

ORACLE®



COLLABORATE15

TECHNOLOGY AND APPLICATIONS FOR JIM
FOR THE ORACLE COMMUNITY

Getting Optimal Performance from Oracle E-Business Suite

Samer Barakat
Director, Applications Performance Group

Applications Technology Group, Oracle E-Business Suite Development
ORACLE

ORACLE

Copyright © 2014, Oracle and/or its affiliates. All rights reserved. |

Program Agenda

- 1 Performance Triage & Resolution
- 2 Optimizing E-Business Suite Applications Tier
- 3 Optimizing E-Business Suite Database Tier
- 4 Optimizing E-Business Suite on RAC
- 5 Optimizing E-Business Data Management
- 6 Upgrade Performance Best Practices

Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Performance Triage & Resolution

Performance Triage & Resolution

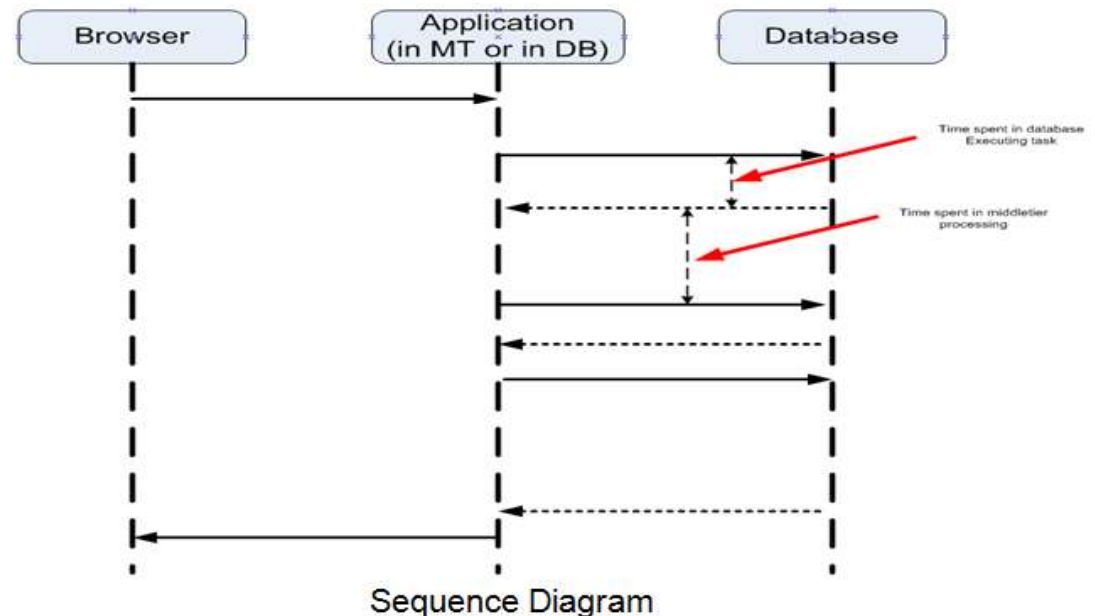
How to Approach a Performance Issue

- **DEFINE** the problem clearly
- **GATHER** the right data to analyze the issue
- Identify the **ROOT CAUSE** of the problem, possibly gather additional data
- Search for a **KNOWN SOLUTION** or workaround that addresses the root cause of the problem
- If it is a product issue, **PASS ON** the right information to support/dev through the regular channels
- Try to identify a **TEMPORARY WORKAROUND** to alleviate the issue while you get a permanent fix

Performance Triage & Resolution

Define the Problem

- Get a clear understanding & quantitative definition of the issue
- Where is the time going ? Get the right diagnostics
 - What?
 - Where?
 - When?
 - Why?
 - How?
- Identify the Techstack components in-play
- Refer to the architecture



Performance Triage & Resolution

Gather Diagnostic Data

~ 80% of issues are DB processing related (flow chart slide)

Start with *MOS ID 1121043.1* for How-to & Best Practices

• SQL Tuning

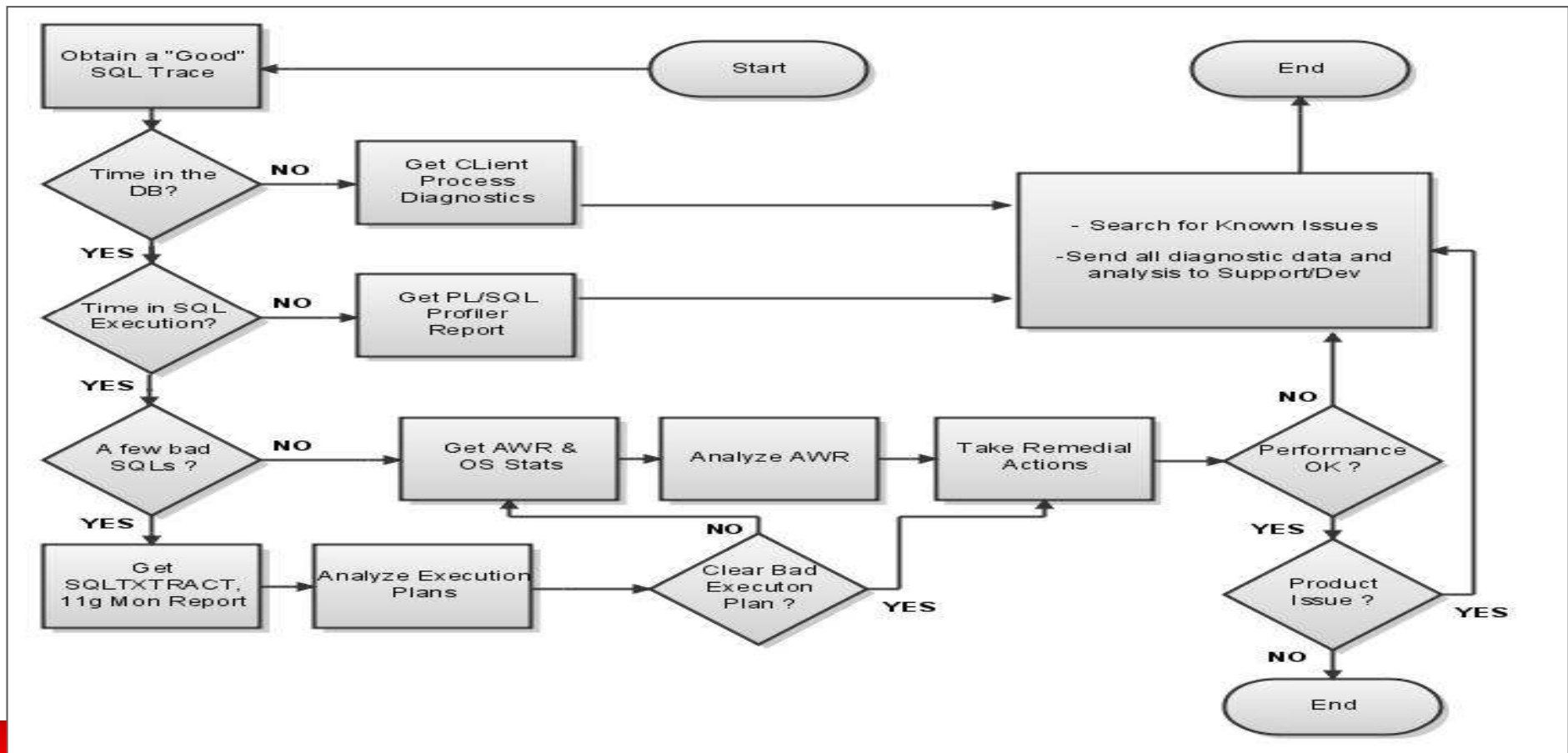
- Trace files
- SQLT output (MOS ID: 215187.1)
- Trace Analyzer (MOS ID: 224270.1)
- AWR Report (MOS ID: 748642.1)
- 11g SQL Monitor Report
- AWR SQL Report (awrsqrpt.sql)
- PL/SQL Tuning
 - Product logs
 - PL/SQL Profiler (MOS ID: 808005.1)
- Reports Tracing (MOS ID: 111311.1)

• Database Tuning

- AWR Report (MOS ID: 748642.1)
- ADDM report (MOS ID: 250655.1)
- Active Session History (ASH)
- Forms Tuning
 - Forms Tracing (MOS ID: 373548.1)
 - FRD Log (MOS ID: 445166.1)
 - Generic note (MOS ID: 438652.1)
- Middle tier Tuning
 - JVM Logs
 - JVM Sizing/Tuning (MOS ID: 362851.1,278868.1)
- OS - OSWatcher (MOS ID: 301137.1)
- Network Test Utilities Best Practices (MOS ID: 556738.1)

Performance Triage & Resolution

Gather Diagnostic Data



Performance Triage & Resolution

Gather Enhanced Performance Diagnostics for Oracle E-Business Suite (MOS ID: 1362660.1)

- Enables gathering all the relevant diagnostic data in one round trip.
 - Available from 12.1.3 as a standalone patch# 12544073 (Mandatory Pre-Requisite AD Patch# 12991557)
 - Enhancement to FND_TRACE: New procedure *“set_preferences”* enables you to
 - Enable tracing for sessions
 - Enable tracing for one or more SQL statements using SQL_ID (*)
 - Generate CBO trace when tracing SQL statements (*)
 - Trace PL/SQL using PL/SQL Hierarchical Profiler (*)
 - Set Statistics Level
- (*) - Only in Oracle Database 11g+

Performance Triage & Resolution

Gather Enhanced Performance Diagnostics for Oracle E-Business Suite (MOS ID: 1362660.1)

- One or more of the following outputs can generated automatically after the end of traced session. The concurrent program '**Gather Diagnostic Data for Traced Sessions**' is automatically submitted via '*System Administrator responsibility* to gather this output
 - AWR, ADDM and ASH Reports
 - Session Statistics
 - SQLT output (*)
 - Trace Analyzer output, which includes SQLT output for top SQLs
 - Objects statistics when a SQL statement is traced, but SQLT output is not chosen or not installed
 - Real-Time SQL Monitor Report when a SQL statement is traced (**)
 - SQL Detail Report when a SQL Statement is traced (***)
- (*) Requires SQLT tool - Note 215187.1, (**) Oracle DB 11g+ (***) Oracle DB 11.2.0.1+

Performance Triage & Resolution

Gather Diagnostic Data

- **Establish baselines for different workloads** by collecting system level performance information
 - AWR (Automatic Workload Repository) Report
 - ADDM (Automatic Database Diagnostic Monitor) Report
 - ASH (Active Session History) Report
 - Real-Time SQL Monitoring Report (11g+) (Parallel queries and queries taking > 5 seconds)
- **Monitor Operating system statistics**
 - OSW Document **MOS ID301137.1**
 - OSWg Document **MOS ID 461053.1**

Performance Triage & Resolution

Gather Diagnostic Data

- **Monitor and trace critical flows & concurrent programs**
 - ASH (Active Session History) Report
 - SQL Trace Level 8 (with waits) or Level 12 (with waits and binds) followed by TKPROF
 - Check both raw trace and TKPROF
 - Interpreting Raw SQL_TRACE files **MOS ID 39817.1**
 - Trace Analyzer (TRCA) reads an Event 10046 SQL Trace file and provides a comprehensive report for performance analysis and tuning **MOS ID 224270.1**
- **Monitor and trace specific SQLs**
 - SQLTXPLAIN (aka SQLT) **MOS ID 215187.1**
 - Maintained by Oracle Support - often requested
 - Collects information on why the execution plan was chosen

Performance Triage & Resolution

Gather Diagnostic Data

Trace/TKPROF ... Get the complete session story

- Set Trace Parameters
- **max_dump_file_size=unlimited**
 - Ensure there is sufficient disk space in the tracing directory
- **user_dump_dest** or if **diagnostic_dest** is set in **Oracle11g**
 - (diagnostic_dest)/diag/rdbms/(dbname)/(instname)/trace
 - background_dump_dest for parallel slave processes
- STATISTICS_LEVEL=ALL

Generate Trace

- Forms: Help -> Diagnostics -> Trace
- OA HTML: Diagnostics -> Tracing
- Set the profile: “Initialization SQL Statement - Custom“. Use FND_CTL.FND_SESS_CTL

Performance Triage & Resolution

Gather Diagnostic Data

Trace/TKPROF ... Get the complete session story

- Raw trace must be
 - **From before the user action began** To the point the DB session ends**
 - A complete, non-truncated trace file
 - *** DUMP FILE SIZE IS LIMITED TO 12345 BYTES***
- **Run TKPROF from the correct Oracle home**
 - Use the sort options = fchela,exeela,prsela
- TKPROF output MUST have
 - **Runtime Execution Plans and Row Counts & Row Source Stats**
 - Run Time Execution Plan = “Row Source Operation” != “Explain Plan”
- Best practices, detailed how-to steps & recommended tracing patches.
 - **MOS ID 1121043.1** (Also review Appendix B – Getting In-Memory partial runtime stats)

Performance Triage & Resolution

Gather Diagnostic Data

Automatic Workload Repository (AWR) ... Get the complete system story

- Regularly Review Automatic Workload Repository (AWR) data for different workloads
- Use DBMS_WORKLOAD_REPOSITORY or Enterprise Manager to create snapshots
- Generate reports using `$ORACLE_HOME/rdbms/admin/awrrpt.sql`
- Review the Advisory sections in AWR to fine tune SGA & PGA
- Monitor and correlate top SQL in AWR to business flows
- Review Load Profile and Top 5 Timed Events section to determine utilization or bottlenecks and review relevant detailed sections for these events

Performance Triage & Resolution

Gather Diagnostic Data

Automatic Workload Repository (AWR) ... Get the complete system story

Top 5 Timed Events

Contention ... Latch Related Waits

Event	Waits	Time(s)	Avg Wait(ms)	% Total Call Time	Wait Class
latch free	31,342,490	613,374	20	58.0	Other
CPU time		386,590		36.6	
db file sequential read	13,474,726	37,319	3	3.5	User I/O
latch: cache buffers chains	2,270,036	12,802	6	1.2	Concurrency
db file scattered read	434,296	6,151	14	.6	User I/O

I/O Related Waits ... Bad SQLs

Event	Waits	Time(s)	Avg wait (ms)	% DB time	Wait Class
DB CPU		10,275		45.02	
db file scattered read	482,913	4,938	10	21.64	User I/O
db file sequential read	910,137	3,263	4	14.30	User I/O
direct path read	190,382	1,652	9	7.24	User I/O
db file parallel read	43,402	670	15	2.93	User I/O

Performance Triage & Resolution

Analyze Root Cause

- Regularly Review Automatic Workload Repository (AWR) data for different workloads
 - **For Latch related waits**
 - Often due to: **non-sharable SQL, sub-optimal SQL** which performs full table or full index scans, dynamic object creation/removal, etc.
 - Review the latch Statistics section to determine the hot latches
 - Trace waiter and holder sessions to determine actual cause
 - **For I/O related waits**
 - Review SQL sections by **Logical/Physical reads/writes** and the Segment Statistics sections by I/O
 - **For Enqueue related or buffer busy waits**
 - Review the following sections: enqueue, segment statistics by buffer busy waits, row lock & ITL waits

Performance Triage & Resolution

Analyze Root Cause

If bottleneck is I/O related...

(db file sequential read, db file scattered read, log file sync, free buffer waits, etc...)

- **Tune Top SQL is always the first step**
- Make sure that system has **updated statistics**
- Maximize Memory availability, allocate generously to buffer cache, review AWR advisories & monitor swapping & paging
- Use ASM or alternatively use the SAME methodology for db files
- IO Sub-system:
 - RAID 10 still preferred most often for high end requirements Ideal avg. response times of < 10ms
- **Check for excessive/redundant indexing**
- Configure async IO, use quick I/O technologies

Performance Triage & Resolution

Analyze Root Cause

If the bottleneck is concurrency related (enq%, latch%, buffer busy%, etc...)

- Use global hash-partitioned indexes for hot leaf blocks - Identify via AWR "Top logical IOs by Segment"
- Some of these waits are commonly caused by bad SQL execution plans
 - For example: latch: cache buffer chains, %buffer busy waits, read by other session
- Make sure to use ASSM and OATM table space model
- Increase INITRANS to alleviate ITL contention
- Increase sequence caches
- Work with support/consulting to evaluate if table/index partitioning will help (is not supported to change out of the box partitioned table)
- If the program allows, more frequent commits (batch size) can help by reducing the CR (consistent read) work required

Optimizing E-Business Suite Applications Tier

Optimizing E-Business Suite Applications Tier

Stay Current

- **Keep the system current** on AD/ATG/OAM code e.g. apply latest AD/ATG RUPs
- Apply the latest EBS Family Packs + Recommended Patch List
- **For 12.2, review** Oracle E-Business Suite Release 12.2: Consolidated List of Patches and Technology Bug Fixes (MOS ID 1594274.1)
- **Critical EBS patches are also listed in the E-Business Suite 12.2 readmes.**
- **That database versions 11.2.0.3 and 12.1.0.1 will be end of error correction July 22nd 2015 and August 27th respectively.**
- **For 12.2, apply** the Latest AD and TXK Release Update Packs to Oracle E-Business Suite Release 12.2 (MOS ID 1617461.1)
- **Apply “Recommended Performance Patches for the Oracle E-Business Suite”, MOS ID 244040.1**
 - Recommended performance patches for all the modules and tech stack components are consolidated in this note
- Upgrade techstack components to the latest certified levels
 - Check <http://blogs.oracle.com/stevenChan/resource/certifications.html>

Optimizing E-Business Suite Applications Tier

Use Optimal Logging Settings

- As Logging and enabling debug messages **have considerable impact on performance**, always make sure that the associated profiles are set properly while keeping logging levels to minimum.
- FND: Debug Log Enabled - Set it to 'Yes' (12.0 RUP3+, 12.1.x, 12.2)
- FND: Debug Log Level - Set to Unexpected (Level=6)
- Query FND_LOG_MESSAGES to check the logging traffic
- Note that With above profile configuration
 - If the query shows a large number of rows being created, there could be exceptions and errors that need to be investigated

Optimizing E-Business Suite Applications Tier

Optimize Workflow Processes

- **Purge runtime data** (Concurrent Program: FNDWFPR)
 - Can run by ITEM_TYPE
 - Monitor/Troubleshoot old workflows not properly closed
 - Purge frequently
- **For background engines via Concurrent Manager**, set the 'Process Stuck' parameter to 'No'
 - Identification of stuck workflows is resource intensive
 - Start a separate background engine to handle stuck/timed out processes with a low frequency –i.e. once a day
- **Use deferred activities to improve online response times** for flows such as Scheduling, PO Document Approval, etc.

Optimizing E-Business Suite Applications Tier

Optimize Workflow Processes

- Run `$FND_TOP/sql/wffngen.sql` to translate the activity function calls into static calls
 - Edit & add heavily used ITEM_TYPES
 - `itemtypelist_t ('WFSTD','FNDFFWF')`
 - Generates `wffncal2b.pls` in `utl_file_dir` to recreate package.
- **Disable retention on Workflow Queues**
 - `DBMS_AQADM.ALTER_QUEUE(queue_name=>:b1,retention_time=>0);`
- **Verify that runtime tables are partitioned for higher scalability – MOS ID: 260884.1**
- For high volume batch processing in RAC use ITEM_TYPE to Node affinity
- Define node affinity at the program level (MOS ID 1129203.1)

Optimizing E-Business Suite Applications Tier

Optimize Forms Processes

- Reduce load on the database server: **train applications users to optimally utilize the professional Forms** interfaces by:
 - Avoiding Blind queries with unselective filtering criteria
 - Providing selective criteria in Find windows and LOVs
- **Minimize network traffic and form open times: train applications users to**
 - Avoid opening and closing forms across transactions
 - Combine forms from multiple-products on a single menu
- Reducing system load and network overhead, is especially important for deployments with high user concurrency levels and high latency connections
- Monitor concurrency levels and system load on the applications tier
- **Generate complete SQL trace and Forms Runtime Diagnostics (FRD)** to debug performance issues

Optimizing E-Business Suite Applications Tier

Optimize JVM Processes

- Total available **memory is the most important factor affecting GC performance.**
- Monitor the **frequency of collections, especially major collections (i.e. Full GC)**
- Enable **verbose GC to tune heap sizes** based on the GC traffic
- **Start with: -Xms1024M and -Xmx1024M**
- **Setting -Xms and -Xmx to the same value avoids the need for heap memory re-allocation during runtime**
- **If full GCs are too frequent, consider increasing Xms and Xmx**
- Consider using **jstat to see and review each of the heap generations** for possible tuning
- **Increase the number of JVMs to scale up for more users with faster GC times.**
 - Each JVM has a smaller Xmx,Xms memory footprint so full GCs will be faster!

Optimizing E-Business Suite Applications Tier

Size The Middle Tier For Concurrency

- The main contributors to the middle tier **memory are the JVMs heaps, forms (frmweb) process memory and concurrent manager components, especially java concurrent** programs.
- To calculate physical memory for oacore JVM heap, the following formula can be used:

$$M = (N / 150) * 1 \text{ GB}$$

Where M = total memory used by oacore VMs

N = total number of concurrent Self-Service users

- Use one JVM per 2 CPUs
- ~100-150 concurrent users per JVM

Optimizing E-Business Suite Applications Tier

Size The Middle Tier For Concurrency

- **To calculate physical memory for Forms frmweb processes**, the following formula can be used:

$$M = N * 40MB$$

Where

M = total memory used by Forms frmweb processes

N = total number of concurrent Forms users

- **Care should be taken to size for the concurrent manager components**, especially java concurrent programs.

Optimizing E-Business Suite Applications Tier

Size The Middle Tier For Concurrency

- Managed instances JVM sizing should consider both memory and CPU domains.
- On 64bit environment, we do not recommend allocating huge heap sizes, but rather have more managed instances in the cluster to scale up to the target concurrency levels.
- **For 12.2**, for Admin Server sizing, the default size of 512M is not enough for most installations, we recommend setting the XMS to at least 1 GB and the XMX to 2GB
- **For 12.2, consider additional sizing requirements for online patching.** An initial guidance on 12.2 environment standard sizing can be found in the “Oracle E-Business Suite Installation Guide: Using Rapid Install (Part No. E22950)”

http://docs.oracle.com/cd/E26401_01/doc.122/e22950/T422699i4773.htm#T610671

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)

Optimizing E-Business Suite Applications Tier

Optimize the Concurrent Manager

- **Manage CM Jobs Lifecycle:** 50% of performance tuning is in the business!
 - Review long-running auto resubmitted jobs
 - Review short/long-running jobs – selective parameters?
 - Don't purge jobs that the users then have to run again
 - Trim the fat: Review and eliminate concurrent jobs that are not required and/or are not being used by users.
- **Manage CM Managers:** More managers/workers != more throughput
 - Avoid enabling an excessive number of standard or specialized managers.
 - A common guideline is between 1-2 target process per CPU, but this needs to be balanced with resources required by online activity
 - Utilize Parallel Concurrent Processing (PCP) to leverage the Cluster (RAC)

Optimizing E-Business Suite Applications Tier

Optimize the Concurrent Manager

- **Manage CM State Data:**

- Purge the FND tables on a regular basis using the **“Purge Concurrent Request and Manager Data”** program
- High throughput: Keep *.out and *.log on fast disks. Use Separate disks if throughput seems slow especially on NFS Filers
- Truncate the reports.log file in log directory. Watch for 2GB limit on any output files (MOS ID 842850.1)

- **Manage CM Schedules:**

- **Use specialization rules and work shifts** to bind specific jobs to specific time windows .
- Avoid scheduling resource intensive batch requests during peak activity.
- Reschedule some programs to run when the concurrent managers have excess capacity.
- Define **Workload Management Strategy** based on job average duration and system usage profile.

Optimizing E-Business Suite Applications Tier

Optimize the Concurrent Manager: Workload Management Strategy

	Avg. Duration	Workers	Sleep	Cache
Fast	10s	Lots	15 - 20	Enough*
Medium	5 mins	A few	60	2xworkers
Slow	30 mins	Not many	60	= 2xworkers**
Long	2 hours +	Very few	60	= workers**
Critical	N/A	?	30 or 60	?

Avoid Short Sleep Times

- *Enough for a couple of minutes of work
- **Set cache size to at least twice the number of workers

• Specialization rules and work shifts

- Bind specific jobs to specific time windows
- Profile Option: Concurrent: Active Request Limit can be used restrict the number of concurrent requests that may be run simultaneously by each user
- Specialize if there are too many jobs in a specific category

Optimizing E-Business Suite Applications Tier

Optimize the Concurrent Manager

- **Conflict Resolution Manager Sleep Time:**

- To maximize throughput for jobs which spawn parallel workers (i.e. Auto Invoice, Payroll), consider reducing the sleep time of the Conflict Resolution Manager (CRM).
- **Default is 60s, consider 5 or 10 seconds**

- **Concurrent Manager Sleep Time:**

- Define dedicated queues for short and frequent requests and increase the sleep times for managers which do not require near real-time job execution
- Reducing sleep time to a very low value many cause excessive CPU utilization.

- **Transaction Manager Sleep Time:**

- Set the profile “**Concurrent:Wait for Available TM**” to **1 (second)** to minimize TM latency. The profile sets the total time to wait for a TM before switchover to next available TM
- Set **Sleep time on Transaction Managers to 30 minutes**. this avoids constant polls to check for shutdown requests.

Optimizing E-Business Suite Database Tier

Optimizing E-Business Suite Database Tier

Optimize Database

- **Tune Init.ora Parameters:**
 - Ensure mandatory init.ora parameters are set correctly.
 - **MOS ID 396009.1 & 216205.1** (R12 & 11i respectively)
(MOS now has a [HOT TOPICS](#) feature to be alerted when favorite notes have been updated)
- **Apply Required Patches & Fixes/Workarounds for Known Issues**
 - Recommended Performance Patches - **MOS ID 244040.1**
 - Required Patching – Interoperability Notes
- **Size SGA and PGA memory for maximum projected concurrency levels**, buffer cache and shared pool sizing specially critical
- **Use Large/Huge pages.** For example on Linux Huge Pages – See MOS ID 744769.1
 - **Only SGA allocation benefits from large/huge pages**, PGA allocation does not
 - Set the **parameter USE_LARGE_PAGES='only'** for each instance so that the instance will only start if sufficient Huge Pages are available See MOS ID 1392497.1

Optimizing E-Business Suite Database Tier

Optimize Disk IO

- Ensure **kernel asynchronous I/O is enabled** and supported for the underlying file system (if file systems are being used for the DB files)
- Configure & **verify direct I/O is used** (if file systems are being used for the DB files)
 - Improves performance/scalability by simulating raw devices, avoiding file system cache traffic
- **Ensure your I/O subsystem can handle your peak I/O load & IOPS**
 - Consider RAID, S.A.M.E. configuration with sufficient spindles
 - Measure with ORION tool or in 11g
DBMS_RESOURCE_MANAGER.CALIBRATE_IO – MOS ID 727062.1
- **Reduce the I/O workload**
 - Tune expensive SQL
 - Trim the workload of unnecessary tasks
 - Do 3X less I/O on average with 11g Advanced Compression Option

Optimizing E-Business Suite Database Tier

Optimize Backend Code Execution Path

- Utilize PL/SQL Native Compilation.
- Pin Top Apps PL/SQL packages by executions to help avoid shared pool fragmentation and reloads.
- Check cursor leaks and SQL statements using literals with large execution counts. Cursor leaks/literals can result in ORA-4031 errors.
- Tune sequence cache sizes for hot sequences (e.g. 1,000 or higher) in order to minimize index key contention for the Apps surrogate keys.
- As each **online patching cycle is completed**, the database will accumulate an additional old database edition. If the number of these grows too large, system performance will start to be affected. **When the number of old database editions reaches 25 or more, you should consider dropping all old database editions by running the adop actualize_all phase and then performing a full cleanup.**
- Make sure to use FND_STATS to gather statistics.

Optimizing E-Business Suite Database Tier

Gather Applications Statistics

- Statistics gathering strategy **should not be based on time**.
- It should always be **based on rate of change** in the data and is an iterative process.
- **Disable the 10g/11g automatic job to gather stats**
- Do not gather statistics excessively on entire schemas or the entire database such as nightly or weekly.
- **Do not gather statistics on Global Temporary Tables.**
- Avoid gathering statistics during peak hours.
- Gather statistics **after large data load** and when mix/max values have changed.

Optimizing E-Business Suite Database Tier

Gather Applications Statistics

- **New Published MOS ID 1586374.1** for "Best Practices for Gathering Statistics with Oracle E-Business Suite"
- **Use only FND_STATS or the Gather Schema / Table Statistics Concurrent Programs**
 - Do NOT USE the analyze or dbms_stats command directly. It is not supported, and can result in sub-optimal plans.
 - When Gather Schema Statistics concurrent program is used fnd_stats does the bookkeeping for the run.
- FND_STATS supports column histograms.
 - Histograms can be seeded by calling to fnd_stats.load_histogram_cols.
- **Use the GATHER_AUTO option** to gather incrementally. This will re-analyze objects which currently have no statistics and objects with stale statistics

Optimizing E-Business Suite Database Tier

Gather Applications Statistics

- **Analyze all schemas at 10%**, then for some specific objects use higher sampling x%
 - Due to data skew, some tables benefit from higher sampling %
 - From 11g, can use value of **zero (AUTO_SAMPLE_SIZE)**
- **Do not invalidate cursors**
 - While submitting concurrent request to gather statistics set **“Invalidate Dependent Cursors”** parameter to No.
- **Consider locking statistics for very volatile tables** once a representative set is gathered.
 - For example, interface tables, ap_selected_invoices, wsh_pr_workers etc.
 - These intermediate tables are used in batch processes.
 - Use FND_STATS.LOAD_XCLUD_TAB to skip the table.

Optimizing E-Business Suite Database Tier

Gather Dictionary and Fixed Stats

- **Gather dictionary object statistics when** there is a significant change in dictionary, for example, lot of new objects created.

```
exec dbms_stats.gather_dictionary_stats;
```

- **Gather fixed object statistics with reasonable** load on the system

```
exec dbms_stats.gather_fixed_objects_stats
```

- Dictionary and Fixed stats should be gather **manually as they are not gathered automatically** in the Release 12 upgrade by adstats.sql or any other method.

Prepare: Database Tier

Gather Dictionary and Fixed Stats

- Fixed Object Statistics should be gathered:
 - After any associated platform or database upgrade that is part of the overall Oracle E-Business Suite upgrade.
 - After any SGA/PGA parameters have changed.
 - After Release 12 upgrade, when there is representative activity on the system.
- Dictionary Statistics should be gathered:
 - After any associated platform or DB upgrade that is part of the overall Oracle E-Business Suite upgrade.
 - After the Release 12 upgrade.
 - After move to OATM

Optimizing E-Business Suite on RAC

Optimizing E-Business Suite on RAC

Verify Optimal HW/DB Configurations

- Interconnect– a Private; GigE or Infiniband
- Network Configuration– Use Jumbo frames for the interconnect
 - `ifconfig <adapter> mtu 9000`
- Make sure that the I/O subsystem sized for performance, not just storage; write optimized
- Increase the buffer Cache by 10%
- Use Parallel Query Instance Affinity (Set PX affinity local each node)
 - 11gR2 - `PARALLEL_FORCE_LOCAL =true`
- Monitor CPU utilization, run queue lengths and interconnect traffic

Optimizing E-Business Suite on RAC

Utilize Instance Affinity and PCP

- Follow recommendation in EBS RAC conversion MOS documents for patch and parameter information
 - (MOS ID 823587.1) 11gr2 RAC with EBS R12
- **Use Affinity:** Direct some workload components to specific RAC nodes to maximize scalability by minimizing inter-node communication and synchronization work.
- **Utilize Parallel Concurrent Processing (PCP) to leverage the Cluster (RAC).**
 - For RAC and PCP refer to (MOS ID 1359612.1)
 - Starting from 12.1, you can define node affinity at the program level

Optimizing E-Business Suite on RAC

Utilize Instance Affinity and PCP

- **PCP: Maintain 1 – 1 correspondence of CM nodes to RAC nodes**
 - Set `<s_cp_twotask>` per CM node to tie to a specific RAC instance.
 - **Do not use a load balanced TNS entry for the value of `s_cp_twotask`.** The request may hang if the sessions are load balanced.
 - Define primary/secondary CM nodes for Failover
- **From 12.1 , Define node affinity at the program level**
 - Concurrent | Program | Define (See MOS ID 1129203.1)
 - Starting from 12.1.3 , a new option to define node affinity at the program level – Concurrent -> Program -> Define

Optimizing E-Business Suite on RAC

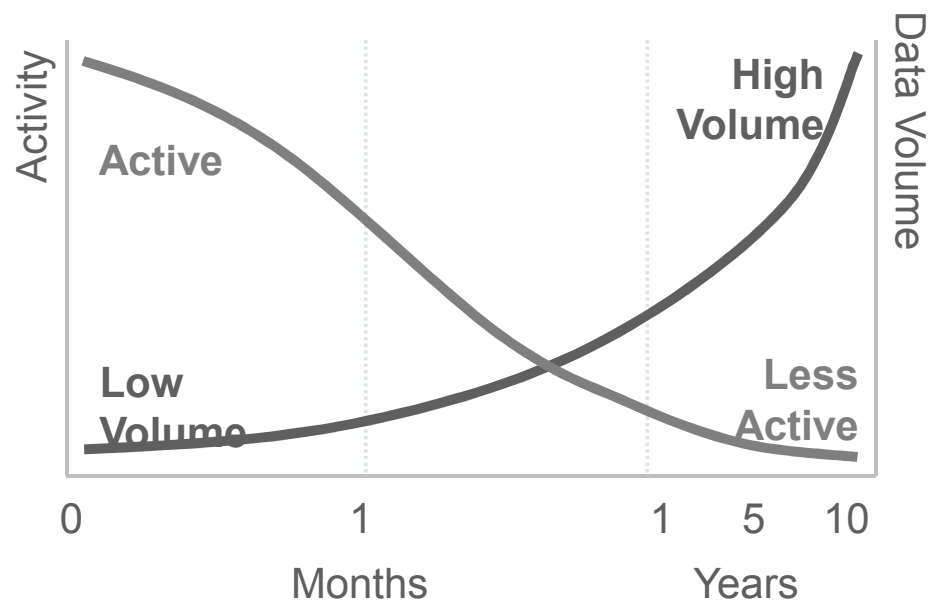
Utilize Instance Affinity and PCP

- **Extend Affinity to the Applications Tier (Forms)**
 - Set **Profile Option "Database Instance"** at App or Resp level which can be tied to two_task value or to a service
- **For 12.1.3, Extend Affinity to the Applications Tier (Self-service)**
 - Set **Profile Options "App%Agent"** to web tier hosts configured for specific services
...or
 - Set Profile Option "Applications Database ID" to node specific DBC file name

Optimizing E-Business Data Management

Optimizing E-Business Data Management

What Do We Know About Data



- From Day 0 data starts to grow
- Data comes from many sources such as
 - **Transactional** e.g. Oracle Payables
 - **Transient** data (i.e. login, concurrent requests etc..)
 - **Reference/Seed** data e.g. lookup codes
- Is all this data needed or required to be available online?

FACT: More than 80% of Data is Inactive

Optimizing E-Business Data Management

Data Management

Optimal Data Management

- Reduced Hardware Cost
- Reduced network impact from data movement
- Reduced backup time
- Reduced upgrade time and associated downtime
- Increased Transactions Per Second Rates (TPS)
- Improved Operating Performance
- Reduced Total Cost of Ownership (TCO)

Available Oracle Solutions

- **Data Growth Control Methods**
 - Archive/Purge Functionality within E-Business Suite
- **Data Management Methods**
 - Database Partitioning
 - Database Compression
 - Information Lifecycle Management (ILM)
- These methods can be used interchangeably

Optimizing E-Business Data Management

E-Business Suite: Archiving & Purging

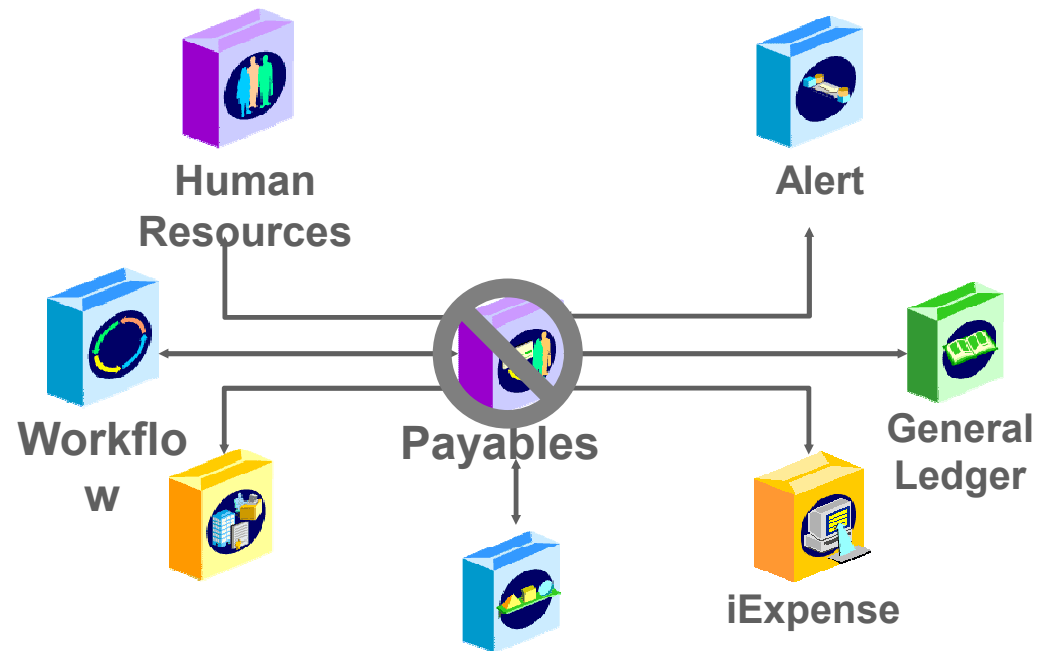
- Where possible try to utilize the standard Oracle supplied programs
 - Purge/Archive programs provided at the module level in the E-Business Suite
 - Many documented standard programs available (**260 purge and archive programs in R12**)
- Purge Portal
 - Purge Portal introduced in 11i10
 - Single purge/archive management console
 - Purge programs can be configured, initiated and monitored
 - Set the execution frequency as well view history of purge programs.
- Accessing the Purge Portal
 - System Administrator > Oracle Applications Manager > [Purging/Critical Activities](#)

<ul style="list-style-type: none">Support User, Vision OperationsKnowledge Base Agent, Vision OperationsKnowledge Base System Administrator, Vision OperationsKnowledge Base Worker, Vision OperationsQA Framework ToolBox TutorialQA Framework ToolBox Tutorial LabsPayables ManagerPerformance Management DesignerPerformance Management Security AdministratorPerformance Management UserPreferences SSWAPurchasing, Vision Operations (USA)Receivables ManagerScripting Agent, Vision EnterprisesSelf Service Web Applications Manager, Vision EnterprisesSEM Exchange ManagerServiceService Contracts Manager, Vision EnterprisesSystem Administration	Oracle Applications Manager <ul style="list-style-type: none">WorkflowLicense ManagerDiagnosticsService Fulfillment ManagerPatching and UtilitiesHostsPurging/Critical ActivitiesSystem AlertsLogsApplications UsageBusiness FlowsDatabase StatusSystem Configuration OverviewForms MonitoringConcurrent ManagersConcurrent RequestsDashboardOAM Setup
--	---

Optimizing E-Business Data Management

E-Business Suite: Archiving & Purging

- E-Business Suite provides Purge/Archive solutions for the key transactional entities
- The native E-Business Suite purge and archive programs **are synchronized with the data model**
 - Oracle's solution considers cross-product dependencies
 - Example: We can't simply delete data in Oracle Payables



Optimizing E-Business Data Management

E-Business Suite: Partitioning

- **When ?**
 - Many times it will be an implementation decision driven by huge data volume
 - Can be physical DM decision to improve performance
- **Situations where partitioning can help**
 - Large deletes could become simple truncates of a partition
 - Re-population/Refreshing of large portions of data could become a “partition exchange” operation
 - Very large tables & their indexes can be split into smaller segments, reducing I/O
- **Partition Key**
 - Should be a key **that most statements will have in the WHERE clause** to reap the benefits of partition pruning & elimination as well as index I/O (local index)
 - Should not change often to avoid row-movement between partitions

Optimizing E-Business Data Management

E-Business Suite: Partitioning

- E-Business Suite **Release 12 is certified with the Oracle Database 11g Partitioning Option**
 - **(MOS ID 554539.1)** – Database Partitioning for Oracle E-Business Suite
- The Oracle E-Business **Suite uses partitioning out-of-the-box** with few modules:
 - **200+ tables**
 - Tables have a natural and logical partition key
 - Majority of the runtime access path (of the standard product) is based on this natural partition key
 - Changing out of the out of the box partitioned tables is not supported.
- Many E-Business Suite tables do not have a natural partitioning key which would apply to all customers
 - Based on their own requirements, customers are free to partition the tables in a logical manner

Optimizing E-Business Data Management

E-Business Suite: Advanced Compression (ACO)

- Advanced Compression (ACO) option is an ideal choice for saving space with read-intensive operations and can reduce the associated Disk I/O. ACO reduces storage requirement from 2-4 times.
- In our benchmarks, online **workload showed up to 30% improvement with up to 6% increase in CPU consumption**
- As for the batch programs, Order-to-Cash batch runtime increased by only 0.43%, while payroll process runtime reduced by 17% with additional 3.7% CPU usage

Oracle E-Business Suite Release 12.1 with Oracle Database 11g Advanced Compression
[MOS ID 1110648.1]

Optimizing E-Business Data Management

Hybrid Columnar Compression (HCC)

- The majority of E-business suite transactions are OLTP in nature, thus we do not recommend using HCC for E-business suite, for the following reasons:
 - Updating compressed data is very costly: Up to 14X slower
 - Updating will undo space saving : Data will be uncompressed when updating an HCC compressed table. This will result in chained rows which will affect table scans
 - Coarse locking - Update of 1 row can lock thousands of rows
- **Our benchmark testing indicates that HCC creates performance and space penalties** in certain conditions due to the overhead associated with uncompressing and recompressing E-Business Suite data. EBS users should not enable Hybrid Columnar Compression in its currently-released version.

Upgrade Best Performance Practices

Performance and Downtime

Plan, Prepare, Test and Upgrade

- As with most planned production maintenance activities, a successful upgrade is **highly dependent on how well-defined the upgrade plan** is.
- **Pre-production testing and validation on an comparable** system prior to the actual upgrade is key to minimizing unforeseen contingencies.
- Optimizing the upgrade process is all about making the right choices at the planning stage **and verifying these choices with a test environment before production**.

**Planning Your Oracle E-Business Suite (EBS) Upgrade from Release 11i to Release 12
(MOS ID 1406960.1)**

**Best Practices for Minimizing Oracle E-Business Suite Release 12 Upgrade Downtime
(MOS ID 1581549.1)**

Test: Pre-Production Testing

Testing and Final Run Planning

- Testing should be done on a **comparable system that has the same CPU, IO and memory capacity** as the target production system
- It is critical to **do multiple rounds of testing** with different settings to maximize server utilization, while considering the following
 - Memory utilization (no swapping/ excessive paging)
 - CPU utilization (scale down if at 100%)
 - I/O response times (scale down if averages > 20 ms)
- When analyzing Release 12 Upgrade performance issues, the goal is **prevent wasted test iterations by maximizing the number of performance issues resolved.**
- **Testing timings along with system resource utilization** should be used to plan the **final upgrade with a 20% contingency factor.**

Test: Pre-Production Testing

Get the Diagnostic Data

- **Start with** Express Diagnosis of Oracle E-Business Suite Release 12 Upgrade Performance Issues (MOS ID 1583752.1)

• SQL Tuning

- Trace files
- SQLT output (MOS ID: 215187.1)
- Trace Analyzer (MOS ID: 224270.1)
- AWR Report (MOS ID: 748642.1)
- 11g SQL Monitor Report
- AWR SQL Report (awrsqrpt.sql)

• Database Tuning

- AWR Report (MOS ID: 748642.1)
- ADDM report (MOS ID: 250655.1)
- Active Session History (ASH)
- OS - OSWatcher (MOS ID: 301137.1) Q

- Correlate AWR, system vitals and expensive SQLs. Start with the top events and top SQLs sections in the AWR reports.

Test: Pre-Production Testing

Common Optimizations

- Once you have identified the long running jobs and SQL, you can **check My Oracle Support** for known issues and potential solutions or workarounds.
- However, bear in mind that the **fix or workaround may not necessarily fix** your particular problem.
- If you cannot confirm that you have exactly the same issue (from the diagnostics) you may still apply the fix, but should **continue to gather diagnostics** and search for a solution until the issue is fully resolved.
- If you have identified that a long running job has an inefficient execution plan, you could use an **SQL Profile to apply hints that will help the CBO choose a better execution plan**. You will need SQL tuning expertise to do this.

Oracle E-Business Suite Learning Stream

Keep Your Skills Current through Continuous Learning

Expert Delivered

Access to 300+ instructional videos delivered by Oracle subject matter experts

Training Across the Entire E-Business Suite

For professionals of all experience levels looking to regularly broaden and deepen their knowledge

Continuously Refreshed Content

Covers technical and functional aspects of Oracle E-Business Suite solutions

Request Topics that Interest You

Subscription Service



What's New in Mobile Apps?

Duration : 00:05:40

+ Q



What's New in Applications Technology?

Duration : 00:14:28

+ Q



R11i / R12: ASCP Performance Analyzer Script

Duration : 00:12:16

+ Q



What are Analyzers?

Duration : 00:07:22

+ Q



R12.x Oracle Payables Management Fundamentals Payment Process Profile Deep Dive

Duration : 01:10:07

+ Q



R12.x E-Business Suite OAF Page Flow from Request to Response

Duration : 00:31:26

+ Q



Making the best use of Retrieval Dashboards in OTL

Duration : 00:40:43

+ Q



Best Practices In E-Business Suite Performance Tuning - Part 1 of 2

Duration : 00:23:18

+ Q

Preview the Learning Stream
NOW!

education.oracle.com/streams/ebusinesssuite

Technical Upgrade Best Practices for Oracle E-Business Suite
Samer Barakat and Udayan Parvate

http://education.oracle.com/pls/web_prod-plq-dad/db_pages.getpage?page_id=724&get_params=streamId:61,p_lod:2687

Questions and Answers



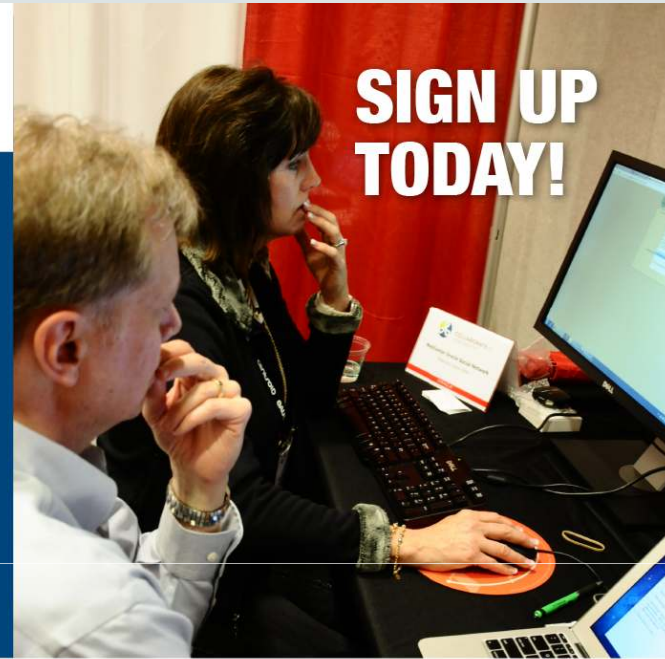


Connection Point®
ONLINE SEMINAR

OAUG Connection Point® AppsTech Online JULY 28-30, 2015

If you are a technologist that supports the Oracle E-Business Suite, you won't want to miss this three-day, online seminar designed exclusively for you.

Members of the OAUG receive access to all 18 sessions for \$195 (non-member rate: \$260).



Who should attend?

- Database Administrators
- System Administrators
- E-Business Suite Developers
- Middleware Technologists supporting Oracle E-Business Suite

Topics Include:

- Applications Strategy and Service
- Applications Development
- Business Intelligence/BI Analytics
- Database
- Middleware
- Upgrade
- System Management

Register now at cp.oaug.org

ORACLE®

Additional Resources



References

**Target Release:
12.1 Only**

- [R12.1 documentation roadmap \(790942.1\)](#)
- [Oracle E-Business Suite Release 12.1 Info center \(806593.1\)](#)
- [Database preparation guidelines for R12.1 upgrade \(761570.1\)](#)
- [Recommended Performance Fixes \(244040.1\)](#)
- [R12 Upgrade Sizing & Best Practices \(399362.1\)](#)
- [R12.1 EBS pre-install patches Report \(1448102.1\)](#)

Additional Resources

Optimizing E-Business Suite Database Tier

- 1121043.1 Collecting Diagnostic Data for Performance Issues in Oracle E-Business Suite
- 1362660.1 Enhanced Performance Diagnostics for Oracle E-Business Suite Release 12.1.3
- 301137.1 OSW Document
- 461053.1 OSWg Document
- 215187.1 SQLTXPLAIN (SQLT)
- 224270.1 Trace Analyzer (TRCA)
- 39817.1 Interpreting Raw SQL_TRACE files
- 280391.1 How to Retrieve SID Information For a Running Request

Additional Resources

Tuning the Concurrent Manager

- 1359612.1 Webcast 'E-Business Suite - RAC & Parallel Concurrent Processing
- 1367676.1 Webcast 'E-Business Suite - Concurrent Manager Performance
- 164085.1 Enhancing and Automating Oracle Applications Concurrent Processing
- 1057802.1 Best Practices for Performance for Concurrent Managers
- 1304305.1 E-Business Concurrent Processing Information Center

Additional Resources

EBS Upgrade and Platform Migration

- Best Practices for Minimizing Oracle E-Business Suite Release 12 Upgrade Downtime (MOS ID 1581549.1)
- Express Diagnosis of Oracle E-Business Suite Release 12 Upgrade Performance Issues (MOS ID 1583752.1)
- R12.1 documentation roadmap (MOS ID 790942.1)
- Oracle E-Business Suite Release 12.1 Info center (MOS ID 806593.1)
- Database preparation guidelines for R12.1 upgrade (MOS ID 761570.1)
- Patching FAQs (MOS ID 459156.1, 225165.1)
- Staged or shared APPL_TOP and distributed AD (MOS ID 734025.1, 384248.1, 236469.1)
- OAM “Patch Wizard” overview and FAQ (MOS ID 976188.1, 976688.1)
- AD Command Line Options for Release R12 (MOS ID 1078973.1)
- Recommended Performance Fixes (MOS ID 244040.1)
- R12 Upgrade Sizing & Best Practices (MOS ID 399362.1)

Additional Resources

EBS Upgrade and Platform Migration

- EBS R12.1 Upgrade related Reports
 - EBS 12.1.3 Data Model Comparison Report (MOS ID 1290886.1)
 - EBS ATG Seed Data Comparison Report (MOS ID 1327399.1)
 - EBS File Comparison Report (MOS ID 1446430.1)
 - EBS pre-install patches Report (MOS ID 1448102.1)
- White papers
 - Planning Your Oracle E-Business Suite Upgrade from Release 11i to Release 12.1 (MOS ID 987516.1)
 - R12 Upgrade considerations by product: Financials (MOS ID 889733.1)
 - Oracle E-Business Suite Upgrades and Platform Migration (MOS ID 1377213.1)
 - Oracle E-Business Suite Release 12.2 Information Center - Upgrade (MOS ID 1583158.1)
 - Script to Diagnose adop and Other AD-TXK Issues in Oracle E-Business Suite Release 12.2 (MOS ID 1901242.1)

Additional Resources

E-Business Suite: Archiving & Purging

- Archive/Purge Product Information
 - Product User guides – GL/AP/AR/FA/OM
 - Support Notes:
 - (MOS ID 138264.1) – General Ledger Archive/Purge FAQ
 - (MOD ID 144431.1) – Fixed Assets Archive/Purge FAQ
 - (MOS ID 136919.1) – General Ledger Archive/Purge Setup and Usage
- (MOS ID 752322.1): Reducing Oracle E-Business Suite Data Footprint
- E-Business Suite: Technology Learning

https://blogs.oracle.com/stevenChan/entry/e_business_suite_technology_learning

Hardware and Software **Engineered to Work Together**

ORACLE

Copyright © 2014, Oracle and/or its affiliates. All rights reserved. |

ORACLE®