CPExpert™

Product Update Bulletin 2012-2

This product update forwards changes to both software and documentation. The software update is Release 22.2 of CPExpert. The release number indicates that it is the second release of 2012.

With Release 22.2, CPExpert has been updated to: (1) support IBM's new zEnterprise EC12 mainframe server, (2) provide additional analysis and features in the WLM Component; (3) provide additional analysis in the DB2 Component, (4) provide updated documentation; and (5) correct errors that have been reported.

- **Support z/Enterprise EC12.** The zEnterprise EC12 mainframe server was announced by IBM in August 2012.

  - All relevant CPExpert components have been updated to provide support for z/Enterprise EC12 mainframe server.

  - All relevant CPExpert documentation has been updated with references to applicable z/Enterprise EC12 mainframe server documents from IBM.

- **Provide additional analysis in the WLM Component.** With CPExpert Update 22.2, new rules have been added and discussion in some rules have been enhanced.

  New Rules. The following rules have been added to the WLM component:

  Rule WLM265 (*Excessive queuing for a processor, low number of servers*) reports that SMF Type 70 processor queuing data showed that there was queuing by address spaces for processor resources. Analysis of SMF data indicates that this excessive queuing for processor resources could have been caused by a relatively low number of servers (logical processors) online. This finding applies to environments **not** running HiperDispatch in the LPAR.

  Rule WLM840 (*Unused zAAP processors were defined to the LPAR*) reports that CPExpert detected that one or more zAAP logical processors were defined to an LPAR, but the logical processors were unused during all of the RMF statistics intervals being analyzed. The associated overhead incurred by the PR/SM management function results in wasted CPU time. Additionally, the process of communicating with the logical processor can cause contention in processor high-speed cache. This analysis is done only if CHKPRSM=Y; is specified in USOURCE(WLMGUIDE).

  Rule WLM841 (*Unused zIIP processors were defined to the LPAR*) reports that CPExpert detected that one or more zIIP logical processors were defined to an LPAR,

but the logical processors were unused during all of the RMF statistics intervals being analyzed. The associated overhead incurred by the PR/SM management function results in wasted CPU time. Additionally, the process of communicating with the logical processor can cause contention in processor high-speed cache. This analysis is done only if CHKPRSM=Y; is specified in USOURCE(WLMGUIDE).

Rule WLM900 (*Average Penalty Cycles Per Instruction exceeded guidance*) reports that CPExpert detected that the average processor Penalty Cycles Per Instruction for work running in the LPAR exceeded the guidance provided to CPExpert. This finding applies with **General Processors** configured on zEnterprise systems **z114, z196, or zEC12**.

Rule WLM901 (*Average Penalty Cycles Per Instruction exceeded guidance*) reports that CPExpert detected that the average processor Penalty Cycles Per Instruction for work running in the LPAR exceeded the guidance provided to CPExpert. This finding applies to **General Processors** configured on **System z10**.

Rule WLM902 (*Average Penalty Cycles Per Instruction exceeded guidance*) reports that CPExpert detected that the average processor Penalty Cycles Per Instruction for work running in the LPAR exceeded the guidance provided to CPExpert. This finding applies with **zAAP Processors** configured on zEnterprise systems **z114, z196, or zEC12**.

Rule WLM903 (*Average Penalty Cycles Per Instruction exceeded guidance*) reports that CPExpert detected that the average processor Penalty Cycles Per Instruction for work running in the LPAR exceeded the guidance provided to CPExpert. This finding applies with **zAAP Processors** configured on **System z10**.

Rule WLM904 (*Average Penalty Cycles Per Instruction exceeded guidance*) reports that CPExpert detected that the average processor Penalty Cycles Per Instruction for work running in the LPAR exceeded the guidance provided to CPExpert. This finding applies with **zIIP Processors** configured on zEnterprise systems **z114, z196, or zEC12**.

Rule WLM905 (*Average Penalty Cycles Per Instruction exceeded guidance*) reports that CPExpert detected that the average processor Penalty Cycles Per Instruction for work running in the LPAR exceeded the guidance provided to CPExpert. This finding applies with **zIIP Processors** configured on **System z10**.

Rule WLM930 (*SMF Type 30 data for intervals with high penalty cycles - GP*) reports SMF Type 30(Interval) data for measurement intervals when penalty cycles for General Processors were larger than the overall average penalty cycles for the LPAR. Work executing in the intervals when there were excessive penalty cycles experienced more than average processor degradation because of penalty cycle delays. This finding applies with **General Processors** configured on zEnterprise systems **z114, z196, or zEC12;** or configured on **System z10**.

Rule WLM931 (*SMF Type 30 data for intervals with high penalty cycles - zAAP*) reports SMF Type 30(Interval) data for measurement intervals when penalty cycles for General Processors were larger than the overall average penalty cycles for the LPAR. Work executing in the intervals when there were excessive penalty cycles experienced more

than average processor degradation because of penalty cycle delays. This finding applies with **zAAP Processors** configured on zEnterprise systems z114, z196, or zEC12 or configured on **System z10**.

Rule WLM930 (*SMF Type 30 data for intervals with high penalty cycles - zIIP*) reports SMF Type 30(Interval) data for measurement intervals when penalty cycles for General Processors were larger than the overall average penalty cycles for the LPAR. Work executing in the intervals when there were excessive penalty cycles experienced more than average processor degradation because of penalty cycle delays. This finding applies with **zIIP Processors** configured on zEnterprise systems z114, z196, or zEC12 or configured on **System z10**.

Enhanced Documentation. The following rules have been enhanced in the WLM component documentation:

Rule WLM530 (ature*Significant zAAP-eligible work executed on a CP***)** has been enhanced by adding a discussion of the implications of setting of the ZAAPAWT value in IEAOPTxx member of SYS1.PARMLIB.

Rule WLM570 (*Significant zIIP-eligible work executed on a CP***)** has been enhanced by adding a discussion of the implications of setting of the ZIIPAWT value in IEAOPTxx member of SYS1.PARMLIB.

Analysis of IBM's CPU Measurement Facility data.

With CPExpert Release 22.2, the WLM Component **optionally** does basic analysis of data produced by IBM's CPU Measurement Facility (CPU MF) and recorded in SMF Type 113 records. The current analysis is described above in the WLM900(series) rules, and the analysis is controlled by the **CHKCPUMF** analysis area variable.

At present, this analysis of CPU Measurement Facility data is done only for data in a MXG[1] performance data base. For the analysis to be done, the MXG ASUM113 and MXG ASUM70PR modules must have been executed before CPExpert executes, and the files produced by these two MXG modules must be in your performance data base. Additionally, the analysis is done only if the CPExpert **CHKCPUMF** analysis area guidance variable is set to **%LET CHKCPUMF=Y;** in USOURCE(WLMGUIDE).

SMF Type 30 (Interval) records must be in the MXG performance data base for Rule WLM930, Rule WLM931, and Rule WLM932 to be executed. Additionally, CPExpert must be told that this MXG file is present by specifying **%LET TYPE30_V = Y;** in USOURCE(GENGUIDE). If you are using the MXG SMFINTRV file rather the the MXG TYPE30_V file, you must also specify **%LET MXG30_V = PDBLIB.SMFINTRV;** in USOURCE(GENGUIDE) so CPExpert will look for the SMFINTRV file.

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[1]I've received SMF Type 113 data from a user running with a MICS performance data base, so I will be able to add this analysis to a MICS performance data base in the near future..

This initial analysis of the CPU MF data is somewhat of an experiment on my part, to "test the water" to determine the level of interest by CPExpert users. I have studied the SMF Type 113 information for more than two years, using data provided by IBM and provided by several CPExpert users. Rule WLM900 documentation has a "Conclusions" section that describes some of the conclusions I've made based on my research of the Type 113 data.

I don't believe that very many people are collecting and using the Type 113 records. Possibly this is because IBM initially suggested that the Type 113 should be collected only when asked to do so by IBM. IBM now **strongly recommends** that the Type 113 records be collected on a continuing basis, for all z/OS LPARs in the CEC. Partially this change in recommendation is because IBM realized that there is no overhead in collecting the raw measurement data (data collection is automatically done by firmware), and the SMF overhead is negligible to write the Type 113 records once every recording interval. IBM appreciates how necessary it is to capacity planning that information contained in the Type 113 records be available.

Unfortunately, it is likely that most people in the user community do not appreciate the *performance analysis value* of information in the Type 113 records. Many people do not fully appreciate that modern IBM computers can deliver a wide range of processor "speed" to applications, depending on where in the cache/memory hierarchy the instructions and data are located when needed. The Type 113 information can be used to show that from an application view, a processor can "appear" to run at one speed or can "appear" to run significantly slower than that speed. The speed of the processor itself does not actually change. It is the number of cycles required to execute an instruction that changes.

Executing a hypothetical instruction might require only one processor cycle, or executing the same hypothetical instruction could take tens or hundreds of processor cycles, depending on where the instructions and data are located within the cache/memory hierarchy. While this hypothetical instruction is used to illustrate the situation, Type 113 data shows that there is indeed a wide range of instruction execution times delivered to user applications.

With the addition of the CHKCPUMF analysis area, the following guidance variables in USOURCE(WLMGUIDE) now control which system areas that the WLM Component will analyze in any specific execution of the WLM Component:

VARIABLE	DESCRIPTION
CHKCPUMF	Analyze IBM's CPU Measurement Facility data contained in Type 113?
CHKCPUQ	Analyze queuing for processor resources?
CHKENQ	Analyze resource contention problems?
CHKGOAL	Analyze service class periods to determine reasons goals were missed?
CHKINIT	Analyze problems with WLM-managed initiators?
CHKIOP	Analyze problems with IOP/SAP imbalance?

CHKLOGER	Analyze problems with System Logger?
CHKPAGE	Analyze problems with paging subsystem?
CHKPLCY	Analyze problems with WLM service policy definition?
CHKRPT	Analyze report class periods to determine reasons goals were missed?
CHKPRSM	Analyze problems with LPAR definitions and other PR/SM issues?
CHKSMF	Analyze problems with System Management Facilities (SMF)
CHKSYS	Analyze problems with SYSTEM/SYSSTC excessive CPU use?
CHKXCF	Analyze problems with coupling facility and XCF?
CHKZAAP	Analyze problems with System z Application Assist Processors (zAAP)?
CHZIIP	Analyze problems with System z *Integrated Information Processor* (zIIP)?

- **Updates to the DB2 Component**. The following rule has been added to the DB2 Component:

  Rule DB2-530 (*Excessive log Control Intervals were written)* reports that the log data rate of bytes per second written exceeded IBM's guidance.

- **Updates to the DASD Component**. Changes to the DASD Component with CPExpert Release 22.2 were to correct minor errors reported by users.

- **Updates to the WebSphere MQ Component**. Changes to the WebSphere MQ Component with CPExpert Release 22.2 were to correct minor errors reported by users.

- **Updated documentation.** This release provides all updated documentation to reflect new or revised rules. The CPExpert documentation is accessible via Adobe Acrobat Reader.   A free version of Adobe Acrobat Reader is available at *http://www.adobe.com/products/acrobat/readstep2.html*.

- **Add a log of changes to code**. A log of changes to the CPExpert code for Release 22.2 has been included, and additions or changes to USOURCE members are included in the changes log. This log is titled CHANGES and shows each module changed (except when the change is minor). Interested users can review the CHANGES log to see what code changes have been made, and can easily identify new guidance variables. CPExpert follows the MXG model for releases (that is, the CHANGES log shows changes in the new release, while the CHANGESS log is an accumulation of changes).

FTP download

CPExpert Release 22.2 (both code and documentation) is available via ftp download from the CPExpert ftp server. If you prefer this method of obtaining the update, please send an email to Don_Deese@cpexpert.com to obtain instructions for ftp download, obtain your user id, and obtain your password. **If you have requested ftp download in past, the ftp download instructions will automatically be sent to you.**

Installation

I suggest that you use the following steps to install Release 22.2:

- Create a new PDS titled "prefix.CPEXPERT.V222.SOURCE".

- Create a new PDS titled "prefix.CPEXPERT.V222.USOURCE".

- Install CPExpert into the "prefix.CPEXPERT.V222.SOURCE" using the normal installation procedures described in the *CPExpert Installation Guide*.

- Install CPExpert into the "prefix.CPEXPERT.V222.USOURCE" using the normal installation procedures described in the *CPExpert Installation Guide*. This step will cause the email macros to be loaded into USOURCE.

- Copy your **old** USOURCE members into "prefix.CPEXPERT.V222.USOURCE". This step should be done so you do not have to recreate all of your unique parameters[2].

- If you elected to receive updates to CPExpert on CD, the software is distributed on the CD that contains the CPExpert user documentation.

  - **Installing CPExpert from CD to MVS**. Copy the *source.222.ebc* file from cd:\software\ as binary, to CPEXPERT.TAPE.RELV222, allocated as DSORG=PS,RECFM=FB,LRECL=80,BLKSIZE=0,AVGREC=K,SPACE(80,(150,50)), DSN=CPEXPERT.RELV222.IEBUPDTE. The *source.222.ebc* file is in standard IEBUPDTE format.

    Use the JCL described in Exhibit 2-1 of the *CPExpert Installation Guide* to install the CPExpert software. Copy your old USOURCE members as described above.

  - **Installing CPExpert from CD to PC**: Copy the cd:\software\source\ on the CD to prefix\cpexpert\rel222\source. Copy the cd:\software\usource\ on the CD to prefix.cpexpert\rel222\usource using the normal installation procedures as described

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[2]The exception to this statement is if you chose to use the "yesterday" option in selecting data. The "yesterday" calculation is done by a PREVIOUS macro contained in USOURCE(GENGUIDE). The PREVIOUS macro is placed in USOURCE so you can select "yesterday" as the immediate previous day, or can define "yesterday" as any other previous day you chose. Placing the PREVIOUS macro in USOURCE(GENGUIDE) allows you to make such a modification, without altering a SOURCE member. Consequently, if you copy your old USOURCE(GENGUIDE) member to CPEXPERT.V212.USOURCE, you may wish to append the PREVIOUS macro from your old USOURCE(GENGUIDE) into your new USOURCE(GENGUIDE).

in the *CPExpert Installation Guide*. This step will cause the email macros to be loaded into usource. Copy your old usource members as described above. Make sure that you update your usource(genguide) member to specify **%LET SOURCE =user_directory;** statement to point to the new SOURCE directory.

- **Downloading via ftp**: If you elected to download updates from my ftp server, you can copy the *source.222.ebc* file to CPEXPERT.TAPE.RELV222, allocated as DSORG=PS,RECFM=FB,LRECL=80,BLKSIZE=0,AVGREC=K,SPACE(80,(150,50)), DSN=CPEXPERT.RELV212.IEBUPDTE. The *source.222.ebc* file is in standard IEBUPDTE format.

  The updated CPExpert user documentation also will be available on the ftp site. It is your option whether you wish to download only the manuals, or also download the individual rule documents. If you wish to download the individual rule documents, they will be available as pdf files in the *Individual_Rule_Documentation.zip* on the ftp site.

- If you have implemented the CPExpert option to produce output to the SAS Output Delivery System (ODS) and if you have exercised the LINKPDF option so you can "click" on a rule in the html output to see the documentation, **please remember to load the new individual rule documentation onto your system**.

- If you chose to implement the xxxHTML option (e.g., WLMHTML) to provide your own SAS ODS HTML statement parameters, please place your own macros into USOURCE and concatenate the USOURCE pds ahead of the SOURCE pds.

- If you chose to implement the CPExpert email option, please update the xxxEMAIL modules in USOURCE to reflect your unique email requirements.

Thanks

I would like to say "**Thank you**" to the following individuals. These folks have proposed new features, graciously sent me test data, suggested documentation changes since the last Update Bulletin, or discovered errors :

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   Bruce Widlund (Merrill Consultants, TX)

Please send me an email if you have suggestions, you want new features, or you would like to see more or different reporting done by CPExpert.

Best regards,

Don Deese

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