What is new and how to get the best performance in EBS 12.2 middle-tier
Dimas Chbane
Agenda

- 12.1 Architecture Review
- 12.2 Architecture Review
- Fusion Middleware Concepts
- Configuration and Maintenance
- Tips and Tools
- Online Patching
- Q & A
Who am I?

Dimas Chbane
• Consultant / DBA / Analyst
• Focus areas:
  • Databases
  • EBusiness Suite
• Blog: dimas-chbane.net
12.2 EBS Changes

- Application changes are only the tip of an iceberg
- The complexity below surface
- It will require more resources from the technical team (DBAs)
12.1 EBS Architecture
12.1 EBS Architecture

Client

Application

Database

Client

HTTP/S

Web Listener

Oracle Fusion Middleware

Application Server

10g

OC4J

JSP

BC4J

UIX

BI Publisher

Forms

Oracle Database

10gR2 | 11g

Global Single Data Model

RAC & ASM

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12.1 EBS Technology Stack

**Application Tier**
- Oracle Application Server 10.1.3
- Developer 10.1.2
  - APPL_TOP
  - COMMON_TOP
  - INST_TOP

**Database Tier**
- Oracle Database 10g|11g
12.1 EBS Components

Client

Application

Database

Apache (1.3)

OAFM OC4J

Forms-c4ws OC4J

OACore OC4J

Forms OC4J

opmn

frmweb

AS 10.1.3 HOME

AS 10.1.2 HOME

Client Application Database

Apache

OAFM OC4J

Forms-c4ws OC4J

OACore OC4J

Forms OC4J

opmn

frmweb

AS 10.1.3 HOME

AS 10.1.2 HOME
12.2 EBS Architecture
12.2 EBS Architecture

Client

Application

Database

- JDBC/SQL Net
- HTTP/S
- Oracle Fusion Middleware 11g
- WebLogic Server
- WebLogic JSP
- BC4J
- UIX 11g
- BI Publisher
- Forms
- Global Single Data Model
- RAC & ASM
- Edition-Based Redefinition
12.2 EBS Technology Stack

**Applications Tier – Dual File System**

- Oracle HTTP Server (OHS)
- WebLogic Server (WLS)
- Developer 10.1.2
- APPL_TOP
- COMMON_TOP
- INST_TOP
- FS_NE

**Database Tier**

- Oracle Database 11gR2|12c

**Fusion Middleware 11g**
R12.2 Components

Client

Node Manager

Admin Server

Application

Apache (2.2)

opmn

Node Manager

Admin Server

Weblogic + OHS

Database

OAFM

Forms-c4ws

OAEA

OACore

Forms

frmweb

AS 10.1.2 HOME

AS 10.1.2 HOME

Client

Weblogic + OHS

Database

AS 10.1.2 HOME

Client

Weblogic + OHS

Database

AS 10.1.2 HOME

Client

Weblogic + OHS

Database

AS 10.1.2 HOME

Client

Weblogic + OHS

Database

AS 10.1.2 HOME
Why change? Why change to Weblogic?

- Provide the latest Middleware technologies to Oracle E-Business Suite
- Leverage the latest improvements in performance, scalability, security and administration
- Establish a platform to easily adopt future advancements in technology
- Support for native FMW tools
What is E-Business Suite from a WebLogic Perspective?

- From a simplistic point of view, E-Business Suite feels like:
  - A handful of web applications…
  - Deployed to Clusters of Managed Servers…
  - Supervised by an Admin Server…
  - Configured in a WebLogic Server Domain
Multi-node installation

- Application Tier Vertical & Horizontal Scaling
Fusion Middleware Concepts
Core Middleware concepts

Domain
• A logically related group of WLS instances that you manage from a “single set of configuration file” (i.e., a single set of config.xml files)

Server
• A running instance of the java class “weblogic.server”
  - This class contains the main method of the WebLogic Server system
• Listens on a particular host and port for incoming requests from clients
  - Performs multiple operations concurrently (multithreaded)
• There are 2 types of servers:
  - Admin Server
  - Managed Servers
Core Middleware Concepts

Admin Server
• Central configuration controller for the entire domain
  – There is one Admin Server in a domain
• Features
  – Hosts the Administration Console
  – Enables you to start and stop servers from a central location
  – Enables you to configure various services (Security, JDBC, JMS, Logging, etc.) for the domain
• The Administration Server does not need to run at all times, but is required for making configuration and deployment changes to servers in the domain.
Core Middleware Concepts

Managed Server

• A running instance that hosts applications and resources needed by those applications
  • The real “work horses” in WebLogic domain

• In EBS:
  • oacore, forms, oafm, forms-c4ws, oaea
  • Configured in a cluster

• Each Managed Server is independent of all other Managed Servers in the domain

• You can have as many Managed Servers in a domain as you need

• Individual Managed Servers can be added for additional capacity
Node Manager

- Utility/process running on a physical server that enables you to start, stop, suspend, and restart WebLogic Server instances remotely
- Must run on each physical server that hosts WebLogic Server instances that you want to control with Node Manager
- Not associated with a domain. Can start any server instance that resides on the same physical server.
- Optional, but required to start/stop servers using the Administration Console
Core Middleware Concepts

Interaction

• The Administration Server stores the master copy of the domain configuration, including the configuration for all managed servers in the domain.
• Each Managed Server stores a local copy of its configuration.
• When a Managed Server starts, it connects to the Administration Server to synchronize the configuration.
  – If Admin server is down, when managed server is started, it uses its local copy of configuration files.
• When configuration is changed, the Administration Server sends changed configuration to Managed Servers.
## Oracle E-Business Suite 12.2 Configuration

<table>
<thead>
<tr>
<th></th>
<th>Fusion Middleware Control</th>
<th>WLS Administration Console</th>
<th>Oracle Application Manager and Autoconfig</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Database Home</strong></td>
<td></td>
<td></td>
<td>SID name, Listener, dbPorts, etc</td>
</tr>
<tr>
<td><strong>Oracle HTTP Server</strong></td>
<td>Performance directives, log configuration, ports, mod_perl, mod_wl_ohs, etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weblogic</strong></td>
<td></td>
<td></td>
<td>oacore, oafm, forms and forms-c4ws services, etc</td>
</tr>
<tr>
<td><strong>Oracle E-Business Suite</strong></td>
<td></td>
<td></td>
<td>Developer 10g, Product specific config files, JVM Settings for Admin Node, etc</td>
</tr>
</tbody>
</table>

In 12.2, Autoconfig has a reduced role in the configuration of OHS and WLS. The remaining configurations performed by Autoconfig stay the same.

Need to use the **Fusion Middleware Control** and the **WLS Administration Console**
Oracle E-Business Suite 12.2 Configuration

• Feedback Loop
  • The applications context file will be kept synchronized with dependant OHS and WLS configuration parameters

OHS Changes require executing script adSyncContext.pl to synchronize the Context File

Managing Configuration of Oracle HTTP Server and Web Application Services in Oracle E-Business Suite Release 12.2 (Doc ID 1905593.1)
Fusion Middleware Control

Default => http://machine:7002/em

Administer Oracle HTTP Server
Fusion Middleware Control

Administer Oracle HTTP Server
Fusion Middleware Control

Administer Oracle HTTP Server

Advanced Server Configuration

View or edit an OHS configuration file. Use the Select File list to select configuration file, and then click Go.

httpd.conf

# documents or custom error documents).
# Set to "On" to also include a meta:link to the ServerAdmin.
# Set to one of: On | Off | None
# ServerSignature Off
#
# Disable the TRACE HTTP method by default
TraceEnable off
#
# HostnameLookups: Log the names of clients or just their IP addresses
# E.g., www.apache.org (on) or 204.62.129.132 (off).
# The default is off because it's overall better for the net if people
# had to knowingly turn the feature on, since enabling it means that
# each client request will result in AT LEAST one lookup request to the
# /etc/hosts file.
# HostnameLookups Off
#
# ServerPool Size Regulation (OHS specific)
#
# httpd(8): number of server processes to start
# Slowly increases the number of server processes which are kept open
WLS Administration Console

Default=> http://machine:7002/console

Quick Links
General Information
Services
Diagnostics
Environment
System Monitoring
Admin Console: Servers

ORACLE WebLogic Server® Administration Console

Change Center
- View changes and restarts
  - Lock & Edit button to modify, add or delete items in this domain.
  - Release Configuration

Domain Structure
- EBS_domain_VISR122
  - Environment
  - Deployments
  - Services
    - Security Realms
    - Interoperability
    - Diagnostics

Summary of Servers

**Configuration**

A server is an instance of WebLogic Server that runs in its own Java Virtual Machine (JVM) and has its own configuration.

This page summarizes each server that has been configured in the current WebLogic Server domain.

**Control**

Customize this table

Servers (Filtered - More Columns Exist)

Click the Lock & Edit button in the Change Center to activate all the buttons on this page.

<table>
<thead>
<tr>
<th>Name</th>
<th>Cluster</th>
<th>Machine</th>
<th>State</th>
<th>Health</th>
<th>Listen Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>AdminServer</td>
<td>forms-4wxs_cluster1</td>
<td>upper07</td>
<td>RUNNING</td>
<td>OK</td>
<td>7002</td>
</tr>
<tr>
<td>forms-4wxs_server1</td>
<td>forms-4wxs_cluster1</td>
<td>upper07</td>
<td>RUNNING</td>
<td>OK</td>
<td>7802</td>
</tr>
<tr>
<td>forms_server1</td>
<td>forms_cluster1</td>
<td>upper07</td>
<td>RUNNING</td>
<td>OK</td>
<td>7402</td>
</tr>
<tr>
<td>oacore_server1</td>
<td>oacore_cluster1</td>
<td>upper07</td>
<td>RUNNING</td>
<td>OK</td>
<td>7202</td>
</tr>
<tr>
<td>oacore_server2</td>
<td>oacore_cluster1</td>
<td>upper07</td>
<td>SHUTDOWN</td>
<td>OK</td>
<td>7203</td>
</tr>
<tr>
<td>oufin_server1</td>
<td>oufin_cluster1</td>
<td>upper07</td>
<td>RUNNING</td>
<td>OK</td>
<td>7802</td>
</tr>
</tbody>
</table>
## Environment setting

- /u01/app/Visr122/EBSapps.env run

<table>
<thead>
<tr>
<th>Environment Variables</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILE_EDITION</td>
<td>run</td>
</tr>
<tr>
<td>RUN_BASE</td>
<td>/u01/app/ebiz/EBSR122/VISR122/fs1</td>
</tr>
<tr>
<td>PATCH_BASE</td>
<td>/u01/app/ebiz/EBSR122/VISR122/fs2</td>
</tr>
<tr>
<td>FMW_HOME</td>
<td>/u01/app/ebiz/EBSR122/VISR122/fs1/FMW_Home</td>
</tr>
<tr>
<td>EBS_DOMAIN_HOME</td>
<td>/u01/app/ebiz/EBSR122/VISR122/fs1/FMW_Home/user_projects/domains/EBS_domain_VISR122</td>
</tr>
<tr>
<td>IAS_ORACLE_HOME</td>
<td>/u01/app/ebiz/EBSR122/VISR122/fs1/FMW_Home/webtier</td>
</tr>
</tbody>
</table>
R12.2: File Structures

Oracle Applications E-Business Suite 12.2 Fusion Middleware Log Files: Locate, View, and Control
(Doc ID 1366187.1)
## Scripts to Manage Components

- **$ADMIN_SCRIPTS_HOME**

<table>
<thead>
<tr>
<th>Script</th>
<th>Arguments</th>
</tr>
</thead>
<tbody>
<tr>
<td>adopmnctl.sh</td>
<td>{start</td>
</tr>
<tr>
<td>adnodemgrctl.sh</td>
<td>{start</td>
</tr>
<tr>
<td>adadminsrvctl.sh</td>
<td>{start</td>
</tr>
<tr>
<td>admanagedsrvctl.sh</td>
<td>{start</td>
</tr>
<tr>
<td></td>
<td>{startall</td>
</tr>
</tbody>
</table>
Tips and Tools
Always good to remember

• Before the upgrade, consider your options
  – Which Oracle E-Business Suite Release Should You Target: 12.1 or 12.2? (Doc ID 1592197.1)

• Read the documentation and notes
  – Oracle E-Business Suite Release 12.2 Information Center (Doc ID 1581299.1)
  – Useful 12.2 Document References (Doc ID 1585889.1)

• Stay current with patches
  – Make sure to apply the patches listed in the release notes:
    • Oracle E-Business Suite Release 12.2.5 Readme(Doc ID 1983050.1)
    • Oracle E-Business Suite Release 12.2.4 Readme (Doc ID 1617458.1)
  – Each product has a separate Release Note
    • Oracle E-Business Suite Product Specific Release Notes, Release 12.2.2 (Doc ID 1585844.1)

• **Test! Test! Test!**
Sizing the middle tier

• JVM sizing should consider both memory and CPU domains.

• For 12.2: “Managing Configuration of Oracle HTTP Server and Oacore, Oafm, Forms and Forms-c4ws Applications in Oracle E-Business Suite Release 12.2 (MOS ID 1905593.1)”

• Be conservative and consider additional resources requirements for online patching

  • Better have more managed instances in the cluster to scale up to the target concurrency levels, than one with large heap

  • The default heap size of 512M for the Admin Server is not enough for most installations
    • Start with Xms =1 GB and Xmx = 2GB

• For 12.1: “JVM: Guidelines to setup the Java Virtual Machine in Apps E-Business Suite 11i and R12 (Doc ID 362851.1)”
Monitoring the WLS Managed Servers

• Avoid excessive logging
  – Slow Performance Navigating Through (OA Framework) Web Pages (Doc ID 1967444.1)
• Garbage collection activity is not enabled by defaults
  – Add “–verbose:gc -Xloggc:<filename>” to the startup options
• Monitoring JDBC connections
  – AOL/J JDBC Connection Pool link under Diagnostic does not work in 12.2
  – WLS has “Inactive Connection Timeout”
    • Don’t let it set all the time in Production
    • Oracle E-Business Suite 12.2 Data Source Connection Pool Diagnostics (Doc ID 1940996.1)
• Java mission control
  – Shipped with jdk 1.7-40+
  – How To Install And Integrate Jrockit Mission Control With Ebusiness Suite 12.2 (Doc ID 1377695.1)
Java Mission Control

Note: screen shots from 12.1
Mining the Apache Access_Log

• Access_log directives httpd.conf: LogFormat
  LogFormat "%h %l %u %t "%r" %>s %b %T "%{Referer}i" "%{User-Agent}i"" combined

• [http://httpd.apache.org/docs/2.2/mod/mod_log_config.html#formats](http://httpd.apache.org/docs/2.2/mod/mod_log_config.html#formats)
  %s – response status
  %b – bytes returned
  %T / %D – time taken to respond to the request (second/microseconds)

• Example:
  172.28.1.68 - - [10/May/2015:06:58:44 +0100] "GET /OA_HTML/AppsLocalLogin.jsp HTTP/1.1" 302 639 1

• 12.2 does not have %T or %D by default (see Doc ID 1967444.1)
Apalyzer – Apache access_log analyzer

• Tool to analyze the access_log
• Free!
• Shell script
• Installs nothing
• Uses Google charts
• Download from http://dimas-chbane.net

• To run:
  – Unzip the file
  – ea3.sh <access_log name>
  – Creates a zip file will all the files
  – In your PC, look for the *START_HERE* file
Online Patching
EBS Downtime 12.1

System is down during patching

Error
The system has not been taken off maintenance mode completely. Please contact your System Administrator.
EBS Downtime – A Major Concern

• Production Outage
  – Major Release
  – Maintenance Rollups (RUPs)
  – Critical Patch Updates (CPUs)
  – Legislative and Regulatory updates

• When outages interfere with core business activity
  – Reluctance to upgrade to take advantage of new feature
  – Barrier to staying current with recommended patches

• Global Single Instance
  – Compounds the problem
  – Patching any one module causes the entire system to be down
Online Patching

• In 12.2 all patching operations are online
  – EBS will remain available to users during patching operations
  – HR Legislative updates can be applied during a payroll run
  – Users can enter expense reports while Payables is being patched

• Online patching uses the latest features of this stack
  – Edition Based Redefinition (EBR)
  – Weblogic Server
Patches are Applied to a Copy of Production

Production Instance

E-Business Suite 12.2

Copy of Production

Patches
- ATG_PF.D
- AD.C
- FIN_PF.E

• Copy the production code
• Apply patches to the copy
Copy the Code, NOT the Data

• EBS uses both the file system and the database to store the code and data that make up the application
  – Code
    • Stored both on the File system & In the Database
    • Any code object changed in a patch is copied
  – Data
    • Stored both on the File system & In the Database
    • Application data is NOT copied by a patch
Changing the unit of measure for downtime

• Cutover is the time taken to switch users from the production system to the newly patched copy
• Cutover changes the unit of measure for downtime
  – Measured in minutes **NOT** hours or days
• Cutover time is very predictable
  – The time taken to bounce the Middle Tiers
Downtime Limited to Short Cutover

Production Instance

E-Business Suite 12.2.0

Patched Production Instance

E-Business Suite 12.2.0
Patches
- ATG_PF.D
- AD.C
- FIN_PF.E

• Users are logged off the production Instance
• When Users reconnect they are directed to the newly patched system
Changing the Patching Paradigm

- **Downtime Patches**
  - No online Users
  - Wall clock time very important
  - Consumes all resources
  - Upgrade designed to run as fast as possible

- **Online Patches**
  - Users remain online
  - Wall clock time is no longer an overriding concern
  - Online Users share resources
  - Data upgrades designed to not affect the running application
Three File Systems and One Database

- All three file systems serve a single database
- The file system in use by the running application is never patched
- All patches are applied to secondary file system
11G R2 Edition-Based Redefinition (EBR)

• The final piece in the high availability puzzle
  – Enables the online upgrade of the database tier
  – Allows an application to efficiently store multiple copies of its application definition in the same database
• Provides an isolation mechanism that allows pre-upgrade and post-upgrade schemas to co-exist
  – Changes to database objects are made in the isolation of an “Edition”
  – Changes to database objects do not effect the running Application
Database Editions

• Client code chooses **the Edition** that it connects to:
  - Run Edition
    • Used by Online Users
    • Never changed by a Patch
  - Patch Edition
    • Used by the Patching Tools
    • Changes do no affect the running Application
Online Patching Interacts with 3 Edition Types

• Run Edition
  – The edition currently in use by the running application
  – This is always the default database edition

• Patch Edition
  – The edition currently in use by the patching tools
  – This edition is only present when patching is in progress
  – Always the direct child of the Run Edition.

• Old Edition(s)
  – There maybe zero or more Old Editions
  – When the Patch Edition is promoted to production the previous Run Edition is now regarded as an Old Edition
  – Only retained until a full cleanup operation is run
Online Patching Cycle

<table>
<thead>
<tr>
<th>Prepare</th>
<th>Apply</th>
<th>Finalize</th>
<th>Cutover</th>
<th>Cleanup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy the production application code</td>
<td>Apply one or more patches to the Patch Edition</td>
<td>Compile invalid Objects</td>
<td>Restart application on Patch Edition</td>
<td>Remove obsolete objects</td>
</tr>
<tr>
<td>Create a new Patch Edition in the database</td>
<td></td>
<td>Wait for a good downtime window</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Users Online
- Users Offline
- Users Online
Database Objects

• **Editioned Objects**
  - PLSQL, Spec, Body, Function, Procedure, Views, Editioning Views, Triggers, Types, Synonyms

• **Non-Editioned Objects**
  - Tables, indexes, MVs, Sequences

• Non-Editioned Objects can't reference Editioned Objects
• 12.2 upgrade removes all such dependencies
New Data Model

- E-Business Code
- Custom Code
- 3rd Party Code

- All code must access the data model via the APPS synonym
- APPS synonym points to the Editioning View (Logical Model)
- Any code accessing the physical model risks accessing obsolete columns
Readiness Reports

- Helps prepare customization and extensions for Online Patching
  - Custom schemas that require registration for Online Patching enablement
  - Custom objects that require manual intervention in order to avoid invalidation post enablement

- All customer should
  - Execute the Readiness Reports before enabling Online Patching
  - Understand and fix any exceptions reported before enabling Online Patching

- Standalone patches available for Readiness Reports: 11i, 12.1 & 12.2
- Summary Readiness Report (ADZDPSUM.sql)
- Manual Readiness Report (ADZDPMAN.sql)
- Database Compliance Checker (ADZDDBCC.sql)
- File System Check Report (gscc.pl)
References

- Note 1581299.1: Oracle E-Business Suite Release 12.2 Information Center
- Note 1366187.1: Oracle Applications E-Business Suite 12.2 Fusion Middleware Log Files: Locate, View, and Control
- Note 1583902.1: Oracle E-Business Suite Release 12.2: Online Patching FAQ
- Note 1542162.1: 12.2 E-Business Suite - Collecting Online Patching and fs_clone Log Files
- Note 1597531.1: Oracle E-Business Suite Release 12.2: Upgrade Sizing and Best Practices
- Note 1531121.1: Using the Online Patching Readiness Report in Oracle E-Business Suite Release 12.2
Thank you