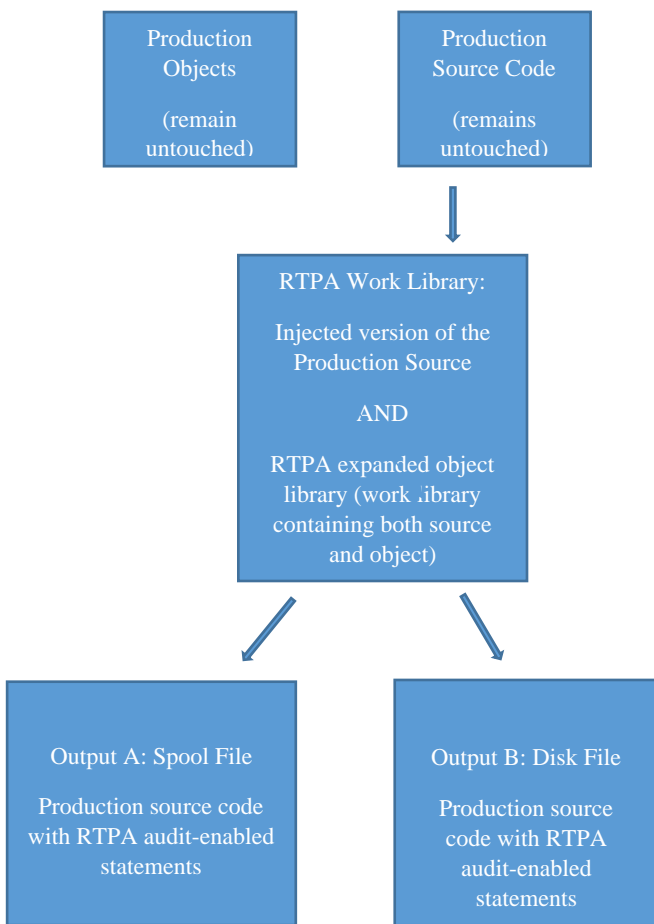# Real-Time Program Audit (RTPA) FAQs

## Will RTPA affect the production code?

No. When RTPA is installed it creates two new libraries, separate from production: (1) the RTPA object (executable) programs; and (2) an empty, temporary work library to contain any RTPA activity, including source programs and the expanded objects. These two libraries are used separately from the production system and are designed to be kept entirely separate from the production system. This is standard practice for test vs production environments.

**Picture 1: RTPA Structural Overview -  Work and Object Libraries**

Production Objects

(remain untouched)

Production Source Code

(remains untouched)

RTPA Work Library:

Injected version of the Production Source

AND

RTPA expanded object library (work library containing both source and object)

Output A: Spool File

Production source code with RTPA audit-enabled statements

Output B: Disk File

Production source code with RTPA audit-enabled statements

**Step 1:**    **Add Libraries**

- RTPA Work and Object libraries added to programmer library list; production source code unchanged

**Step 2:**    **RTPA executed**

- RTPA extracts the selected source program, and adds expanded audit-enabled source

**Step 3:**    **Compile Expanded Source and Create Object Program**

- RTPA Work Library: temporary/work library for expanded work and object
- RTPA Object Library: unchanged by user

**Step 4:**    **Execute Job - Audit Output Ready for Use**

- Jobs executed from smarter RTPA-enabled object (not production library)
- Two output types:
  (a) The printer file (printer spool file): for everyday use by programmers
  (b) Example Db2 disc file: for specialized analysis (eg, SQL, IBM Query, RTPA Query)
- Note: Summary production source and object libraries are not changed.

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## What are the system requirements to use RTPA?

- IBM i Power 5 or later, and appropriate IBM ILE Compilers (RPG, CL, COBOL)
- Approximately 150 million bytes of disk storage

## What programming languages does RTPA run in?

The current RTPA product produces audit logs for RTPA for IBM i RPG, IBM i COBOL, and CL. However the RTPA program is patented for every computer language, and we are working to develop in other languages.

## Does RTPA for RPG audit all RPGIII programs?

Yes. RTPA for RPG is designed to audit all types RPGIII (OPM) source programs including: RPG, RPT, SQLRPG.

RTPA for RPG uses the CVTRPGSRC command to dynamically convert the a copy of the RPGIII source program to RPGIV, and then immediately expands the RPGIV source program with RTPA audit statements and compiles the expanded RPG4IV source program into an object program to immediately enable RTPA auditing.

Only the IBM RPG ILE compiler is utilized, not the out-of-support RPGIII OPM compiler.

## Does RTPA audit free-form RPG?

Yes, RTPA audits freeform (free-format) RPG as in the following example:

```
...Source Code Fragment...

0100.00 /free
0101.00   torder = 1500;
0102.00   iorder = 78.543;
0103.00   xorder = torder + 13.45  +
0104.00           26.2 + iorder;
0105.00 /end-free
...
```

```
...Audit File Fragment...

0201   torder = 1500;
          1500
0202   iorder = 78.543;
       78.543
0203   xorder = torder + 13.45   +
     1618.19     1500
0204           26.2 + iorder;
                   78.543

...
```

RTPA Factsheet v09.19

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## Does RTPA audit free-form only RPG?

No, RTPA does not, at this time, audit RPG free-form Only (RPG source programs not using the RPG cycle) source programs.

## Do I need to expand all my source programs?

No, only the selected programs. Each source program that you want to audit must be expanded with the RTPA program. Only expanded programs will produce audit files.

## Will RTPA exceed maximum file limits?

No, there is no number of files limit for the ILE compilers.

## Does RTPA for audit all RPG, COBOL, and CL programs?

As far as tested, RTPA audits all RPGIII, RPG IV, COBOL, and CL programs. RPG III programs are automatically converted to RPGIV source programs in an RTPA work library by the CVTRPGSRC command, and then immediately expanded with RTPA audit statements. Only IBM i ILE compilers are used by RTPA.

## How does RTPA work?

RTPA is a pre-compiler that converts a normal source program into an audit-enabled source program, which is then compiled normally. (Similar to the SQL pre-compiler). The RTPA process is simple:

- RTPA analyzes the source code and then creates a new temporary source code file containing both the source code and audit statements.

- RTPA compiles the audit-enabled source code with the regular compiler. The resulting object is an audit-enabled object program.

- When the audit-enabled program is initiated (interactive or batch), the executable itself produces an audit output file, which we normally refer to as an audit file, or audit.

- The audit file can be viewed in real time as the program executes, or as it is a normal spooled file, printed out after execution. It can also be displayed online, making it searchable.

## How long does it take to RTPA enable a large RPG IV source program?

The steps of RTPA to audit enable even very large IBM RPG ILE source programs of 10,000 or 20,000 source statements and create the RTPA audit enabled object program should take no more than ten (10)

elapsed seconds  on current IBM i Power 8 or Power 9 computers with 3,000 CPW or more of processor power assigned to the partition.

IBM Power 9 computers with 14,000 CPWs (an entire  processor core) assigned to the RTPA partition can expect the eight RTPA steps to be completed in perhaps two (2) elapsed seconds. (Two seconds after command key 10 (F10) is pressed in the RTPA entry screen to submit the RPG input program for audit expansion.)

## How much IBM i processing power is used when creating the RTPA output?

RTPA for RPG is primarily  intended to be used in a development environment, where RPG applications and programs are developed, tested, quality assured, and supported, rather in a production environment.

Development normally utilizes relatively small sized test data, and typical RTPA processing power (RTPA overhead) is very small and should not be a consideration. (It is typically less than one second total of RTPA processing overhead, which can be seen by reviewing the RTPA time stamp in each executing source statements).

RTPA does provide some useful options to limit the amount RTPA audit output of printer pages to a default of 15,000 pages of audit output for a job, and also options to select areas of RTPA auditing, such as conditional auditing, watch variable auditing, from and to ranges of statements auditing, to both focus and limit RTPA audit output.

## How much disk space is used by the RTPA audit output?

RTPA for RPG is primarily intended to be used in development, where RPG applications and programs are developed, tested, quality assured, and supported, rather in a production environment.

Development normally utilizes relatively small-sized test data, and typical RTPA disk file processing  (RTPA audit output space) is small and should not be a consideration. (RTPA outputs one 280 character RTPA audit printer or disk record for each executing program statement and the time stamp that has been audit enabled, plus optionally a record with the contents of variables in the executing statement).

RTPA does provide some useful options to limit the amount RTPA audit output of printer pages to a default of 15,000 pages of audit output for a job, and also options to select areas of RTPA auditing, such as conditional auditing, watch variable auditing, from and to ranges of statements auditing, to both focus and limit RTPA audit output.

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## What types of output does RTPA provide?

RTPA produces three types of outputs: (1) the RTPA printer audit log or DB2 audit log, (2) source program documentation, and (3) customized/ad hoc reports produced from the disc audit log file by the RTPA Query or by IBM QUERY or by customer SQL programs over the RTPA DB2 audit file.

**(1) The RTPA Audit Log**
The RTPA audit log is automatically generated by RTPA. It is produced from the expanded source program, which includes the executing source statement, the moment-in-time the source statement was executed, and the value of the fields in the executing source statements, and more).

The audit log is saved to:
(a) The printer file (printer spool file): for everyday use by programmers
(b) The DB2 disk file: for specialized analysis (eg, for SQL use, the IBM query program, the RTPA query program)

**(2) Source program documentation**
Documentation only option, inserts comment statements. Useful for the first day analysis to make the entire library of source members more understandable.

**(3) Customized/Ad Hoc Reports from the Disk Audit Log File**
- If written to disk (option b), various programs (eg, IBM query, SQL, or RTPA Query) can be used to extract and analyze data, including creating and printing reports.
- RTPA Query includes six built-in analytical report options: display files, reports, fields, files, call programs, and programs executed. These show what actually is/has been executed for that job in the RTPA audit log.
- Using SQL or IBM Query allows for the analysis of any field/conditions in the RTPA audit log database, showing what is/has been executed in the RTPA audit log for that job.

## How does RTPA auditing relate to IBM i journals and audit logs?

RTPA is based on the same concept as job log journaling, in that it is keeping track of what is happening, but RTPA provides a vast amount of additional information. RTPA takes the IBM i audit and journal logs a much more detailed step further by auditing and logging every statement executed within every IBM i job. The result is a real-time video-camera-like stream of all of the statements executing inside the relevant applications and programs.

IBM i provided audit journals, IBM i History journal (DSPLOG command over file QHST), IBM i disk journal of before and after images of disk journaled files, and the newer IBM i security journal of security issues logging are focused on the IBM IT department system administers needs for understanding and managing IT department issues. RTPA is focused on what is happening inside the applications and programs being processed.

RTPA focused and real-time audits and records (turns on the 'security camera' of all RTPA application RPG, CLP, and COBOL programs that have been audit enabled (or made auditable) in addition to all of the other IBM auditing capability.

IBM i job log journals provide a trail of every job processed within the computer (eg, start, stop, completion, time used); RTPA logs and audits every statement executed within an IBM i job and application in real time (ie, everything that happens in between the start and stop of the job log). RTPA also includes a disk file journal function, but in much expanded form. It does not just audit the disk file journaling, it provides the repository and search function capability of the executing statement log information.

RTPA differs from other types of software program auditing products because other products tend to relate to disk activity, whereas RTPA provides program execution activity at the most detailed level (ie, each statement being executed, in every relevant program and application, with a timestamp).

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