

Embarcadero DB Optimizer

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Most database performance tools focus on what is happening in the database and fixing it, rather than preventing problems from occurring in the first place. Conversely, this is DB Optimizer's strength.

Philip Howard

Executive summary

In general it is a good idea to get the most out of your investments, regardless of whether these are IT-based or not. Within IT, one area where it is commonplace to not get the most out of your investment is from your databases. This is primarily because they do not perform with optimal efficiency, with the result that service levels are reduced and the business suffers. Historically, the simple answer to such problems has been to increase the power of the hardware supporting the database but this is an expensive solution at the best of times and, in the midst of a recession, is likely to be unappealing. A preferable, and more cost effective, solution is to detect and cure performance problems through software and, better yet, prevent such problems from occurring in the first place. This is what Embarcadero DB Optimizer is designed to do.

Fast facts

The biggest cause of database performance is poorly written SQL and this is what DB Optimizer focuses on. It is not, however, a general-purpose 24/7 database performance monitoring tool: Embarcadero's Performance Center offers those sorts of capabilities. Instead, DB Optimizer is specifically focused on profiling, reporting and tuning SQL so that it is optimised for database performance. These capabilities come in handy when leveraged during performance fire drills in production and, when DB Optimizer is employed during the development lifecycle, costly production issues can be prevented in a proactive manner.

Key findings

In the opinion of Bloor Research, the following represent the key facts of which prospective users should be aware:

- DB Optimizer is a cross-platform tool that supports Microsoft, Sybase ASE, Oracle and DB2 LUW environments. We would like to see the company extend this capability to MySQL.
- DB Optimizer supports continuous profiling (the discovery of bottlenecks) within a configurable span of time, together with reporting and snapshotting capabilities so that you can diagnose and prioritise remedial efforts and SQL tuning.
- We are pleased to see that the product uses wait time measurements as well as conventional CPU, I/O monitoring and so forth.

- Tuning, which is available for all supported databases, includes support for hints, SQL rewrites and index analysis and there are also batch capabilities for DML statements, stored procedures and so on.
- Ease of use makes DB Optimizer particularly suitable for any user interested in the prevention of poor-performing SQL as a part of the development lifecycle.
- A major concern within performance management environments is to avoid finger pointing. Thus it is important to be able to bridge the developer/DBA divide. We are therefore pleased that Embarcadero has introduced the related product, J Optimizer, which provides Java optimisation that can be used in conjunction with DB Optimizer.

The bottom line

As the saying goes: "prevention is better than cure". Most database performance tools focus on what is happening in the database and fixing it, rather than preventing problems from occurring in the first place. Conversely, this is DB Optimizer's strength. What may be an issue is that this is a tool for fixing the problems of the database administrator that will actually be deployed, when used preemptively, by developers. In environments where these communities work closely together that will not be a problem but there are companies where that is not the case. On the other hand, the use of tools such as DB Optimizer (particularly when used in conjunction with J Optimizer) may help to draw these groups together to work in a more collaborative fashion. In either case DB Optimizer is certainly worth serious consideration.

The product

DB Optimizer was released in July 2008 and is in its second major release, version 1.5. It is a desktop tool that runs under Windows (2003 and later) or Linux (Red Hat and SUSE) and requires the relevant Sun Java 2 Standard Edition. DB Optimizer includes Embarcadero PowerSQL Professional Edition which, at the time of writing, is in version 1.1.

Databases supported include Oracle 8i to 11g, Sybase ASE 12.5 to 15.0 (note: there were no versions 13 or 14), Microsoft SQL Server 2003, 2005 and 2008 and IBM DB2 for LUW (that is, for distributed rather than mainframe platforms) version 8.0 through 9.0. The company has not yet introduced support for versions of DB2 later than 9.0. The product is fully Unicode compliant.

In terms of functionality DB Optimizer essentially does three things: profiling, reporting and tuning. We shall consider each of these in turn.

Profiling

Profiling is the process of discovering performance bottlenecks caused by poor-performing SQL. There is a particular emphasis on discovering problems before they arise, during the development phase, rather than leaving them to production where they become significantly more costly to fix. Thus you can profile (and tune) a single stored routine whenever required so that you can see how efficient it is. This will particularly suit agile programming environments but would also make sense more generally. Alternatively, the product also supports continuous profiling. It is also worth noting that there is a command line API that allows profiling to be initiated from a remote location.

Of course, in development profiling is not a panacea. Many applications will already be written or have been licensed from third parties, which may result in SQL-related performance problems. To support these environments DB Optimizer provides the facility to profile an entire database instance so that you can look at the relevant details (see next section). In order to ensure negligible overhead on the target database, DB Optimizer utilises sampling, which captures long running or frequently executed queries by sampling database system tables and intelligently aggregating and analysing the data in real time.

However you go about it, the resulting snapshots, with all their associated data and metadata, can be saved for subsequent sharing and analysis, as appropriate.

Reporting

As you would expect from a tool of this sort, DB Optimizer provides a range of graphical representations of the data it has profiled, of which Figure 1 provides a typical example that should be fairly self-explanatory.

Details are presented of CPU, I/O and other sorts of wait activity and you can drill down into further detail either in terms of the wait times being analysed or the SQL statement that you are analysing; in the latter case so that you can see the full SQL text together with the relevant details for each line of that statement.

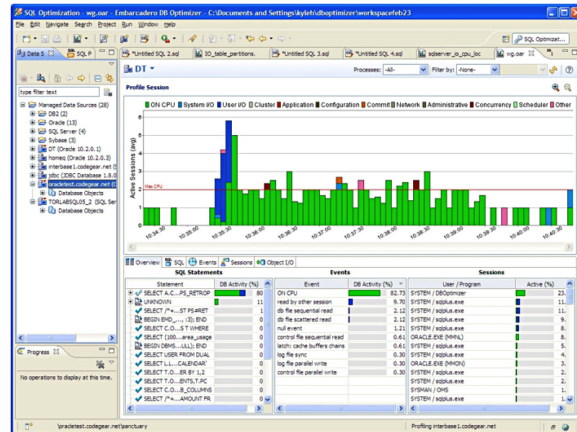


Figure 1: Profiled performance data using DB Optimizer

While you can visually inspect and compare the performance of different SQL statements, and while you can easily change the time intervals you are inspecting, you can also see aggregated results over a period of time. In particular, “top ten” listings of the most onerous SQL statements are useful, especially when combined with frequency of use statistics. DB Optimizer allows you to focus on the statements with the most activity and quickly diagnose them in order to ensure you are putting your efforts into the SQL statements that will yield the greatest performance benefits for your database.

Finally under the heading of Reporting, the software provides facilities whereby the Explain Plan for each SQL statement can be calculated. This is important because it allows you to optimise the execution of the SQL. Note that the Explain Plan is worked out without actually running the query and it is presented graphically as a tree diagram. If used in conjunction with the product's tuning capabilities then you can also calculate the costs associated with each Explain Plan.

Tuning

As with profiling, you can tune individual SQL statements or you can work in batch mode. You can tune one statement at a time (either as you write it or after you discover it while profiling) and simply drop the SQL into the tuner as illustrated in Figure 2 or you can tune batches of DML statements, and SQL files, which will be parsed and tuned in bulk.

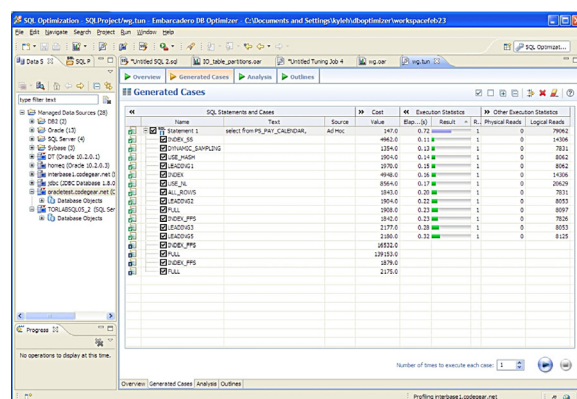


Figure 2: SQL tuning using DB Optimizer

The product

The tuner suggests hints, SQL rewrites, and indexes in order to help you speed up your SQL code, which is accomplished via a single button click:

- Hints act as a direction finder for your code in terms of telling the database which turns to take in order to stay on the quickest path.
- SQL rewrites actually adjust your code to avoid common mistakes such as cartesian products and suppressed indexes that can kill database performance.
- Index analysis dives into the database itself and looks for performance opportunities that could speed up the retrieval of result sets.

In addition to tuning per se, DB Optimizer also provides what might be described as pre-emptive tuning capabilities. For example, as we have noted, DB Optimizer embeds Embarcadero Rapid SQL Developer, which is a SQL IDE (integrated development environment) that is illustrated in Figure 3. In this example, the code assist features of the product are illustrated, providing you with context-appropriate object suggestions. This is generated as you type and thus provides dynamic syntactic and semantic error checking.

Code assist is available even when you are not connected to the database.

Another major feature, apart from support for hints, is Quick Fixes, as illustrated in Figure 4, whereby suggestions that accord with best practice (as opposed to out and out errors) are put before you, based on your own customisation of the tool: you decide, for example, the subset of hints to be considered for use.

Other tuning features include support for resolving bind variables, the ability to tune SQL extracted from a procedure, and index analysis, though in the case of indexes there is no facility to automate the creation of indexes. To be fair, while this is a common in-database feature it is not usually present in third party performance tools, though we see no reason why a direct link to the database's software should not be implemented.

Beyond these features there is also a visual text differencing tool that will allow you to compare different SQL statements with automatic highlighting of any differences between them.

Third party applications

All the foregoing discussions have been around software that is developed in-house. However, it is commonly the case that companies use packaged applications in many instances and it is by no means unknown for these packages to generate very poorly performing SQL. Of course, you can use DB Optimizer to profile the SQL so that you can demonstrate to your supplier how poor their SQL is but that may not get you every far, or not very quickly, so Embarcadero provides an additional facility known as a stored outline. The way that this works is that after running a tuning job you can generate the DDL to create a stored outline for the best execution plan. You then insert this into the database so that SQL statements from the application will follow this plan rather than the one it did originally.

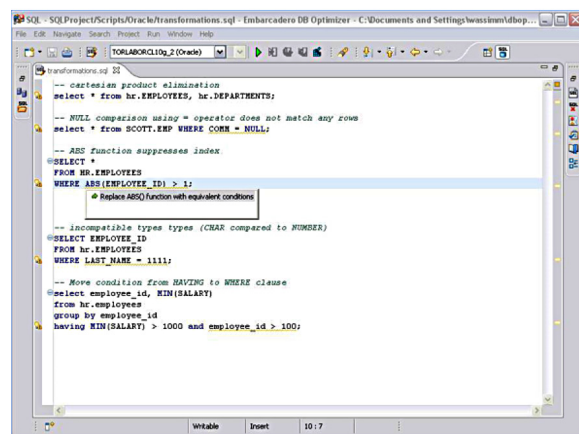


Figure 3: Embarcadero Rapid SQL Developer

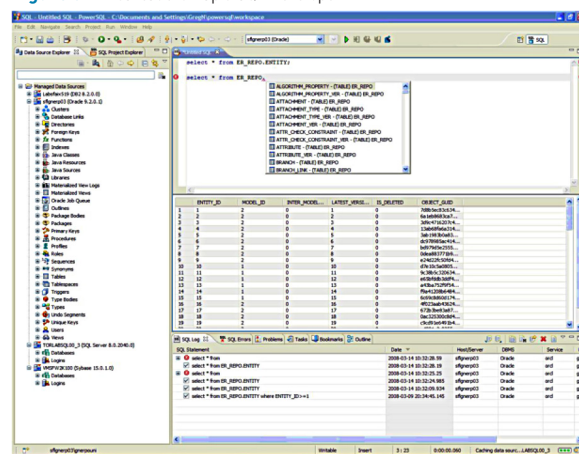


Figure 4: Quick Fix support in DB Optimizer

The vendor

Embarcadero Technologies was founded in 1993 and its first product, Embarcadero Rapid SQL, was a Sybase development product that quickly expanded to support Microsoft SQL Server. From there the company increasingly specialised in the data management arena with products such as Embarcadero DBArtisan and, more recently, Power SQL, J Optimizer and Change Manager as well as the ER/Studio modeling product. In effect, the company markets all sorts of products for supporting database and application environments, including the design, development and management of databases, the movement of data to and from such databases, and the performance management and testing of databases, applications, and overall systems. The one thing that Embarcadero has not done historically is to provide a database of its own.

In June 2008 Embarcadero acquired CodeGear, which was itself split out from Borland in 2006, containing all that company's tools that were not related to application lifecycle management, upon which Borland is now focused. As a part of that acquisition, Embarcadero gained the Delphi, JBuilder (and variants such as C#Builder) and RAD Studio development environments and associated products. During the course of 2009 we are likely to see the first instances of integration between the CodeGear and Embarcadero product sets, such as the embedding of ER/Studio within relevant development environments.

One additional product that Embarcadero has acquired with this purchase is the InterBase database management system. It remains to be seen what Embarcadero, which has traditionally been agnostic about the databases products it supports, does with respect to InterBase.

Embarcadero floated on NASDAQ in 2000 but went private again in a \$200m deal in 2007. The company has offices in the United States, Canada, Brazil (CodeGear only), France, Germany, Russia, the UK, Australia, Japan, Singapore and China. In general, in North America the company's primary approach is via direct sales (70%) whereas in the rest of the world it is mostly via channel partners (70%). It has partners across Europe, in the Far East, India, Asia-Pacific, and in both Mexico and South America.

While we have yet to see much in terms of integration between the data and application areas (DB Optimizer and J Optimizer being an exception) in terms of products the company has introduced a new approach to licensing that spans the product sets. This is called All-Access and effectively offers a toolbox style approach. Most Embarcadero users probably focus on using just one or two of its products. Although they might look to use some of the company's other tools once in a while that does not merit taking out a full license. What All-Access offers is a range of tools for not much more than the cost of the licenses of the couple of tools you are already using, but providing much more flexibility when you, from time to time, want access to other technologies.

Embarcadero web addresses:

www.embarcadero.com
www.codegear.com

Summary

Embarcadero is established as perhaps the leading independent tools vendor for database management. Viewed within this context DB Optimizer is a significant addition to the company's portfolio of solutions and we expect to see significant uptake of the product. However, DB Optimizer is perhaps best suited for use by developers rather than in the database environment per se. We therefore expect that Embarcadero will also be promoting this product to its recently acquired CodeGear customers, particularly in conjunction with J Optimizer. This should make a compelling combination.

Further Information

Further information about this subject is available from <http://www.BloorResearch.com/update/1027>

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Philip Howard Research Director - Data Management

Philip started in the computer industry way back in 1973 and has variously worked as a systems analyst, programmer and salesperson, as well as in marketing and product management, for a variety of companies including GEC Marconi, GPT, Philips Data Systems, Raytheon and NCR.

After a quarter of a century of not being his own boss Philip set up his own company in 1992 and his first client was Bloor Research (then ButlerBloor), with Philip working for the company as an associate analyst. His relationship with Bloor Research has continued since that time and he is now Research Director focussed on Data Management. Data Management refers to the management, movement, governance and storage of data and involves diverse technologies that include (but are not limited to) databases and data warehousing, data integration (including ETL, data migration and data federation), data quality, master data management, metadata management, and log and event management. Philip also tracks spreadsheet management and complex event processing.

In addition to the numerous reports Philip has written on behalf of Bloor Research, Philip also contributes regularly to www.IT-Director.com and www.IT-Analysis.com and was previously the editor of both "Application Development News" and "Operating System News" on behalf of Cambridge Market Intelligence (CMI). He has also contributed to various magazines and published a number of reports published by companies such as CMI and The Financial Times. Philip speaks regularly at conferences and other events throughout Europe and North America.

Away from work, Philip's primary leisure activities are canal boats, skiing, playing Bridge (at which he is a Life Master), dining out and walking Benji the dog.

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