximizes the resources available for the production/source system. Also, the mirroring process can be started well in advance of the actual cloning and thus shortens the window of the cloning process, since only the last incremental updates need to be transferred to complete the copy.

Cloning the Oracle E-Business Suite 11*i* using Snapshot™ is another possible solution if Network Appliance fabric-attached storage is already in use. However, this solution is slower since it involves copying the Snapshot to a different volume within the same fabric-attached storage or to a separate storage. If the same storage used by production is used for the clone, then there will be a performance hit to the production system due to the sharing of the storage. If it is a different storage, then the transfer is either done manually or automated using scripts, which is more complex than the way SnapMirror handles the data transfer, which is done automatcially. SnapMirror also gives you the capability to resynchronize so subsequent cloning is completed faster.

4. System Configuration
The following are the hardware and software configurations of the system used for this paper:

4.1. Hardware Configuration
Source server   Sun™ Fire 280R Server running Solaris™ 8
Target server   Sun Fire 280R Server running Solaris 8
Storage system   Network Appliance FAS960

4.2. Software Configuration
Oracle   E-Business Suite 11*i* (version 11.5.9) with AutoConfig
Network Appliance   Data ONTAP™ 6.4.2

4.3. Storage Configuration

The same mount points are used on both source and target servers.

/vol/apps	-	source volume for Oracle Apps 11*i*
/vol/orabin	-	source volume for Oracle9*i*™ binaries
/vol/oradata	-	source volume for database files
/vol/oralogs	-	source volume for online redo logs
/vol/archlogs	-	source volume for archived logs

The cloned volumes are the same size and geometry as the source volumes.

/vol/apps_mirr	-	clone of source /vol/apps
/vol/orabin_mirr	-	clone of source /vol/orabin
/vol/oradata_mirr	-	clone of source /vol/oradata
/vol/oralogs_mirr	-	clone of source /vol/oralogs
/vol/archlogs_mirr	-	clone of source /vol/archlogs_mirr

The source server stores all the database and Oracle E-Business Suite files in the NetApp FAS960 storage system, and the target server does the same, but with a separate NetApp FAS960. This ensures that when the cloned Oracle Apps instance is brought online, the performance of the production system, which is the source, is not affected at all, given the use of separate servers and separate storage.
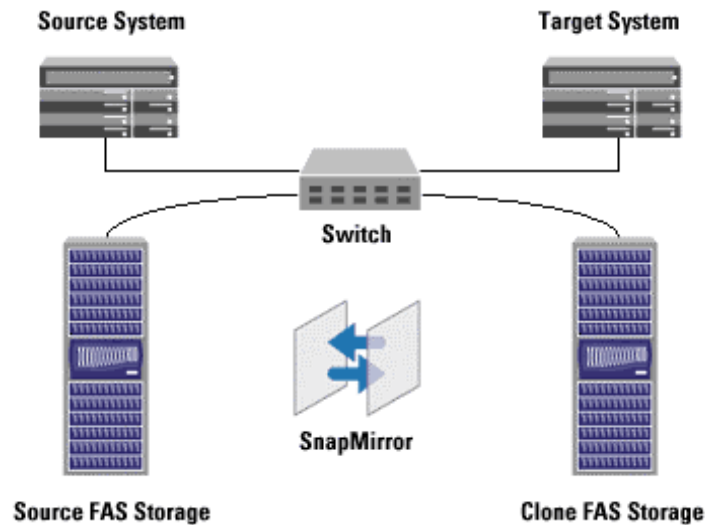

Figure 2. Server and Storage Configuration

The source volumes have been created and mounted by the source server.

Oracle E-Business Suite is in working condition on the source server.

The source and target servers are configured to mount the volumes from the correct storage systems to the correct mount points and with the proper permissions.

Usage	Source Volume Name	Mount Point on Both Source and Target Servers	Clone Volume Name
E-Business Suite files (APPL_TOP, COMMON_TOP, iAS)	/vol/apps	/oracle/apps	/vol/apps_mirr
ORACLE_HOME	/vol/orabin	/oracle/server	/vol/orabin_mirr
Database files	/vol/oradata	/oracle/data	/vol/oradata_mirr
Online redo logs	/vol/oralogs	/oracle/logs	/vol/oralogs_mirr
Archive logs	/vol/archlogs	/oracle/arch	/vol/archlogs_mirr

Table 1. Storage Configuration of Source and Target Servers

5. Implementing SnapMirror for E-Business Suite Cloning

NetApp SnapMirror technology provides asynchronous mirroring of data between filer volumes. Data on the source volume is periodically replicated to the target at a user-definable time interval, with the range being from one minute to one month. At the end of each replication event, the mirror target volume becomes an exact block-for-block copy of the mirror source volume. At that point, the two volumes share identical data content and characteristics. The mirror is initialized by effectively copying the entire source volume to the target volume. Once this initial copy is complete, replication events thereafter copy only changed blocks from the source volume to the target volume. This provides a highly efficient data replication mechanism.

For more information about the SnapMirror technology, follow the link SnapMirror Software Global data availability and disaster recovery.

5.1. SnapMirror Setup and Operation

Setting up SnapMirror is relatively simple and quick. Basic requirements are:

- Identify the source and target volumes.

- Create a pair of configuration files.

- Start the mirror.

1. On the source and clone NetApp FAS storage, make sure that SnapMirror is licensed.

2. Edit the configuration files on both source and clone storage, and, for simplicity, the respective FAS storage systems are called source and clone.

   a. `/etc/snapmirror.allow`
   The content of this file should be the name of the FAS storage that will participate in the SnapMirror replication, in this case:

      ```
      source
      clone
      ```

   b. `/etc/snapmirror.conf`
   The content of this file should be the source storage and source volume; target storage and target volume; SnapMirror options; and schedule expressed in

minutes, hours, day of the month, and day of the week. For simplicity, we chose default options and update the mirror once a minute.

```
source:apps clone:apps_mirr - * * * *
source:orabin clone:orabin_mirr - * * * *
source:oradata clone:oradata_mirr - * * * *
source:archlogs clone:archlogs_mirr - * * * *
```

3. On the clone storage, restrict the target volumes so the mirror can be initialized. Log in to the clone storage and use the **vol restrict volname** command to restrict all the target volumes.

```
vol restrict apps_mirr
vol restrict orabin_mirr
vol restrict oradata_mirr
vol restrict archlogs_mirr
```

4. Initialize the mirror, log in to the clone storage, and use the **snapmirror initialize** command.

```
snapmirror initialize -S source:apps clone:apps_mirr
snapmirror initialize -S source:orabin
clone:orabin_mirr
snapmirror initialize -S source:oradata
clone:oradata_mirr
snapmirror initialize -S source:archlogs
clone:archlogs_mirr
```

To monitor the status of the SnapMirror operation, use the command **snapmirror status**. Make sure that the initializations have completed and the mirror (or mirrors) is established. Once the mirror is established, it is updated incrementally every minute (this is what was specified in snapmirror.conf).

At this point the mirrors are established, and the next step is to break the mirror and use the clones.

5.2. Breaking the Mirror in Preparation for Use

1. For the volumes containing the E-Business Suite files and the Oracle binaries (ORACLE_HOME), break the mirror by issuing the **snapmirror quiesce** and **snapmirror break** commands for each target volume from the clone storage.

```
snapmirror quiesce volume-name
snapmirror break volume-name
```

where volume-name is the target volume name.

For example, for the apps volume, break the mirror by doing the following from the clone storage:

```
snapmirror quiesce apps_mirr
snapmirror break apps_mirr
```

Also break the mirror for the target ORACLE_HOME volume.

```
snapmirror quiesce orabin_mirr
snapmirror break orabin_mirr
```

2. For the database and archive log volumes, you'll need to do a hot backup of the database and issue the **snapmirror update**, **snapmirror quiesce**, and **snapmirror break** commands.

- Force a switch and archive the current redo logs.

```
SQL> alter system archive log current;
```

- Put all the tablespaces in backup mode (part of hot backup).

```
SQL> alter tablespace tablespace-name begin
backup;
```

- From the clone storage, issue the snapmirror update, snapmirror quiesce, and snapmirror break commands to split the mirror for the volume containing the database files.

```
snapmirror update oradata_mirr
snapmirror quiesce oradata_mirr
snapmirror break oradata_mirr
```

- Take the tablespaces out of backup mode.

```
SQL> alter tablespace tablespace-name end
backup;
```

- Again archive the current log to make sure that you have the archive log set for database recovery.

- From the clone storage, split the mirror for the archive logs volume.

```
snapmirror update archivelogs_mirr
snapmirror quiesce archivelogs_mirr
snapmirror break archivelogs_mirr
```

- Mount the cloned volumes from the target server and recreate the control file with the new clone SID. Proceed to recover the database by applying the archived logs from the hot backup.

3. At this point you have a working clone database. Proceed with the Rapid Clone steps to complete the cloning process.

5.3. Clone Resynchronization Procedures
To refresh the clone from the source once the SnapMirror source/target relationships have been established, follow the steps outlined below. Resynchronization operations are much faster than initialization, since only the changed blocks are transferred from the source storage.

1. Shut down Oracle E-Business Suite 11*i*, including the database on the target server.

   Use the `adstpall.sh script` to shut down Oracle E-Business Suite 11*i* and SQL*Plus to shut down the database.

2. Resynchronize the SnapMirror target volumes; from the clone storage use the **snapmirror resync** command.

   ```
   snapmirror resync -f apps_mirr
   snapmirror resync -f oradata_mirr
   snapmirror resync -f archivelogs_mirr
   ```
   Monitor the SnapMirror operation to make sure that the resynchronization has completed. From the clone storage use **snapmirror status** to monitor.

3. Once the target storage is in sync, proceed to break the mirror relationships; use the **snapmirror update**, **snapmirror quiesce**, and **snapmirror break** commands. For the database volumes, make sure to put the database in hot backup mode, as previously discussed in the "Breaking the Mirror in Preparation for Use" section.

All the SnapMirror commands can be saved in scripts. The only additional requirement is to establish RSH access to the storage from the server where the scripts (in this case the target server) will be executed. Scripting the whole process allows for automation, which lessens the possibility of user errors and further simplifies the cloning process.

6. Conclusion

Using SnapMirror simplifies the E-Business Suite cloning process; the use of storage-level mirroring allows the copies to be done quickly, efficiently, and independently of the server. This maximizes the resources on the source server available for production/online use. The mirroring can also be started way ahead of time if possible so that only the last incremental changes need to be transferred during cloning, thus shortening the whole process.

This solution provides for an optimal process for E-Business Suite cloning. This in turn gives you flexibility in the frequency of when cloning is done to satisfy the cloning requirements of the enterprise, be it for development, testing, reporting, or whatever the case may be.

SnapMirror is easy to set up, configure, and maintain and, most important, is cost-effective as a mirroring solution. Using Network Appliance storage with SnapMirror in conjunction with Oracle's Rapid Clone greatly simplifies and speeds up the E-Business Suite cloning process. This provides users with the maximum benefit out of their investment in the overall system.

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