





# Database tools for developers

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# Outline



#### Most useful tools:

- SQL\*Plus
- Benthic
- SQL Developer
- JDeveloper
- Session Manager
- Weekly reports
- Typical use-cases:
  - My query is slow
  - My application is slower than it used to
  - My DML statement got stuck







# Most useful tools







# SQL\*Plus



- SQL\*Plus is the primary tool to access an Oracle database
  - You can be sure to find it wherever Oracle software is installed
- It is a traditional line-mode tool to execute SQL:
  - Scripting and formatting facilities
    - Can generate quite good reports
  - Some SQL optimization functionality
- But
  - Formatting the output is not an easy task
  - No command history on Unix
    - Use rlwrap tool to make SQL\*Plus more user friendly <u>https://twiki.cern.ch/twiki/bin/view/PSSGroup/RIWrap</u>





# Setting up SQL\*plus



- To start using SQL\*Plus from lxplus run:
  - For tcsh:

source /afs/cern.ch/project/oracle/script/setoraenv.csh -s client ver

– For bash:

source afs/cern.ch/project/oracle/script/setoraenv.sh -s client\_ver

- Some useful formating commands:
  - set linesize xxx number of characters per line
  - set pagesize xxx number of rows per page
  - col column\_name for ... specified the way contents of the column are printed e.g:

col name for a50; col salary for 9999.99

- set long xxx number of characters printed for LOB columns
- If you create login.sql script, it will be run automatically when you connect with SQL\*Plus
  - Use SQLPATH environment variable to indicate the patch to your SQL scripts.





# Checking query execution plans with SQL\*Plus



- SQL\*Plus can be used for SQL debugging purposes. It can provide information on:
  - Actual query execution plan
  - Query execution statistics
- SET AUTOTRACE TRACEONLY
- Comprehensive SQL\*Plus documentation can be found here: <a href="http://oracle-documentation.web.cern.ch/oracle-documentation/10gr2doc/server.102/b14357/toc.htm">http://oracle-documentation.web.cern.ch/oracle-documentation/10gr2doc/server.102/b14357/toc.htm</a>





# Example



#### SQL> set autotrace traceonly

SQL> var :b1 number; SQL> exec :b1 := 3423

SQL> SELECT file\_state FROM lcg\_fts\_prod.t\_file

WHERE file\_id = :B1;

10	1	Operation	Name		Rows	Bytes	Cost	(%CPU)	Time	Ī
İ	1	SELECT STATEMENT TABLE ACCESS BY INDEX ROWID INDEX UNIQUE SCAN	   T_FILE   FILE_FILE_ID_PK	     	1   1   1	11	į :	1 (0)	00:00:01 00:00:01 00:00:01	İ

Predicate Information (identified by operation id):

2 - access("FILE\_ID"=TO\_NUMBER(:B1))

#### Statistics

.....

- 1 recursive calls
- 0 db block gets
- 1 consistent gets
- 1 physical reads
- 0 redo size
- 279 bytes sent via SQL\*Net to client
- 385 bytes received via SQL\*Net from client
  - 1 SQL\*Net roundtrips to/from client
  - 0 sorts (memory)
  - 0 sorts (disk)
  - 0 rows processed







# Query execution statistics



Statistics	Meaning				
Recursive calls	number of SQL statements executed on behalf of the query				
Db block gets, consistent gets	number of blocks read from the cache				
Physical reads	number of physical reads from datafiles into the cache				
Redo size	Total amount of redo generated				
Bytes sent/received via SQL*Net to/from client	amount of data sent between the client to the server				
SQL*Net roundtrips to/from client	total number of messages exchanged between the client and the server				
Sorts (memory)	sorts done in the sessions memory				
Sorts (disk)	sorts done on disk (in the temporary tablespace)				
Rows processed	number of rows modified or returned by executed SQL statement				



# Benthic

- CERN**T**Department
- Benthic applications provide GUI for writing queries, running scripts, developing PL/SQL code and browsing schema objects
  - Benthic Golden is a querying and scripting tool
  - Benthic PLEdit is PL/SQL code editor
  - Benthic GoldView is a schema structure browser
- Benthic is available for Windows OS only
- Benthic can be downloaded from http://www.benthicsoftware.com
- It is commercial software, the license keys are located at DFS, can be used by anybody on the CERN site





### Benthic Golden



- Benthic Golden is an ad-hoc query and SQL scripting tool:
  - Allows editing and running multiple scripts simultaneously
  - Supports SQL\*Plus variable prompting, bind variables and calling external scripts with parameter passing.
  - Supports SQL\*Plus specific command EXEC, DESC and CONNECT.
  - Provides script and statement's timing
  - Provides access to query execution plans
  - Contains various export/import options.
  - Allows editing of single table result sets
  - Supports colored syntax highlighting
  - Includes SQL builder tool to quickly assemble desired SQL statement





## **Benthic PLEdit**



- Benthic PLEdit facilitates editing and compiling of PL/SQL code modules (stored procedures, functions, packages, triggers)
  - Supports editing of multiple modules simultaneously
  - Simplifies resolving compilation errors
  - Supports colored syntax highlighting
  - Includes SQL builder for easier assembly of PL/SQL blocks
  - Includes some stored PL/SQL code management tools
  - Shows dependencies visually
  - Misses PL/SQL debugger





## Benthic GoldView



- GoldView is a schema structure browser
  - Offers a fast and easy way to find an information about the objects in a schema
  - It is a read-only tool
- Displays objects in all accessible schemas
- Shows detailed information on tables, views, triggers, indexes, synonyms, sequences, types and code modules
- Shows structure, keys, constraints, stored code, DDL and more!

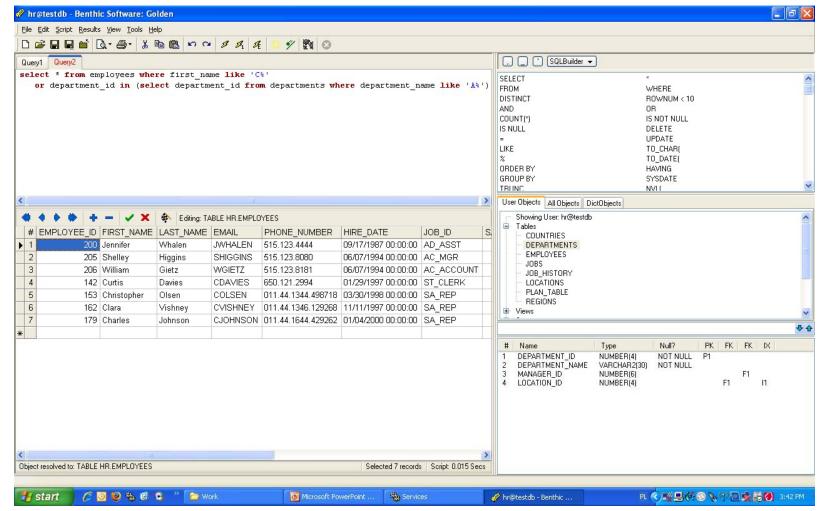


# now loop war

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# Benthic









# Oracle SQL Developer



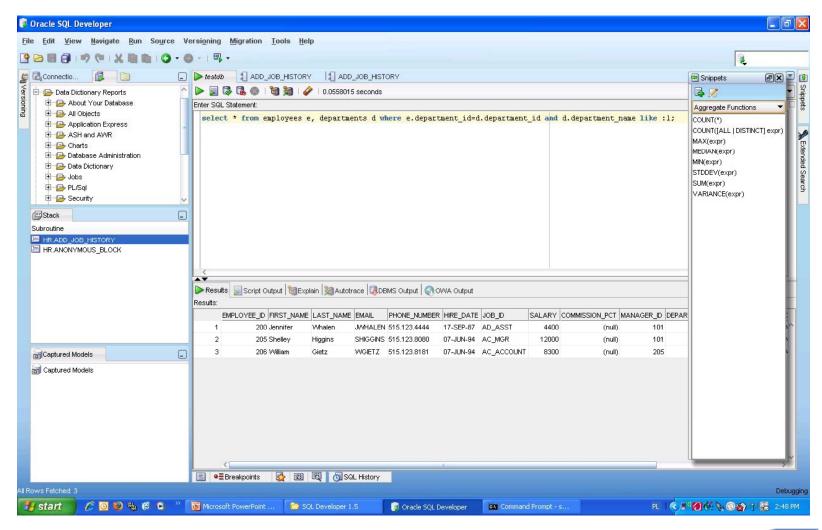
- Oracle SQL Developer is a powerful GUI for database interaction and development. It has all the Benthic functionality and in addition:
  - Visual Query builder
  - Full PL/SQL debugging
    - Required DEBUG CONNECT SESSION and DEBUG ANY PROCEDURE privs
  - Pre-defined and user-defined reports
  - Full integration with CVS and Subversion
  - Integrated tool for migrating data from 3rd party database engines like MySQL, Microsoft SQL Server, Sybase Adaptive Server, or Microsoft Access
- Oracle SQL Developer is a Java-based application so it is fully portable between different platforms
- It is a free tool, can be downloaded from <u>http://otn.oracle.com</u>





# SQL Developer











# **JDeveloper**



- Complete and integrated Java, XML and Web Services development environment
  - Build/debug/tune/deploy
  - Full J2EE 1.4 and EJB 3.0 support (as of 10.1.3)
- Very good integration with Oracle Database Server
  - Very similar functionality to what SQL Developer offers
- Good integration with several application servers (Oracle AS, JBoss, Tomcat, WebLogic)
- JDeveloper is a Java-based application







# **JDeveloper**



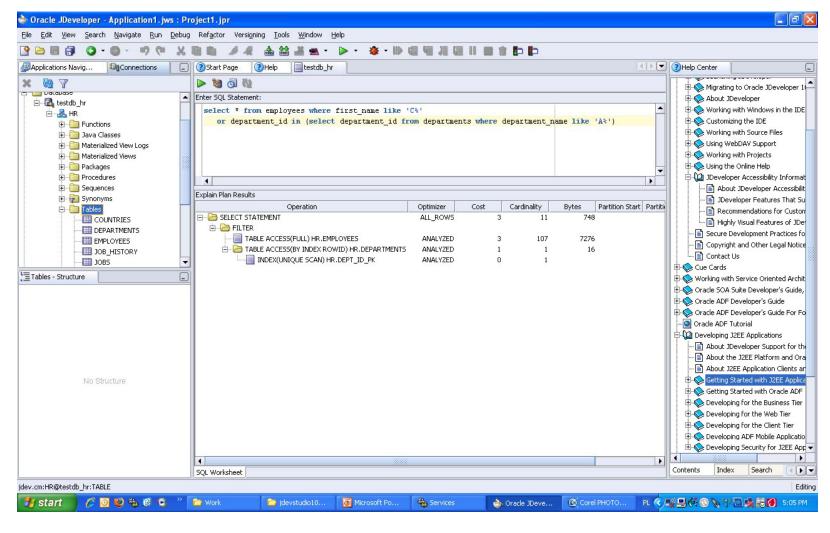
- Wizards to create your Servlets, JSP, EJB, WEB Services, XML...
- WYSIWYG editor for web pages
- UML diagrammer
- Support for Open Source projects like Junit, Apache Ant, Struts
- Support for CVS
- And all the functionality of SQL Developer
- ... and much more



# on a SIG now loop war

# **JDeveloper**











# **Session Manager**



 Home-grown tool to monitor and manage applications' database sessions:

https://twiki.cern.ch/twiki/bin/view/PSSGroup/Sessions Manager

- Installed and configured for all development, integration and production databases
- Offers a convenient way to:
  - Check who is connected
  - See database sessions' details
  - Check what sessions are doing/waiting for
  - Investigate on locking conditions
  - Kill problematic sessions

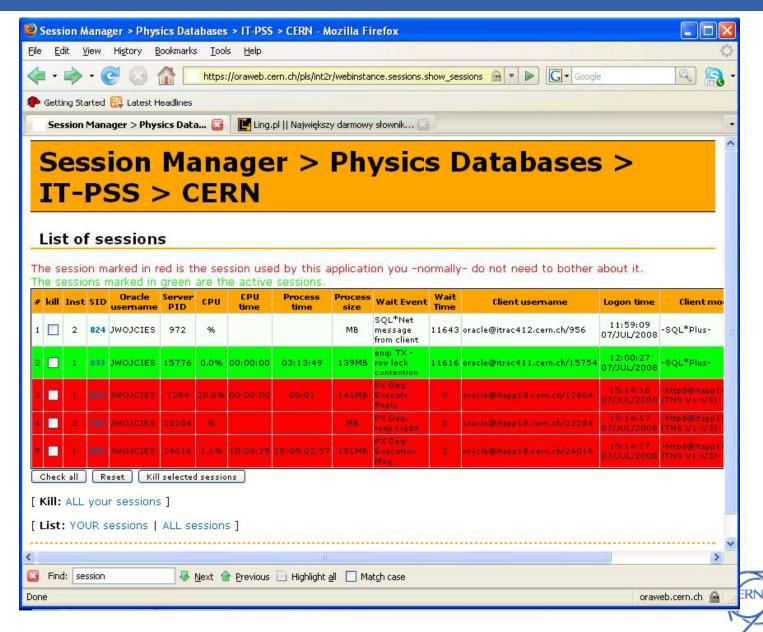


# eturn: / now loop war

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# Session Manager







# Weekly reports



- Another home-grown tool
- Provides aggregated information on applications' activity
  - Top resource consumers
  - Hourly applications' activity stats
- Signalizes potential problems
  - Repeting queries without bind variables
  - Expiring/expired passwords
  - Invalid objects
  - Failing jobs
  - Fragmented tables
  - Connection errors







# **Typical use-cases**







# My query is slow



- SQL\*Plus
  - Connect to the databse
  - Enable autotrace

set autotrace traceonly

- Run the query:
  - keep bind variables
- Study the execution plan, look for costly steps:
  - TABEL ACCESS FULL usually means missing index
  - MERGE JOIN CARTESIAN usually means missing WHERE predicates
  - INDEX FULL SCAN operations also should be avoided
- Check for existing indices and create missing ones:

```
select * from user_ind_columns where
table_name='name_of_the_table';
```





# My query is slow (2)



 Check if object statistics were collected recently, if not collect them:

```
select table_name, last_analyzed from
  user_tables where
  table_name='name_of_the_table';
select index_name, last_analyzed from
  user_indexes where table_name='
  name_of_the_table';
exec dbms_stats.gather_table_stats(user,
    'name_of_the_table')
exec dbms_stats.gather_index_stats(user,
    name_of_the_index')
```

- Review query execution statistics returned by autotrace:
  - Pay special attention to 'recursive calls', 'physical reads', 'SQL\*Net roundtrips' and 'sorts (disk)'
- Or do the same with SQL Developer or Benthic





# My application is slower than it used to be



- If the application runs on a shared database have a look at the Weekly Report:
  - Check the load generated by your and other applications
  - Check the number of sessions
  - Compare with the previous Weekly Reports
- Check when application objects where last analyzed
  - Collect statistics if needed:

```
exec dbms_stats.gather_schema_stats(null)
```

 Check if there were any recent changes of the schema and objects:

```
select object_name, object_type, created,
  last_ddl_time from user_objects where
  created>sysdate-5 or last_ddl_time>sysdate-
5;
```

Review execution plans of most important queries







# My DML statement got stuck



- This most likely means wait for resouces locked by other sessions
  - Go to the Session Manager
  - Find the session keeping resource your DML is waiting for
  - Either commit, rollback or kill the blocking session
  - Review the application to avoid similar problems in the future.









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