Blackboardlearn+

Release 9.1

32-bit to 64-bit Cross Platform Migration for Linux

Blackboard

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Introduction

Blackboard Learn Release 9.1 is the first release to offer an entire application and database footprint using 64-bit addressable memory. To take advantage of more addressable memory, Blackboard strongly encourages clients to deploy using 64-bit operating systems (OSs) and sub components (Java and SQL Server or Oracle). Migrating to 64-bit operating systems allows institutions to deploy a 64-bit JVM with larger heap sizes that suppresses the need to run in Tomcat clustered environments.

Blackboard Learn 9.1 Service Pack 8 (SP8) requires a 64-bit operating system. Clients upgrading to SP8 must upgrade their operating system before upgrading the application. Instructions in this guide will help you through the process of migrating from a 32-bit system to a 64-bit system.

Migration Guide

Nomenclature

The **source application server ($SRC_APP_HOSTNAME)** refers to the original server running your production Blackboard application instance, running on a Red Hat Enterprise Linux 32-bit operating system.

The **source database server ($SRC_DB_HOSTNAME)** refers to the original server running your production Blackboard database instance, running on a Red Hat Enterprise Linux 32-bit operating system.

The **destination application server ($DST_APP_HOSTNAME)** refers to the new server which is intended as the application instance migration target of this process, running on a Red Hat Enterprise Linux 64-bit operating system.

The **destination database server ($DST_DB_HOSTNAME)** refers to the new server which is intended as the database instance migration target of this process, running on a Red Hat Enterprise Linux 64-bit operating system.

Process Overview and Server Combination Scenarios

When performing Blackboard Learn migrations from 32-bit platforms to 64-bit platforms, there are five distinct actions that take place in order, regardless of your server combinations:

- Backup the Application
- Backup the Database
- Restore the Database
- Restore the Application
- Upgrade the Application

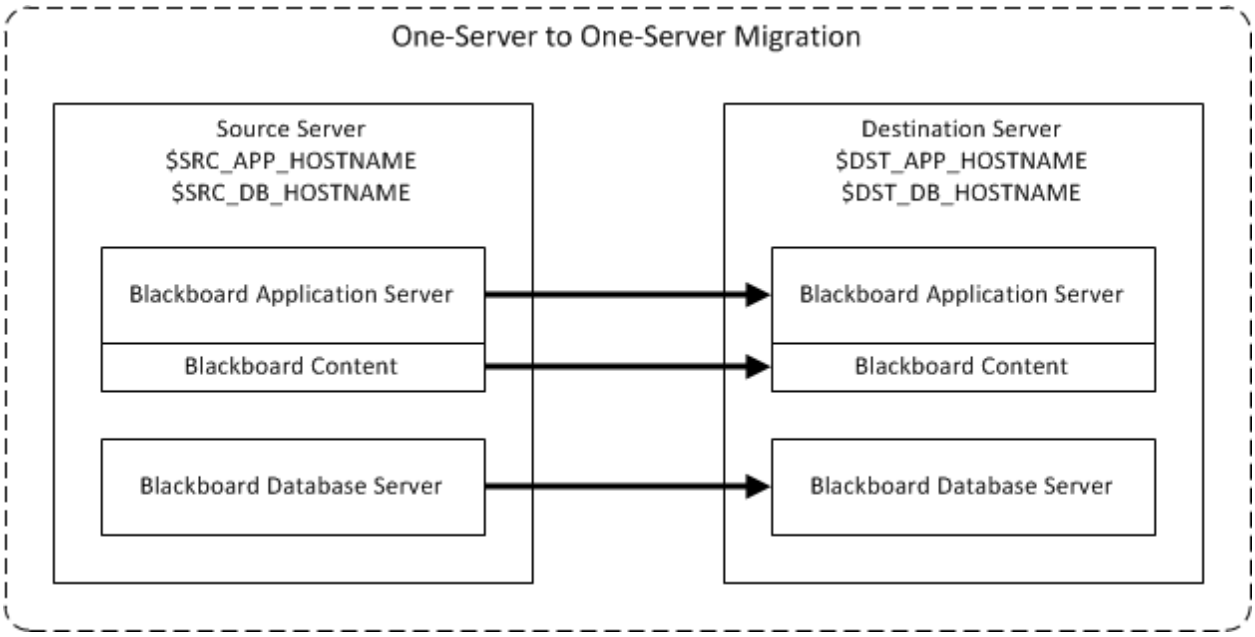
In order to condense this guide, each of these sections is written exactly once in such a manner that it can apply to any server combination that may be installed. As long as these actions are followed in order and unique hostnames are correctly specified during the restore steps, the migration process will be successful.

One Server to One Server

The source application server and source database server are the same ($SRC_APP_HOSTNAME == $SRC_DB_HOSTNAME).

The destination application server and the destination database server are the same ($DST_APP_HOSTNAME == $DST_DB_HOSTNAME).

Blackboard content is backed up and restored with the application.

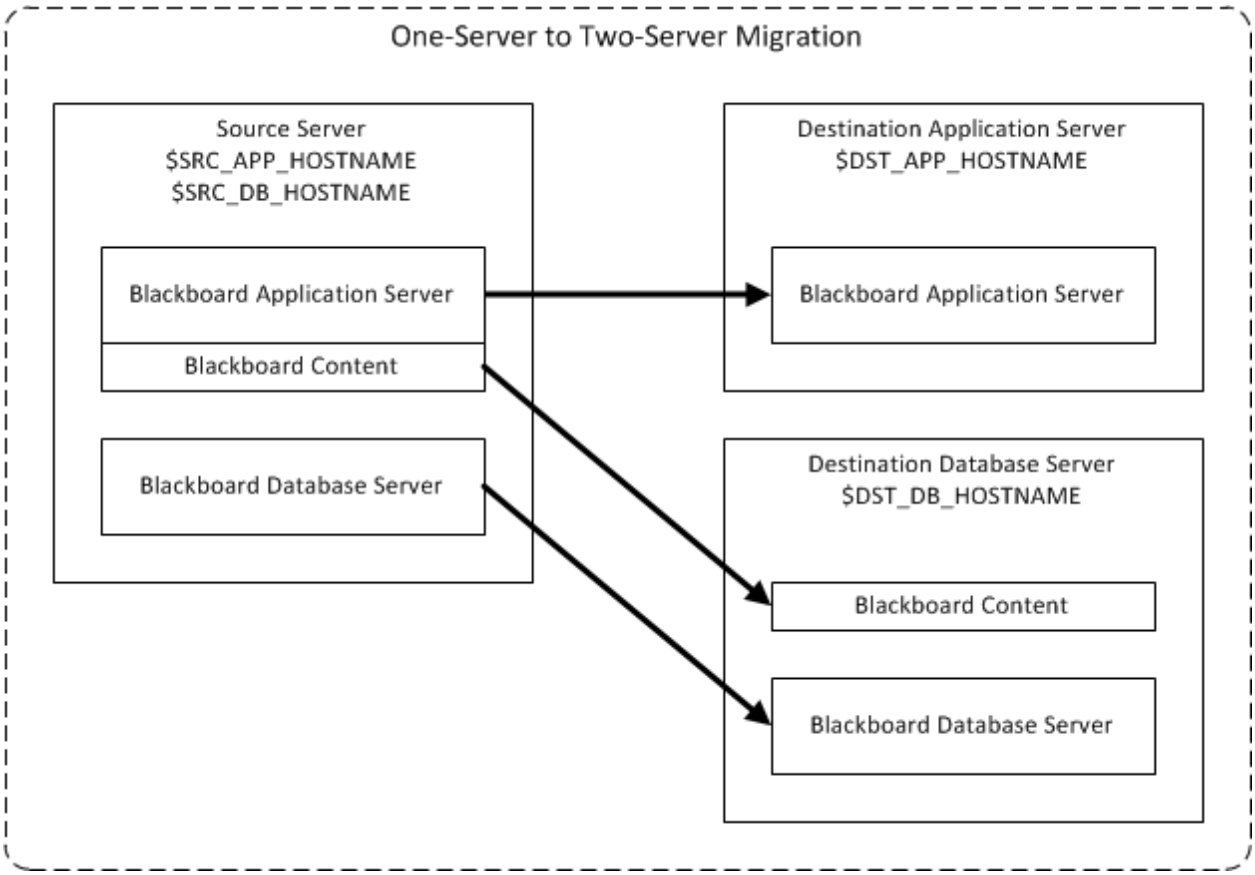


One Server to Two Servers

The source application server and source database server are the same ($SRC_APP_HOSTNAME == $SRC_DB_HOSTNAME).

The destination application server and the destination database server are separate ($DST_APP_HOSTNAME != $DST_DB_HOSTNAME).

Blackboard content is backed up and restored with the database.

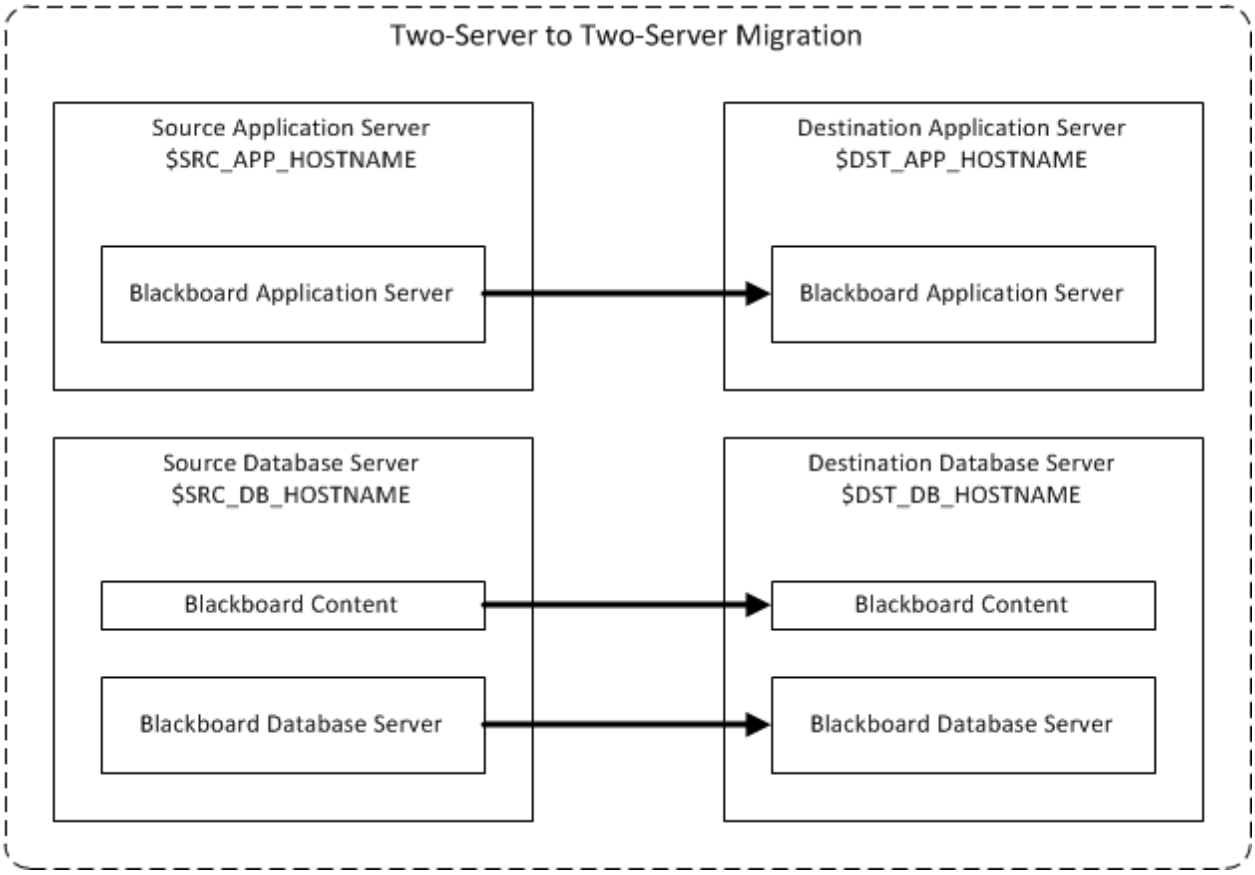


Two Servers to Two Servers

The source application server and source database server are separate ($SRC_APP_HOSTNAME != $SRC_DB_HOSTNAME).

The destination application server and the destination database server are separate ($DST_APP_HOSTNAME != $DST_DB_HOSTNAME).

Blackboard content is backed up and restored with the database. This is also a general case for many-server installations that are load-balanced.



Source Server Assumptions

If your configuration varies from these assumptions, then these instructions must be adjusted to fit your environment.

Source Application Server ($SRC_APP_HOSTNAME)

You are running one of the following versions of Red Hat Enterprise Linux:

- Red Hat Enterprise Linux 5 32-bit

You are running one of the following versions of Blackboard Learn:

- Blackboard Learn 8.0 SP7 (8.0.494.0)
- Blackboard Learn 8.0 SP7 HF1 (8.0.494.5)
- Blackboard Learn 8.0 SP7 HF2 (8.0.494.35)
- Blackboard Learn 9.0 SP7 (9.0.692.0)

You are planning to upgrade to Blackboard Learn 9.1 SP8 (9.1.82223.0).

You have a full Blackboard License which includes the Learning System, the Content System, the Community System and the Outcomes System.

- This guide will work with other license types, but the database and database user counts may be different than what is reflected in this guide.

You have installed Blackboard to `/usr/local/blackboard`.

You are running the latest version of JDK 1.6 32-bit at `/usr/local/jdk1.6.0_30` (update 30 was used for this writing).

You are running the Blackboard appserver on port `8009` and the webserver on port `80`.

Your collab server is running on port `8010` and port `8011`.

You know your SMTP server hostname.

Your shared content location is `/usr/local/blackboard/content`.

> For two-server configurations, this location is mapped to `$SRC_DB_HOSTNAME:/usr/local/bb_content` via NFS.

Your storage location for `/courses` is `/usr/local/blackboard/content/storage/courses`.

Your storage location for `/institution` is `/usr/local/blackboard/content/storage/institution`.

Your storage location for `/library` is `/usr/local/blackboard/content/storage/library`.

Your storage location for `/orgs` is `/usr/local/blackboard/content/storage/orgs`.

Your storage location for `/users` is `/usr/local/blackboard/content/storage/users`.

Source Database Server ($SRC_DB_HOSTNAME)

You are running one of the following versions of Red Hat Enterprise Linux:

- Red Hat Enterprise Linux 5 32-bit

You are running one of the following versions of Oracle and you know the instance name (ENG1 in this document).

- Oracle 10gR2 (10.2.0.4) 32-bit

You know your database "sys" and “system” administrator passwords.

Your database data files directory is `/usr/local/blackboard/oracle/data`.

Your database index files directory is `/usr/local/blackboard/oracle/data`.

For two-server configurations, your shared content location is `/usr/local/bb_content` which is shared via NFS as `$SRC_DB_HOSTNAME:/usr/local/bb_content`.

Destination Server Assumptions

Destination Application Server ($DST_APP_HOSTNAME)

You are running one of the following versions of Red Hat Enterprise Linux:

- Red Hat Enterprise Linux 5 64-bit

You have the latest version of JDK 1.6 64-bit installed at `/usr/local/jdk1.6.0_30` (update 30 was used for this writing).

Destination Database Server ($DST_DB_HOSTNAME)

You are running one of the following versions of Red Hat Enterprise Linux:

- Red Hat Enterprise Linux 5 64-bit

You are running one of the following versions of Oracle and you know the instance name (ENG2 in this document).

- Oracle 11gR1 (11.2.0.1) 64-bit

You have the following Oracle 11g patches installed:

- None at this time.

Your database data files directory is `/usr/local/blackboard/oracle/data`.

Your database index files directory is `/usr/local/blackboard/oracle/data`.

For two-server configurations, your shared content location is `/usr/local/bb_content` which is shared via NFS as `$DST_DB_HOSTNAME:/usr/local/bb_content`.

Prepare Destination Server

This work needs to be done as a user which has been granted root or sudo permissions.

Destination Application Server ($DST_APP_HOSTNAME)

1. Create a directory for the Blackboard Learn application backup files.

   ```
   mkdir /usr/local/bb_backup
   ```

2. Create the Blackboard application user.

   ```
   groupadd -g 550 bbuser
   useradd -c "Blackboard Application User" -u 550 -g 550 bbuser
   passwd bbuser
   ```

3. Create the NFS mount point mapping. If you have a one-server configuration, then skip this step.

   ```
   vi /etc/fstab
   $DST_DB_HOSTNAME:/usr/local/bb_content /usr/local/blackboard/content
   nfs auto,rw,soft,timeo=60,intr,nolock,rsize=8192,wsize=8192 0 0
   :wq
   ```

Destination Database Server ($DST_DB_HOSTNAME)

1. Create a directory for the Blackboard Learn database backup files.

   ```
   mkdir /usr/local/bb_backup
   ```

2. Create the Blackboard application user. The numeric user id should be the same as it is on the destination application server. If you have a one-server configuration, then skip this step.

   ```
   groupadd -g 550 bbuser
   useradd -c "Blackboard Application User" -u 550 -g 550 bbuser
   passwd bbuser
   ```

3. Create the shared content directory structure and NFS share. If you have a one-server configuration, then skip this step.

```
mkdir -p /usr/local/bb_content

chown -R bbuser /usr/local/bb_content

vi /etc/exports

/usr/local/bb_content $DST_APP_HOSTNAME(rw,anonuid=550,anongid=550)

:wq

exportfs -r
exportfs –v
```

Backup the Application on the Source Server

Source Application Server ($SRC_APP_HOSTNAME)

1. Shutdown the Blackboard Learn application.

   ```
   /usr/local/blackboard/tools/admin/ServiceController.sh services.stop
   ```

2. Copy the Blackboard Learn application (and content) to the destination application server.

   a. One-server source, one-server destination; exclude the database files.

   ```
   cd /usr/local

   rsync -avz blackboard --exclude=/blackboard/oracle
   $DST_APP_HOSTNAME:/usr/local/bb_backup
   ```

   b. One-server source, two-server destination; exclude the database and content files.

   ```
   cd /usr/local

   rsync -avz blackboard --exclude=/blackboard/oracle --
   exclude=/blackboard/content
   $DST_APP_HOSTNAME:/usr/local/bb_backup
   ```

   Warning: The `/usr/local/blackboard/content` directory should be excluded. Verify that the following directories were copied to the destination server:

   - `/usr/local/blackboard/webapps/blackboard/content`
   - `/usr/local/blackboard/webapps/blackboard/WEB-INF/classes/blackboard/webapps/blackboard/content`

   c. Two-server source, two-server destination; exclude the content files.

   ```
   cd /usr/local

   rsync -avz blackboard --exclude=/blackboard/content
   $DST_APP_HOSTNAME:/usr/local/bb_backup
   ```

   Warning: The `/usr/local/blackboard/content` directory should be excluded. Verify that the following directories were copied to the destination server:

   - `/usr/local/blackboard/webapps/blackboard/content`
   - `/usr/local/blackboard/webapps/blackboard/WEB-INF/classes/blackboard/webapps/blackboard/content`

Backup the Database on the Source Server

If you have a full Blackboard license which includes the Learning System, the Content System, the Community System and the Outcomes System, then there are 11 users, 10 tablespaces and 10 indexes to backup. If you do not have all of these modules licensed, then there will be fewer tablespaces, schemas and users to backup.

Source Database Server ($SRC_DB_HOSTNAME)

1. Create a directory to store the database backup. Grant the `oracle` user write access to the directory.

   ```
   mkdir /usr/local/sql_backup
   chown oracle /usr/local/sql_backup
   ```

2. Export the database, where $PASSWORD is the Oracle system user password.

   ```
   su - oracle
   export EXPORT_DIR=/usr/local/sql_backup
   $ORACLE_HOME/bin/exp system/$PASSWORD \
   file=$EXPORT_DIR/bb_export.dmp \
   log=$EXPORT_DIR/bb_export.log \
   owner=\(bbadmin, bb_bb60_stats, bb_bb60, \
   bb_bb60_report, cms, cms_doc, cms_files_orgs, \
   cms_files_inst, cms_files_courses, cms_files_library, \
   cms_files_users\) buffer=2048000
   ```

   If your export is greater than 2GB in size, then you may need to follow instructions on using a split named pipe as described by Jeff Hunter at Oracle DBA Tips

3. Backup the Oracle tablespace definitions, users and privileges.

   a. Create the `/usr/local/sql_backup/backup-database.sql` script.

   ```
   set echo off
   set feedback off
   set heading off
   set linesize 200

   spool $EXPORT_DIR/recreate_bb_database.sql

   -- Generate SQL Script to Recreate the Blackboard Learn
   Tablespaces
   select 'create tablespace ' || dt.tablespace_name ||
   ' datafile ''' ||  ddf.file_name ||
   ```

```
 ''' size 100m autoextend on extent management local segment
space management auto; '
 from dba_tablespaces dt, dba_data_files ddf
 where (dt.tablespace_name = ddf.tablespace_name and
dt.tablespace_name like 'BB%')
 or (dt.tablespace_name = ddf.tablespace_name and
dt.tablespace_name like 'CMS%');

-- Generate SQL Script to Recreate the Blackboard Learn Database
Users
select 'create user ' || username ||
' identified by values ''' || password ||
 ''' default tablespace ' || default_tablespace ||
 ' temporary tablespace ' || temporary_tablespace ||
 ' quota unlimited on ' || default_tablespace || ';'
 from dba_users
 where (username like 'BB%')
 or (username like 'CMS%');

-- Generate SQL Script to Grant Role Privileges to the Blackboard
Learn Database Users
select 'grant ' || granted_role ||
 ' to ' || grantee || ';'
 from dba_role_privs
 where grantee in
 (select username
  from dba_users
  where (username like 'BB%')
  or (username like 'CMS%')
 );

-- Generate SQL Script to Grant System Privileges to the
Blackboard Learn Database Users
select 'grant ' || privilege ||
 ' to ' || grantee || ';'
 from dba_sys_privs
 where grantee in
 (select username
  from dba_users
  where (username like 'BB%')
  or (username like 'CMS%')
 );

-- Closing Statement for Generated SQL Script
select 'quit' from dual;

spool off

quit
```

b. Execute the `/usr/local/sql_backup/backup-database.sql` script.

```
su - oracle
```

```
export EXPORT_DIR=/usr/local/sql_backup

$ORACLE_HOME/bin/sqlplus "/ as sysdba" @$EXPORT_DIR/backup-
database.sql
```

4. Copy the database backup (and content) to the destination database server.

    a. One-server source, two-server destination.

    ```
    cd /usr/local

    rsync -avz sql_backup $DST_DB_HOSTNAME:/usr/local/bb_backup
    ```

    b. One-server source, two-server destination; copy content.

    ```
    cd /usr/local

    rsync -avz blackboard/content
    $DST_DB_HOSTNAME:/usr/local/bb_backup

    rsync -avz sql_backup $DST_DB_HOSTNAME:/usr/local/bb_backup
    ```

    c. Two-server source, two-server destination; copy content.

    ```
    cd /usr/local

    rsync -avz bb_content $DST_DB_HOSTNAME:/usr/local/bb_backup

    rsync -avz sql_backup $DST_DB_HOSTNAME:/usr/local/bb_backup
    ```

Restore the Database on the Destination Server

If you have a full Blackboard license which includes the Learning System, the Content System, the Community System and the Outcomes System, then there are 11 users, 10 tablespaces and 10 indexes to restore. If you do not have all of these modules licensed, then there will be fewer tablespaces, schemas and users to restore and you should adjust these scripts as necessary.

Destination Database Server ($DST_DB_HOSTNAME)

1. Move the Blackboard Learn content and database files to the proper location.

```
# move content files, if they were copied to this server
mv /usr/local/bb_backup/bb_content/* /usr/local/bb_content
chown -R bbuser /usr/local/bb_content

# create the database directory structure
mkdir -p /usr/local/blackboard/oracle/data
chown oracle /usr/local/blackboard/oracle/data
```

2. Restore the database on the Destination Server.

```
su - oracle

export EXPORT_DIR=/usr/local/bb_backup/sql_backup

sqlplus "/ as sysdba"
alter system set
db_create_file_dest='/usr/local/blackboard/oracle/data';
exit

$ORACLE_HOME/bin/sqlplus "/ as sysdba"
@$EXPORT_DIR/recreate_bb_database.sql
$ORACLE_HOME/bin/imp system/$PASSWORD \
 file=$EXPORT_DIR/bb_export.dmp \
 log=$EXPORT_DIR/bb_import.log \
 full=y buffer=2048000
```

   There are multiple warnings of this type, but the import will complete successfully and they can be safely ignored:

```
IMP-00041: Warning: object created with compilation warnings
```

3. Reconfigure the Blackboard Learn configuration parameters within the restored database. $DST_APP_HOSTNAME should be replaced with the unqualified hostname of the destination application server, $DST_DB_HOSTNAME should be replaced with the unqualified hostname of the destination database server, $DB_INSTANCE should be replaced with your database instance name and $DOMAIN should be replaced with your DNS domain name.

```
su - oracle
sqlplus "/ as sysdba"
```

```
update bbadmin.BB_CONFIG_REGISTRY set HOSTNAME =
'$DST_APP_HOSTNAME.$DOMAIN';

update bbadmin.BB_INSTANCE set DB_HOST = '%DST_DB_HOSTNAME%';

update bbadmin.BB_INSTANCE set DB_INSTANCE = '%DB_INSTANCE%';

update bbadmin.BB_INSTANCE set STAT_DB_HOST =
'%DST_DB_HOSTNAME%';

update bbadmin.BB_INSTANCE_HOST set HOSTNAME =
'%DST_APP_HOSTNAME%.%DOMAIN%';


update cms.XY_FILE_SYSTEMS set JDBC_CONNECTION_URL =
'jdbc:inetdae7:%DST_DB_HOSTNAME%.%DOMAIN%\%DB_INSTANCE%:1433?data
base=cms_files_users&secureLevel=0' where DISPLAY_NAME =
'cms_files_users';

update cms.XY_FILE_SYSTEMS set JDBC_CONNECTION_URL =
'jdbc:inetdae7:%DST_DB_HOSTNAME%.%DOMAIN%\%DB_INSTANCE%:1433?data
base=cms_files_courses&secureLevel=0' where DISPLAY_NAME =
'cms_files_courses';

update cms.XY_FILE_SYSTEMS set JDBC_CONNECTION_URL =
'jdbc:inetdae7:%DST_DB_HOSTNAME%.%DOMAIN%\%DB_INSTANCE%:1433?data
base=cms_files_orgs&secureLevel=0' where DISPLAY_NAME =
'cms_files_orgs';

update cms.XY_FILE_SYSTEMS set JDBC_CONNECTION_URL =
'jdbc:inetdae7:%DST_DB_HOSTNAME%.%DOMAIN%\%DB_INSTANCE%:1433?data
base=cms_files_inst&secureLevel=0' where DISPLAY_NAME =
'cms_files_inst';

update cms.XY_FILE_SYSTEMS set JDBC_CONNECTION_URL =
'jdbc:inetdae7:%DST_DB_HOSTNAME%.%DOMAIN%\%DB_INSTANCE%:1433?data
base=cms_files_library&secureLevel=0' where DISPLAY_NAME =
'cms_files_library';

update cms.XY_FILE_SYSTEMS set JDBC_CONNECTION_URL =
'jdbc:inetdae7:%DST_DB_HOSTNAME%.%DOMAIN%\%DB_INSTANCE%:1433?data
base=cms_doc&secureLevel=0' where DISPLAY_NAME = 'cms_doc';


exit
```

Restore the Application on the Destination Server

Destination Application Server ($DST_APP_HOSTNAME)

1. Move the Blackboard Learn files to the proper location.

```
mv /usr/local/bb_backup/blackboard /usr/local
mkdir /usr/local/blackboard/content
chown -R bbuser /usr/local/blackboard
mount /usr/local/blackboard/content
```

2. Reconfigure Blackboard Property Files. There are 28 properties across 3 files that need to be to updated or verified.

   a. $DST_APP_HOSTNAME should be replaced with the unqualified hostname of the destination application server, $DST_DB_HOSTNAME should be replaced with the unqualified hostname of the destination database server, $DB_INSTANCE should be replaced with your database instance name and $DOMAIN should be replaced with your DNS domain name.

   b. **File:** `/usr/local/blackboard/apps/xythos/xythos.properties`

Property	Purpose
`Xythos.BaseJDBCConnectionURL=jdbc:oracle:thin:@$DST_DB_HOSTNAME.$DOMAIN:1521:$DB_INSTANCE`	Update server name and SQL Server instance name.

   c. **File**: `/usr/local/blackboard/config/bb-config.properties`

Property	Purpose
`bbconfig.java.home=/usr/local/jdk1.6.0_30`	Update JDK location, if necessary
`bbconfig.java.home.win=\\usr\\local\\jdk1.6.0_30`	Update JDK location, if necessary
`bbconfig.base.shared.dir=/usr/local/blackboard/content`	Check the shared content location
`bbconfig.base.shared.dir.win=\\usr\\local\\blackboard\\content`	Check the shared content location
`bbconfig.webserver.fullhostname=$DST_APP_HOSTNAME.$DOMAIN`	Set the webserver hostname, fully qualified
`bbconfig.appserver.fullhostname=$DST_APP_HOSTNAME.$DOMAIN`	Set the appserver hostname, fully qualified
`bbconfig.appserver.machinename=$DST_APP_HOSTNAME`	Set the appserver machinename, unqualified
`bbconfig.appserver.domainname=$DOMAIN`	Set the appserver domainname

Property	Purpose
bbconfig.smtpserver.hostname=$SMTP_HOSTNAME.$DOMAIN	Update the SMTP server, if necessary, fully qualified
bbconfig.collabserver.fullhostname.default=$DST_APP_HOSTNAME.$DOMAIN	Set the collabserver hostname, fully qualified
(9.0) bbconfig.database.datadir=/usr/local/blackboard/oracle/data (8.0) bbconfig.database.bbadmin.db.datadir=/usr/local/blackboard/oracle/data	Check the database data directory
(9.0) bbconfig.database.datadir.win=\\usr\\local\\blackboard\\oracle\\data (8.0) bbconfig.database.bbadmin.db.datadir.win=\\usr\\local\\blackboard\\oracle\\data	Check the database data directory
(9.0) bbconfig.database.server.name=$DST_DB_HOSTNAME (8.0) bbconfig.database.bbadmin.machine.machinename=$DST_DB_HOSTNAME	Set the database server hostname, unqualified
(9.0) bbconfig.database.server.fullhostname=$DST_DB_HOSTNAME.$DOMAIN (8.0) bbconfig.database.bbadmin.machine.fullhostname=$DST_DB_HOSTNAME.$DOMAIN	Set the database server hostname, fully qualified
(9.0) bbconfig.database.server.instancename=$DB_INSTANCE (8.0) bbconfig.database.bbadmin.machine.instancename=$DB_INSTANCE	Set the database server instance name
bbconfig.database.stats.server.name=$DST_DB_HOSTNAME.$DOMAIN	Set the database stats server hostname, fully qualified
(9.0) bbconfig.database.logdir.mssql=\\usr\\local\\blackboard\\oracle\\data (8.0) bbconfig.database.bbadmin.db.mssql.logdir.win=\\usr\\local\\blackboard\\oracle\\data	Check the database log directory

Property	Purpose
(9.0) bbconfig.database.indexdir.oracle=/usr/local/blackboard/oracle/data (8.0) bbconfig.database.bbadmin.db.oracle.indexdir=/usr/local/blackboard/oracle/data	Check the database index directory
bbconfig.cs.external.data.courses=/usr/local/blackboard/content/storage/courses	Set the courses shared content location
bbconfig.cs.external.data.inst=/usr/local/blackboard/content/storage/institution	Set the institution share content location
bbconfig.cs.external.data.library=/usr/local/blackboard/content/storage/library	Set the library shared content location
bbconfig.cs.external.data.orgs=/usr/local/blackboard/content/storage/orgs	Set the orgs shared content location
bbconfig.cs.external.data.users=/usr/local/blackboard/content/storage/users	Set the users shared content location
bbconfig.cs.external.storage.location=/usr/local/blackboard/content/storage	Set the storage shared content location

d. **File:** `c:\blackboard\tools\admin\PushConfigUpdates.bat`

Property	Purpose
`set JAVA_HOME=C:\jdk1.6.0_30`	Update JDK location, if necessary

3. Update the Blackboard configuration by running PushConfigUpdates.

   `/usr/local/blackboard/tools/admin/PushConfigUpdates.sh`

Upgrade the Application on the Destination Server

Destination Application Server ($DST_APP_HOSTNAME)

1. Run the Blackboard installer jar to upgrade the application.

   ```
   $JAVA_HOME/bin/java -jar bb-as-linux-9.1.82223.0.jar
   ```