

Free GiAPA Performance Analysis

A step-by-step guide:

	Estimated manpower minutes
1. Download the GIAPALIB save file	10
2. Install the GiAPA software product	15
3. Start the GiAPA performance data collection (allow data collection to run e.g. 72 hours)	3
4. End the GiAPA performance data collection	3
5. Run the automatic performance Analysis	2
6. Display examples of optimization hints	<u>5</u>
	38

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Is GiAPA Safe to Run on Our Server?

GiAPA never

- copies or opens customer files or accesses customer data
- modifies an operating system value or parameter
- calls customer programs (exception: user exit programs defined to GiAPA)

GiAPA users over the past decade include major banks, insurance and logistics companies and large corporations – please see “References” on www.giapa.com.

iPerformance ApS has been an IBM Business Partner since 2003.

APIs called by GiAPA:

QBNLPGMI QCMDEXC QDMLOPNF QLICOBJD QLZARTV QMHRMVPM QMHSNDM QMHSNDPM
QPMLPFRD QPMWKCOT QSZRTVPR QUSADDUI QUSCHGUS QUSCMDLN QUSCRTUI QUSCRTUQ
QUSCRTUS QUSCUSAT QUSLFLD QUSLJOB QUSLOBJ QUSLRCD QUSPTRUS QUSRJOBI
QUSRMBRD QUSRMVUI QUSROBJD QUSRTVUI QUSRTVUS QUSRUIAT QUSRUSAT QWCCVTDI
QWCOLTHD QWCRDTAA QWCRSSTS QWCRSVAL QWVRCSTK QZLSADFS QZLSCHFS QZLSOLST

Authority Needed to Collect Performance Data

GiAPA calls the performance data collector APIs **QPMLPFRD** and **QPMWKCOL**.

If Job Accounting is active, GiAPA runs CL command **RCVJRNE** to obtain job start and end time.

These three objects are shipped by IBM with public authority *EXCLUDE.

The GiAPA data collection job must have authority to use these objects. This can be achieved in two ways:

1. Using adopted authority for data collection

GiAPA's data collection programs GIAPA111, GIAPA112 and GIAPA113 are shipped with authority adopted from QSECOFR. When restoring GIAPALIB, sign on using a profile having QSECOFR authority and with the system value QALWOBJRST allowing a restore of programs using adopted authority.

2. Run data collection under a user profile having sufficient authority.

GIAPALIB may be restored using a profile without QSECOFR authority. In this case the data collection job must run under a user profile having authority to call the QPMLPFRD and QPMWKCOL APIs and to read the job accounting journal.

GiAPA Menu option 89 shows if authorization is sufficient for GiAPA data collection.

Installation of GiAPA

1. Download the password protected zipped file named giapa.zip from <https://www.giapa.com/giapa.zip>
2. Unzip the file on your PC using the password received from your GiAPA sales representative. The zipped file contains
 - library GIAPALIB in save file **giapalib.savf**
 - GiAPAmannual.pdf.
3. Transfer the unzipped **giapalib.savf** to an already existing *SAVF on your Server (if you use FTP: Remember BINary mode).
4. Install GiAPA by running the command
RSTLIB SAVLIB(GIAPALIB) DEV(*SAVF) SAVF(mysavefile)
5. Install the security code received from your GiAPA sales representative:
Run command **GIAPALIB/GIAPA009 SECCODE(YourTrialSecurityCode)**

GIAPALIB Backup Considerations

Given the <0.1% CPU usage most users allow GiAPA data collection to run 24/7, i.e. GiAPA remains active even when backups are running.

Most backup software automatically includes any new libraries, using a “save while active” technique for data bases.

To avoid object lock conflicts during backup please specify the GIAPALIB objects type *USRIDX and *USRSPC as exceptions during backup.

For a SAVLIB command this is handled by using the OMITOBJ keyword:
OMITOBJ((GIAPALIB/*ALL *USRSPC) (GIAPALIB/*ALL *USRIDX))

Simplified GiAPA Trial Menu

CL-command **GIAPALIB/GIAPA** displays the GiAPA Trial Menu

GiAPA (c) by
iPerformance



POWER720 KAARE
06E84CT LPAR 00001

GiAPA

Welcome to GiAPA --> Global i Application Performance Analyzer

Simplified menu for trial installation

- 11 Submit GiAPA performance data collection (default values are OK for trial)
- 13 End GiAPA performance data collection
- 14 Submit job to expand and analyze collected performance data
- 20 Display example of automatic application performance analysis
- 60 Display full GiAPA menu
- 71 Export collected GiAPA performance data to save file to be sent to support@giapa.com
- 89 Check if authority is adequate to run data collection
- 98 Display server attributes: Serial and LPAR number, OpSys and GiAPA version, etc.

Starting GiAPA Data Collection

Use GiAPA Menu option 11; keep all default options.

```
Submit performance collection (GIAPA110)
```

```
Type choices, press Enter.
```

```
Minutes to collect data . . . . MINUTES          *NOMAX
Store output data in library . . DATALIB      > GIAPALIB
HotSpot CPU pct limit / 15 sec  CPULIMIT      4.0
Collect pgm + file usage data?  HOTSPOTS     *YES
Days after which data deleted   . DLTAFTER     *KEEP
```

This command will submit several jobs – typically 4 plus 2 more for each additional CPU active in the LPAR.

GiAPA's total CPU usage is typically less than 0,1 % despite collecting data for all active jobs on the server.

To verify that GiAPA is collecting data you may use menu option 71, which also displays the size of the data collected. To this end, a new data base member is created every day.

Ending GiAPA Data Collection

Use GiAPA Menu option 13.

```
Terminate GiAPA Collection (GIAPA130)  
  
Type choices, press Enter.  
  
Stop GiAPA data collection? . . TERMINATE      Y
```

Please note:

Do NOT end GiAPA data collection using an ENDJOB command!

The ENDJOB command will result in some data loss since GiAPA will be prohibited from consolidating all data collected into one member.

Running the Performance Data Analysis

The expansion and analysis of the collected performance data is

- for GiAPA the most complex part of a Free Trial ...AND
- for the user the least complex part to run:

Simply select option 14 from the GiAPA Menu !

This will result in submission of batch job GIAPAEXPAN that will run five to 20 minutes, depending on how much data was collected.

Please note:

- expansions run with priority 59 to avoid disturbing other jobs
- ***a FreeTrial only allows one analysis/expansion, i.e. terminate all data collections prior to running an expansion.***

Requesting the Results of the Analysis

When job GIAPAEEXPAN (expansion and analysis) is terminated, please use GiAPA Menu option 20 to display this panel:

```

GiAPA (c) by          Select input member for generation of          21-04-26
iPerformance         Optimization Hints for Programs and File Access 10:37:11
                    Data Library: GIAPALIB

Select (generic) pgm or file *ALL          Show savings exceeding 001 minutes

Select between two output formats
Show in HTML window:  1=All results      2=Program hints      3=File access hints
Use 5250:             4=Totals          5=All results      6=Program hints      7=File access hints

Opt  Member      Date      Text
_   FREETRIAL    210426   Free GiAPA analysis of performance data
  
```

Select option 4 to check the total potential savings found.

Select option 1 to check the results for both program and file access in HTML format.

Option 4: Total Tally for Potential Savings

Displayed together with data collection statistics and server data

```

GiAPA (c) by                               Statistics from Automated Application Performance Analysis          21-04-25
iPerformance                               Library GIAPALIB                               Member FREETRIAL                               17:52:54

      11,501 data collection intervals processed = data from 1 days 23 hours 55 minutes
21-04-20  0:02 date and time for first data included in analysis (YY-MM-DD hh:mm)
21-04-21 23:58 date and time for last data included in analysis (YY-MM-DD hh:mm)
      75,934,744 job and task records received from Performance Collector API
      13,911,316 showed resource usage --> record generated
           121,402 different jobs and tasks found in API data
           123,580 HotSpots detected (Job exceeded interval limits)
           130,728 program call stacks retrieved
           1,589,244 program names processed
      10,207,356 open file data records processed
  
```

```

Source machine specifications:
GiAPA version           V05M00
System name             MAINSERV
Serial number           713FD78
Processor type          EPT7
Model & Server Model    E8D
Price group             P20
Op.System version       V7R3M0
LPAR number             3
Number of LPARs        4
Nbr of Phys. CPUs      8
Processor capacity      7.50
PVU per processor       0
Available memory Mb    210,239,488
Auxiliary storage Gb   30,342,937
System ASP Gb          30,342,937
System ASP use pct     71.3929
  
```

Potential Savings Found by Automated Application Performance Analysis

19	Improvements of Program Functions	1,158 Minutes
11	Improvements of File Access Method	346 Minutes
*** Total Potential Run Time Savings		25 Hours 04 Minutes

For FreeTrial runs you obtain the results indicating the 3rd best savings
→ Details for top 2 savings (Optimization Hints # 1 and 2) are not shown.

If selection 1 = HTML format does not automatically display the output below,
please use selection 5 = 5250 “Green Screen” format to obtain the same data.

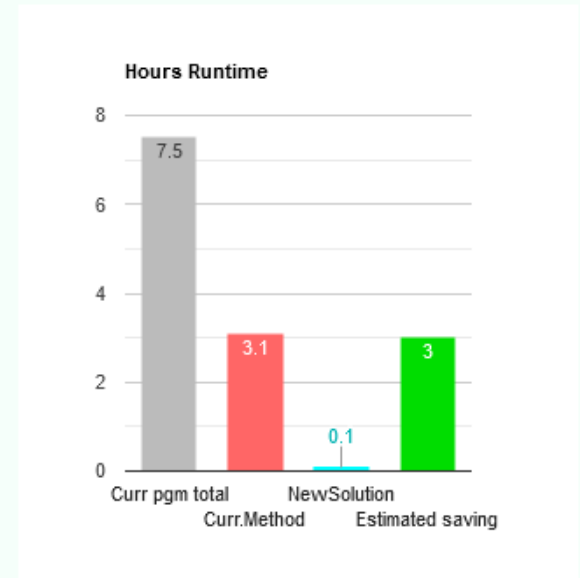


Program Optimization Hint

System: MAINSERV
713FD78 LPAR 003

47.9 hours of data collected starting 2021-04-20 at 00:01

Program used	Library/Program not shown	Program optimization suggestion nbr. 1
Statement number	00000	
GiAPA detected	Description of potential performance improvement was suppressed ---	
Job and user	--- --- --- ---	
Estimated saving	---	
Effort required	Probably < 3 hours programmer time (test not included)	



Technical explanation

Tips on how to optimize the performance

Automatically Generated Program Optimization Hint

→ Based on test data received from a customer site

Names of all jobs, users, user libraries and programs have been pseudonymized

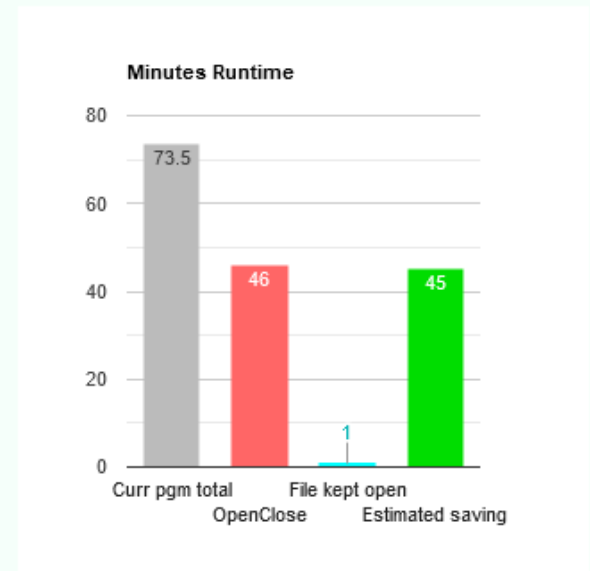


Program Optimization Hint

System: MAINSERV
713FD78 LPAR 003

47.9 hours of data collected starting 2021-04-20 at 00:01

Program used	ATMPROD/EM0764	I/O subprogram for accessing ATM records
Statement number	766 1000001	
GiAPA detected	File opening or closing routine found in 184 HotSpots	
Job and user	ATMTRANS NIGHTPROD ATMVALID NIGHTPROD	
Estimated saving	97 % of OPENCLOSE = 45 minutes run time	
Effort required	Probably < 3 hours programmer time (test not included)	



Technical explanation

Opening a file is slow, but paves the road for subsequent efficient I/O. Closing is less expensive, but also worthwhile minimizing

Tips on how to optimize the performance

To open and close files frequently is rather expensive. A "full open" creates an ODP (Open Data Path) which is a temporary object containing tailored code optimized to ensure efficient I/O. Programs using many I/Os will therefore perform efficiently whereas the time used by creating an ODP will cause significant overhead if the file is closed (= ODP deleted) after each I/O. QDBOPEN and QDBCLOSE creates / deletes an ODP, respectively. QDMCOPEN and QDMCCLOSE are the Data Management Common Open/Close routines that will call the program to open/close a data base file, a save file, a device file, etc. QDBSOPEN/QDBSCLOSE are the shared open/close routines that only attach/detach the program to/from an existing ODP and therefore use significantly less resources.

Optimization Hint for Data Base Access

GiAPA detected that a given file accessed in arrival sequence was read one record at the time instead of in blocks

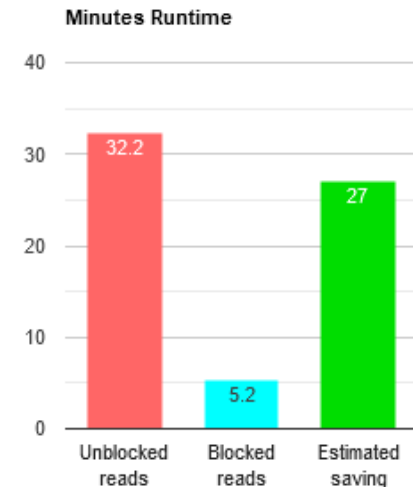


File Access Optimization Hint

System: MAINSERV
713FD78 LPAR 003

47.9 hours of data collected starting 2021-04-20 at 00:01

File accessed	QTEMP/GHETR211	*** File not found ***
Records in file	5,002,664 (Estimate based on records accessed)	
GiAPA detected	27,502,722 sequential reads of next record found in 150 HotSpots	
Job and user	RKSM TDEE CJMUNCK (2 jobs) RKSM TDEE LSPEDDIE (2 jobs) RKSM_2302 CJMUNCK	
Estimated saving	27 minutes run time (mainly CPU time)	
Effort required	Probably < 4 man-hours (test time not included)	



Technical explanation

Always avoid reading records/rows one by one if accessing the data in "arrival sequence" (= as the are stored)

Tips on how to optimize the performance

Reading records one at the time is obviously much less efficient than if data base management can pass e.g. 100 records to the program in one block. However, before forcing blocked access we must also know if the records are stored in the sequence in which we want to read them. Access may be in a logical sequence (e.g. orders in customer number sequence), but if our order file actually is stored in chronological order we might decrease performance by forcing blocked access. Please note, that if a file only is read, it must be opened for input only to obtain blocked access. There are too many rules of the game to cover here - please refer to the first 10 slides in Tutorial 14 on www.giapa.com.

GiAPA Menu Option 71

Displays the data base members containing collected performance data, and facilitates saving the data to a save file in case the data needs to be uploaded to the iPerformance WebServer for additional analysis.

```
GiAPA (c) by          Save raw GiAPA Performance Data into Savefile      21-04-26
iPerformance          for Export or Offline Storing                    10:33:11
```

```
Save file: _____      Observe: The save file          Data Library: GIAPALIB
Savf library: _____    is cleared (or created)
```

1=Select collected GiAPA performance source data members to export

Opt	Member	Size in Kb	Text
_	PF04210004	43,724	Pfr.data from 210421 at 000004
_	PF04200001	72,076	Pfr.data from 210420 at 000001

GiAPA Menu Option 98

Displays the below panel indicating various server and software specifications often needed for ordering security codes from software suppliers etc.

```

GiAPA (c) by                               Performance Related           Sys.Name POWER720
iPerformance                               Hardware and Software Attributes  21-04-25 13:28:22

Serial Number.....: 06E84CT                System Values
LPAR number.....:      1                    QDYNPTYADJ...: *On
System type and model.....: 8202 E4D      720  QDYNPTYSCD...: *On
Operating system version.....: V7R3M0      QPFRADJ.: 2 = IPL + Auto
Software processor group.....: P05        70 PVU/CPU  QPRCMLTTSK...: Syst.Ctrl.
Processor feature.....: EPCK                QQRYDEGREE...: *MAX
Current number of partitions.: 1           QQRYTIMLMT...: *NOMAX
Primary partition identifier.: 0
Partition sharing processors.: NO

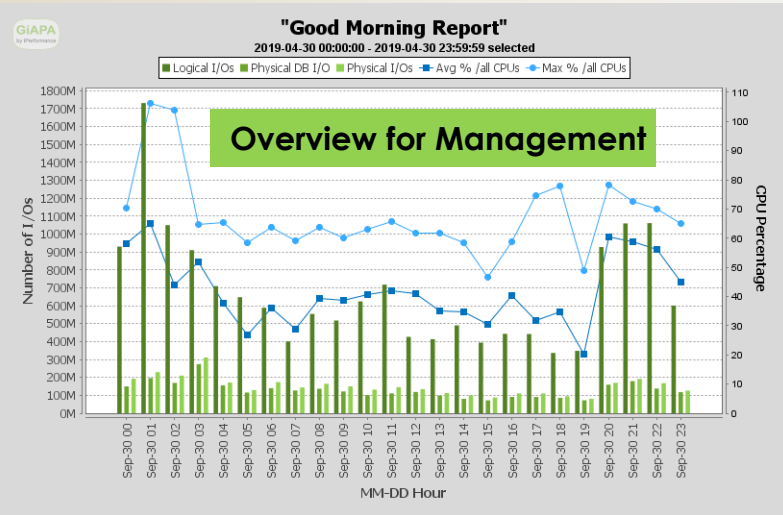
Total auxiliary storage in MB:      418,759
System ASP:      418,759      % used:  67.055

GiAPA version V05M00
GiAPA license type: A
GiAPA security code:
3A260A367A2FE015230B46

Current      Minimum      Maximum
Number of virtual processors.....:      1          1          4
Configured memory in megabytes.....: 15488      320        16384
Percentage interactive work.....:      100        0          100
Processing capacity.....:      1.00      1.00      4.00
    
```


GiAPA has so much more to offer ...

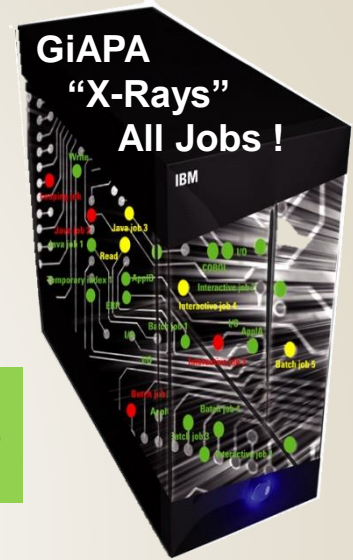
... the "Free GiAPA Performance Analysis is just "the tip of the iceberg"



Resource usage trends per application for management

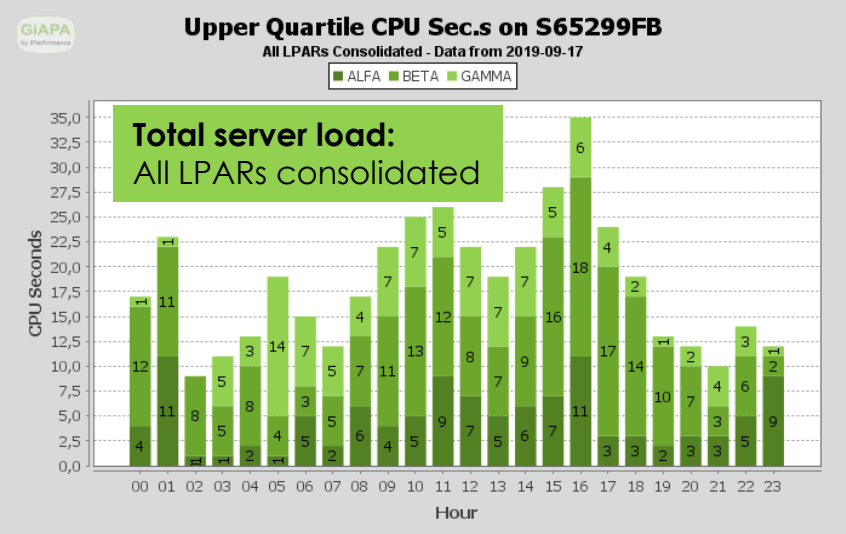
Warning to operator:
Job XYZ is looping

Warning to operator:
Excessive memory allocation by Job ABC slows down the entire LPAR



Quality Control Tool for Development
Performance analysis details to program source line

Operations tool
Timing & purpose of resource usage:
who – when – what – how much
Graphics and statistics of usage and trends



Please check our GiAPA Product Presentation Video:
[https://www.giapa.com/GiAPA2021Presentation%20\(Published\)/](https://www.giapa.com/GiAPA2021Presentation%20(Published)/)

For more Information: Please visit www.giapa.com

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