the little r12.1.3 architecture and concepts guide for Oracle E-Business Suite

Release 12.1.3 & RDBMS Version 11gR2

by
Mike Swing

It is possible to fail in many ways...while to succeed is possible only in one way.

Aristotle (384 BC - 322 BC), Nichomachean Ethics
Special Thanks

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Preface

TruTek®
The Oracle Experts

TruTek is a national leader in technical and functional Oracle training and consulting.

This book is based on TruTek’s Oracle E-Business Suite R11i to R12.1.3 Technical Upgrade class. This class is 5 days long and upgrades an 11.5.10.2 Vision instance to Release 12.1.3. The 11.5.10.2 database version is 9.2.0.6 and is upgraded to RDBMS Version 10.2.0.3 prior to the class. The class upgrades to RDBMS Version 11.1.0.7. The class size is limited to 4 to 6 students to allow plenty of instructor attention for dealing with problems that arise and students’ questions. Each student uses a quad core Linux server with 4-8 GB of memory and 1 TB of disk space to perform the upgrade. Minimizing downtime is a common theme throughout the class. Downtime reduction techniques include merging patches, using block virtualization / snapshots and other techniques.

The class uses this book, along with other TruTek books, and thereby tests the accuracy of this document every time the class is held. This guide is also used by TruTek Release 12.1 upgrade consultants, so the material is well tested in client systems with various data sets and configurations. The documentation is updated for every class to include the latest patches.

Our goal is to provide a reference with concise steps for experienced veterans of upgrades and detailed explanations for less experienced upgrade DBAs. A cross-reference to the Oracle Applications Upgrade Guide: Release 11i to Release 12.1.3, Part No. E16342-03 is included in Appendix D: Upgrade Guide & TUMS Cross Reference in our companion book, the little r12.1.3 upgrade guide. While all the steps needed are included in these books, additional insight can be gained by referring to the Oracle Applications Upgrade Guide steps.

The Upgrade class will continuously evolve as the upgrade process changes, while the books will be published in more discrete intervals. The Upgrade class also provides the additional confidence building of a hands-on learning experience, and offers more detailed insight by the instructor and other attendees during the five day class. The class also has the added advantage of being able to test many different upgrade parameters, since
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there are many students, and evaluate the effect of these parameter changes on performance.

This book describes the architecture of the Release 11i and Release 12.1 E-Business Suite environments. When you upgrade to Release 12.1, you will need to understand the Release 11i architecture and how it differs from the Release 12.1 architecture. We have other books that describe the process we follow during our class and in our upgrade engagements. There are some steps, such as the database upgrade, that can be completed either before or during the Release 12.1 upgrade.

The upgrade of the Release 11.5.10.2 Vision instance offers a comprehensive test of the upgrade process. The 11.5.10.2 Vision environment has all the modules installed and configured, so almost every job during the upgrade is run. In most E-Business Suite installs, all modules are installed, but not configured. Therefore, not all the jobs are run. For instance, the Vision instance runs more than 125,000 jobs, while we’ve seen clients with 115,000 jobs for their upgrade to Release 12.1.1.

While most upgrade errors are related to missing prerequisite steps and/or missing patches, some errors are data related. Therefore, while this upgrade works perfectly with a Vision instance, you may – and likely will - experience additional issues. Since Oracle continues to provide patches for issues that are reported by customers, there is always a chance that after we publish our books new patches will become available. The books reflect everything we’ve learned so far from classes and consulting engagements; we believe you’ll do best with a TruTek consulting engagement paired with a tailored version of our upgrade guide.

This book is no substitute for using the power of your own analytical skills. And of course, our hardware will likely not be exactly the same as your hardware configuration, so there are likely to be differences due to operating system and other variations.

The Oracle E-Business Suite R11i to R12.1.3 Technical Upgrade class follows this agenda:

The Oracle E-Business Suite R11i to R12.1.3 Technical Upgrade class follows this agenda:

Day 1

Compare Release 11i and Release 12 Architecture
Release 12.1.3 Upgrade Overview
Review 10.2.0.3 Instance
Day 2
Complete the Database Upgrade to RDBMS 10gR2 10.2.0.3
Install Release 12.1.1 upgrade file system
Upgrade RDBMS Version 10.2.0.3 to Version 11.1.0.7

Day 3
Finish RDBMS Version 11.1.0.7 Upgrade
Plan for the Applications Upgrade
Prepare for the Applications Upgrade
Begin the Upgrade to Release 12.1.1

Day 4
Upgrade the Applications to Release 12.1.1
Finish the Upgrade to Release 12.1.1

Day 5
Upgrade to Release 12.1.3+
Review the AD_TASK_TIMING table
Apply the On-line Help Patch

Note: It is common to upgrade the RDBMS to Version 11gR2 as a separate activity, on a different weekend after the upgrade, or as a separate project before the Release 12.1 upgrade.

TruTek Training, Consulting, and Books
Check out our training, our consulting, and our books, and you’ll see we’ve developed a comprehensive approach to upgrading to Release 12.1.3.

TruTek Training

Release 12.1 New Features Training
One could argue that the changes to the E-Business Suite of Applications for Release 12.1 is the most significant part of a Release 12.1 upgrade. Our expert trainers cover new features provided by Release 12.1, including changes to General Ledger, Purchasing, Payables, Fixed Assets, Receivables and Cash Management. Our class also discusses changes to Inventory, Order Management, Projects, iExpense, iSupplier, iProcurement, iReceivables, and TCA. We can also tailor the class to just the modules that you plan to use, and if we’re assisting with your upgrade, our trainers also do the consulting work, so they can tailor classes to your unique environment.
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**TruTek Release 12.1.3 First Pass Upgrade Onsite Training**

If you’re ready to upgrade and want to run against your own data, rather than a Vision instance, we now offer a special consulting engagement called the Release 12.1.3 First Pass Upgrade. We come to you for this upgrade, and we lead your technical staff through the upgrade in a two to three week engagement. We provide step by step guidance and our detailed problem solving skills, while your technical staff performs the upgrade. During the engagement we work with your staff to monitor activities overnight and on the weekends, and we inevitably hit issues that we haven’t seen at other clients. We document the workarounds and provide each client with an updated version of the little r12.1.3 upgrade guide that includes patches that are specific to their environment. We would expect a normal first pass upgrade to take 1 – 3 months, but because we’ve been through the upgrade process so many times in our classes and consulting engagements, we can streamline the first pass to two to three weeks. So if you’re ready, give us a call.

TruTek Consulting

**TruTek Release 12.1.3 Technical Upgrade Readiness Assessment**

Before you start your upgrade to Release 12.1.3, we strongly recommend a Release 12.1.3 Upgrade Readiness Assessment. We send you a questionnaire and list of scripts to run, and then we come onsite and evaluate your environment to help you decide if you’re ready to upgrade. Our detailed report covers your environment and describes issues that you need to address before you start your upgrade. Do you have the right hardware to support Release 12.1.3? Do you have the right skillsets to support Release 12.1.3? Do you have the right patches in place to support your Release 11i environment while you are preparing to upgrade to Release 12.1.3? We look at those questions and more to help you prepare.

**Release 11i Extended Support Mandatory Patching Consulting Engagement**

This onerous task requires comparing which modules you’ve licensed and the current status of patching of those licensed modules with Oracle’s MOS Doc. ID: 883202.1, which includes a list of dozens of patches that may need to be applied to your environment in order to receive support from Oracle now that Release 11i is in Extended Support. If you plan to upgrade to Release 12.1.3, we believe you should get your E-Business Suite Release 11i environment in order so that your staff can focus on the Release 12.1.3 upgrade rather than potential support issues with your current environment.
Doing so requires a thorough review of your environment, as well as a meticulous review of Oracle’s Release 11i Extended Support Mandatory Patches, including reading all the Readmes, searching for pre-requisite patches and post patches, building a spreadsheet of all the required patches, and then applying and testing them. TruTek has been down this road a few times and would be happy to assist.

**TruTek Release 12.1.3 Ongoing Technical Support**

Most of our clients require assistance on their Second Pass Upgrade. The flurry of issues that arise during the First Pass Upgrade often take attention away from establishing total comfort with the upgrade process. We can provide support either onsite or remotely for the Second Pass, and we’re happy to continue to provide support for additional passes until everyone is comfortable with the process. We can also provide ongoing support by keeping your DBA informed as we head to new clients and discover new issues and patches. We can also provide onsite support during your final upgrade weekend. We highly recommend production upgrade support – during the full court press, it helps to have an experienced partner helping to check and doublecheck that the final upgrade goes smoothly.

**TruTek Release 12.1.3 Functional Upgrade Readiness Assessment**

TruTek’s Functional Upgrade Readiness Assessment is best performed shortly after the TruTek Release 12.1.3 First Pass Upgrade. Your users will need guidance to perform the gap analysis between the existing Release 11i environment and the Release 12.1.3 environment. This Assessment begins the process of determining new features, as well as determining what customizations have been done, and whether they should be maintained or eliminated.

**TruTek Functional Upgrade Support**

TruTek’s functional consultants understand the nuances of Release 12.1.3 and can work with you to build a test plan, resolve issues with functionality, and help drive the customization review process.

**TruTek’s Release 12.1 Books**

TruTek now offers two sets of books, those published externally about the E-Business Suite for anyone interested in upgrading to Release 12.1, and tailored books (we call them the blue books) written for each of our customers or classes as part of an upgrade project or training class. We’ve made this change because each customer’s patches will be different depending on their operating system, database, Applications patches and E-
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Business Suite modules. For some of the books, reflecting those differences is critical to upgrade success.

Figure 1 – The TruTek Release 12.1 Upgrade Roadmap

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You can buy our books and DVDs online at:
http://www.shop.trutek.com/category.sc?categoryId=30

and if you’d like to take a training class with us or bring us in to consult, give us a call at:
801 486-6655.

Remember, your upgrade is bound to be hard, but if you train and practice, it doesn’t have to be awful.
E-Business Suite Release 12.1, the Ultimate Moving Target

It takes nothing short of “a little moxy” to try to publish a book about upgrading the E-Business Suite of Applications. By the time we upload this document, several patches will surely have been replaced, or a new My Oracle Support document will be published, or a new point release of the Applications will become available. Don’t hold it against us; we’re just trying to help. We consider the little r12.1.3 architecture and concepts guide to be an “evergreen book”. We produce new editions when the underlying architecture changes significantly. If you’d like to be notified when a new edition is released, sign up for our newsletter at www.trutek.com.

Sign up for TruTek’s monthly TruTalk Newsletter.
Chapter 1: Overview of the Upgrade Process

The beginning of knowledge is the discovery of something we do not understand.

Frank Herbert (1920 - 1986)

The point of this book is to describe the underlying architecture and concepts of the Release 11i and Release 12.1.3 E-Business Suite. Understanding the architecture is a critical step in preparing to upgrade to Release 12.1.3 of the E-Business Suite. To help readers spot important My Oracle Support documents and patches, My Oracle Support Knowledge Documents (MOS Doc. IDs) are highlighted and Patch IDs are double underlined throughout this book. The index at the back of the book groups all of the referenced documents and patches together.

Assess Your Hardware and Operating System

As a general rule, when upgrading Oracle Applications, it is recommended to use a new, more powerful machine than is currently used in the production system, and then possibly re-purpose the old production server to TEST or DEV. The idea behind this recommendation is:

- We want the fastest server to process the upgrade
- If we do an in-place upgrade on the old production server, we will need to completely recover the Release 11i system in the event the upgrade
fails. At 3:30 AM on Monday morning, after spending the last 36 hours awake, this can be a daunting task.

- This method requires a clone to the new upgrade server from the old production server when the upgrade downtime begins on the upgrade weekend.

If the plan includes buying new hardware, consider migrating from the current 32-bit platform to a 64-bit platform. The following are reasons to migrate to a 64-bit environment:

- Release 11i doesn’t support running the Application Tier on a 64-bit hardware platform. Release 12.1 supports 32-bit and 64-bit architectures for the Application Tier; however, most companies use the 64-bit version to be able to use the larger addressable memory,

- Release 11i, Release 12, and Release 12.1 all support running the database on a 64-bit operating system, in a split or mixed architecture.

- There are five hardware platforms supported for Release 12.1 and all of the platforms support a 64 bit version.

- There are less memory restrictions on a 64-bit machine because of additional addressable memory.

- Because of more addressable memory, more users can be supported on each Application Tier.

- MRP and other programs run much more quickly on a 64-bit database.

An Operating System Migration Requires Conversion

If you plan to migrate to a different operating system, you must convert your data to the new operating system’s format. You cannot simply copy the files if you are changing operating systems. You have three options to consider: Transportable Database, Transportable Tablespace, or DataPump. No matter which option you choose, you will need to test thoroughly, and add the conversion time to your upgrade weekend downtime.

Some customers may be able to speed up their operating system migrations by using either Cross Platform Transportable Tablespace or Cross Platform Transportable Database, rather than DataPump or Export/Import. In the pecking order of options, using Cross Platform Transportable Database is preferred, followed by Cross Platform Transportable Tablespace if that isn’t possible, and then DataPump if that isn’t possible. DataPump is superior to...
the old Export/Import, so we recommend you not even consider Export/Import. Determining certification of either option with the E-Business Suite can’t be determined from MOS’s Certification tab. See Steven Chan’s blog, Oracle E-Business Suite Technology Stack Certifications to determine certification possibilities.

Transportable Database

Transportable Database is certified for both Release 11i and Release 12.1, but you need to ensure that it will work given the pairs of platforms you’re using. Since Transportable Database doesn't do "endian-ness" conversion, you would not be able to use it to migrate from Solaris to Linux, for example. Using the Transportable Database feature offers a 50% performance improvement over traditional export/import methods, so if you can use it, it is a feature well worth exploring. According to MOS Doc ID: 1166564.1, Transportable Database is certified for RDBMS Version 10.2.0.4, 11.1.0.7, 11.2.0.1, but is not certified for 10.2.0.3.

- For Release 11i, see MOS Doc. ID: 729309.1, Using Transportable Database to migrate Oracle E-Business Suite 11i using Oracle Database 10g Release 2.
- For Release 12.1, see MOS Doc. ID: 734763.1, Using Transportable Database to migrate Oracle E-Business Suite release 12 Using Oracle database 10g Release 2 or 11g Release 1 Enterprise Edition.

Transportable Tablespace

According to MOS Doc. ID: 1166564.1, Master Note for Transportable Tablespaces (TTS) -- Common Questions and Issues,

Why use Transportable Tablespaces (TTS)?

- Oracle Transportable Tablespaces are the fastest way for moving large volumes of data between two Oracle databases.
- Using TransportableTablespaces, Oracle data files (containing table data, indexes, and almost every other Oracle database object) can be directly transported from one database to another. Furthermore, like Import and Export, Transportable Tablespaces provide a mechanism for transporting metadata in addition to transporting data.
Transportable Tablespaces have some limitations: source and target systems must be running Oracle8i (or higher), must use compatible character sets, and, prior to Oracle Database 10g, must run on the same operating system.

Figure 2 - Transportable Tablespace is currently certified with RDBMS Version 10gR2 and 11gR2 for many Operating System versions against both EBS Release 11.5.10.2 and Release 12.1. Notice with Oracle Solaris that it is currently only supported for Version 10, not for Version 11. Remember when you check Certify that you must check the RDBMS, E-Business Suite and Operating System version.

The Transportable Tablespace process is certified to migrate a Release 11i or Release 12.1 database to a new platform with the same "endian" format (byte ordering). The “endian” format refers to whether the most significant byte comes first or the least significant byte comes first. This is big endian byte ordering and little endian byte ordering, respectively.

DataPump

If you cannot use either Transportable Database or Transportable Tablespace, then you should use Oracle’s DataPump to export/import your database for an operating system migration.

Follow [MOS Doc. ID: 741818.1](https://docs.oracle.com/en/database/oracle/oracle-database/11.2.0.4/administrators.html) to import/export an R12.1 instance. More information about DataPump is included in the *little r12.1.3 database upgrade and migration guide*. 

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Chapter 1 – Overview of the Upgrade Process

Upgrade Timeframe

Typically, the upgrade to Release 12.1.3 from Release 11.5.10.2 will require a 3 to 4 day weekend for downtime, starting at the close of business on Wednesday or Thursday, for a 3 or 4 day downtime window.

The database upgrade generally takes 8 to 12 hours. If the database upgrade is complete prior to upgrade weekend, it is possible to do a 2 day applications upgrade from 11.5.10.2.

The Applications portion of the upgrade will take 14 to 32 hours depending on the speed of the server and the amount of data to upgrade. Testing will take 8-12 hours after the upgrade is complete.

Frequent backups after major steps are highly recommended. The time to complete a backup or recovery can be significantly decreased with the use of block virtualization technology, with EMC Business Continuance Volumes and other products that support OS snapshots with Oracle. We cannot emphasize enough how important backups will be during the early upgrade attempts – you will apply patches that need to be undone, and the best way to accomplish that will be to throw away your work and restore a backup.

The ideal upgrade delivers the newly upgraded production system on upgrade weekend to the application testers by noon on Sunday. Be sure to make a backup of the entire Release 12.1.3 system before allowing users to test. If destructive testing is performed, include time to recover the system from the backups before going live.

Major Functional and Technical Tasks

There are two major stakeholders that need to be represented on an upgrade committee: the functional users, and the technical support staff consisting of Oracle Applications database administrators and developers.

- **Functional Staff**
  - Understand the new functionality of Release 12.1.3
  - Determine Gap / Fit – Design Custom processes
  - Develop Detailed Test Scripts
  - Verify Detailed Testing has been performed
  - Perform pre-upgrade downtime reduction steps
  - Complete the post-upgrade verification steps
  - Determine Functional Training Requirements
  - Approval Management
  - Release 12.1.3 Functional New Features

- **Technical Staff**
  - Plan for the Release 12.1.3 upgrade
  - Develop a plan to migrate/replace customizations
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Plan for new hardware / rehosting to new operating system
Perform the Upgrade
Implement customizations
Develop new custom process as designed by the functional staff
Determine Technical Training Requirements
XML Publisher
BPEL
OA Framework

The motivation to upgrade should be driven by functional requirements. However, the major factor for most upgrades is quite often a desire to avoid compliance issues associated with de-support of the technical components of Oracle Applications.

The technical steps of the Release 12.1.3 upgrade for a Vision instance are repeatable and consistent. The Release 12.1.3 upgrade becomes more difficult when integrating 3rd party systems, upgrading large amounts of data, and introducing modifications to the interfaces and customizations.

Use My Oracle Support

The Oracle Applications Upgrade Guide: Release 11i to Release 12.1.3, Part No. E16342-03 is the primary upgrade guide and has 87 references to My Oracle Support Knowledge Documents. Each document can have many other references to My Oracle Support Knowledge Documents. For Release 12.1.3, you’ll use MOS Doc. ID: 1080973.1, Oracle E-Business Suite Readme, Release 12.1.3, which also points to a number of other documents. This overload of documentation can lead to confusion and despair, especially when documents seem to have conflicting information. Be sure to use the latest edition of the Upgrade Guide that we’ve noted – the earlier version is Oracle Applications Upgrade Guide: Release 11i to Release 12.1.1, Part No. E14010-01.

Typically, in order to organize all the different information, the “upgrade dba” downloads all the upgrade notes, and prints them out and orders them in a notebook for reference. We encourage the use of My Oracle Support as the source of the documentation. For every different upgrade, we go back to My Oracle Support and download all the documents to make sure any new information is included for the new upgrade. We tend to collect all the documents in a directory on disk. Further, we recommend saving the version of documentation that you ultimately use to complete your production upgrade. We have seen cases where the documentation has changed and questions have come up regarding whether the instructions were properly followed; it is helpful if you can show that you followed the instructions as they were documented at the time.
Chapter 1 – Overview of the Upgrade Process

Use Patch Wizard from Oracle Application Manager (OAM)

If you’ve held off working with Patch Wizard for determining available patches and downloading them, now is the time to begin using it. While Patch Wizard does have its flaws – it does not currently, for example, locate prerequisite patches – it does make the research effort less painful and does find a good percentage of patches. We recommend that when you finish your upgrade to what you believe is the latest version of 12.1.3, with all the patches and Family Packs identified from patchsets.sh, TruTek’s books, and your own research, you should run Patch Wizard again to see if additional patches are found. When we ran a Vision upgrade in February, 2011, Patch Wizard identified 78 more patches above and beyond everything we found for 12.1.3.

Note that Patch Wizard may recommend patches for both Release 11i and Release 12.1.

Check Certifications in My Oracle Support

To further prepare for the upgrade, the Certifications tab on My Oracle Support is used to identify certified configurations of E-Business tech stack components. The Certifications tab links to critical information concerning technical components of Oracle Applications.

The following are examples of required certifications, in order to successfully run Oracle Applications:

- Hardware Platforms
the little r12.1.3 architecture and concepts guide

- Operating Systems
- Database Versions
- Installation and Upgrade Notes

Figure 4 – Check Certify for the E-Business Suite version you want to upgrade to, and the Operating System you will use.

In this example, we queried for certification levels on 64 bit Oracle Solaris on Sparc for a customer who has already migrated to a 64 bit Solaris operating system.

Figure 5 – Follow any notes that Certify tells you about.

Your job as you work through certifications is to track down any document that Oracle tells you about that is relevant to your environment. So in this
case, we will print out and carefully read MOS Doc. ID: 761568.1, *Oracle E-Business Suite Installation and Upgrade Notes Release 12 (12.1.1) For Oracle Solaris on SPARC (64-bit)*. And if MOS Doc ID: 761568.1 points to additional documents, we’ll print those out and read those as well.

Our certification analysis is not done yet – we’ve confirmed information about the desired operating system, and now we need to look at the RDBMS 11gR2 information:

Figure 6 - We concluded that the simplest way to query for the RDBMS was to leave the Platform tab set to Any and to research various versions of the RDBMS.

Figure 7 – How irritating! At the time that we queried, there were no platform matches for RDBMS Version 11.2.0.2.0 or 11.2.0.3.0 with E-Business Suite Release 12.1.3. Those platforms were only certified for Release 11.5.10.2. If you are anxious to upgrade to the latest version of the RDBMS, you may need to wait for Certify to catch up.
Figure 8 – Good news! A week later, we queried and the certification combination we were looking for appeared – RDBMS 11.2.0.3 with R12.1.3 on Oracle Solaris on SPARC, 64 bit. Once you find your certified version, click on it! You need to see if there are any caveats to the 11.2.0.3.0 certification.
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Figure 9 – The Operating System versions that we most commonly support are all certified with E-Business Suite Release 12.1.3 for RDBMS Version 11.2.0.3. Remember that everything – Operating System, RDBMS Version and E-Business Suite – have to be certified.

After confirming the database/operating system/E-Business Suite certification, we’ll also check to see what the most current version of JRE is:
Figure 10 – You’ll also want to stay current on the JRE version for your users’ Windows PC environment. Choose Management and Development Tools when you are looking at the Oracle E-Business Suite 12.1.3 certifications.

You can see that JRE 1.6.0_30 is the most current. We recommend staying current on JRE throughout your upgrade process. Oracle brings out new versions more than once a year that improve security and performance.

Release 11i Certified Hardware

A "Certified E-Business Suite Platform" is defined as a platform that supports the Application and Database Tiers of the E-Business Suite. Currently the supported platforms are:

- HP Tru64
- HP-UX PA-RISC
- IBM AIX Based Systems
- Linux x86
- Solaris Operating System SPARC
- Windows 2000/Windows Server 2003 (x86)

Release 11i Split Configuration

The Release 11i Application Tier is not supported on 64 bit machines. This is an important consideration in your hardware planning – when you do your Release 12.1 testing, you will not be able to use the same Application Server to support both your Release 11i and Release 12.1 environments. E-Business Suite Release 11i customers with a large number of users can access more addressable memory on the database server with a 64 bit hardware platform. By running the database on a 64 bit machine and the application on a 32 bit machine, the database processes are segregated away from the Application Tier and can run more effectively and support more
Chapter 1 – Overview of the Upgrade Process

users on a 64 bit platform. The following platforms support running the Database Tier in a split tier configuration:

- Linux x86 (32bit)
- Sun Solaris SPARC (64-bit)
- IBM AIX Based Systems (64-bit)
- HP-UX Itanium
- HP-UX PA-RISC (64-bit)
- Linux x86-64

Release 12.1 Certified Hardware

A "Certified E-Business Suite Platform" is defined as a platform that supports the Application and Database Tiers of the E-Business Suite. Currently the supported platforms are:

- Linux x86
- Linux x86-64
- HP-UX Itanium
- HP-UX PA-RISC
- IBM AIX based Systems
- Sun SPARC Solaris

Note: The Application Tier can now run on a Linux x86-64 environment with Release 12. In order to accommodate a large numbers of users on either the application tier or the database tier, it is recommended to use a 64-bit operating system so there is more addressable memory.

Release 12.1 Split Configuration

Since the Application Tier is now supported on 64 bit machines, the Database Tier can be on the same 64 bit machine as the application tier; the primary reason to split the configuration is now obsolete.

Release 12.1 Certified Operating Systems

Some operating systems are obsolete. For instance, for all combinations of database version, applications release and operating system, Version 2.6 of Solaris is desupported. Red Hat 5 is now certified with Release 12.
## Release 11i Database Certifications for Solaris

<table>
<thead>
<tr>
<th>Oracle Applications Release</th>
<th>Certified Database Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5.10.2</td>
<td>10g, 10gR2, 11gR1, 11gR2 and the 64 bit versions</td>
</tr>
<tr>
<td>11.5.10</td>
<td>10g, 10gR2 and the 64 bit versions</td>
</tr>
<tr>
<td>11.5.9</td>
<td>9.2, 10g, 10gR2 and the 64 bit version</td>
</tr>
<tr>
<td>11.5.9</td>
<td>Also supports 9.0.1 and 8.1.7 without the 64 bit versions</td>
</tr>
<tr>
<td>11.5.8</td>
<td>8.1.7, 9.0.1, 9.2 and 9.2-64 bit</td>
</tr>
<tr>
<td>11.5.7</td>
<td>8.1.7, 9.0.1 9.2, and 9.2-64 bit</td>
</tr>
</tbody>
</table>

Figure 11

## Release 11i Database Certifications for Linux

<table>
<thead>
<tr>
<th>Oracle Applications Release</th>
<th>Certified Database Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5.10.2</td>
<td>10gR2, 11gR1, 11gR2 and the 64 bit versions</td>
</tr>
<tr>
<td>11.5.10</td>
<td>10gR2 and the 64 bit versions</td>
</tr>
</tbody>
</table>

Figure 12

At the time of publication, Release 11.5.10.2 and Release 12.1 are certified with RDBMS Version 11.2.0.3.

## Release 12 Database Certifications for Linux and Solaris

<table>
<thead>
<tr>
<th>Oracle Applications Release</th>
<th>Certified Database Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0</td>
<td>10gR2, 11gR1, 11gR2 and the 64 bit versions</td>
</tr>
<tr>
<td>12.1</td>
<td>10gR2, 11gR1, 11gR2 and the 64 bit versions</td>
</tr>
</tbody>
</table>

Figure 13
Chapter 1 – Overview of the Upgrade Process

Release 12.1 Database Upgrade My Oracle Support Notes

You should read these documents carefully, and then use the appropriate Interoperability Note to do the database upgrade.

- MOS Doc. ID: 837570.1, Complete Checklist for Manual Upgrades to 11gR2
- MOS Doc. ID: 785351.1, Oracle 11gR2 Upgrade Companion

Interoperability Notes

When you upgrade, you must apply an interoperability patch, along with additional patches if the interoperability note includes them, to make the database version that you are running work with the E-Business Suite version that you are running. There are different interoperability patches for the different database and applications combinations that you can do:

- If you are running Oracle 9i and need to upgrade to 10g before upgrading to RDBMS 11gR2, use MOS Doc. ID 362203.1 for the 10g – Release 11i upgrade and MOS Doc. ID: 1058763.1 for the 11g – Release 12.1 upgrade
- If you plan to use Oracle Database 10gR2 with Release 12.1 (not recommended), use MOS Doc. ID 812362.1
- If you plan to upgrade to RDBMS 11.1.0.7 because Release 12.1 lays down an 11.1.0.7 RDBMS (not recommended), use MOS Doc. ID: 452783.1 with Release 11i and then MOS Doc. ID: 802875.1 with Release 12.1
- If you plan to upgrade the RDBMS to Version 11gR2 prior to upgrading from Release 11i to Release 12.1 (recommended), you will need to use two Interoperability documents, MOS Doc. ID: 881505.1 to deal with RDBMS patches specific to Release 11i when you do the database upgrade, and then MOS Doc. ID: 1058763.1 to deal with RDBMS patches specific to Release 12.1 when you do the applications upgrade.
- You should continue to monitor the Interoperability documents for important patches that may affect your production environment before you get to Release 12.1.3 on 11gR2.
MOS Interoperability Notes

10gR2 Interoperability

- MOS Doc. ID: 362203.1, Interoperability Notes Oracle E-Business Suite Release 11i with Oracle 10g Release 2 (10.2.0.5)
- MOS Doc. ID: 1135973.1, Interoperability Notes Oracle E-Business Suite Release 11i with Oracle 10g Release 2 (10.2.0.4)
- MOS Doc. ID: 726982.1, Interoperability Notes Oracle E-Business Suite Release 11i with Oracle 10g Release 2 (10.2.0.3)
- MOS Doc. ID: 423056.1, Interoperability Notes Oracle E-Business Suite Release 11i with Oracle 10g Release 2 (10.2.0.2)
- MOS Doc. ID: 812362.1, Interoperability Notes Oracle E-Business Suite Release 12 with Oracle Database 10g Release 2 (10.2.0)
- MOS Doc. ID: 1135955.1, Interoperability Notes Oracle E-Business Suite Release 12 with Oracle Database 10g Release 2 (10.2.0)
- MOS Doc. ID: 730957.1, Interoperability Notes Oracle E-Business Suite Release 12 with Oracle Database 10g Release 2 (10.2.0)

11gR1 Interoperability

- MOS Doc. ID: 452783.1, Interoperability Notes Oracle E-Business Suite Release 11i with Oracle Database 11g Release 1 (11.1.0)
- MOS Doc. ID: 802875.1, Interoperability Notes Oracle E-Business Suite Release 12.1 with Oracle Database 11gR1 (11.1.0)

11gR2 Interoperability

- MOS Doc. ID: 881505.1, Interoperability Notes Oracle E-Business Suite Release 11i with Oracle Database 11gR2 (11.2.0) - this is for RDBMS 11.2.0.3
- MOS Doc. ID: 1265268.1, Interoperability Notes Oracle E-Business Suite Release 11i with Oracle Database 11gR2 (11.2.0.1)
Release 12 Upgrade Paths

If upgrading from a release prior to 11.5.7, the upgrade path may require an interim upgrade to Release 11.5.10.2. Because of the significant downtime required to upgrade from Release 11.0 to Release 12.1, it may be more feasible to first upgrade to Release 11.5.10.2 and then some time later upgrade to Release 12.1. This requires the functional users to learn Release 11.5.10.2, and perform all the testing for another upgrade. The amount of work necessary to perform two rounds of system acceptance testing may justify another day or two of downtime, so that the upgrade from Release 11.0 to Release 12.1 can be completed in one longer period of downtime. A double upgrade is a significant task for your DBA staff – the last one that we did took six days around the clock. Anything that you can do to improve performance during the downtime window, particularly in terms of increasing the power of your hardware, is important to consider. You should also aggressively prune data like concurrent manager information and log file data on the Release 11i side to help improve migration performance.

Figure 14 lists the upgrade paths to Release 12:

<table>
<thead>
<tr>
<th>Initial Release</th>
<th>Interim Release</th>
<th>Final Release</th>
<th>R12 Patch</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.0, 11.5.1 - 11.5.6</td>
<td>Release 11.5.10 CU2</td>
<td>Release 12.0.0</td>
<td>4440000</td>
</tr>
<tr>
<td>11.5.7, 11.5.8, 11.5.9* or 11.5.10*</td>
<td>Release 12.0.0</td>
<td>4440000</td>
<td></td>
</tr>
<tr>
<td>11.5.7, 11.5.8, 11.5.9.2, 11.5.10.2</td>
<td>Release 12.0.4</td>
<td>6394500</td>
<td></td>
</tr>
</tbody>
</table>
Figure 14

* includes CU1 and CU2 (consolidated update)

** use Release 12.1 CUP 1

Figure 14 indicates that a direct upgrade path exists from Release 11.5.7 to Release 12.0.0 or 12.0.4. We recommend upgrading to Release 11.5.10.2, then to Release 12.1.1, and then to Release 12.1.3, if the starting point is 11.5.9 or less.

The Upgrading Oracle Applications Guide: Release 11i to Release 12.1 (Doc Library CD) describes all the steps necessary to upgrade a system from Oracle Applications Release 10.7 or Release 11.0 to Release 11i. To prepare to upgrade an older release to 11i, refer to MOS Doc. ID: 289788.1, Maintenance Pack Installation Notes, Release 11.5.10 CU2.

Database Upgrade Requirements

First of all, because Linux was not a supported operating system for Release 11.5.7, we can’t upgrade Linux from Release 11.5.7. However, let’s assume that we have a Solaris operating system:

<table>
<thead>
<tr>
<th>Oracle Applications Release</th>
<th>Certified Database Versions on Solaris</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1</td>
<td>10gR2, 11gR1, 11gR2 and the 64 bit versions</td>
</tr>
<tr>
<td>12.0</td>
<td>10gR2, 11gR1, 11gR2 and the 64 bit versions</td>
</tr>
<tr>
<td>11.5.10.2</td>
<td>10gR2 or 11gR1, 11gR2 and the 64 bit versions</td>
</tr>
<tr>
<td>11.5.9.2</td>
<td>10gR2 and the 64 bit versions</td>
</tr>
<tr>
<td>11.5.7</td>
<td>8.1.7, 9.0.1 9.2, and 9.2-64 bit</td>
</tr>
</tbody>
</table>

Figure 15

From Figure 15, we can see that there is no database version certified with both Release 11.5.7 and Release 12.0 or 12.1. Therefore, we can’t do the database upgrade before the downtime window, and we cannot upgrade straight to Version 11gR2. This will require a database upgrade from Version 9.2 to 10gR2 in our downtime window and generally will take
another 6 to 12 hours, depending on the number of available CPUs and database size. Mileage may vary.

Because Release 12.1 shares a common database version with Release 11.5.10.2, the database upgrade can be performed in advance of the Release 12.1 upgrade, or it can be performed as part of the downtime window. In order to minimize the downtime, we recommend performing the database upgrade in advance of the Release 12.1 upgrade. The users may object, however, because this doubles the amount of testing that’s required. One set of tests is required for the database upgrade and then another test to ensure that all the functionality is available for the Release 12.1 upgrade.

The upgrade to Release 12.1 requires the database be upgraded to at least Oracle 10g Release 2 (10.2.0.4). The most current database version certified with both Release 11.5.10.2 and Release 12.1 is Version 11.2.0.3.

Release 11.5.9 CU2 and Release 11.5.10 CU2
Upgrade the database either before the upgrade downtime window or during the upgrade downtime window.

Release 11.5.9 Base, 11.5.9 CU1, 11.5.10 Base, and 11.5.10 CU1
Upgrade the database during the upgrade downtime window.

Release 11.5.8 Environments
Upgrade the database during the upgrade downtime window.

During the project to upgrade to Release 12.1, it is recommended to upgrade the database to Version 11.2.0.3. It is possible but not necessary to use the 11.1.0.7 database home supplied by RapidWiz and then upgrade to Version 11.2.0.3 from there.

If the database version is at least Version 10.2.0.4, since 10.2.0.4 is certified with Release 12.1, the database could be upgraded to Version 11.2.0.3 at a later date. However, RAC has some performance issues with Version 10.2.0.4 that are resolved with a Version 11.1.0.7 upgrade (or higher) or a backported Version 10.2.0.5 patch. The backported database patches for Version 10.2.0.4 are 6495206 and 6047864.

<table>
<thead>
<tr>
<th>Patch</th>
<th>Patch Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>6495206</td>
<td>Backported database patch for Version 10.2.0.4</td>
</tr>
<tr>
<td>6047864</td>
<td>Backported database patch for Version 10.2.0.4</td>
</tr>
</tbody>
</table>

Figure 16
Technical Upgrade Considerations

Release 11i Technology Stack Components

Rapid Install automatically installs and configures the required technology stack components for both the database tier and the application tier. The database tier technology stack for both a new installation and for a system upgrade is based on Oracle11g Release 1 (11.1.0.7).

The technology stack installed on the application tier (Middleware / Application Servers on Certify) includes, among other components:

- Oracle 10g Application Server (AS) 10.1.2.3 – this is the most current version, but there are additional patches available
- Oracle 10g Application Server (AS) 10.1.3.4 – 10.1.3.5 is available
- Oracle Developer 10g 10.1.2.2 (includes Oracle Forms) – 10.1.2.3.0 is available
- Java (J2SE) native plug-in 1.6.0_07 – 1.6.0_30 is available

Management and Development Tools on Certify includes:

- Java Developer Kit (JDK) 6.0 – 1.6.0_6+ is installed with R12.1.1, 1.6.0_10+ is the most current

Figure 17 – Release 12.1.1 installs JDK Version 1.6.0_7
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New Technology Components with Release 12.1

- 10gAS 10.1.2.3 Forms
- 10g AS 10.1.3.4 Apache, Tools
- Oracle Developer 10g (includes Forms)

Obsolete Technology Components with Release 12

Oracle has eliminated a number of technology components with the advent of Release 12.

mod_plsql

If you have custom development on mod_plsql, you should migrate your Web pages to Oracle Application Framework.

Oracle Reports Server Reports

- Convert the reports to Oracle XML Publisher.
- Convert the reports to Oracle Application Framework.
- Run the reports through the Concurrent Manager.

Oracle Graphics Integrations with Oracle Forms

- Convert both the form and the chart to an Oracle Application Framework-based application.
- Convert the chart to an Oracle Application Framework-based page that can be launched from Oracle Forms.

AK mode

If Release 11i OA Framework-based pages have personalizations in the AK repository, then during the upgrade from Release 11i to Release 12.1, all custom personalizations will automatically be migrated from AK to MDS, if the AK and MDS repositories are in the same database instance. The AK schema is deprecated and replaced by the MDS repository.

If AK/ICX Web Inquiries were used in Release 11i, use the Oracle Application Framework Search feature to recreate personalizable search regions

You can also manually migrate using the Personalization Migration tool if AK and MDS repositories are not in the same database instance.
You can use the OA Framework Search feature to recreate search regions implemented as AK/ICX web inquiries in Release 11i. See Figure 22 for more details on the MDS repository.

Oracle Applications Tablespace Model (OATM)

Release 11i of Oracle Applications has hundreds of tablespaces (382 at last count). Each module has its own tablespaces, one for data and another for the indices. OATM uses 12 locally managed tablespaces that are based on database object type instead of module or schema. These include a temporary tablespace, SYSTEM tablespace, system-managed undo (SMU), and SYSAUX tablespace. Database objects are assigned to a tablespace based on object type, object size, life span, access methods, and locking.

Migrating to OATM is mandatory for Release 12.1, because the new products created with the Release 12.1 upgrade are created in the OATM model, while the old objects are kept in the old tablespace model. This is referred to as the hybrid model and is not recommended.

The best approach to avoid a longer downtime during the Release 12.1 upgrade is to migrate to the OATM model before the Release 12.1.3 upgrade.

OATM is available out-of-the-box with Release 11.5.10.2, 12.0, 12.0.4 and 12.1.1 Rapid Install.

The OATM Migration Utility is available to customers on earlier 11i releases. To migrate to OATM, apply standalone Patch 3381489. This patch has a prerequisite of the 11i.AD.H minipack and a minimum database version of Version 9.2.0.4. See MOS Doc. ID: 404954.1, *How to run OATM migration utility*.

<table>
<thead>
<tr>
<th>Patch</th>
<th>Patch Name</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>3381489</td>
<td>AOL/FND OATM Migration Utility for tablespace consolidation</td>
<td>11i</td>
</tr>
</tbody>
</table>

Release 10.7 or 11.0 customers who are upgrading to Release 11i and wish to adopt OATM can also use the OATM Migration Utility.

When Release 12.1 is installed, the database tablespaces are installed using the OATM model. This new model allows for easier maintenance, reduces space usage, and allows for potential run-time performance gains.

The Oracle Applications Tablespace Migration Utility is an interactive menu-based PERL program that includes a set of sizing estimate reports.
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OATM converts the Oracle Applications database to the new tablespace model either for all schemas at once, or for selected schemas, depending on acceptable down time and available disk space.

See MOS Doc. ID: 248857.1, Oracle Applications Tablespace Model Release 11i - Tablespace Migration Utility.

Testing Recommendations

Users need to understand the importance of testing. Users should be proficient at executing their test scripts. Functional and technical tests should be routinely performed after clones and major patches. Of course, the testing for a Release 12.1.3 upgrade needs to be more rigorous than smaller patches or a techstack upgrade.

In order to increase the confidence of the users, before giving the Release 12.1.3 upgrade system to the users for testing, the DBA should perform a set of tests to verify that all techstack components are working properly. If this level of testing is satisfactory, the developers should test all the customizations. When the developers are complete, the users should then run detailed tests that further stress the functionality of the system.

Load testing should be performed during the upgrade process to validate the system capacity.

Customizations

Customizations that exist in the current system need to be documented. Upgrade developers should define steps to re-apply the customizations in the new Release 12.1.3 system. Some customizations, such as reports, may more easily be created in XML Publisher rather than Oracle Reports. Developers may need additional training in new technologies.

Technology components that may have customizations:

- Workflow
- Forms
- OA Framework - JDeveloper
- Reports
- XML Publisher

Tasks to be included in the development upgrade plan:

- Remove old obsolete code before the upgrade
- Check Invalid Objects for source of old code
- Identify columns that become obsolete during the upgrade
Create a script to remove obsolete columns

Developers may need to enhance their skills with OAFramework and XML Publisher to stay current with the technology changes in Release 12.1.

### Upgrade Tools

**Upgrade Assistant**

The Upgrade Assistant was a standalone product that has existed since Release 11.5.5. Its purpose is to guide Release 10.7 and 11.0 customers in a methodical and repeatable way through the upgrade process. There was also a companion standalone product called the Maintenance Pack Assistant which took customers already on Release 11i to the latest version of Release 11i.

**Maintenance Wizard**

There were releases of the Upgrade Assistant for Release 11.5.5, 11.5.7, 11.5.8 and 11.5.9. As of Release 11.5.10, the Upgrade Assistant and Maintenance Pack Assistant have been rolled into a new framework called the Maintenance Wizard. The Maintenance Wizard not only contains the Upgrade Assistant for Release 11.5.10 and Maintenance Wizard for Release 11.5.10, but will also eventually include other techstack components such as Applications database upgrades.

The Maintenance Wizard v2.x only supports upgrades from Release 11i to Release 12. The Maintenance Wizard requires a separate install of RDBMS Version 10gR2 and 10gAS. Additional Oracle licenses may be required.

**TUMS**

TUMS is a utility to help customers reduce the number of steps necessary in the upgrade. It looks at a customer's specific situation, and identifies which steps are irrelevant for that customer. The output of TUMS can be used to reduce upgrade time. Use of the TUMS utility is fully included in the Maintenance Wizard tool, and does not have to be used separately if you are using Maintenance Wizard.

### Release 12.1 New Features

Multiple Organizations

Multiple Organizations architecture supports performance improvements and separation of business information across the E-Business Suite. Multiple Organizations enable Multiple Organizations Access Control (MOAC); MOAC allows an Applications Responsibility to access multiple operating units if desired. An upgrade to Release 12.1 requires the conversion of all Single Organization architecture systems to multiple organizations. You must define at least one operating unit and assign it to the MO:Operating Unit Profile Option.

Converting to Multiple Organizations does not require the use of multiple operating units or sets of books, but it does enable these features. If multiple operating units and/or sets of books are not defined, the conversion is transparent to the users.

Global Accounting

Release 12.1 is designed to increase the ease with which you understand and process your worldwide business and address compliance in every nation. It reflects the maturity of several initiatives designed to rationalize subledger bookkeeping, generalize transaction tax compliance, and improve access to subledger data, with the intention of both facilitating subledger shared services and improving and standardizing throughput.

Because of shared service ideals, the bank and disbursement models have been revised.

Financial Enhancements

- The data has been separated from the management of general ledgers
- Improved legal entity support and intercompany processing
- A new row and column consolidation system, with rich set of financial management functions
- Expedite your regional and group control
- Lower your finance expenses, and speed decision making by centralizing the processing of dispersed data.
- Daily Business Intelligence is greatly expanded
- XML Publisher brings powerful report customization to the end-user
- Radical improvements to budgeting, profit management and activity analytic

TruTek®
The Oracle Experts
the little r12.1.3 architecture and concepts guide

- New Financial Consolidation Hub
- Uses the Shared Enterprise Performance Foundation.

Release 11i GL SoB

In Release 11i, a user assigned to an Operating Unit (OU) would process data from the products deployed in that OU. To process data for another OU, a user would log out of the first and into the second. The data generated in that OU would be accounted for according to rules generated by various product accounting engines, and posted to general ledger in ways appropriate for the different products, some generating part of the detail at different times in the process. General Ledger sets of books (SoB) were self-contained, reflecting the balances of the entity to which you’d assigned the SoB, and managed by users assigned to the SoB.

Release 12 Subledgers

In Release 12, users can be assigned to multiple operating units, and are supported by processes and transactions that can span operating units. Their data is book-kept according to rules stored in a single accounting engine, and the accounting is stored in subledger tables that are standard across all products. Complete accounting is maintained for every appropriate event, and all subledger entries are fully balanced and detailed. A single, common posting engine summarizes to your required level of detail, and posts to General Ledger.

Sets of Books are replaced by the accounting entity’s “Ledger” for data, and its “Ledger Set” for processing, from reporting, opening and closing, through allocations. Ledgers can be combined into Ledger Sets, and GL users are assigned to the Ledger Sets.

Multi-Org Access Control (MOAC) – Subledger Accounting (SLA)

User access to multiple operating units is called “Multi-Org Access Control”, (MOAC). The new subledger accounting architecture is the Subledger Accounting (SLA). Ledgers, ledger sets and multiple ledgers are described below. Even if you define only one organization, MOAC is enabled for Release 12.

Subledger Accounting Model

The Oracle Applications Release 12 Subledger Accounting feature provides a common accounting engine that replaces the existing accounting processes in the different subledgers. Consequently, the Subledger Accounting upgrade consists of migrating the existing accounting data;
depending on business requirements, "existing accounting data" may have different implications for each customer.

Financial Management Information Architecture Release 12

Sub-ledger Currency Views

Accounting for subledger transactions at the event in a standard manner with a single accounting engine allows us to provide multiple accounting representations for a single event. A purchase can be simultaneously accounted for an increment to inventory for your US GAAP or IAS/IFRS accounting, and as a debit to the P&L for national compliance accounting.

The accounting entity involved can maintain multiple ledgers, each complying with a different set of accounting principles – called ‘accounting methods’, and, of course, the transactions and ledgers can be valued and denominated in different currencies;

Now it’s possible to generate currency views of a ledger at the subledger transaction, general ledger transaction, general ledger balance, or consolidation workplace levels.
Ledger Sets

Combining ledgers into sets will be attractive not only in nations where you might have many ledgers serving regulated registered companies. Across continental regions, locally managed statutory ledgers are updated automatically by centrally managed single currency corporate ledgers.

Integrated Financials

The new bank account and disbursement models facilitate the payment of invoices and other payables out of different operating units, from an appropriate bank account, and with the appropriate intercompany handling.

Intercompany processing is enhanced in both Financials Intercompany Management and Supply Chain Management’s Enhanced Drop Shipments. Rather than a GL only system, Financials now links into Receivables and Payables to generate matching and tied documents (configurable though Bill Presentment) and a new reconciliation scheme. Related SCM products provide transfer pricing modeling and enforcement, inventory consignment (at subsidiaries or otherwise), and tracking of profit in inventory.

All these modules feed back to General Ledger and the Financial Consolidation Hub for elimination.

Subledger Architecture

A Set of Books (Release 11i) becomes a Ledger with its own Ledger Set in Release 12.1. SLA will return the same accounting as the earlier accounting engine did. Operating Units will still ‘stripe’ your transaction data.

Benefits:

- Subledger Accounting,
- XML publishing applied to reports,
- additional DBI portlets and pages,
- AR-AP netting, and
- Gross Margin Analytics in AR.

Multiple Reporting Currencies

Multiple reporting currency functionality has migrated to Reporting Currency functionality in the Oracle Subledger Accounting model. Oracle Subledger Accounting provides a single repository where you can view amounts in reporting currencies.
Chapter 1 – Overview of the Upgrade Process

Shared Services

A Shared Services model of operations drives cost savings and increases information quality. In an effort to focus business units on their core competencies, increase efficiencies company-wide, and better manage and access information, companies consolidate non-revenue generating, administrative tasks in Shared Service Centers.

Shared Services Centers eliminate redundant processes, continuously lowering the unit costs per transaction through self-service, automating processes, and standardizing common business practices reduces costs. By centralizing information through a Shared Service Center, a consolidated view of essential decision-making information is available and accessible globally.

Standardization of common business practices also adds to the timeliness and accuracy of data. With consistent business processes throughout the enterprise, information can be gathered uniformly, with consistent quality.

Services can be shared at many different levels, and shared service centers can exist for different reasons.

- Order desks,
- Reporting Centers,
- General Ledger Centers,
- Disbursement Centers,
- Inventory Management Centers,
- Procurement Centers.

Many of these centers may be combined as one center.

Multi-Org Access Control (MOAC)

Multi-Org Access Control enables companies with a Shared Services operating model to efficiently process business transactions by allowing them to access, process and report on data for an unlimited number of operating units within a single Applications Responsibility. This increases the productivity of Shared Service Centers, as users and processes no longer have to switch applications responsibilities when processing transactions for multiple operating units at a time.

Data security and access privileges are still maintained using security profiles that now support a list of operating units.
Oracle E-Business Tax is the global compliance repository that captures fiscal and tax rules in a single point solution for tax events. Oracle E-Business Tax provides the infrastructure for transaction tax knowledge management and delivery using a global system architecture that is configurable and scalable for adding country specific tax content.

As the single point solution for managing transaction-based tax, Oracle E-Business Tax uniformly delivers tax services to all E-Business Suite business flows through one application interface.

Oracle E-Business Tax consists of a tax knowledge base, a variety of tax services that respond to specific tax events, a set of repositories (for tax content and tax recording) that allows customers to manage their local tax compliance needs in a proactive manner, as well as the ability to integrate with external tax content providers through a single integration point.

Oracle E-Business Suite products that are integrated for tax services with E-Business Tax in Release 12 include the following:

- Oracle Purchasing
- Oracle Internet Procurement
- Oracle Receivables
- Consigned Inventory
- Oracle Payables
- Oracle Intercompany Invoicing
- Oracle Order Management
- Oracle Trade Management
- Oracle Services Contracts
- Oracle Order Capture/iStore/Quoting
- Oracle Internet Expenses
- Oracle Project Accounting
- Oracle General Ledger
Chapter 1 – Overview of the Upgrade Process

Release 12.1.3 Upgrade Flow Chart

Figure 19 illustrates the Release 11i to 12.1.3 Upgrade Flow

The first 9 steps can be done in advance of the downtime required for the Release 12.1.1 upgrade in the production environment (make sure to test in a TEST system):

1. Migrate to OATM in advance if possible
2. Apply AD.I .7 to Release 11i
3. Apply ATG RUP7 to Release 11i
4. Run AD Prep scripts
5. Run Pre-Upgrade Verification Tasks
6. Install the Release 12.1.1 Technology Stack and Version 11.1.0.7 Oracle Home
7. You could use the Release 11.1.0.7 RDBMS that is installed with Release 12.1.1, but we recommend upgrading to the most current certified RDBMS version, currently 11.2.0.3. Install the 11.2.0.3 Database patch. The upgrade to Version 11.1.0.7 is supported, but some performance issues exist with RAC running Version 11.1.0.7. Apply
8. DB Upgrade Downtime begins:

Upgrade Database
- The DB Upgrade can be moved into the upgrade downtime in Step 9, before the apps upgrade.
- The DB Upgrade can be performed weeks or months in advance of the Release 12.1.3 upgrade.

Note that Oracle has created Interoperability documents to cover the various alternatives for each database version – E-Business Suite Applications release. You need to be careful to use the right document, and you may have to use two documents, depending on how and when you tackle the database upgrade.

9. Functional and Technical Testing – if the database upgrade will be done separately from the Release 12.1.3 upgrade, then test the database upgrade both functionally and technically; otherwise, finish the Release 12.1.3 upgrade and then perform a full test suite.

10. Apps Upgrade Downtime begins:
- Apply the AD 12.1.1 upgrade driver
- Perform the upgrade to Release 12.1.1
- Apply Release 12.1.1 Post Upgrade patches
- Apply Release 12.1.3 patch
- Apply Post-12.1.3 patches
- Test the Technical Stack
- Patch Patch Wizard
- Apply the Online Help Patch, additional Family Packs identified by patchsets.sh, additional patches identified by Patch Wizard, and the latest Critical Patch Update (CPU)
- Perform Post Upgrade Technical and Functional Steps
- Perform a backup
- Apply customizations
- Begin non-destructive functional testing
Chapter 1 – Overview of the Upgrade Process

11. Apps Upgrade Downtime ends
12. Perform Functional and Technical Testing
13. Perform Load Testing

Note: If testing involves destructive testing, clone the new instance to a test instance for testing.

You should reference TruTek’s other books for more detail about the upgrade process, tools, and ongoing maintenance.

Definitions

applmgr User who owns the Applications file system (APPL_TOP and application tier technology stack) i.e., applvis

oracle User who owns the database file system (RDBMS ORACLE_HOME and database files), i.e., oravis

CONTEXT_NAME Default is <SID>_<hostname>

CONTEXT Full path to the context file (either Applications context file or database context file).

Default:

<INST_TOP>/appl/admin/<CONTEXT_NAME>.xml

and

<RDBMS ORACLE_HOME>/appsutil/<CONTEXT_NAME>.xml

APPUser/APPSPwd Applications database username and password, default: apps/apps

Server Partitioning In Release 11.0.3, Server Partitioning was the use of different ORACLE_HOMEs for linking and data storage. The first ORACLE_HOME was used to link the code run by the E-
Business Suite. The second ORACLE_HOME was used to execute the programs for the E-Business Suite and to connect and retrieve data.

For Release 11i, this is called a Split Configuration.

For Release 12.1, this is called a Mixed Platform Architecture.

Multiple ORACLE_HOMEs

Oracle Applications supports employing an Applications database running out of one ORACLE_HOME, while running other Applications components out of additional ORACLE_HOMEs. This multiple ORACLE_HOMEs configuration allows Applications to utilize new features of the Oracle database and associated technologies in the most flexible manner.

RapidWiz

Rapid Install and RapidWiz are the same program and this terminology is interchangeable.

AutoConfig

AutoConfig is a tool that supports automated configuration of an Oracle E-Business Suite instance. All the information required for configuring an Applications instance is collected into two local repositories, called the Applications context file and the database context file. When AutoConfig runs on the application tier, it uses information from the Applications context file to generate all configuration files and update database profiles. When AutoConfig runs on the database tier, it uses information from the database context file to generate all configuration files used on the database tier. The executable is adautocfg.sh
| **Server** | A server is the traditional term for a process that provides a particular functionality. This term, in the sense of denoting a single process, is less appropriate for some components of the Release 12.1 architecture, in which case the replacement term of *service* or *service group* is used. |
| **Node** | A node is a logical grouping of servers, and therefore fundamentally a software concept rather than a hardware concept, although it is often also used to refer to the machine on which a particular node is installed. |
| **Tier** | A Tier is a logical grouping of servers or services, potentially spread across more than one physical machine. |
| **AutoPatch** | The name of the utility that is executed by running adpatch to apply patches to the Applications. |
| **ORACLE_BASE** | The base directory of the database – /d01/oracle/VIS |
| **APPS_BASE** | The base directory of the applications – /d01/oracle/VIS |
Chapter 2: Release 11i Architecture

It is easier to perceive error than to find truth, for the former lies on the surface and is easily seen, while the latter lies in the depth, where few are willing to search for it.

Johann Wolfgang von Goethe

AutoConfig for Release 11i

In Release 11.5.10.2, there are hundreds of configuration files, and there are also many Profile Options. Recreating these configuration files manually after a clone was almost impossible. A sql script was created and maintained for modifying all the Profile Options.

In Release 11 and early versions of Release 11i, there weren’t too many configuration files to manage manually. Manual procedures, documented step by step, became tedious, and a list of all configuration files was created. This was a list of files that contained a configuration specific to that instance. These files were copied to another location before a clone wiped out the old directories.

After each clone, the old configuration files were copied back to the new target directories. By keeping these preconfigured files and a sql script with all the Profile Option changes, downtime was minimized.

Then, Oracle developed a repository for instance-specific parameters; an XML repository called the context file. The applications tier and the database tier each have their own context file.
AutoConfig File Templates

Template files include named tags. Named tags are replaced with instance-specific information from the context file.

As an example, in the apps_ux.conf template file the following named tag exists:

```
%{s_enable_trusted_nodes_access}%include 
%{s_iASconfig_home%/Apache/Apache/conf/trusted.conf}
```

AutoConfig Driver File

Every product in the E-Business Suite maintains a driver file used by AutoConfig. The driver file lists the AutoConfig file templates and their destination locations.

Figure 20

During the install, AutoConfig runs and reads the config.txt file. The values from the config.txt are the initial values used by AutoConfig to create the instance.

After the install, when AutoConfig runs for either the database tier or the application tier, it reads the context file and substitutes the values from the context file into each template. It then uses this template with values substituted in, aka instantiation, to generate the needed configuration files.

AutoConfig also modifies the context-specific data in the database, such as Profile Options. AutoConfig runs initially when RapidWiz reads the config.txt to build the first context file. Subsequent execution of AutoConfig reads the context file, generates the configuration files and updates the database with new values for Profile Options and other configurations that are stored in the database, such as workflow settings. AutoConfig is run separately for the Applications tier and Database tier.
AutoConfig on the Application Tier

The script to run AutoConfig is:

```
<COMMON_TOP>/admin/scripts/<CONTEXT_NAME>/adautocfg.sh
```

AutoConfig calls

- `$AD_TOP/bin/adconfig.sh`
- `adcvm.sh - Context Value Management`
- `$OA_JRE_TOP/bin/$javacmd`
- `$AD_TOP/java/adconfig.zip`

AutoConfig on the Database Tier

The script to run AutoConfig is:

```
$ORACLE_HOME/appsutil/scripts/<CONTEXT_NAME>/adautocfg.sh
```

Other AutoConfig Scripts, located in $AD_TOP/bin:

- `adchkcfg.sh` This script may be run before running AutoConfig to review the changes on running AutoConfig. This will generate a report showing the differences between the existing configuration and what the configuration would be after running AutoConfig.
- `adtmplreport.sh` This script can be used to gather information
regarding the location of the AutoConfig templates, provided the location of the Instantiated files and vice versa.

This script is used while applying patches to the database tier. Running this script generates appsutil.zip which may be copied over to the database tier to migrate the patch to the database tier.

Customizing AutoConfig-Generated Files

The context file has many parameterized values that allow values to be easily maintained and customized. However, not everything that needs to be customized has been parameterized. For example, it may be necessary to:

- Start additional services or processes
- Define and add zones to the JServ configuration
- Extend Forms to integrate with a third party Java version
- Develop customer applications that are maintained by AutoConfig

If configuration files are edited with an editor, such as vi, the next time AutoConfig runs, the changes are over-written.

Initially, Oracle provided a method where customizations were added between "Begin/End customizations" blocks in the configuration files. This method is now obsolete. Now, custom templates are copies of the original template, copied to the “custom” directory, located just below the template directory.

Review and Migrate Existing Customizations

If you implemented customizations between "Begin/End customization" blocks in the past, then migrate those settings now. Execute the following commands:

Database  

```
<RDBMS ORACLE_HOME>/appsutil/bin/adcustomizer.sh
contextfile=<CONTEXT>
```

Application  

```
<AD_TOP>/bin/adcustomizer.sh contextfile=<CONTEXT>
```

This utility:

- Detects all configuration files that have "Begin/End customizations" blocks.
Chapter 2 – Release 11i Architecture

- Copies the corresponding AutoConfig template files to custom template files.
- Appends the contents between "Begin/End customizations" blocks at the end of the custom template files.
- Removes the "Begin/End customizations" blocks from the configuration file.

Template Files

A template file has tags for substituting values from the context file to generate configuration files. AutoConfig combines the context values with all the template files.

To list all template files, the corresponding AutoConfig template files and custom template files:

```
adtmplreport.sh contextfile=<CONTEXT>
```

To list only customized template files, add this option to the end of the command above: `listcustom`

Custom Template Files

When AutoConfig detects a custom template file in the custom directory, AutoConfig uses the custom template file instead of the original template file. To customize AutoConfig-managed configuration files, copy the AutoConfig template file to the custom template file and edit the custom template file. Never customize the original AutoConfig template files.

For instance, if it is determined that the apps.conf file should be customized:

- Run the adtmplreport.sh to find the template file that should be copied to the custom directory:
  ```
  $FND_TOP/admin/template/apps_ux.conf
  ```
- Create the `$FND_TOP/admin/template/custom` directory and copy the `apps_ux.conf` file into the custom directory.
  ```
  cp -i $FND_TOP/admin/template/apps_ux.conf \\
  $FND_TOP/admin/template/custom/apps_ux.conf
  ```
- Verify the Customization to AutoConfig Files:
  - For the apps tier, use `adchkcfg.sh` in `$AD_TOP/bin`
  - For the DB tier, use `adchkcfg.sh` in `$ORACLE_HOME/appsutil/bin`
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adchkcfg.sh contextfile=<CONTEXT> appspass=<APPSPwd>

- topfile.txt - On the first run of AutoConfig, topfile.txt gets updated with the customized product top. The second run of AutoConfig reads this entry and updates the context file with the new product top.

Release 11i OA Framework

The OA Framework Model is implemented using Business Components for Java (BC4J). BC4J is an implementation of J2EE design patterns that is included in Oracle JDeveloper. BC4J is used to implement business logic using Java business components. BC4J provides a mechanism for mapping relational tables to Java objects. It allows the separation of the application business logic from the UI.

The OA Framework Views are implemented using UI XML (UIX). UIX uses XML to describe the components and hierarchy that make up an application page. UIX also provides runtime capabilities to translate that metadata into HTML output so that it can be shown on a Browser or a mobile device.

AOL/J provides the Oracle Applications Framework with underlying security and applications Java services. It provides the Oracle Applications Framework with connectivity to the database and with application-specific functionality, such as flexfields and attachments.

The metadata used to describe the UI is loaded into a database repository, Meta Data Services (MDS), at deployment time and optionally at design time as well.

The OA Controller is a Java class implementation that handles user and application-driven interactions. Simple page flows (such as a 2-step transaction) are implemented directly into the Controller object; others are implemented using Oracle Workflow.
BC4J objects provide application business logic and database access

AOL/J provides security and validates user page access

Declarative UI component definitions are stored in the form of metadata in a database repository.

The page definition, also called the metadata UI definition, is loaded from the MDS-Metadata repository.

The java controller interprets the page definition based on the MetaData UI definition.

The UIX, an HTML UI generator, reads the page definition and generates the HTML.

The OA Framework was designed with durable personalization capabilities. Personalizations are translated into offsets from the base metadata definition and stored separately. At runtime the various applicable personalization meta-data is uploaded from the repository and layered over the base metadata definition to produce the net effect.
Product upgrades and patching only affect the base meta-data definition. Customer personalizations continue to function properly as far as applicable.

OA Framework is a Model-View-Controller (MVC) Architecture

Figure 23 shows the MVC (model-view-controller) design pattern, which offers a better way of designing an application by enabling the application to be extensible and modular. The MVC architecture separates the application into three parts:

- the business logic part, which implements data retrieval and manipulation
- the user interface part, which is what the application users see
- the controller part, which routes requests to the proper objects.

By separating an application into these parts, the MVC design pattern enables you to modify one part of the application without disturbing the other parts.

OA Framework State Management

OA Framework is primarily transaction based. Transactions can cover many pages. In order to maintain these multiple page transactions, the state across multiple browsers must be preserved.

The HTTP protocol is stateless; it does not retain any application-specific state information or provide support for state persistence. Furthermore, if
the JVM instance that provides the servlet session fails -- or the servlet session times out -- the application state is permanently lost, and pending transactions cannot be recovered.

OA Framework incorporates the ability to transparently save and restore client state while the user works, even if the servlet session times out (a future release will provide JVM failover support):

The process of saving application state to a secondary medium (in the case of OA Framework, database tables) is called passivation. The process of restoring this state from the secondary medium is called activation.

Specifically, OA Framework currently provides the following state management features:

- **Scalable Applications** - when resource consumption is high, rather than creating a new dedicated resource instance for each new server thread, OA Framework saves application state for idle threads and reclaims their resources for use by others. When the idle user thread wakes up, the saved application state is restored. In short, memory is reclaimed for idle JDBC connections, application modules, and user sessions without adversely affecting the user experience.

- **Servlet Session Time-Out Recovery** - servlet sessions can time out without forcing the user to restart an incomplete transaction. In the future, this feature will be extended to provide middle-tier failover support.

**Servlet Engine**

In the same way that AOL/J pools JDBC connections, the servlet engine pools request processing threads. As illustrated, the servlet engine allocates a thread to process each request it receives. When the request completes, the servlet engine returns the thread to its pool.

Figure 24 assumes a user performs two actions resulting in two separate HTTP requests while working in the same browser window (the same browser session). It should not be interpreted to mean that two browser windows are open. The user has one browser open as Session ZZZ.
Figure 24 - Servlet Engine

Since a single browser session can be served by numerous threads (a different one for each request), the servlet session provides a resource for maintaining state across requests. If a web application wants to establish a servlet session, it calls a method on the request object asking for a session to be created. The servlet engine creates the session (specifically, a javax.servlet.http.HttpSession object), along with a special cookie that it returns to the browser with the response. This session cookie holds the servlet session ID. When a new request is received with the session ID cookie, the servlet engine uses this ID to locate that particular browser's servlet session object. Web application code can then access any data stored on the servlet session during previous requests within the same browser session.

You can track sessions two ways. The most common way is the method OA Framework uses: a session cookie. Alternatively, you can encode the cookie into request URLs.
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Release 11.5.10.2 Directory Structure

Oracle Applications files are stored in the <sid>appl directory, which is known as the APPL_TOP directory.

The APPL_TOP directory contains:

- The core technology files and directories
- The product files and directories (for all products)
- The main applications environment file, called
  `<CONTEXT_NAME>.env` on Unix

The CONTEXT_NAME is the Applications context; the default value is `<SID>_<hostname>`.

The application environment file is: `APPS <SID>_<hostname>.env`

Rapid Install creates a directory tree for every Oracle Applications product in the APPL_TOP directory, whether licensed or not. All Oracle Applications products are installed in the database and the file system, regardless of registration status. Never attempt to remove files for any unregistered products.

**<PRODUCT>_TOP Directory**

Each product (aka module) has its own subdirectory under the APPL_TOP. The subdirectories are named with the product's short name, for example, GL for General Ledger. Within each product directory is a subdirectory that is named using the base Oracle Applications release number, such as 11.5.0. The subdirectory is a combination of the product directory, GL, for example, and the release number, such as:

```
$APPL_TOP/gl/11.5.0
```

This combination of product and release is known as the PRODUCT_TOP. There are environment variables defined in `adovar.env` that specify the value of each product top. For example, if
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APPL_TOP=/d01/oracle/visappl, then the value contained in the AD_TOP environment variable is 
/d01/oracle/visappl/ad/11.5.0, and the AD_TOP environment variable points to the <APPL_TOP>/ad/11.5.0 directory.

Each <PRODUCT>_TOP directory, such as <APPL_TOP>/gl/11.5.0, contains subdirectories for product files. Product files include forms files, reports files, and files used to upgrade the database. To display a form for Oracle General Ledger, for example, Oracle Applications accesses files in the forms subdirectory under the 11.5.0 directory.

Some products, for example, JTF, have some different directories when compared to products like GL:

<table>
<thead>
<tr>
<th>11i GL_TOP</th>
<th>11i JTF_TOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td>admin</td>
</tr>
<tr>
<td>bin</td>
<td>content</td>
</tr>
<tr>
<td>forms</td>
<td>forms</td>
</tr>
<tr>
<td>help</td>
<td>help</td>
</tr>
<tr>
<td>html</td>
<td>html</td>
</tr>
<tr>
<td>jar</td>
<td>jar</td>
</tr>
<tr>
<td>java</td>
<td>java</td>
</tr>
<tr>
<td>lib</td>
<td></td>
</tr>
<tr>
<td>log</td>
<td>log</td>
</tr>
<tr>
<td>mds</td>
<td>mds</td>
</tr>
<tr>
<td>media</td>
<td>media</td>
</tr>
<tr>
<td>mesg</td>
<td>mesg</td>
</tr>
<tr>
<td>out</td>
<td>out</td>
</tr>
<tr>
<td>patch</td>
<td>patch</td>
</tr>
<tr>
<td>reports</td>
<td></td>
</tr>
<tr>
<td>sql</td>
<td>sql</td>
</tr>
<tr>
<td>xml</td>
<td></td>
</tr>
</tbody>
</table>

Figure 25 - 11i GL_TOP vs. 11i JTF_TOP

Files under the xml directory:

/d01/oracle/visappl/jtf/11.5.0/xml/oam/diagfwk
testClassVersions.uix
testDetails_support.uix
testDetails.uix
testInputArgs.uix

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testStatFailView.uix
testStatFullView.uix
testStatSummary.uix
testSummary.uix

Other Release 11i common directories under a product top:

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>media</td>
<td>Contains .gif files used in the display of text and graphics on the desktop client.</td>
</tr>
<tr>
<td>reports</td>
<td>Contains Oracle Reports generated runtime (.rdx) files.</td>
</tr>
<tr>
<td>help</td>
<td>Contains the online help source files. Within this directory are subdirectories for each language installed.</td>
</tr>
<tr>
<td>driver</td>
<td>Contains driver files (.drv files) used in upgrading.</td>
</tr>
<tr>
<td>import</td>
<td>Contains DataMerge files used to upgrade seed data.</td>
</tr>
<tr>
<td>odf</td>
<td>Contains object description files (.odf files) used to create tables and other database objects.</td>
</tr>
<tr>
<td>include</td>
<td>Contains C language header (.h) files that may be linked with files in the lib directory. Not all products require this directory.</td>
</tr>
</tbody>
</table>

Figure 26 - Release 11i Common Directories Under a Product TOP

These files include:

- object files (.o on Unix), with compiled code specific to one of the product's programs.
- library files (.a on Unix), with compiled code common to the product's programs.
- make files (.mk) that specify how to create executables from object files and library files

Configuration Files

In Release 11i, configuration files are put in directories named after the `<CONTEXT_NAME>`; for example:

- In the directory 
  `/d01/oracle/viscomn/admin/scripts/rh10_VIS/`, the scripts for starting and stopping the apps are located, along with other utility scripts, such as adautocfg.sh.
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- Under the APPL_TOP/admin there’s another /rh10_VIS directory for logs and out files.
- Under the RDBMS ORACLE_HOME/admin there’s another /rh10_VIS directory that contains the dump directories.
- Under the IAS_ORACLE_HOME is the /d01/oracle/visorora/iAS/appsutil/log/VIS_rh10 directory with the inverse CONTEXT_NAME.

Configuration files are generally kept in an instance-specific directory for each component. These configuration directories are spread across the Release 11i file system.

Shared APPL_TOP

A traditional multi-node installation of Release 11i requires each application tier node to maintain its own application tier file system, consisting of the APPL_TOP file system (APPL_TOP and COMMON_TOP directories) and the application tier technology stack file system (8.0.6 and iAS Oracle Homes).

- In 2003, the "Shared APPL_TOP" architecture was introduced, which allows the sharing of a single APPL_TOP file system with all the application tier nodes of a multi-node system.
- In Release 11.5.10, the ability to share the APPL_TOP file system was combined with the ability to share the application tier technology stack file system, resulting in the "shared application tier file system" architecture.

Shared Apps Tier

In a Release 11i file system with two apps tiers named rh10 and rh11, while examining the directory structure of a shared APPS Tier, we find under the mount point for viscomn two context_name directories; one for rh10 and another for rh11. For example,

/d01/oracle/visorona/admin/scripts/rh10_VIS/
/d01/oracle/visorona/admin/scripts/rh11_VIS/

This is shared disk, so both configuration directories are available from both machines, even though each machine only needs access to its own scripts. It may be desirable to separate these from the shared disk and place them on storage that is local to each machine.
Release 11i Shared Mount Points

- Shared COMMON_TOP: /d01/shared_mount/viscomm
- Shared APPL_TOP: /d01/shared_mount/visappl
- Shared 806 ORACLE_HOME: /d01/shared_mount/visora/8.0.6
- Shared iAS ORACLE_HOME: /d01/shared_mount/visora/iAS

With Release 11i, both the common files and instance-specific files are stored on shared storage. In the Release 12.1 file system, instance-specific configuration files are grouped together, making it easier to separate these configuration files from the common files needed by both machines.
Chapter 3: Release 12.1 Architecture

All are architects of fate, working in these walls of time.

Henry Wadsworth Longfellow

Release 12.1 Directory Structure

Release 11i has 5 distinct directories at the top level of the file system, and they are: visappl, visora, viscomn, visdb and visdata, if VIS is the name of the instance. In Release 12.1, a new abstract directory “layer” has been added to distinguish between the application stack, with the apps_st directory and the technology stack, or the tech_st directory. There is also a new directory structure that contains the configuration files for a given Context.

The layer below with the visappl, viscomn, visora, visdb and visdata directories is not a layer in the Release 12.1 directory structure, but is the Release 11i equivalent directory structure, listed to illustrate the relative directory position in Release 12.1.

For example, if the base install directory for an 11i single node install is /d01/oracle, the following subdirectories exist: visappl, visora, viscomn, visdb and visdata.

In Release 12.1, the subdirectories under the base directory are:

/home/d01/oracle/VIS/apps
/home/d01/oracle/VIS/db
/home/d01/oracle/VIS/inst
These subdirectories are shown as the top level of Figure 27:

R12 File System – this new layer of directories lies on top of the old 11i directories. The major difference is the inclusion of a new directory, `inst`, also known as, INST_TOP. The first two levels are new R12 directory structures:

```
apps
  apps_st
    appl (APPL_TOP)
      comm
  tech_st
    10.1.2
    10.1.3
  inst
da
  inst_top
    admin/scripts
    certs
    logs
    ora
  db
    db_home
    data
```

**11i File System Equivalents**

```
visappl
   $OA_HTML
   $OA_JAVA
   util
   clone
viscomn
   $OA_JAVA
visora
   806
visdb
   iAS
visdata
```

**Figure 27**

Figure 27 shows that the new `apps/apps_st` directory corresponds with the old `visappl` and `viscomn` directories from Release 11i.

`apps/tech_st` contains the ORACLE_HOMEs for the application tier.
Chapter 3 – Release 12.1 Architecture

The database ORACLE_HOME is now located under the tech_st directory and the old Release 11i visdata directory is now located under the dB/apps_st directory.

The ORACLE_HOME for Forms is now 10.1.2.3 in Release 12.1; in Release 11i it was 8.0.6. Oracle Application Server (OracleAS) 10g 10.1.2.3 is the foundation for Forms, Reports, and C code. This replaces the 8.0.6-based ORACLE_HOME and provides legacy support for forms.

11i  R12.1

   Forms & C  8.0.6 ➔ 10.1.2

The ORACLE_HOME for Java is now 10.1.3 in Release 12.1; in Release 11i it was iAS. Oracle Application Server (OracleAS) 10g 10.1.3 is the foundation for Java, XML and Apache code. This replaces the iAS ORACLE_HOME. This is the latest, most advanced and stable Application Server for JDeveloper, OC4J and Apache.

11i  R12.1

   Java & Web  iAS ➔ 10.1.3

The Release 12.1 APPL_TOP Directory

Oracle Applications files are stored in the apps/apps_st/appl directory, which is known as the APPL_TOP directory.

Figure 28 - The APPL_TOP Directory

The application environment file is: APPS <SID>_<hostname>.env

Oracle Applications files are stored in the apps/apps_st/appl directory, which is known as the APPL_TOP directory.
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<table>
<thead>
<tr>
<th>admin</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ad</td>
<td>12.0.0</td>
</tr>
<tr>
<td>ap</td>
<td>$APPL_TOP Product Top for Accounts Payable</td>
</tr>
<tr>
<td>au</td>
<td>12.0.0</td>
</tr>
<tr>
<td>fnd</td>
<td>12.0.0</td>
</tr>
<tr>
<td>gl</td>
<td>$GL_TOP Product Top for General Ledger</td>
</tr>
<tr>
<td>gma</td>
<td>12.0.0</td>
</tr>
</tbody>
</table>

**Figure 29 - APPL_TOP Directory Structure**

The APPL_TOP directory contains:

- The core technology files and directories.
- The product files and directories (for all products).
- The main applications environment file, called `<CONTEXT_NAME>.env` on Unix.
- The consolidated environment file, called `APPS<CONTEXT_NAME>.env` on Unix.

**The Release 12 <PRODUCT>_TOP Directory**

Each product (aka module) has its own subdirectory under the APPL_TOP. The subdirectories are named with the product's short name, for example, GL for General Ledger. Within each product directory is a subdirectory that is named using the base Oracle Applications release number, such as 12.0.0. An example for GL, which combines the product directory and the release number, is:

\[ $APPL_TOP/gl/12.0.0 \]

For example, if

APPL_TOP=/d01/oracle/VIS/apps/apps_st/appl, then the value contained in the AD_TOP environment variable is

/d01/oracle/VIS/apps/apps_st/appl/ad/12.0.0, and the
Chapter 3 – Release 12.1 Architecture

AD_TOP environment variable points to the <APPL_TOP>/ad/12.0.0 directory.

Each <PRODUCT>_TOP directory, such as <APPL_TOP>/gl/12.0.0, contains subdirectories for product files. GL_TOP, as an example, has the following subdirectories:

<table>
<thead>
<tr>
<th>admin</th>
<th>The &lt;PRODUCT&gt;_TOP/admin directory contains product-specific files used to upgrade each product. This is in distinction to the &lt;APPL_TOP&gt;/admin directory, which contains upgrade-related files for all products.</th>
</tr>
</thead>
<tbody>
<tr>
<td>bin</td>
<td>Contains Concurrent Programs, other C language programs and shell scripts for each product.</td>
</tr>
<tr>
<td>discover</td>
<td></td>
</tr>
<tr>
<td>forms</td>
<td>Contains Oracle Forms generated runtime (.fmx) files</td>
</tr>
<tr>
<td>graphs</td>
<td></td>
</tr>
<tr>
<td>html</td>
<td>Contains HTML, JavaScript, and Java Server Page (JSP) files, primarily for HTML-based Applications products</td>
</tr>
<tr>
<td>java</td>
<td>Contains JAR files (Java Archive files) and Java dependency files. Copies of JAR files are also located in the $AF_JLIB directory.</td>
</tr>
<tr>
<td>lib</td>
<td>Contains files used to relink Concurrent Programs with the Oracle server libraries.</td>
</tr>
</tbody>
</table>
| log         | Contains output files for Concurrent Programs:  
|             | • .mgr (master log file for Concurrent Manager)  
|             | • .req (log file for a Concurrent Process)       |
| msg         | Message files                                                                                   |
| out         | Output from Concurrent Programs, not used if using a common log-out directory structure         |
| patch       | Contains objects that patches apply for specific modules                                         |
Oracle Applications Release 12 introduces the concept of a top-level directory for an Applications instance. This directory is referred to as the *Instance Home*, and is denoted by the environment variable `$INST_TOP`. $INST_TOP is the collection of all the instance-specific configuration files.

Using an Instance Home provides the ability to share Applications and technology stack code among multiple instances; for example, a development instance and a test instance. Equally, the centralization of configuration log files for a particular instance makes their management simpler.

The basic structure of the Instance Home is:

```
<APPS_BASE>/<context>/<INST_TOP>
```

`APPS_BASE` is the top level of the Applications installation, and `<context>` is the highest level at which the Applications context exists.

`APPS_BASE = /d01/oracle/VIS` is not a defined environment variable.

An example of the `INST_TOP` for the VIS_RH10 instance is:

```
INST_TOP = /d01/shared_mount/apps/apps_st/viscomn
```
There are directories under the $INST_TOP for each of the configuration components, including:

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td>start and stop scripts, adautocfg.sh, adpreclone.pl</td>
</tr>
<tr>
<td>scripts</td>
<td></td>
</tr>
<tr>
<td>appl</td>
<td></td>
</tr>
<tr>
<td>admin</td>
<td>The Apps Context File, rh10_VIS.xml</td>
</tr>
<tr>
<td>conc</td>
<td>$APPLCSF</td>
</tr>
<tr>
<td>oam</td>
<td></td>
</tr>
<tr>
<td>rgf</td>
<td>$APPLRGF</td>
</tr>
<tr>
<td>fnd</td>
<td>this also contains $INST_TOP/fnd/12.0.0/secure/VIS.dbc</td>
</tr>
</tbody>
</table>
**Read-Only File Systems**

A key benefit of moving to the new Instance Top model is that AutoConfig no longer writes to the `APPL_TOP` or `ORACLE_HOME` directories, so these can both be made read-only file systems. In previous Applications releases, the `adpatch` utility wrote to `$APPL_TOP/admin` on a patching/admin node: under the new model, `$APPL_CONFIG_HOME/admin` is used instead. `$APPL_CONFIG_HOME` will equate to a value such as `/d01/oracle/VIS/apps/apps_st/appl`.

**Log Files**

Another advantage of an Instance Home is that log files can be stored centrally for an instance and managed more easily. This is important for security, as log files may contain data that should not be seen by unauthorized users.
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Figure 33 - Log Files Can Be Stored on a Shared Disk. The Common File System shares

Release 12 File System

- The `apps/apps_st/appl` (APPL_TOP) directory contains the product directories and files for Oracle Applications
- The `apps/apps_st/comn` (COMMON_TOP or COMN_TOP) directory contains directories and files used across products
- The `apps/tech_st/10.1.2` directory contains the ORACLE_HOME used for the Applications technology stack tools components
- The `apps/tech_st/10.1.3` directory contains the ORACLE_HOME used for the Applications technology stack Java components
The db/apps_st/data (DATA_TOP) directory is located on the database node machine, and contains the system tablespaces, redo log files, data tablespaces, index tablespaces, and database files.

The db/tech_st/11.1.0 directory is located on the database node machine, and contains the ORACLE_HOME for the Oracle11g database. These files are needed for running and maintaining the Oracle Applications database.

The Release 12 COMMON_TOP Directory Structure

The apps/apps_st/comn (COMMON_TOP) directory contains files used by many different Oracle Applications products, and may also be used with third-party products.
### Figure 35
The Star ⭐ represents the continuation of the java directory.

<table>
<thead>
<tr>
<th>admin</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>java</td>
<td></td>
</tr>
<tr>
<td>classes</td>
<td>$JAVA_TOP, expanded classes</td>
</tr>
<tr>
<td>lib</td>
<td>$AF_LIB. Jar and zip files</td>
</tr>
<tr>
<td>_pages</td>
<td>Compiled JSPs</td>
</tr>
<tr>
<td>_cabo</td>
<td></td>
</tr>
<tr>
<td>_jsp</td>
<td></td>
</tr>
<tr>
<td>_oa_html</td>
<td></td>
</tr>
<tr>
<td>_oa__html</td>
<td></td>
</tr>
<tr>
<td>_oa_java</td>
<td></td>
</tr>
<tr>
<td>_txkcsa</td>
<td></td>
</tr>
<tr>
<td>util</td>
<td></td>
</tr>
<tr>
<td>Java</td>
<td></td>
</tr>
</tbody>
</table>
The html Directory

The OA_HTML environment variable points to the html directory. The Oracle Applications HTML-based sign-on screen and Oracle HTML-based Applications HTML files are installed here. The html directory also contains other files used by the HTML-based products, such as Java Server Page (JSP) files, Java scripts, XML files, and style sheets. The path looks like:

/d01/oracle/VIS/apps/apps_st/comn/webapps/oacore/html

Two new subdirectories, META-INF and WEB-INF, are introduced to meet J2EE specifications.

The java Directory

Release 12 introduces some significant changes to the locations where the various types of Java files are stored. Rapid Install installs all Oracle Applications class files in the COMMON_TOP/classes directory, pointed to by the $JAVA_TOP environment variable. Zip and jar files are installed in the $COMMON_TOP/lib directory, pointed to by the $AF_JLIB environment variable (introduced with Release 12). The top-level Java directory, $COMMON_TOP/java, is pointed to by the $JAVA_BASE environment variable.
The util Directory

The util directory contains the third-party utilities licensed to ship with Oracle Applications. These include, for example, the Java Runtime Environment (JRE), Java Development Kit (JDK), and the Zip utility.

Release 12 AutoConfig Enhancements

AutoConfig in Parallel Mode Across Multiple Nodes

The ability to run AutoConfig in parallel across multiple nodes was introduced in the TXK 12.1.1 Consolidated Patch. This feature reduces maintenance downtime.

AutoConfig can be run in parallel mode by issuing the following command:

On the Applications tier:

```
perl <AD_TOP>/bin/adconfig.pl
contextfile=<CONTEXT_FILE>
[product=<product_top>] -parallel
```

On the Database tier:

```
perl <ORACLE_HOME>/appsutil/bin/adconfig.pl
contextfile=<CONTEXT_FILE> -parallel
```

When running AutoConfig simultaneously on multiple nodes, the -parallel option must be specified while starting AutoConfig on every node. Otherwise, the execution of AutoConfig processes on individual nodes will not be synchronized, which might result in inconsistent file system or database updates.

AutoConfig in Profile Mode

AutoConfig can be run in profile mode by issuing the following command:

On the Application Tier:

```
perl <AD_TOP>/bin/adconfig.pl
contextfile=<CONTEXT_FILE>
[product=<product_top>] -profile
```

```
perl $AD_TOP/bin/adconfig.pl
contextfile=$INST_TOP/appl/admin/VIS_rh8.xml -profile
```

On the Database Tier:
Perl <ORACLE_HOME>/appsutil/bin/adconfig.pl
contextfile=<CONTEXT_FILE>
[product=<product_top>] -profile

AutoConfig Performance Profiler Report

The TXK 12.1.1 Patch introduced the AutoConfig Performance Profiler to profile the instantiation or execution time of the templates in each PRODUCT_TOP. The AutoConfig Profiler creates an HTML report that contains the following sections:

Summary
This section of the report shows the profile information for all product tops processed in the current AutoConfig run. It shows the following:

- Product Top: Short name of each product top.
- Instantiation Time: Total time taken to instantiate templates from each product top.
- Execution Time: Total time taken to execute scripts from each product top.
- Time (%): Percentage of AutoConfig execution time taken to instantiate and execute scripts from each product top.
- Status: Whether or not all the templates from each product top were successfully instantiated and executed.

The profile information for individual templates can be seen by drilling down into the product tops listed in the summary section.

Details
This section contains the profile information for all product templates that are only instantiated/executed in the current AutoConfig run. It shows the following:

- Script Name: Target name of the template.
- Instantiation Time: Time taken to instantiate the template.
- Execution Time: Time taken to execute the instantiated template.
- Time (%): Percentage of product top processing time taken to process the template.
- Status: Whether or not the template was successfully processed.
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- Execution Summary: Contains the source and target locations of the template and the execution report of the script. This summary can be viewed by clicking on the script name link in the detailed report.

Sample output of the *AutoConfig Performance Profiler Report* looks like the following:

<table>
<thead>
<tr>
<th>AutoConfig Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start Time</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Context Value Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scripts</strong></td>
</tr>
<tr>
<td>cvm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product Summary Report</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Top</strong></td>
</tr>
<tr>
<td>adm</td>
</tr>
<tr>
<td>icx</td>
</tr>
<tr>
<td>icx</td>
</tr>
<tr>
<td>bis</td>
</tr>
<tr>
<td>ans</td>
</tr>
<tr>
<td>cct</td>
</tr>
<tr>
<td>wsh</td>
</tr>
<tr>
<td>cmn</td>
</tr>
<tr>
<td>okl</td>
</tr>
<tr>
<td>nks</td>
</tr>
<tr>
<td>rcf</td>
</tr>
<tr>
<td>jty</td>
</tr>
<tr>
<td>mwa</td>
</tr>
<tr>
<td>mna</td>
</tr>
<tr>
<td>en</td>
</tr>
<tr>
<td>csi</td>
</tr>
<tr>
<td>csw</td>
</tr>
<tr>
<td>ema</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Script Name</th>
<th>Instantiation Time (sec)</th>
<th>Execution Time (sec)</th>
<th>Total Time (sec)</th>
<th>Time (%)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>adconfig.txt</td>
<td>0.41</td>
<td>-</td>
<td>0.41</td>
<td>0.45</td>
<td>Passed</td>
</tr>
<tr>
<td>adalldefines.txt</td>
<td>0.23</td>
<td>-</td>
<td>0.23</td>
<td>0.25</td>
<td>Passed</td>
</tr>
<tr>
<td>adadmat.pl</td>
<td>0.23</td>
<td>0.61</td>
<td>0.84</td>
<td>0.93</td>
<td>Passed</td>
</tr>
<tr>
<td>adupdbid.sql</td>
<td>0.21</td>
<td>-</td>
<td>0.21</td>
<td>0.23</td>
<td>Passed</td>
</tr>
<tr>
<td>VIS_rh8.env</td>
<td>0.63</td>
<td>-</td>
<td>0.63</td>
<td>0.69</td>
<td>Passed</td>
</tr>
</tbody>
</table>

This report contains many more entries, but only three are shown from the top of the report.

AutoConfig Context Variable Information Utility

The TXK 12.1.1 Patch introduced the AutoConfig Context Variable Information Utility to associate templates and their respective context variables. For example, by entering all or part of the context variable name, the utility generates a report of associated templates and context variables, the variable descriptions, default and current values.

To run the Context Variable Information Utility:

- Source the Applications environment file as the owner of the application tier file system (APPLMGR user).
- Run the Context Variable Information Utility using the following syntax:

  On the Applications Tier:
  ```
  perl <FND TOP>/bin/txkrun.pl -script=GenCtxInfRep -keyword="<keyword>"
  ```

For example, to search for all the context variables that have JDBC as part of the name, run the following:

  ```
  [applvis@rh8 bin]$ perl txkrun.pl -script=GenCtxInfRep -keyword="JDBC"
  ```
Enter the Report FileName ? txk_JDBC.txt

*** ALL THE FOLLOWING FILES ARE REQUIRED FOR RESOLVING RUNTIME ERRORS

Program :
/home/d01/oracle/VIS/apps/apps_st/appl/fnd/12.0.0/patch/115/bin/txkGenCtxInfRep.pl started @ Wed Nov 11 09:20:29 2009

Reportfile
/home/d01/oracle/VIS/inst/apps/VIS_rh8/appltmp/TXK/txk_JDBC.txt

Logfile located at :

Program :
/home/d01/oracle/VIS/apps/apps_st/appl/fnd/12.0.0/patch/115/bin/txkGenCtxInfRep.pl completed @ Wed Nov 11 09:20:33 2009

End of
/home/d01/oracle/VIS/apps/apps_st/appl/fnd/12.0.0/patch/115/bin/txkGenCtxInfRep.pl : No Errors encountered

The html output looks like the following:

**Technology Stack (TXK) Context Variable Information Report**

<table>
<thead>
<tr>
<th>Report Header</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Date</strong></td>
</tr>
<tr>
<td><strong>Search Keyword</strong></td>
</tr>
<tr>
<td><strong>Context Type</strong></td>
</tr>
<tr>
<td><strong>Context File</strong></td>
</tr>
<tr>
<td><strong>Output File</strong></td>
</tr>
<tr>
<td><strong>Report Type</strong></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Context Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>s_appsjdbc_connect_descriptor</strong></td>
<td>JDBC connection descriptor for Oracle RAC Database instances. Please see MOS Doc ID: 388577.1, Using Oracle 10g Release 2 Real Application Clusters and Automatic Storage Management with Oracle E-Business Suite Release 12, for more information on RAC and discussion of the value for this variable.</td>
</tr>
<tr>
<td><strong>s_txkjdbc_zip</strong></td>
<td>JDBC driver name</td>
</tr>
<tr>
<td><strong>s_fnd_maxjdbc_connections</strong></td>
<td>Sets the parameter fnd_maxjdbc_connections in the DBC file, indicating the maximum JDBC pool size. It represents the sum of the number of available connections and the number of locked connections. If the pool reaches the maximum size and all connections are locked, new clients will not be able to borrow a connection until one of the current clients has returned one. Please refer to Oracle MetaLink Document 278868.1 for more details.</td>
</tr>
<tr>
<td><strong>s_fndjdbc_stmt_cache_size</strong></td>
<td>Sets the parameter fndjdbc_stmt_cache_size in the DBC file, indicating how many parsed SQL statements are retained in the JDBC cache. Statements stored in the JDBC cache will not require a reparse operation and therefore are highly optimized. The parameter should not be increased to an extreme value because maintaining this cache takes up memory in the JVM. We recommend a value between 200 and 400.</td>
</tr>
<tr>
<td><strong>s_fndjdbc_buffermax</strong></td>
<td>Sets the parameter fndjdbc_buffer_max in the DBC file, indicating the maximum buffer size that should be maintained by the applications database connection pool. If the buffer size is greater than the maximum, the pool...</td>
</tr>
</tbody>
</table>
maintenance thread will remove either the number of available connections specified by JDBC buffer decay size or the number of connections in excess of the buffer minimum, whichever is smaller. Please refer to Oracle MetaLink Document 278868.1 for more details.

<table>
<thead>
<tr>
<th>Context Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>s_jdbc_proc_esc</td>
<td>This variable is used to enable or disable JDBC escape processing mechanism. Changing this parameter value has performance implications.</td>
</tr>
<tr>
<td>s_tck jdbc_nls</td>
<td>The JDBC thin driver uses this library to convert between different character sets. The context value management system automatically maintains this variable and it should not be manually modified. Java 1.4 uses nlscharset12.zip, Java 1.5 and Java 1.6 use orai18n.zip.</td>
</tr>
<tr>
<td>s_apps jdbc_connect_alias</td>
<td>Configure this variable only when you have an Oracle RAC Database instance. This variable can have a value of either a load balanced connect descriptor or an instance specific connect descriptor. Please see MOS Doc ID: 388577.1 for more information on RAC and discussion of the value for this variable.</td>
</tr>
<tr>
<td>s_jdbc_max_cached_buffersize</td>
<td>This variable is used in the DBC file to set the maximum capacity of JDBC cached buffer. A buffer whose capacity is bigger than this value is not pooled. Changing the value of this variable has performance implications.</td>
</tr>
</tbody>
</table>
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Template Files Matched in Product Tops

<table>
<thead>
<tr>
<th>Source Files</th>
<th>Target Files</th>
<th>Matched Context Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>/admin/template/adgendbc_ux.sh</td>
<td>/home/d01/oracle/VIS/apps/apps/rh8/admin/install/adgendbc.sh</td>
<td>s_apps_jdbc_connect_descriptor, s_fnd_max_jdbc_connections, s_fnd_jdbc_stmt_cache_size, s_jdbc_proc_escaping, s_jdbc_max_cached_buffersize</td>
</tr>
<tr>
<td>/admin/template/APPLSYS_ux_env</td>
<td>/home/d01/oracle/VIS/apps/apps_st/appl/VIS_rh8.env</td>
<td>s_apps_jdbc_connect_descriptor</td>
</tr>
<tr>
<td>/admin/template/server_xml_1013.tmp</td>
<td>/home/d01/oracle/VIS/apps/apps/rh8/ora/10.1.3/j2ee/oacore/config/server.xml</td>
<td>s_txk_jdbcZip, s_txk_jdbc_nls</td>
</tr>
<tr>
<td>/admin/template/oafm_data_sources_xml_1013.tmp</td>
<td>/home/d01/oracle/VIS/apps/apps/rh8/ora/10.1.3/ee/oafm/application-deployments/oafm/data-sources.xml</td>
<td>s_apps_jdbc_connect_descriptor</td>
</tr>
<tr>
<td>/admin/template/ojspCompile_1013_properties.tmp</td>
<td>/home/d01/oracle/VIS/apps/apps/rh8/appl/admin/ojspCompile.properties</td>
<td>s_txk_jdbcZip, s_txk_jdbc_nls</td>
</tr>
<tr>
<td>/admin/template/adjborg.txt</td>
<td>/home/d01/oracle/VIS/apps/apps/rh8/admin/adjborg.txt</td>
<td>s_txk_jdbcZip, s_txk_jdbc_nls</td>
</tr>
<tr>
<td>/admin/template/adjborg2.txt</td>
<td>/home/d01/oracle/VIS/apps/apps/rh8/admin/adjborg2.txt</td>
<td>s_txk_jdbcZip, s_txk_jdbc_nls</td>
</tr>
<tr>
<td>/admin/template/adjareas.txt</td>
<td>/home/d01/oracle/VIS/apps/apps/rh8/admin/adjareas.txt</td>
<td>s_txk_jdbcZip</td>
</tr>
</tbody>
</table>

Figure 37 - Technology Stack (TXK) Context Variable Information Report

On the Database Tier:

perl <ORACLE_HOME>/appsutil/bin/txkrun.pl -script=GenCtxInfRep -keyword="<keyword>"

The utility takes the following arguments:

- contextfile (optional): complete path to the context file. By default, it is set to the value of <CONTEXT_FILE>
- keyword (required): all or part of a context variable name
- reportType (optional): the report type. Valid values are html (default) or text
- outfile (required): the report file. If only the name and not the complete path for the report file is provided, the report will be generated in the <APPLTMP> directory.
Release 12 AutoConfig Enhancements

Additional Configuration and Deployment Options

The AutoConfig utility provided with E-Business Suite Release 12 automates a wide variety of deployment options.

- Hardware-based load-balancing routers
- Secure Socket Layer (SSL)
- Demilitarized Zones (DMZ) and reverse proxies
- Multiple domain names for the same E-Business Suite environment
- Integration with Oracle Application Server 10g, including Single Sign-On, Oracle Internet Directory, Portal, and Discoverer
- Oracle Real Application Clusters (Oracle RAC) and Automatic Storage Management (ASM)

Release 12 Start and Stop Scripts

These scripts are located in $INST_TOP/admin/scripts:

<table>
<thead>
<tr>
<th>Script</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>adaautocfg.sh</td>
<td>run AutoConfig</td>
</tr>
<tr>
<td>adstpall.sh</td>
<td>Stop all services</td>
</tr>
<tr>
<td>adstrtal.sh</td>
<td>Start all services</td>
</tr>
<tr>
<td>adapcctl.sh</td>
<td>Start/stop/status Apache only</td>
</tr>
<tr>
<td>adformsctl.sh</td>
<td>Start/stop/status OC4J Forms</td>
</tr>
<tr>
<td>adoacorectl.sh</td>
<td>Start/stop/status OC4J oacore</td>
</tr>
<tr>
<td>adopmnctl.sh</td>
<td>start/stop/status OPMN</td>
</tr>
<tr>
<td>adalnctl.sh</td>
<td>start/stop RPC listeners (FNDFS/FNDSM)</td>
</tr>
<tr>
<td>ademctl.sh</td>
<td>start/stop Concurrent Manager</td>
</tr>
<tr>
<td>gsmstart.sh</td>
<td>start/stop FNDSM</td>
</tr>
<tr>
<td>jtffmctl.sh</td>
<td>start/stop Fulfillment Server</td>
</tr>
<tr>
<td>adpreclone.pl</td>
<td>Cloning preparation script</td>
</tr>
<tr>
<td>adoafmctl.sh</td>
<td>adoafmctl.sh to start/stop/status OC4J oafm</td>
</tr>
<tr>
<td>adexecsql.pl</td>
<td>Execute sql scripts that update the profiles in an AutoConfig run</td>
</tr>
<tr>
<td>java.sh</td>
<td>Call java executable with additional arguments, (used by</td>
</tr>
</tbody>
</table>
Release 12 Log Files

<table>
<thead>
<tr>
<th>AD Script log files (adapctl.sh)</th>
<th>$INST_TOP/logs/appl/admin/log</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM Log Files ($APPLCSF/$APPLLOG)</td>
<td>$INST_TOP/logs/appl/conc/log</td>
</tr>
<tr>
<td>AD tools log files (adpatch, adadmin, adctrl)</td>
<td>$APPL_CONFIG_HOME/admin/$TWO_TASK/log</td>
</tr>
<tr>
<td>OPMN Log Files (Text &amp; ODL)</td>
<td>$INST_TOP/logs/ora/10.1.3/opmn</td>
</tr>
<tr>
<td>Apache Log Files (Text &amp; ODL)</td>
<td>$INST_TOP/logs/ora/10.1.3/Apache</td>
</tr>
<tr>
<td>OC4J Log Files (Text)</td>
<td>$INST_TOP/logs/ora/10.1.3/j2ee/oacore/</td>
</tr>
<tr>
<td>OC4J Log Files (ODL)</td>
<td>$INST_TOP/logs/ora/10.1.3/j2ee/oacore/log/oacore_default_group_1/oc4j</td>
</tr>
</tbody>
</table>

Figure 39 - Release 12 Log Files

In Release 12, the log files are located in $LOG_HOME (this translates to $INST_TOP/logs)

Concurrent Request-related Logs

- $LOG_HOME/appl/conc -> location for concurrent requests log and out files
- $LOG_HOME/appl/admin -> location for mid tier startup scripts log files

Apache Logs

(10.1.3.4 Oracle Home which is equivalent to the iAS Oracle Home)

- $LOG_HOME/ora/10.1.3/Apache -> Location for Apache Error and Access log files
- $LOG_HOME/ora/10.1.3/j2ee -> location for j2ee related log files
- $LOG_HOME/ora/10.1.3/opmn -> location for OPMN related log files

Forms & Reports-related Logs

(10.1.2.3 Oracle Home which is equivalent to the 806 Oracle Home)

- $LOG_HOME/ora/10.1.2/forms
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- $LOG_HOME/ora/10.1.2/reports

Subdirectories Used to Categorize the Log Files

- $LOG_HOME = <APPS_BASE>/inst/apps/<context_name>/logs
- $INST_TOP = <APPS_BASE>/inst/apps/<context_name>

Oracle Configuration Home for Apache, OC4J and OPMN ($ORA_CONFIG_HOME/10.1.3)

The Apache server is still being used and its configuration path is:

$ORA_CONFIG_HOME/10.1.3/Apache/Apache/conf

OC4J Services

By default, Oracle Applications Release 12.1 creates three OC4J Instances:

- OACore: runs OA Framework-based applications
- Forms: runs Forms-base applications
- OAFM (Oracle Apps Fusion Middleware): runs web services, mapviewer, ascontrol

The configuration files path for the three OC4J instances is:

- $ORA_CONFIG_HOME/10.1.3/j2ee/<oacore, forms, oafm>/config

The configuration file used to adjust the log file path for the three OC4J instances is:

- $ORA_CONFIG_HOME/10.1.3/j2ee/<oacore, forms, oafm>/application-deployments/<oacore, forms, oafm>/orion-application.xml
- $ORA_CONFIG_HOME/10.1.3/Apache/Apache/conf/httpd.conf LogLevel warn, info, error, debug

Apache Log Level

You may need to update the context variable (s_apache_loglevel) in the context file ($INST_TOP/appl/admin/<SID_HOSTNAME.xml>) to set the Apache log level and then run AutoConfig.

To enable debug, set (LogLevel debug ) in (httpd.conf) file

Apache log files will be generated in the following path:

$LOG_HOME/ora/10.1.3/Apache
There are two types of log files created:

- Access Log (CustomLog)
  Filename format: access_log.<unique id>

- Error Log (ErrorLog) this includes ECID information
  Filename format: error_log.<unique id>

Apache ODL log files will be generated in the following path:

$LOG_HOME/ora/10.1.3/Apache/oracle

You may also need to find log files on Linux changed in the last 24 hours and tar them:

```
find $LOG_HOME/ora/10.1.3 -type f -mtime -1>m.tmp; tar cvf ApacheLogFiles_`hostname`_.tar -files-from=m.tmp
```

Release 12 HTTP Server

The Oracle HTTP Server is the Web server component of Oracle Application Server. It is based on the Apache HTTP Server. It is a robust, reliable Web server, pre-configured to do the following:

- provide a high-availability infrastructure integration with Oracle Process Manager and Notification Server (OPMN), for process management, death detection and failover for OC4J and Oracle HTTP Server processes.

- provide Dynamic Monitoring Services (DMS) metrics that give runtime performance statistics for both Oracle HTTP Server and OC4J processes.

Oracle Process Manager and Notification Services - OPMN

OPMN manages OC4J containers (and the JVMs for oacore, forms, oafm) and the HTTP Server instances. OPMN can be configured to manage custom processes with its extensible design.

In Oracle 10gAS, OPMN manages all Application Server components except the Oracle AS Metadata Repository and the Application Server Control Console.

OPMN is comprised of two primary services:

- Oracle Notification Server (ONS) is able to notify the Process Manager of a failure, recovery, or startup of components in the 10g Oracle
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Application Server. ONS utilizes a publish-subscribe model that publishes a notification based on its subscription to the AS component.

- Oracle Process Manager (PM) is the centralized process management mechanism that starts, stops, restarts and detects death of these processes. The PM is configured to manage AS processes that are configured in the opmn.xml file.

When processes are to be stopped, the PM receives a request with parameters. OPMN is monitored by a shadow process that restarts upon request or after a catastrophic failure.

The Process Manager uses the Oracle Notification Server to:

- detect that a process has completed initialization and is ready to receive requests
- determine what ports are in use
- obtain component specific runtime information

Four parameters determine the behavior of the Oracle Process Manager and Notification services process in managing the iAS middle tier comprising of OC4J instances and the Apache HTTP server. They are located in the schema definition file, opmn.xsd:

1. restart-on-death – default value = TRUE, pings process three times then, restarts the process.
2. ping timeout
3. ping interval
4. reverse-ping timeout

Services managed by OPMN are:

1. HTTP_Server – runs Apache
2. oacore - Supports framework based applications
3. forms - Supports forms based applications
4. oafm - expands to Oracle Application Fusion Middleware - for mapviewer, webservices, ascontrol

In Release 12 there are 3 groups of OC4Js. OC4J replaces JServ (Java servlet containers), one of the components of the Release 11i techstack. OC4J is Oracle's Implementation of the J2EE specification set.
OPMN provides the ability to restart failed services automatically. If an oacore JVM crashes because of an out of memory issue, OPMN automatically restarts the failed service after it detects the death. The opmn.log contains the record of failed and restarted services:

```bash
$LOG_HOME/ora/10.1.3/opmn/opmn.log
```

OPMN restarts failed processes and detects a failure using the following process:

- OS process is checked by OPMN every 2 seconds
- Forward Ping: periodically OPMN pings the process every 20 seconds and expects a response
- Reverse Ping: every 20 seconds managed process sends OPMN a ping notification

Originally based on the IronFlare Orion Application Server, Oracle Corporation released this as 10g AS; this is why configuration files named `orion-web.xml` and `orion-application.xml` exist.

**Script to Control OPMN**

```bash
$ADMIN_SCRIPTS_HOME/adopmnctl.sh status | stop | start
```

```
$ adopmnctl.sh status

<table>
<thead>
<tr>
<th>ias-component</th>
<th>process-type</th>
<th>pid</th>
<th>status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OC4J</td>
<td>oafm</td>
<td>24503</td>
<td>Alive</td>
</tr>
<tr>
<td>OC4J</td>
<td>forms</td>
<td>16403</td>
<td>Alive</td>
</tr>
<tr>
<td>OC4J</td>
<td>oacore</td>
<td>8444</td>
<td>Alive</td>
</tr>
<tr>
<td>HTTP_Server</td>
<td>HTTP_Server</td>
<td>22024</td>
<td>Alive</td>
</tr>
</tbody>
</table>
```

**Oracle Process Manager is responsible for:**

1. starting
2. stopping
3. restarting
4. monitoring the services it manages (this includes death detection and automatic restart of the process)

**OPMN Manages the Oracle HTTP Server**

The Apache server can hang or become unresponsive. If Apache is unresponsive over the ping period, OPMN will kill and restart the Oracle HTTP Server (OHS) as needed.
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**OPMN Manages the OC4J Containers**

When the garbage collection (GC) thread starts, it looks for objects that can be released to the heap memory pool based on the kind of references the objects have to themselves. A collection is "generational". In other words, objects that have references are promoted to an older generation and presumed to have a longer life. Objects with weak references are candidates to have the memory released to the global heap of the JVM.

No other application processing is possible while the garbage collection is running. A full GC, is when the collection is over the entire heap, consists of a mark/sweep/compact cycles, that "mark" the memory to be reclaimed, "sweep" the memory into the corresponding generations and "compact" the holes created when the memory is reclaimed.

Garbage Collection can result in a delay in the container responding to an OPMN ping cycle. During full GC scans, OPMN can kill and restart the container, causing it to lose the state of the application or request.

Since full GC scans can happen at any time during the life of a request or an application, there is always the danger of OPMN killing a perfectly good container on the assumption that the container was hung.

**OPMN Architecture**

10gAS in Release 12 is similar to Release 11i, since there is still an Apache listener. In Release 12, the JVM is run in an OC4J container. The HTTP server creates JVM instances with OC4J in Release 12, instead of creating JServ JVMs in 11i. If the request is to process some Java code it will pass the request to a separate JVM process that provides the response for the Client.

![Diagram](image)

The Apache and OC4J processes are started, stopped and managed by the OPMN process. OPMN manages Apache; Apache is the HTTP Server and web listener for Release 12. Apache spawns child processes to run forms and java (jsps) in the OC4J containers. OC4J runs as a module in Apache.
the little r12.1.3 architecture and concepts guide

This means that the OPMN process must be started first, then OPMN starts Apache and any OC4J processes that are needed.

Release 12 creates three OC4J instances:

1. Oacore - runs OA Framework-based applications
2. Forms - runs Forms-base applications
3. OAFM (Oracle Apps Fusion Middleware) - runs web services, mapviewer, ascontrol

The number of OC4J instances for each group will be determined by the corresponding nprocs context variable:

- `s_oacore_nprocs`
- `s_forms_nprocs`
- `s_frmsrv_nprocs`
- `s_oafm_nprocs`

OC4J Performance Tuning

There are three areas of possible performance improvement: heap memory settings of the OC4J container, garbage collection latency and service times of the HTTP server.

HTTP services times may differ due to dynamic characteristics such as server load, network traffic and client connectivity. The HTTP service time is largely controlled by network engineers and is effectively not in our domain.

**Heap Memory Settings for OC4J Containers**

Tuning OC4J containers' heap is important because the GC thread might make full GC scans anytime during the lifetime of the container. These settings are made in the opmn.xml file in the `<java-option>` sections for each OC4J instance.

The settings for heap must include the `-Xms` (for start heap memory) and `-Xmx` (for maximum heap memory). Use the `-server` option as the first option in the `<java-option>` sections. The recommended setting for the `-Xmx` value is 512MB, as typical applications need that much memory to avoid the `java.lang.OutOfMemoryError`.

Start with an `-Xms` value of 128MB to prevent "Too many files open" errors when this setting is too high.
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Garbage Collection

Garbage collection starts later for higher -Xms values, resulting in open file handles not getting released by the GC.

```java
<java-option>-server -Xms128M -Xmx512M
```

From the opmn.xml file located in $INST_TOP/apps/<CONTEXT>/ora/10.1.3/opmn/conf, the following excerpt illustrates the OC4J settings for the OACORE JVM. There are other similar sections in the opmn.xml file for each OC4J JVM, including forms, oafm, and oacore. Note in the highlighted section below that the settings for Xmx and Xms are set to the recommended values:

```xml
-Xmx512M -Xms128M
```

Redundancy and Load Balancing

A Java Virtual Machine (JVM) runs in an OC4J container. Creating multiple JVMs to accommodate a bigger workload is one of the most effective methods of increasing throughput, as long as memory and CPUs are adequate. Each JVM requires its own OC4J container to run. Therefore,
starting more than one OC4J instance can increase the volume of requests that are processed. This is set through the numProcs parameter in the opmn.xml file and this parameter takes the value of 1 by default, to start a single OC4J instance.

For multiple instances, the numProcs parameter can be adjusted to different values (2 for two instances). The Process Manager needs to be restarted with this value for the modules under its control. Very often, the applications that are being run may be process or memory intensive and may require adjusting the value of the numProcs parameter to effect load-balancing via multiple instances.

In Oracle Applications, instead of editing the opmn.xml file, the context variables should be changed in the context file and then AutoConfig should be run to instantiate the new values in the configuration files.

Figure 41 describes the functional areas as groups within each Apache JServ container, with the context variables for configuring the number of JVMs and defining weighting for each JVM Group:

<table>
<thead>
<tr>
<th>JVM Group</th>
<th>Weight Context Variable</th>
<th>Number of JVMs Context Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core group</td>
<td>OACORE Node Weight</td>
<td>OACORE JVM Processes</td>
</tr>
<tr>
<td>Forms group</td>
<td>s_oacore_node_weight</td>
<td>s_oacore_nprocs</td>
</tr>
<tr>
<td>Forms</td>
<td>FORMS Node Weight</td>
<td>Forms Servlet JVM Processes</td>
</tr>
<tr>
<td>Disco group</td>
<td>s_forms_node_weight</td>
<td>s_forms_servlet_nprocs</td>
</tr>
<tr>
<td>Web Services group</td>
<td>DISCO Node Weight</td>
<td>Discoverer JVM Processes</td>
</tr>
<tr>
<td></td>
<td>s_disco_node_weight</td>
<td>s_disco_nprocs</td>
</tr>
<tr>
<td>Web Services group</td>
<td>XMLSVCS Node Weight</td>
<td>XML Services JVM Processes</td>
</tr>
<tr>
<td></td>
<td>s_xmlsvcs_node_weight</td>
<td>s_xmlsvcs_nprocs</td>
</tr>
</tbody>
</table>

Figure 41 - 11i JServ Load Balancing

1 Node Weight only applies to Release 11i Apache JServ that uses OProcMgr. Release 12.1 uses OC4J, and therefore only uses the NPROCS value to determine the number of JVMs to start on each node.

A JVM configuration could look like this:
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### Figure 42 - A Possible JVM Configuration

Notice that Self-Service (OA Framework) requires both XML Services and OACORE processes to be running, while Forms and Discoverer only require their specific JVM to run. This is defined in the Apps Context file, `$INST_TOP/appl/admin/VIS_rh10.xml`, using the following context variables:

#### Release 11i JVM Context Variables

For a given CONTEXT, the context file defines configuration parameters for a specific node. Each node has its own context file for each instance of Oracle Applications. Release 11i uses context variables to define the number of JVMs running on a hardware node, nprocs, and node_weight.

Release 11i has a parameter that defines the weight applied to each JVM. For example, if a hardware node has twice the computing resources of other hardware nodes in the application tier, assign a node weight that is twice that of the other nodes.

```
<xmlsvcs_nprocs oa_var="s_xmlsvcs_nprocs">1</xmlsvcs_nprocs>
<xmlsvcs_node_weight oa_var="s_xmlsvcs_node_weight">1</xmlsvcs_node_weight>
<forms_node_weight oa_var="s_forms_node_weight">1</forms_node_weight>
<forms_node_weight oa_var="s_forms_node_weight">1</forms_node_weight>
<servlet_nprocs oa_var="s_forms_servlet_nprocs">1</servlet_nprocs>
<servlet_comment oa_var="s_forms_servlet_comment">#</servlet_comment>
<servlet_node_weight oa_var="s_oacore_node_weight">1</servlet_node_weight>
<oacore_nprocs oa_var="s_oacore_nprocs">1</oacore_nprocs>
<disco_nprocs oa_var="s_disco_nprocs" osd="Linux">1</disco_nprocs>
<disco_node_weight oa_var="s_disco_node_weight" osd="Linux">1</disco_node_weight>
```

OProcMgr derives the weighting information from the configuration files in order to determine the load for the specific node. This applies only to those environments in Release 11i that use OProcMgr to do the Apache JServ Load Balancing.

#### Release 12 OC4J JVM Load Balancing

In Release 12, the JVM runs in an OC4J container. OC4J isn’t based on the Apache OProcMgr. OC4J no longer supports the concept of “weight” for each group of JVMs. Therefore, the “weight” parameters in the Release 11i context file no longer exist in the Release 12 context file.

Figure 43 shows three apps tiers with the corresponding number of CPUs. A reasonable rule of thumb for JVMs is that there should be at least one CPU per JVM. In this example, we have followed this rule. The JVMs with the
most redundancy in this example are the OACORE and XML Services JVMs. This is because in this example, OTL - Oracle Time and Labor, is the most important module and requires high availability. As long as the database and one of the apps tiers is available, then OTL will be available. This assumes that all other necessary services are available on each node.

| Forms Servlet Processes | 2 | 1 | 0 |
| Discoverer JVM Processes | 0 | 0 | 2 |
| OACORE JVM Processes | 2 | 1 | 1 |
| XML Services JVM Processes | 2 | 1 | 1 |
| OAFM JVM Processes | 2 | 1 | 0 |

**Figure 43 - This Configuration Has at Least One CPU Per JVM**

**Release 12 JVM Context Variables**

The number of JVMs are defined in the Apps Context file, $INST\_TOP/appl/admin/VIS\_rh10.xml, using the following context variables:

```xml
<frmsrv_nprocs oa_var="s_frmsrv_nprocs">1</frmsrv_nprocs>
<servlet_comment oa_var="s_forms_servlet_comment">#</servlet_comment>
<form_nprocs oa_var="s_forms_nprocs">1</form_nprocs>
<oacore_nprocs oa_var="s_oacore_nprocs">1</oacore_nprocs>
<oafm_nprocs oa_var="s_oafm_nprocs">1</oafm_nprocs>
```

In Release 12, the JVM runs in an OC4J container and uses the NPROCS value to determine the number of JVMs to start on each node. Each Node has its own Context File where these configurations are set.

**JDBC Connections**

The JVM preallocates a certain number of database connections that are stored to be reused across all the applications running in the same JVM. Java applications running in this JVM borrow connections from the pool when needed, instead of opening and closing connections. Connections are sent back to the pool, waiting to serve the next request. Since the connections are always open, performance issues related to the overhead of creating and closing connections is eliminated.
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The AOLJ database connection pool is intended to have a farm of open JDBC connections to the database which can be borrowed for a short time by the Java code running in the OACoreGroup. This is more efficient for performance, since it saves opening and closing of a JDBC connection each time. This, however, means that a connection can be idle for quite a long time when there is little activity in the system.

Any mechanism that automatically closes JDBC connections (i.e., IDLE_TIME profile values or SQLNET.EXPIRE_TIME) are not supported, as the connections MUST remain open. Closing of unnecessary connections is managed by the pool itself.

In general, several mechanisms exist to control JDBC connections to the database. JDeveloper has its own methods to manage connection pools, while Oracle Applications uses an entirely different mechanism, AOL/J. The JDBC Pool in E-Business Suite is implemented using AOL/J. AOL/J uses the dbc file in order to obtain the parameters needed to create a database connection.

When starting the Application Server in Release 12, the HTTPD process launches the OC4J engine. During the startup of OC4J, the JDBC connection pool is created based on the parameters specified by the DBC file. The DBC file is located under $FND_SECURE and is generated during installation time.

Here’s an example of a DBC file:

```
<Context_Name>.dbc
$FND_SECURE
  rh10.trutek.com_VIS.dbc
  rh10_VIS.dbc  (alias in hosts file)
#DB Settings
APPS_JDBC_DRIVER_TYPE=THIN
APPL_SERVER_ID=D3C48550A53472A0E0330A19014E72A0267154486915
34060144412136994136
TWO_TASK=VIS
GUEST_USER_PWD=GUEST/ORACLE
DB_HOST=rh10.trutek.com
DB_NAME=VIS
FNDNAM=APPS
GWYUID=APPLSYS/PUB
DB_PORT=1521
```

This particular example does not include any sizing parameters for the JDBC connection pool and, when initialized, it will start with the default values for these parameters:

```
FND_MAX_JDBCgetConnections=500
```
In a system that supports thousands of users, 
FND_MAX_JDBC_CONNECTIONS could be set to a large value. Each 
JDBC connection pooled for use consumes memory. A better solution is to 
recycle unused connections more frequently by setting:

FND_JDBC_BUFFER_DECAY_INTERVAL=30  #every 30 seconds, 
recycle 100 connections (decay_size) 
FND_JDBC_BUFFER_DECAY_SIZE=100

Table – Tunable JDBC parameters in the .dbc file are located in 
$FND_SECURE. This translates to:

$INST_TOP/fnd/12.0.0/secure

Figure 44 shows that each JVM will create its own JDBC connection pool:

---

Figure 44 - 11i JDBC Connections
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Figure 44 illustrates two Release 11i JVMs, OACORE and DISCO. Each JVM runs in a JServ container that has a JDBC connection object that controls the use of JDBC connections in the JDBC Connection Pool. Each connection object uses AOL/J to maintain the JDBC connections as defined in the DBC file.

If multiple JVMs are configured, not all users will use the same JVM. Some users may get errors trying to obtain connections from the pool, while other users may not have any connection issues because they are using the other JVM.

Figure 45 shows two Release 12 JVMs running in separate OC4J containers, being managed by OPMN. OPMN is a component of the Oracle 10g Application Server.

Release 12 Architecture

Figure 45 - Release 12 Architecture

All connection pool parameters are configured by setting the corresponding environment variable in the .dbc file. If a parameter is set to something other than an allowed value in the .dbc file, the default value is used.

Two additional parameters that are important to the JDBC pool, but are NOT configurable, are the following:

- maximum wait time (FND_JDBC_MAX_WAIT_TIME)
- the selection policy (FND_JDBC_SELECTION_POLICY)
If the process is configured with RETENTION_LEVEL=MANAGE_STATE, it can take advantage of Application Module connection pooling, as described in MOS Doc. ID: 275876.1, Oracle Application Framework Profile Options Release 11i (11.5.10). This allows the connection to be released immediately and reclaimed for re-use. This is configured by setting the following two Profile Options at SITE level:

- FND: Application Module Pool Enabled = Yes
- FND: Application Module Connection Pool Enabled = Yes

**SQL to Monitor JDBC Connections**

REM Connections by machine and instance

```sql
select s.machine, s.username, s.module, s.inst_id, count(*) how_many
from (select distinct PROGRAM, PADDR, machine, username, module, inst_id from gV$SESSION) s, gv$process p
where s.paddr = p.addr
and p.inst_id = s.inst_id
group by s.machine, s.username, s.module, s.inst_id
```

REM Number of sessions per user

```sql
select user_name, count(*) How_many_sessions
from ICX_SESSIONS icx, FND_USER u
where icx.user_id = u.user_id
and disabled_flag != 'Y'
and PSEUDO_FLAG = 'N'
and (last_connect + decode(FND_PROFILE.VALUE('ICX_SESSION_TIMEOUT'), NULL, limit_time, 0, limit_time, FND_PROFILE.VALUE('ICX_SESSION_TIMEOUT')/60)/24) > sysdate
and counter < limit_connects
group by user_name
order by 2 desc
/
```

REM SQL to check number of JDBC connections

```sql
set echo on
set feedback on
set pagesize 132
set linesize 80
col username format a10
```
col how_many format 9999
col machine format a25

select s.machine, s.username, s.module, count(*)
how_many
from (select distinct PROGRAM, PADDR, machine, username, module from V$SESSION) s,
 v$process p
where s.paddr = p.addr and s.program = 'JDBC Thin Client'
group by s.machine, s.username, s.module;

Show Connection Usage Per Module and process

select count(*), machine, process, module
from gv$session
group by machine, process, module
order by 1 asc
/

You can check which TCP port is being LISTENed to by the OACORE JVM(s):

#############################################################
### START OF SCRIPT ###
#############################################################

( echo "=========================================="
  echo "Run started ", date
  echo "=========================================="
  for fn in `grep ^oacore $ORA_CONFIG_HOME/10.1.3/opmn/logs/states/* | cut -d: -f 1`
do
    echo $fn
    echo "Check the following ports are listening..."
    awk ' { if ( FNR>=15 && FNR<=17) print $1 } ' $fn
    echo "---------------------------------------"
    for corePort in `awk ' { if ( FNR>=15 && FNR<=17) print $1 } ' $fn`
do
      netstat -an | grep $corePort | grep LISTEN
Forms Listener Servlet

The Forms 10g component of Release 12, by default is configured to run in servlet mode. This is recommended for security reasons, but may not perform as well as socket mode for specific environments. A servlet that runs in an OC4J container, called the Forms Listener Servlet manages the interaction between the Forms JVM and the Forms Runtime Process. In socket mode, this is called the Forms Listener.

The Forms Listener Servlet provides more standard web application communication and more easily supports advanced networking configurations, such as reverse proxy or modules deployed in the DMZ. The Forms Listener Servlet communicates with the Oracle database server using the Oracle Net networking infrastructure.

The Forms Listener Servlet manages:

- the creation of a Forms runtime process for each client,
- network communications between the client and its associated forms runtime process.

The client sends HTTP requests and receives HTTP responses from the Web services.

Forms Listener Servlet is recommended, but in the following examples, the use of socket mode may be necessary:

- The network topology is multinode and the Forms Services are configured on a node different from the node that the Web services (Web Entry Point and Web Applications) are configured upon.
- If the network bandwidth is constrained or machine resources are limited, consider socket mode as an alternative to improve performance.
Chapter 3 – Release 12.1 Architecture

- To reduce network traffic. The servlet mode uses http protocol on each transaction between a client and the Forms Server, requiring the exchange of cookies and http headers, which increases network traffic.

On Release 12, check whether the Forms Server is running:

```
$INST_TOP/admin/scripts/adformsrvctl.sh status
```

Open the `appsweb.cfg` file pointed to by environment variable `FORMS_WEB_CONFIG_FILE` and check the values for the following parameters:

- `serverURL=`
- `connectMode=`

<table>
<thead>
<tr>
<th>In Servlet Mode</th>
<th>In Socket Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>serverURL=/forms/lservlet</td>
<td>serverURL=(should be blank)</td>
</tr>
<tr>
<td>connectMode=servlet</td>
<td>connectMode=Socket</td>
</tr>
</tbody>
</table>

**Figure 46**

Forms Socket Mode implements a default 40 bit encryption based on keys randomly generated at runtime. Oracle does not promote socket mode encryption as it is not a "secure solution". Customers that require high levels of security should use the Forms Servlet configured for https. If they need to use Socket Mode, they should use a secure VPN connection to provide the required level of security.

The Forms runtime process (frmweb) is still forked into a 10.1.2 environment, by deploying the Forms Servlet to the 10.1.3 OC4J container during the patching process. This step is still required even if you only use Socket Mode, as the Forms Servlet is still used to generate the initial HTML page. The Forms Servlet is configured to run in an OracleAS 10.1.3 OC4J container, so a single OracleAS 10.1.3 version of the Oracle HTTP Server services all Forms, Reports and HTTP-based (formerly Self-Service) requests.

On Unix and Linux, Release 12 user-exit code is now contained in its own FND-owned shared object, and is dynamically linked at runtime. 11i uses `f60webmx`, `ar60run`, `ar60runb` and `ar60rund` executables with user-exit objects statically linked.
In Release 12, the executables $ORACLE_HOME/bin/frmweb and $ORACLE_HOME/bin/rwrun are built by the standard OracleAS 10g 10.1.2 patching process. By default, OracleAS 10g 10.1.2 does not include the Forms and Reports builders. These are normally shipped as a separate product, Oracle Developer Suite 10.1.2. However, for the convenience of E-Business Suite Release 12 customers, the builders are included in the OracleAS 10g 10.1.2 Oracle Home on the Linux, Sun Solaris SPARC, and Windows platforms.

**Release 12 Architecture**

![Figure 47 - Release 12 Architecture](image)

On the middle tier, Forms Services consists of two major components:

- Forms Listener Servlet
- Forms Runtime Process

The Forms Listener Servlet takes connection requests from Java client processes and initiates Forms runtime processes. The Forms Listener Servlet manages transactions from the Java client and spawns a forms runtime process in the forms runtime engine.

The Forms Runtime Process manages application logic and processing. It maintains a connection to the database on behalf of the Java client.
Forms 6i with Release 11i

The listener executable is `f60srvm`, located in `$ORACLE_HOME/bin`. The 6i listener supports non-secure socket mode and socket/https mode. The Forms Metric Server is used in 6i to support forms load balancing. CGI is supported in forms 6i, but not in forms 10g.

Forms and Reports Architecture in Release 12


Forms 10g with Release 12

By default, Oracle E-Business Suite Release 12 utilizes the Forms Servlet architecture, with either an HTTP or HTTPS connection. The listener executable is `frmsrv`, located in `$ORACLE_HOME/bin`. The 10g listener supports only non-secure socket mode and servlet mode. Clients that require http or https must use servlets.

In order to implement iProcurement, on a host located in the DMZ, Oracle recommends using servlets instead of socket mode, because the encryption with servlets (128 bit encryption) is much better than with sockets (40 bit encryption).

Load balancing is accomplished by using multiple Java Virtual Machines (JVMs) to serve the requests. Instead of using CGI to initiate the forms server, like forms 6i, in forms 10g the initial request to start the forms applet is processed by the forms servlet. The servlet receives only one request per forms session.

To change the forms mode between Servlet or Socket mode, see MOS Doc. ID: 384241.1, *Using Forms Socket Mode with Oracle E-Business Suite Release 12:*

```
$FND_TOP/bin/txkrun.pl -script=ChangeFormsMode \
  [-contextfile=<CONTEXT_FILE>] \ 
  -mode=socket \ 
  [-port=<Forms port number>] \ 
  -runautoconfig=<No or Yes> \ 
  -appspass=<APPS password>
```
### Parameter Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-contextfile</td>
<td>Full path to application tier context file, using the syntax: $INST_TOP/appl/admin/&lt;CONTEXT_NAME&gt;.xml</td>
</tr>
<tr>
<td>-mode</td>
<td>servlet - to enable Forms Servlet mode, the default value. socket - to enable Forms Socket mode</td>
</tr>
<tr>
<td>-port</td>
<td>The port number used to run Forms in socket mode. The default port number is 9095. A port number is not needed if servlet mode is enabled.</td>
</tr>
<tr>
<td>-runautoconfig</td>
<td>Should AutoConfig be run after changing the forms mode No - This is the recommended value. Yes</td>
</tr>
<tr>
<td>-appspass</td>
<td>Required only if -runautoconfig=Yes.</td>
</tr>
</tbody>
</table>

**Figure 48**

For example, on Unix:

```
$FND_TOP/bin/txkrun.pl -script=ChangeFormsMode \  
-contextfile=$INST_TOP/appl/admin/mycontext.xml \  
-mode=socket \  
-port=9095 \  
-runautoconfig=No
```

The script prompts for the parameters if they are not passed as command line arguments.

If AutoConfig was not automatically executed as part of the preceding step, then run AutoConfig on the application tier:

On Unix:

```
$INST_TOP/admin/scripts/adautocfg.sh
```


Enable Forms Dead Client Detection
Value specified in minutes : FORMS_TIMEOUT=10
Terminates fwebmx processes for dead clients.
Enable Forms Abnormal Termination Handle
Do not set FORMS_CATCHTERM

The above two variables (FORMS_TIMEOUT and FORMS_CATCHTERM) can be changed from the context file, s_f60catchterm and s_f60time parameters for Release 11i users, and s_forms_catchterm and s_forms_time for Release 12.1 users.

Summary of Key Differences Between Release 11i and Release 12

Release 11i and Release 12 Environment Variables

<table>
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<tr>
<th>Variable</th>
<th>Oracle Applications Release 11i</th>
<th>Release 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAS_ORACLE_HOME</td>
<td>$/d01/oracle/&lt;SID&gt;/ora/iAS</td>
<td>$/d01/oracle/apps/tech_st/10.1.3</td>
</tr>
<tr>
<td>ORACLE_HOME (oracle)</td>
<td>$/d01/oracle/&lt;SID&gt;/db/10.2.0</td>
<td>$/d01/oracle/db/tech_st/10.2.0</td>
</tr>
<tr>
<td>ORADATA</td>
<td>$/d01/oracle/&lt;SID&gt;/data</td>
<td>$/d01/oracle/db/apps_st/data</td>
</tr>
<tr>
<td>OA_HTML</td>
<td>$COMMON_TOP/html</td>
<td>$COMMON_TOP/webapps/oacore/html</td>
</tr>
<tr>
<td>ADMIN_SCRIPTS_HOME</td>
<td>$COMMON_TOP/admin/scripts/&lt;SID&gt;</td>
<td>$INST_TOP/admin/scripts</td>
</tr>
<tr>
<td>FND_SECURE</td>
<td>-</td>
<td>$INST_TOP/appl/fnd/12.0.0/secure</td>
</tr>
<tr>
<td>LOG_HOME</td>
<td>-</td>
<td>$INST_TOP/logs</td>
</tr>
<tr>
<td>FORMS_WEB_CONFIG_FILE</td>
<td>-</td>
<td>$INST_TOP/ora/10.1.2/forms/server/appsweb.cfg</td>
</tr>
<tr>
<td>JAVA_BASE</td>
<td>-</td>
<td>$COMMON_TOP/java</td>
</tr>
<tr>
<td>INST_TOP</td>
<td>-</td>
<td>$/d01/oracle/inst/apps/&lt;CONTEXT&gt;</td>
</tr>
<tr>
<td>ORA_CONFIG_HOME</td>
<td>-</td>
<td>$INST_TOP/ora</td>
</tr>
</tbody>
</table>

Figure 49 - Release 11i and Release 12 Environmental Variables

Release 11i and Release 12 Directory Changes

<table>
<thead>
<tr>
<th>File</th>
<th>Oracle Applications Release 11i</th>
<th>Release 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start &amp; Stop scripts</td>
<td>$COMMON_TOP/admin/scripts/&lt;CONTEXT&gt;</td>
<td>$INST_TOP/admin/scripts</td>
</tr>
<tr>
<td>AutoConfig – Apps Context File (Apps)</td>
<td>$COMMON_TOP/admin/scripts/&lt;CONTEXT&gt; $APPL_TOP/admin/$TW O_TASK.xml</td>
<td>$INST_TOP/admin/scripts $INST_TOP/appl/admin/$SID_&lt;hostname&gt;.xml</td>
</tr>
<tr>
<td>SSL Certificates</td>
<td>$COMMON_TOP/admin/certs</td>
<td>$INST_TOP/certs</td>
</tr>
<tr>
<td>appsweb.cfg</td>
<td>$OA_HTML/bin</td>
<td>$INST_TOP/ora/10.1.2/forms/server</td>
</tr>
<tr>
<td>tnsnames.ora</td>
<td>$ORACLE_HOME/network/admin/&lt;CONTEXT&gt;</td>
<td>$INST_TOP/ora/10.1.2/network/admin</td>
</tr>
<tr>
<td>File</td>
<td>Path 1</td>
<td>Path 2</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>Apps listener.ora</td>
<td>$ORA_HOME/network/admin/&lt;CONTEXT&gt;</td>
<td>$INST_HOME/ora/10.1.2/network/admin</td>
</tr>
<tr>
<td>AS tnsnames.ora (Apache)</td>
<td>$IAS_ORACLE_HOME/network/admin/&lt;CONTEXT&gt;</td>
<td>$INST_HOME/ora/10.1.3/network/admin</td>
</tr>
<tr>
<td>httpd.conf</td>
<td>$IAS_ORACLE_HOME/Apache/Apache/conf</td>
<td>$ORA_CONFIG_HOME/10.1.3/Apache/Apache/conf</td>
</tr>
<tr>
<td>apps.conf</td>
<td>$IAS_ORACLE_HOME/Apache/Apache/conf</td>
<td>$ORA_CONFIG_HOME/10.1.3/Apache/Apache/conf</td>
</tr>
<tr>
<td>Concurrent Manager logs</td>
<td>$APPL_HOME/conc/log or $APPL/Home/log</td>
<td>$LOG_HOME/app/conc/log or $APPL_HOME/log</td>
</tr>
<tr>
<td>AD scripts logs</td>
<td>$COMMON_HOME/admin/log/&lt;SID_hostname&gt;</td>
<td>$LOG_HOME/app/admin/log</td>
</tr>
<tr>
<td>Apache logs</td>
<td>$IAS_ORACLE_HOME/Apache/Apache/logs</td>
<td>$LOG_HOME/ora/10.1.3/Apache</td>
</tr>
<tr>
<td>JServ logs</td>
<td>$IAS_ORACLE_HOME/Apache/j2ee/logs</td>
<td>$LOG_HOME/ora/10.1.3/j2ee</td>
</tr>
<tr>
<td>Javacache.log</td>
<td>$COMMON_HOME/rgf/&lt;SID_Hostname&gt;</td>
<td>$LOG_HOME/app/rgf</td>
</tr>
<tr>
<td>opmn.log</td>
<td>$INST_HOME/ora/10.1.3/opmn</td>
<td>$INST_HOME/ora/10.1.3/opmn</td>
</tr>
<tr>
<td>Apps env file</td>
<td>$APPL_HOME/APPSSSRORV.env</td>
<td>$APPL_HOME/APPSSSRORV.env</td>
</tr>
<tr>
<td>adovars.env</td>
<td>$APPL_HOME/admin</td>
<td>$APPL_HOME/admin</td>
</tr>
<tr>
<td>DB env</td>
<td>$ORA_HOME/&lt;SID&gt;.env</td>
<td>$ORA_HOME/&lt;SID&gt;.env</td>
</tr>
<tr>
<td>custom/&lt;CONTEXT&gt;_env</td>
<td>$APPL_HOME/custom/&lt;CONTEXT&gt;_env</td>
<td>$APPL_HOME/custom/&lt;CONTEXT&gt;_env</td>
</tr>
<tr>
<td>Forms env</td>
<td>Apps $ORA_HOME/&lt;CONTEXT&gt;_env</td>
<td>$INST_HOME/ora/10.1.2/&lt;CONTEXT&gt;_env</td>
</tr>
<tr>
<td>formservlet.ini</td>
<td>$IAS_ORACLE_HOME/Apache/j2ee/etc</td>
<td>$ORA_HOME/forms/server/default.env</td>
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