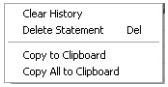
Contents

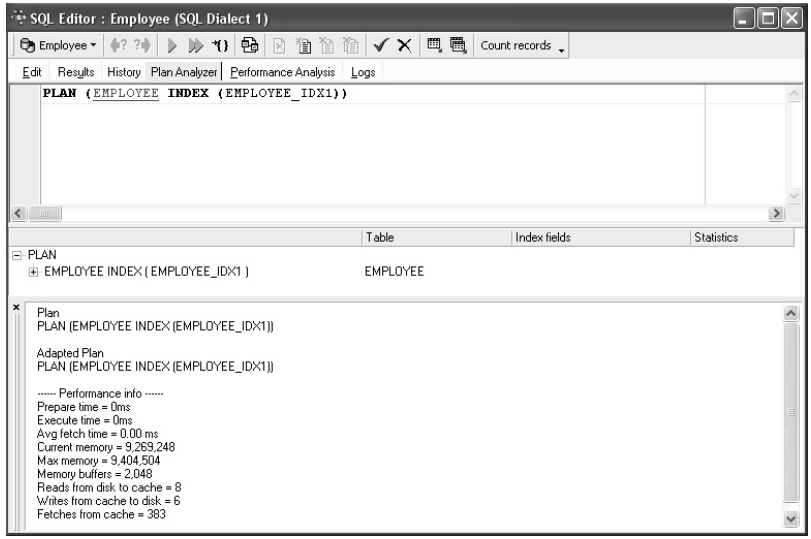


This menu also allows single statements (or all) to be copied to clipboard.

8.1.7 (4) Plan Analyzer

The SQL Editor Plan Analyzer (also a part of the Procedure Editor and Trigger Editor) shows how Firebird/InterBase approaches a query, e.g. with `SORTS`, `JOINS` etc, which tables and indices are used. This information is displayed in a tree structure: firstly what and which data quantities, and secondly what is carried out with this data and how.

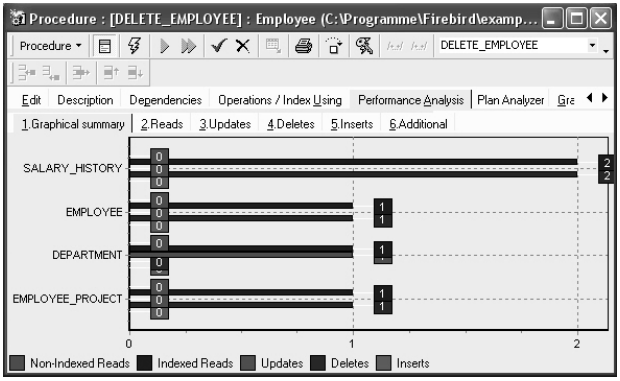
The plan is an InterBase/Firebird description, showing how the optimizer uses tables and indices to obtain the result set. If the word `SORT` is displayed, you should check whether improvements upon the query or the indices are possible.



The Plan Analyzer provides information in the lower panel in a tree structure with statistics.

8.1.8 (5) Performance Analysis

The Performance Analysis is part of the SQL Builder, Visual Query Builder and Stored Procedure Editors. It displays information showing how much effort was required by InterBase/Firebird to carry out an executed query or procedure. The analysis is performed after a `SELECT` statement is opened or a stored procedure started.



It is possible to deactivate the Performance Analysis, by checking the Disable Performance Analysis option, found under Database / Register Database *or* Database Registration Info / Additional. This may be desirable, when working remotely with a slow modem connection.

It is however often interesting to know what exactly a procedure or query does and how; and all this can be viewed in the Performance Analysis.

The main advantage here is, of course, the possibility to compare the performance of different queries and procedures.

The performance can be viewed in 6 different ways:

1. Graphical summary
   i) indexed reads
   ii) non-indexed reads
   iii) updates
   iv) deletes
   v) inserts
2. Reads (graphical representation)
3. Updates (graphical representation)
4. Deletes (graphical representation)
5. Inserts (graphical representation)
6. Additional
   i) Enhanced Info
   ii) Query Time
   iii) Memory
   iv) Operations

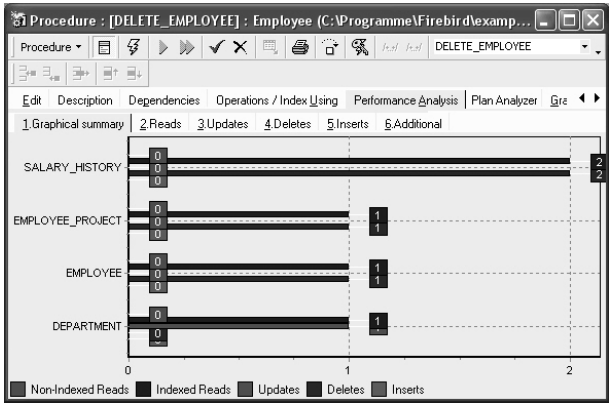
`SELECT` statements will only have a result on the Reads page, but some stored procedures will have results on all pages.

In the SQL Editor the lower panel displays the query plan, along with a summary of the performance information included under 6. Additional. For further information regarding the query plan, please refer to the Plan Analyzer.

The analysis displayed in 6. Additional can also be documented using the Copy Analysis to Clipboard button.

Graphical Summary

This provides a graphical overview, broken down by the tables involved, of the number of operations performed by the query/procedure, including reads (indexed and non-indexed), updates, deletes and inserts. It shows whether indices have been used indicating the efficiency of the database's indices. The figures displayed refer to the number of data sets.

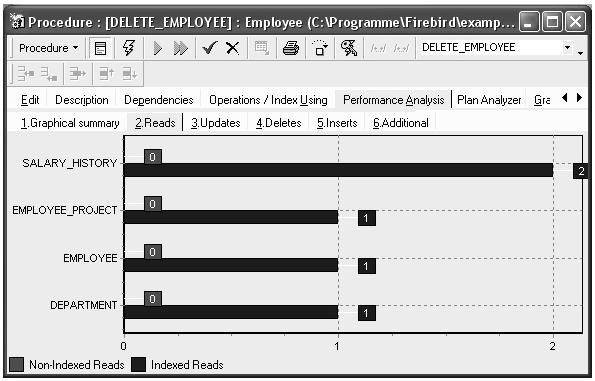


The x-axis lists the names of the tables consulted by the query/procedure, with the number of operations displayed graphically. The color key can be seen below the graphic. The operation types are as follows:

- Non-indexed reads
- Indexed reads
- Updates: The number and type of updating operations.
- Deletes: The number and type of deleting operations.
- Inserts: The number and type of inserting operations.

The graphical information displayed here can also be viewed in tabular format under 6. Additional.

Reads



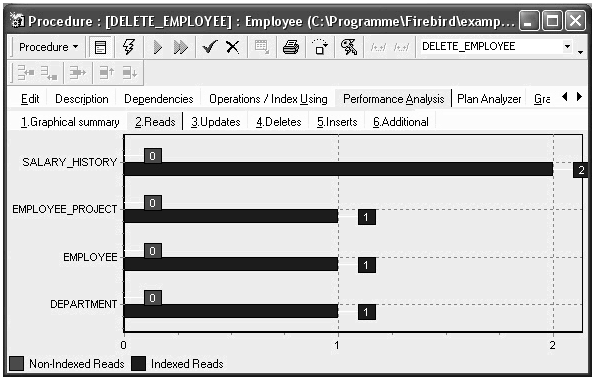
This displays the number and type of reading operations in an executed query/procedure. The figures displayed refer to the number of data sets and are broken down by table into the categories *indexed* and *non-indexed* reads.

Those database indices used to perform an SQL query can be viewed in the SQL Editor in the Performance Analysis query plan.

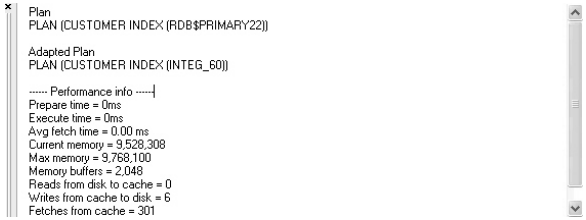
This information can be used to evaluate the efficiency of the database\'s indices.

Indexed Read

Indexed reads are displayed in the Performance Analysis, which can be found in the SQL Editor, Visual Query Builder and Stored Procedure Editors.

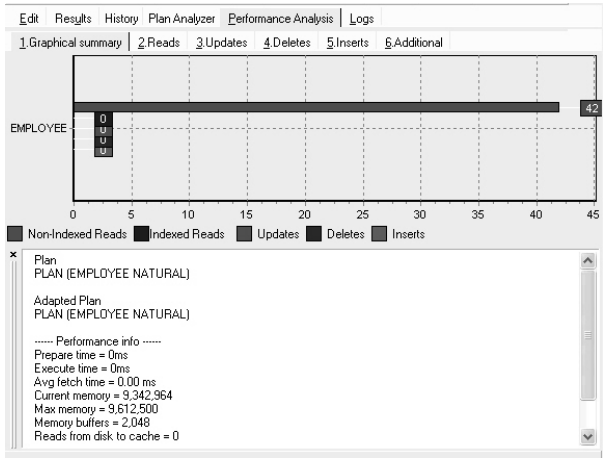


An indexed read indicates that the data was selected by the InterBase/Firebird server using one or more indices (named in the SQL Editor query plan in the lower panel). This results in many cases in a significantly lower number of data sets being consulted than with a non-indexed read, saving both time and memory.



Non–Indexed Read

Non-indexed reads are displayed in the Performance Analysis, which can be found in the SQL Editor, Visual Query Builder and Stored Procedure Editors.

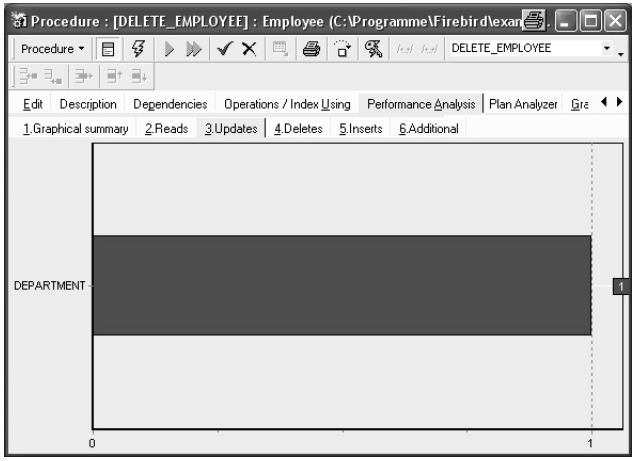


A non-indexed reads indicates that the data was read without the aid of an index. In most situations this can be both time- and memory-consuming. Non-indexed reads always include a large number of data sets, as the server needs to search through the whole table(s) to find the relevant information. All data pages from the corresponding table(s) need to be loaded.

The SQL Editor's query plan shows which tables were read without an index using the term `NATURAL`.

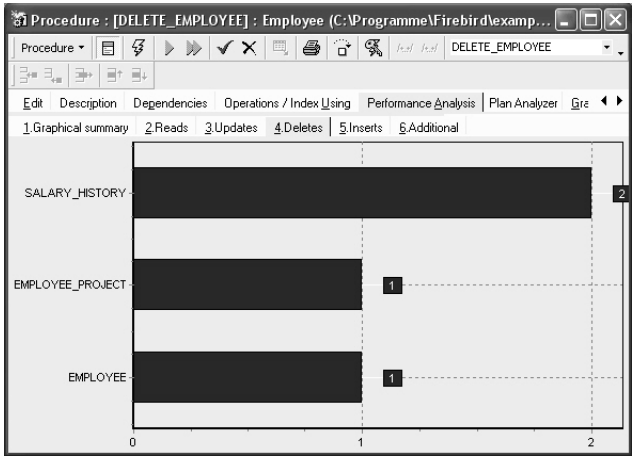
For further information regarding the use of indices, please refer to index.

Updates



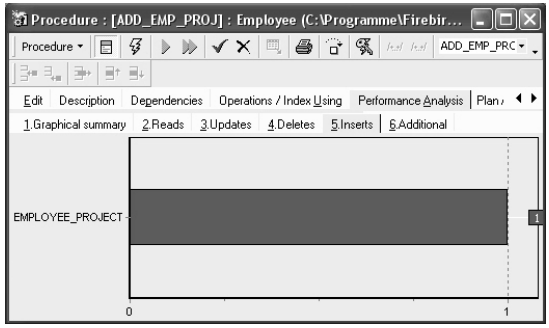
This displays the number and type of updating operations in an executed query/procedure. The figures displayed refer to the number of data sets, broken down by table.

Deletes



This displays the number and type of deleting operations in an executed query/procedure. The figures displayed refer to the number of data sets, broken down by table.

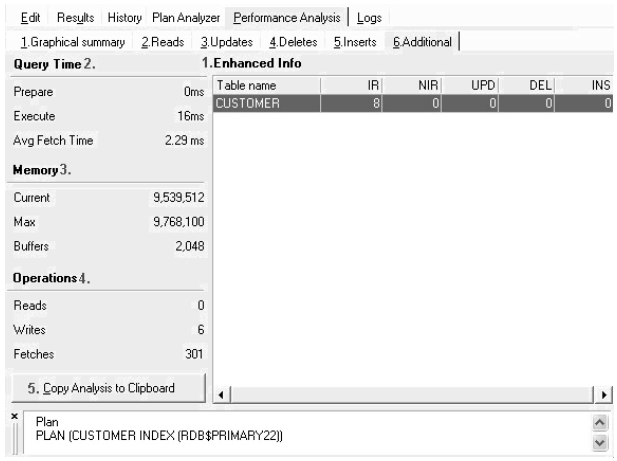
Inserts



This displays the number and type of inserting operations in an executed query/procedure. The figures displayed refer to the number of data sets, broken down by table.

Additional

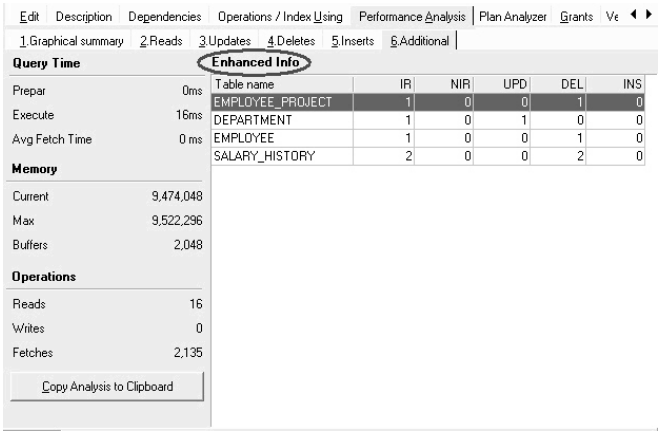
This displays a statistical report. The *Enhanced Info* displays a statistical summary of the information shown in 1. Graphical Summary. Certain additional information, such as query time, memory and operations, is also included in this section.



There is furthermore a Copy Analysis to Clipboard button, to document the statistics if wished.

Enhanced Info

The Enhanced Info displays a statistical summary of the information shown in 1. Graphical summary.



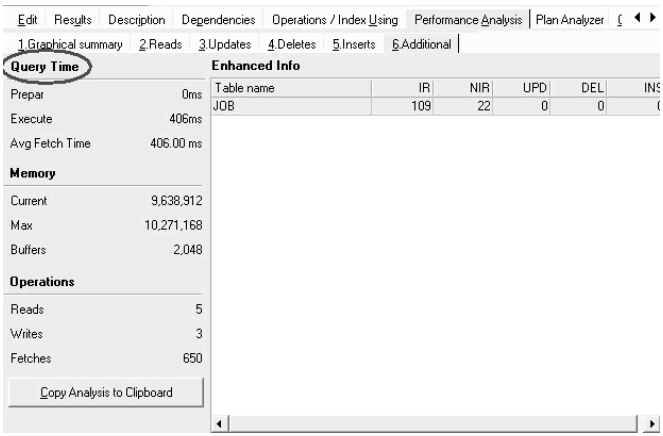
The names of tables consulted during execution of the query/procedure are listed in the first column, with the number of data sets listed according to the following criteria:

- IR = Indexed Read
- NIR = Non-Indexed Read
- UPD = Updates
- DEL = Deletes
- INS = Inserts

The information can be copied to clipboard, if wished, using the Copy Analysis to Clipboard button.

Query Time

Query time shows the time needed to prepare for the execution of the query/procedure, along with the execution time and average fetch time.



Prepare:

This measures the preparation time required by InterBase/Firebird to plan and prepare the query/procedure execution, i.e. from the moment when the source text is sent to the server and is compiled on the server in binary form (decides which indices, tables etc. need to be used to perform the query/procedure).

When a query/procedure is executed a second time, the query time is usually 0 ms, as it has already been prepared.

Execute:

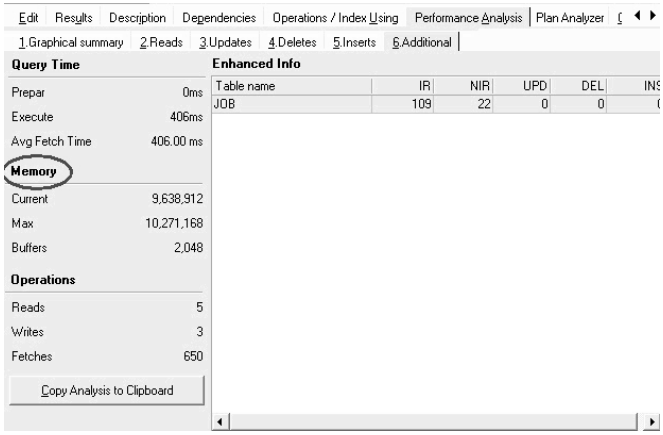
This measures the direct execution time of the command.

Avg fetch time:

This shows the average fetch time pro data set. This figure is calculated based only on those data sets that can be seen in the returns and does not include those that are not yet visible. An optimal analysis can be attained when the query/procedure is executed using [Shift + F9] = Execute and Fetch all.

Memory

This shows the memory development during and following execution of the procedure/query.



Current:

This displays the current memory used by the server.

Max.:

This displays the maximum memory used by the server during execution of the query/procedure.

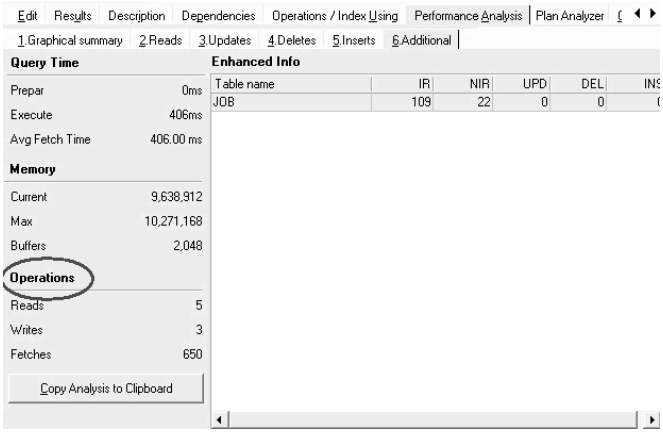
Buffers:

This displays the number of data pages that are being held as cache on the server (from InterBase 6 onwards the standard is 2,048). This can be found in the corresponding configuration file: since Firebird 1.5 it is called `FIREBIRDCONFIG`; in older Firebird versions or InterBase, it is called `IBCONFIG`, found in the main InterBase folder.

This can be altered for the current database if wished, using the IBExpert menu item Services / Database Properties / Buffers. The total KB is calculated according to the current database page size. For an alteration to become effective, it is therefore necessary for all users to disconnect from the database and then reconnect. Buffers are only reserved if they are really necessary for pages loaded from the database file.

Operations

Operations displays the number of data pages that were read from the database file to the memory, written and fetched, while executing the query/procedure.



Reads:

This displays the number of pages read for the executed query/procedure. This is necessary when data sets have to be loaded, that are not already in the memory.

Writes:

This displays the number of pages written while executing the query/procedure. If the total cache buffers are too small to load subsequent pages, it may be necessary for the server to save altered pages to the hard drive, in order to make room for further pages to be loaded. If these values are very high, it may be wise to increase the buffers, providing of course, that physical memory is sufficient.

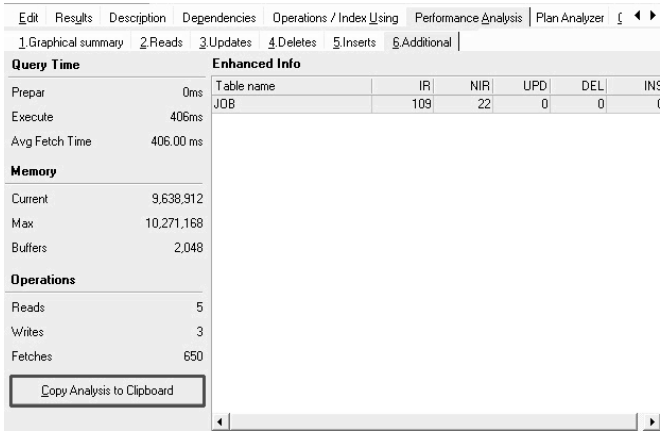
Fetches:

When a query/procedure is started, the command (or series of commands) is sent to the database server. To obtain results, numerous data sets/pages need to be referred to (= fetch), in order to perform the operation. Fetches are, in other words, internal operations performed by InterBase/Firebird in order to successfully execute a query/procedure. This indicates, for example, if deleted data sets in a `SELECT` are recognized as deleted, they will still appear here in the number of fetches, as the server also searches through those data sets that have been marked as deleted. This can however offer an advantage over the number of indexed and non-indexed reads, as these only display operations on undeleted data sets. If the query is executed again, the result is quicker if the garbage collection is running simultaneously.

Using the Performance Analysis, the number of fetches in data pages could possibly indicate why one query is quicker than another with an equal number of data sets and the same index plan.

Copy Analysis to Clipboard

The Copy Analysis to Clipboard button copies all information included in the Additional page, including both the grid contents (= Enhanced Info) and the statistics listed in the left-hand panel (= query time, memory and operations).



The Copy Analysis to Clipboard button can be found in the bottom left corner of the 6. Additional dialog in the Performance Analysis. Should this not be visible, it is probably because the windows in IBExpert are set to Cascading. This can be easily solved by clicking the SQL/Procedure Editor dialog window to full-size (right-hand blue icon in the dialog title bar).

8.1.9 (6) Logs

The Log page can be found in the SQL Editor and displays a list of qualified error messages etc. It shows what Firebird/InterBase did and when in each respective SQL window.