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MANAGE MIPS TO CONTROL MAINFRAME COSTS

By Marla Axelrod, Product Marketing Manager

Business demand is fueling application growth and increases in computing capacity at record rates. At the same time, IT organizations are trying to manage this increased complexity while maintaining or even reducing expenditures. In many cases, it simply isn't working because as the business grows, effective utilization of IT resources is not always maximized. The simple view is, if the business and its related applications and transactions are growing 20 percent annually, then computing capacity must also grow by 20 percent. However, MIPS (Millions of Instructions Per Second) don't come cheap… especially in the mainframe world!

IBM® has made architectural changes to its System Z platform through the introduction of cost effective specialty processors for executing specific types of workloads thereby reducing the amount of general processor MIPS required to run existing applications. However, in many cases even these cheaper processors are not being utilized to their maximum potential.

IT needs a way to enable business growth to out-pace MIPS growth by maximizing utilization of existing resources. To accomplish this, IT needs the tools to understand how existing MIPS capacity is being used and where adjustments are needed to enable application and transaction growth without having to purchase more MIPS.

MAXIMIZE USE OF EXPENSIVE CPU MIPS

How can you achieve this? Look for tools and solutions that will help your IT organization maximize the use of their mainframe MIPS. A good z/OS-based performance and capacity management offering provides many capabilities that support strategies for reducing or controlling MIPS consumption in a mainframe environment, including these key features:

- Determining where high MIPS consumption is currently occurring, when it is occurring, and what is causing it. This is the first step in any plan to reduce or contain MIPS growth. You must know what workloads are causing high CPU consumption, the time periods when it is happening, and what processors are being pushed to the limit.
- Forecasting future MIPS consumption by workload. Forecast MIPS utilization based upon projected growth for applications to understand if you have enough existing capacity to address the growth without simply going out and purchasing more processing power. This forecasting capability is designed to accommodate varying workload growth levels over time as well as changing business requirements.
- Deciding what are the applicability and potential benefits of using less expensive specialty processors such as zIIPs to process the same work and reduce MIPS consumption. The effective use of specialty processors ensures that more expensive MIPS are reserved for only those workloads that must run on general processors. Understanding what workloads can be moved to cheaper and faster specialty processors is critical for reducing MIPS capacity on more expensive general purpose central processors. Many IT organizations are not reaping the benefits provided by using specialty processors to contain MIPS growth. At the same time, overloaded specialty processors can result in workloads that would normally run on a specialty processor being moved back to general purpose processors thereby consuming more expensive MIPS.

- Determining the optimum settings for various logical partition (or LPAR) environments (to enable effective competition/sharing of CPU resources. All IBM mainframes run LPARs in a logically partitioned environment with PR/SM managing the distribution of the CPU resources (MIPS) among LPARs. There are many configuration settings for LPARs running in this environment that influence how effectively this distribution of the CPU resource takes place. LPAR Modeling can be used to assess the effectiveness of the user-specified system settings for LPARS and determine the effect of potential changes to those settings to provide the maximum use of CPU resources.
- Forecasting placement of LPARs on different mainframes to maximize resource utilization and control MIPS growth. Managing MIPS consumption may sometimes involve moving the workloads in one or more LPARs to another CPU in the installation. Using a solution that has a CPU Modeling facility you can get a 24-hour picture of current MIPS consumption for all LPARs in the installation. It also allows you to model the movement of LPARs to other existing or newly proposed CPUs and then graphically charts MIPS consumption levels for all CPUs involved in the analysis. Analysis should be of MIPS utilization on both general and specialty processors such as zIIP. At peak periods LPAR03 on CPU24 uses about 8000 Total MIPS, with nearly 7000 MIPS on General Processors and only about 1000 MIPS on zIIPs. zIIP eligible work MIPS that are running on General Processors are identified as targets for movement to zIIPs.
- Analyzing the effectiveness of using defined capacity for z/OS LPARs to control MIPS consumption and the possible adverse effects of soft capping. “Defined capacity” allows an IBM z/OS mainframe user to limit the MIPS consumption of particular LPARs. When an LPAR exceeds its defined capacity in a sustained manner it is “capped,” reducing its access to CPU resources. Comprehensive monitoring and reporting of defined capacity and LPAR capping enables you to set appropriate LPAR caps to ensure effective use of CPU resources without impacting performance via over or under capping of LPARs.
- Analyzing actual delays in accessing CPU resources that may manifest themselves as high MIPS consumption. Delays inside of PR/SM for access to physical hardware central processor resources by an LPAR can be mistaken for high CPU MIPS consumption. LPAR Modeling identifies how much delay for access to central processor resources exists inside of z/OS versus how much delay exists inside of PR/SM for these resources. If you mistakenly identify delay for resources versus actual high CPU MIPS consumption, you may incorrectly decide to increase MIPS capacity when in reality all you need to do is optimize configuration options and tuning. LPAR modeling enables you to avoid this pitfall. LPAR Modeling is being used to show the effect of moving LPAR17 from CPU24 to CPU21 to enable more balanced utilization of physical processors and allow for growth.

CONTROL AND CONTAIN MIPS GROWTH

A good MIPS utilization and growth planning exercise must include the following.

- Determining where high MIPS consumption is currently occurring, when it is occurring, and what is causing it.
- Forecasting future MIPS consumption by workload and application.
- Effective use of zIIP specialty processors for eligible work to reduce MIPS consumption on more expensive, general purpose processors.
- Effective use of LPAR placement.
- Effectively capping of LPAR demand.
- Determining the optimum settings for various LPARs in logical partitioned environments to enable effective competition/sharing of CPU resources.
- Analyzing actual delays in accessing CPU resources that may manifest themselves as high MIPS consumption.

Taking these steps will ensure that IT organizations maximize their CPU resources and only upgrade capacity when it is truly needed.

You will need an advanced and robust performance and application management solution to identify and address inefficiencies in today's massively-scaled z/OS-based systems.

KEY BENEFITS YOU SHOULD LOOK FOR IN YOUR PERFORMANCE MANAGEMENT SOLUTION INCLUDE THE FOLLOWING:

- Reducing CPU consumption and recovering wasted processing time.
- Uncovering system, database, I/O and application performance inefficiencies.
- Pinpointing application execution delays and execution metrics.
- Delivering in-depth performance profiles at transaction level.
- Providing in-depth analysis of Websphere-based applications running on z/OS.
- Improving application throughput and planning for growth to avoid costly upgrade charges.

Your solution should contain dynamic solutions for monitoring every area of IBM's z/OS operating system and its sub-systems including: CICS, DB2, IMS, and MQ across every LPAR in the enterprise. It should also provide real-time performance information on important software and hardware resources and long-term online data for after the fact analysis of resource usage trends, service levels, I/O contention, job delays, exceptions, and more.

Robust application performance management tools designed for performance engineers, technical analysts, and applications development teams help to isolate the sources of excessive processing faster and easier than traditional application performance analysis products, improving application response and lowering CPU consumption.

Automated Analysis, Reporting, Modeling and Capacity Planning are the tools needed to ensure your IT organization maximizes use of CPU resources effectively to prevent them from consuming MIPS unnecessarily, and prevent unnecessary CPU and MIPS capacity upgrades until they are truly required.

Collecting both physical and virtual performance and capacity data across your enterprise and analyzing it automatically will make it easier to know where your problems are, where you can improve performance, and how to assess what needs to be done to improve your overall IT utilization. You need to take the guesswork out of planning and decision-making, allowing your company to set realistic expectations, communicate accurate and actionable information, and align business objectives with IT performance.

ABOUT THE AUTHOR

Marla Axelrod is a product marketing manager for Performance Management, Applications Management and Operations Management Mainframe Solutions at ASG Technologies. As a seasoned product professional with more than 25 years of mainframe experience, Marla has witnessed the growth and evolution of systems software and tools across US and International markets.

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