

Release 11i Applications DBA – Teaching An Old Dog New Tricks

Randy Giefer
Computer Systems Authority

1 Introduction

The goal of this paper and related presentation is to assist existing Oracle Applications DBAs and Administrators in identifying the new features of Release 11i that will affect how they accomplish their day-to-day administrative tasks. It is unrealistic to attempt for this to be the ultimate, comprehensive reference for these items, but a summary level description of each is provided to aid the reader. Additional references will be noted throughout the document.

Many changes will be occurring to this document, as new features, tips & tricks, and lessons learned are discovered over time. Updated copies of this document can be found on the CSA web site (www.csac.com) by clicking on the 'Papers & Presentations' button.

1.1 The Author

Randy Giefer has over 17 years of practical business experience in the Information Technology and Systems arena, with experience in the energy, airline, mortgage banking, automotive manufacturing and finance industries. This business experience is coupled with more than 4 years of experience in the implementation and administration of Oracle Financial and Manufacturing software applications in the role of an Applications Database Administrator. In addition to his Oracle Applications experience, he has over 7 additional years of Oracle database development and administration. His project experience includes systems architecture, database architecture, installation, upgrades, performance tuning, development, testing, database administration and production systems management.

In addition to several prior management roles, he is currently a Practice Director and a Applications DBA consultant for Computer Systems Authority, a leading provider of Real World Solutions® for information systems and integration challenges. Randy and other CSA professionals provide unparalleled industry experience to the business world by using a comprehensive suite of services and tools that accelerate each solution and keep it focused on the customer's business objectives. With professionalism and attention to quality, CSA delivers the most comprehensive solutions available in a quick and efficient manner. This unique balance of business and technical expertise has earned CSA recognition with more than 230 domestic and international customers.

2 Abstract

This paper focuses on the features of Release 11i that are new or different for current R10.7 Applications System Administrators and Applications DBAs. Emphasis is placed on preparing the existing Oracle Applications DBA for the changes that will impact them on an everyday basis once R11i is implemented.

3 Executive Overview

Release 11i introduces many new changes into the way that the Oracle Applications are administered on a day-to-day basis. For existing Release 10.7 Applications DBAs and System Administrators, these changes can be dramatic, given their current technology implementation under the 10.7 release. These changes come from two main areas, the Release 11i technology stack, and Release 11i itself.

3.1 Release 11i Technology Stack

Never has a single Applications release introduced so many new products and tools with as many new features as is the case with Release 11i. From the numerous and in depth changes within Oracle 8i, to the multi-component technology stack required to execute the applications forms in a three tier environment, it is very obvious that this is one of the most complex technology infrastructures that Applications DBAs will have to support.

Oracle 8i. While there are numerous new features in Oracle 8i, this presentation will primarily address those utilized by Release 11i. Features like materialized views, cost-based optimization, advanced queuing, temporary and partitioned tables, invoker rights and cache fusion will be defined, with tips, tricks, and pitfalls added. Applicable init.ora parameters will also be addressed.

Internet Computing Architecture. Along with Oracle 8i, there are numerous other components that comprise the underlying technology stack for Release 11i. A brief description, as well as additional notes and hints relating to the following products will be given: Oracle Forms Server, Oracle Reports Server, Oracle Graphics Server, WebDB, and the JRE (Java Runtime Environment).

3.2 Release 11i New Features

As with any new Applications release, there are changes and improvements to the Applications that affect the day-to-day administration of the environment, and Release 11i does not fail to deliver its share of these changes for the administration staff. Discussions will focus on changes that affect the day-to-day administration. Changes to the AutoPatch process and AD utilities, new configuration files, the new License Manager will be some of the topics discussed. Key changes to some of the database table structures will also be addressed.

4 Release 11i Technology Stack Breakdown

Never has a single Applications release introduced so many new products and tools with as many new features as is the case with Release 11i. From the numerous and in depth changes within Oracle 8i, to the multi-component technology stack required to execute the applications forms in a three tier environment, it is very obvious that this is one of the most complex technology infrastructures that Applications DBAs will have to support.

4.1 Release 11i Technology Stack – Oracle 8i

At the heart of the new technology stack for Release 11i, is the latest and greatest version of Oracle's RDBMS, Oracle 8i. While there are numerous new features in Oracle 8i, here are a few that are applicable to administrators of Release 11i.

4.1.1 Materialized Views

Materialized views can be used to summarize, replicate, and distribute data and are often used to precompute and store aggregated data such as sums and averages. They can be used to provide better performance when you have many individual queries repeatedly creating the same summary results. Unlike traditional views, materialized views are actually stored data – they consume data storage space. Since they are analogous to a snapshot, they need to be refreshed frequently if the accessed tables also change frequently. What is unique about materialized views, is that the view itself does not have to be explicitly stated in a SQL statement in order to be utilized. If the init.ora parameter `query_rewrite_enabled` is enabled, the Cost Based Optimizer will use a materialized view instead of the original source tables when it recognizes that doing so will improve the execution plan for a query.

4.1.2 Cost-based Optimization

The Oracle RDBMS can be configured via init.ora parameters to use either a *rule-based* or *cost-based* approach. Using CBO, the optimizer will choose the available access paths and factors based on hints and statistical information gathered on the tables and indexes referenced in the SQL statement. Here's how it works:

1. The optimizer creates a set of potential execution plans for the SQL statement based on the available access paths and hints.
2. The optimizer estimates the *cost* of each execution plan based on statistics in the data dictionary. This data is comprised of statistics based on the data distribution and storage characteristics of the tables, indexes, and partitions.
3. The optimizer compares the costs of the execution plans and chooses the one with the lowest cost.

4.1.2.1 Parameters for Cost-Based Optimization

This section describes the mandatory init.ora parameters that relate to cost-based optimization.

init.ora Parameter Name	Suggested Value
<code>sort_elimination_cost_ratio</code>	5
<code>optimizer_mode_force</code>	TRUE
<code>fast_full_scan_enabled</code>	FALSE
<code>ordered_nested_loop</code>	TRUE
<code>complex_view_merging</code>	TRUE
<code>push_join_predicate</code>	TRUE
<code>use_column_stats_for_function</code>	TRUE
<code>push_join_union_view</code>	TRUE
<code>like_with_bind_as_equality</code>	TRUE
<code>or_expand_nvl_predicate</code>	TRUE
<code>table_scan_cost_plus_one</code>	TRUE
<code>optimizer_undo_changes</code>	FALSE
<code>db_file_multiblock_read_count</code>	8
<code>optimizer_max_permutations</code>	79000
<code>optimizer_mode</code>	CHOOSE
<code>optimizer_percent_parallel</code>	0
<code>optimizer_features_enable</code>	8.1.6
<code>query_rewrite_enabled</code>	TRUE

Table 1 - init.ora CBO Parameters

Note: Oracle provides a script, `$FND_TOP/sql/AFCHKCBO.sql` (from patch 1245516) to check the current setting of these parameters in the `v$parameters` table. The output of the script is a list of all parameters along with their current and recommended values.

4.1.2.2 CBO and Release 11i

Cost-based optimization (CBO) has been around for sometime, but the Oracle Apps have used rule-based almost exclusively until this release. For Release 11i, the SQL has been tuned (supposedly) for cost-based optimization, and as a result, Release 11i requires the use of cost-based optimization. Prior to Release 11i, `optimizer_mode` was always set to `rule`. For Release 11i, `optimizer_mode` must be set to `choose`. The Oracle Applications will set the particular optimizer mode to either `first_rows` or `all_rows`, depending on whether the session is online or batch. In general, profile options will establish that online users use `first_rows`, and that batch jobs use `all_rows`. For concurrent programs, the **Define Concurrent Programs** form has a list box on the Session Control dialog that allows the specification of an optimizer mode.

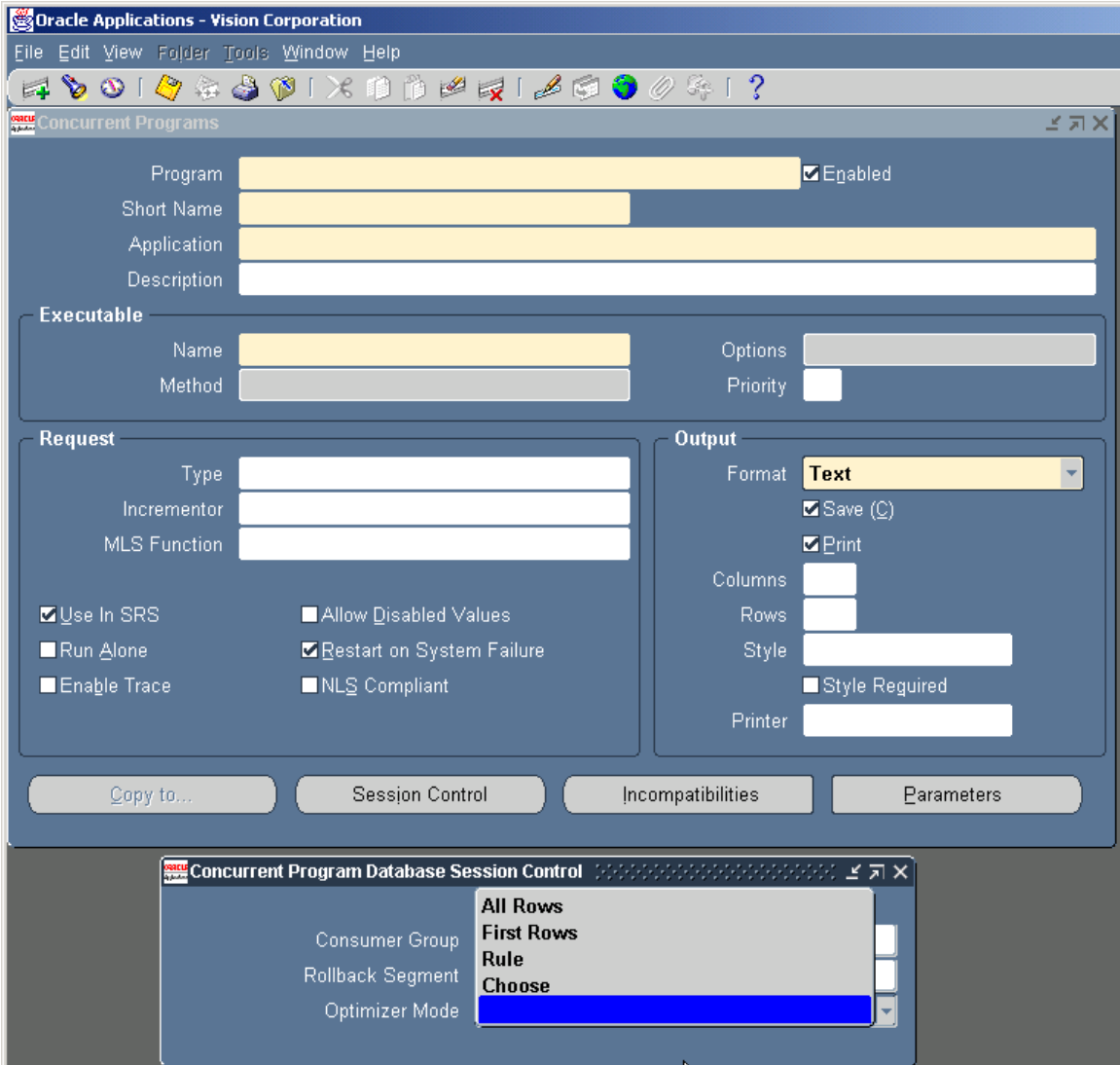


Figure 1. Define Concurrent Program Screen

4.1.2.3 Gathering Statistics in Release 11i

In order to use CBO effectively, the statistics must be current. Fortunately, Oracle has provided some scripts and concurrent programs to make this administrative task easier. FND_STATS is a PL/SQL package for the Applications that has numerous functions that will assist in this administrative task. The following concurrent programs have been defined to gather and maintain various statistics using the FND_STATS package.

Concurrent Programs

- Analyze All Index Columns
- Gather Table Statistics
- Backup Table Statistics
- Restore Table Statistics
- Gather Column Statistics
- Gather All Column Statistics
- Gather Schema Statistics

Additional Information: The Optimizer, *Oracle8i Concepts*

4.1.3 Database Resource Manager

The Database Resource Manager in Oracle8i gives the system administrator more control over system resource management. By utilizing resource consumer groups, resource plans, resource allocation methods, and resource plan directives, the DBA can specify how to allocate processing resources (only CPU) among different users. This is a new enhancement that allows a DBA to assign priorities to different users or user groups within the database. For instance, the DBA could limit ad hoc queries to consume no more than a specific percentage (e.g. 10%) of total CPU usage. The DBA could also allocate a specific percentage of CPU to a group of key users during certain times of the day. For example, the DBA could guarantee the shipping users 50% of the CPU resources during a key time of the day (e.g. 3:00pm to 5:00pm), and then give priority to long running GL batch jobs after business hours

4.1.3.1 Enabling the Database Resource Manager

The Database Resource Manager is enabled by setting the init.ora parameter, RESOURCE_MANAGER_PLAN. This parameter indicates which resource plan to use for this instance. The Oracle resource manager will load this top plan as well its associated sub-plans, directives and consumer groups. This parameter may also be set by a DBA after instance startup using the ALTER SYSTEM command on the parameter.

4.1.3.2 Managing Resource Objects

There are several procedures available to create/update/delete resource plans, subplans and resource groups. The DBMS_RESOURCE_MANAGER package is used to facilitate this.

Additional Information:

- Oracle Applications Release 11i Concepts, pg. 20
- Oracle 8i Administrator's Guide, Sections 9 and 11
- Oracle 8i Concepts, Section 9 Database Resource Management

4.1.4 Partitioned Tables

Partitioned tables are large tables that are sub-divided into smaller and more manageable segments. Release 11i products now use this RDBMS feature so that SQL statements can access and manipulate the partitions rather than entire tables or indexes. There are two primary partitioning methods: range partitioning, which partitions the data in a table or index according to a range of values, and hash partitioning, which partitions the data according to a specified hash function. Benefits of partitioning:

- 1) Separate segments to store each partition of a range-partitioned or hash-partitioned table or index.
- 2) Ability to map partitions to different disk drives to balance the I/O load and increase parallelism.
- 3) Ability to back up and recover each partition independently.

Additional Information:

- Oracle Applications Release 11i Concepts, pg. 21

4.1.5 Temporary Tables

Release 11i now uses the Oracle 8i Server temporary table feature. Temporary tables hold data that exists only for the duration of a session or transaction. This data is private to the session and can only be modified or read by the session that owns it. It is important to note that unlike permanent tables, SQL updates on temporary tables are not written to the redo logs, and as a result, DML locks are not acquired to manipulate the data in a temporary table. The INV and GL modules are now starting to use this feature.

4.1.6 Invoker Rights

Previous releases of the Oracle Applications had the ability to utilize features called Multiple Reporting Currencies (MRC) or Multiple Sets of Books Architecture (MSOBA). If these features were used, several copies of Oracle Applications packages existed in the database. This took up more space in the database and required extra time to upgrade and maintain. Release 11i now uses the new Invoker Rights functionality of Oracle 8i to ensure that most packages are installed only once, in the APPS schema. Now, other schemas, such as the MRC and MSOBA schemas, have synonyms that point to the packages in the APPS schema, instead of having their own copies.

Additional Information:

- Oracle Applications Release 11i Concepts, pg. 22
- PL/SQL User's Guide and Reference

4.1.7 Cache Fusion

In environments where Oracle Parallel Server is utilized, a new feature of Oracle 8i, called *cache fusion* allows the sharing of data that has been committed, but not written to disk among the OPS nodes. Cache Fusion provides copies of blocks directly from the holding node's memory cache to the requesting node's memory cache, increasing the availability of the remaining node in the case where one of the OPS nodes goes down.

4.1.8 Locally Managed Tablespaces

Locally Managed Tablespaces are tablespaces that in essence, manage their own extents. This is accomplished by maintaining a bitmap in each datafile to keep track of the free or used status of blocks in that specific datafile. Each bit in the bitmap corresponds to a datafile block. When the extents are either allocated or freed for reuse, the bitmap values are switched to show the new status of the blocks, either allocated or free. The specific updates written to these bitmaps do not update any tables in the data dictionary, and also are not recorded in the rollback segments.

ADVANTAGES IN USING LOCALLY MANAGED TABLESPACES

- Because locally managed tablespaces do not record extent and free space information in data dictionary, there is reduced contention on the data dictionary tables.
- Local management of extents automatically tracks adjacent free space, eliminating the need to coalesce free extents.
- Avoids recursive space management operations, which can occur in dictionary-managed tablespaces if consuming or releasing space in an extent results in another operation that consumes or releases space in a rollback segment or data dictionary table.
- Sizes of extents that are managed locally can be determined automatically by the system. Alternatively, all extents can have the same size in a locally managed tablespace.
- Changes to the extent bitmaps do not generate rollback information because they do not update tables in the data dictionary (except for special cases such as tablespace quota information).
- Reduced fragmentation

4.2 Release 11i Technology Stack – Internet Computing Architecture

Along with Oracle 8i, there are numerous other components that comprise the underlying technology stack for Release 11i.

- Oracle8i Enterprise Edition 8.1.6 with *interMedia* and Spatial options
- Oracle8 Enterprise Edition 8.0.6
- WebDB 2.2
- WebDB 2.5
- Apache Web Server (1.3.9)
- JServ (1.1)
- JRE (Java Runtime Environment) 1.1.8
- JDK (Java Development Kit) 1.1.8
- Oracle Web Discoverer 3.3.48 (optional)
- Oracle JInitiator (1.1.7) on the client
- Oracle Forms 6i
- Oracle Reports 6i

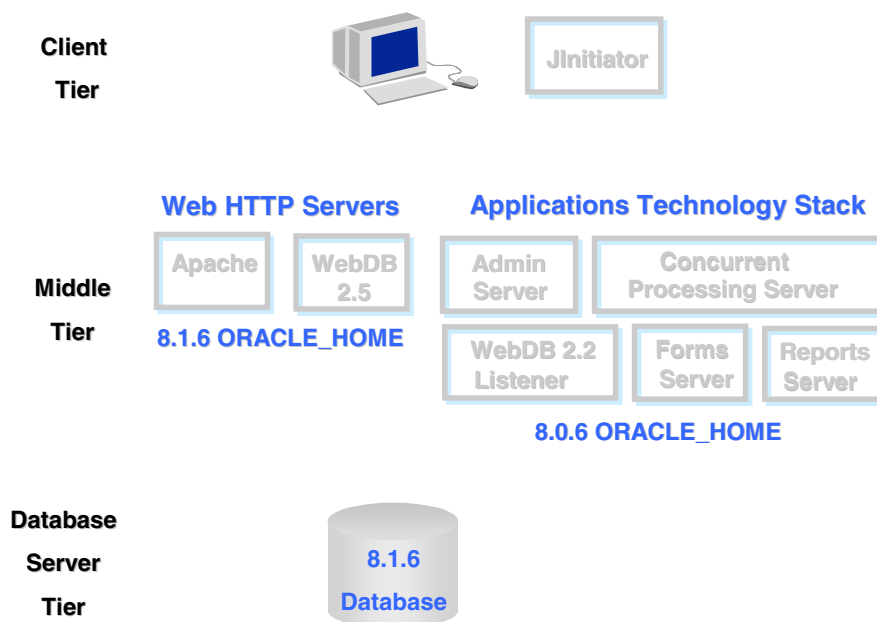


Figure 2 – ICA Technology Stack Diagram

The combination of multiple versions of the same product is due to the Applications being developed and certified on previous, instead of the most recent releases of products. The products associated with the Applications technology stack are:

- Oracle8 Enterprise Edition 8.0.6 (only Oracle Home)
- Oracle Forms 6i, Oracle Reports 6i, Oracle Graphics
- WebDB 2.2 (WebDB listener only against 8.0.6 Oracle Home)

5 Release 11i New Features

As with any new Applications release, there are changes and improvements to the Applications that affect the day-to-day administration of the environment, and Release 11i does not fail to deliver its share of these changes for the administration staff.

5.1 Release 11i User Interface

Release 11i brings a new look and feel to the Applications, especially for those that are switching from character mode! For those upgrading from 10.7 NCA or Release 11, there are some noticeable differences in the user interface.

New Look and Feel

- Required fields are color highlighted
- LOV Indicator
- Bubble help
- Context sensitive help
- Right mouse click – popup menus
- Better Colors!
- Folder tab metaphor - alternate regions displayed as folder tabs
- For 10.7 and 11 NCA installs, no more floating toolbar!

5.2 Workflow-enabled Applications

The following Oracle applications modules are now workflow-enabled.

- Purchasing
- General Ledger
- Payables
- Project Accounting
- Receivables
- HR
- Account Generator
- Oracle Business Intelligence
- Oracle Service
- Oracle Engineering
- Oracle Inventory
- Oracle Web Employees
- Oracle Web Customers
- Oracle Web Suppliers
- Implementation Wizard
- Oracle CRM

5.3 Define Concurrent Program – Screen Changes

The Define Concurrent Programs screen has changed somewhat:

Figure 3 – Define Concurrent Program Screenshot.

5.3.1 New Define Concurrent Programs Screen Fields

New fields on the Define Concurrent Programs screen:

- Priority
- Incrementor
- MLS Function
- Restart on System Failure
- Enable Trace
- NLS Compliant

5.3.1.1 Priority

You can assign a concurrent program its own priority from the Define Concurrent Program screen. The Concurrent Managers process requests submitted to this program at the priority specified here. If a priority is not specified on this screen, it will be set to the value specified in the user's profile option Concurrent:Priority at the time the request is submitted.

5.3.1.2 Incrementor

Internal development use only. A future enhancement?

5.3.1.3 MLS Function

The Multilingual Concurrent Request feature allows a user to submit a request once to be run multiple times, each time in a different language. If the concurrent program has been programmed to utilize this feature, then the specified MLS function determines which installed languages are needed for the request.

5.3.1.4 Enable Trace Checkbox

SQL trace files can now be generated for individual concurrent programs – hurray!

5.3.1.5 Restart on System Failure Checkbox

Indicates that this concurrent program should automatically be restarted when the concurrent manager is restored after a system failure.

5.3.1.6 NLS Compliant Checkbox

For concurrent programs that have been specifically written to take advantage of the NLS Compliant feature, checking this box allows a user to submit a request of this program that will reflect a language and territory that are different from the language and territory that the users are operating in.

For example, a user can enter an order in English from the United Kingdom using the number and date formats established for the UK, and the have the invoices generated in German using the number and date formats appropriate for German customers.

5.3.2 Session Control Dialog

When defining a Concurrent Program using the Define Concurrent Program screen, the Session Control dialog is launched after clicking on the Session Button at the bottom of the screen. This is a new dialog that allows the administrator to specify options for the database session of the concurrent program when it is executed.

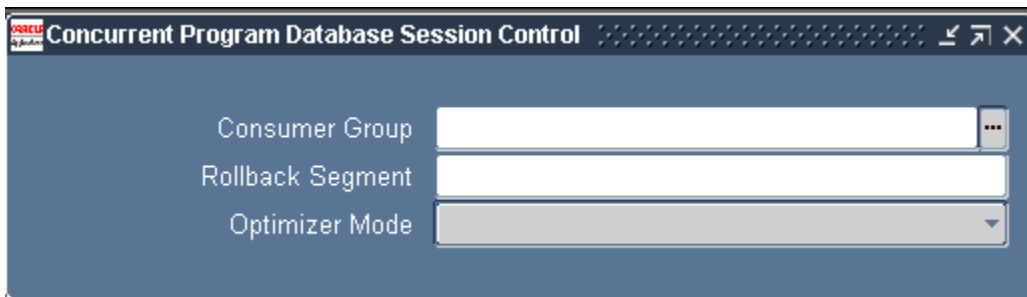


Figure 4 – Concurrent Program Session Control Dialog

5.3.2.1 Consumer Group

The Consumer group field is used to specify the resource consumer group for the concurrent program. As was stated earlier in this document, the Database Resource Manager in Oracle8i is used to allocate and manage resources among database users and applications. The defined resource consumer groups and resource plans provide a method for specifying how to distribute processing resources across different users and user groups. This field allows the administrator to assign concurrent programs to a resource consumer group.

5.3.2.2 Rollback Segment

The Rollback Segment field is used to specify a rollback segment for the concurrent program. A couple of notes here:

- 1) The specified rollback segment is only used up to the first commit.
- 2) The Concurrent Program executable must call the functions `FND_CONCURRENT.AF_COMMIT` and `FND_CONCURRENT.AF_ROLLBACK` in order to use the specified rollback segment.

5.3.2.3 Optimizer Mode

As was stated earlier in this document, the Oracle Applications now utilize the Cost Based Optimizer. Using this field, you can specify which mode you want to utilize during execution of this concurrent program (`FIRST_ROWS`, `ALL_ROWS`, `RULE`, or `CHOOSE`).

5.4 Concurrent Manager Changes

The only notable change on the Define Concurrent Managers screen is the addition of the Consumer Group field, which has already been discussed.

Oracle Applications - Vision Corporation
File Edit View Folder Tools Window Help

Concurrent Managers

Manager Enabled
Short Name
Application
Description
Type **Concurrent Manager**
Data Group Cache Size
Consumer Group

Parallel Concurrent Processing Details

	Node	System Queue	Platform
Primary	<input type="text"/>	<input type="text"/>	<input type="text"/>
Secondary	<input type="text"/>	<input type="text"/>	<input type="text"/>

Program Library

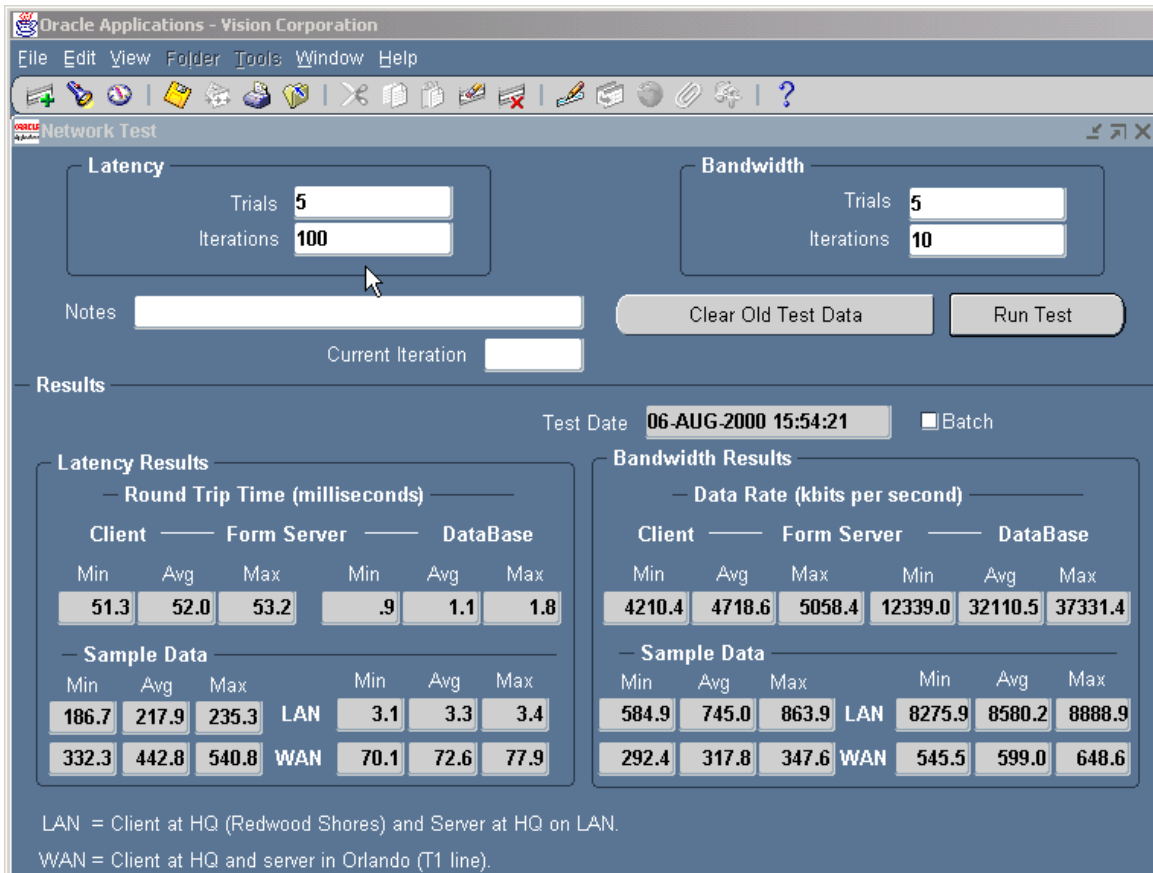
Name Application

Specialization Rules Wgrk Shifts

Figure 5 – Define Concurrent Manager Screen

5.5 Network Test Screen

The Network Test Screen has been updated for Release 11i to include Latency and Bandwidth information for the client to the middle-tier, and the middle-tier to the database.



The screenshot shows the Oracle Applications Network Test screen. It includes configuration fields for Latency (Trials: 5, Iterations: 100) and Bandwidth (Trials: 5, Iterations: 10). Below these are buttons for 'Clear Old Test Data' and 'Run Test', along with a 'Notes' field and a 'Current Iteration' display. The 'Results' section shows the test date as 06-AUG-2000 15:54:21 and a 'Batch' checkbox. It contains two main result tables: 'Latency Results' (Round Trip Time in milliseconds) and 'Bandwidth Results' (Data Rate in kbits per second). Each table has columns for Client, Form Server, and DataBase, with sub-columns for Min, Avg, and Max. Sample data is provided for both LAN and WAN configurations.

Latency Results
— Round Trip Time (milliseconds) —

Client			Form Server			DataBase		
Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
51.3	52.0	53.2	.9	1.1	1.8			

— Sample Data —

Min	Avg	Max		Min	Avg	Max
186.7	217.9	235.3	LAN	3.1	3.3	3.4
332.3	442.8	540.8	WAN	70.1	72.6	77.9

Bandwidth Results
— Data Rate (kbits per second) —

Client			Form Server			DataBase		
Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
4210.4	4718.6	5058.4	12339.0	32110.5	37331.4			

— Sample Data —

Min	Avg	Max		Min	Avg	Max
584.9	745.0	863.9	LAN	8275.9	8580.2	8888.9
292.4	317.8	347.6	WAN	545.5	599.0	648.6

LAN = Client at HQ (Redwood Shores) and Server at HQ on LAN.
WAN = Client at HQ and server in Orlando (T1 line).

Figure 6 – Network Test Screen

5.6 Key Table Changes

The following table identifies some of the table changes that may affect the scripts used in existing 10.7 or Release 11 environments.

Table Name	Column Name	Type
FND_CONCURRENT_PROCESSES	INSTANCE_NUMBER LAST_TXN_END LAST_TXN_START PLSQL_DIR	New New New New
FND_CONCURRENT_PROGRAMS	ENABLE_TIME_STATISTICS INCREMENT_PROC MLS_EXECUTABLE_APP_ID MLS_EXECUTABLE_ID OPTIMIZER_MODE RESOURCE_CONSUMER_GROUP ROLLBACK_SEGMENT SECURITY_GROUP_ID STAT_COLLECT DESCRIPTION MAXIMUM_LENGTH MAXIMUM_WIDTH USER_CONCURRENT_PROGRAM_NAME	New New New New New New New New New Del Del Del Del
FND_CONCURRENT_QUEUES	INSTANCE_NUMBER LAST_VERIFIED PCP_FLAG PMON_STAT RESOURCE_CONSUMER_GROUP WORK_END WORK_START DESCRIPTION	New New New New New New New Del
FND_CONCURRENT_REQUESTS	EXP_DATE LFILE_SIZE NLS_CODESET OFILE_SIZE OPS_INSTANCE QUEUE_APP_ID QUEUE_ID RESOURCE_CONSUMER_GROUP RESUB_COUNT SECURITY_GROUP_ID STALE	New New New New New New New New New New New

Thanks to Eric Albacete, CSA Principal Consultant for assisting with the identification of these table changes.

5.7 Profile Options

Several new profile options have been added in Release 11i.

5.7.1 FND: Resource Consumer Group

Resource consumer groups are used by the Oracle8i Database Resource Manager, which allocates CPU resources among database users and applications. Each form session is assigned to a resource consumer group. The system administrator can assign users to a resource consumer group for all of their forms sessions and transactions. If no resource consumer group is found for a process, the system uses the default group "Default_Consumer_Group".

5.7.2 Utilities:SQL Trace

SQL trace can be enabled at the user level by setting the profile "Utilities:SQL Trace" to "Yes". Only the System Administrator can enable this profile for a user.

5.8 License Manager (LicenseMgr)

Now in Release 11i, when additional products or languages need to be added to a Oracle Applications installation, a GUI application called the Oracle Applications License Manager is used to accomplish these tasks.

For UNIX users:

```
$ cd $COMMON_TOP/admin/assistants/licmgr  
$ LicenseMgr
```

6 Summary

In closing, there are many changes and new features that have added some complexity to the administration of the Release 11i Applications. By using this document as a guideline, you will be able to prepare yourself ahead of time to be successful once your upgrade is complete.