

Solution-in-a-box: Best practices for deploying Oracle E-Business Suite Release 12.2.4 on Oracle Database Appliance 12.1.2.7

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Executive Overview

Oracle E-Business Suite is the most comprehensive suite of integrated, global business applications that enable organizations to make better decisions, reduce costs, and increase performance.

Oracle Database Appliance is an Oracle engineered system consisting of hardware and software designed to simplify the deployment, maintenance and support of high availability Oracle Database and Oracle E-Business Suite Applications Tier solutions.

Oracle Database Appliance offers the option to deploy highly available Oracle Databases in a bare metal environment or to deploy both Oracle Databases and the Applications Tier in virtualized environments within the appliance. This paper describes how to rapidly deploy Oracle E-Business Suite 12.2.4 database and Applications tiers on Oracle Database Appliance Virtualized Platform 12.1.2.7 (and later) using the preconfigured Oracle E-Business Suite VM templates. Each Oracle E-Business Suite deployment consists of two Oracle VM templates: a database image template and a primary Applications tier template. These templates deliver the complete software stack and are pre-configured for a Vision demo with sample data or a fresh install database for production environment. The procedure in this paper provides a simple, reliable and cost effective solution-in-a-box which is fully supported for production use.

Scope

This paper describes how to install Oracle E-Business Suite Release 12.2.4 database and Applications tiers on the Oracle Database Appliance Virtualized Platform 12.1.2.7 (and later) using Oracle E-Business Suite templates. This document is an update to include Oracle ACFS support with latest versions of Oracle Database Appliance with support for Driver Domains.

You need to be familiar with the Oracle Database Appliance documentation and, in particular, the Oracle Database Appliance Virtualized Platform documentation. Further information about the Oracle Database Appliance is available at: http://docs.oracle.com/cd/E22693_01/index.htm

Understanding Oracle E-Business Suite 12.2 architecture is essential. The documentation library is available at: http://docs.oracle.com/cd/V39571_01/current/html/docset.html

Oracle Database Appliance Virtualized Platform Deployment Architecture

This section summarizes some of the key architectural points that will make it easier to understand the installation procedure in this paper.

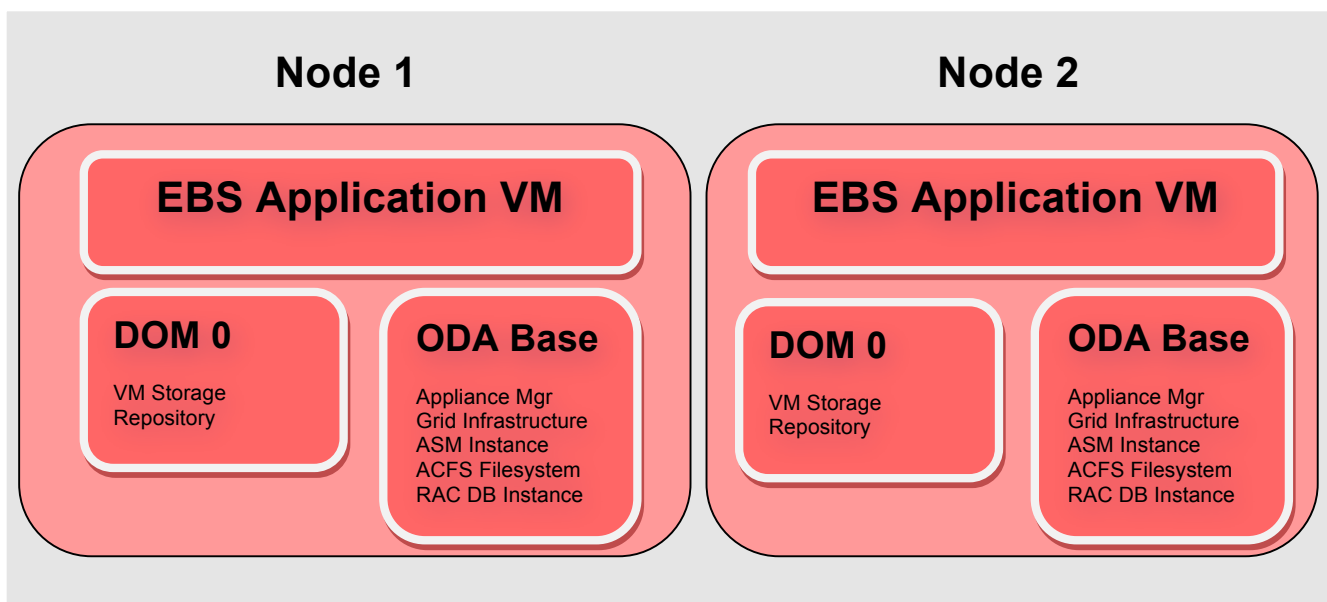
Deploying Oracle Database Appliance Virtualized Platform creates an ODA_BASE privileged user domain. The Appliance Manager provisions and manages the Oracle Database within the ODA_BASE domain. This domain is optimized to host database instances, and all the shared disks are directly attached to this domain minimizing virtualization overhead.

Oracle Database Appliance 12.1.2.0 introduces a fundamental change in the storage layer – the introduction of Oracle ACFS. Oracle ACFS is designed to deliver the best performance for Oracle databases. Oracle ACFS supports the creation of filesystem snapshots – a feature that vastly simplifies the creation of space efficient database clones. Going forward, new databases should only be created on ACFS filesystems in a new ODA deployment scenarios.

Although Oracle E-Business Suite database can be installed in any of the user domains, it is best practice to deploy the Oracle E-Business Suite database in ODA_BASE as described in this paper since it significantly improves performance and manageability. To support high availability at the Applications tier, the Oracle E-Business Suite Applications tier VM template can be installed in multiple VMs.

After completing the procedure outlined in this paper, Oracle Database Appliance will be configured with a two node Oracle RAC database and the Oracle E-Business Suite Applications tier running in two VMs, one on each node.

Half the physical CPU and memory resources will be allocated to ODA_BASE for database, and the other half will be allocated to the Applications tier VMs. Dom0 uses very few resources and doesn't need a separate allocation.



Note: This paper describes deploying the solution on an Oracle Database Appliance X5-2 running ODA software release 12.1.2.7. The steps are applicable for later software and hardware releases, but some of the component versions may be different. The following lists the main components of the configuration:

Software on each physical server

Dom0 Management Domain

- » Oracle VM Server 3.2.9

ODA_BASE Virtual Machine

- » Special privileged user domain for database instances.
- » Oracle Linux 6.7.
- » Oracle Database 11gR2 and 12c.
- » Oracle Real Application Clusters (RAC) 12c.
- » Oracle ACFS 12c.
- » Automatic Storage Management (ASM) 12c.
- » Oracle Clusterware 12c.
- » 128 GB main memory and 16 cores allocated. This allocation can easily be changed later based on performance requirement within the limits available software licenses.

Oracle E-Business Suite Virtual Machine

- » User domain.
- » Oracle Linux 6.5.
- » Oracle E-Business Suite 12.2.4.
- » 96 GB main memory and 16 cores allocated. This allocation can be changed later.

Installing Oracle E-Business Suite 12.2.4 on ODA Virtualized Platform

This section lists the steps necessary to install Oracle E-Business Suite Release 12.2.4 with Oracle Database 11gR2 on Oracle Database Appliance 12.1.2.7 (or later). The Table 1 provides a quick reference to the environment details referred to in this document:

Table 1: Example Environment Details

Host	Server 1	Server 2
Dom0	node1-d0	node2-d0
ODA_BASE	node1	node2
Applications VM	app1	app2

In this document, all passwords are assumed to be *welcome1*. These passwords should always be changed. This document requires access to both nodes of the Oracle Database Appliance as root, grid and oracle users.

STEP 1: Deploy Oracle Database Appliance Virtualized Platform

1. The Oracle Database Appliance has to be deployed as a Virtualized Platform in order to support Oracle E-Business Suite Applications VMs. Oracle Database Appliance Virtualized Platform Setup instructions are provided on the Setup Poster, which is available at: http://docs.oracle.com/cd/E22693_01/. Follow the instructions to setup the Oracle Database Appliance. It is not necessary to deploy a database during the appliance setup. Deselect “Create Initial Database” checkbox in the “Database Information” page of the Appliance Manager.
2. Oracle E-Business Suite requires the database VM (ODA_BASE) runs certain UNIX packages and specified minimum versions, which are listed in My Oracle Support (MOS) Knowledge Document

1330701.1 *Oracle E-Business Suite Installation and Upgrade Notes Release 12 (12.2) for Linux x86-64*.
Ensure that the ODA_BASE on both nodes meet these requirements.

3. The space requirement for the templates and VM images are listed in Table 2:

Table 2: Space Requirement

EBS VM Templates	Disk Space Required
Oracle E-Business Suite Database VM template	300 GB
Oracle E-Business Suite Database VM	300 GB
Oracle E-Business Suite Applications VM template	300 GB
Oracle E-Business Suite Applications VM (2 VMs)	300 GB x 2 = 600 GB
Total Space required	1500 GB

4. Login as the root user on node 1 and create a 1600 GB shared repository which will be used to host the VMs using the following command:

```
$ oakcli create repo appsrepo -size 1600G -dg RECO
$ oakcli show repo
```

5. The Oracle Database Appliance team releases RDBMS Clone Bundles for each Oracle Database Appliance version. Oracle E-Business Suite 12.2.4 VMs require Oracle Database 11.2.0.4.3 which is available in patch: 17770873 – Oracle Database Appliance 11.2.0.4.3 End-User (RDBMS Clone).

Download the RDBMS clone. As the root user stage the software using oakcli utility as follows:

```
$ oakcli unpack -package \
<absolute_path_to_downloaded_patch_file>/p17770873_121200_Linux-x86-64.zip
```

STEP 2: Prepare the Target ORACLE_HOME

1. Create a new ORACLE_HOME to host the database using oakcli.

```
$ oakcli create dbhome -version 11.2.0.4.3
$ oakcli show dbhomes
```

2. The new ORACLE_HOME created by the oakcli utility does not include the Oracle Database 11gR2 Examples component, which is required by Oracle E-Business Suite. This can be downloaded from the Oracle Technology Network at: <http://www.oracle.com/technetwork/database/enterprise-edition/downloads/index.html>.

Unzip the installation media into a staging directory. As the oracle user, run the OUI from the downloaded installation media directory using the following command and follow the on-screen instructions:

```
$ ./runInstaller
```

3. Oracle E-Business Suite needs additional RDBMS patches to be installed. Required patches for 11.2.0.4.3 RDBMS PSU are enumerated in the MOS Knowledge Document 1147107.1 *Database Patch Set Update Overlay Patches Required for Use with PSUs and Oracle E-Business Suite*.

4. When Oracle Database Appliance is deployed, Role Separation uses different owners for the Grid Infrastructure and Oracle Database. Applying the one-off RDBMS patches will re-generate the Oracle binary in \$ORACLE_HOME/bin and its permissions will be reset to the default ownership. You need to reset the Oracle binary permissions for the grid user on both node1 and node2, using the following command:

```
$ /u01/app/12.1.0.2/grid/bin/setasmgidwrap \  
o=/u01/app/oracle/product/11.2.0.4/dbhome_1/bin/oracle
```

5. Oracle E-Business Suite 12.2 uses Oracle 9i NLS information. The required support files are created by running the following script under the RDBMS home as the oracle user on both node1 and node2:

```
$ perl $ORACLE_HOME/nls/data/old/cr9idata.pl
```

STEP 3: Setup the Oracle E-Business Suite Database VM

The Oracle E-Business Suite VMs include a database VM with the required metadata for an Oracle E-Business Suite deployment. This database will be migrated to run in ODA_BASE which provides optimal performance.

1. Oracle E-Business Suite Release 12.2.4 x86 (64 bit) VM templates are available at: <https://edelivery.oracle.com/linux>. Download the following files to a staging area under the /cloudfs directory on node1:
 - V56219-01_1of2.zip Oracle E-Business Suite Release 12.2.4 Production Database Tier Install X86 (64 bit) (Part 1 of 2)
 - V56219-01_2of2.zip Oracle E-Business Suite Release 12.2.4 Production Database Tier Install X86 (64 bit) (Part 2 of 2)
 - V56220-01_1of2.zip Oracle E-Business Suite Release 12.2.4 Production Database Tier Install X86 (64 bit) (Part 1 of 2)
 - V56220-01_2of2.zip Oracle E-Business Suite Release 12.2.4 Production Database Tier Install X86 (64 bit) (Part 2 of 2)
 - V56218-01_1of2.zip Oracle E-Business Suite Release 12.2.4 Production Database Tier Install X86 (64 bit) (Part 1 of 2)
 - V56218-01_2of2.zip Oracle E-Business Suite Release 12.2.4 Production Database Tier Install X86 (64 bit) (Part 2 of 2)
2. Unzip the files using the following commands:

```
$ unzip V56218-01_1of2.zip  
$ unzip V56218-01_2of2.zip  
$ unzip V56219-01_1of2.zip  
$ unzip V56219-01_2of2.zip  
$ unzip V56220-01_1of2.zip  
$ unzip V56220-01_2of2.zip
```
3. Combine the six files into a single compressed file using the following command:

```
$ cat \  
Oracle-E-Business-Suite-PROD-DB-12.2.4.ova.0 \  
Oracle-E-Business-Suite-PROD-DB-12.2.4.ova.1 \  
Oracle-E-Business-Suite-PROD-DB-12.2.4.ova.2 \  
Oracle-E-Business-Suite-PROD-DB-12.2.4.ova.3 \  
Oracle-E-Business-Suite-PROD-DB-12.2.4.ova.4 \  
Oracle-E-Business-Suite-PROD-DB-12.2.4.ova.5 \  
> Oracle-E-Business-Suite-PROD-DB-12.2.4.ova
```
4. Start Python based HTTP server from the same directory which contains the assembly file. Leave the session running until VM template import completes.

```
$ python -m SimpleHTTPServer
```

5. Login as root user on node1 and create a VNC session that will be used for GUI components, such as the VM console, using the following command:

```
$ vncserver
```

6. Before the downloaded Oracle Database VM template can be used to start a VM, it needs to be staged within the ODA. As the root user on node1, import the VM template using the following command:

```
$ oakcli import vmtemplate dbtempl -assembly \  
http://node1:8000/Oracle-E-Business-Suite-PROD-DB-12.2.4.ova \  
-repo appsrepo -node 0
```

7. As root user on node1, use the oakcli clone command to create the VM as follows:

```
$ oakcli clone vm dbvm -vmtemplate dbtempl -repo appsrepo -node 0
```

8. Confirm the VM has been created using the following command:

```
$ oakcli show vm  
NAME      NODENUM      MEMORY  VCPU    STATE      REPOSITORY  
  
Dbvm      0             4096    4       OFFLINE    appsrepo
```

```
$ oakcli show vm dbvm  
Resource: appdb  
  AutoStart      :      restore  
  CPUPriority    :      100  
  Disks          :      |file:/OVS/Repositories/appsrepo/.A  
CFS/snaps/dbvm/VirtualMachines/dbvm  
/e6794c5f000c48d3a6da48544c1318bd.i  
mg,xvda,w|,xvdb:/OVS/Repositories/  
appsrepo/.ACFS/snaps/dbvm/VirtualMa  
chines/dbvm/cdrom,r|  
  Domain        :      XEN_PVM  
  ExpectedState  :      offline  
  FailOver       :      false  
  IsSharedRepo   :      true  
  Keyboard       :      en-us  
  MaxMemory      :      2048  
  MaxVcpu        :      2  
  Memory         :      2048  
  Mouse          :      OS_DEFAULT  
  Name           :      dbvm  
  Networks       :  
  NodeNumStart   :      0  
  OS              :      OL_5  
  PrefNodeNum    :      0  
  PrivateIP      :      None  
  ProcessorCap   :      100  
  RepoName       :      appsrepo  
  Source         :      0  
  State          :      Offline  
  TemplateName   :      otml_dbtempl  
  VDIsks         :      |0|  
  Vcpu           :      1  
  cpupool        :      default-unpinned-pool  
  vncport        :      None
```

9. Reconfigure the VM to use net1 as the public interface:


```

$ oakcli modify vm dbvm -addnetwork net1
$ oakcli show vm dbvm
Resource: appdb
  AutoStart      :      restore
  CPUPriority    :      100
  Disks          :      |file:/OVS/Repositories/appsrepo/.ACFS/snaps/dbvm/VirtualMachines/dbvm/
                  /e6794c5f000c48d3a6da48544c1318bd.i
                  mg,xvda,w||,xvdb:/OVS/Repositories/
                  appsrepo/.ACFS/snaps/dbvm/VirtualMa
                  chines/dbvm/cdrom,r|
  Domain        :      XEN_PVM
  ExpectedState  :      offline
  FailOver       :      false
  IsSharedRepo   :      true
  Keyboard       :      en-us
  MaxMemory      :      2048
  MaxVcpu        :      2
  Memory         :      2048
  Mouse         :      OS_DEFAULT
  Name           :      dbvm
  Networks       :      ['bridge=net1']
  NodeNumStart   :      0
  OS             :      OL_5
  PrefNodeNum    :      0
  PrivateIP      :      None
  ProcessorCap   :      100
  RepoName       :      appsrepo
  Source         :      0
  State          :      Offline
  TemplateName   :      otml_dbtempl
  VDIsks        :      |0|
  Vcpu           :      1
  cpupool        :      default-unpinned-pool
  vncport        :      None

```

10. Due to bug: 21101080, the VM configuration has an incorrect entry for the cdrom in the vm.cfg file. This has to be corrected manually. Edit the vm.cfg and change following:

```

xvdb:/OVS/Repositories/appsrepo/.ACFS/snaps/dbvm/VirtualMachines/dbvm/cdrom,r
to:
xvdb:cdrom,r

```

11. Start the database VM using the following command:

```
$ oakcli start vm dbvm
```

12. The database VM can be configured from the VM console. Login to the VNC session created earlier and start the VM console using the following command:

```
$ oakcli show vmconsole dbvm
```

13. The firstboot process starts the configuration of the VM. The passwords for root, oracle and applmgr users will have to be changed when prompted. The configuration process will then continue to setup the network requiring inputs for IP address, netmask, gateway, DNS server address and hostname. Finally, the E-Business Suite database configuration starts by prompting for the database SID.

```

Changing password for user root.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.

```

```
Changing password for user oracle.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
Changing password for user applmgr.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
```

Configure a Static IP

```
Configuring network interface.
  Network device: eth0
  Hardware address: 00:16:3E:53:49:0C
```

```
Enter static IP address: 1.2.3.4
Enter netmask: [255.0.0.0] 255.255.255.0
Enter gateway: 1.2.3.1
Enter DNS server: 1.2.3.1
```

```
Shutting down interface eth0: [ OK ]
Shutting down loopback interface: [ OK ]
```

```
Configuring network settings.
  IP configuration: Static IP address
```

```
Bringing up loopback interface: [ OK ]
Bringing up interface eth0: Determining if ip address 1.2.3.4 is already in
use for device eth0...
[ OK ]
```

```
Enter hostname (e.g, host.example.com): [dbhost.us.oracle.com]
```

```
Network configuration changed successfully.
  IP configuration: Static IP address
  IP address: 1.2.3.4
  Netmask: 255.255.255.0
  Gateway: 1.2.3.1
  DNS server: 1.2.3.1
  Hostname: dbhost.us.oracle.com
```

STEP 4: Migrate the Database to ODA_BASE

1. Login to the source database VM as the oracle user. Source the environment using the following command:

```
$ . /u01/install/PROD/11.2.0/PROD_dbhost.env
```

2. Create a passwordfile for the Oracle database in order to facilitate remote sysdba login (this is required for subsequent data migration operations):

```
$ $ORACLE_HOME/bin/orapwd file=$ORACLE_HOME/dbs/orapwPROD password=welcome1
```

3. Oracle Database duplication procedures are simpler when using an spfile. Create an spfile for the database as follows:

```
$ sqlplus / as sysdba
SQL> create spfile from pfile;
```

4. Prepare the source database tier for cloning:

```
$ cd $ORACLE_HOME/appsutil/scripts/PROD_dbhost
$ perl adpreclone.pl dbTier
```

5. The AutoConfig files will need to be installed in the target ORACLE_HOME. As a first step, create a new zip file of the appsutil directory in source ORACLE_HOME and copy it to ODA_BASE:

```
$ cd $ORACLE_HOME
$ zip -r appsutil.zip appsutil
$ scp appsutil.zip node1:/u01/app/oracle/product/11.2.0.4/dbhome_1/
```

6. Shutdown the source database and start it in mount state using the following command:

```
$ sqlplus / as sysdba
SQL> shutdown immediate
SQL> startup mount
```

7. Login as the Oracle user to ODA_BASE on node 1 and install the AutoConfig files as follows:

```
$ cd $ORACLE_HOME
$ unzip appsutil.zip
```

8. Oracle Database Appliance has an optimal configuration of HDD & SSD disks. The database has to be located such that underlying storage subsystem is utilized optimally. Filesystems must be created and mounted to host datafiles on HDDs and redologs on SSDs. The following command creates the storage structure for a database named PROD:

```
$ oakcli create dbstorage -db PROD
```

9. Prepare the target database tier. While configuring the Oracle Applications environment choose "/u02/app/oracle/oradata/datastore/ACFS/snaps/PROD" ACFS filesystem to be the DATA_TOP. When prompted for ORACLE RAC database, respond with No as the database will be converted to ORACLE RAC at a later stage. Also, choose a non-zero port pool so that it does not clash with the existing listener settings on the Oracle Database Appliance. This procedure uses PROD as the database SID:

```
$ cd $ORACLE_HOME/appsutil/clone/bin
$ perl adcfgclone.pl dbTechStack
```

10. When Oracle Database Appliance is deployed, Role Separation uses different owners for the Grid Infrastructure and Oracle Database. Running Autoconfig will re-generate the Oracle binary in \$ORACLE_HOME/bin and its permissions will be reset to the default ownership. You need to reset the Oracle binary permissions for the grid user on both node1 and node2, using the following command:

```
$ /u01/app/12.1.0.2/grid/bin/setasmgidwrap \
o=/u01/app/oracle/product/11.2.0.4/dbhome_1/bin/oracle
```

11. Create the password file on the target database home using the following command as the oracle user on node1:

```
$ $ORACLE_HOME/bin/orapwd file=$ORACLE_HOME/dbs/orapwPROD password=welcome1
```

12. Setup the Applications environment and start the target database instance in a nomount state:

```
$ . $ORACLE_HOME/PROD_node1.env
$ $ORACLE_HOME/bin/sqlplus / as sysdba
SQL>startup nomount
```

13. Add the TNS alias for both source and target databases in the tnsnames.ora of both the source & target ORACLE_HOMEs. For example,

```
PROD_DBHOST=
  (DESCRIPTION=
    (ADDRESS=
```

```

        (PROTOCOL=tcp) (HOST=dbhost) (PORT=1521)
    )
    (CONNECT_DATA= (SERVICE_NAME=PROD))
)

PROD_ODATABASE=
  (DESCRIPTION=
    (ADDRESS=
      (PROTOCOL=tcp) (HOST=node1) (PORT=1529)
    )
    (CONNECT_DATA=
      (SERVICE_NAME=PROD))
  )
)

```

14. Connect to both the source and destination database instances using RMAN. The source database is the target database and the destination database is the auxiliary database in RMAN terminology.

```

$ $ORACLE_HOME/bin/rman target sys/welcome1@prod_dbhost \
auxiliary sys/welcome1@prod_odabase

```

15. Duplicate the database using the following RMAN script. Ensure that the parameters LOCAL_LISTENER, AUDIT_FILE_DEST, DIAGNOSTIC_DEST, CONTROL_FILES and DB_UNIQUE_NAME correspond to the values for your environment. The remainder of the parameters have the same values across all the Oracle Database Appliance environments.

```

RMAN> run
{
  allocate channel tgt1 device type disk;
  allocate auxiliary channel aux1 device type disk;
  allocate channel tgt2 device type disk;
  allocate auxiliary channel aux2 device type disk;
  allocate channel tgt3 device type disk;
  allocate auxiliary channel aux3 device type disk;
  allocate channel tgt4 device type disk;
  allocate auxiliary channel aux4 device type disk;
  DUPLICATE TARGET DATABASE
  TO PROD FROM ACTIVE DATABASE
  SPFILE
  SET DB_UNIQUE_NAME='PROD'
  SET CLUSTER_DATABASE='false'
  SET
DB_CREATE_FILE_DEST="/u02/app/oracle/oradata/datastore/.ACFS/snaps/PROD"
  SET
DB_RECOVERY_FILE_DEST="/u01/app/oracle/fast_recovery_area/datastore"
  SET DB_RECOVERY_FILE_DEST_SIZE="500G"
  SET DB_CREATE_ONLINE_LOG_DEST_1="/u01/app/oracle/oradata/datastore"
  SET CONTROL_FILES="/u01/app/oracle/oradata/datastore/PROD/control.ctl"
  SET DB_BLOCK_CHECKSUM='FULL'
  SET DB_BLOCK_CHECKING='FULL'
  SET DB_LOST_WRITE_PROTECT='TYPICAL'
  SET FILESYSTEMIO_OPTIONS='SETALL'
  SET USE_LARGE_PAGES='ONLY'
  SET COMPATIBLE='11.2.0.4'
  SET PARALLEL_ADAPTIVE_MULTI_USER='FALSE'
  SET PARALLEL_EXECUTION_MESSAGE_SIZE='16384'
  SET PARALLEL_THREADS_PER_CPU='2'
  SET PARALLEL_MIN_SERVERS='0'
  SET
DIAGNOSTIC_DEST='/u01/app/oracle/product/11.2.0.4/dbhome_1/admin/PROD_node1'
  SET
AUDIT_FILE_DEST='/u01/app/oracle/product/11.2.0.4/dbhome_1/rdbms/audit'
  SET LOG_ARCHIVE_DEST_1=''
  SET LOCAL_LISTENER='PROD_LOCAL'
}

```

```
NOFILENAMECHECK;  
}
```

16. Run the library update script on the target database.

```
$ cd $ORACLE_HOME/appsutil/install/PROD_node1  
$ sqlplus / as sysdba @adupdlib.sql so
```

17. Configure the target database tier.

```
$ cd $ORACLE_HOME/appsutil/clone/bin  
$ perl adcfgclone.pl dbconfig $ORACLE_HOME/appsutil/PROD_node1.xml
```

18. The Autoconfig tool does not generate the correct config.c in \$ORACLE_HOME/rdbms/lib/ directory. Workaround is to make the following changes to config.c:

a. Add a new line:

```
#define SS_ASM_GRP ""
```

b. Change the following line:

```
char *ss_dba_grp[] = {SS_DBA_GRP, SS_OPER_GRP};
```

to:

```
char *ss_dba_grp[] = {SS_DBA_GRP, SS_OPER_GRP, SS_ASM_GRP};
```

c. Generate config.o:

```
$ make -f $ORACLE_HOME/rdbms/lib/ins_rdbms.mk $ORACLE_HOME/rdbms/lib/config.o
```

d. Generate osdbagrp binary again:

```
$ cd $ORACLE_HOME/srvm/lib  
$ make -f ins_srvm.mk iosdbagrp
```

19. Register database with CRS.

```
$ srvctl add database -d PROD -o /u01/app/oracle/product/11.2.0.4/dbhome_1 -p  
/u02/app/oracle/oradata/datastore/PROD/spfilePROD.ora -c single -x node1  
$ srvctl setenv database -d PROD -T ORA_NLS10=$ORACLE_HOME/nls/data/9idata  
$ srvctl setenv database -d PROD -T  
TNS_ADMIN=$ORACLE_HOME/network/admin/PROD_node1  
$ srvctl start database -d PROD
```

20. Update the following init.ora parameters in a SQL*Plus session:

```
SQL> alter system set "_disable_interface_checking"=true scope=spfile sid='*';  
SQL> alter system set "_gc_undo_affinity"=false scope=spfile sid='*';  
SQL> alter system set "_gc_policy_time"=0 scope=spfile sid='*';  
SQL> alter system set "_enable_numa_support"=false scope=spfile sid='*';  
SQL> alter system set "_file_size_increase_increment"=2143289344 scope=spfile  
sid='*';
```

21. Restart the database for the parameter to take effect:

```
$ srvctl stop database -d PROD  
$ srvctl start database -d PROD
```

STEP 5: Setup the Oracle E-Business Suite Applications Tier VM

1. Oracle VM Templates for Oracle E-Business Suite Release 12.2.4 Media Pack v1 for x86 (64 bit) are available at: <https://edelivery.oracle.com/linux>. The staging directory /cloudfs would require 75GB free space. Download the following files to a staging area under the /cloudfs directory on node1:
 - V59638-01_1of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 1 of 2)
 - V59638-01_2of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 2 of 2)
 - V59637-01_1of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 1 of 2)
 - V59637-01_2of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 2 of 2)
 - V59636-01_1of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 1 of 2)
 - V59636-01_2of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 2 of 2)
 - V59635-01_1of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 1 of 2)
 - V59635-01_2of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 2 of 2)
 - V59639-01_1of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 1 of 2)
 - V59639-01_2of2.zip Oracle E-Business Suite Release 12.2.4 Application Tier Install X86 (64 bit) (Part 2 of 2)

2. Unzip the files using the following commands:

```
$ unzip V59638-01_1of2.zip
$ unzip V59638-01_2of2.zip
$ unzip V59637-01_1of2.zip
$ unzip V59637-01_2of2.zip
$ unzip V59636-01_1of2.zip
$ unzip V59636-01_2of2.zip
$ unzip V59635-01_1of2.zip
$ unzip V59635-01_2of2.zip
$ unzip V59639-01_1of2.zip
$ unzip V59639-01_2of2.zip
```

3. Combine the split files into a single compressed file.

```
$ cat \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.0 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.1 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.2 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.3 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.4 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.5 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.6 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.7 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.8 \
Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova.9 \
> Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova
```

4. Before the downloaded Applications VM template can be used to start a VM, it needs to be staged within the ODA. It requires 285 GB of repository space. As the root user, import the VM template using the following command:

```
$ oakcli import vmtemplate apptempl -assembly \
https://node1:8000/Oracle-E-Business-Suite-APPS-TIER-12.2.4.ova \
-repo appsrepo -node 0
```

5. As the root user, use the oakcli clone command to create the VM as follows:

```
$ oakcli clone vm appvm -vmtemplate apptempl -repo appsrepo -node 1 \
-driverdomain
```

6. As the root user confirm the VM has been created using the following command:

```
$ oakcli show vm
```

```

$ oakcli show vm appvm
Resource: appvm
  AutoStart      : restore
  CPUPriority    : 100
  Disks          : |file:/OVS/Repositories/appsrepo/.A
                  CFS/snaps/appvm/VirtualMachines/app
                  vm/d84a641d07a340dfa550bf3518244896
                  .img,xvda,w||,xvdb:/OVS/Repositorie
                  s/appsrepo/.ACFS/snaps/appvm/Virtua
                  lMachines/appvm/cdrom,r|
  Domain        : XEN_PVM
  ExpectedState  : online
  FailOver       : false
  IsSharedRepo   : true
  Keyboard       : en-us
  MaxMemory      : 16384
  MaxVcpu        : 8
  Memory         : 16384
  Mouse          : OS_DEFAULT
  Name           : appvm
  Networks       :
  NodeNumStart   : 0
  OS             : OL_5
  PrefNodeNum    : 0
  PrivateIP      : None
  ProcessorCap   : 100
  RepoName       : appsrepo
  Source         : 0
  State          : Online
  TemplateName   : otml_apptempl
  VDIsks         : |0|
  Vcpu           : 8
  cpupool        : default-unpinned-pool
  vncport        : None

```

7. Reconfigure the VM to use net1 as the public interface. As the root user, run the following command:

```

$ oakcli modify vm appvm -addnetwork net1
$ oakcli show vm appvm
Resource: appvm
  AutoStart      : restore
  CPUPriority    : 100
  Disks          : |file:/OVS/Repositories/appsrepo/.A
                  CFS/snaps/appvm/VirtualMachines/app
                  vm/d84a641d07a340dfa550bf3518244896
                  .img,xvda,w||,xvdb:/OVS/Repositorie
                  s/appsrepo/.ACFS/snaps/appvm/Virtua
                  lMachines/appvm/cdrom,r|
  Domain        : XEN_PVM
  ExpectedState  : online
  FailOver       : false
  IsSharedRepo   : true
  Keyboard       : en-us
  MaxMemory      : 16384
  MaxVcpu        : 8
  Memory         : 16384
  Mouse          : OS_DEFAULT
  Name           : appvm
  Networks       : ['bridge=net1']
  NodeNumStart   : 0
  OS             : OL_5
  PrefNodeNum    : 0

```

```

PrivateIP      :      None
ProcessorCap   :      100
RepoName       :      appsrepo
Source         :      0
State          :      Online
TemplateName   :      otml_apptempl
VDisks         :      |0|
Vcpu           :      8
cpupool        :      default-unpinned-pool
vncport        :      None

```

8. Due to bug: 21101080, the VM configuration has an incorrect entry for cdrom in the vm.cfg file. This has to be corrected manually. Edit the vm.cfg and change following:

```

xvdb:/OVS/Repositories/appsrepo/.ACFS/snaps/appvm/VirtualMachines/appvm/cdrom,
r
to:
xvdb:cdrom,r

```

9. The Applications VM can now be started using the following command as the root user:

```
$ oakcli start vm appvm
```

10. The Applications VM requires that the Applications environment network is configured in the same way as for the database VM. In order to do this, you need to use The VM console, which is accessed as the root user within the VNC session using the following command:

```
$ oakcli show vmconsole appvm
```

11. The firstboot process starts the configuration of the VM. The passwords for root, oracle and applmgr users will have to be changed when prompted. The configuration process will then continue to setup the network requiring inputs for IP address, netmask, gateway, DNS server address and hostname. When the Oracle E-Business Suite Applications tier is started you will need to supply the Database Host IP, Database Hostname, Database Host domain, Database SID and Listener Port.

```

Changing password for user root.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
Changing password for user oracle.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
Changing password for user applmgr.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.

```

Configure a Static IP

```

Configuring network interface.
Network device: eth0
Hardware address: 00:16:3E:53:49:0C

Enter static IP address: 1.2.3.5
Enter netmask: [255.0.0.0] 255.255.255.0

```



```

Enter gateway: 1.2.3.1
Enter DNS server: 1.2.3.1

Shutting down interface eth0:                [ OK ]
Shutting down loopback interface:           [ OK ]

Configuring network settings.
  IP configuration: Static IP address

Bringing up loopback interface:              [ OK ]
Bringing up interface eth0: Determining if ip address 1.2.3.5 is already in
use for device eth0...
                                           [ OK ]

Enter hostname (e.g, host.example.com): [apphost.us.oracle.com]

Network configuration changed successfully.
  IP configuration: Static IP address
  IP address:      1.2.3.5
  Netmask:        255.255.255.0
  Gateway:        1.2.3.1
  DNS server:     1.2.3.1
  Hostname:       apphost.us.oracle.com

Enter the IP Address of the DB Tier Host:1.2.3.4

Enter the Database Tier Host Name (without the domain) :dbhost

Enter the Database Tier Domain Name :us.oracle.com

Enter the Oracle Database SID :PROD


Enter the TNS Listener Port Number :1521

```

STEP 6: Enable High Availability

1. To provide High Availability (HA) at the Applications layer, an additional Applications VM needs to be deployed as described in STEP 5.6: Setup Oracle E-Business Suite Applications VM. Repeat steps 5.6 to 5.11 on the second node in the appliance.
2. Converting a single database on Oracle Database Appliance to Oracle RAC uses standard Oracle E-Business Suite procedures as provided in Section 4 of the MOS Knowledge Document 1453213.1, Using Oracle 11g Release 2 Real Application Clusters and Automatic storage management with Oracle E-Business Suite Release 12.2.
 - Ensure the requirements listed in *Section 4.1 Pre-Requisites* are met prior to migrating to Oracle RAC database.
 - As the clusterware has already been installed, the procedure is further simplified. Follow the steps from *Section 4.4 Listener Configuration in 11gR2 to Section 4.7 Establish Applications Environment for Oracle RAC* to convert the database to ORACLE RAC.
3. Load balancing the application servers provides both protection against failure as well as increased scalability. Oracle E-Business Suite supports load balancing at multiple layers, including, for example, DNS and Web Services. Oracle Database Appliance puts no specific restriction in the configuration of the Load Balancers for Oracle E-Business Suite. *MOS Knowledge Document 380489.1: Using Load-Balancers with Oracle E-Business Suite Release 12* provides detailed information on configuring load balancing.

STEP 7: Cleanup

- 
1. The python HTTP server process can be killed.
`$ kill -9 <pid of python process>`
 2. Files that were downloaded, uncompressed and combined in the process of creating the database and Applications VMs can now be deleted from the /cloudfs directory.
 3. Since the database has been migrated to ODA_BASE, the database VM can be deleted using the following command:
`$ oakcli stop vm dbvm`
`$ oakcli delete vm dbvm`
 4. The database VM template can also be removed. To remove the template, use the following command:
`$ oakcli delete vmtemplate dbvm`

STEP 8: Validate Environment

5. The presence of Applications VMs – run the following command as root user on ODA_BASE on node1:
`$ oakcli show vm`
6. The presence of a cluster database – run the following command as oracle user on ODA_BASE on node1:
`$ srvctl config database -d PROD -a`
7. The application availability can be validated by logging into the application using the URL
`http://app1.company.com:8008/`

Best Practices

This section lists the best practices, which should be reviewed once the deployment is complete.

Consider Resizing the Resource Configuration for ODA_BASE

A reasonable starting point is to allocate 50% of the available CPU and memory resources to ODA_BASE. These can be modified to reflect capacity requirements while remaining within the software licensing restrictions. The number of CPU cores and memory allocations can be changed using the following command as the root user on dom0 (on an X4-2):

```
$ oakcli configure oda_base
Core Licensing Options:
  1. 2 CPU Cores
  2. 4 CPU Cores
  3. 6 CPU Cores
  4. 8 CPU Cores
  5. 10 CPU Cores
  6. 12 CPU Cores
  7. 16 CPU Cores
  8. 24 CPU Cores
  9. 36 CPU Cores
Current CPU Cores      :16
Selection[1 .. 9](default 36 CPU Cores) : 7
ODA base domain memory in GB(min 16, max 244)(Current Memory
128G)[default 192] :
```

The core counts above reflect physical cores. The OS inside ODA_BASE will report virtual cores (vcpu), which equates to a half physical core. The changes are made to ODA_BASE on both nodes; the resource allocation should be the same across both. The changes take effect when the ODA_BASE is restarted. To restart the ODA Base, as the root user execute the following command on each node:

```
$ oakcli restart oda_base
```

Consider Resizing the Resource Configuration for the Applications VMs

As with the Oracle Database, the CPU and memory allocation for the Applications VMs can also be reconfigured after the initial deployment. As VMs are managed from ODA_BASE, to reconfigure the resources for an Applications VM, the command is executed as the root user from ODA_BASE. Use the following example command to change the CPU and memory allocation for an Applications VM:


```
$ oakcli configure vm appvm -vcpu 32 -maxcpu 32
$ oakcli configure vm appvm -memory 96G -maxmemory 96G
```

This command references virtual cpus (vcpu). The changes are static in nature and require the VM to be restarted. To restart the VMs, use the following commands:

```
$ oakcli stop vm appvm
$ oakcli start vm appvm
```

Consider Implementing Workload Isolation using CPU Pools

Oracle Database Appliance has the ability to isolate workloads within CPU pools. Once assigned, a VM is constrained to only use the CPUs available within that pool. Two pools are created by default when Oracle Database Appliance is deployed: odaBaseCpuPool and default-unpinned-pool. The ODA_BASE domain is allocated to the odaBaseCpuPool, and the number of the vCPUs in the odaBaseCpuPool is equal to the vCPUs allocated to ODA_BASE during deployment or re-configuration.



The Applications VMs can also benefit from CPU isolation by creating additional CPU Pools. Once these pools are created and the Applications VMs are assigned to these pools, no other VM can use these vCPU resources.

Additional CPU pools have to be created manually on each ODA_BASE as the CPU pool is node specific. As the root user, use the following command to create a CPU pool:

```
$ oakcli create cpupool appVmPool -numcpu 4 -node 0
```

To validate the creation of the CPU pool:

```
$ oakcli show cpupool -node 0
```

The Applications VM can then be assigned to the new CPU pool as follows:

```
$ oakcli configure vm appvm -cpupool appVmPool
```

Patching Oracle Database Appliance

Oracle Database Appliance provides an infrastructure for simplified patching as the requisite patches for all components of the Oracle Database Appliance stack (excluding Applications VM patches) are included in a single bundle patch. This vastly simplifies the end-to-end patching of both hardware and software since a single command is used to patch all the components. Patches for different components present within a bundle patch have been validated to work with each other. This eliminates any adverse patch conflicts for each of the components on Oracle Database Appliance and ensures end-to-end compatibility after patching. The Oracle Database Appliance patch bundles are released regularly to keep up-to-date with the Oracle Database Patches Set Update releases.

It is recommended that you not apply any Grid Infrastructure/Database one-off patches or install any additional OS packages outside of the standard Oracle Database Appliance patching mechanism. However, Oracle E-Business Suite functional patches are excluded from this policy. In the rare event of a conflict between a one-off RDBMS patch and the Oracle Database Appliance patch bundle, the recommended approach to address this is to roll back the problem patch prior to applying the Oracle Database Appliance Bundle Patch. If the patch has not been included in the Oracle Database Appliance bundle patch, then it can be reapplied.

The Oracle E-Business Suite Applications tier can be patched using standard patching utilities. Oracle Database Appliance puts no restriction on patching the Applications tiers. For further details on patching, please refer to the Maintenance Guide in the Oracle E-Business Suite documentation at:

http://docs.oracle.com/cd/V39571_01/current/html/docset.html

System Sizing

General guidelines on system sizing and capacity can be found in the Oracle Database Appliance documentation, available at: http://docs.oracle.com/cd/E22693_01/index.htm

Oracle E-Business Suite workloads can vary widely depending on many factors, such as modules deployed, users per module and business cycles. When migrating legacy systems to Oracle Database Appliance, the existing peak CPU, memory, IOPS and storage space utilization can be used as guidance to properly size the new environment. You should work with your local Oracle representative on the sizing exercise.

Enable Driver Domain

Driver Domain is a new feature available in OAK release 12.1.2.7.0 and higher. A driver domain is a user domain that has been given special privileges and responsibilities for a particular piece of hardware thereby eliminating dom0 as a bottleneck. The Driver Domain functionality allows for

implementation of guest virtual machines to use ODA_BASE as the driver domain for access to virtual disks.

One of the limitations of the current implementation of Driver Domains on ODA is lack of support for boot partition in a disk image accessed via driver domain. The E-Business Suite VMs provide a single disk image which includes both boot partition and the application partition on the same disk. This configuration effectively excludes out-of-the-box implementation Driver Domains for the E-Business Suite applications VMs.

Driver Domains can be implemented on E-Business Suite application VMs by moving out the boot partition to a different disk image. The following steps detail the process:

1. Create a new boot disk of size 500M in the same location as the original.

```
dd if=/dev/zero
of=/u01/app/sharedrepo/ebsrepo/.ACFS/snaps/appvm/VirtualMachines/appvm/boot.img oflag=direct count=0 bs=1M seek=500M
```
2. Attach boot disk to the vm by updating disk parameter in the vm.cfg

```
disk =
[u'file:/u01/app/sharedrepo/ebsrepo/.ACFS/snaps/ebsapp/VirtualMachines/appvm/99a674656e49406382ac741f07a7a582.img,xvda,w',
u'file:/OVS/Repositories/ebsrepo/.ACFS/snaps/appvm/VirtualMachines/appvm/boot.img,xvdb,w']
```
3. Restart application vm

```
oakcli stop vm appvm
oakcli start vm appvm
```
4. Partition the new disk and make it bootable

```
echo -e "\n\np\n1\n\n\n\t\n83\na\n1\nw" | fdisk /dev/xvdc
```
5. Format the new partition

```
mkfs.ext4 /dev/xvdb1
```
6. Mount the new filesystem

```
mount /dev/xvdb1 /mnt
```
7. Copy everything under /boot to new filesystem

```
cp -dpR /boot/* /mnt
```
8. Mount the new filesystem as /boot

```
umount /mnt
umount /boot
mount /dev/xvbl /boot
```
9. Install grub in the new boot disk

```
$ grub
grub> device (hd0) /dev/xvdb
grub> root (hd0,0)
grub> setup(hd0)
```
10. Get the UUID of the new boot partition

```
blkid /dev/xvdb
```
11. Update the /boot entry in /etc/fstab with UUID of the new partition

```
UUID=cc3635e4-4030-4881-91b0-a8279ddb1ef0 /boot ext4 defaults 1 2
```

12. Edit the `vm.cfg` to update the driver domain information for each disk. The boot partition should refer to the `/OVS/Repositories` location and the root partition should refer to `oda_base` location as follows:

```
disk =
[u'file:/u01/app/sharedrepo/ebsrepo/.ACFS/snaps/appvm/VirtualMachines/ebsd
b/471489424d0e46a6a3cd6fc53f4370ee.img,xvdb,w,oakDom1',
u'file:/OVS/Repositories/ebsrepo/.ACFS/snaps/appvm/VirtualMachines/appvm/b
oot.img,xvdb,w']
```

13. Restart the application VM

```
oakcli stop vm appvm
oakcli start vm appvm
```

Conclusion

Oracle Database Appliance is ideal for small to medium size deployments of Oracle E-Business Suite deployments. It enables the Oracle Database and Oracle E-Business Suite Applications tier to be deployed in a single cost effective and flexible system that is engineered for simplicity and reliability.



Appendix A: References

1. Oracle Database Appliance documentation: http://docs.oracle.com/cd/E22693_01/index.htm
2. Oracle E-Business Suite documentation: http://docs.oracle.com/cd/V39571_01/current/html/docset.html
3. MOS Knowledge Document 1330701.1: Oracle E-Business Suite Installation and Upgrade Notes Release 12 (12.2) for Linux x86-64
4. MOS Knowledge Document 1349240.1: Database Preparation Guidelines for an E-Business Suite Release 12.2 Upgrade
5. MOS Knowledge Document 1453213.1: Using Oracle 11g Release 2 Real Application Clusters and Automatic storage management with Oracle E-Business Suite Release 12.2
6. MOS Knowledge Document 1566935.1: Implementing Oracle E-Business Suite 12.1 Databases on Oracle Database Appliance
7. MOS Knowledge Document 380489.1: Using Load-Balancers with Oracle E-Business Suite Release 12
8. MOS Knowledge Document 1147107.1: Database Patch Set Update Overlay Patches Required for Use with PSUs and Oracle E-Business Suite

Appendix B: Configuring VMs after First Boot

The Virtual Machines are configured during the first boot. The E-Business Suite VMs have scripts that can be used to reconfigure the VMs after the first boot or after a failure of configuration during first boot. These scripts are present in the following locations:

On both Database and Applications VM:

SCRIPTS BASE_DIR	:	/u01/install/scripts
CONFIGURE DHCP	:	/u01/install/scripts/configdhcp.sh
CONFIGURE STATIC IP	:	/u01/install/scripts/configstatic.sh
SCRIPT TO CLEANUP VM	:	/u01/install/scripts/cleanup.sh

On Database VM:





SCRIPTS BASE_DIR	:	/u01/install/PROD/scripts/
START SCRIPT	:	/u01/install/PROD/scripts/startproddb.sh
STOP SCRIPT	:	/u01/install/PROD/scripts/stopproddb.sh
DB VM RECONFIG SCRIPT	:	/u01/install/PROD/scripts/proddbconfig.sh
DB VM CLEANUP SCRIPT	:	/u01/install/PROD/scripts/proddbcleanup.sh

On Applications VM:

SCRIPTS BASE_DIR	:	/u01/install/APPS/scripts/
START SCRIPT	:	/u01/install/APPS/scripts/startapps.sh
STOP SCRIPT	:	/u01/install/APPS/scripts/stopapps.sh
APPS VM RECONFIG SCRIPT	:	/u01/install/APPS/scripts/appsconfig.sh
APPS VM CLEANUP SCRIPT	:	/u01/install/APPS/scripts/appscleanup.sh
CONFIGURE A NEW WEB ENTRY POINT	:	/u01/install/scripts/configwebentry.sh



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Hardware and Software, Engineered to Work Together

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Solution-in-a-box: Best practices for deploying Oracle E-Business Suite Release 12.2.4 on Oracle Database Appliance 12.1.2.7
 July 2016
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