

Anatomy of an Upgrade

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Introduction

This white paper will walk through a model E-Business Suite upgrade and platform migration. This particular model is based on several upgrades that I have personally performed. Even though the model upgrade is fairly complex, it is still somewhat typical.

Please note that every upgrade project and every platform migration project is different. These differences arise from the combination of platforms, versions, and modules, as well as the variances in “what's current” from Oracle at the time of the upgrade. As a result, this white paper, and any accompanying documentation should be viewed as merely a sample and/or “roadmap” rather than a step-by-step guide. As always, you should refer to Oracle-provided documentation when planning your project. The author is not responsible for any issues that arise from following this or any accompanying document.

Source Environment

For this particular upgrade, our source environment is on Sun Solaris. The dbTier is running RDBMS 11gR2, and the appsTier is E-Business Suite Release 12.1.3. For the purpose of simplicity, we will assume that the dbTier and appsTier are two independent machines.

Target Environment

In our target environment both nodes will be RedHat Enterprise Linux 7 on the x86-64 platform.

Where do I begin?

Start with the upgrade manual. That will provide a general guide to the upgrade process for E-Business Suite. If you need to upgrade the database and/or do a platform migration, follow these documents. Keep in mind that, if you're doing a platform migration, the only things that you're actually migrating are the database and any customizations. In reality, your customizations are probably platform independent.

Strategy and Method

Map it out. For each iteration, create a RUNBOOK. A RUNBOOK is a scripted list of steps/commands that you intend to use going into an iteration. As you assemble this RUNBOOK, you should keep track of (or project, based on the previous iteration) any projected timings for each step in the process. As you go through that iteration, you should convert that RUNBOOK into a TRANSCRIPT. The TRANSCRIPT is a detailed record of the commands, failures, corrections, and any adjustments that you encounter during that iteration.

This is an iterative process. The transcript that you produced during PASS1 becomes your runbook for PASS2. As you encounter problems, uncover the fixes, put them into the transcript for the current upgrade iteration. When you're preparing the runbook for your next iteration, examine these fixes and determine if and when you can apply them pre-emptively to avoid the errors.

This approach also allows you to re-sequence your upgrade steps. Consider which steps need to be performed during your “blackout window” and which steps can be performed in advance. These “out of band” steps are generally ones that don't require access to the database. Things like installing software, merging patches, patching the database `$ORACLE_HOME`, or any of

the tools patches, can all be done in the days or weeks prior to your actual production upgrade, thus dramatically reducing any required downtime.

Decisions to Make

At this point, you have some decisions to make. You will want to upgrade the database to 11.2.0.4 or 12.1.0.1 (current) at some point during this project. The question is, which of these do you want to perform “out-of-band” versus during your main upgrade window?

The answer, as always, is “it depends”. The degree of end-user testing for a database upgrade can be significant because of the impact that changes to the optimizer might have on the performance of custom code.

In the case of the database upgrade, there are a number of things to consider. First, is 12.1.0.1 available for your source platform? If it is available, then what technology do you plan to use for the database platform migration? Depending on platform and version, you may be able to use Transportable Database, Cross-Platform Transportable Tablespaces, DataPump, or, you may be forced to use old-fashioned export/import.

The Transportable Database and Cross-platform Transportable Tablespace options have some conditions that may or may not rule them out for your combination of platforms. In particular, this is where the concept of byte order or “ENDIANNESS” comes into play. ENDIANNESS basically refers to the order in which bytes within a word (16, 32, or 64-bits) are processed by the system. If they're processed left-to-right (MSB → LSB), then the system is “BIG ENDIAN”. If they're processed right-to-left (LSB → MSB), then it's “LITTLE ENDIAN”. MOS Note 733205.1 contains a useful table that details the endian format of various platforms. If you want to use the Transportable Database feature, both your source and target platforms need to be the same endian format. Transportable Tablespaces, however, can convert from one endian format to another.

DataPump will work for all platforms but may not be an option if your source is not at least 10g. Your final choice if you cannot use Transportable Database, Transportable Tablespaces or DataPump is export/import. While export/import is the slowest option, it is valid for all versions and platform pairs.

Prepare Target: Install software

First and foremost, prepare the operating system. Make sure that any packages and operating system parameters are set. You can find the particulars in the installation guide and the READMEs for your particular operating system.

Once the operating system has been prepared, the next step is to perform a full installation of E-Business Suite Release 12.1.1. For the first installation on a particular machine, I generally like to do a full installation (as opposed to the “upgrade filesystem”) so that I can run patchsets.sh against the fresh database. This approach also has the added advantage of proving that the operating system is configured to support E-Business Suite. Once that is done, you can delete the fresh database.

The next step is to install the latest certified version of the database. For most platforms, this is 12cR1 (12.1.0.1).

It is important to note that, while 12cR2 (12.2.0.1) has been available for some time, it is NOT certified for use with any version of E-Business Suite. It is my understanding that ATG is PLANNING to certify against 12cR2 and 19c at some point (skipping 18c). Database 19c will be the terminal release for the 12c codeline and, as such, will likely have the longest support horizon, once certified.

Prepare Target: Apply patches

At this time, you should also apply any database-level patches that are on your list. These include any patches recommended for E-Business Suite (the interoperability document will contain a list), the latest PSU (or CPUs), as well as any recommended or “high priority” patches you may have already identified. Remember that you don't actually need a database at this point.

If we were to wait until we had upgraded the database, then we would need to run any of the SQL updates required by the patch (generally along the lines of catalog.sql and catproc.sql). However, by applying the patches to the \$ORACLE_HOME prior to upgrading the database, we will only have to run those once (thus removing redundant steps from our critical blackout window).

Yes, you can also patch some things on the appsTier nodes in advance! Apply patches to Developer and each of the appsTier

\$ORACLE_HOMES as part of your software installation process (and before your blackout window). You can apply any patches that don't actually require a database at this point.

Prepare Target: Create Empty Database

Because we've chosen to use a DataPump export/import, we're going to need an empty database to import into. This can be created in advance using the database creation script (aucrdb.sql) generated by auclondb.sql (patch 7120092). Given the I/O requirements behind creating even an empty database, performing this step first will save us between 1 and 2 hours.

Pre-Upgrade Steps (Perform in EBS 12.1)

In our example, we've chosen to perform the database upgrade as part of the E-Business Suite Upgrade outage. Our database upgrade will be performed as part of the platform migration. This allows us to leave the source environment in a usable state, giving us a valid fallback in the unlikely event of a failure.

Before we start the actual platform migration (and the upgrade), there are functional pre-upgrade steps that will need to be performed before you do much to the source system. These steps generally take care of "in-flight" transactions so that data doesn't get lost in the interface tables between the modules.

There are also pre-upgrade steps that are performed by the DBA. These steps are listed in the E-Business Suite Upgrade Manual. The adtums.sql script (available for previous upgrades) no longer exists for upgrades to R12.2.

Once those are done, you are ready to begin the platform migration.

Migrating the Database

This is where our blackout window begins. For those of you following along in the E-Business Suite Upgrade Guide, this would be part of the "Chapter 3" steps.

In the case of our example, since we're already on 11gR2 we're going to use DataPump export/import (Following MOS Note 741818.1).

There are some relatively minor patches that will need to be installed (which deliver the export/import related scripts). Once that patch has been applied, generate your aucrdb.sql script and your auque2.sql script for use on your target. At this point, perform the export.

If you haven't done it already, create your empty database and then perform the export, again following MOS Note 741818.1. Between the steps to create the empty database and the import steps in MOS Note 1585256.1, you have now managed to upgrade the database as well.

Upgrade to R12.2.0 and R12.2.8

At this point, we're going to apply the latest R12.AD patch and CUP (CUP9) to the 12.2 \${APPL_TOP}. This is done using the adpatch tool we're all familiar with at this point.

We'll also apply the Consolidated Upgrade Patches (MOS 1448102.2) and some other preinstall patches.

Once you've applied this merge using "preinstall=y" you will need to merge the driver with the u101024646.drv driver. The command to merge your preinstall with the driver is:

```
cd ${AU_TOP}/patch/115/driver  
admrgpch -d . -preinstall -master u101024646.drv
```

Apply the merged patch using adpatch and run RapidWiz to configure the instance.

At this point, we come to the interesting part. We need to enable Online Patching. There are a number of tools involved here. Among them, the Online Patching Readiness Reports and the Global Standards Compliance Checker. [MOS 1531121.1].

Run the online patching readiness reports. Review the output and correct any problems. Then run the reports again (to ensure that the identified problems are resolved). There will be a significant number of “false positives” coming from E-Business Suite components that haven’t yet been upgraded, you can ignore those.

Once you’ve remediated the online patching items, apply the online patching enablement patch and, if successful, re-run the reports. These can help to guide you through your code remediation later in the project.

From this point forward, patches will be applied using the adop tool (rather than old, familiar, adpatch).

Apply the latest AD Patch, latest TXK patch, and the critical AD & TXK patches [MOS 1617461.1]. When that’s done, you’re at R12.2.0. You can then apply the R12.2.8 patch and move on to your patch current. Remember, all of these are done using the phases of the online patching cycle.

Patch Current

So, the next question that usually comes up is which patches should be applied after the upgrade. My practice, at least early in the project, is to apply any and all family packs, as well as the most recent security patches. Through the duration of the project, since the system will be thoroughly tested, this should relieve any fears. As you get closer to your go-live date, the only patches you should add (aside from identified bugfixes) are security patches.

Finishing up the dbTier

Once you're done with upgrading and patching the appsTier, you'll need to fully AutoConfig-enable the dbTier \$ORACLE_HOME. The first step will be to run `admkappsutil.pl` and deploy a new `$ORACLE_HOME/appsutil` directory onto your dbTier. Once you've done that, you can generate your dbTier context file using `adbldxml.pl` and then run AutoConfig on the dbTier.

External References

The table below contains a variety of documents and notes from My Oracle Support that we ended up using during our upgrade. As I mentioned earlier, given the differences between every upgrade project, this is by no means an exhaustive listing of the documents you may need to refer to. It is also likely that some of these documents may have no bearing on your particular project.

DocID	Title
252422.1	R11i / R12 : Requesting Translation Synchronization Patches (Doc ID 252422.1)
258021.1	How to Monitor the Progress of a Materialized View Refresh (MVIEW) (Doc ID 258021.1)
389422.1	R12: Recommended Browsers for Oracle E-Business Suite (Doc ID 389422.1)
393931.1	Deploying JRE (Native Plug-in) for Windows Clients in Oracle E-Business Suite Release 12 (Doc ID 393931.1)
396009.1	Database Initialization Parameters for Oracle E-Business Suite Release 12
458282.1	R12 E-Business Suite Applications Technology Stack - Autoconfig Context File Entries Including OA_VAR, Variable Name, And Defined Values (Doc ID 458282.1)
1077728.1	Microsoft Office Integration with Oracle E-Business Suite 11i and R12 (Doc ID 1077728.1)
1267768.1	Oracle E-Business Suite Releases 11i and 12.x: Required Updates for Patch Wizard (Doc ID 1267768.1)
1304727.1	Certification Information for Oracle Database on Linux x86-64
1311068.1	Installing Oracle E-Business Suite Integrated SOA Gateway, Release 12.2 (Doc ID 1311068.1)
1314621.1	Oracle E-Business Suite NLS Release Notes, Release 12.2 (Doc ID 1314621.1)
1320300.1	Oracle E-Business Suite Release Notes, Release 12.2 (Doc ID 1320300.1)
1330701.1	Oracle E-Business Suite Installation and Upgrade Notes Release 12 (12.2) for Linux x86-64 (Doc ID 1330701.1)

DocID	Title
1349240.1	Database Preparation Guidelines for an E-Business Suite Release 12.2 Upgrade
1355068.1	Oracle E-Business Suite 12.2 Patching Technology Components Guide (Doc ID 1355068.1)
1376618.1	Oracle E-Business Suite Technology Stack Release Notes for Release 12.2.2 (Doc ID 1376618.1)
1442457.1	During 11g Upgrade, Mview refresh warning (Doc ID 1442457.1)
1448102.2	R12.1 and 12.2 Oracle E-Business Suite Preinstall Patches Report [Video] (Doc ID 1448102.2)
1491965.1	E-Business Suite Add-on Localizations - 12.2.7 Availability (Doc ID 1491965.1)
1503653.1	Complete Checklist for Manual Upgrades to Oracle Database 12c Release 1 (12.1)
1515747.1	Oracle Database 12c Release 1 (12.1) Upgrade New Features (Doc ID 1515747.1)
1524398.1	Interoperability Notes EBS 12.0 or 12.1 with RDBMS 12cR1
1530033.1	Using the Latest JDK 7.0 Update with Oracle E-Business Suite Release 12.2 (Doc ID 1530033.1)
1531121.1	Using the Online Patching Readiness Report in Oracle E-Business Suite Release 12.2
1545584.1	How To Automatically Set the Current Run or Patch Edition / File System for EBS 12.2 (Doc ID 1545584.1)
1577661.1	Developing and Deploying Customizations in Oracle E-Business Suite Release 12.2
1577707.1	Creating a Custom Application in Oracle E-Business Suite Release 12.2 (Doc ID 1577707.1)
1581549.1	Best Practices for Minimizing Oracle E-Business Suite Release 12.1.3 and 12.2.n Upgrade Downtime
1585343.1	Scripts to automatically update the RDBMS DST (timezone) version in an 11gR2 or 12c database . (Doc ID 1585343.1)
1585857.1	Oracle E-Business Suite Release 12.2: Technical Planning, Getting Started, and Go-Live Checklist
1585889.1	Useful E-Business Suite 12.2 Documents
1591073.1	Enhanced Jar Signing for Oracle E-Business Suite (Doc ID 1591073.1)
1594274.1	Oracle E-Business Suite Release 12.2: Consolidated List of Patches and Technology Bug Fixes (Doc ID 1594274.1)
1609251.1	How to Stop Auto Refresh of Materialized View (Doc ID 1609251.1)
1617461.1	Applying the Latest AD and TXK Release Update Packs to Oracle E-Business Suite Release 12.2 (Doc ID 1617461.1)
1665676.1	Actions For DST Updates When Upgrading To Or Applying The 12.1.0.2 Patchset (Doc ID 1665676.1)
1901242.1	Script to Diagnose adop and Other AD-TXK Issues in Oracle E-Business Suite Release 12.2 [Patch 19045166:R12.AD.C] (Doc ID 1901242.1)
1903052.1	Applying A Non-Current Version of the AD and TXK Release Update Packs to Oracle E-Business Suite R12.2
1905593.1	Managing Configuration of Oracle HTTP Server and Web Application Services in Oracle E-Business Suite Release 12.2 (Doc ID 1905593.1)
1926201.1	Interoperability Notes Oracle EBS 12.2 with Oracle Database 12c Release 1
1939637.1	E-Business Suite Support Analyzer Bundle Menu Tool (Doc ID 1939637.1)
1957323.1	Enabling Online Patching During 12.2 Upgrade Fails For MRP_COMPANY_USERS_SN (Doc ID 1957323.1)
1961997.1	Requirements for Installing Oracle Database 12.1on RHEL7 or OL7 64-bit (x86-64)
1987484.2	SRDC - Service Request Data Collection Catalog: All Products - Database - Exadata - EBS - Fusion - GBUs - JDE - Middleware - Peoplesoft - Siebel - Sun Systems (Doc ID 1987484.2)

DocID	Title
1995384.1	How To Check External Dependencies On Possible Obsolete Schemas With E-Business Suite (Doc ID 1995384.1)
2007492.1	Weblogic 10.3.6 Patching Error Using BSU - "java.lang.OutOfMemoryError: GC overhead limit exceeded" (Doc ID 2007492.1)
2017686.1	"Timestamps Mismatch In Data-dictionary" : Exceptions Occur In The 12.2 <ETCC> Online Patching Database Compliance Checker Report: ADZDDBCC.sql (Doc ID 2017686.1)
2033780.1	Oracle E-Business Suite Applications DBA and Technology Stack Release Notes for R12.AD.C.Delta.7 and R12.TXK.C.Delta.7
2062531.1	SRDC - EBS 12.2 Install or Upgrade Data Collection (Doc ID 2062531.1)
2085705.1	How to Upgrade to Oracle Database 12c Release1 (12.1.0) and Known Issues (Doc ID 2085705.1)
2096033.1	Upgrade to 12.2 Failed Due To Failed with PAXPREPR form (Doc ID 2096033.1)
2114792.1	LAD Add-on Localizations - Upgrade Guide Release 12 (Doc ID 2114792.1)
2188898.1	Using Java Web Start with Oracle E-Business Suite (Doc ID 2188898.1)
2230783.1	Oracle E-Business Suite Release 12.2.7 Readme (Doc ID 2230783.1)
2234327.1	12.2 E-Business Suite NLS Patching Guide - How To Apply An NLS Patch Via The Online Patching ADOP Utility (Doc ID 2234327.1)
2235983.1	SRDC - Data Collection for E-Business Suite 12.2 Install (Doc ID 2235983.1)
2271366.1	Enhancement for WLS BSU (Smart Update): Resolves Very Long Time to Apply Patches - Especially When Checking for Patch Conflicts (Doc ID 2271366.1)
2285658.1	ADOP phase=fs_clone fails with validation error: the value of s_apps_jdbc_connect_descriptor in PATCH Context File is NULL (Doc ID 2285658.1)
2292750.1	Oracle E-Business Suite Applications DBA and Technology Stack Release Notes for Release 12.2.7 (Doc ID 2292750.1)
2292750.1	Oracle E-Business Suite Applications DBA and Technology Stack Release Notes for Release 12.2.7 and 12.2.8 (Doc ID 2292750.1)
2295390.1	Oracle E-Business Suite Applications DBA and Technology Stack Release Notes for R12.AD.C.Delta.10 and R12.TXK.C.Delta.10 (Doc ID 2295390.1)
2298314.1	Oracle E-Business Suite System Administration Release Notes for Release 12.2.7 and 12.2.8 (Doc ID 2298314.1)
2311308.1	Secure Configuration Console in Oracle E-Business Suite Release 12.1.3 (Doc ID 2311308.1)
2312409.1	How to Run Secure Configuration Console Non-Interactively (Doc ID 2312409.1)
2331554.1	Applying the DSTv31 update for the Oracle Database (Doc ID 2331554.1)
2357810.1	Oracle EBS R12.2 Upgrade - Outstanding Performance Bugs, Issues and Solutions during Upgrade (Doc ID 2357810.1)
2384629.1	Oracle E-Business Suite Person Data Removal Tool (PDRT) Resource Center (Doc ID 2384629.1)
2388237.1	Oracle E-Business Suite Person Data Removal Tool (PDRT) Release Notes (Doc ID 2388237.1)
2393248.1	Oracle E-Business Suite Release 12.2.8 Readme (Doc ID 2393248.1)
2409163.1	Installing Oracle Enterprise Command Center Framework, Release 12.2 (Doc ID 2409163.1)

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