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Oracle SQL Developer: Latest Features

Syme Kutz

Senior Development Manager



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Agenda

- Overview
- SQL Developer 2.1
- SQL Developer 3.0
- SQL Developer Extensions
- Other talks at this conference
- Finding out more

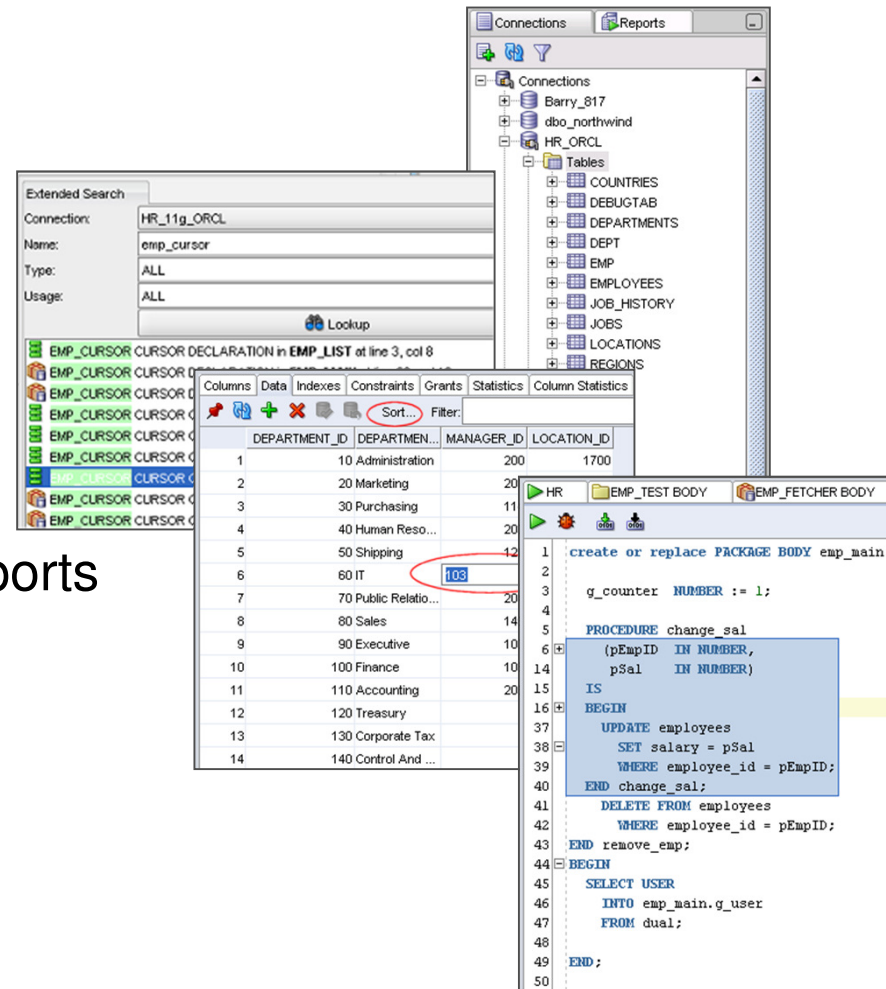


Overview and History

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Oracle SQL Developer Feature Overview

- Database connections
- Browse, query, update objects
- SQL Worksheet
- Query Builder
- Data import and export
- Object export
- PL/SQL
- Database and User defined reports
- User defined extensions
- Files and source code control
- Third-party databases
- Database migration
- Oracle APEX integration
- TimesTen integration





Release History

- SQL Developer 3.0 – Date not available
 - Introduces wide spectrum of new features
- SQL Developer 2.0 – 2009/2010
 - Introduced PL/SQL Unit Testing, Data Modeler viewer
 - **SQL Developer 2.1.1 – March '10 – Current production release**
- SQL Developer 1.5.x – 2008 /2009
 - Introduced version control and file management
 - SQL Developer 1.5.4 – Full translation supporting 9 languages
 - **SQL Developer 1.5.5 – Shipped with Oracle Database 11g Release 2**
 - SQL Developer 1.5.6 – Bundled with Oracle JDeveloper 11g
- SQL Developer 1.2.x – 2007
 - Introduced database migration
- SQL Developer 1.x – 2006/2007
 - **SQL Developer 1.1.3 – Oracle Database 11g Release 1**
 - Initial production release – March 2006



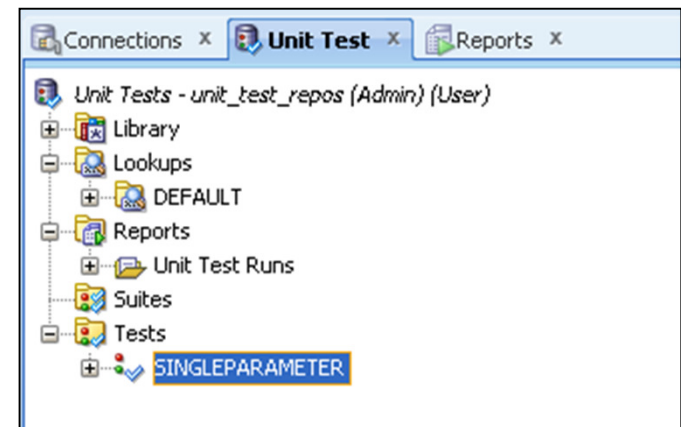
SQL Developer 2.1

Production Release – December 2009

- PL/SQL Unit Testing
- Data Modeler Viewer
- Migration support for IBM DB2 UDB and Teradata
- Updated Data Grids
 - Manage columns, filter on data
- New SQL Worksheet
 - Dockable dbms_output, multiple worksheets
- Increased Connections navigator support for
 - Jobs, Editions (for Database 11g Release 2), XML DB Repository
- Updated display editors
 - PL/SQL edit mode, subpartitions
- Version Control support for Serena Dimensions, Perforce
- Updated filtering mechanism
 - Schema level, generated objects

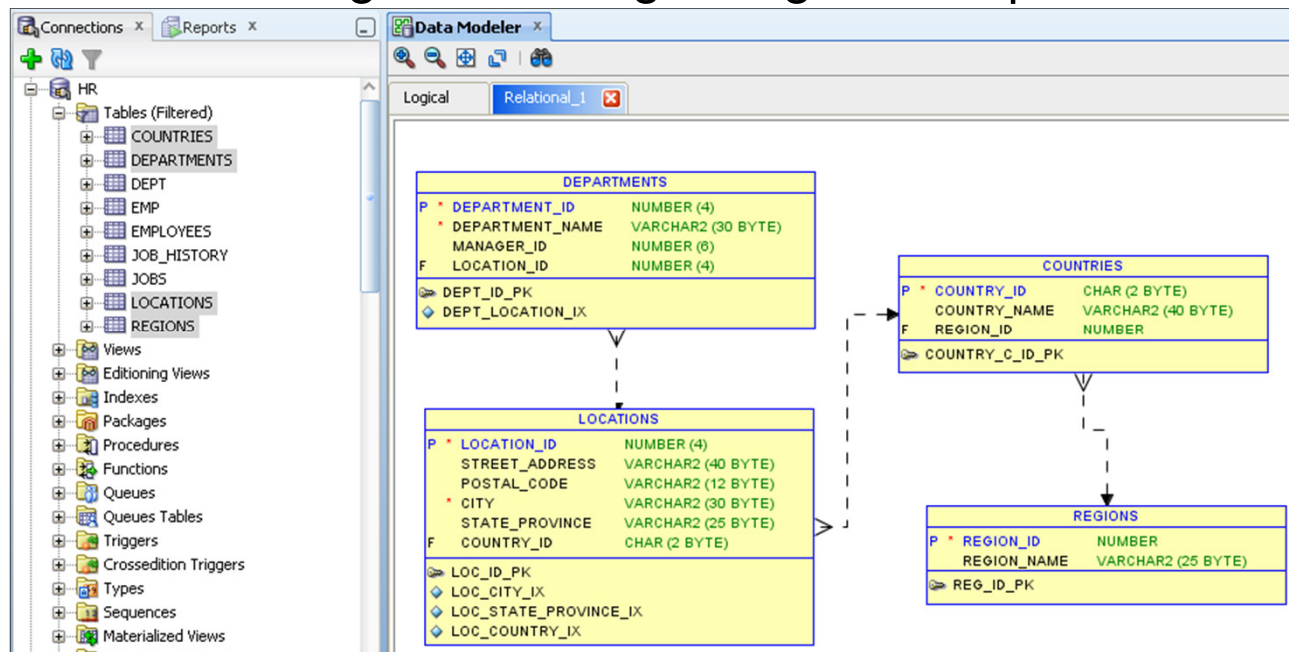
PL/SQL Unit Testing

- Create tests with one or more implementations
- Build up suites of tests
- Run test reports
- Store reusable components in a library
- Build static and dynamic lookups
- Support multiple users through a repository
- Build up code coverage stats
- Run tests from the command line
- Target any database



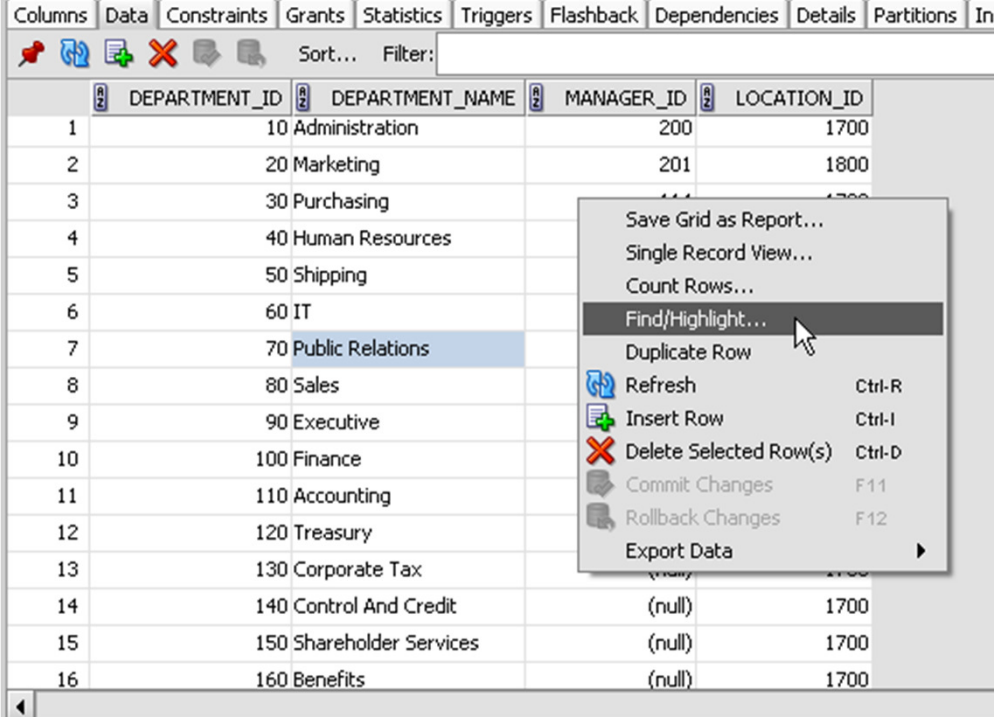
Data Modeler Viewer

- Read-only model viewer
- Open any data model created in SQL Developer Data Modeler
- All properties available for review through dialogs
- Create ad hoc diagrams through drag and drop



Updated Data Grids

- Browse table and views data grid
 - Filter, Sort
- Context menus offer
 - Single record view
 - Duplicate row
 - Count rows
 - Save Grid as a report
 - Highlight data
- Manage columns
 - Reorder
 - Hide and show columns
 - Data filters
- Track updates in message log
- Recall filters
- Single value updates in data grid
- Clear grid settings



	DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
1	10	Administration	200	1700
2	20	Marketing	201	1800
3	30	Purchasing		
4	40	Human Resources		
5	50	Shipping		
6	60	IT		
7	70	Public Relations		
8	80	Sales		
9	90	Executive		
10	100	Finance		
11	110	Accounting		
12	120	Treasury		
13	130	Corporate Tax		
14	140	Control And Credit	(null)	1700
15	150	Shareholder Services	(null)	1700
16	160	Benefits	(null)	1700



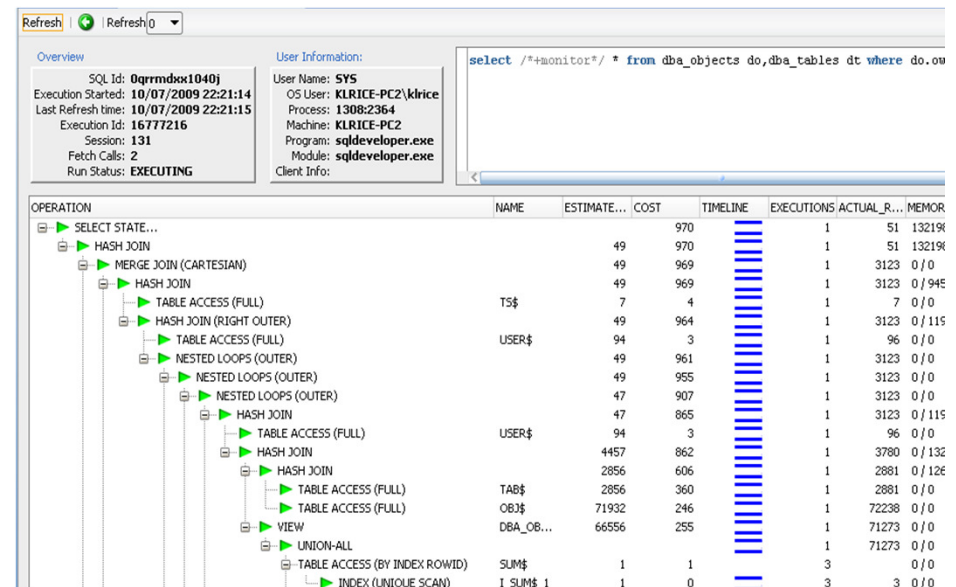
Refactor, Review, Search, Tune and Monitor

SQL Developer provides a PL/SQL related utilities

- PL/SQL Hierarchical Profiler
- Extended Search using PL/SQL
- SQL Monitor
- SQL Developer PL/SQL Reports
- General refactoring
- APEX refactoring

Real-Time SQL Monitoring

- Real time view of SQL
- Drill to view details
- Visual indicators for current step
- Queries over 5 seconds monitored
- Use `/*+MONITOR*/`
- `DBMS_SQLTUNE.REPORT_SQL_MONITOR`





Oracle SQL Developer 3.0

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Oracle SQL Developer 3.0

- DBMS Scheduler
- Query Builder
- Database migration
- Integrated spatial support
- PDF file support
- DBA Navigator
- Schema browser
- Extended Tuning Support
- Extended Unit Testing
- PL/SQL updates
- Import and Export updates
- Integrated Data Miner support

The screenshot displays the Oracle SQL Developer 3.0 interface. On the left is the 'DBA Navigator' tree, showing a hierarchy of database objects including 'hr' and 'system' schemas, and various configuration and management folders like 'Database Configuration', 'Resource Manager', 'Security', and 'Storage'. The main window is divided into two panes. The top pane shows a SQL query:

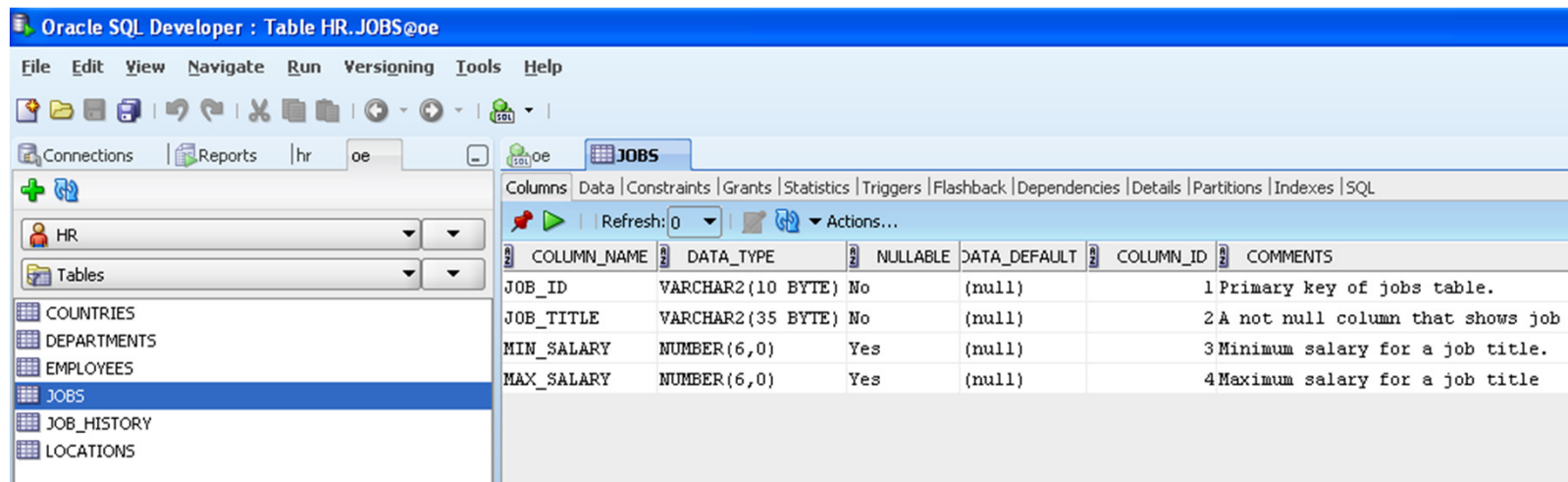
```
select /* use_hash e,d */ *  
from hr.departments d, hr.employees e  
where d.department_id = e.department_id  
and e.first_name like 'A%';
```

 The bottom pane shows the execution plan for this query, which is a 'SELECT STATEMENT' using 'NESTED LOOPS'. The plan details include 'TABLE ACCESS (FULL) EMPLOYEES', 'Filter Predicates' for 'E.FIRST_NAME LIKE 'A%'', 'INDEX (UNIQUE SCAN) DEPT_ID_PK', 'Access Predicates' for 'D.DEPARTMENT_ID=E.DEPARTMENT_ID', and 'TABLE ACCESS (BY INDEX ROWID) DEPARTMENTS'. At the bottom, a table shows statistics for the query execution:

V\$STATNAME Name	V\$MYSTAT Value Autotrace 1	V\$MYSTAT Value
CPU used by this session	6	4

Schema Browser

- Alternate view of object browser
- Select and filter object type
- Select and filter users
- Additional client-side filter



The screenshot shows the Oracle SQL Developer interface. The left pane displays the 'HR' schema with a list of tables: COUNTRIES, DEPARTMENTS, EMPLOYEES, JOBS, JOB_HISTORY, and LOCATIONS. The 'JOBS' table is selected. The right pane shows the 'Columns' tab for the 'JOBS' table, displaying a table with columns: COLUMN_NAME, DATA_TYPE, NULLABLE, DATA_DEFAULT, COLUMN_ID, and COMMENTS. The table contains four rows of data for the JOBS table columns.

COLUMN_NAME	DATA_TYPE	NULLABLE	DATA_DEFAULT	COLUMN_ID	COMMENTS
JOB_ID	VARCHAR2(10 BYTE)	No	(null)	1	Primary key of jobs table.
JOB_TITLE	VARCHAR2(35 BYTE)	No	(null)	2	A not null column that shows job
MIN_SALARY	NUMBER(6,0)	Yes	(null)	3	Minimum salary for a job title.
MAX_SALARY	NUMBER(6,0)	Yes	(null)	4	Maximum salary for a job title

Query Builder

- Replaces current query builder
- Integrated with Worksheet
- Supports
 - Multiple object selection
 - Switch from Query Builder and Worksheet
 - Aggregates, Alias, Order By, Group By, Where clauses
 - Repeated tables
 - Union, intersect, minus and subqueries

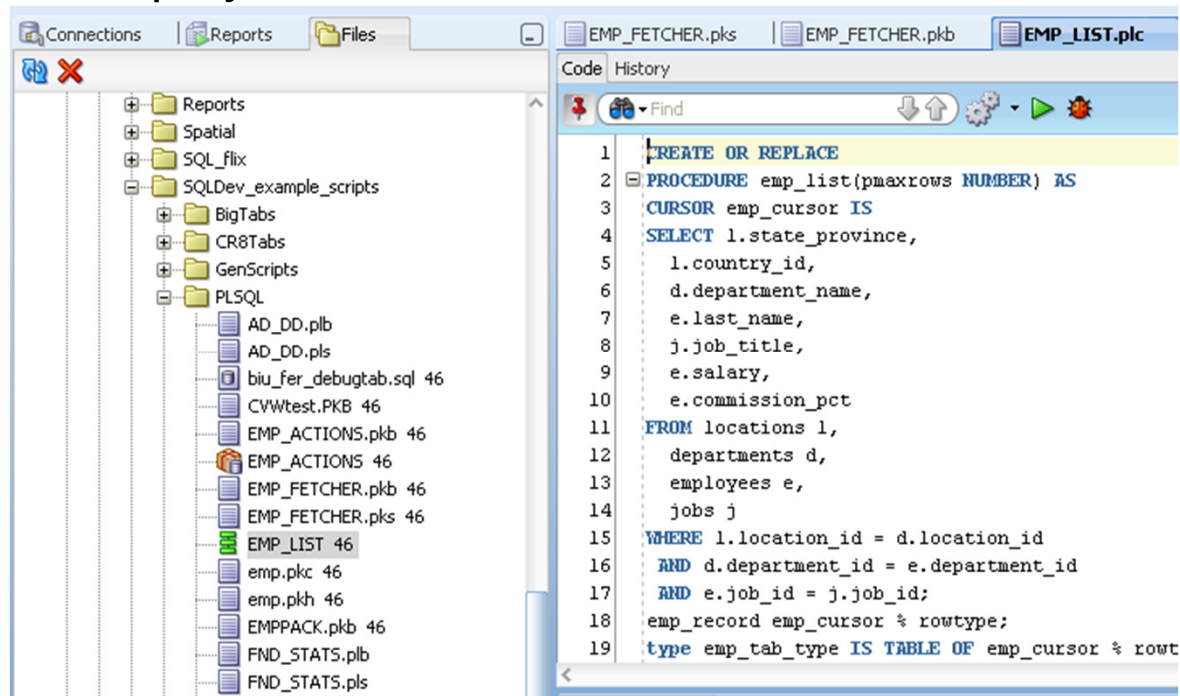
The screenshot displays the Oracle Query Builder interface. At the top, there's a 'Main' tab with four table objects: REGIONS, COUNTRIES, LOCATIONS, and DEPARTMENTS. Each table has a list of columns with checkboxes. REGIONS has REGION_ID and REGION_NAME (checked). COUNTRIES has COUNTRY_ID, COUNTRY_NAME (checked), and REGION_ID. LOCATIONS has LOCATION_ID, STREET_ADDRESS, POSTAL_CODE, CITY (checked), STATE_PROVINCE, and COUNTRY_ID. DEPARTMENTS has DEPARTMENT_ID, DEPARTMENT_NAME (checked), MANAGER_ID, and LOCATION_ID. Below the table selection, there's a table with columns: Output, Expression, Aggregate, Alias, Sort Type, Sort Order, Grouping, Criteria for, and Criteria. The rows are: 1. REGION_NAME (checked), Region, Ascending, 1, For groups. 2. COUNTRIES.COUNTRY_NAME, Country, Ascending, 2, For groups. 3. LOCATIONS.CITY, City, Ascending, 3, For groups. 4. DEPARTMENTS.DEPARTMENT_NAME, Count, Department, For groups. Below this is a 'Script Output' section showing '7 rows selected' and a table with columns: REGION, COUNTRY, CITY, and DEPARTMENT. The data rows are: Americas/Canada/Toronto/1, Americas/United States of America/Seattle/21, Americas/United States of America/South San Francisco/1, Americas/United States of America/Southlake/1, Europe/Germany/Munich/1, Europe/United Kingdom/London/1, and Europe/United Kingdom/Oxford/1.

Output	Expression	Aggregate	Alias	Sort Type	Sort Order	Grouping	Criteria for	Criteria
<input checked="" type="checkbox"/>	REGIONS.REGION_NAME		Region	Ascending	1	<input checked="" type="checkbox"/>	For groups	
<input checked="" type="checkbox"/>	COUNTRIES.COUNTRY_NAME		Country	Ascending	2	<input checked="" type="checkbox"/>	For groups	
<input checked="" type="checkbox"/>	LOCATIONS.CITY		City	Ascending	3	<input checked="" type="checkbox"/>	For groups	
<input type="checkbox"/>	DEPARTMENTS.DEPARTMENT_NAME	Count	Department			<input type="checkbox"/>	For groups	
<input type="checkbox"/>						<input type="checkbox"/>	For values	

REGION	COUNTRY	CITY	DEPARTMENT
Americas	Canada	Toronto	1
Americas	United States of America	Seattle	21
Americas	United States of America	South San Francisco	1
Americas	United States of America	Southlake	1
Europe	Germany	Munich	1
Europe	United Kingdom	London	1
Europe	United Kingdom	Oxford	1

PL/SQL Updates

- Debugging PL/SQL tagged file
- Run and debug procedures with ref cursors
 - Display ref cursor data

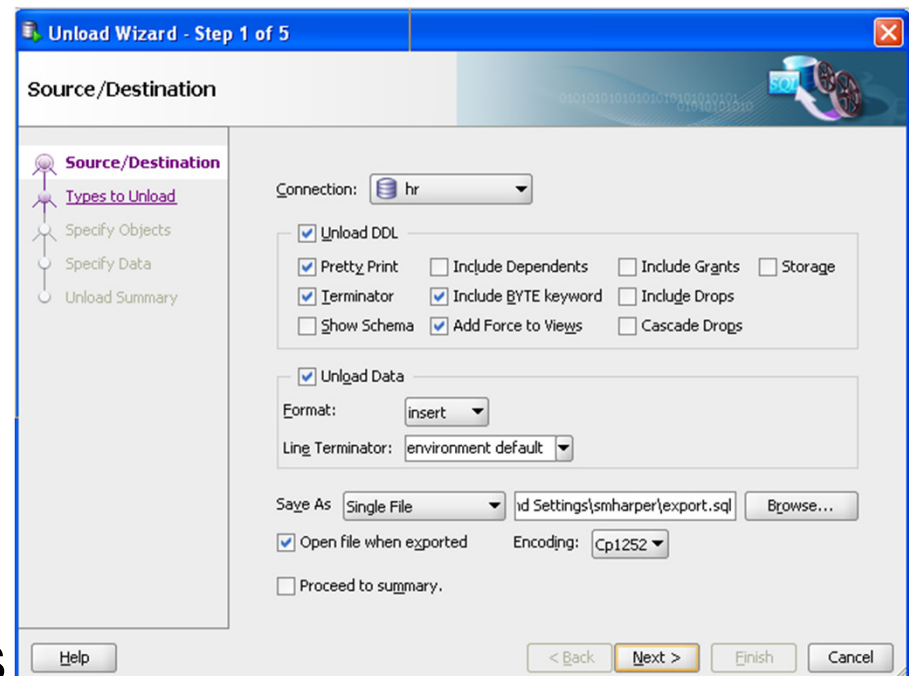


The screenshot shows the Oracle SQL Developer IDE. On the left is the 'Files' pane showing a project structure with folders like 'Reports', 'Spatial', 'SQL_flix', and 'SQLDev_example_scripts'. Under 'PLSQL', several files are listed, including 'EMP_LIST 46' which is highlighted. On the right is the 'Code' editor showing the PL/SQL code for 'EMP_LIST.plc'. The code defines a procedure 'emp_list' that takes a 'pmaxrows' parameter and uses a ref cursor to return a list of employee data.

```
1 CREATE OR REPLACE
2 PROCEDURE emp_list(pmaxrows NUMBER) AS
3 CURSOR emp_cursor IS
4 SELECT l.state_province,
5        l.country_id,
6        d.department_name,
7        e.last_name,
8        j.job_title,
9        e.salary,
10       e.commission_pct
11 FROM locations l,
12      departments d,
13      employees e,
14      jobs j
15 WHERE l.location_id = d.location_id
16       AND d.department_id = e.department_id
17       AND e.job_id = j.job_id;
18 emp_record emp_cursor % rowtype;
19 type emp_tab_type IS TABLE OF emp_record % rowtype;
```

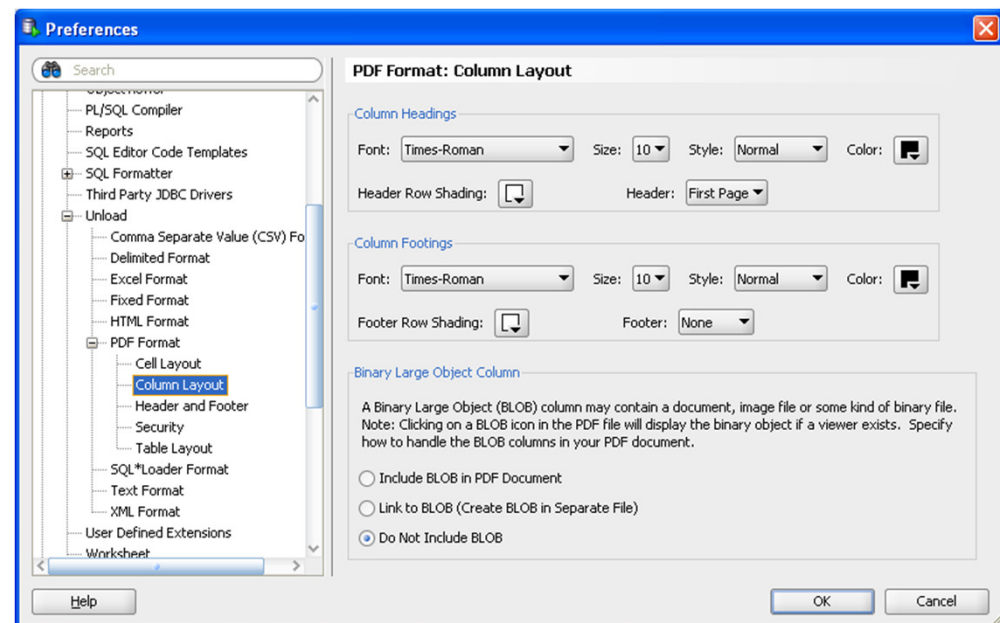

Unload (Export) Data

- Unload metadata and data for a schema, selected object types or selected objects
- Customizable user interface
- Configurable metadata and data format options
- Target options to send output to single or multiple files and directories
- Set delimiters, enclosures, record terminators, encoding and header



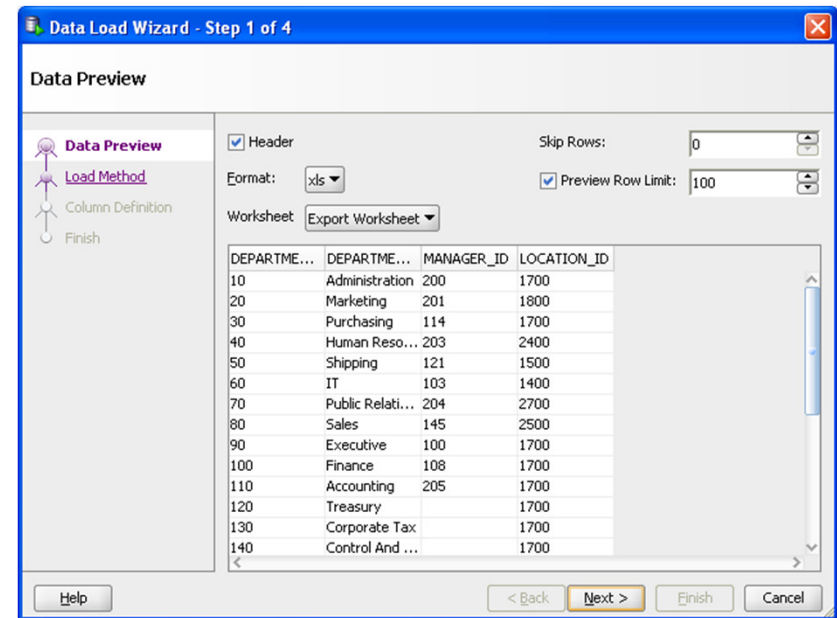
Export to PDF

- New data format support for PDF
- Configure PDF file format using preferences
- Customizable Layouts
- Provides security to encrypt and password-protect
- Provides option to include BLOBs such as images, video, spreadsheets



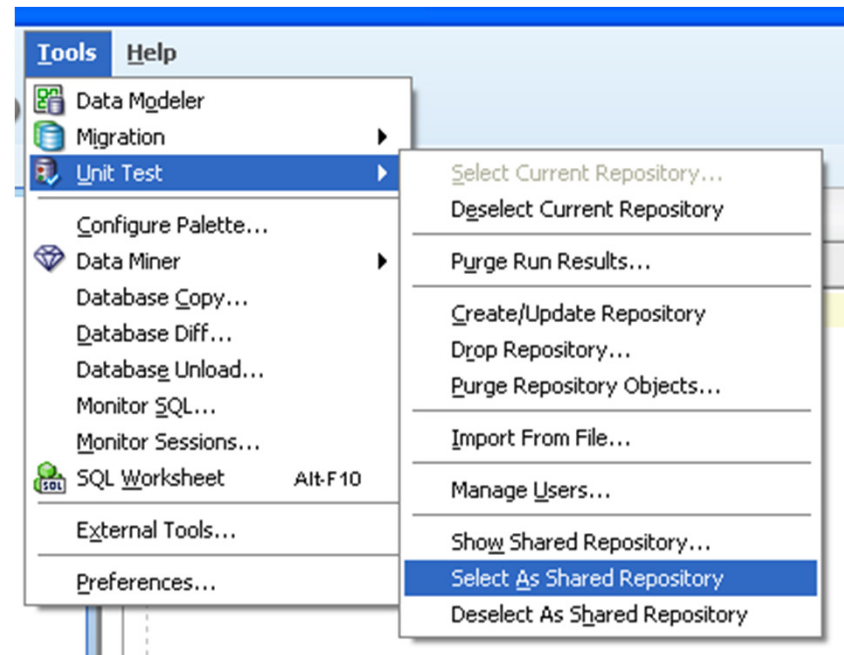
Import (Load) Data

- Various load methods
 - Insert and insert script
 - External table, staging external table,
 - SQL*Loader
- Customizable user interface
- Delimited file support for specifying delimiters, enclosures, record terminators, encoding and header
- Dynamic data preview provides view of file as changes to the definition are made



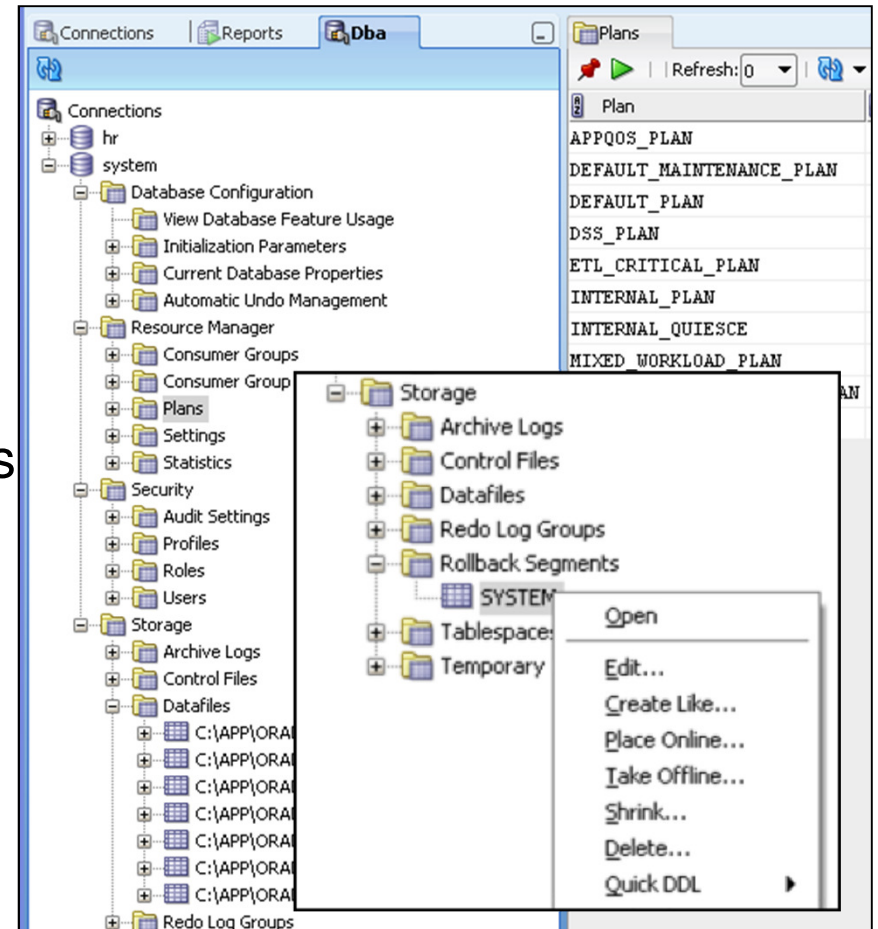
Unit Test Updates

- Enhanced multi-user support
- Support added for abstract data types
 - PL/SQL VARRAY
 - PL/SQL Nested Table
 - PL/SQL Associative Array
 - Ref Cursors
- Multiple startups and teardowns
- Purge run results
 - All results
 - Set of results



DBA Navigator

- Browse and maintain database configuration
- Review and manage database using the resource manager
- Browse, update and create security options
- Update and review storage objects
- Create users and roles



Extended Tuning Support

- Current Tuning support includes
 - Monitor SQL
 - PL/SQL Hierarchical Profiler
 - Explain Plan
 - Autotrace
- SQL Developer 3.0
 - SQL Tuning Advisor
 - Diff tool for explain plans

V\$STATNAME Name	V\$MYSTAT Value Autotrace 1	V\$MYSTAT Value Autotrace
CPU used by this session	6	4
CPU used when call started	6	4
DB time	7	5
SQL*Net roundtrips to/from client	13	13
buffer is not pinned count	26	26
buffer is pinned count	4	4

SQL Tuning Advisor

- Requires *advisor* and *administer SQL Tuning set* privileges
- Review all advice or select individual components
 - Stale or missing statistics
 - Generation of SQL Profiles with in depth detail
 - Manual restructuring of SQL
 - Use of indexes

SQL Tuning Advisor

5.766 seconds

Implement Type

- Statistics
- SQL Profile
- Indexes
- Restructure SQL

Overview Detail

Tuning Task Name: **staName51030**
Tuning Task Owner: **HR**
Workload Type: **SQL Statement**
Scope: **COMPREHENSIVE**
Completion Status: **COMPLETED**

```
select owner
         "Owner",
         initcap(object_type)
         object_name
         initcap(status)
         created
         nvl(last_ddl_time,created)
```

FINDINGS	RECOMMENDATIONS	RATIONALE
Optimizer statistics for table "SYS"."OBJAUTH\$" and its indices are stale.	Consider collecting optimizer statistics for this table.	The optimizer requires up-to-date statistics for the table in order to select a good execution plan.
A potentially better execution plan was found for this statement.	Consider accepting the recommended SQL profile.	This attribute adjusts optimizer estimates.

Compare Explain Plan and Autotrace Results

- Compare results of two queries
 - Gather Explain Plan/Autotrace results for first query
 - Pin results
 - Modify query
 - Gather second set of plan results
 - Compare plans

The screenshot displays the Oracle SQL Developer interface. At the top, a query is entered in the SQL editor:

```
select /* use_hash e,d */ *  
from hr.departments d, hr.employees e  
where d.department_id = e.department_id  
and e.first_name like 'A%';
```

Below the editor, the 'Autotrace' tab is selected, showing a comparison of two autotrace results. The interface includes checkboxes for 'Cascade Diff' and 'Ignore Pred'. The autotrace results are presented as two side-by-side explain plans.

Left Explain Plan:

- SELECT STATEMENT
- ├── NESTED LOOPS
- │ ├── NESTED LOOPS
- │ │ ├── TABLE ACCESS (FULL) EMPLOYEES
- │ │ │ ├── Filter Predicates
- │ │ │ │ └── E.FIRST_NAME LIKE 'A%'
- │ │ │ └── INDEX (UNIQUE SCAN) DEPT_ID_PK
- │ │ └── Access Predicates
- │ │ └── D.DEPARTMENT_ID=E.DEPARTMENT_ID
- │ └── TABLE ACCESS (BY INDEX ROWID) DEPARTMENTS

Right Explain Plan:

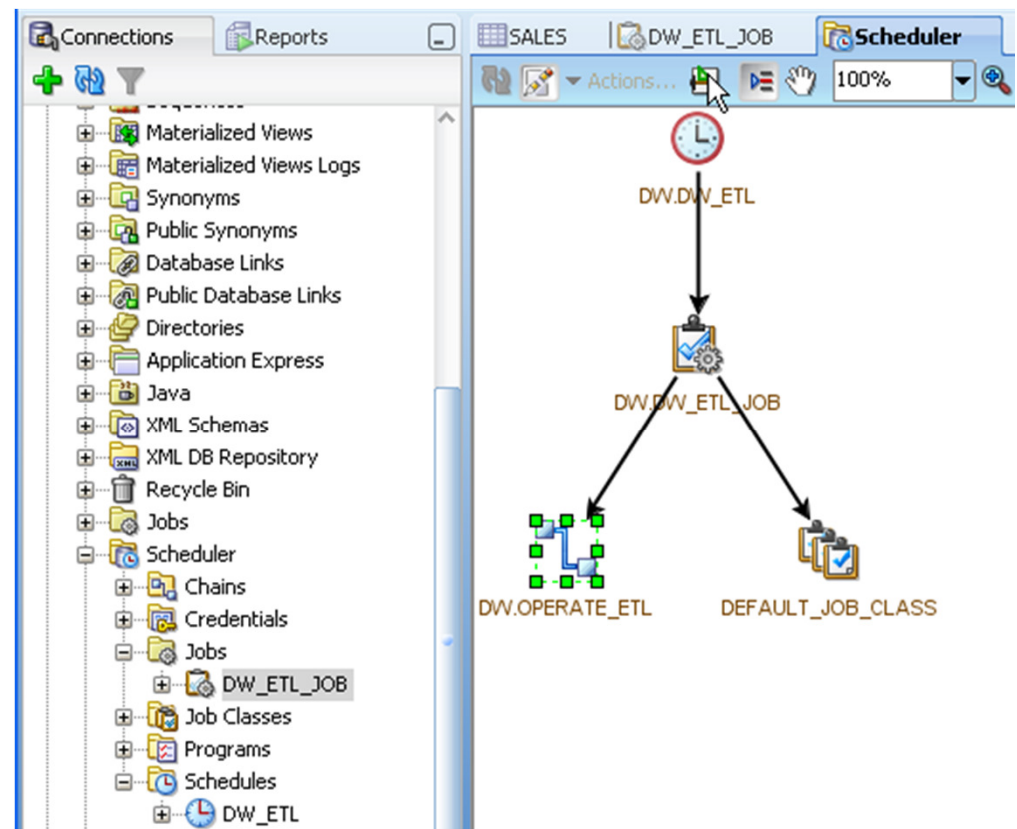
- SELECT STATEMENT
- ├── NESTED LOOPS
- │ ├── NESTED LOOPS
- │ │ ├── TABLE ACCESS (FULL) EMPLOYEES
- │ │ │ ├── Filter Predicates
- │ │ │ │ └── E.FIRST_NAME LIKE 'A%'
- │ │ │ └── INDEX (UNIQUE SCAN) DEPT_ID_PK
- │ │ └── Access Predicates
- │ │ └── D.DEPARTMENT_ID=E.DEPARTMENT_ID
- │ └── TABLE ACCESS (BY INDEX ROWID) DEPARTMENTS

At the bottom, a table compares V\$STATNAME values for 'Autotrace 1' and 'Autotrace':

V\$STATNAME Name	V\$MYSTAT Value Autotrace 1	V\$MYSTAT Value Autotrace
CPU used by this session	6	4
CPU used when call started	6	4
DB time	7	5

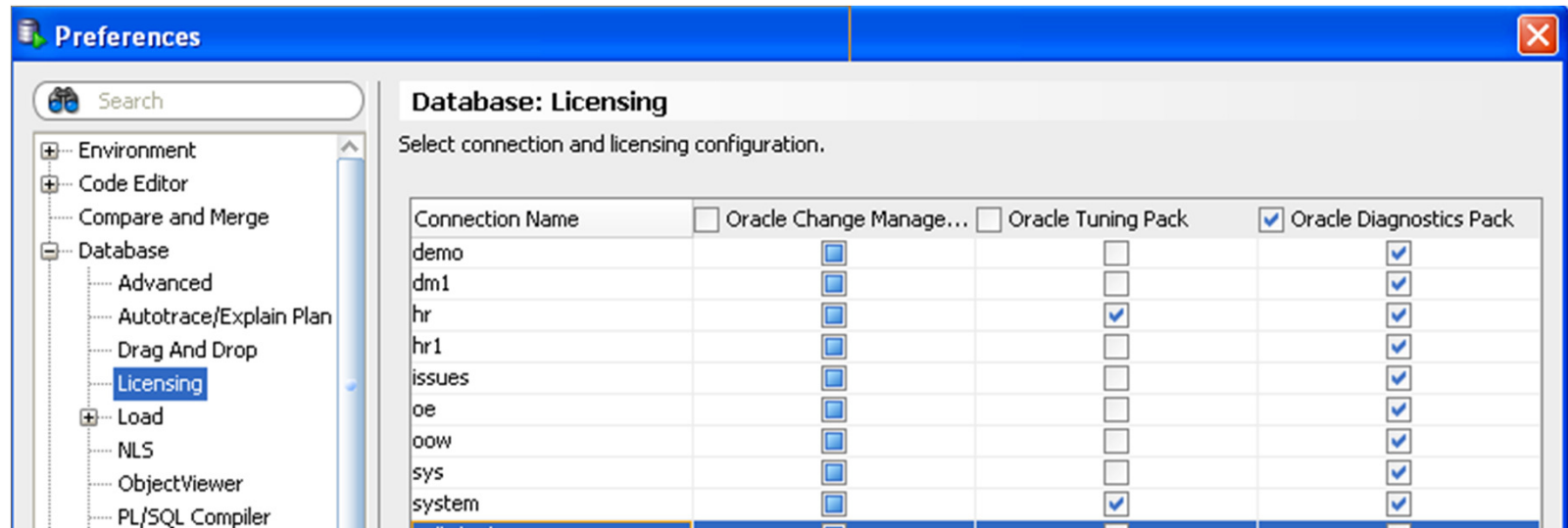
DBMS Scheduler

- DBMS Scheduler allows you to control when and where various tasks take place
- Scheduler node provides
 - Chains
 - Credentials
 - Jobs & Job Classes
 - Programs
 - Schedules
- Design Editor view for graphical representation



Management Pack Preference Setting

- SQL Developer supports Oracle Database Management packs
 - Oracle Diagnostic Pack (ASH and AWR Reports)
 - Oracle Change Management Pack (Database Diff)
 - Oracle Tuning Pack (SQL Tuning Advisor, Monitor SQL)



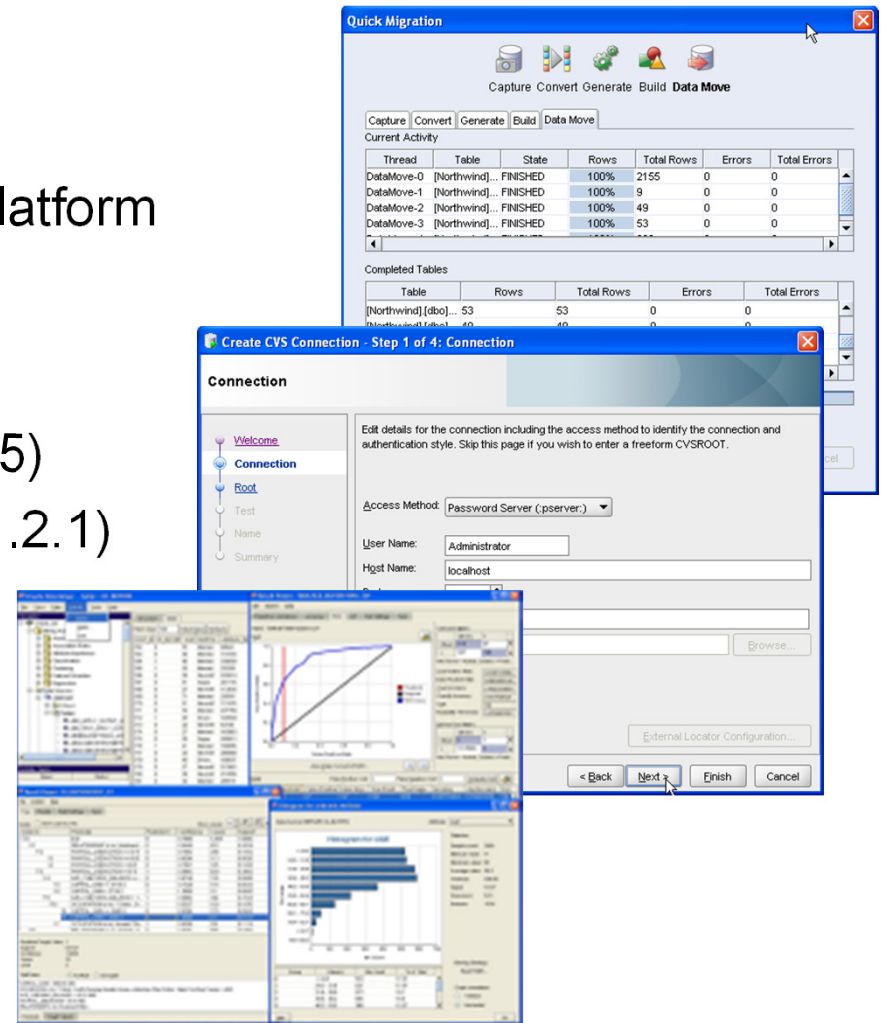


Extending SQL Developer

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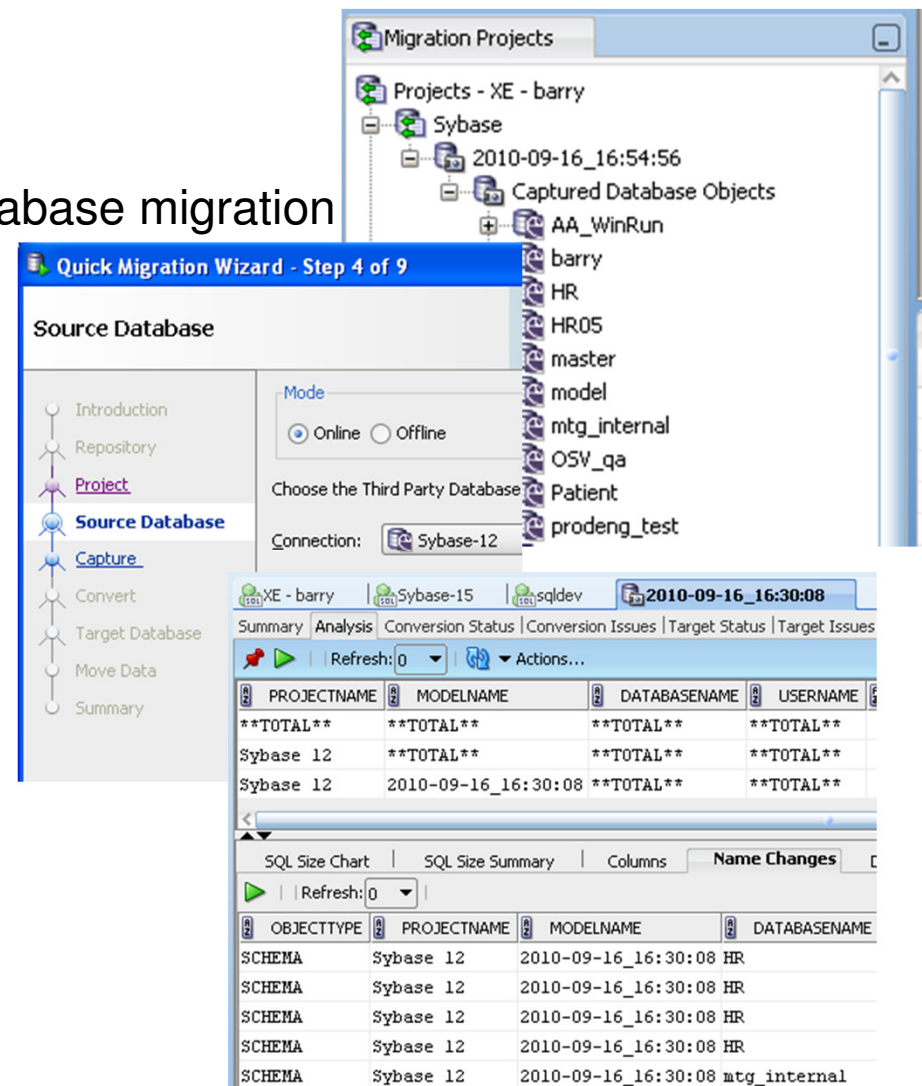
SQL Developer's Extensible Framework

- Easily extended
 - Based on the Fusion Client Platform
- Oracle custom extensions:
 - Migration Workbench
 - TimesTen (SQL Developer 1.5)
 - Data Miner (SQL Developer 1.2.1)
 - Rdb (under development)
 - Oracle Spatial
- Third Party extensions
 - Various third party available



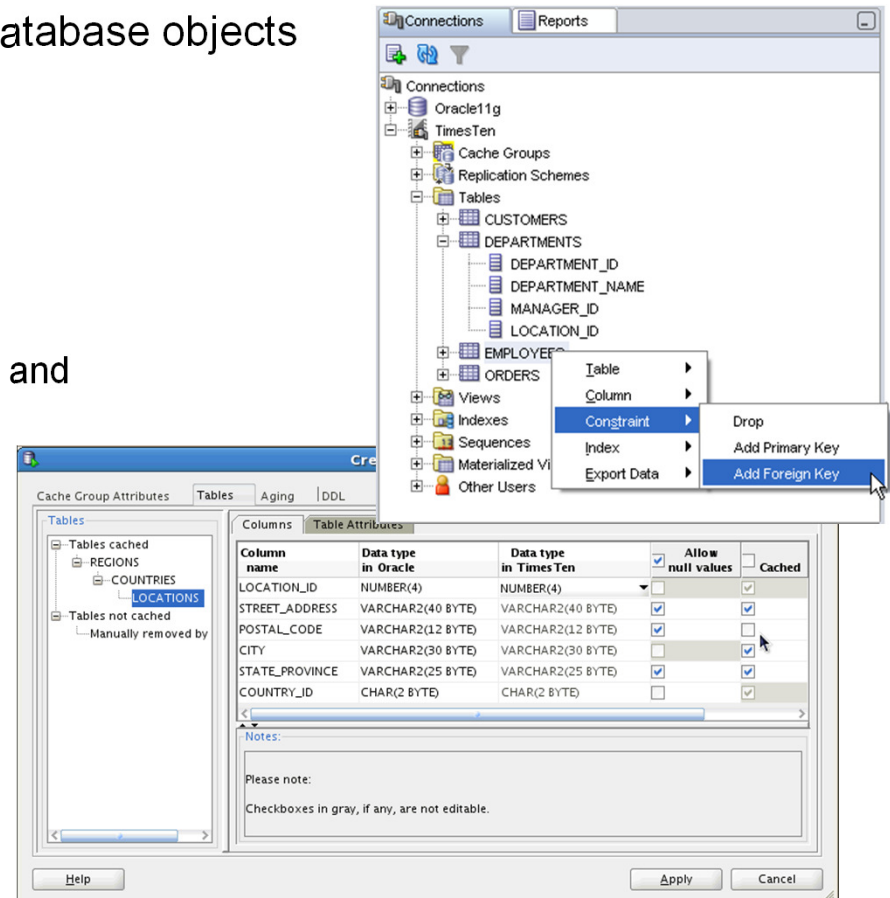
Database Migration Projects

- Migration navigator for 3rd party database migration
- Copy to Oracle
 - Right click and copy to a connection
- Server Capture for multi-database
- Migration Wizard
 - Drives all phases of migration
- Command line support
 - All migration features
- Migration Reports
 - Project Estimation/Server Analysis
 - Conversion Issues
 - Data Quality metrics
 - Target objects verification
- Client application scanning
 - Identifies 3rd party database calls in applications



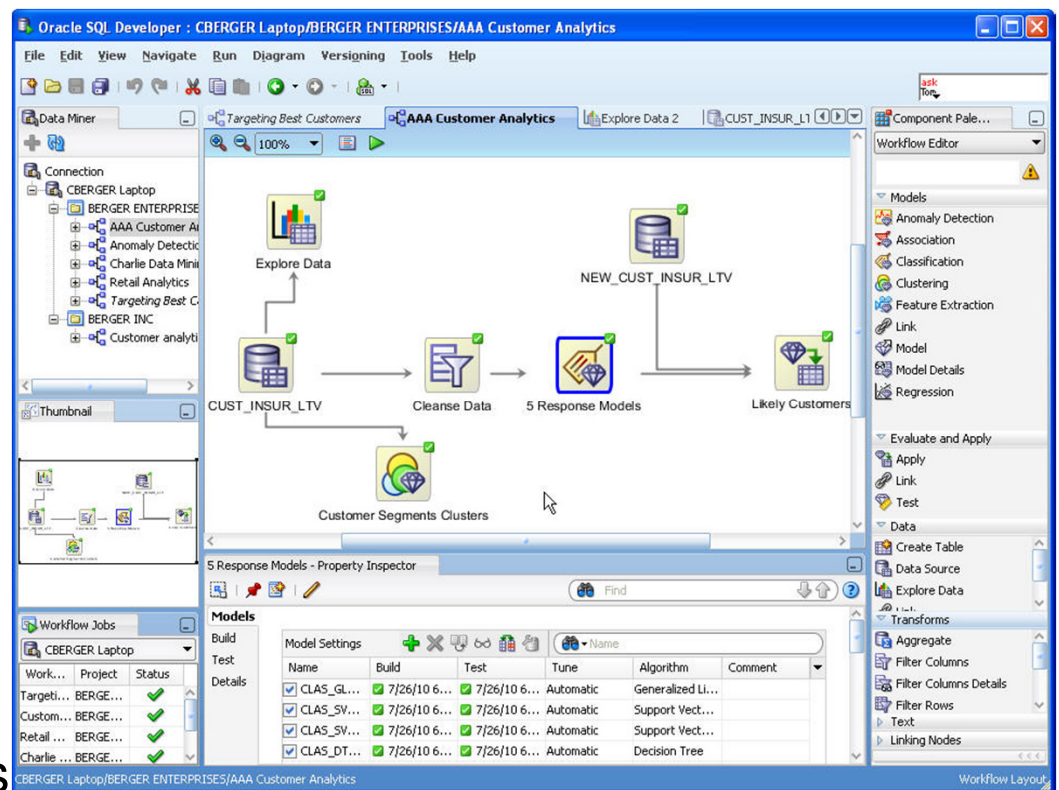
TimesTen Support in SQL Developer 3.0

- Browse, edit, create, modify TimesTen database objects including users
- In-Memory Database Cache
 - Create/drop/alter cache groups
 - Load/unload, flush, refresh cache data
- PL/SQL support
 - Create/Replace/Drop, Edit, Compile, Run, and Export procedures/functions/packages
- Show SQL execution plans and update table and column statistics
- Access SQL Worksheet for ad-hoc SQL queries, execute TimesTen built-in procedures and ttlsql commands
- Run pre-defined database and objects reports
- Manipulate cached data in both TimesTen and Oracle at the same time

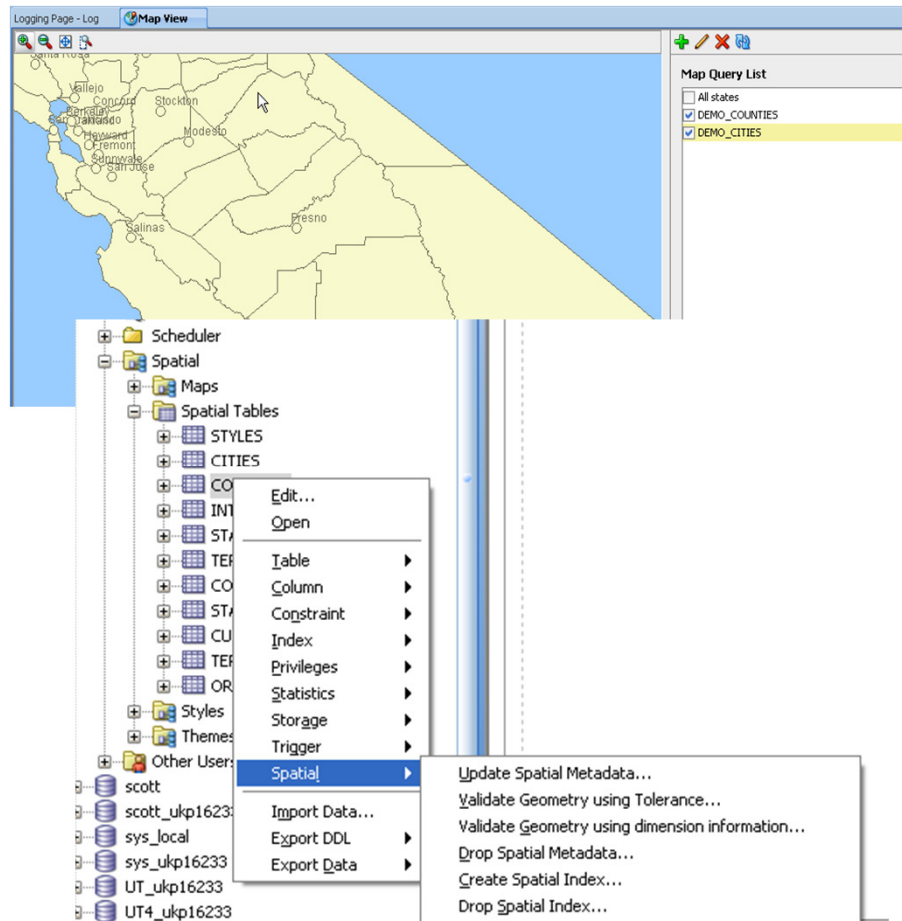


Oracle Data Miner in SQL Developer 3.0

- Graphical User Interface for data analysts
- Build and evaluate data mining models
- Apply predictive models
- Share analytical workflows
- Deploy SQL, apply code and scripts
- Predict customer behavior
- Identify key factors
- Predict next-likely product
- Customer profiling
- Detect fraud and anomalies
- Mine “text” and unstructured data



Managing Oracle Spatial Information



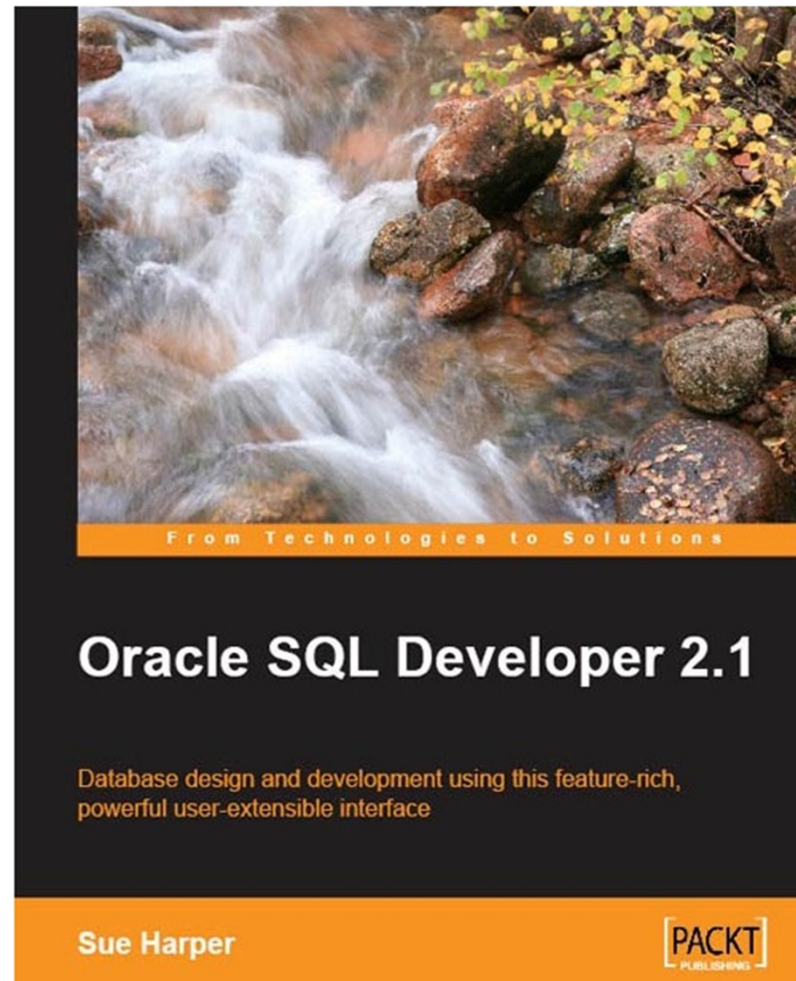
- Data Management
 - Maintain spatial metadata and indexes
 - Support for spatial validation
- Data Querying
 - Create spatial queries
 - Generate spatial shapes
 - Display query results in map view
- Map support
 - Display layers in a map based on map queries
 - Drag and drop spatial tables onto map view for quick display
 - Use spatial snippets



More Information

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Finding More Detail





Finding More Detail

www.oracle.com/technetwork/developer-tools/sqldeveloper/

- SQL Developer on OTN
 - White papers, Oracle by Example (OBE), online demos, models and scripts
 - www.oracle.com/technetwork/developer-tools/sqldeveloper/
- SQL Developer Exchange
 - Add feature requests: sqldeveloper.oracle.com
- Forums
 - SQL Developer
forums.oracle.com/forums/forum.jspa?forumID=260
- Book
 - Oracle SQL Developer 2.1
- Webcasts



Summary

- Connects, Reports, Files DBA navigators
 - Browse, query, update objects
- SQL Worksheet
 - Query Builder
- Data export and import
- SQL Tuning
 - SQL query adviser, Explain, Diff
- PL/SQL
 - Create, edit debug, Unit Testing
- Extensible framework
 - User defined extensions
 - Database migration projects
 - Oracle TimesTen, Oracle Data Miner, Oracle Spatial Management
- Oracle APEX integration

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