

zIIP and zAAP Software Update

Overview

The System z9 and z10 Integrated Information Processor (zIIP) is the latest specialty engine for the IBM System z mainframe. The zIIP is designed to help improve resource optimization and lower the cost of portions of eligible workloads, enhancing the role of the System z9 and z10 mainframe as the data hub of the enterprise. The System z9 and z10 Integrated Information Processor (zIIP) will join the ranks of the eServer® zSeries® Application Assist Processor (zAAP), and Integrated Facility for Linux® (IFL). All specialty engines run full speed.

zIIPs are very similar in concept to System zApplication Assist Processors (zAAPs). Like the zAAPs, but unlike standard central processors (CPs), ICFs, and IFLs, the zIIP can do nothing on its own. They cannot execute an Initial Program Load and can only assist the general purpose CP for the execution of eligible work. IBM does not impose software charges on zIIP capacity.

The amount of general-purpose processor savings will vary based on the amount of workload executed by the zIIP, among other factors.

Exploiters for zAAP and zIIPs

These are the enabled technologies:

- Java - IBM z/OS JAVA technology based applications (zAAP)
- Centralized data serving - portions of BI, ERP and CRM remote connectivity to DB2 V8 or DB2 V9 and long running parallel queries and select utilities (zIIP)
- Network encryption - IPSEC network encryption/decryption- (zIIP)
- XML parsing - z/OS XML System Services (zIIP or zAAP)
- z/OS Global Mirror function (zIIP)
- Hipersockets - multiple Write operation for outbound large messages (zIIP)
- Business Intelligence - IBM Scaleable Architecture for Financial Reporting™ (zIIP)
- z/OS CIM Server (Common Information Model) - intra-server communications (zIIP)
- DB2 Sort utility

DB2 V8 and higher releases exploit the zIIP specialty engine. Today, there are three types of DB2 for z/OS workloads which may benefit from the use of a zIIP. These are:

- ERP or CRM application serving - For applications, running on z/OS, UNIX, Intel, or Linux on System z accessing DB2 for z/OS V8 or V9 on a System z9 or z10, via DRDA over a TCP/IP connection, DB2 gives z/OS the necessary information to have portions of these SQL requests directed to the zIIP.

- Data Warehousing applications - Requests utilizing DB2 for z/OS V8 or V9 for long running parallel queries, including complex star schema parallel queries, may have portions of these SQL requests directed to the zIIP when DB2 gives z/OS the necessary information. These queries are typical in data warehousing implementations. The addition of select long running parallel queries as eligible for zIIP redirection may provide more opportunity for DB2 on z/OS customers to optimize their environment for Data Warehousing applications while leveraging the unique qualities of service provided by System z9 or z10 and DB2.
- Some DB2 for z/OS V8 and V9 utilities - A portion of DB2 utility functions used to maintain index maintenance structures (LOAD, REORG, and REBUILD INDEX) typically run during batch, may be redirected to the zIIP.

Note: The zIIP is designed so a program can work with z/OS to have a portion of its enclave Service Request Block (SRB) work directed to the zIIP. The above types of DB2 work are those executing in enclave SRBs, of which portions can be sent to the zIIP. Stored procedures and user-defined functions do not use enclave SRBs and therefore are not eligible for zIIP redirection. Note: DB2 V9 introduced a stored procedure language which is eligible for redirection to the zIIP.

PROJECTCPU

The introduction of the PROJECTCPU parameter in PARMLIB member IEAOPTxx is applicable to both zAAP and zIIP engines. The ability to use the PROJECTCPU parameter requires the zIIP web download for z/OS or z/OS.e at V1R6/R7 or z/OS 1.8 or higher releases to be installed. Additionally, DB2 V8 or higher releases is required for zIIP projections and usage. Components of z/OS have been enhanced to report both projected zIIP and zAAP usage and actual zIIP and zAAP usage. See the *z/OS Initialization and Tuning Reference* for current information on PROJECTCPU.

Note: PROJECTCPU specifies whether to activate or deactivate the projection of how work could be redirected from general purpose CPs to special assist processors like zAAPs and zIIPs. When a special assist processor is defined to a system, whether the processor is online or varied offline, the system will collect projection values regardless of the PROJECTCPU setting. Any work eligible for redirection to a special assist processor will be reported as Special_Processor_on_CP work (AAPCP or IIPCP fields in RMF). This information can be used to understand the benefit of adding a special processor to the configuration. The default value is set to NO, meaning projection will not be done unless a special assist processor is configured to the system. In this case, the system will collect projection values.

zIIP: The projected usage function is intended to gather information about how much CPU time is spent executing code which could potentially execute on zIIPs. This information can be gathered from production workloads or from representative workloads to understand the potential for zIIP execution with current applications. For customers with installed zIIPs, the reporting functions can provide current zIIP execution information which can be used to optimize current configurations or to help predict potential future usage. The usage and projected usage monitoring functions are only available on z/OS V1.6, z/OS.e 1.6 or higher with the appropriate service APARs installed.

It is possible to estimate the potential amount of DRDA work which can be redirected to a zIIP prior to installing the required hardware and software. IBM has developed tools which can process RMF and DB2 data to provide this information. In order to do this analysis, please have your IBM account team make a request to IBM Techline for a zIIP estimation analysis. IBM Techline will provide a data collection guide as well as an optional DB2 data reduction tool. The data collection guide asks several questions to allow IBM to do the proper evaluation. Return the completed data collection guide and FTP the required RMF data and optional DB2 data created by the DB2 data reduction program to IBM. The data will be analyzed and a report sent to your IBM account team.

Once the proper level of software is installed on the customer server, RMF and DB2PM will provide additional information which will show the potential for redirecting work to a zIIP. By using the new PROJECTCPU parameter in SYS1.PARMLIB member IEAOPTxx, this analysis can be done prior to installation of the actual zIIP hardware.

You must have all zIIP FMIDS and PTFs installed for z/OS and DB2 V8 or higher for PROJECTCPU to actually project zIIP requirements.

zAAP: The JAVA5 JVM implementation on z/OS (i.e., J9 JVM) will no longer support the Xifa:projectn where n is the number of minutes in the interval used to estimate zAAP usage.

As the JAVA5 JVM requires z/OS 1.6 or higher, there are two options for obtaining zAAP usage estimation, both of which involve using the RMF Monitor I Workload Activity Report.

The FMID which enables System z Integrated Information Processors (zIIPS) also brings new functionality which allows you to estimate zAAP usage without setting any additional JAVA properties parameters. This functionality is provided by FMID JBB77S9 (z/OS 1.6) and JBB772S (z/OS 1.7). See Software Requirements within this document for details on these FMIDs.

The zAAP and zIIP estimation information can be obtained through the RMF Workload Activity Report by setting the following option in the IEAOPTxx member:

PROJECTCPU=YES

Note: The IFACROSSOVER parameter in IEAOPTxx is ignored when z/OS 1.8 or higher, or the zIIP FMID from the zIIP web download is installed.

Software Requirements

The zIIPs execution environment will accept eligible work from z/OS (minimum level is z/OS and z/OS.e V1.6), which will manage and direct the work between the general purpose processor and the zIIP. DB2 for z/OS V8 and higher will exploit the zIIP capability for portions of eligible workloads.

If you are running z/OS (or z/OS.e) V1.6 or V1.7 and want to use a zIIP, then you must download and install the [IBM System z9 Integrated Information Processor Support for z/OS and z/OS.e V1R6/R7](#) Web deliverable, which is FMID JBB77S9 for 1.6 and JBB772S for 1.7, as well as the service identified in the program directory. IBM DB2 UDB for z/OS V8 or V9 with PTFs, is also required for exploitation. Note for z/OS and z/OS.e V1.8 and higher the web deliverable is integrated in to base z/OS. (zIIP PTFs will be included in the BCP subset for z/OS V1R8 or higher). URL for zIIP web download is <http://www-03.ibm.com/servers/eserver/zseries/zos/downloads/#ziip>

Note: There are several PTFs required for this support and some are HIPER and have been identified as Red Alerts. All documented PTFs **MUST** be installed when there is a zIIP engine present or if the zIIP web download is installed. PTF service is documented in the z9 and z10 PSP and z/OS PSP buckets. It is highly recommended you use SMP/E 3.5 and the FIXCAT category in HOLDDATA or the Enhanced PSP Tool to identify all zIIP service. See Washington Systems Center FLASH10477 for description and usage. Enhanced PSP Tool URL is <http://www14.software.ibm.com/webapp/set2/psp/srchBroker>

There are updates to Omeгамon products for zIIP support. Refer to the zIIP PSP bucket for APAR information.

1. OMEGAMON XE on z/OS
2. OMEGAMON II for MVS v550 *
3. OMEGAMON Base v550 (component of the above products)
4. OMEGAMON XE for DB2 Performance Expert on z/OS v310
5. OMEGAMON XE for DB2 Performance Monitor on z/OS v310

- OMEGAMON II for MVS is a component product of OMEGAMON XE on z/OS, but also a product in its own right. It also contains within it the product called OMEGAMON for MVS (which customers often refer to as "OMEGAMON Classic").

There are several DB2 V8 PTFs for zIIP support. See Informational APAR II14219 for a complete DB2 V8 list.

Other Considerations

You must contact your vendors regarding zIIP support. The FMID for the web downloads changes the z/OS release to 1.7.1 for z/OS 1.7 and z/OS 1.6.1 for z/OS 1.6. Check with your ISVs to ensure this will not be a problem.

See "Red Alert" PTFs in the BCPZIIP subset for z/OS.

A Systems Assurance is required for all zIIP specialty engines being installed. Contact your IBM representative or Business Partner for details.

Other Documentation

Document Number	Document Title
PRS2123	WSC experiences with the zIIP Processor

PRS1905	The IBM z9 Integrated Information Processor (zIIP) and Its Effect on Siebel Application Architecture
TD103468	z/OS 1.8 Installation Checklist
WP100836	IBM System z9™ zIIP Measurements: SAP® OLTP, BI Batch, SAP BW Query, and DB2 Utility Workloads
FQ115394	Can the IBM System z9 Integrated Information Processors (zIIP) be used with SAP?
TD103460	zAAP Estimation with Java5 and WebSphere for z/OS V6.1
FLASH10477	z/OS Positioning Software for z9 EC and z9 BC Servers
TD104518	z/OS Positioning Software for the z10 EC and z10 BC Servers

Summary

1. No zIIP engine on z9 or z10 - then the required software and PTFs do not need to be installed.
2. zIIP engines defined; then you **must** have the required z/OS level installed to exploit the zIIP(s) in an LPAR:
 - z/OS 1.6 or z/OS.e 1.6 plus web download and all zIIP PTFs
 - z/OS 1.7 or z/OS.e 1.7 plus web download and all zIIP PTFs
 - z/OS 1.8 or higher, plus all zIIP PTFs
3. No zIIP engine on z9 or z10, but want to use PROJECTCPU for estimation; then you **must** have the required z/OS level **and** DB2 V8 or higher installed:
 - z/OS 1.6 or z/OS.e 1.6 plus web download and all zIIP PTFs (z/OS and DB2 V8)
 - z/OS 1.7 or z/OS.e 1.7 plus web download and all zIIP PTFs (z/OS and DB2 V8)
 - z/OS 1.8 or higher, plus all zIIP PTFs (z/OS and DB2 V8 or higher)
4. Installed zIIP web download with no zIIP engine; then you must have all the required zIIP PTF service installed (z/OS and DB2 V8 or higher)
5. Use SMP/E 3.5 and FIXCAT HOLDDATA or the functional PSP to acquire all zIIP PTF service. See Washington Systems Center FLASH10477 for description and usage. Enhanced PSP Tool URL is
<http://www14.software.ibm.com/webapp/set2/psp/srchBroker>
6. No zAAP engine on a z990, z890, z9 or z10 and want to use the PROJECTCPU for estimation without the need to update the JVM properties then you must have the zIIP FMID from the zIIP web download installed or z/OS release with the code imbedded.