

QUICKLY LOCATE AND ELIMINATE THE CAUSES OF DB2 AND DB2 DDF APPLICATION INEFFICIENCIES

Compuware Strobe products for DB2 provide comprehensive, DB2-specific application performance information, giving users even more ownership and control of application performance. Strobe *for DB2* supports DB2 V10 .

Strobe products for DB2 and iStrobe enable IT professionals to measure, analyze and improve the performance of applications that use DB2. Strobe *for DB2 DDF* provides the ability to identify SQL statements coming into DB2 via DB2 Distributed Data Facility (DDF) that use significant CPU or have poor response time. These features extend the benefits of Strobe by contributing DB2-specific information to the Performance Profile, a series of hierarchical reports that pinpoint the sources of resource demand.

iStrobe is a Compuware web server application that works with Strobe to help IT professionals pinpoint inefficiencies within applications. With iStrobe, users can view and analyze Performance Profile information interactively using a standard browser such as Internet Explorer.

For online and batch processing applications, Strobe *for DB2*, Strobe *for DB2 DDF* and iStrobe help:

- identify the individual SQL statements and DB2 system services that cause excessive CPU time or wait time, or have poor response time
- supply access path explanations

- Strobe can identify DB2 usage of the Specialty Engines for parallel SQL, and iStrobe reports it in all the SQL activity reports for both DB2 and DDF
- offer recommendations for changing SQL statements and DB2 database definitions to improve application performance
- enable interactive analysis of SQL predicates to determine the impact changes will have on application performance
- Strobe allows you to measure SQL executing against the new IBM Smart Analytics Optimizer hardware/software combination. It opens the door to accessing information on the performance of your new hardware/software for massive data warehousing applications.

These features allow application developers, database administrators and other IT professionals to quickly identify and improve the causes of poor transaction response time, long runtime and high CPU usage within applications that use DB2, including distributed applications accessing DB2 data via DB2 Connect/DB2 DDF.

System	Timestamp	Stmt count	Elapsed time (sec)			Parallel Task CPU Distribution (sec)		CPU time (sec)				
			Avg	Max	Total	SP CPU	Total CPU	Avg %	Max	Total		
SYSD000	08/27/2011 03:25:22 AM	887	0.000065	0.001984	0.058324	0.000000	0.000000	0.000083		0.074139		
Target stmt	Stmt type	Stmt count	Avg	Max	Total	SP CPU	Total CPU	Avg %	Max	Total		
9 SELECT	DC	9	0.000524	0.001541	0.004715	0.000000	0.000000	0.001283		0.011550		
Text												
<pre> SELECT ITEM_PREFIX, ITEM_NUMBER, SUPPLIER_PREFIX, SUPPLIER_ID, QUANTITY_ON_HAND, UNIT_PRICE FROM PCAPROD.ITEM_SUPPLIER WHERE ITEM_PREFIX = ? AND SUPPLIER_PREFIX = ? AND SUPPLIER_ID = ? ORDER BY ITEM_NUMBER FOR FETCH ONLY </pre>												
Executing stmts												
		Stmt count	Avg	Max	Total	SP CPU	Total CPU	Avg	Max	Total		
10	PREFPRE	3	0.000044	0.000048	0.000132	0.000000	0.000000	0.000195		0.000317		
11	OPEN	3	0.000009	0.000010	0.000026	0.000000	0.000000	0.000021		0.000062		
12	FETCH	3	0.001519	0.001541	0.004657	0.000000	0.000000	0.003724		0.011171		
Run time statistics												
Type	Rows Processed	Rows Examined	Rows-Q Skipped	Rows-Q Skipped	Rows Inserted	Rows Deleted	Rows Updated	Get Page Requests	# Page Scans	# Page Entries	LOB Page Scans	LOB Page Updates
INDEX	451	132	1,060	1,060	0	0	0	138	0	0	0	0
SEGO	1,060	1,060	0	0	0	0	0	194	0	0	0	0
Requesters												
Requester location	Authentication ID	Stmt count	Avg	Max	Total	SP CPU	Total CPU	Avg %	Max	Total		
10.4.26.05	HJICRNG	9	0.000524	0.001541	0.004715	0.000000	0.000000	0.001283	0.003773	0.011550		

Figure 1: Strobe for DB2 DDF SQL Activity Report — identifies all SQL executed, number of times it was executed, Run Time statistics, which gives an indication of the access path that DB2 employs as well as the number of GET PAGES. It also details the Elapsed and CPU Time statistics.

Executing stmt	Invoking stmt	Stmt type	Statement count	Avg time (sec)	CPU %	Wait %	Page	Total	
1218	FETCH	2	DECLARE	SC	858.975	.0001	0.51	0.00	0.00

```

DECLARE SUBCAT CURSOR FOR
SELECT
NUMBER,
NAME
FROM
ITEM
WHERE
PREFIX = 'H'
ORDER BY
SUB_CATEGORY_NAME

```

SELOCK NO	PLAN NO	METHOD	INDEXONLY	CREATOR	THNAME	SRNO	ACCESS TYPE	MATCH COLS	SORTN LOGS	SORTC LOGS
1	1	PRE FETCH	N	PC4PROG	ITEM	1			10000	10000
2	1	INDEX	N	PC4PROG	ITEM_IL	2				
3	1	INDEX	N	PC4PROG	ITEM_IL	3				
4	1	INDEX	N	PC4PROG	ITEM_IL	4				
5	1	INDEX	N	PC4PROG	ITEM_IL	5				
6	1	INDEX	N	PC4PROG	ITEM_IL	6				
7	1	INDEX	N	PC4PROG	ITEM_IL	7				
8	1	INDEX	N	PC4PROG	ITEM_IL	8				
9	1	INDEX	N	PC4PROG	ITEM_IL	9				
10	1	INDEX	N	PC4PROG	ITEM_IL	10				
11	1	INDEX	N	PC4PROG	ITEM_IL	11				
12	1	INDEX	N	PC4PROG	ITEM_IL	12				
13	1	INDEX	N	PC4PROG	ITEM_IL	13				
14	1	INDEX	N	PC4PROG	ITEM_IL	14				
15	1	INDEX	N	PC4PROG	ITEM_IL	15				
16	1	INDEX	N	PC4PROG	ITEM_IL	16				
17	1	INDEX	N	PC4PROG	ITEM_IL	17				
18	1	INDEX	N	PC4PROG	ITEM_IL	18				
19	1	INDEX	N	PC4PROG	ITEM_IL	19				
20	1	INDEX	N	PC4PROG	ITEM_IL	20				
21	1	INDEX	N	PC4PROG	ITEM_IL	21				
22	1	INDEX	N	PC4PROG	ITEM_IL	22				
23	1	INDEX	N	PC4PROG	ITEM_IL	23				
24	1	INDEX	N	PC4PROG	ITEM_IL	24				
25	1	INDEX	N	PC4PROG	ITEM_IL	25				
26	1	INDEX	N	PC4PROG	ITEM_IL	26				
27	1	INDEX	N	PC4PROG	ITEM_IL	27				
28	1	INDEX	N	PC4PROG	ITEM_IL	28				
29	1	INDEX	N	PC4PROG	ITEM_IL	29				
30	1	INDEX	N	PC4PROG	ITEM_IL	30				
31	1	INDEX	N	PC4PROG	ITEM_IL	31				
32	1	INDEX	N	PC4PROG	ITEM_IL	32				
33	1	INDEX	N	PC4PROG	ITEM_IL	33				
34	1	INDEX	N	PC4PROG	ITEM_IL	34				
35	1	INDEX	N	PC4PROG	ITEM_IL	35				
36	1	INDEX	N	PC4PROG	ITEM_IL	36				
37	1	INDEX	N	PC4PROG	ITEM_IL	37				
38	1	INDEX	N	PC4PROG	ITEM_IL	38				
39	1	INDEX	N	PC4PROG	ITEM_IL	39				
40	1	INDEX	N	PC4PROG	ITEM_IL	40				
41	1	INDEX	N	PC4PROG	ITEM_IL	41				
42	1	INDEX	N	PC4PROG	ITEM_IL	42				
43	1	INDEX	N	PC4PROG	ITEM_IL	43				
44	1	INDEX	N	PC4PROG	ITEM_IL	44				
45	1	INDEX	N	PC4PROG	ITEM_IL	45				
46	1	INDEX	N	PC4PROG	ITEM_IL	46				
47	1	INDEX	N	PC4PROG	ITEM_IL	47				
48	1	INDEX	N	PC4PROG	ITEM_IL	48				
49	1	INDEX	N	PC4PROG	ITEM_IL	49				
50	1	INDEX	N	PC4PROG	ITEM_IL	50				

Figure 2: SQL Analysis Feature — EXPLAIN Report — provides the PLAN_TABLE data indicating the Access Path that DB2 may use to access the Data (DYNAMIC reports show the path DB2 would choose, existing PLAN_TABLE shows what was chosen).

Executing stmt	Invoking stmt	Stmt type	Statement count	Avg time (sec)	CPU %	Wait %	Page	Total	
1218	FETCH	2	DECLARE	SC	858.975	.0001	0.51	0.00	0.00

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NAME
FROM
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WHERE
PREFIX = 'H'
ORDER BY
SUB_CATEGORY_NAME

```

Observation: LIST SEQUENTIAL PREFETCH - Mozilla Firefox

The DB2 optimizer has chosen LIST SEQUENTIAL PREFETCH as part of the access strategy for your query. LIST SEQUENTIAL PREFETCH needs a set of data pages determined by a list of RIDs taken from an index. LIST SEQUENTIAL PREFETCH is chosen as part of the access strategy when any of the following is true:

- A single index is being used that has a cluster ratio lower than 80%.
- On indexes with a high cluster ratio, if the estimated amount of data to be accessed is too small to make sequential prefetch efficient, but large enough to require more than one regular read.
- To access data by multiple index access.
- To access data from the inner table during a hybrid join.

DB2 ends LIST SEQUENTIAL PREFETCH when the estimated number of RIDs to be processed exceeds 50% of the RID POOL, when the query is executed. This condition is known as RID POOL FAILURE, and can severely degrade the performance of your application. RID POOL FAILURES can be detected by analyzing the DEDPM Accounting Detail reports.

If a RID POOL FAILURE is detected, notify the DBA that the condition is occurring, and that the RID POOL size may need to be increased. Also, consider making the following modifications to your SQL in order to disable LIST SEQUENTIAL PREFETCH:

- Add an OPTIMIZE FOR n ROWS clause
- Add a GROUP BY clause
- Modify max_row_memo_list variable definition

Figure 3: SQL Analysis Feature — Observations Report — based on the EXPLAIN and Catalog Statistics Report, it provides some high-level observations that may improve the performance of the SQL statement.

A COMPREHENSIVE VIEW OF APPLICATION PERFORMANCE PINPOINT RESOURCE-CONSUMPTIVE SQL STATEMENTS

Information from Strobe for DB2, Strobe for DB2 DDF and iStrobe is fully integrated with performance data from Strobe and other Strobe products, such as Strobe for CICS, Strobe for Java™ and Strobe for IMS in a single Performance Profile. Users can quickly gain a comprehensive understanding of overall application performance, even in complex applications written in multiple languages and using multiple databases and teleprocessing subsystems.

IMPROVE DB2 APPLICATION EFFICIENCY AND RESPONSIVENESS

With Strobe for DB2, Strobe for DB2 DDF and iStrobe, users can easily locate resource-consumptive SQL statements, improve SQL access path efficiency and avoid the excessive use of DB2 system services.

Identifying the individual SQL statements that use excessive resources can be a challenging and time-consuming task. Strobe for DB2 pinpoints the static and dynamic SQL statements that use excessive CPU time or have poor response time, enabling users to quickly locate performance-improvement opportunities within their online and batch processing applications. Detailed reports identify the percentage of CPU time or wait time caused by individual SQL statements, the number of times the SQL statement was executed and its average service time. Reports also supply SQL statement text.

Strobe for DB2 DDF identifies dynamic and static SQL statements that originate in distributed applications which access DB2 data via DB2 Connect/DB2 DDF. Users can see what SQL ran on behalf of a particular location, the number of times the SQL statement was executed as well as how much CPU time and the average minimum and maximum response time that SQL statement used.

Figure 4: SQL Analysis Feature — Catalog Statistics Report — shows selected Catalog Statistics for the DB2 Objects being accessed during execution of the SQL statement.

Table	TABLE	TABLE	CARD	NUMBER	SPLIT ROWS	INDEX	PCT	PCT	PARTIAL	AVG	STATUS
Columns (SYSCAT.COLUMNS)	TABLE	TABLE									
Index (SYSCAT.INDEXES)	INDEX	INDEX									
Table (SYSCAT.TABLES)	TABLE	TABLE									
Package (SYSCAT.PACKAGES)	PACKAGE	PACKAGE									

IMPROVE SQL STATEMENT EFFICIENCY

iStrobe takes the guesswork out of making application performance improvements. For resource-consumptive SQL statements, it supplies EXPLAIN data and translations for analyzing access path efficiency. Strobe also offers specific rules-based recommendations for modifying SQL statements and database definitions to improve application performance.

Users can analyze the state of the DB2 catalog at the time of EXPLAIN execution and see table, column and index statistics for referenced SQL statements.

iStrobe also helps users evaluate the efficiency of SQL statement predicates by reporting on whether a predicate requires stage-1 or stage-2 processing, and whether it is indexable. This feature even enables developers to evaluate “what-if” scenarios so they can determine how changes to SQL predicates or DB2 releases may impact application performance. With iStrobe, users can interactively change SQL statements, then preview resulting predicate analysis information — without modifying the application.

DETECT RESOURCE-CONSUMPTIVE DB2 SYSTEM SERVICES

Strobe for DB2 helps users avoid the inefficient use of DB2 system services by identifying the SQL statements that call them. Performance Profiles highlight the individual SQL statements that cause excessive wait time or execution in DB2 system services.

iStrobe offers additional help in reducing resource consumption, supplying detailed module descriptions for DB2 system services and hints to improve application performance. iStrobe provides a high-level system overview of the DB2 activity in your applications, without needing to perform a deep dive. This option can be used instead of, or with, the normal performance trace option provided in previous releases. It provides more information as well, including DB2 buffer pool statistics.

A SIMPLE WAY TO MEASURE AND ANALYZE DB2 APPLICATION PERFORMANCE

With Strobe for DB2, Strobe for DB2 DDF and iStrobe, users can easily measure batch job steps, online regions or TSO sessions that use DB2. There is no need to specify DB2 modules, procedures, plans or queries; and no JCL changes, recompiles, rebinds or relinks are necessary. These products automatically capture and report on the number of times an SQL statement was executed, the CPU time and wait time for SQL statements and DB2 system services in the measured application. Because of the Strobe low-density sampling technology, these products can be used with confidence in both production and test environments.

APM PROBLEM SOLVER SERVICE

The APM Problem Solver service assists in identifying and resolving specific performance problems in mainframe-centric, business-critical applications.

Using Compuware's industry-leading products, experienced Compuware Delivery Consultants work closely with your IT personnel to measure an application's performance, identify performance improvement opportunities and make recommendations for implementing solutions.

With the APM Problem Solver services, organizations not only resolve problems quickly and effectively, but they gain the skills necessary to prevent future application performance degradation.

Compuware's Delivery Consultants are experts in managing APM projects. They have the latest knowledge of APM methodology and technologies and average 10 or more years experience in OS/390 and z/OS application or system programming, database administration and/or application performance tuning.

To learn more about Compuware Strobe *for DB2*, visit:
compuware.com/strobe

APM PRODUCTS

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- Strobe *for CA-Optimizer*
- Strobe *for CA Gen*

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