

## Applies To:

ABAP

## Summary

SQL trace is a performance analysis tool that shows how open SQL statements are converted into native SQL statements. The following document discusses the performance measure utility of SAP SQL Trace Analysis (Transaction code ST05).

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## Performing an SQL Trace

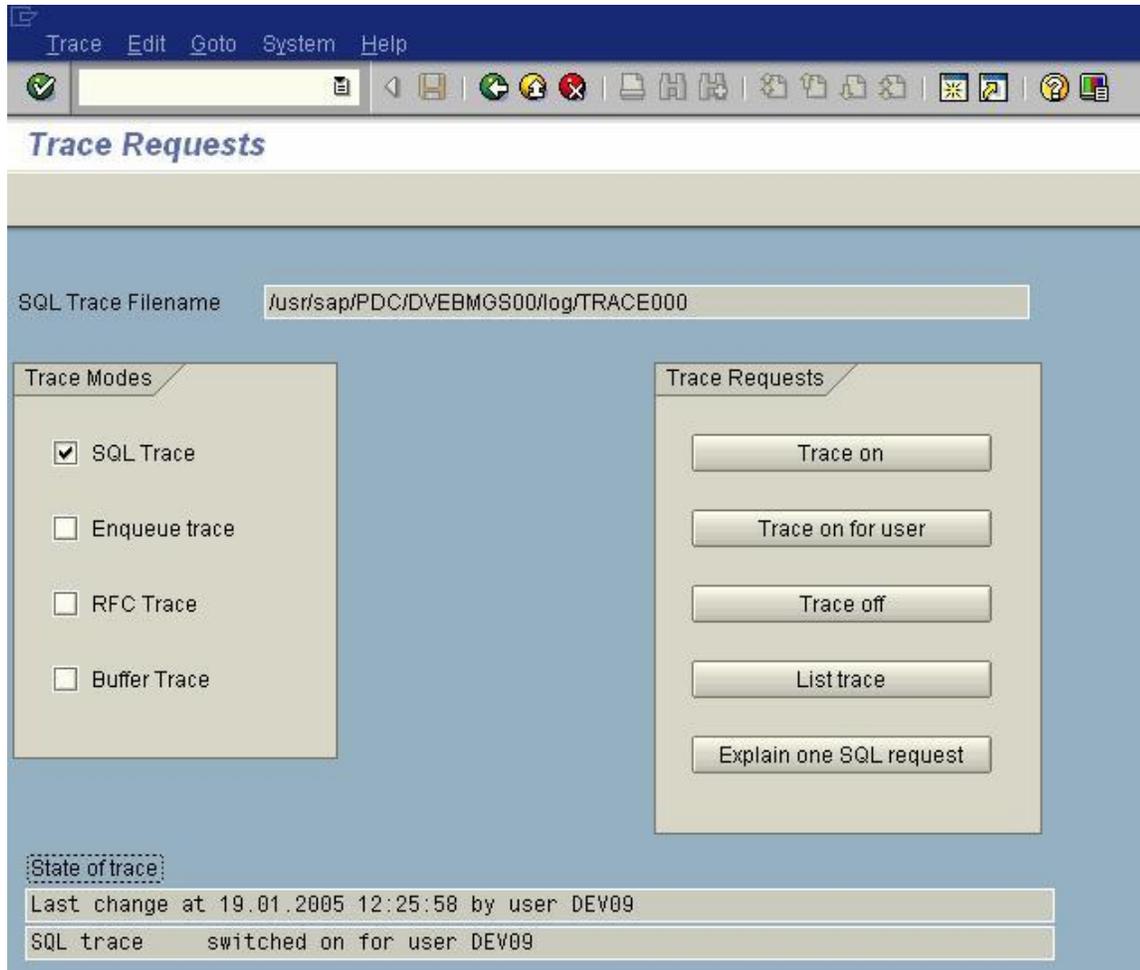
**Step 1:** Access transaction ST05. From the initial screen, click the check box for SQL trace, under the trace requests, click **Trace on**.

**Step 2:** Run the program containing the SQL query that needs to be analyzed in the SE38 editor.

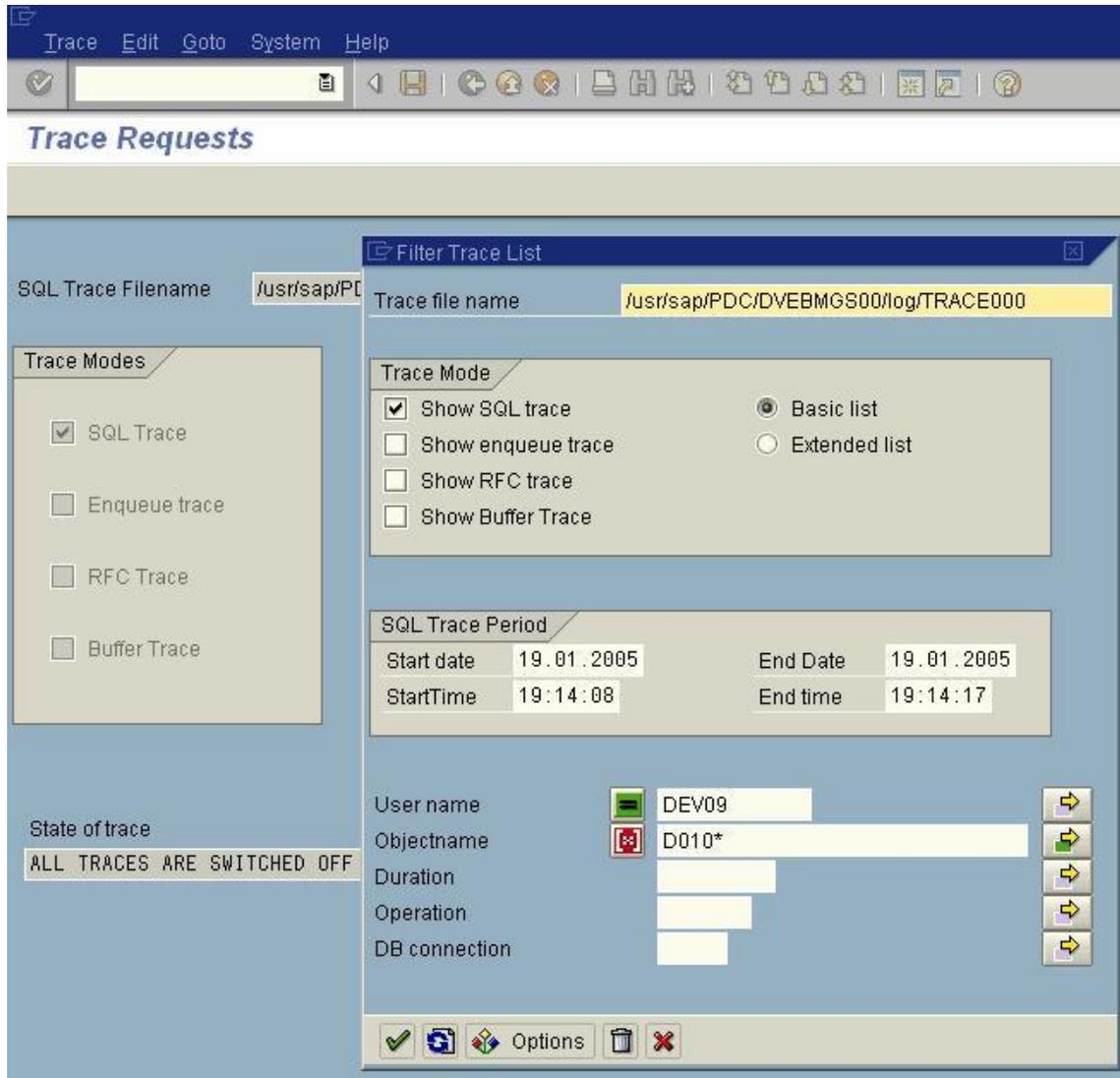
**Step 3:** Come back to **ST05** screen, under Trace requests, click **Trace off**.

**Step 4:** Click **List trace** to view the trace of the current statement.

Screen shot of the initial ST05 screen



## After clicking list trace



The screenshot shows the SAP Trace Requests dialog box. The main window title is "Trace Requests". On the left, there is a "Trace Modes" section with four checkboxes: "SQL Trace" (checked), "Enqueue trace", "RFC Trace", and "Buffer Trace". Below this is a "State of trace" section with a message: "ALL TRACES ARE SWITCHED OFF".

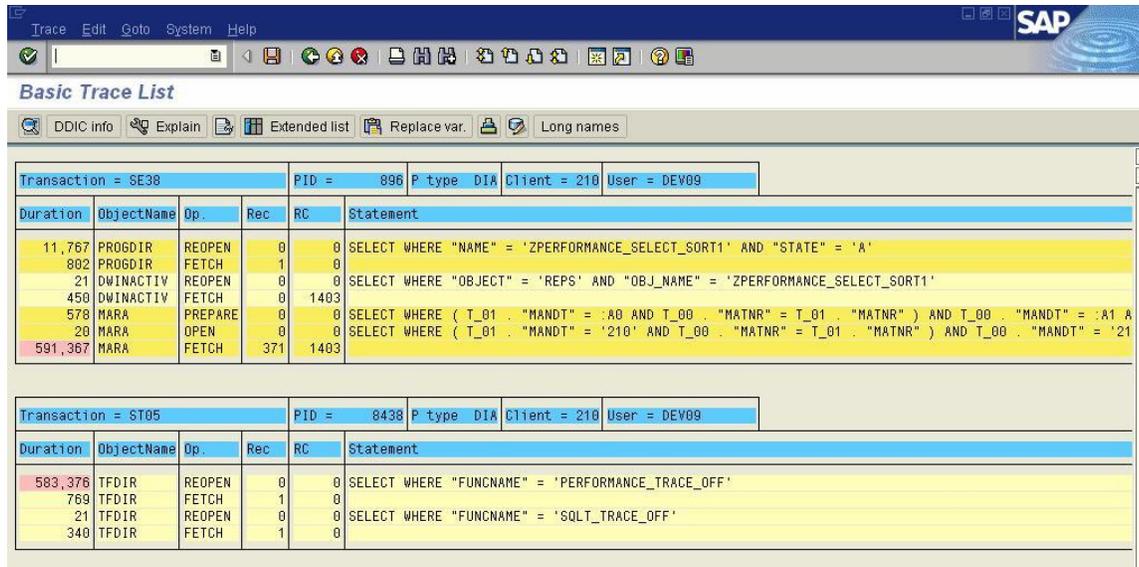
The main area is titled "Filter Trace List" and contains the following fields and options:

- Trace file name:** /usr/sap/PL
- Trace Mode:**
  - Show SQL trace
  - Show enqueue trace
  - Show RFC trace
  - Show Buffer Trace
  - Basic list
  - Extended list
- SQL Trace Period:**

Start date	19.01.2005	End Date	19.01.2005
StartTime	19:14:08	End time	19:14:17
- User name:** DEV09
- Objectname:** D010\*
- Duration:** [Empty field]
- Operation:** [Empty field]
- DB connection:** [Empty field]

At the bottom of the dialog, there are several icons: a green checkmark, a blue refresh icon, a multi-colored options icon, and a red 'X' icon.

## Basic List Trace

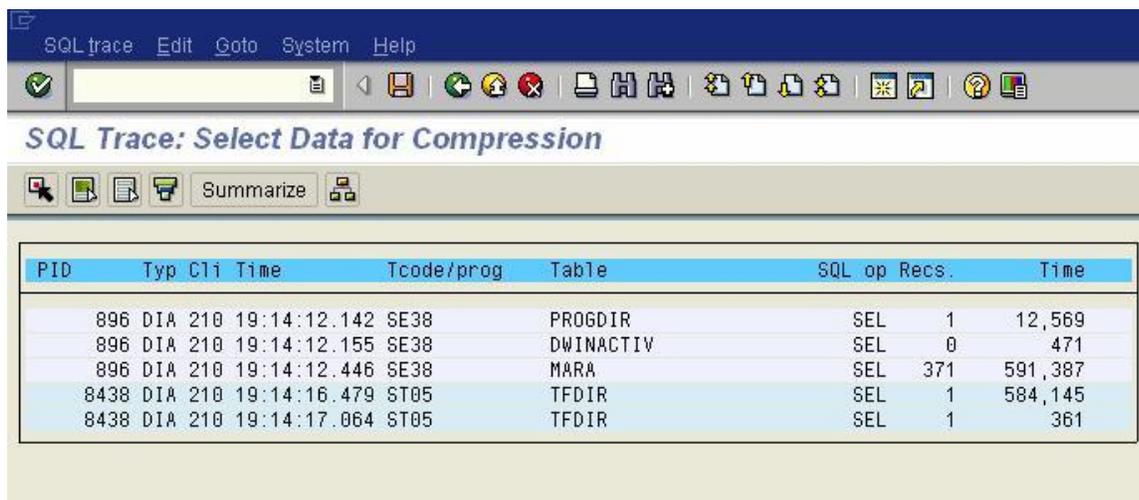


The screenshot shows the 'Basic Trace List' window in SAP. It displays two transaction traces. The first trace is for Transaction = SE38, PID = 896, P type = DIA, Client = 210, User = DEV09. The second trace is for Transaction = ST05, PID = 8438, P type = DIA, Client = 210, User = DEV09. Each trace shows a list of database operations with columns for Duration, ObjectName, Op., Rec, RC, and Statement.

Transaction	PID	P type	DIA	Client	User
SE38	896	DIA	210	210	DEV09
Duration	ObjectName	Op.	Rec	RC	Statement
11,767	PROGDIR	REOPEN	0	0	SELECT WHERE "NAME" = 'ZPERFORMANCE_SELECT_SORT1' AND "STATE" = 'A'
802	PROGDIR	FETCH	1	0	
21	DWINACTIV	REOPEN	0	0	SELECT WHERE "OBJECT" = 'REPS' AND "OBJ_NAME" = 'ZPERFORMANCE_SELECT_SORT1'
450	DWINACTIV	FETCH	0	1403	
578	MARA	PREPARE	0	0	SELECT WHERE ( T_01 . "MANDT" = :A0 AND T_00 . "MATNR" = T_01 . "MATNR" ) AND T_00 . "MANDT" = :A1 A
591,367	MARA	FETCH	371	1403	SELECT WHERE ( T_01 . "MANDT" = '210' AND T_00 . "MATNR" = T_01 . "MATNR" ) AND T_00 . "MANDT" = '21
Transaction	PID	P type	DIA	Client	User
ST05	8438	DIA	210	210	DEV09
Duration	ObjectName	Op.	Rec	RC	Statement
583,376	TFDIR	REOPEN	0	0	SELECT WHERE "FUNCNAME" = 'PERFORMANCE_TRACE_OFF'
769	TFDIR	FETCH	1	0	
21	TFDIR	REOPEN	0	0	SELECT WHERE "FUNCNAME" = 'SQLT_TRACE_OFF'
340	TFDIR	FETCH	1	0	

The basic list trace shows the sequence of database operations that are taking place while a query is processed, it includes prepare, fetch, open, reopen, execute. In addition the basic list trace also gives the duration execution for each of the operations with color legend.

## Summarizing the basic trace list (menu path: Goto → Summary)

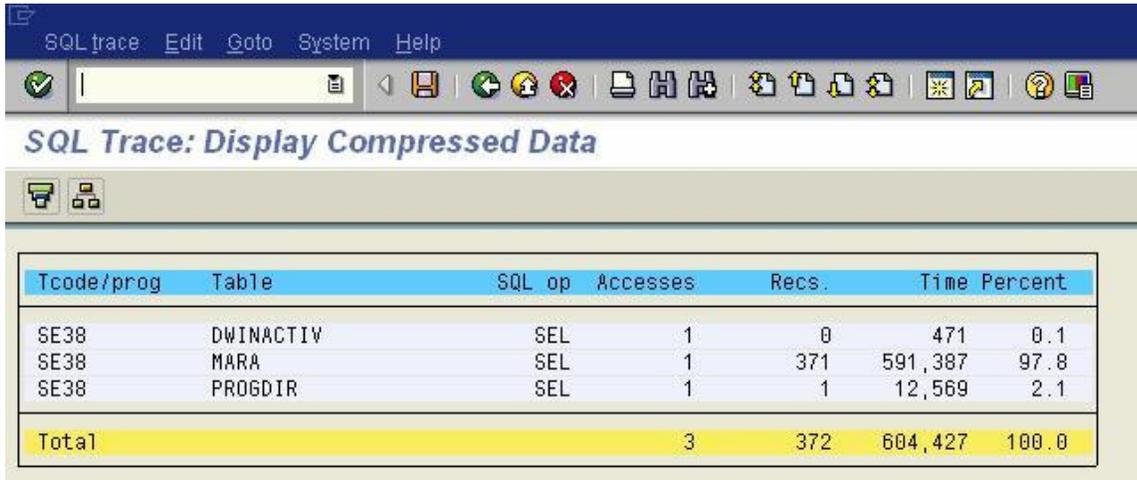


The screenshot shows the 'SQL Trace: Select Data for Compression' window in SAP. It displays a summarized table of database operations. The table has columns for PID, Typ, Cli, Time, Tcode/prog, Table, SQL op, Recs., and Time.

PID	Typ	Cli	Time	Tcode/prog	Table	SQL op	Recs.	Time
896	DIA	210	19:14:12.142	SE38	PROGDIR	SEL	1	12,569
896	DIA	210	19:14:12.155	SE38	DWINACTIV	SEL	0	471
896	DIA	210	19:14:12.446	SE38	MARA	SEL	371	591,387
8438	DIA	210	19:14:16.479	ST05	TFDIR	SEL	1	584,145
8438	DIA	210	19:14:17.064	ST05	TFDIR	SEL	1	361

A basic trace list can be summarized to see the summation of execution times of similar database operations. Use menu path: Goto→Summary. The above screen shot depicts the summed up execution time. The summary option lists the summed up execution time of all the queries that the SQL trace has captured at its runtime, but the identification of a particular query can be done using the **PID – Process ID** which is displayed as the first column of the above screen shot. For example, **896** is the process ID for one of the SQL statements.

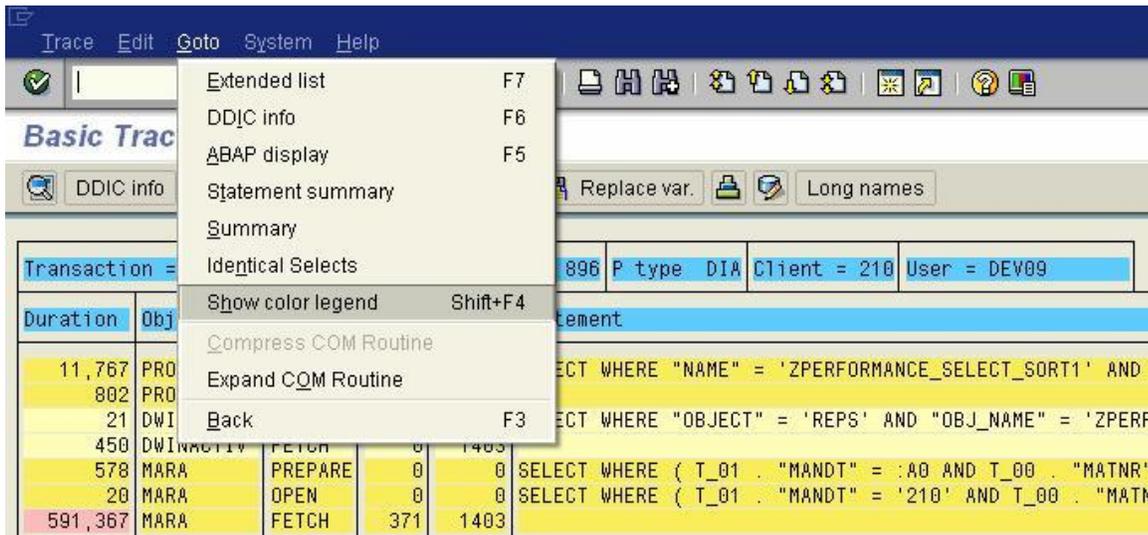
## Summary of a particular trace



Tcode/prog	Table	SQL op	Accesses	Recs.	Time	Percent
SE38	DWINACTIV	SEL	1	0	471	0.1
SE38	MARA	SEL	1	371	591,387	97.8
SE38	PROGDIR	SEL	1	1	12,569	2.1
<b>Total</b>			<b>3</b>	<b>372</b>	<b>604,427</b>	<b>100.0</b>

To get the total execution time, specifically for a particular SQL Statement, select all the **PID** corresponding to it and click summarize in the application toolbar. This leads to a compressed data of SQL trace as above.

## Color legends indicating the processes in a trace 1



Transaction	Duration	Obj	SQL op	Accesses	Recs.	Time	Percent
	11,767	PRO					
	802	PRO					
	21	DWI					
	450	DWINACTIV	FETCH	0	1403		
	578	MARA	PREPARE	0	0		
	20	MARA	OPEN	0	0		
	591,367	MARA	FETCH	371	1403		

Use the menu path: Goto -> Show color legend to know about the color specification in the trace.

## Color legends indicating the processes in a trace 2

**Basic Trace List**

Transaction = SE38

Duration	ObjectName	Op.
11,767	PROGDIR	REOPEN
802	PROGDIR	FETCH
21	DWINACTIV	REOPEN
450	DWINACTIV	FETCH
578	MARA	PREPARE
20	MARA	OPEN
591,367	MARA	FETCH

Transaction = ST05

Duration	ObjectName	Op.
583,376	TFDIR	REOPEN
769	TFDIR	FETCH
21	TFDIR	REOPEN

**Color Legend for Performance Trace**

Meaning of colors

- Heading
- Threshold value for execution time exceeded
- SQL trace Color change at
- SQL trace Table name change
- Enqueue trace Color change at
- Enqueue trace Lock object change
- RFC trace Color change at
- RFC trace Host name change
- Table buffer trace Color change at
- Table buffer trace Table name change

SELECT WHERE "FUNCNAME" = 'SQLT\_TRACE\_OFF'

The above screen shot indicates that the query execution time has exceeded its threshold with the link pink color. A change in object name is indicated with the change in color to yellow. These colors thereby indicate whether the query is well written and also the current status of the database server.

## Extended list

**Extended SQL Trace List**

Transaction = SE38 PID = 896 P type DIA Client = 210 User = DEV09

HH:MM:SS.MS	Duration	Program	ObjectName	Op.	Curs	Array	Rec	RC	Conn	Statement
19:14:12.142	11,767	SAPLS38E	PROGDIR	REOPEN	150		0	0	R/3	SELECT WHERE "NAME" = 'ZPERFORMANCE_SELECT_SORT1' AND "STATE"
19:14:12.153	802	SAPLS38E	PROGDIR	FETCH	150	1	1	0	R/3	
19:14:12.155	21	SAPLSEW%	DWINACTIV	REOPEN	358		0	0	R/3	SELECT WHERE "OBJECT" = 'REPS' AND "OBJ_NAME" = 'ZPERFORMANCE'
19:14:12.155	450	SAPLSEW%	DWINACTIV	FETCH	358	560	0	1403	R/3	
19:14:12.445	578	ZPERFOR%	MARA	PREPARE	82		0	0	R/3	SELECT WHERE ( T_01 . "MANDT" = :AO AND T_00 . "MATNR" = T_01
19:14:12.446	20	ZPERFOR%	MARA	OPEN	82		0	0	R/3	SELECT WHERE ( T_01 . "MANDT" = '210' AND T_00 . "MATNR" = T_
19:14:12.458	591,367	ZPERFOR%	MARA	FETCH	82	866	371	1403	R/3	

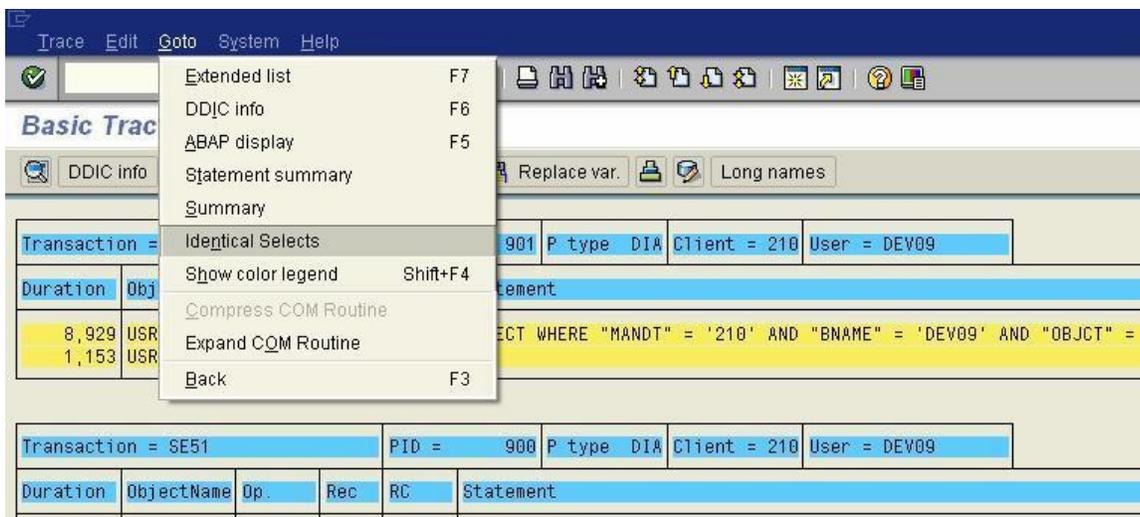
Transaction = ST05 PID = 8438 P type DIA Client = 210 User = DEV09

HH:MM:SS.MS	Duration	Program	ObjectName	Op.	Curs	Array	Rec	RC	Conn	Statement
19:14:16.479	583,376	SAPLSS00	TFDIR	REOPEN	12		0	0	R/3	SELECT WHERE "FUNCNAME" = 'PERFORMANCE_TRACE_OFF'
19:14:17.063	769	SAPLSS00	TFDIR	FETCH	12	1	1	0	R/3	
19:14:17.064	21	SAPLSS00	TFDIR	REOPEN	12		0	0	R/3	SELECT WHERE "FUNCNAME" = 'SQLT_TRACE_OFF'
19:14:17.064	340	SAPLSS00	TFDIR	FETCH	12	1	1	0	R/3	

(From basic trace list: click extended list button in application toolbar to view the extended list). The extended list shows the cursor id declared for the SQL statement, the connection type also.

**Cursors:** A cursor is a handle or name for an area in memory in which a parsed statement and other information for processing the statement are kept; such an area is also called a private SQL area. Although most Oracle users rely on the automatic cursor handling of the Oracle utilities, the programmatic interfaces offer application designers more control over cursors. In application development, a cursor is a named resource available to a program and can be used specifically for the parsing of SQL statements embedded within the application.

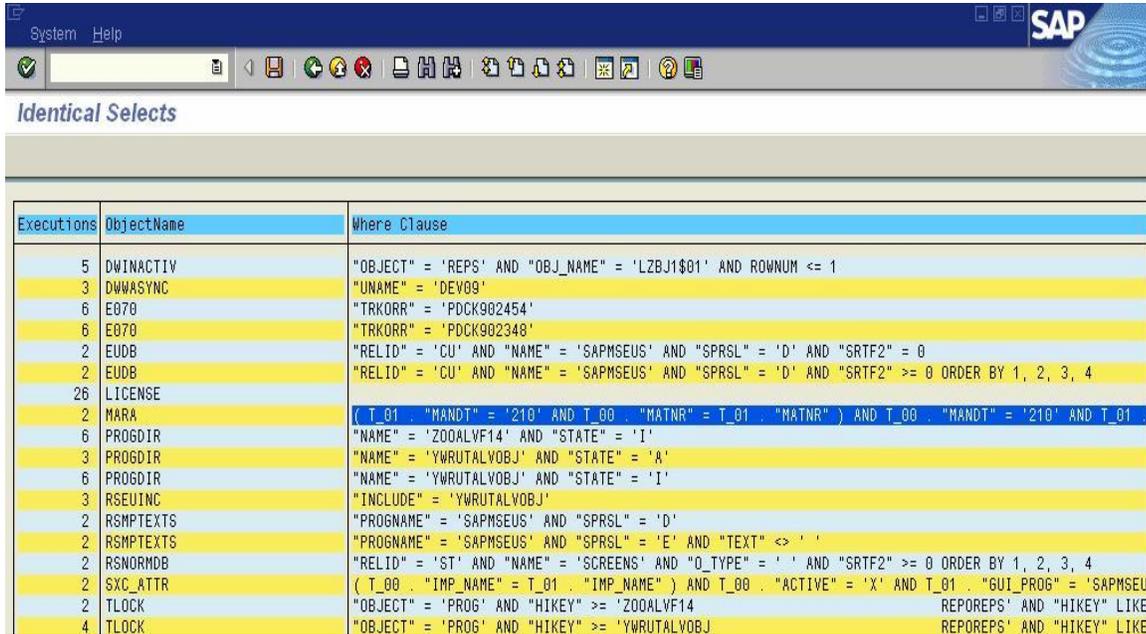
## Identical select statements



Use the menu path: Goto → Identical Selects to view a comprehensive list of identical select statements executed during the trace and the number of times they were executed. Identical select statements are grouped based on the **where clause**.

Note that identical **select statements have similar execution plan** used for their processing thereby saving time of execution and provide increased performance, too.

## Identical select statements displayed



Executions	ObjectName	Where Clause
5	DWINACTIV	"OBJECT" = 'REPS' AND "OBJ_NAME" = 'LZBJ1\$01' AND ROWNUM <= 1
3	DWWASYNC	"UNAME" = 'DEV09'
6	E070	"TRKORR" = 'PDCK902454'
6	E070	"TRKORR" = 'PDCK902348'
2	EUDB	"RELID" = 'CU' AND "NAME" = 'SAPMSEUS' AND "SPRSL" = 'D' AND "SRTF2" = 0
2	EUDB	"RELID" = 'CU' AND "NAME" = 'SAPMSEUS' AND "SPRSL" = 'D' AND "SRTF2" >= 0 ORDER BY 1, 2, 3, 4
26	LICENSE	
2	MARA	( T_01 . "MANDT" = '210' AND T_00 . "MATNR" = T_01 . "MATNR" ) AND T_00 . "MANDT" = '210' AND T_01
6	PROGDIR	"NAME" = 'ZOOALVF14' AND "STATE" = 'I'
3	PROGDIR	"NAME" = 'YWRUTALVOBJ' AND "STATE" = 'A'
6	PROGDIR	"NAME" = 'YWRUTALVOBJ' AND "STATE" = 'I'
3	RSEUINC	"INCLUDE" = 'YWRUTALVOBJ'
2	RSMPTEXTS	"PROGNAME" = 'SAPMSEUS' AND "SPRSL" = 'D'
2	RSMPTEXTS	"PROGNAME" = 'SAPMSEUS' AND "SPRSL" = 'E' AND "TEXT" <> ' '
2	RSNORMDB	"RELID" = 'ST' AND "NAME" = 'SCREENS' AND "O_TYPE" = ' ' AND "SRTF2" >= 0 ORDER BY 1, 2, 3, 4
2	SXC_ATTR	( T_00 . "IMP_NAME" = T_01 . "IMP_NAME" ) AND T_00 . "ACTIVE" = 'X' AND T_01 . "GUI_PROG" = 'SAPMSEUS
2	TLOCK	"OBJECT" = 'PROG' AND "HIKEY" >= 'ZOOALVF14 REPOREPS' AND "HIKEY" LIKE
4	TLOCK	"OBJECT" = 'PROG' AND "HIKEY" >= 'YWRUTALVOBJ REPOREPS' AND "HIKEY" LIKE

The above screen shot shows the list of identical select statements and the number of time they got executed.

## Database Operations Measured by SQL Trace

The SQL Trace analysis helps in measuring the execution time of the following data base operations that are performed when executing an SQL statement.

- 1) **DECLARE:** This operation declares a new cursor and assigns the SQL statement to that cursor created.
- 2) **PREPARE:** This operation converts the SQL statement into native SQL and frames out an execution plan for that statement.
- 3) **OPEN:** This operation opens the declared cursor and passes the parameters for database access.
- 4) **FETCH:** This operation passes one or more data records fetched to the database interface of the R/3 system.
- 5) **REOPEN:** Once a new select statement is brought in then this operation opens the cursor previously declared for previous select statement and performs new parameter passing to the database.
- 6) **EXEC:** Passes the parameters for the database statement, and executes the statements that change data in the database (such as UPDATE, DELETE, or INSERT).

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