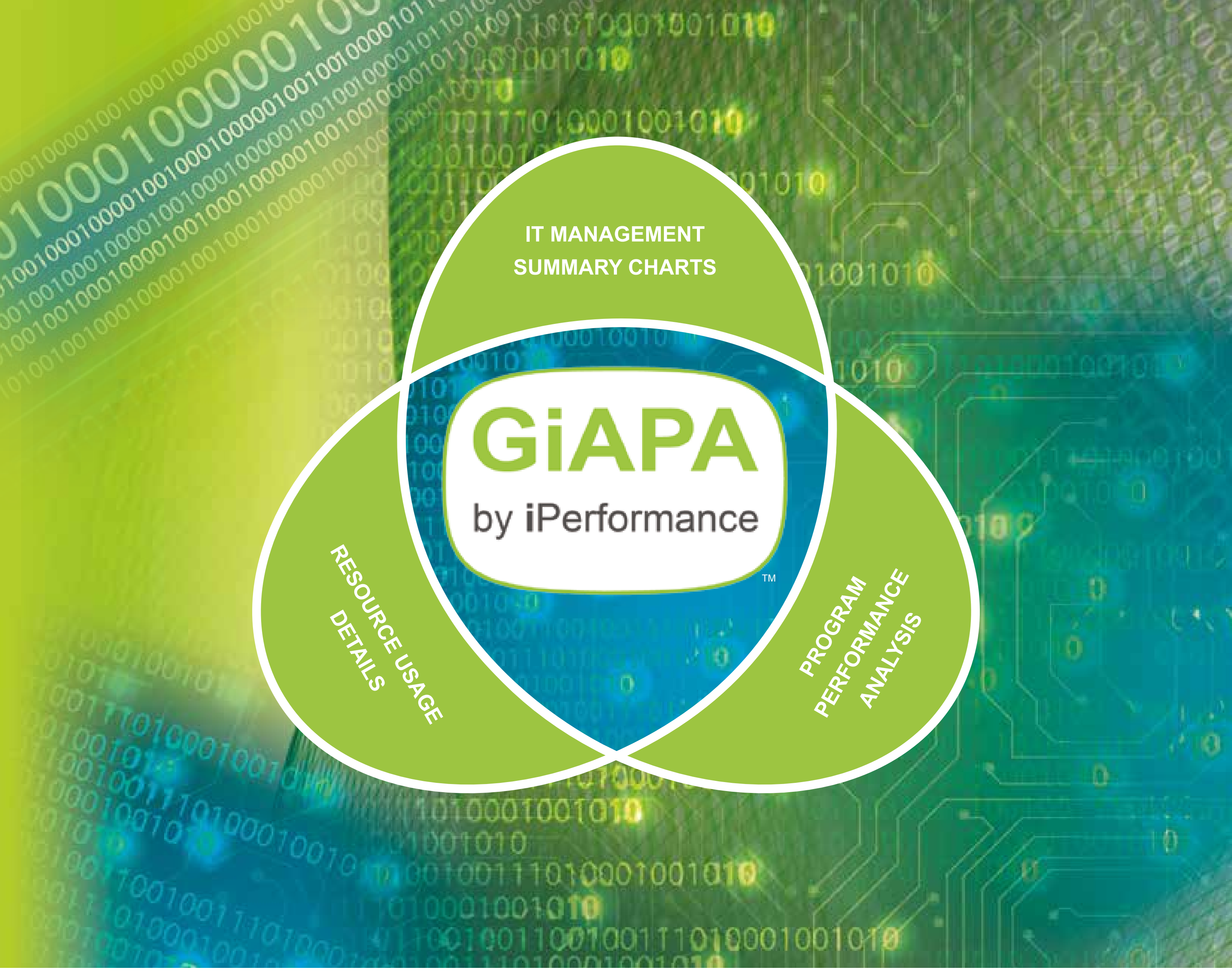


With IBM Power Systems running IBM i you have a lot of resources available ...

... are they used optimally?

VERIFY THAT RESOURCES ARE USED EFFICIENTLY:

LET GIAPA “X-RAY” YOUR SERVER

24 7 365

GiAPA

by iPerformance

Performance data is analyzed automatically

– no external experts needed!

OPERATIONS

… identify reasons for peaks experienced:

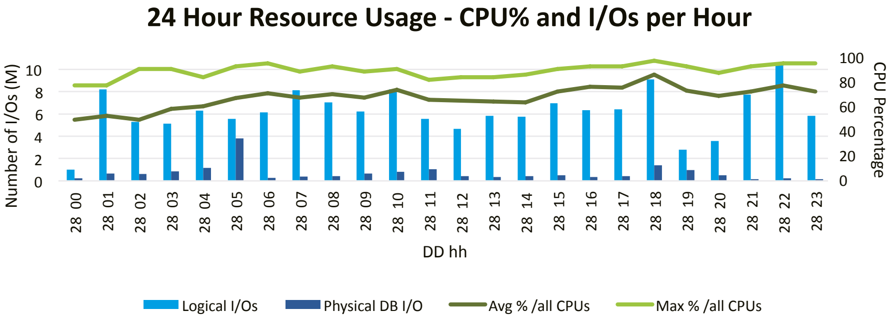
- What happened
- Which job is the culprit
- Responsible user
- Which program and source statement

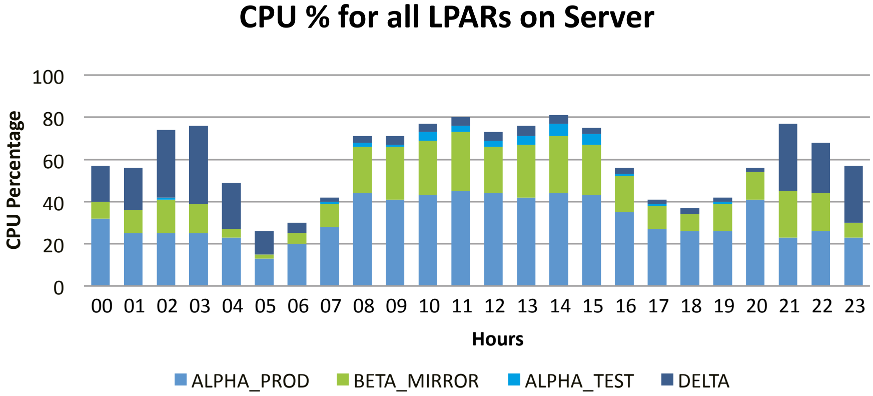
In addition, GiAPA also

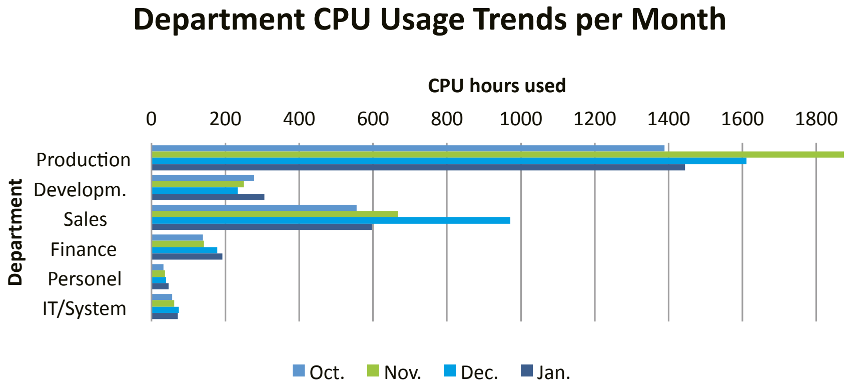
✓ warns QSYSOPR if a job is looping
✓ reports who used which Query when
✓ lists files not used the last xx months
✓ shows temporary index generations
✓ … and much more!

IT MANAGEMENT

… easily get the full overview with a “Good Morning Report”



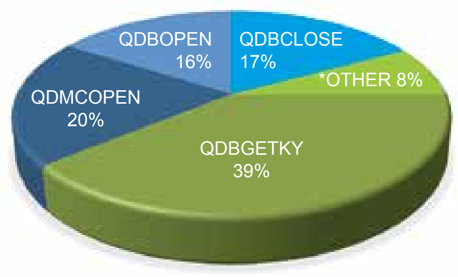




DEVELOPMENT

…get a powerful quality control tool that pinpoints optimization potential down to source code line.

For a job assumed to run OK, GiAPA returned the following cues on how to improve performance:

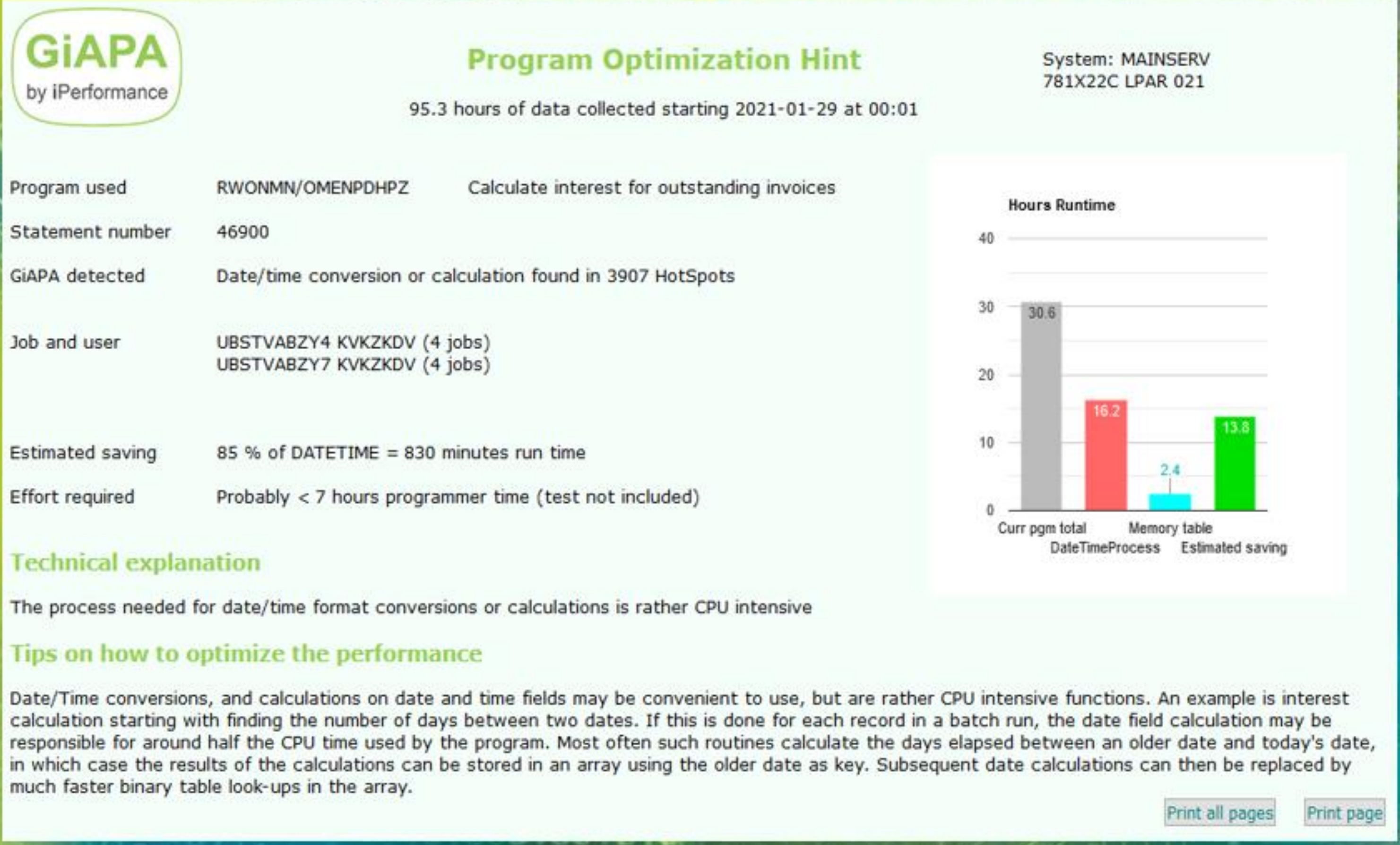


1. 53% runtime may be gained by keeping files open

2. QDBGETKY (Read by key) used 39% runtime. GiAPA reported that 176 million reads (= 135 + 41) are used to access 1359 records (= 731 + 628) in two files; a table within the program could save 85% of the reads.

GiAPA “File Analysis Summary” report for Job XYZ:

File Name	I/O	Writes	Reads	Other I/Os	# of records in file	Superflouous I/Os
A10DQA04	I	0	135.580.207	0	731	135.579.476
R1CBDI01	I	0	41.387.642	0	628	41.387.014
(Other files with fewer I/Os not shown here)						
*** Total		62.031	203.212.888	17.079		176.966.490



Program Optimization Hint

95.3 hours of data collected starting 2021-01-29 at 00:01

System: MAINSERV
781X22C LPAR 021

Program used	RWONMN/OMENPDHPZ	Calculate interest for outstanding invoices
Statement number	46900	
GiAPA detected	Date/time conversion or calculation found in 3907 HotSpots	
Job and user	UBSTVABZY4 KVKZKDV (4 jobs) UBSTVABZY7 KVKZKDV (4 jobs)	
Estimated saving	85 % of DATETIME = 830 minutes run time	
Effort required	Probably < 7 hours programmer time (test not included)	

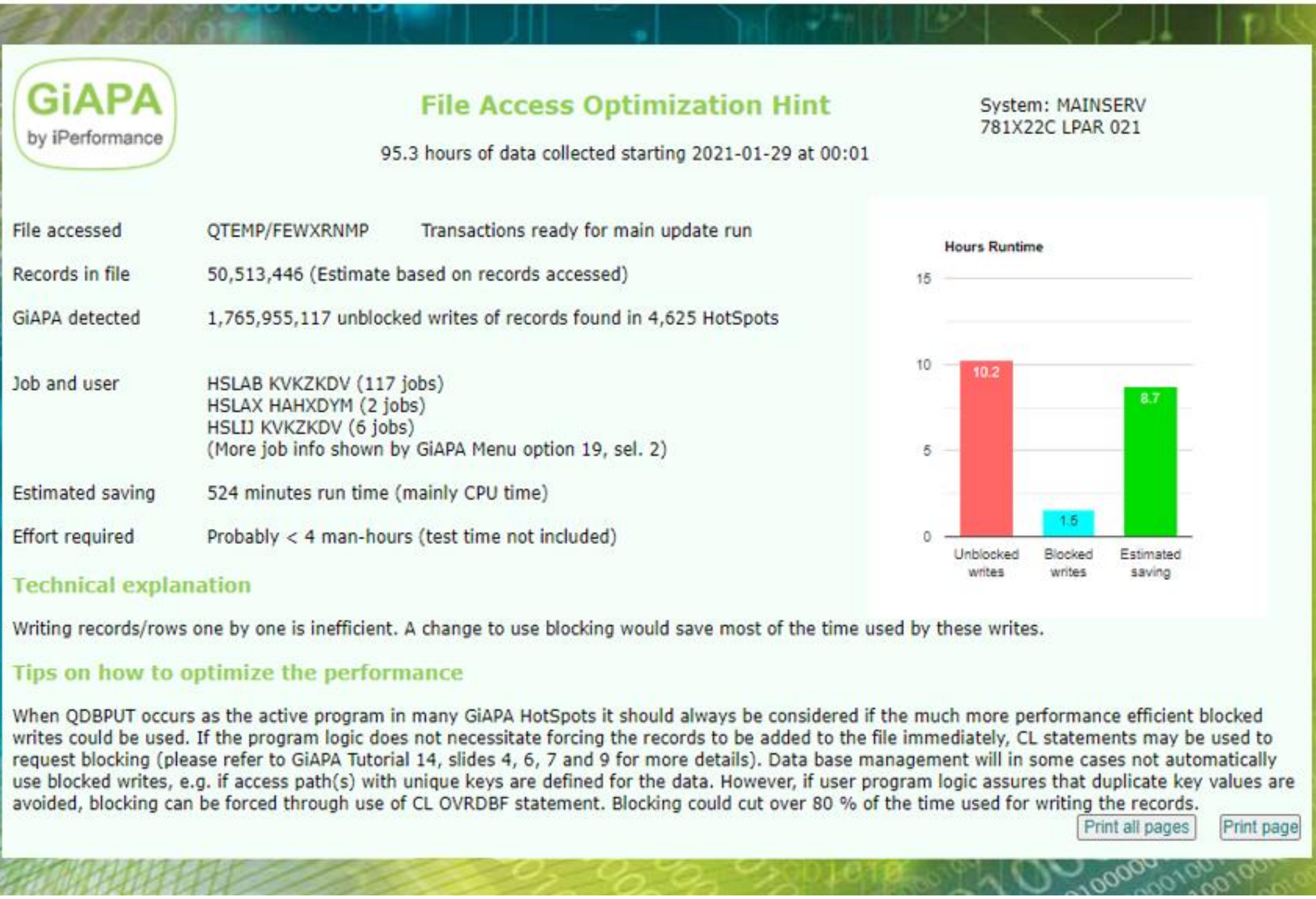
Technical explanation

The process needed for date/time format conversions or calculations is rather CPU intensive

Tips on how to optimize the performance

Date/Time conversions, and calculations on date and time fields may be convenient to use, but are rather CPU intensive functions. An example is interest calculation starting with finding the number of days between two dates. If this is done for each record in a batch run, the date field calculation may be responsible for around half the CPU time used by the program. Most often such routines calculate the days elapsed between an older date and today's date, in which case the results of the calculations can be stored in an array using the older date as key. Subsequent date calculations can then be replaced by much faster binary table look-ups in the array.

Examples of GiAPA's fully automated Performance Analysis



File Access Optimization Hint

95.3 hours of data collected starting 2021-01-29 at 00:01

System: MAINSERV
781X22C LPAR 021

File accessed	QTEMP/FEWXRNMP	Transactions ready for main update run
Records in file	50,513,446 (Estimate based on records accessed)	
GiAPA detected	1,765,955,117 unblocked writes of records found in 4,625 HotSpots	
Job and user	HSLAB KVKZKDV (117 jobs) HSLAX HAHXDYM (2 jobs) HSLIJ KVKZKDV (6 jobs) (More job info shown by GiAPA Menu option 19, sel. 2)	
Estimated saving	524 minutes run time (mainly CPU time)	
Effort required	Probably < 4 man-hours (test time not included)	

Technical explanation

Writing records/rows one by one is inefficient. A change to use blocking would save most of the time used by these writes.

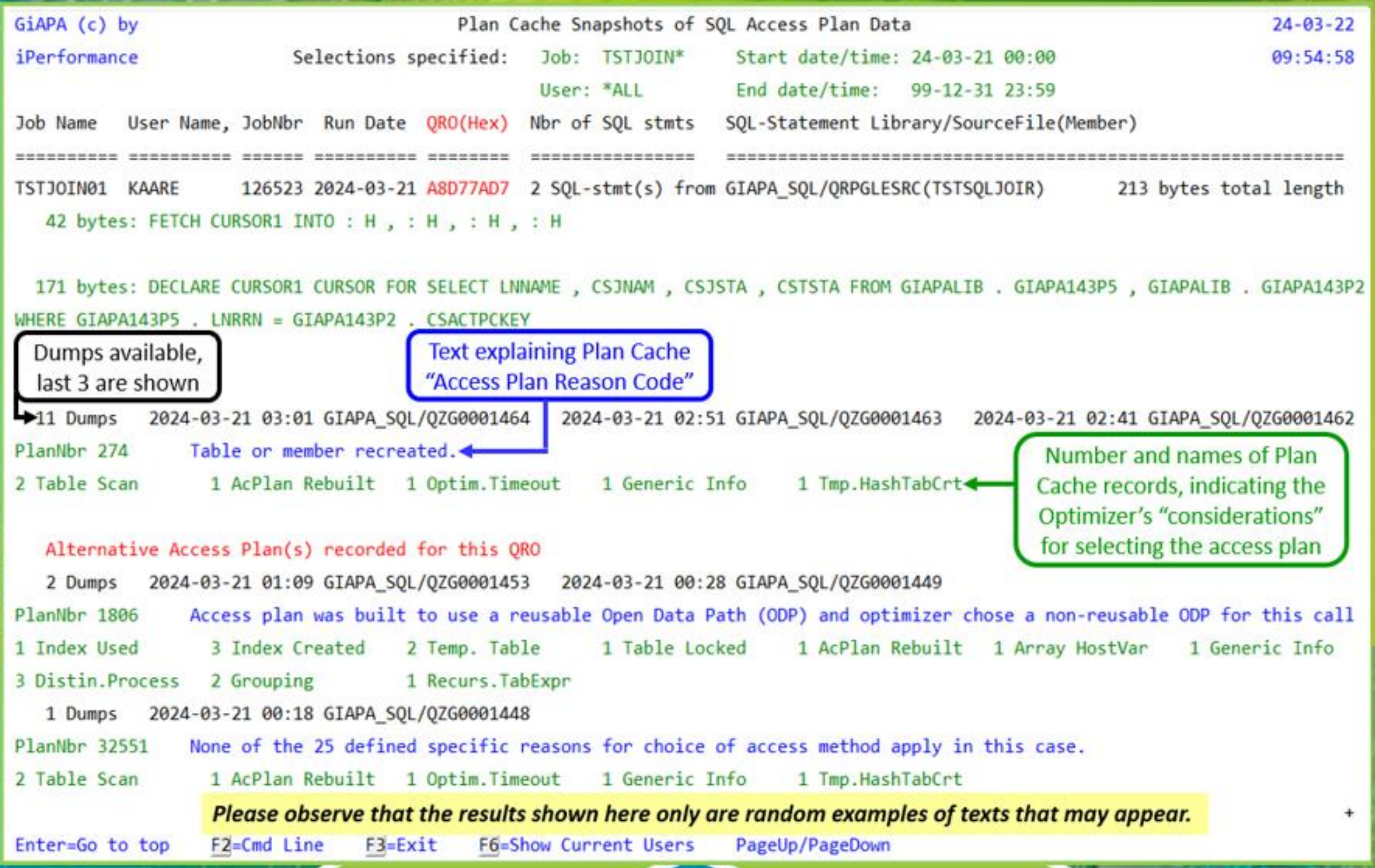
Tips on how to optimize the performance

When QDBPUT occurs as the active program in many GiAPA HotSpots it should always be considered if the much more performance efficient blocked writes could be used. If the program logic does not necessitate forcing the records to be added to the file immediately, CL statements may be used to request blocking (please refer to GiAPA Tutorial 14, slides 4, 6, 7 and 9 for more details). Data base management will in some cases not automatically use blocked writes, e.g. if access path(s) with unique keys are defined for the data. However, if user program logic assures that duplicate key values are avoided, blocking can be forced through use of CL OVRDBF statement. Blocking could cut over 80 % of the time used for writing the records.

SQL Observer

Automated, user controlled collection of Plan Cahe dumps:

- ✓ Data needed for analysis by IBMs SQL Performance Center in the ACS.
- ✓ Documents reasons for selection and changes of acess plan



```
GiAPA (c) by                   Plan Cache Snapshots of SQL Access Plan Data                         24-03-22
iPerformance            Selections specified:  Job:  TSTJOIN*     Start date/time: 24-03-21 00:00   09:54:58
                                               User: *ALL         End date/time:   99-12-31 23:59
Job Name   User Name, JobNbr  Run Date  QRO(Hex)  Nbr of SQL stmts   SQL-Statement Library/SourceFile(Member)
========== ========== ====== ========== ========  ================   ==========================================================
TSTJOIN01  KAARE      126523 2024-03-21 A8D77AD7  2 SQL-stmt(s) from GIAPA_SQL/QRPGLESRC(TSTSQLJOIR)      213 bytes total length
   42 bytes: FETCH CURSOR1 INTO : H , : H , : H , : H

  171 bytes: DECLARE CURSOR1 CURSOR FOR SELECT LNNAME , CSJNAM , CSJSTA , CSTSTA FROM GIAPALIB . GIAPA143P5 , GIAPALIB . GIAPA143P2
WHERE GIAPA143P5 . LNRRN = GIAPA143P2 . CSACTPCKEY

  11 Dumps   2024-03-21 03:01 GIAPA_SQL/QZG0001464   2024-03-21 02:51 GIAPA_SQL/QZG0001463   2024-03-21 02:41 GIAPA_SQL/QZG0001462
PlanNbr 274      Table or member recreated.
2 Table Scan       1 AcPlan Rebuilt   1 Optim.Timeout    1 Generic Info     1 Tmp.HashTabCrt

   Alternative Access Plan(s) recorded for this QRO
   2 Dumps   2024-03-21 01:09 GIAPA_SQL/QZG0001453   2024-03-21 00:28 GIAPA_SQL/QZG0001449
PlanNbr 1806     Access plan was built to use a reusable Open Data Path (ODP) and optimizer chose a non-reusable ODP for this call
1 Index Used       3 Index Created    2 Temp. Table      1 Table Locked     1 AcPlan Rebuilt   1 Array HostVar    1 Generic Info
3 Distin.Process   2 Grouping         1 Recurs.TabExpr
   1 Dumps   2024-03-21 00:18 GIAPA_SQL/QZG0001448
PlanNbr 32551    None of the 25 defined specific reasons for choice of access method apply in this case.
2 Table Scan       1 AcPlan Rebuilt   1 Optim.Timeout    1 Generic Info     1 Tmp.HashTabCrt
                                                                                                                              +
Enter=Go to top    F2=Cmd Line    F3=Exit    F6=Show Current Users    PageUp/PageDown
```

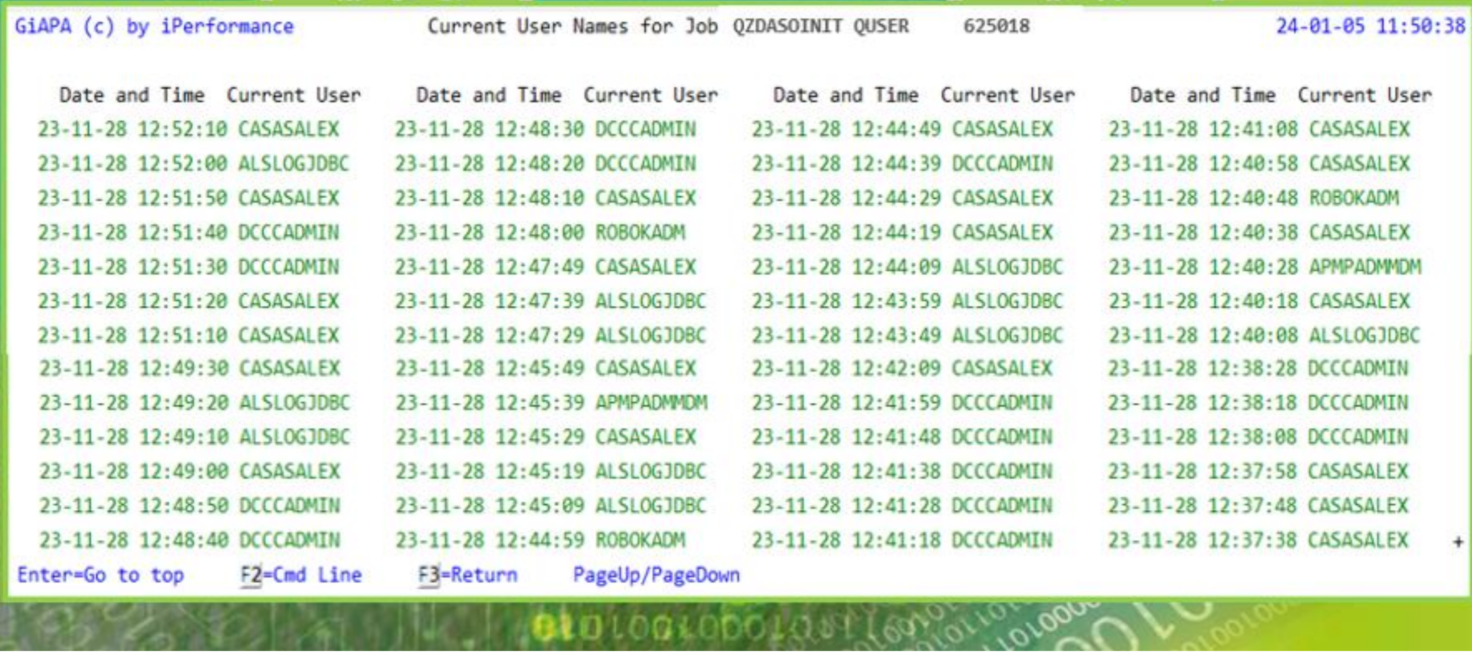
Dumps available, last 3 are shown

Text explaining Plan Cache "Access Plan Reason Code"

Number and names of Plan Cache records, indicating the Optimizer's "considerations" for selecting the access plan

Please observe that the results shown here only are random examples of texts that may appear.

Current user list - valuable info for analysing server jobs:



```
GiAPA (c) by iPerformance        Current User Names for Job QZDASOINIT QUSER     625018                24-01-05 11:50:38

  Date and Time  Current User    Date and Time  Current User    Date and Time  Current User    Date and Time  Current User
 23-11-28 12:52:10 CASASALEX    23-11-28 12:48:30 DCCCADMIN    23-11-28 12:44:49 CASASALEX    23-11-28 12:41:08 CASASALEX
 23-11-28 12:52:00 ALSLOGJDBC   23-11-28 12:48:20 DCCCADMIN    23-11-28 12:44:39 DCCCADMIN    23-11-28 12:40:58 CASASALEX
 23-11-28 12:51:50 CASASALEX    23-11-28 12:48:10 CASASALEX    23-11-28 12:44:29 CASASALEX    23-11-28 12:40:48 ROBOKADM
 23-11-28 12:51:40 DCCCADMIN    23-11-28 12:48:00 ROBOKADM     23-11-28 12:44:19 CASASALEX    23-11-28 12:40:38 CASASALEX
 23-11-28 12:51:30 DCCCADMIN    23-11-28 12:47:49 CASASALEX    23-11-28 12:44:09 ALSLOGJDBC   23-11-28 12:40:28 APMPADMMDM
 23-11-28 12:51:20 CASASALEX    23-11-28 12:47:39 ALSLOGJDBC   23-11-28 12:43:59 ALSLOGJDBC   23-11-28 12:40:18 CASASALEX
 23-11-28 12:51:10 CASASALEX    23-11-28 12:47:29 ALSLOGJDBC   23-11-28 12:43:49 ALSLOGJDBC   23-11-28 12:40:08 ALSLOGJDBC
 23-11-28 12:49:30 CASASALEX    23-11-28 12:45:49 CASASALEX    23-11-28 12:42:09 CASASALEX    23-11-28 12:38:28 DCCCADMIN
 23-11-28 12:49:20 ALSLOGJDBC   23-11-28 12:45:39 APMPADMMDM   23-11-28 12:41:59 DCCCADMIN    23-11-28 12:38:18 DCCCADMIN
 23-11-28 12:49:10 ALSLOGJDBC   23-11-28 12:45:29 CASASALEX    23-11-28 12:41:48 DCCCADMIN    23-11-28 12:38:08 DCCCADMIN
 23-11-28 12:49:00 CASASALEX    23-11-28 12:45:19 ALSLOGJDBC   23-11-28 12:41:38 DCCCADMIN    23-11-28 12:37:58 CASASALEX
 23-11-28 12:48:50 DCCCADMIN    23-11-28 12:45:09 ALSLOGJDBC   23-11-28 12:41:28 DCCCADMIN    23-11-28 12:37:48 CASASALEX
 23-11-28 12:48:40 DCCCADMIN    23-11-28 12:44:59 ROBOKADM     23-11-28 12:41:18 DCCCADMIN    23-11-28 12:37:38 CASASALEX   +
Enter=Go to top    F2=Cmd Line    F3=Return    PageUp/PageDown
```

62%

is the average performance optimization obtained using GiAPA to analyze slow running applications.

96%

improvement in response time was obtained when GiAPA analyzed a frequently used interactive transaction at a Swedish manufacturing company.

86%

runtime reduction was found by GiAPA in a daily five hour batch job at a large German wholesale company.

94%

CPU usage corresponding to 3½ hours was saved by an American information processing company when GiAPA found an unintended loop in a frequently used job.

57%

decrease in CPU usage was the result when a major American IT supplier applied GiAPA's cues for optimization of a payroll application.

97%

of the logical I/Os were saved when a read routine of a weekly batch job was changed at a major Scandinavian bank; runtime was reduced from 33 to 7 hours, saving 8 hours CPU time.

0.1%

CPU is the average overhead used by GiAPA to collect detailed performance data for all jobs and tasks every 15 seconds.

A leading global provider of supply chain solutions reported that five years use of GiAPA had saved them

€1,000,000!

Want to know more?
www.giapa.com contains

- Four minutes introductory video
- Product presentation video
- Complete GiAPA course as online tutorials
- Download and installation instructions
- References and success stories

Clicking one of the squares above from our home page www.giapa.com will show a reference success story from a GiAPA Customer

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