www.*DanHotka*.com
Quarterly Newsletter

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Dan Hotka is a Training Specialist who has over 30 years in the computer industry and over 24 years of experience with Oracle products. He is an internationally recognized Oracle expert with Oracle experience dating back to the Oracle V4.0 days. Dan's latest book is the SQL Developer Handbook by Oracle Press. He is also the author of Oracle9i Development By Example and Oracle8i from Scratch by Que and has co-authored 7 other popular books including the Database Oracle10g Linux Administration by Oracle Press. He is frequently published in Oracle trade journals, and regularly speaks at Oracle conferences and user groups around the world.

Public Training Offerings

Watch for Dan in your area with these courses. Contact Dan for course details and enrollment. Check www.DanHotka.com , click on Onsite Training for course outlines, or, just ask Dan.

March 24 - 26 Oracle SQL Performance and Tuning (Minneapolis)

April 7 – 9 Advanced PL/SQL Programming (Minneapolis**)**

April 14 – 16 Oracle SQL Performance and Tuning (Denver)

May 19 - 21 Advanced PL/SQL Programming (Denver)

The year has started out well. I'm going to try some promotions as a vendor at a few shows this Spring. I had a booth at RMOUG and the response was pretty good! RMOUG continues to be a great user group based in the Denver area and their annual Training Days event continues to draw record crowds. I conducted a University session on Understanding Explain Plans…the main newsletter topic this quarter as well.

I'll be at Collaborate and hopefully Oracle Open World as an exhibitor as well. Stop and introduce yourself to me. I'll be giving away SQL Tuning Tip Sheets.

I'm also going to try and do a few more public offerings. I will be in Denver in April with my popular tuning class and Denver in May with my Advanced PL/SQL class. These classes are $995 per person and I'll take 20 people for each. Contact me with your level of interest.

Help me promote a class in your area and you get to sit in for free.

This newsletter will cover:

- Understanding Explain Plans
- Product Review: Useful Techniques in TOAD and SQL Developer for Tuning
- How to get Free Training from www.DanHotka.com
- *OracleDatabase 11g SQL: Master SQL and PL/SQL in the Oracle Database* by Price
- New Presentation: Oracle11g New Features for Developers

- Back Page: Tomato Bisque Soup

This newsletter, along with all prior newsletters, are available at www.DanHotka.com.

What's in this issue?

User Group Information:

- See Dan at Collaborate!
- See page 2 for Dates and Submitted Papers.
- I have several new presentations for User Groups – See New Presentations. A complete list of topics is at http://www.danhotka.com/

Understanding Explain Plans

An overview of explain plan contents. Page 4

Free Downloads

Free Downloads. Page 9

Free Training Opportunity

Learn how to attend free training by Dan. Page 3

Product Review

- TOAD 9 SQL Tuning Tips
- SQL Developer 1.5 SQL Tuning Tips

See page 6.

Book Review

Oracle Database 11g SQL: Master SQL and PL/SQL in the Oracle Database

Check out this useful book by Jason Price on page 8.

Educational Offerings

- My Training Pricing Model – up to 15 attendees for one low price!
- On-site at your company or in your city via user group participation…see Educational Offerings on Page 3.

Featured Presentation

- New Presentation to be given at Collaborate: Oracle11g New Features for Developers. See page 9.

The Back Page:

- Tomato Bisque Soup
- VW Review

Puzzler…

What was the first available anti-virus program and how did it work?

Go to www.DanHotka.com for the answer!

User Group Information

See Dan at these events:

Collaborate 09, 2009 (Orlando)
Speaking Topics
Discoverer10g Tips and Techniques
Oracle11g New Features for Developers
www.ioug.org

I am available to speak at your user group. A complete listing of available topics is on my website.

Let me know what you would like and I can fill your timeslot.

Educational Offerings

Please remember that my portable computer lab make these courses very easy to teach at your site. The cost of this lab is included in my 1-fee pricing model (see below).

2008 has been a year of PL/SQL and SQL Performance Tuning. I have been doing training for 5 years now (where

does the time go…) and have noticed definite patterns of training.

My PL/SQL offerings include both Intro to PL/SQL (a 2-day course) and Advanced PL/SQL (a 3-day course). Both courses cover using the Oracle PL/SQL Profiler and other PL/SQL tuning topics.

The focus of my SQL Performance Tuning course is to cover exactly how Oracle arrives at the explain plan, how Oracle uses/includes indexes in these plans, and tuning using a coding style that I find helps keep the tuned SQL stay tuned.

I have adapted this course to 1-day, 2-day, and 3-day offerings. This course also illustrates various tuning tools such as Stats Pack, SQL Trace, and the PL/SQL profiler, as well as advanced topics that include SQL Profiling, finding SQL problems using the V$ tables, and Oracle10g performance issues.

Training Pricing Model

I price my courses at a fixed rate for up to 15 attendees. This rate compares to the price that others charge for just 2 to 4 attendees. This course fee always includes the use of my portable computer lab. There is a separate per attendee charge that covers the cost of the student guide and any additional books that might be associated with the course. This student fee is anywhere from $50 to $150, depending on the course.

Current Course Offerings

Give your technical staff that competitive edge with Oracle Workshops! These courses are designed to enhance your staff's skill set to perform their job better.

These workshops are designed to be held at your location. These courses use my portable computer lab. On-site instruction enables more people to be trained with the same training dollar.

The course utilizes a variety of current tools. Students will have the opportunity to learn more about SQL Developer, TOAD, TextPAD, as well as the Oracle tools like SQL*Plus, iSQL*Plus, and Dan's new Java-based SQL Tuner.

Oracle SQL Performance Tuning Tips and Techniques (1-day, 2-day, or 3-day offerings)

TOAD for IT Staff

SQL Developer for IT Staff

Oracle Analytics/Answers for End Users

Oracle Analytics for Administrators

Oracle Discoverer for End Users

Oracle Discoverer for Administrators

Introduction to Oracle (SQL)

Oracle Intro to PL/SQL
Oracle Advanced PL/SQL
Oracle Fundamentals
Oracle10g New Features for Developers
Introduction to UNIX/Linux
UNIX/Linux Shell Programming

Oracle/Unix Scripting Tips and Techniques

Free Training Opportunity

I have met folks that have organized a public course in their area. They always get to sit in the class for free!

I usually do on-site training because the training opportunity is easier to manage and the public offerings can be fickle with headcount.

I need at least 5 people to make a public class viable.

How does this work?

Contact me with interest in wanting to work with your current employer and your prior employers, your network of friends and associates in the area, etc, to provide me with 8 to 10 attendees.

I will do all the contract work, collections, and follow-up. I may ask you to help make contact with additional folks by providing me with additional contact information, etc.

What classes are available?

- The Oracle SQL Performance Tuning (2-days or 3-days…most go for the 2-day version)
- Advanced PL/SQL Programming Tips and Techniques

Any course I offer (see www.DanHotka.com) is available. It is the two offerings mentioned that tend to draw the larger groups for public offerings.

Summary:

Contact me with the course you are interested in helping to promote a public class in your area. Work with me to get at least 8 people from your contact group involved and you will get to sit in free.

Understanding Explain Plans

This is an excerpt from my SQL Performance Tuning Class.

The Oracle optimizers produce an execution plan for every SQL statement submitted. This execution plan contains information on exactly how Oracle is going to retrieve or process the requested data. An Explain Plan is a visualization of this execution plan.

The PLAN_TABLE is used to visualize the execution plan. This table is used by just about every tool that displays an explain plan.

This table is created by using the <Oracle Home>\rdmbs\admin\utlxplan.sql.

Column	Pk	Data Type
STATEMENT_ID		VARCHAR2 (30)
TIMESTAMP		DATE
REMARKS		VARCHAR2 (80)
OPERATION		VARCHAR2 (30)
OPTIONS		VARCHAR2 (255)
OBJECT_NODE		VARCHAR2 (128)
OBJECT_OWNER		VARCHAR2 (30)
OBJECT_NAME		VARCHAR2 (30)
OBJECT_INSTANCE		NUMBER
OBJECT_TYPE		VARCHAR2 (30)
OPTIMIZER		VARCHAR2 (255)
SEARCH_COLUMNS		NUMBER
ID		NUMBER
PARENT_ID		NUMBER
POSITION		NUMBER
COST		NUMBER
CARDINALITY		NUMBER
BYTES		NUMBER
OTHER_TAG		VARCHAR2 (255)
PARTITION_START		VARCHAR2 (255)
PARTITION_STOP		VARCHAR2 (255)
PARTITION_ID		NUMBER
OTHER		LONG
DISTRIBUTION		VARCHAR2 (30)
CPU_COST		NUMBER
IO_COST		NUMBER
TEMP_SPACE		NUMBER
ACCESS_PREDICATES		VARCHAR2 (4000)
FILTER_PREDICATES		VARCHAR2 (4000)

*****Note***** It is important to rerun this script when migrating to a newer instance of Oracle. There are always newer columns and you will not be taking advantage of the latest features of Oracle without using the latest PLAN_TABLE.

My SHOW_PLAN.sql script (on my website or ask me for it) also formats the contents of this PLAN_TABLE into understandable results.

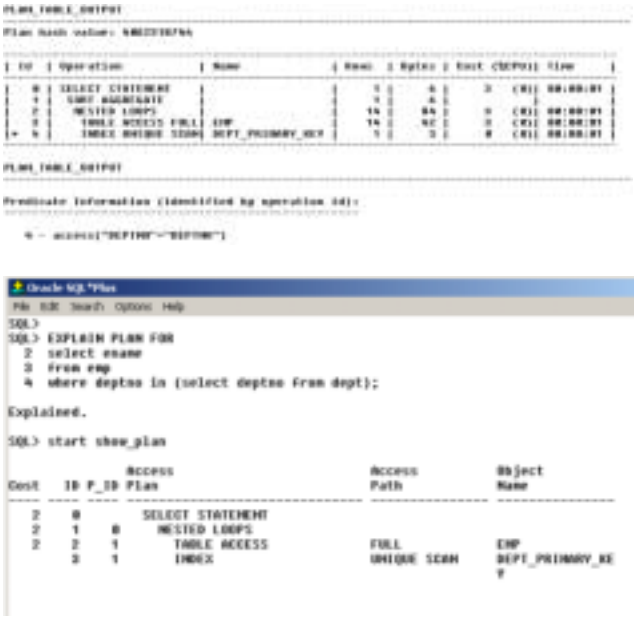
The Autotrace feature of SQL*PLUS will produce an explain plan: set autotrace on explain. Oracle v9 and before showed useful numbers in interpreting the flow of the explain plan where Oracle10g+ does a better job of showing the where clause predicates.

The SHOW_PLAN.sql script still shows useful numbers for interpreting the flow of the explain plan.

Sometimes it is preferable to get an explain plan without running the SQL code first. You already know it runs

slowly… The syntax 'EXPLAIN PLAN FOR' in front of the SQL code will cause the PLAN_TABLE to be populated with an explain plan. Notice the 'Explained' comment from SQL*Plus. When running with the EXPLAIN PLAN FOR syntax…SQL*Plus responds with 'Explained'. Now the PLAN_TABLE is populated. Use the 'start show_plan.sql' script or the undocumented 'DBMS_XPLAN.DISPLAY' (covered next) to format the explain plan.

Use the syntax 'SELECT * FROM TABLE(DBMS_XPLAN.DISPLAY)' to format the contents of the PLAN_TABLE.



```
SQL>
SQL> EXPLAIN PLAN FOR
  2  select ename
  3  from emp
  4  where deptno in (select deptno from dept);

Explained.

SQL> start show_plan

                Access                          Access          Object
Cost    ID P_ID Plan                            Path            Name
---- ---- ---- ------------------------------ --------------- ---------------
   2    0       SELECT STATEMENT
   2    1    0    NESTED LOOPS
   2    2    1      TABLE ACCESS               FULL            EMP
        3    1      INDEX                      UNIQUE SCAN     DEPT_PRIMARY_KE
                                                               Y
```

Output from SHOW_PLAN.sql

Oracle reads the SQL from the end to the beginning. While processing the various items, Oracle keeps track of the available indexes.

Oracle does the table joins first. Oracle only joins 2 tables at a time. Oracle only processes each where clause predicate once.

Sometimes Oracle needs to access a table again to satisfy an unused or remaining where clause item.

RBO: follows a set of rules mostly based on indexes and types of indexes.
CBO: uses statistics and math to make an educated guess at the lowest cost. CBO processes multiple iterations of explain plans (called permutations). CBO picks the one with the overall lowest cost.

Oracle always processes the table joins first.

Oracle will keep track of the where clause predicates used.

Oracle only joins 2 tables at a time. The first table in the join I refer to as the driving table and the other the inner. Oracle documentation labels these the outer table and the inner table.

Both optimizers parse backwards…so…the first table that they both arrive at in the above example is the C table. Both optimizers will look at B first (next in line going backwards). RBO will look at the where clause predicates and see if there is something that directly relates these tables together. If so…it will join these 2 tables (as it did). CBO…will cost this join out…then cost out all the other combinations…trying to drive off of the most selective option (based on statistics and calculations…the newer the release…the better Oracle seems to do with this).

There are 3 join conditions that will be covered in depth in a bit.

- Nested Loop
- Merge Join
- Hash Join

In the above SHOW_PLAN.sql example, notice the 2 columns of numbers. The left column is the Statement ID and the right column is called the Parent ID (should be called the child ID in my line of thinking) as the output of the Parent ID feeds its output to the Statement ID listed.

Sometimes it is necessary to use the SHOW_PLAN.sql script to display this relationship.

The driving table of this query is at Statement ID 5 because this is the first table in the Nested Loop join condition and the table at Statement ID 7 is the inner table. Both of these tables are utilizing indexes. The output of the Nested Loop at Statement ID 4 goes into Statement ID 3.

Each join condition makes an intermediate result set that is not visible to us but it is there. The size of this in rows is visible by using SQL Trace (discussed in the Fall08 newsletter). The CBO will give an estimated size as well.

The most rows that can be eliminated first, the faster the query will execute. If Oracle does not select well, then most of the rows will not be eliminated first.

*****Tuning Tip***** Shuffle the tables around on the 'from' clause with the RBO. You should notice that some queries run better than others. Using the CBO…you will need the LEADING or ORDERED hint to force the CBO to

produce explain plans where the tables are in ORDER on the FROM clause. The CBO will do the same as the RBO but it will make a selection of driving table based on statistics. The LEADING or ORDERED hint will tell the CBO to only consider explain plans that follow the hint..

Summary

My SQL Statement Tuning Tips and Techniques course goes on to discuss how to:

- How to control this explain plan
  - With hints
  - With coding style
- Complete index review
  - All indexes
  - Why Oracle sometimes doesn't use them
  - How to identify indexes not being used
  - How to identify poor-quality indexes
- Finding SQL and performance problems
- Using the free tuning tools from Oracle
- Useful INIT.ORA settings and more

Check my schedule for this class…check with me for an on-site course.

This article touches on how to interpret the contents of the explain plan. The next newsletter will take a closer look at what various items in the explain plan actually mean.

Product Review

TOAD and SQL Developer are good tools for tuning SQL statements. Both tools have a nice explain plan visualization feature and both tools have code snippets useful for optimizer hints.

TOAD 9

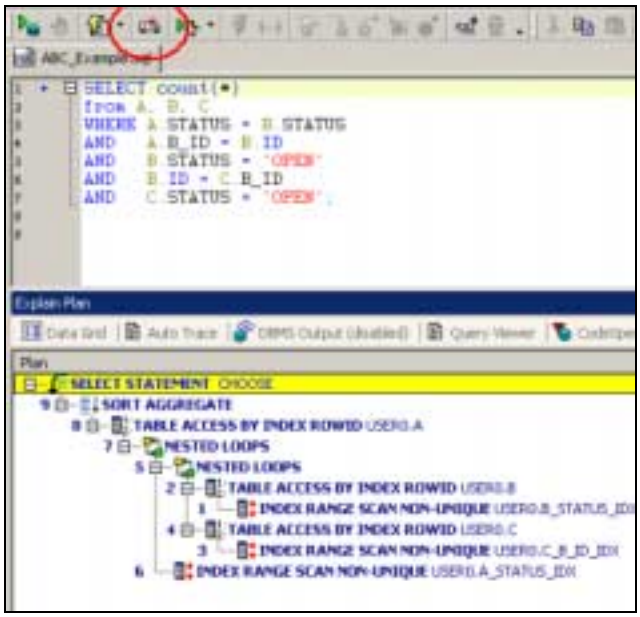
TOAD is a useful tool for finding and tuning SQL statements. This article will focus only on the explain plan from the SQL Editor window. Quest Software has a SQL Tuner environment available to TOAD. The DBA module of TOAD also has a Stats Pack and an AWR viewer built in. Trace files can easily be viewed using the TKProf Interface and the session browser allows for trace to be started/stopped, view current SQL and all open cursors, locking situations involving a particular user, and more.

Plan Table Setup

TOAD installs and uses its own plan table called TOAD_PLAN_TABLE. I usually change this to the PLAN_TABLE as discussed in the above article on Understanding Explain Plans. You can change the plan table TOAD uses under Options → Oracle → General

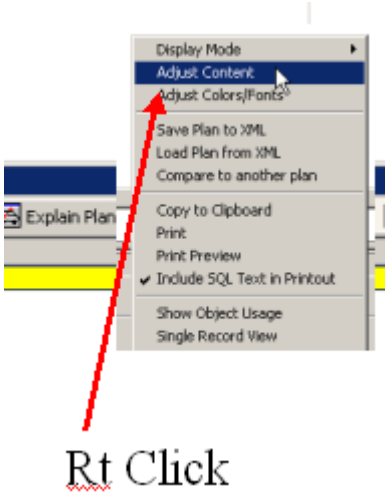
Explain Plan

Click on the Explain Plan button to have TOAD produce an explain plan from the SQL in the SQL Editor.

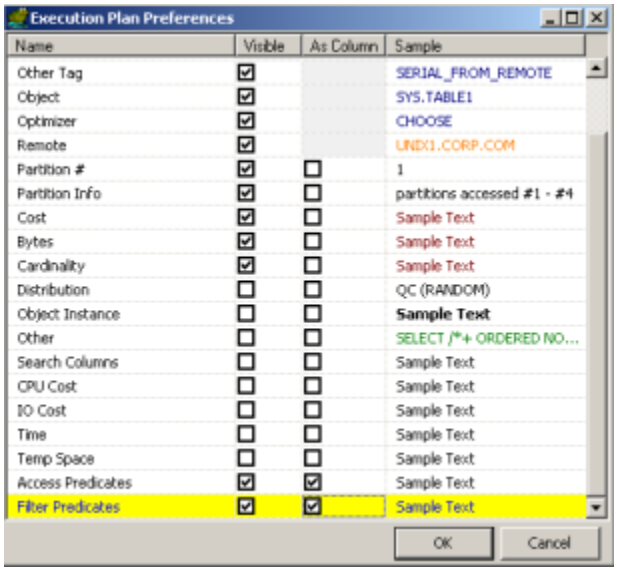


This display shows the explain plan steps and the order in which Oracle processes them (very important information in the tuning process).

Right click on this window to change the explain plan display and content.



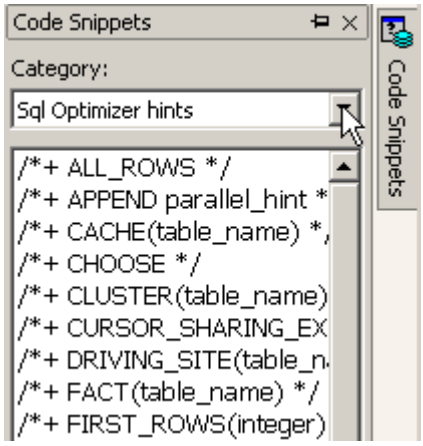
Select Display Mode to have TOAD walk thru the steps and to give an English translation of each step.



Select Adjust Content to add useful information (such as the access and filter predicates – where clause lines!).

Code Snippets

TOAD also has Code Snippets. These snippets are available by selecting View → Code Snippets. Code Snippets contains all kinds of functions, date formats, and the cost-based optimizer hints! This view can also be set to auto hide (click on the push pin).



These snippets can be easily added to your SQL with a drag and drop operation.

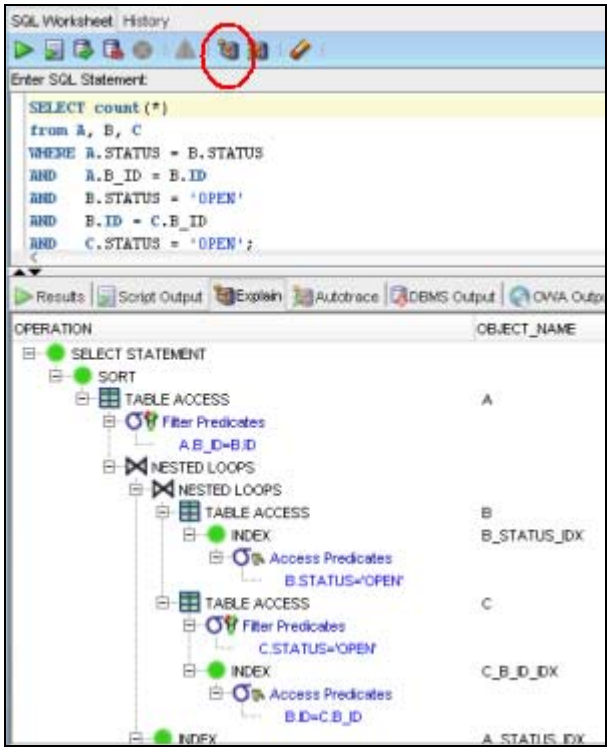
Useful Links:

www.ToadWorld.com

SQL Developer 1.5

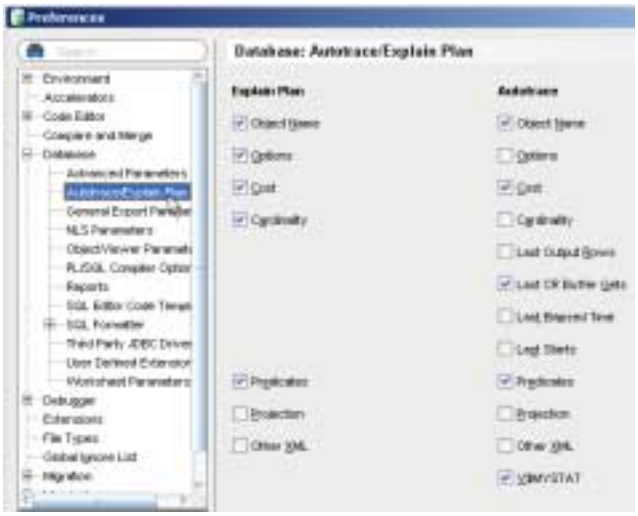
SQL Developer is a useful tool for finding and tuning SQL statements. This article will focus only on the explain plan from the SQL Worksheet. SQL Developer contains reports that identify top SQL, can see active and open cursors for each user, can start/stop Oracle trace, and can view Oracle trace files (simply open the trace file using the Open File button or drag and drop the trace file into SD!).

Explain Plan



Click the Explain Plan button to display the execution plan.

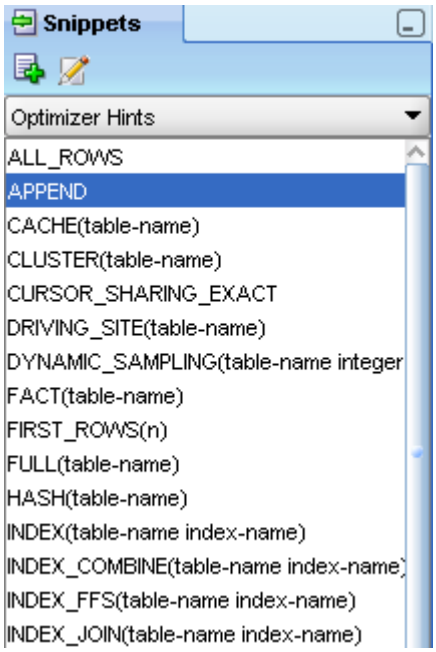
The content of this explain plan display is controlled via Tools → Preferences → Database → Autotrace/Explain Plan



Snippets

SQL Developer has snippets of PL/SQL code templates, common Oracle functions, and cost-based optimizer hints. This panel can hide along the boarder by clicking the minimize button.

Access the snippets panel via View → Snippets



Anything in this Snippets display can be copied to the SQL Worksheet via a drag and drop operation!

Useful Links

New Features Document:
http://www.oracle.com/technology/products/database/sql_developer/files/newFeatures_v15.html
Feature List:
http://www.oracle.com/technology/products/database/sql_developer/files/featurelist_1_5.htm

Book Review

Oracle Database 11g SQL
ISBN: 978-0-07-149850-0
By: Jason Price
Publisher: Oracle Press/McGraw Hill Osborne.

I use this book for my SQL reference. I like the examples and the level of detail Mr. Price included in this compete SQL reference..

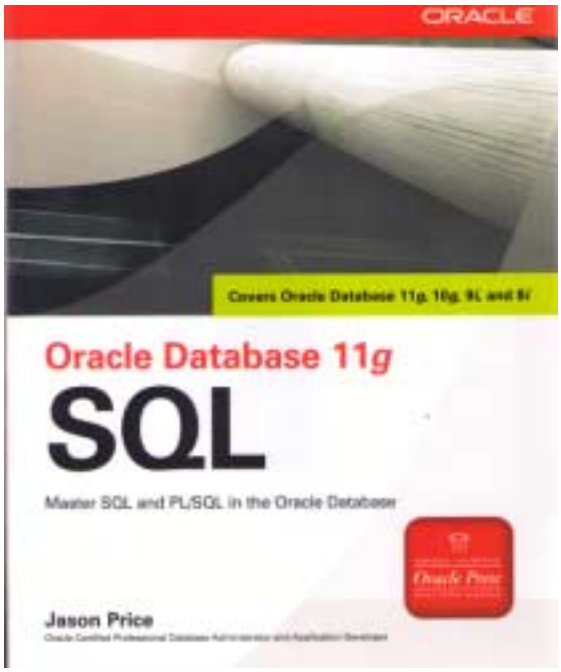
This book contains chapters on:

- Basic SQL, SQL+, and SQL Developer
- PL/SQL
- Analytical SQL

- Data Structures and abstract data
- Java programs via ODBC
- Large Objects with multi media/movies/music
- Chapter on SQL Tuning
- Latest 11g features:
    - PIVOT and UNPIVOT
    - Flashback

This is a good book for anyone working with SQL.

Nice job Jason!



Featured Presentation

Oracle11g New Features for Developers

This presentation is a must-see for anyone migrating to the new Oracle11g Database. The focus of this presentation is new features that would be of interest to developers.

Dan covers:

- Flashback topics
- Database Replay
- SQL*Plus new commands
- New SQL Syntax Options
- PL/SQL Enhancements including:
    - New Compiler Options
    - Triggers
    - Dynamic SQL

Free Downloads

TOAD www.ToadSoft.com

SQL Developer
http://www.oracle.com/technology/software/products/sql/index.html

Oracle PL/SQL Profiler Paper and Script: Learn how to use this free PL/SQL profiler from Oracle Corp. The paper also covers using the PL/SQL Profiler from TOAD. Download this paper and script from www.DanHotka.com.

Email Dan at Dhotka@Earthlink.net for any of these items:

- **Oracle SQL Trace Start and Stop Scripts**: Use these scripts to start and stop the Oracle Trace.
- **JS Tuner:** This tool will assist you with enhanced explain plans and useful index info/hints/and SQL history at your fingertips.
- **JS Analyzer:** This tool makes running the character-mode TKProf and SQL*Plus interface Trace Analyzer a snap. No more typing long trace file names.
- **SHOW_PLAN.**sql: Use to give an explain plan from the PLAN_TABLE that shows the statement ID relationships.

The Back Page

Tomato Bisque Soup

I have found by adding a can of diced tomatoes with oregano and seasonings to most anything really spices it up nicely.

Simply add a can of this to Campbell's Tomato Soup to make this chunky version.

1 Can Campbell's Tomato Soup
¾ can milk
1 Can Del Monte's Diced Tomatoes with oregano, garlic, and …

Fix the tomato soup as you normally would and add the can of diced tomatoes. Easy and very tasty!!!

VW Update

I have to line them up again this spring for new pics. Notice no top or turn signals on Oldbug…

I finished the top on the 1960 (Oldbug). There was a nice day here in Iowa in Feb and I put the window trim on along the convertible top edge. I now consider this bug project complete!

I start this bug about every other week. It is all serviced and ready for the new season!

Blue bug (71 convertible bug) had a series of small old-car issues this past season like clogging fuel filters after just a couple of tanks of gas. It got a new fuel tank a few years ago. I think it's the fuel line that runs down thru the middle of the car, replaced that with a new one that now runs down the outside of the car (next to one of the support rails). It also liked to fill the engine with gasoline. I was told that this was a carburetor float problem but it appeared to be more of a fuel pump issue as I could watch it push gas thru the over flow tube and into the carb with the car not running, etc. I solved this with an electric fuel pump. It will need 2 new front tires because I forgot and left the steering locked when pulling it with the motor home once…

About the time I got these issues corrected, it decided I had not yet spent enough money and took to popping out of 4th gear. So…again…this car is all a part in my garage, transmission is out for rebuild and I hope to get it back running again soon. I MUCH prefer to take the transmission out of this one than Oldbug…the older bugs have a transmission called a 'swing axle'…and the tranny and axles/rear wheel assembly needs to be removed as a unit. From a 50 year old car where it has its factory transmission? I think not!

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