

POSITIONING FOR MVS/ESA SP 5

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ABSTRACT

IBM's latest hardware facilities (Parallel Transaction Servers and the Coupling Facility) and software (MVS/SP 5 with its new WLM - Workload Manager) are exciting and promise to offer relief in the cost of mainframe applications and ease of managing the resources. To gain immediate and valuable use of the new facilities, however, you should start your migration plan early -- as in NOW!

The speaker, who's been tuning systems since 1965, is looking forward to the changes and provides some hints, tips, recommendations, and just plain common sense in preparing for these new facilities. She'll look at what to do about service level objectives now, a year or more before moving to the new Workload Manager. (It will take more than a simple conversion of a few IPS parameters!) You can't prepare too early for the latest release of MVS, so here's your chance to start.

Before you can decide if and when you're going to move to SP 5, you should consider the benefits and costs, both tangible and intangible. The first sections of this article describe these pros and cons. I've recently been asked whether I'd recommend moving to SP 4.3 or directly to SP 5.1, and one section provides my answer to that. The majority of sections, however, deal with how to prepare for SP 5, even if you're still at XA. There are many things you can do to position yourself for SP 5 that will also provide real benefits today. With proper positioning, the migration to SP 5 will be extremely easy, as well as beneficial. These comments apply both to SP 5.1, which is available today, as well as SP 5.2, which will be available in the first quarter of 1995.

ADVANTAGES OF MVS/ESA SP 5

If you're running any release of MVS today, you know that at some point in the future you'll probably move to SP 5 (or 6 or 7), since that will eventually be the only version supported. (Elimination of support for MVS/XA, for instance, was scheduled for 9/30/94, but is being extended to 9/30/95 to "facilitate customer migrations to newer versions of MVS"). If you want to know what's in it for you *today*, here are the major benefits of SP 5. (This article was originally written describing the considerations for moving to SP 5.1. On September 13, 1994, MVS/ESA SP 5.2 was announced, with availability in the first quarter of 1995. All of the comments in the article apply to both SP 5.1 and 5.2, unless specifically indicated. You may still see references to 5.1, since that's the release currently available and in use.)

EXTENSION OF SYSPLEX SUPPORT "Sysplex" or "SYStem ComPLEX" is the term applied to the facility that provides a standard interface for subsystems that need to communicate with multiple systems (MVS images). Sysplex was introduced in SP 4.1, and was initially implemented in GRS, JES, VTAM, CICS, PR/SM recovery, and several other MVS facilities. The enhanced sysplex support available in SP 5 provides the basis for high speed data sharing among multiple systems within the sysplex. This is done via the new coupling technology introduced in SP 5.1 and further enhanced in SP 5.2. MVS is also enhanced to exploit this coupling facility in areas other than data sharing. This sysplex exploitation is provided to simplify the maintenance and management of both single and multiple MVS images. For example, SP 5 provides the ability to specify a single set of parameters for managing the workloads (using the Workload Manager as described later) and provides a method to define a course of action in the case of sysplex failures (through a sysplex failure management (SFM) policy). The ability to automatically recover from an outage that occurs within a single system sysplex may be all the justification you need to move to SP 5.

SUPPORT FOR PARALLEL SYSPLEX IBM's announcements of their new S/390 CMOS parallel processors, the 9672-P and 9672-E Parallel Transaction Servers (PTS) and the 9672-R Parallel Enterprise Servers (PES), are among their most significant announcements to date. (CMOS, by the way, stands for Complementary Metal Oxide Semiconductor - doesn't that tell you a lot?) These less expensive air-cooled processors will allow installations to save the millions of dollars invested in MVS applications and avoid having to rewrite them to fit on UNIX or similar machines. Most of the companies that have been looking at downsizing are now evaluating the new CMOS processors as an alternative to downsizing. These new processors are only one step towards some significant improvements in price per MIPS that we'll soon see. IBM predicts that the speed of the CMOS processors will double in a very short while, and it won't be long until they match the speeds of the current large mainframe CPUs (while still available at lower cost). The

announcement on September 13 of the PES machines indicated that the current range of machines is equivalent to (and ready to replace) the S/370 and S/390 machines from 4381, 308x, and 3090/180 up to a 3090/300S. A doubling of the speed of a CMOS processor would result in a machine that's the equivalent of a 3090/520 based machine.

One of the keys to using these new machines is the "Coupling Facility", which is the hardware and software that's used to allow quick communication between the CMOS processors and each other or multiple non-CMOS systems (511- or 711-based machines). The new coupling facility also provides high speed data sharing, so that (eventually!) anyone, anywhere, can read or write a record within the enterprise (without contention delays). Parallel sysplex is the name given to the combination of facilities provided by the coupling facility, the hardware, and MVS/SP 5 that allows this easy and fast communication between multiple machines. This high speed data sharing is currently announced and available for IMS/DB and will soon be available for both DB2 and VSAM.

The coupling facility and parallel sysplex require the functions provided by MVS/ESA SP 5. This is another major reason that installations will move to SP 5. It's a step on the way to lowering costs in the data center - and that's what counts!

WORKLOAD MANAGER (WLM) SP 5 provides an enhancement to the System Resources Manager (SRM) called the Workload Manager (WLM). This new feature is one of the main reasons to move to SP 5, regardless of your plans for parallel sysplex. The WLM has three primary objectives.

The first objective of WLM is to simplify the management of the system resources, such as CPU and storage. Prior to the WLM, installations would try to allocate resources to address spaces by using parameters such as dispatch priority, storage isolation, expanded storage criteria ages, domain contention parameters, logical swap parameters, and many others. The WLM, instead, allows an installation to simply specify desired response time objectives and relative importance for the work, and then let the system work towards achieving those response time objectives by allocation of resources to the work in the system. This simplification of the parameters is a boon to already over-worked sysprogs.

A second objective of WLM is to provide a single, complex-wide, consistent set of parameters for managing multiple workloads across multiple systems in a sysplex environment. If you plan to implement either a sysplex or a parallel sysplex, WLM can provide a simple means of defining your response time goals. Even with a single CEC today, such as an single ES/9000, you may be running four or five LPARs, each with their own ICS, IPS, and OPT parmliib members. With WLM and sysplex, you could manage those LPARs with a single set of specifications.

A third, but related, objective of WLM is to provide support for other subsystems. Subsystems that take advantage of MVS workload manager services allow MVS to manage the subsystem regions according to the goals of the transactions they service. Thus, the performance administrator will be able to specify response time goals for their "CICS inventory" transactions and MVS will manage the CICS regions that process these "inventory" transactions according to the goals of these transactions. In addition, there is a product for CICS called CICSplex System Manager (also referred to as CP/SM) that will dynamically route transactions to multiple CICS regions in an attempt to meet response goals. These CICS regions might even reside in different CECs in a sysplex environment. CICS 4.1 and IMS 5.1 provide support for WLM.

Thus, WLM provides:

- 1) simplified externals
- 2) system resources managed according to customer goals for the work
- 3) management of subsystem address spaces according to the goals of the transactions (for subsystems that support WLM)
- 4) single system-wide specification of installation parameters
- 5) support to manage workloads across multiple CECs in a parallel sysplex

As you can see, WLM alone is reason enough to move to SP 5.

OPENEDITION MVS (RUN UNIX UNDER MVS!) As more and more companies investigate developing client/server applications and using existing UNIX applications, OpenEdition MVS (OMVS) is a facility that will become increasingly popular. OMVS is part of the base component of MVS in SP 5 that supports POSIX-compliant applications. (POSIX is a standard defined by the Open Software Foundation (OSF) for open systems applications, and is based on C-programs and UNIX techniques.) Since many, although not all, UNIX applications are POSIX-compliant, this base MVS support allows you to run these relatively inexpensive applications on your mainframe. The IBM announcement letter #294-152 indicates that some of the software products available with OpenEdition MVS in 1994 include TUXEDO (Information Management Co.), MOSAIC (The Mosaic Group), SAS, SAS/C, Omegamon (Candle), CaseWare CM (CaseWare, Inc.), ADABAS (Software AG), and CA-ACF@ (Computer Associates).

I've talked to five different installations in the past month that are moving to 5.1 simply because their users had found some client/server applications that they wanted installed as soon as possible. In all cases, it made more sense to upgrade the MVS software and run the applications on the current mainframe than purchase, install, test, and put into production a separate hardware solution for the applications. Realize that some of the vendor products have not completed their move to a true POSIX-compliant status. Check with your prospective vendors to determine their current status and plans. I don't know of any major UNIX software vendor that isn't working on POSIX-compliance.

Another reason that you might find a good use for OMVS is the availability of programmers that are UNIX-trained in school. As one manager puts it, "teach them TSO for a couple of days, and they'll be able to develop applications in the OMVS environment".

OMVS supports the UNIX Hierarchical File System (HFS), which is implemented using a PDSE data set. Since PDSE requires SMS, at least an initial implementation of SMS is required for OMVS applications. OpenEdition MVS appears to be one of the fastest growing new application platforms on MVS.

SUPPORT FOR 4-DIGIT DEVICE NUMBERS There are several installations that feel restricted by the current 3-digit device support. SP 5.1 now provides for 4-digit support. The initial implementation only allows between 1500 and 2000 more devices without incurring a virtual storage constraint below the line. That limitation is removed in SP 5.2 because the control blocks are moved above the 16MB line.

There are some JCL changes necessary as soon as you start to use the 4-digit designation. The basic support for 4-digit device numbers is documented in the Conversion Notebook, but essentially consists of placing a "P" in front on any 4-digit number. As an example, consider the DD parameter, UNIT=. Currently, you can specify UNIT=SYSDA or UNIT=3390 to specify a generic device allocation. Reference to a specific device by device number, such as 590, would be included as: UNIT=590. With 4-digit device support, you could actually define a device with a number of 3390. The use of a "P" allows the interpreter to determine whether you're specifying a generic or a specific device. Thus, UNIT=3390 refers to the generic name assigned to many 3390 devices, while UNIT=/3390 refers to the single device numbered 3390.

CICS SUBSPACES In SP 4.2.2, support was provided to allow CICS system code to be protected from transactions through a feature called Subsystem Storage Protection. Some sites estimate a lack of protection to be the cause of 75% of unplanned CICS outages.

In SP 5, this support has been extended to isolate transactions from one another. This new support is called CICS Subspaces Support, and confirms that a transaction has write access to storage before allowing an update to occur. This SP 5 facility is used by CICS/ESA V4.1 with the Extended Availability feature, and is hardware assisted on the following processors: ES/9000 211-based processor, ES/9000 511-based processor with SEC C35945 or higher, ES/9000 711-based processor with SEC 228250 (plus patch ZFIL2069) or SEC228270 (or higher), and the S/390 9672 Parallel Servers (PTS & PES).

This feature will cause some overhead. In some benchmarks, the ITR (Internal Throughput Rate) decreased 3% to 6% when transaction isolation was turned on, and the CICS region needed an additional 9K

plus 10.1K for each Subspace created. For most installations, however, this is a small price to pay to ensure CICS stability and availability.

SHARED MASTER CATALOG Here's one of the most sought-after improvements: a shared master catalog! Before SP 5, you couldn't share a master catalog because of the need to use the same name (e.g. SYS1.LOGREC) on each image. SP 5 allows you to specify a symbolic, &SYSNAME, to allow creation of unique names for each system. This allows you to define data sets for LOGREC, page and swap data sets, dump data sets, VIODSN, DUPLEX, NONVIO, SMF data sets, and SVCDUMP data sets for each system. As additional support, SMF data sets can have any valid 44-character name, and dump data sets can be dynamically named and allocated as needed.

Use of a single, shared master catalog will definitely simplify systems management in a multi-image installation. The ability to have a shared master catalog also allows an installation to consider the use of a shared SYSRES.

Continuing this single management support, SP 5.2 provides a new MVS System Logger, which provides an integrated logging facility for SYSLOG and LOGREC. Future subsystems are expected to exploit the system logger by using it for transaction recovery, database media failure recovery, and multisystem online log merge capabilities.

MORE GOODIES There are some other neat enhancements of 5.1 that make the effort of a 5.1 migration worthwhile. Bob Rogers of IBM gave a great presentation at SHARE in August, called "MVS/ESA SP 5.1 - More Goodies", where he described some of the little-advertised new features of 5.1. Here are some items from his list of "goodies".

1. Dynamic Dump Data Set Allocation

SVC dump can operate in two modes, either by using pre-allocation data sets (which have a tendency to fill up and consume a lot of space), or by dynamically allocating them at the time the dump is produced. The advantage of dynamic allocation is that no formatting is needed, the data sets are allocated to the correct size, you don't need to waste DASD space for unused dump data sets, and you won't have to copy the dumps from your pre-allocated dump data sets to a unique name (it will already be allocated). The decision to use dynamic data sets can be made with an operator command, not an IPL. An operator command can show any dumps that have been dynamically created since the last IPL.

2. Enhancement of Exit Capabilities

SP 5.1 provides a Dynamic Exit Facility that eases the updating and testing of exits. The parmlib member, PROGxx, which was used to support dynamic APF in SP 4.3, has a new function in SP 5. In PROGxx, you can define exit points and exit routines. You can specify multiple routines per exit point, and can replace exits dynamically. A PARMLIB conversion aid, IEFEXPR (a PDF edit macro), is provided to help in the conversion once you install 5.1. While the intention is to support all exits with this facility, currently only allocation exits and SMF exits are supported.

3. IOS - Device Drain

SP 5.1 has solved the problem of trying to vary a device offline. Before 5.1, a device could be varied offline, but would remain "pending" until no jobs have it allocated. Unfortunately, new jobs could allocate to it while it was in "pend" state. In 5.1, a pending device is no longer eligible for allocation, unless overridden by the operator or a Device Installation Exit.

4. IPCS Improvements

There are several improvements in IPCS performance. The dump directory initialization time has been improved by allowing a CI size greater than 4096. One installation cut the time for one dump from 60 minutes to 36 seconds. Use APAR OY62871 to allow IPCS to default to the larger CI size. There are many improvements to SADMP (stand-alone dump) processing, including writing to multiple DASD volumes, support for EXCD non-synchronous I/O, optimized block sizes for 3390, and automated restart.

5. Operations Support

In SP 5.1, you can finally identify the system and jobname holding a device reserve with the command, "D GRS,DEV=dddd". If the system is outside the sysplex, it's identified by the CPU serial number.

DYNAMIC TAPE ALLOCATION MVS/ESA SP 5.2, available in March 1995, will provide dynamic tape allocation very similar to JES3. This feature should simplify operations and improve throughput in many installations.

DISADVANTAGES OF GOING TO MVS/ESA SP 5.1 IMMEDIATELY

With all these advantages, what would keep you from moving to SP 5.1 immediately? Here are things to consider.

ONE MORE CONVERSION If you've just converted to SP 4.2 or 4.3 from a pre-SP 4.2 release, you've already been through a fairly significant conversion, and may not be ready for another one. There are probably other things in your installation that need attention. The conversion to 5.1 takes a bit more time if you aren't already positioned for it. If you've done all the ground work, the migration is very easy. (That's the primary reason I'm writing about it this month.) As you'll see in the rest of this article, there are several things that could or should be done ahead of time. There are a few requirements, such as HCD, but there are several items that would result in a smoother implementation if they were completed before moving to SP 5. These include the initial implementation of SMS, and an understanding of your current workloads and response requirements.

TAKES MORE RESOURCES It would make sense that these new facilities might take more resources, especially CPU. IBM has completed some benchmarks using a set of jobs running on SP 4.3 and SP 5.1. The studies are documented in GG24-3258, "MVS/ESA SP 5.1 Performance Studies." They found that the ITRs (internal throughput rates) were slightly lower on a 5.1 system, because, like SMS, you're asking the system to do work that the systems programming staff used to do. (There are over 1.5 million lines of code to support SP 5.1 and parallel sysplex.) But I think the overhead is fairly low in comparison to what you get. IBM's initial benchmarks show the following reductions in ITRs between SP 4.3 and SP 5.1 when running in compatibility mode:

- Batch workload - 2%
- TSO/E workloads - 2% to 5.5% (8-way 9021 had 2%, 1-way LPAR had 5.5%, but lower as CPU utilization increased)
- CICS V3.3 & DB2 workload - 0%
- CICS V4.1 workload - 3-4%
- IMS V3.1 workload - 0%
- IMS V4.1 (early prototype) workload - 4-5%

When evaluating these results, you should be aware of several things. First, your workload will be different (not might, but will). The IBM workloads are optimally tuned. In most installations, the workloads are not optimally tuned, and may see performance improvements after moving to SP 5 simply because WLM could end up in running the workload more efficiently. For example, I've seen some installations that are actually restricting the performance of their systems because of a poor implementation of storage isolation. WLM will apply storage isolation dynamically only if it will improve the ability to meet your response time goals.

When reviewing IBM's benchmarks, also note that several of the IBM benchmarks were run prior to applying the 5.1 PTF UW07924, a PTF that was available on 7/6/94 to improve performance of the locking functions. Before you install SP 5.1, be sure that the 5.1 release includes the code available with this PTF. The benchmark study also indicated that the ETR (external throughput rate) didn't change (this would indicate that response times weren't affected).

Storage usage changes in SP 5.1 of course. IBM's benchmarks showed that virtual storage below the line got a savings of between 140K to 290K in CSA and SQA. Processor storage (central and/or expanded) increased by 4.5MB plus 1K per address space in fixed SQA. Your results may vary.

WLM monitors the state of the system resources and of work running every 1/4 second and may adjust the system every two to ten seconds, while the sysprog might have been making similar changes weekly or monthly. That's quite a change in the response to performance problems! In addition to monitoring address spaces, WLM also monitors both CICS and IMS transactions. The control of the resources is better, response times will be easier to manage, the sysprog or performance analyst will spend less time on performance problems, all because the system is doing the management of resources. Of course, this might cost you in both storage and CPU. The benchmarks mentioned above indicated that a switch from compatibility mode to goal mode caused a CPU increase of 1% to 2.5%, an ITR decrease. Some of the early customers indicated that they saw no CPU increase.

Remember that these estimates are based on simply moving an existing workload to 5.1 with no alteration. Many of the facilities of 5.1 will result in an improved ITR after they're implemented. For example, the use of data sharing in a parallel sysplex can allow you to reduce the overhead present in the current techniques, and thus will reduce the residency and CPU time for online systems accessing common data. Improvements in JES processing, the dynamic ability to manage poorly performing workloads, improvements in dump processing, and storage improvements in the newer releases of CICS and IMS are expected to improve both ITRs and ETRs.

If one of your reasons to move to 5.1 is the ability to use the new less-expensive CMOS PTS machines for your workloads, consider that the price/performance of the PTS machines will more than offset any decrease in ITR. See the item on page 5 of my SHARE trip report where Jerry Miaszkowski from Allstate Insurance reported that their move to the

PTS machines provided projected savings of \$4.7 million in 1994, \$10.3 million in 1995, and \$10.6 million in 1996.

Watch for a new manual that's expected in 11/94: GG24-4352, "Workload Manager Performance Studies for MVS/ESA SP 5.1."

REQUIRES HCD This is the only *real* requirement of SP 5. Many sites have already moved to HCD (Hardware Configuration Definition), and have been quite happy with the results. IBM has provided a variety of conversion aids to help you, but it's not an overnight conversion. You might as well start on it now.

SUMMARY For most installations, the advantages of migrating to SP 5 outweigh the disadvantages, but you'll may need additional CPU and storage resources to support the new release. The migration can proceed in stages, however, so that you're completely ready to make the final switch.

MIGRATE TO SP 4.3 OR SP 5.1?

In the last month or so, people have begun asking, "should I migrate to SP 4.3 or SP 5.1?". My answer, in all cases, is "it depends!" I've never been a fan of moving to the latest release of software immediately. I'd prefer to let the "bleeding-edge" folks test the software for me first, so my first answer would be to wait for awhile. As an example, SP 4.3 has been available since March 1993, and users are still finding new performance problems, mostly from other software vendors. SP 5.1 has only been available since the end of June this year. Besides, there's a lot of work you can do before moving to SP 5 that can just as well be done on an earlier release. (Just keep reading!)

There are two situations where I'd recommend moving to SP 5.1 instead of SP 4.3, however. The first case is the business situation where POSIX client/server applications are needed in the near future. Although SP 4.3 also has support for OMVS, the 5.1 release provides more functions and facilities.

The second situation occurs for sites that haven't converted to SP 4.2 yet, especially MVS/XA sites. Rather than make two conversions of your IPS, ICS, and OPT, I'd be tempted instead to move directly to SP 5.1 and use the WLM's goal mode. It will take less time overall for the conversions, and will probably result in better management of the resources. I'd suggest a couple of different things in this situation. First, wait as long as is comfortable (let other sites do the testing). Second, make sure that you've increased the amount of storage (and possibly CPU) before the conversion. You'll be stepping past several significant releases, and the new releases will simply use more resources, especially storage. Watch out for potential problems when migrating to new levels of DFP, since you may require some toleration PTFs to avoid serious compatibility problems when accessing volumes from two releases of DFP.

POSITIONING FOR MVS/ESA SP 5

If you're planning to migrate to SP 5 in the future, I'd highly recommend that you **start the migration now**, even if you're at MVS/XA. Many of the conversion steps to SP 5 will take weeks, if not months, and can easily be done ahead of time. The really good news is that, without exception, all of these positioning moves are good techniques to be using in any installation today. So, even if you're not planning to move to 5 any time soon, these recommendations still apply to you. The recommendations are listed in Figure 1 and are described in the following sections.

Please note: This is not a duplication of, nor a replacement of, IBM's Conversion Notebook, GC28-1435. These articles are intended to show you what can be done a year or more before you move to SP 5, not necessarily the week before you're ready to install it. The two documents can, and should, be used in conjunction.

PREPARE FOR HCD

SP 5 requires that all devices be defined through HCD (Hardware Configuration Definition) instead of MVSCP. If you've been waiting to implement HCD, here's a reason to get on with it. Besides, the feedback on using HCD is very positive, since it's easier to use and the full-screen application reduces the complexity of hardware changes. The conversion to HCD isn't all that easy, however. Often, the primary problem is finding and updating all of the vendor products that still use the old method of scanning the UCB chain (which isn't useable with HCD).

PREPARE FOR SP 5 (MISCELLANEOUS)

▮ **INSTALL NEW PRODUCTS** SP 5 requires new releases (or versions) of several products in order to both support and exploit the new facilities of sysplex, parallel sysplex, and the workload manager. You'll reduce the migration time considerably if you're already at a release

1. Prepare for HCD
2. Prepare for SP 5 (Miscellaneous)
 - Install New Products
 - Change SMF Exits to 31-bit
 - Turn Off SMF Type 99 Records
3. Prepare for WLM Compatibility Mode
 - Change IEASYSxx Parameters
 - Include IPS=xx in IEASYSxx
 - Remove APG=
 - Change IEAOPTxx Parameters
 - Evaluate CPENABLE Parameter
 - Evaluate ESCT Parameters
 - Change IEAIPSxx Parameters
 - Change IOSRVC=TIME to =COUNT
 - Set APGRNG=(0-15)
 - Consider Changing Service Definition Coefficients
 - If SDCs Changed, Then Change DUR, DSRV, ASRV
 - If at SP 5.1, Remove GRS Storage Isolation
 - Change IEAICSxx Parameters
 - Add Subsystems
 - Identify System Task Assignments
4. Prepare for WLM Goal Mode
 - Evaluate Test Batch
 - Evaluate Production Batch
 - Evaluate TSO
 - Evaluate Started Tasks
 - Evaluate CICS & IMS Transactions
 - Evaluate Other Online Transactions
5. Become Familiar with Sysplex

Figure 1 - Checklist for Positioning to SP 5

close to the one that's required for SP 5. In several cases, the releases are available on earlier releases of MVS, especially SP 4.2. The two primary benefits of installing new releases early are that you can make the move at your convenience rather than in a crunch, when other products are also being upgraded, and you can start to take advantage of the new features provided in the new products. The disadvantage of moving to a new release too early is the (usually) increased cost of the newer release.

Let me use CICS as an example. CICS/ESA 4.1 is a release that can be run on SP 5 and provides support for the workload manager. In SP 5, you'll be able to start collection of CICS response times and report them using RMF. While it's possible to run CICS/ESA 3 on SP 5, you wouldn't be able to collect activity and response times by transaction until you migrate to CICS 4. Since it often takes several weeks to implement an upgrade to your online systems, it would be beneficial to have already upgraded to CICS 4 before installing SP 5. CICS 4 can provide other benefits even before you move to SP 5, such as virtual storage improvements and several performance improvements. CICS 4.1 can be installed on MVS/ESA SP 3.1.3 and later. CICS 4.1 is currently available to users in QPP (Quality Partnership Program) or users who install a parallel transaction server. General availability for CICS 4.1 is 10/28/94.

IMS/TM V5 supports WLM and is currently available to users in QPP or users who install a parallel transaction server. General availability hasn't been announced yet.

You might also want to consider an additional product from IBM called CICSplex System Manager/ESA (CP/SM). This product can automatically route transactions to MROs. When using CP/SM on early releases of CICS, such as V2 or V3, CP/SM can manage MROs on a single image. With CICS 4.1, CP/SM can route transactions to MROs in other systems in the sysplex based on WLM goals in SP 5 if all the systems in the CICSplex are in goal mode. Installing CP/SM early in the process allows you to gain the benefits and the experience of automatic transaction routing.

A further consideration occurs if you're severely back-leveled. CICS is another good example of this. Those installations that are still on CICS V2 have a *major* conversion before moving to CICS 3 or CICS 4. The conversion of CICS programs from 2 to 3 requires changing programs from macro level to command level and, in some cases, means rewriting portions of programs that attempt functions not available in CICS 3 or 4. If you're still at CICS 2, you'll need to undertake the CICS conversion in order to eventually take advantage of the new MVS facilities and CMOS processors.

To see which products are required or supported, look at the announcement letter, #294-152. It lists the required product releases needed before installing SP 5. (Access to faxed

announcements is listed in the bibliography later in this newsletter.) Some of the products are actually current releases with PTFs applied. In most cases, the PTFs can be applied well before moving to SP 5. Note that the conversion notebook (GC28-1436) does not include anything regarding product releases. (I wish it would!). Access IBMLINK and the Technical Questions & Answers section. Document Q669125, item 45559, "List of non-IBM (ISV) products that run in an MVS/ESA SP V 5 environment", contains a list of products that can run on SP 5.1, according to the vendors. Finally, check with all your vendors to see if any PTFs are needed or if a new release is needed to support SP 5.1.

The benefits from upgrading to current releases of products generally include the availability to new facilities or functions, higher reliability, virtual storage constraint relief, and typically some performance improvements. The cost of upgrading to a newer release would include possibly higher software costs, the time to install and test a new release, the possibility of an outage due to an untested feature, more storage usage (sometimes), and possibly some performance degradation (seldom).

Be sure to investigate Single Version Charging (SVC), which allows you to install a new release of a product and only pay for the new release (and not the old release) while you're migrating your applications. You can do this for up to a year. (CICS V2 isn't restricted.) Information about this pricing feature can be found in announcement #394-198.

CHANGE SMF EXITS TO 31-BIT All SMF exits in SP 5 require 31-bit addressability. Since you've been able to change these exits to 31-bit mode for the past 10 years, why not take the time to convert them now. It's not a tough job for the installation's own exits, but you may need some lead time to contact the different vendors who use SMF exits. This may require upgrading to a newer release of their products. This is a requirement before you install SP 5, although a benefit of rewriting these exits even prior to SP 5 is the relief of virtual storage constraint.

TURN OFF SMF TYPE 99 RECORDS The SMF type 99 records provide very detailed information while running in WLM goal mode (described later). Most of this data won't be used, yet will generate a very large amount of data when you go to goal mode. Turn them on only if you run into problems or if you want to dig deep into the workings of WLM.

Before going to goal mode (right now if you want), simply update the SMFPRMxx member to eliminate type 99 records. Either of the following techniques would work: SYS(TYPE(0:98,100:255)) or SYS(NOTYPE(99)). This is one of those things you might forget before you turn on goal mode, and it can't hurt your current system to turn these records off.

PREPARE FOR WORKLOAD MANAGER

One of the major features of SP 5 is the availability of the MVS Workload Manager (WLM). You can run WLM in either compatibility mode or goal mode. When you first install SP 5, you will normally run in compatibility mode, which uses your current IPS, ICS, and OPT parmilib members. You would collect data for a period of time and then migrate to goal mode by setting service goals (or service objectives) and allowing the Workload Manager to manage the resources in order to meet the goals you've set.

PREPARE FOR COMPATIBILITY MODE

This section is to help you prepare for WLM, first in compatibility mode and then in goal mode. What's interesting about this list of items is that all of them are good recommendations for implementation on *any* release of MVS. Even if you have no plans to migrate to SP 5, these recommendations still apply to you.

CHANGE IEASYSXX PARAMETERS Before you install SP 5, there are two parameters in IEASYSxx that should be reviewed, and possibly modified: the IPS and the APG parameters.

If you're currently using APG, convert to DP= immediately, because it gives you more control over your workloads. Use of APG means that many, if not all, jobs use the JCL DPRTY statement to control dispatch

OPT Parameter	(0)	(1)	(2)
ESCTBDS (hiperspace)	1500	1500	1500
ESCTPOC (page out)	1200	1200	1200
ESCTSTC (stolen)	100	250	250
ESCTSWTC (swap trim)	450	450	350
ESCTSWWS (swap set)	450	450	350
ESCTVf (virtual fetch)	100	100	100
ESCTVIO (VIO)	1500	1500	1500

Figure 2 - Recommended Criteria Ages

priorities instead of SRM. This technique doesn't give a lot of control to an installation. (See my comments on APGRNG in the section on IEAIPSxx.) If you go to SP 5 without removing the APG parameter, your dispatch priorities will be much different than they are now. The easiest way to convert from APG to APGRNG is to add an APGRNG=(m,m), where m in the value from your APG= parameter in IEASYSxx. Then change the APG= subparameter on each PGN statement in the IEAIPSxx member from APG=n to DP=x, using the following conversion:

APG=n	DP=x
0 to 6	M0
7	M0 or F0
8	M0 or F0
9	M0 or F0
10	F0
11	F00
12	F01
13	F02
14	F03
15	F04

APG=7 to 9 were fixed dispatch priorities using APG, but there aren't any fixed priorities that correspond to them with DP. A better solution would be to use APGRNG=(0-15), remove the DPRTY from the JCL, and assign a new set of dispatch priorities to all performance groups. Just be sure that this is completed before installing SP 5.

CHANGE IEAOPTXX PARAMETERS The OPT member will be used in both compatibility mode and goal mode, although some parameters are ignored during goal mode. There are several parameters that you might want to change on any release of MVS, in order to improve performance.

EVALUATE CPENABLE PARAMETER This parameter determines how MVS will manage the CPUs that handle I/O interrupts. First, let me describe how MVS processes interrupts. Initially, only one CPU in MVS is enabled to handle I/O interrupts. The others are disabled until they're needed. SRM decides whether to enable the CPUs for interrupts based on the CPENABLE parameter. At the end of processing an I/O interrupt, the CPU sends a request (TPI, or Test Pending Interrupt) to all channels to test for any pending interrupts. If there are more interrupts to handle, the CPU handles them at the same time. If an interrupt is found to be pending, that means the I/O device had to wait for the CPU to process a prior interrupt - thus delaying the subsequent I/O.

The default value, CPENABLE=(10,30), indicates that if over 30% of the interrupts are handled via TPI, then another CPU should be enabled to handle them. Then, if less than 10% of the interrupts are handled by TPI, the system should disable a CPU from handling interrupts. In a non-LPAR environment, this default and logic hold true. In an LPAR environment, however, many interrupts could be delayed if the CPU was busy processing another LPAR. If a large number of interrupts are delayed, then the application response times will suffer. This delay is called I/O elongation and is shown on the RMF CPU activity report for each CPU.

In a shared LPAR environment prior to SP 5, the current recommendation is to set CPENABLE=(0,0) in order to reduce I/O elongation (all CPUs are enabled to handle interrupts). In SP 5, the default is now (0,0). As a general performance guideline, LPAR environments should have specified (0,0) even before going to SP 5. After SP 5 is installed, you may want to consider changing CPENABLE back to the old defaults of (10,30) for non-LPAR environments or for

Amdahl and HDS sites where one CPU in the LPAR is assigned to handle the interrupts without other LPAR activity.

EVALUATE ESCT PARAMETERS The ESCTxxxx parameters in the OPT provide recommendations for when pages are to be moved to auxiliary storage instead of expanded storage. These values are called criteria ages. The original default values prior to SP 4.2 were in the 50 to 100 range, meaning that if the migration age was greater than 50 (or 100), that type of page (as defined by the parameter) could be moved to expanded storage. (The VIO and hiperspace values were 900.) A high migration age normally means that expanded storage is available. These original criteria age values were quite low and the migration age seldom, if ever, reached the criteria ages. Therefore, there was no differentiation between CICS, TSO, and batch when SRM decided which pages to move to expanded storage.

In SP 4.2, IBM changed the defaults to higher values (in the 1200 to 1500 range), in order to better manage expanded storage. These values tended to be too high in some installations. Thus, we've been seeing that IBM keeps adjusting the default criteria age values in each release of MVS. In SP 4.3 and 5.1, more criteria ages were changed. IBM's benchmarks have shown the latest values to be more effective, and not really limited to SP 5.1, but applicable on any release of MVS.

If you're already at SP 5.1, avoid coding any ESCT values, and let the defaults be used. Prior to SP 5, code the ESCT values, but use the SP 5.1 values shown in Figure 2. To understand how the table is set up, remember that the ESCT parameters are normally qualified by a type (in parenthesis) that indicates the type of address space. For example, ESCTPOC(0) refers to page outs for non-swappable and common pages, while ESCTPOC(2) refers to page outs for TSO pages, and ESCTPOC(1) refers to other page outs. As of SP 4.2, you can assign all work in a domain to a special type (with ESCRTABX=n on the DMN statement) and then include ESCTxxxx(n) parameters for that work. Figure 2 shows the criteria age values for SP 5.1, which are quite applicable and useful even in MVS/XA environments.

CHANGE IEAIPSXX PARAMETERS There are also a few parameters that are useful to change in the IPS member before moving to SP 5. Each of them provides benefits in earlier releases as well.

CHANGE IOSRVC=TIME TO =COUNT SP 5 goal mode bases I/O service units on EXCP counts rather than device connect time. Prior to SP 5 (and in SP 5 compatibility mode), you can determine which technique you use with the IOSRVC parameter from the IPS. This parameter indicates how I/O service units are calculated. If IOSRVC=COUNT (the default), service units are based on the number of EXCPs accumulated by a job. If IOSRVC=TIME, service units are based on the amount of device connect time (in 8.3 millisecond units). The TIME option is a better indicator of how much channel and device time is used by a job, and therefore is used by several modeling products. (For example, an 80-byte block and a 24K block both count as one EXCP, but the larger block takes 300 times more connect time.)

If you're using TIME now, first contact your software vendors to see if they require that specification. Then identify all the users of I/O service units. For example, if I/O service units are being used for chargeback, you'll need to plan a conversion back to using EXCPs. Your capacity planners might be using I/O service units to characterize their workloads, or data

PGN	PGP	DMN	TIME SLICE GROUP	INTERVAL	SERVICE	AVERAGE ABSORPTION, AVG TRX SERV RATE, TCB+SRB SECONDS, %		PAGE-IN RATES	STORAGE	TRANSACTIONS	AVG TRANS. TIME, STD. DEVIATION HHH.MM.SS.TTT					
SUBSYS = JES2			TRXCLASS = E		ACCTINFO = NO											
USERID =			TRXNAME =													
0010	1	012	**		IOC	40,575	ABSRPTN	1,226	SINGLE	0.00	AVERAGE	357.34	AVG	0.55	TRX	000.00.50.687
					CPU	145,448	TRX SERV	1,226	BLOCK	0.00			MPL	0.55	SD	000.00.48.960
					MSO	9,887	TCB	13.1	HSP	0.00	TOTAL	199.16	ENDEED	6		
					SRB	9,191	SRB	0.8	HSP MISS	0.00	CENTRAL	193.28	END/SEC	0.01	QUE	000.07.28.793
					TOT	205,101	TCB+SRB%	4.6	EXP SNGL	0.01	EXPAND	5.88	#SWAPS	3	TOT	000.08.19.481
					PER SEC	683	EX VEL%	43.6	EXP BLK	0.00						

Figure 3 - RMF Workload Activity (Extract)

center reports might be using I/O service units to track the I/O trend on the system. Identify the users and plan a conversion to using EXCPs.

To help justify the move now, rather than wait for SP 5 goal mode, consider some of the differences between the use of COUNT and TIME. One of the advantages of COUNT (using EXCPs) is that the results are more consistent from one run to another. Use of TIME can be fairly inconsistent, and gives the opposite result that you might want for chargeback. For example, device connect time is less when a data set is on a newer, more expensive device (3390 versus 3380), so the more expensive device costs the user less for the same amount of data. Data that is found in the more expensive cache storage or solid-state devices

results in connect times of 2-3 milliseconds instead of 20-30 milliseconds from the cheaper DASD devices. Again, the more expensive resources cost the user less for the same amount of data.

You'll be much happier making this change well before converting to SP 5 goal mode, so that you don't need to deal with it in the middle of a migration.

SET APGRNG=(0-15) Another interesting change in SP 5 compatibility mode is the removal of the APGRNG parameter, with the resulting change to force SRM to manage all performance group ranges.

I'm so glad they did it! Too many sites were overriding SRM by specifying APGRNG=(n-14), and then using DPRTY=(15,15) on some job cards (and TSO users!). This was always a potential performance problem if inadequate controls allowed CPU hogs to run above all other MVS work, such as all online systems and system tasks. I'm quite happy that MVS is now forcing all performance groups to be managed by SRM.

Check the APGRNG in your IPS. If the high value is 15, you probably won't need to make any changes. If the high value is less than 15, then you probably have some jobs or TSO users with a higher priority. Find these jobs or users and, if they need the higher priority, then place them in the ICS and assign them to a high priority performance group.

Before you install SP 5, you should change the APGRNG to (0-15). If you have been specifying something like (5-15), the actual dispatch priority of jobs will change. Without going into more detail about how dispatch priorities work, a DP=F4 specified on a performance group will result in an actual dispatch priority of x'4A' if APGRNG=(0-15) is used, but results in x'9A' if APGRNG=(5-15) is used. If any programs use or collect the actual dispatch priority, you'll need to identify them and change them.

Changing APGRNG to have a maximum of 15 will give you more control over the dispatch priorities in your installation, and could reduce some current performance problems.

□ **CONSIDER CHANGING SERVICE DEFINITION COEFFICIENTS**

There have been many discussions concerning the change of the MSO service definition coefficient (SDC) from 3.0 to a smaller value, such as 0.1, 0.01, or 0.001. This capability was provided as early as SP 3.1.3, but is implemented in only a minority of sites. IBM's IPO values of CPU=10.0, SRB=10.0, MSO=3.0, and IOC=5.0, are used in most installations. With more storage today than when the SDCs were created, the MSO value has become much too large a percent of the total service units, thus the recommendation for reducing it.

Total service units are used to determine period durations (DUR) and domain priorities (DSRV, ASRV, DOBJ, AOBJ, and SRV). In some sites, the use of MSO=3.0 could result in over 85% of the service units being based on storage usage. This doesn't provide consistent period durations or TSO response times. Performance analysts have been recommending the use of smaller values for several years. In the past, use of MSO=0.0 has been discouraged because of the potential loss of data, since MSO could be used to roughly estimate the amount of central storage used by an address space or performance group. MSO=0.0 is also a bad value for some vendor products that depend on MSO service units.

In SP 4.2 and later, the loss of data isn't as serious since new measurements have been made available in the SMF type 72 (RMF Workload Activity) records (central and expanded storage occupancy). The SMF type 30 record (by job) has always had a similar field called PAGE-SEC that can provide a similar estimate of storage. If you have any vendor products that require MSO service units for SP 4.2 systems and later, try to convince the vendors to update their products.

In SP 5 compatibility mode, the MSO service units are still used as part of total service units for both duration and domain priorities (DSRV & ASRV). In SP 5 goal mode, the SDCs are defined in the WLM specifications and are only used for duration. Therefore, as soon as you convert to SP 5, a logical change would be to set MSO=0.0, since the data is not useful and can lead to inconsistent TSO response times. (But watch out for any vendor products that require a non-zero value.) Prior to SP 4.2, don't set MSO below about 0.001, or you won't be able to determine working set size. For SP 4.2 and SP 4.3, I don't think it matters as long as the MSO SDC is small enough (0.01 or 0.001, or even 0.0). If you're on SP 4.2 or 4.3 and are planning to convert to SP 5, there's little harm in setting MSO=0.0 now, as long as you first determine whether MSO service units are used by anyone else. If you change SDCs, please review the next section.

□ **IF SDCS CHANGED, THEN CHANGE DUR, DSRV, ASRV** If you change the MSO (or any other) SDC, then you'll want to change other parameters and notify other users. Before changing the SDCs, first determine if anyone is using the MSO service units. They might be used for chargeback (oh, but I hope not, since they're not repeatable or accurate), they're often used by capacity planners, and they might be used in data center reporting. As I mentioned before, they might also be used by other vendor products.

You'll also need to change other IPS parameters if the SDC changes. Let me describe how to make changes to parameters such as DUR, DSRV, and ASRV. For an example, let's assume the current MSO SDC is 3.0 and the current DUR value on a performance group period (assume TSO first period) is 800. If you're going to change MSO to 0.0, the calculation for the new DUR value is fairly simple. Just collect the MSO service units and total service units for a peak period interval. Let's assume we had 40,000 MSO service units and 50,000 total service units. The new duration could be calculated as:

$$\begin{aligned} \text{new DUR} &= \text{DUR} * ((\text{total su} - \text{MSO su}) / (\text{total su})) \\ &\text{or} \\ \text{new DUR} &= 800 * ((50000 - 40000) / 50000) = 160 \end{aligned}$$

If you're changing the value of the MSO SDC to a non-zero value, or any other SDC for that matter, it's slightly more complicated. You'll need to calculate the portion of the DUR (or other) value due to the changing SDC and the portion of the DUR value not changing to the SDC values. Let's assume in our previous example that we simply want to change the MSO SDC to 0.1. Determine the MSO portion of the DUR value:

$$\begin{aligned} \text{DUR(MSO portion)} &= \text{DUR} * (\text{MSO su} / \text{total su}) \\ \text{DUR(MSO)} &= 800 * (40000 / 50000) = 640 \\ \text{DUR(non-MSO portion)} &= \text{DUR} - \text{DUR(MSO portion)} \\ \text{DUR(non-MSO)} &= 800 - 640 = 160 \end{aligned}$$

Now re-calculate the MSO portion with the new SDC. The calculation is:

$$\begin{aligned} \text{DUR(new MSO)} &= \text{DUR(old MSO)} * (\text{new MSO SDC} / \text{old MSO SDC}) \\ \text{DUR(new MSO)} &= 640 * (0.1 / 3.0) = 21 \end{aligned}$$

Now re-calculate the new duration by recombining the portions:

$$\begin{aligned} \text{new DUR} &= \text{DUR(new MSO)} + \text{DUR(non-MSO)} \\ \text{new DUR} &= 21 + 160 = 181 \end{aligned}$$

These same techniques work for changing the duration (DUR) or any of the domain objectives (DSRV, ASRV, or the pre-SP 4.2 SRV parameters).

□ **IF AT SP 5.1, REMOVE GRS STORAGE ISOLATION** Prior to SP 5.1, MVS had a forced storage protection for GRS equivalent to PWSS=(32K,*), which caused few if any page frames to ever be stolen from GRS. Many sites overrode this by placing GRS in a separate performance group with a PWSS=(0,*), which resulted in GRS behaving like all other address spaces. In SP 5, MVS no longer forces the protection, so you won't have to assign GRS to its own group. If you won't be moving to SP 5.1 soon, leave the PWSS parameter in place, since it prevents GRS from taking too many frames. Also, note the caution later in "Identify System Task Assignments."

CHANGE IEAICSXX PARAMETERS Fortunately, there are few changes, if any, needed for the ICS in compatibility mode. Of course, if you're prior to SP 4.2, you'll need to make the change to ACCTINFO due to the change in the search order. If you decide to change the performance group structure, as I describe later, the ICS will need to be changed to reflect new performance group assignments.

□ **ADD NEW SUBSYSTEMS** It would be a good idea at this time to add the new subsystems for OpenEdition MVS and for APPC/MVS. Simply assign all work to a default performance group that you can later track and manage them. For example, you might add the following fields in the ICS:

```
SUBSYS=TSO
...
SUBSYS=OMVS,PGN=nn
SUBSYS=ASCH,PGN=nn
```

If you assign unique performance groups to these subsystems, you'll be able to easily determine the activity when new applications are added.

If you're on SP 5.1 already, and you want to collect CICS and IMS response times, then you'll want to add SUBSYS=CICS and SUBSYS=IMS, with report performance groups. This is discussed in a later section.

□ **IDENTIFY SYSTEM TASK ASSIGNMENTS** Prior to SP 5.1, MVS forced dispatch priorities for several system tasks, such as GRS, CONSOLE, and TRACE. It also used the PVLDP priority for all privileged programs, as specified in the SCHEDxx parmlib member. In SP 5.1, the performance group dispatch priority will now be used, and this may require you to change your assignments in the ICS and IPS.

Several sites placed these high priority system tasks in separate performance groups in order to report on them or force storage isolation (such as for GRS mentioned above). Even if they were assigned to user performance groups, MVS would still force a high dispatch priority. In SP 5 compatibility mode, the dispatch priorities of the performance group will be honored and used. Thus, if you had assigned GRS to PGN 23 for storage isolation and neglected to put a DP= parameter, the default of M0 would be used when you went to SP 5. This is NOT recommended!

Therefore, before you move to SP 5, you should try to identify any specific system task assignments that you have made in the ICS. Looking at an online monitor, such as RMF Monitor II, could show you the dispatch priorities and performance groups that are currently in use

for your started tasks. A later section, "Evaluate Started Tasks", describes how to do this. If you find a started task, which is specified in your ICS, that is also running in performance group zero or dispatch priority FF, then plan to either remove the assignment prior to installing SP 5, or assign a high dispatch priority to the current performance group (DP=F94). This step can help you avoid performance problems when you first install SP 5 in compatibility mode.

PREPARE FOR WLM GOAL MODE

There are several things you can do to make the move to goal mode easier. You can start this process well before you migrate to SP 5 or after you've installed SP 5 and are running in compatibility mode. In order to understand the following sections, it will help to remember the types of response time goals that can be specified. For any service class period in WLM goal mode, you can assign one of four types of response goals: average response time (e.g. average of .4 seconds response time), percentile response time (e.g. 85% of the transactions should complete in 1.0 second), execution velocity (e.g. 30% velocity indicates that a job is executing at 30% of its potential, while 70% of the time the job was delayed for one reason or another), and discretionary (no response time objective, these have the lowest importance in the system).

WORKLOAD MANAGER Before I continue, I'd like to make a few comments regarding the Workload Manager.

The WLM service classes are very similar to performance groups, and can be defined with multiple periods. Each period can be assigned a different response goal. Even though service classes are similar to performance groups, they shouldn't be created directly from your current performance groups unless you've designed your performance groups specifically for that purpose. Today, you might have dozens, or even hundreds, of performance groups without any appreciable performance overhead (except during the nightly post-processing).

Service classes, however, are very different. The more service class periods used during goal mode, the more difficult you make the job for WLM. WLM will be much more effective with a minimum number of periods. I'd probably try to keep the number of service class periods to less than twenty. This restriction doesn't apply, however, to periods with a discretionary goal. All discretionary service class periods are logically managed by WLM as a single group.

You can still report on any workloads by assigning reporting service classes, and they don't add to the complexity of WLM processing. An address space can only be assigned to one reporting service class, unlike multiple report performance groups, so the problem of duplicate accounting and reporting due to report performance groups is reduced, although not eliminated.

The purpose of this section is to provide some guidelines for changing your performance groups or domains so that they really can be converted or compared directly to service classes when you're ready to go to goal mode. The primary reason for these early changes is to allow MVS (and you) to collect the response time data on your workloads and report them by performance group or domain. That is, if you have a performance group that will eventually become a service class, you'll already know what the current response or turnaround times are. If you haven't done this before you go to goal mode, you'll need to experiment with service class assignments and response goals until everything seems to be working right. Why not go into the process with all the answers?

A second reason for trying to compare performance groups (or domains) to service classes is to reduce the confusion in reporting systems when you eventually move to goal mode. Consider your management reporting systems that are currently based on performance groups (from the RMF type 72, subtype 1 record). When you move to goal mode, these records are no longer produced, and you'll need to use the RMF type 72, subtype 3 records for the service class periods. You'll probably need some type of conversion logic to map these performance groups to service classes in order to produce corresponding reports. This is especially true if you plan to switch back and forth between goal mode and compatibility mode (not a recommendation that I'd make, however). If there is some equivalence between performance groups and service classes, you'll be able to merge the data from these two RMF sources for your reporting programs.

Using the guidelines I'm outlining below will give you a set of performance groups or domains that can later be easily converted to service classes. In almost all cases, the resulting IPS will be easier for you to manage today, and will provide better response times for your loved ones. One caution: some modeling products (such as BGS's Best/1 and most others) require the use of control performance groups to divide your workloads for modeling. If you're using these modeling products, then consider using domains to combine your performance groups into a small subset of workloads or domains that can correlate to service classes.

```

SYS1.PARMLIB(IEAICS00)
SUBSYS=STC,PGN=4
  TRXNAME=ALLOCAS,PGN=3          /* ALLOCAS */
  TRXNAME=ONLNMON,PGN=123        /* ONLINE
MONITOR */
  TRXNAME=CNMPROC,PGN=132        /* NETVIEW */
  TRXNAME=DSNM(1),PGN=451        /* DB2 */
  TRXNAME=DSNPIRLM,PGN=401       /* DB2 LOCK
MANAGER */
  TRXNAME=DSNPMSTR,PGN=402        /* DB2 PROD MSTR
*/
  TRXNAME=DSNPDBM1,PGN=403        /* DB2 PROD DBM1
*/
  TRXNAME=DSNPDIST,PGN=404        /* DB2 TEST */
  TRXNAME=DSNT(1),PGN=451        /* DB2 TEST */
  TRXNAME=JES2,PGN=2              /* JES2 */
  TRXNAME=LLA,PGN=3              /* LLA */
  TRXNAME=NET,PGN=131            /* VTAM */
  TRXNAME=PCAUTH,PGN=3           /* PCAUTH */
  TRXNAME=TRACE,PGN=3            /* TRACE */
  TRXNAME=VLF,PGN=3              /* VLF */
SUBSYS=TSO,PGN=201
SUBSYS=JES2,PGN=600
  TRXCLASS=A,PGN=601
  TRXCLASS=B,PGN=602
  TRXCLASS=C,PGN=603
  ...
  TRXCLASS=X,PGN=624
  TRXCLASS=Y,PGN=625
  TRXCLASS=Z,PGN=626
  TRXCLASS=A,PGN=627

SYS1.PARMLIB(IEAIPS00)
CPU=10.0,IOC=5.0,MSO=3.0,SRB=10.0
APGRNG=(5-14)
IOQ=PRTY
PVLDP=F82
DMN=1,CNSTR=(999,999),DSRV=(999999999,999999999)
DMN=2,CNSTR=(18,26)
DMN=4,CNSTR=(3,6),DSRV=(3000,5000)
DMN=11,CNSTR=(6,25),DSRV=(7000,11000)
DMN=13,CNSTR=(5,25),DSRV=(5000,8000)
DMN=14,CNSTR=(0,0)
PGN=1,(DMN=21,DP=F62)           /* ACF2 */
PGN=2,(DMN=1,DP=F80)           /* JES2 */
PGN=3,(DMN=1,DP=F40)           /* MISC. STC */
PGN=4,(DMN=1,DP=F20)           /* DEFAULT STC */
PGN=5,(DMN=1,DP=F42)
PGN=51,(DMN=1,DP=F22)
PGN=52,(DMN=1,DP=F211)
PGN=53,(DMN=1,DP=F22)
PGN=54,(DMN=1,DP=F211)
PGN=55,(DMN=1,DP=F22)
PGN=56,(DMN=1,DP=F211)
PGN=121,(DMN=1,DP=F22)
PGN=122,(DMN=1,DP=F211)
PGN=123,(DMN=1,DP=F22)
PGN=124,(DMN=1,DP=F211)
PGN=201,(DMN=2,DUR=800,DP=F63)
      (DMN=2,DUR=2800,DP=F61)
      (DMN=4,DP=M4)

.... AND ANOTHER 56 PERFORMANCE GROUPS!...

```

Figure 4 - Sample ICS & IPS (before modifying)

If you want to combine performance groups, but still want to report the data separately, use report performance groups. This may require you to change some report programs. You'd also want to notify any other users or groups that use the workload data. If you haven't used report performance groups before, it may simply be easier at this point to keep multiple control performance groups, but combine them into domains that can later be used for service classes.

As an alternative, you might want to design your performance groups (that will later be used for service classes) from scratch. (It might be easier!). If so, it will be easier to think in terms of generic workloads. For example, you might divide all work into the following categories: system STCs, high importance STCs, medium importance STCs, low importance STCs, short test batch, medium test batch, low importance test batch, high importance production batch, standard importance production batch, low importance production, high importance online regions, standard online regions, test online regions, and a three-period TSO workload. All of the low importance workloads could reside in a single performance group with a low dispatch priority. Each of the others would be assigned to unique performance groups.

This very simple type of organization would result in only twelve performance groups with plenty of room to grow. When you move to goal mode, each performance group could be assigned to a unique service class. This is much more effective (and efficient!) than using 100 service classes to correspond to your 100 performance groups!

If you've designed performance groups that will easily correspond to service classes, you'll find it will be very easy to collect the response times by using RMF. With each of the workloads I'll describe below (test

batch, production batch, TSO, etc.), I'll recommend how to set up current performance groups that will correspond to future service classes.

For my examples, I'll use the IPS shown in Figure 4. This is a typical ICS and IPS from a production system. (I made minor alterations to eliminate product names.) This installation has a different performance group set up for each online address space and for each job class. I've eliminated some of the lines because of space; the actual ICS and IPS contained over 250 lines of parameters.

Figure 5 is a version of an ICS and IPS that could be used in the same installation. Notice that it only has 13 performance groups, and would be much easier to maintain. In addition, the conversion to SP 5 will be quite simple since you would know the current response times (or velocity) for each performance group, and could easily match them one-for-one with a set of service classes. During compatibility mode, the execution velocity of a performance group period will be shown in the RMF Workload Activity report. Figure 3 shows an extract of one performance group, where you can see the EX VEL% of 43.6% on the bottom line.

One last note about the WLM in SP 5. WLM is designed to manage the resources in order to meet user-specified response time and turnaround time goals. This is actually something you've been doing for years, but it might not have been formalized. You know that if people start calling and complaining about response time, that the system needs to be tuned or resources need to be re-directed. At what point do they start calling? If you haven't been tracking service level objectives, you can't answer that question. If you have been keeping them, you'd know, for example, when the TSO first period response time goes above 1.2 or when test batch job class S takes over an hour to complete, people will call and complain. Those are really your service level objectives, even if the user isn't aware of them.

When you convert to SP 5 goal mode, you'll need to specify the service objectives for each type of work. If you've been keeping them, as described below, you can easily provide them to WLM. Also, if you've been collecting them, you'll be able to track to see how well you're doing after you convert to SP 5. Understanding your service levels is the most important thing you can do as a capacity planner or performance analyst.

When it comes right down to it, the job of a capacity planner is to ensure that enough resources are available to provide an adequate level of response. As a performance analyst, you need to ensure that changes don't adversely impact your users' response times. Response times that are starting to increase (degrade) provide a key indication that the system needs to be tuned.

Strategy: *There are two reasons to consider changing performance groups now in order to migrate to WLM goal mode in the future. First, if you have been collecting response times prior to goal mode, you can use them to easily set WLM goals. Second, if you decide to switch back and forth between goal mode and compatibility mode, you could easily map the data from performance groups and their corresponding service classes for reporting purposes. This will be especially useful for sites that will have one or more MVS systems running in SP 5 goal mode along with one or more systems that aren't using goal mode. In order to simplify data center reporting and capacity planning, it would be useful to easily relate performance groups and service classes. That's the purpose of these next sections. In all cases, the resulting performance groups would be easy to manage and report in any release of MVS. In the sections listed below, I'll introduce each type of workload by discussing how WLM can control the work in goal mode, how you might want to set up performance groups now, and how you can map those performance groups to service classes when you migrate to goal mode.*

▮ **EVALUATE TEST BATCH** Test batch jobs represent an important workload in any installation, although it's a workload that is often run at a lower importance than other workloads. To improve productivity, however, many sites try to provide relatively good turnaround time for at least the short jobs. This section will describe one technique for setting up performance groups for test batch classes.

HOW WLM WILL CONTROL TEST BATCH In goal mode, you can define test batch service classes with one or more periods and either response time goals (average turnaround time or percentile turnaround time (e.g. 80% of the jobs completed within 10 minutes)), velocity goals, or discretionary goals. The turnaround time is defined by the time from when the job is submitted until it terminates execution. Thus, it includes JES input queue time waiting for an initiator and execution time, but doesn't include print time.

Neither WLM nor JES will route batch jobs from one MVS image to another in order to meet the service class goals. Part of managing batch

```

SYS1.PARMLIB(IEAICS00)
SUBSYS=STC,PGN=10
    TRXNAME=ALLOCALS,PGN=14 /* ALLOCALS */
    TRXNAME=ONLNMN,PGN=13 /* ONLINE MONITOR */
    TRXNAME=CNMPROC,PGN=14 /* NETVIEW */
    TRXNAME=DSNM(1),PGN=12 /* DB2 */
    TRXNAME=DSNPDIRLM,PGN=14 /* DB2 LOCK MANAGER */
    TRXNAME=DSNPMSTR,PGN=12 /* DB2 PROD MSTR */
    TRXNAME=DSNPDBM1,PGN=12 /* DB2 PROD DBM1 */
    TRXNAME=DSNPDIST,PGN=11 /* DB2 PROD DIST */
    TRXNAME=DSNT(1),PGN=10 /* DB2 TEST */
    TRXNAME=OP(1),PGN=PGN=11 /* OPERATIONS JOBS */
    TRXNAME=JES2,PGN=14 /* JES2 */
    TRXNAME=LLA,PGN=14 /* LLA */
    TRXNAME=NET,PGN=14 /* VTAM */
    TRXNAME=PCAUTH,PGN=14 /* PCAUTH */
    TRXNAME=TRACE,PGN=14 /* TRACE */
    TRXNAME=VLF,PGN=14 /* VLF */
SUBSYS=TSO,PGN=20
SUBSYS=JES2,PGN=30
    TRXCLASS=H,PGN=34 /* HI PRI PROD */
    TRXCLASS=J,PGN=33 /* PROD */
    TRXCLASS=K,PGN=33 /* PROD */
    TRXCLASS=P,PGN=33 /* PROD */
    TRXCLASS=R,PGN=31 /* 1 HOUR TEST BATCH */
    TRXCLASS=U,PGN=31 /* 1 HOUR TEST BATCH */
    TRXCLASS=W,PGN=32 /* HI PRI TEST BATCH */
    TRXCLASS=X,PGN=32 /* 10 MIN TEST BATCH */

SYS1.PARMLIB(IEAIPS00)
CPU=10.0,IOC=5.0,MSO=0.001,SRB=10.0
APGRNG=(0-15)
IOQ=PRTY
PVLDP=F71
DMN=1,CNSTR=(999,999) /* NON-SWAPPABLES */
DMN=2,CNSTR=(999,999) /* ONLINE SYSTEMS */
DMN=3,CNSTR=(8,15),DSRV=(3000,5000) /* TSO */
DMN=4,CNSTR=(6,15),DSRV=(7000,11000) /* BATCH STD */
DMN=5,CNSTR=(10,25),DSRV=(15000,25000) /* HI PRI BATCH */
DMN=9,CNSTR=(0,0) /* SWAP OUT */
PGN=1,(DMN=11,DP=M0) /* DEFAULT NEW SUBSYSTEMS */
PGN=2,(DMN=4,DP=M0) /* DEFAULT TSO (UNUSED) */
PGN=10,(DMN=1,DP=M3) /* DEFAULT STC & TEST ONLINES */
PGN=11,(DMN=1,DP=F60) /* OPERATIONS HIGH PRIORITY STC */
PGN=12,(DMN=1,DP=F70) /* ONLINE SYSTEMS */
PGN=13,(DMN=1,DP=F80) /* MONITORS */
PGN=14,(DMN=1,DP=F90) /* MVS STCS */
PGN=20,(DMN=3,DP=F63,DUR=160) /* TSO FIRST PERIODS */
(DMN=3,DP=F61,DUR=840) /* TSO 2ND PERIOD */
(DMN=4,DP=M4) /* TSO 3RD PERIOD */
PGN=30,(DMN=4,DP=M2) /* DEFAULT LOW PRI BATCH */
PGN=31,(DMN=4,DP=M4) /* 1 HOUR TEST BATCH */
PGN=32,(DMN=5,DP=M5) /* 15 MIN TEST BATCH */
PGN=33,(DMN=4,DP=M4) /* PROD BATCH */
PGN=34,(DMN=5,DP=M5) /* HI PRI PROD BATCH */

.... and that's all!!!!

```

Figure 5 - Sample ICS & IPS (after modifying)

will be to manage the batch initiators across multiple MVS images in the sysplex. The techniques for assigning jobs to job classes are the same in goal mode and in prior releases.

For goal mode, you can assign any short test jobs that have a turnaround (service) objective to a service class with response goals, either average or percentile. Long test batch jobs that have a turnaround objective, such as two-hour turnaround, would be assigned to a service class with a velocity goal. Other test batch jobs (or the last period of a long test batch job) would be assigned to a service class with a discretionary goal.

SETTING UP PERFORMANCE GROUPS NOW For installations that currently have test job class turnaround objectives, setting up performance groups will be fairly easy. You probably already have a performance group set up for each set of job classes that have the same turnaround objectives. If you have too many different objectives, however, they'll each need a unique service class when you go to goal mode and this may not be the most efficient way for WLM to manage the jobs. If you have very many different objectives in your current environment, consider combining two workloads with quite similar objectives. For example, you might now have five test job classes defined: 10 minute turnaround, 20 minute turnaround, 1 hour turnaround, 4 hour turnaround, and overnight. It would take less sysprog management time (and less resources in goal mode), if instead you defined three test performance groups, one with 15-minute turnaround, one with 90-minute turnaround, and one with no objectives. Setting up a performance group for each service objective will allow you to collect and monitor turnaround times well before moving to SP 5.

If you currently don't have turnaround objectives, but have job classes based on resource usage (e.g. maximum of one minute CPU time), the performance groups will be fairly easy to define. One or more job classes will be assigned to a performance group. You can collect the current turnaround time and see what turnaround times you're currently

providing the users. By default, the current turnaround time can become the service objective if users are happy with the current turnaround times.

In SP 4.2 or later, RMF will provide a fairly good estimate of turnaround time (from job submission to job termination) by performance group in the TOT (Total Response time) field (sum of transaction time and que time). For example, Figure 3 shows an extract from an RMF Workload Activity report. Performance group 10 is test batch jobclass E that has a service objective of a 10 minute turnaround. We can see that it's currently getting slightly over 8 minute turnaround. In all releases, you can collect turnaround time from the SMF type 30 records. RMF may show more jobs and lower turnaround times than SMF because the following conditions cause multiple transactions to be counted for RMF: a job that contains a PERFORM parameter on an EXEC statement will cause the transaction count to be bumped for that step (so you'd be counting steps instead of jobs), an operator change of a job from one performance group to another will cause a new transaction to be started, a reset of the ICS or IPS could cause transactions to be restarted.

If you only use one or two job classes for test batch jobs, you can define a multiple period performance group. See my comments in the Q & A regarding multiple period batch performance groups.

The easiest technique for test batch jobs is to provide the users with a small number of job classes (three is a good goal) with a documented service level objective for each job class based on turnaround time. This not only simplifies the user's decisions, it also reduces the complexity of managing test batch prior to moving to goal mode, and it improves the efficiency of WLM when you do move to goal mode. A common set of job classes might include the following: Class S = average 10-minute turnaround, Class T = average 2 hour turnaround, and Class U = overnight (no turnaround objective). You would probably set resource limits on class S and class T (e.g. 5 seconds CPU time, no tapes for class S; 15 seconds CPU time, max 2 tapes for class T; no limits for class U).

The benefit of defining test batch job performance groups as described would be a system that is easy to manage, easy to report, and provides optimum productivity to the users. A simple set of job classes will simplify the decision for users, and will allow you to easily manage the workload across multiple shared spool or sysplex images by managing the initiators.

MAPPING PGNS TO SERVICE CLASSES If you end up with a small set of test batch performance groups as described above, setting comparable service classes will be quite easy. You could set up a service class for the short test batch PGN and specify an average or percentile response goal. The service class for the longer service objective, such as 2 hours, would be assigned a velocity goal. You'll be able to determine the average velocity of these jobs by looking at the performance group activity in RMF reports during SP 5 compatibility mode. You can then use the current velocity as the starting point for your service goal in goal mode. The unlimited time performance group would be mapped to a service class that has a discretionary goal. If you choose to have a performance group with multiple periods, then you would normally assign a response goal for the first period, a response or velocity goal for the second period, and a discretionary goal for the last period.

EVALUATE PRODUCTION BATCH The following sections describe how you might evaluate your production batch jobs in order to run them successfully under WLM goal mode.

HOW WLM WILL CONTROL PRODUCTION BATCH MVS has never really been able to provide a technique to easily manage production batch jobs. The reason is most production batch jobs are run in the evening and have a deadline goal (e.g. the jobs must be completed before 6:00am when the online systems are brought up). MVS can't know at 8:00 in the evening that a job has to have a high importance because it's in the critical path in order to complete other jobs for the morning deadline. Traditionally, installations have used the MVS priority techniques (of dispatch priority, storage isolation, expanded storage controls, I/O priority, and swapping controls) to achieve their deadline times by assigning high importance jobs to performance groups with higher priority attributes. Operators often need to ensure that the jobs meet their deadline by moving them to performance groups that will provide better service.

I think the easiest way to use WLM goal mode to meet the needs of production batch is to provide two or three service classes with different velocities, perhaps a high importance service class and a standard service class. As installations learn that a job is part of their critical path, or as they determine that a job needs to have a shorter elapsed time, the job can be assigned to the service class with the velocity goal. All other jobs would go into a standard service class that has a discretionary goal. Some sites with very tight batch windows may find that they'll need three service classes, one with a high velocity, one with a low velocity, and one with a discretionary goal.

SETTING UP PERFORMANCE GROUPS NOW Most installations currently place all production batch in a single batch jobclass and manage them with an automatic scheduling package. Unfortunately, most of the controls used by automatic schedulers are restricted to management of JES initiators and releasing jobs. There is little, if any, information given to MVS and SRM about how important each job is. This doesn't make it easy for SRM to manage the resources. I'd like to offer a suggestion that has worked in several sites, and will make the migration to goal mode very simple.

First, you'll need to identify your batch window critical path. You find critical paths by identifying the deadline jobs that must be complete by a specific time (e.g. 6:00am). Then identify all jobs that produce input to the deadline jobs, which, should they take longer, would delay the start of the deadline job. This will result in a set of jobs that must complete in order to produce the smallest batch window. Some of the jobs will overlap, and you can eliminate some of the jobs from consideration. Let me give an example. Assume that job A1 starts at 8:00pm, typically takes an hour to complete, and produces a file needed by job A4, which is on the critical path. Also at 8:00pm, job A2 is started and A2 produces input used by A3, which also produces a file needed by job A4. Jobs A2 and A3 normally take 15 minutes to complete.

```
A1.....A4.....
A2.....A3.....A4.....
...other jobs .....
```

Prior to WLM, the easiest way to manage such work is to put jobs A1 and A4 in a performance group with high priority controls (higher dispatch priority, controls that prevent swapping, etc.). A2 and A3 and other jobs would be placed in a standard production batch performance group. This will ensure that A4 is completed in the minimum amount of time. Of course, you'll always have to watch out for the situation where jobs A2 and A3 take longer to execute and they actually end up taking longer than A1. In that case, either A2 or A3 will need to be moved to the higher importance performance group. In some sites, the high importance jobs are placed in a separate jobclass that's assigned to the higher importance performance group, and in other sites, the high importance jobs contain a PERFORM statement that indicates the performance group.

Once identified, these jobs can be run in a unique jobclass (if possible), but definitely in a unique performance group. The performance group should have a much higher dispatch priority than other batch production jobs. If you can assign them to unique job classes, then provide sufficient initiators for just these jobs classes (inits with only the critical path jobclass defined). If storage is constrained, then consider providing storage isolation (to reduce paging delays) for the critical path performance group. Now, run your batch production cycle like you normally do.

If the critical path is still not completing on time, give it more resources (e.g. higher dispatch priority, more initiators, higher storage isolation, etc.) or tune the applications (such as using batch LSR to reduce the elapsed time).

The benefit to this technique prior to goal mode is that it makes it much easier to control the completion time of your deadline jobs if you've identified all of the jobs in the critical path and have given them a high access to the system resources.

MAPPING PGNS TO SERVICE CLASSES If you've set up performance groups as described above, you'll be able to create service classes which correspond to the current performance groups. Once you've installed SP 5, the RMF workload report will give you the execution velocity of the performance group while running in compatibility mode. See the EX VEL% in Figure 3. The execution velocity of performance group 10 in Figure 3 is 43.6% (that is, it's being delayed for some reason over 50% of the time). You can use this execution velocity as the initial goal for the important service class. If the critical path is taking too much elapsed time, you can give the jobs more service by increasing the execution velocity and/or the service class importance in comparison to other workloads. Be careful that you don't specify too high an objective for your critical path jobs. It would be possible to give them such a high importance and access to the resources that lower importance jobs would be seriously delayed and extend into prime shift. Even though the critical path jobs are completing far earlier than needed, this lower importance work could then adversely impact the online performance. WLM provides a very easy method to control your critical path if all important, related jobs are in the same service class. Most other production batch would have a WLM goal of discretionary.

EVALUATE TSO TSO is one of the easiest workloads to move to WLM goal mode. You'll have few, if any, changes.

TYPE	NUMBER OF ASIDS		
	MIN	MAX	AVG
BATCH	24	29	26.6
STC	95	101	97.6
TSO	79	87	84.0

Figure 6 - RMF CPU Activity (Extract)

HOW WLM WILL CONTROL TSO WLM goal mode manages TSO to its service objectives. You can set up a service class with multiple periods based on duration. You can set response goals (average or percentile) for first and second period TSO, and then use a velocity goal for the last period. The only major consideration for WLM goal mode is the use of MSO in determining the duration. The duration in goal mode is calculated in the same manner as compatibility mode, using the sum of TCB, SRB, IOC, and MSO service units. Since the default MSO SDC of 3.0 makes MSO a disproportionate part of the total service units (85% or more), and MSO varies considerably with other work in the system, it's to your benefit to reduce the MSO SDC as soon as possible. This will ensure more repeatable and consistent response times.

SETTING UP PERFORMANCE GROUPS NOW One of your first considerations for TSO today is to provide repeatable durations to define first and second periods. This can only be done by reducing the MSO SDC to a small value (less than .1 if possible). See my earlier discussion on MSO in the section on IPS changes. After you've made this change, you can collect current response times.

Most installations already have service objectives for TSO, based on average TSO (internal) response time. For example, most sites have a single TSO performance group with three periods. You might have an objective that 80% of your transactions should complete in first period with an average response time of .5 seconds, 10% of the transactions should complete in an average of 10 seconds, while 10% of the transactions have no response time goal. If you have this type of environment, leave the TSO performance groups as they're defined and simply convert them to a similar service class when you go to goal mode. You'll have already collected your response times in RMF, and don't need any further effort.

If you've defined multiple TSO performance groups, or more than three periods, you may want to consider combining them. While some installations have a definite need for four TSO periods, most sites will do fine with just three periods. Fewer periods take less overhead in pre-5.1 systems, and will definitely take less overhead in SP 5 goal mode systems. Three periods are also easier to set up and track for most every installation. They'll also convert to the most efficient service classes.

Following these recommendations will give you more knowledge about an important online application (TSO *is* an online system), and will provide a method of tracking important service level objectives for your users. The use of fewer periods can reduce overhead due to a reduction in period transitions. Tracking TSO response time can also help the performance analyst and capacity planner by providing an early warning system of performance problems. For example, if you see the response times start to increase, you can quickly respond to try to identify the problem.

MAPPING PGNS TO SERVICE CLASSES As I mentioned before, it will be relatively simple to map the TSO performance group to a service class with multiple periods. If you've been using multiple TSO performance groups to manage different groups of users, consider combining them into a single service class and use a report service class to report the users separately. Try to avoid using several multi-period service classes for TSO. WLM will be more effective if it has multiple address spaces in a single service class to monitor and control.

EVALUATE STARTED TASKS How many started tasks do you concurrently run? Most installations run between 50 and 200 started tasks. (You see, the operations and systems staffs have learned how much easier it is to run a started task than a batch job, so they do!) To see how many started tasks you run, just look at the first page of any RMF CPU report. In Figure 6, you can see the minimum, maximum, and average number of started tasks.

Do you know what they are? Most people don't. Often, STCs are really batch jobs disguised as started tasks, and they might scan VTOCs to produce a report, print tape labels, print address lists, create spreadsheets for the football pool (of course not!), run microfiche/microfilm jobs, etc. Unfortunately, most of these jobs are currently run at a very high dispatch priority because the default for started tasks is often quite high. Having a started task that scans VTOCs

while running at a higher dispatch priority than CICS is not a good thing. Unfortunately, there's little control over individual started tasks, since they don't really have turnaround goals, nor response times. Most installations simply give them a high dispatch priority and monitor whether they're delayed too much. Note that this discussion on started tasks does not include the online started tasks, such as CICS, which is covered next.

HOW WLM WILL CONTROL STCS In SP 5, you'll be able to put job cards on started tasks. This will allow you to associate accounting information with started tasks, which in turn will allow you to easily separate your varied started tasks into a small number of service classes. You can then let WLM manage them by using velocity or discretionary goals on the started task service classes.

WLM has two service classes that it will use for assignments. SYSTEM is a pre-defined service class used by very high priority work, such as the master scheduler, *MASTER*, CONSOLE, RASP, DUMPSRV, XCFAS, SMXC, WLM, ANTMAIN, IOSAS, SMF, and CATALOG. Another pre-defined service class is SYSSTC that can be used for your high priority tasks such as GRS, JES, and VTAM. (By the way, service class names starting with SYS are reserved for IBM's use.) SYSTEM and SYSSTC are considered very important service classes by WLM and have a high importance and velocity.

SETTING UP PERFORMANCE GROUPS NOW Unfortunately, in most sites today, there are far too many performance groups for started tasks. This has come about because of a misconception about the need to have separate, unique dispatch priorities for each started task (such as VTAM needs to be above JES which needs to be above theinits, etc.) There is really no reason to have the twenty to forty different dispatch priorities (and, resultant performance groups) that many sites have today. It's true that you'll need multiple performance groups to separate some of your work based on dispatch priority, but a small number should suffice. For your information, the dispatcher logic was changed in SP 5 to enable tasks to use the same dispatch priority without having one of the tasks hog the CPU and prevent the other task from getting to the CPU.

Some installations have multiple performance groups in order to report on each of their major started tasks, and that will still be possible in SP 5 with report service classes.

Here are two possible methods to prepare for WLM goal mode today. You can either redefine and simplify your current performance group structure, or you can assign multiple STC performance groups to a small set of domains and collect information by domain.

For the first method, you might consider managing the started tasks today by dividing all started tasks into just a few performance groups. The ICS tends to be longer, but the IPS is shorter, and much easier to manage. Additionally, the performance groups will convert over to service classes quite easily when you move to goal mode. You might consider the following groups:

MVS system tasks - These are the highest priority and used to provide MVS services. They'll include GRS, VTAM, JES3, JES2, ALLOCAS, TRACE, SMF, etc.

Monitors - These need to be a high priority in order to monitor other address spaces. They'll include RMF or CMF, Candle's Omegamon, Landmark's TMON/MVS, and similar products.

Online Systems - These will include your CICS, IMS, DB2, and similar **production** online systems. Test systems should not be included in these performance groups. I'll discuss these in the next two sections.

High priority started tasks - These are the installation's highest priority address spaces that need to be completed in a timely manner, and might include job scheduling packages and similar products. These are normally run at a lower dispatch priority than the online systems and monitors.

Standard started tasks - Everything else! These should normally be run in a dispatch priority close to either production batch or test batch, whichever the installation feels is most applicable. Test online systems would be included here. This performance group will contain the majority of the started tasks.

You might want to convert some of the started tasks that really *should* be batch jobs to batch jobs at this time.

If you don't know which started tasks you're running, there's plenty of information available. I would probably use the SMF type 30 records and collect all records for started tasks. Summarize the data on started task proc name and collect the amount of CPU time, the elapsed time, and the number of times that the proc was used. This type of report can provide some real surprises! Remember that if you don't use SMF interval recording, and you have a started task that is always active, you won't find any SMF records (since the task doesn't terminate until the system is shut down).

You can also use an online monitor, such as RMF Monitor II, to identify the started tasks by taking a snapshot of the started tasks that are currently in the system. Run this multiple times throughout the day, or simply run Monitor II in background, which collects data on SMF. As an example, you could use the RMF Monitor II command, 'ASDA,A,nn', to get a list of all address spaces running in domain nn. Just pick the domain that the default started tasks are assigned to (from the PGN=xx,...DMN=nn statement). You'll be able to find the started task names. Hopefully you can determine the users of the started task by looking at the JCL in PROCLIB (it might have some route codes or even comments indicating the owner). You can ignore any started task in performance group zero, since MVS has already assigned them to domain 0. (Although remember my earlier comments about the IPS regarding system tasks that you assign to a performance group.)

The second method mentioned above consists of keeping your current performance group assignments, but assigning them to a small set of domains that correspond to my suggested performance group "groupings" above. This will allow you to later assign service classes and collect consistent data for reports between compatibility mode and goal mode.

There are two advantages of using the first technique (small subset of performance groups) prior to moving to SP 5. First, it helps you move the lower priority started tasks to dispatch priorities below your important work. This reduces performance bottlenecks. Second, it provides an extremely easy way to manage hundreds of address spaces with minimal involvement.

MAPPING PGNS TO SERVICE CLASSES Once you've defined and started using your performance groups and moved to SP 5 compatibility mode, you'll be able to collect velocities for each of the high priority groups. This can then provide the starting point for velocity goals when you define corresponding service classes for goal mode.

EVALUATE CICS & IMS TRANSACTIONS You can run two different types of online systems: those that provide WLM support and those that don't. The products that currently support WLM are CICS/ESA 4.1.0 and IMS/ESA 5.1.0. Earlier releases can be run on SP 5, but won't be able to take advantage of the new WLM facilities. They'll be treated like other online products as described below.

HOW WLM WILL CONTROL CICS & IMS For the latest releases of CICS and IMS, WLM goal mode can manage resources in order to try to achieve response time goals (average or percentile) as defined for transactions. If you specify a response goal for all of the transactions in a CICS region, for example, WLM will attempt to provide the resources to that region in order to meet your goals (by managing dispatch priorities, access to storage, and other controls). Additionally, if you have additional products, such as CICSplex/SM (CP/SM), the products can use WLM's goals to manage their own transactions. For example, CP/SM might route transactions to one MRO region or another based on expected response times.

When setting up service classes, you'll be able to assign response goals to transactions based on transaction name, transaction class, LU name, net id, subsystem instance, or userid. As mentioned before, you don't want to restrict WLM's ability to manage the work by assigning too many service classes. In fact, a set of service classes for high importance, medium importance, and low importance are really all that will be needed for most installations. As an example, you might even use service class names such as CICSHIGH, CICSMED, and CICSLOW. The CICSHIGH service class would probably have a short response time goal, the CICSMED might have a higher response time goal, and the CICSLOW might have a velocity goal.

It's important to remember that WLM, by itself, can only provide resources to the online region and can't have any impact on response goals for two types of transactions in the same region. Only additional products, such as CP/SM, can manage at the transaction level.

SETTING UP PERFORMANCE GROUPS NOW You should try to convert to these new online releases as early as possible, since often a conversion to a new online release can take several weeks or months of testing. As I mentioned earlier, when it becomes available, CICS V 4.1 can be installed on MVS/ESA SP 3.1.3. In compatibility mode under SP 5, these releases allow you to collect transaction-level response times (although a WLM service policy will need to be defined and activated).

Once the products are installed, you can define a service policy and activate it (even if you aren't yet running in goal mode). Then you can turn on transaction-level collection by defining the IMS or CICS subsystem in the ICS. You can define report performance groups using a new selection parameter called SRVCLASS. RMF can start collecting the average response time and report it. Later, when you move to goal mode, you'll know the current response times for each of your CICS and IMS systems, and can define them for your service classes.

The steps needed to collect response times in compatibility mode after you've installed SP 5 consist of the following:

1. Define a WLM service policy (this consists of several steps).
2. Define and install a service class in that service policy for all CICS transactions. The IBM manual on Planning: Workload Management (see bibliography) has an example on page 34 that's a good one to use:

```
Service Class -
Service Class:      CICSALL
Description:        All CICS transactions
Goal:               5 second average response time
```

```
Classification Rules -
Subsystem Type:     CICS
Default Service Class: CICSALL
(By using these new releases that support WLM, you'll be able to define different service classes for each type of transaction.)
```

3. Define a report performance group in your ICS for the service class with:

```
SUBSYSTEM=CICS
SRVCLASS=CICSALL,RPGN=100
```

4. Now install the new ICS with "SET ICS=xx".

5. Activate the test service policy with "V WLM,POLICY=TEST". Please note that in compatibility mode, it's possible to define a WLM policy and "activate" it in order to collect data. This doesn't mean that you need to use WLM goal mode. These are two different steps. You can define a service policy with goals and "activate" the policy for data collection. Later, often months later, you can put the system into goal mode where WLM will manage the resources in order to attempt to meet the goals. To put a system in goal mode, you have to either IPL with the IPS=xx parameter missing, or issue the F WLM,MODE=GOAL command dynamically. At this point in time, you only want to activate the policy.

6. Now the RMF reports will provide you with average response time as an average of all CICS transactions.

One warning before you start this. If you haven't been using report performance groups before, make sure that your reporting programs differentiate between report groups and control groups or you may end up double counting the resource usage.

Even before moving to SP 5 and compatibility mode, you can (and should) be collecting response times for your online systems. The advantage of obtaining this information is the same as collecting response times for TSO - you'll be better able to track performance problems and changes in activity that will impact the available capacity of the machine.

MAPPING PGNS TO SERVICE CLASSES Once you've collected the response times for each online system, you can define service classes that correspond to the report performance group(s) you've defined. For data center reporting, you can easily map the report performance groups to the new service classes.

EVALUATE OTHER ONLINE SYSTEMS For online systems except the two mentioned in the previous section, you'll need to treat each online address space as simply a long-running batch job with no turnaround objective or a fairly high importance started task. These online systems include not only DB2 and non-IBM products, but include older versions of CICS and IMS as well. In compatibility mode, you'll manage these like you always have, by using dispatch priority and storage isolation. In goal mode, you'll manage them by assigning execution velocities. You'll probably want to specify a high execution velocity for your high priority online systems, and a low velocity goal (even as low as 5%) for your low priority and (especially) your test online systems.

In compatibility mode, be sure to separate your high priority online systems into a separate performance group, so you can start to collect the velocities. The velocities will start showing in the RMF Workload Activity report, as you can see in Figure 3. Be careful not to combine your test online systems with production systems. If you use non-IBM products, such as ADABAS, IDMS, Roscoe, Wylbur, etc., now's a good time to contact the vendor to find out their plans for goal mode. Do they plan to support workload management, and if so, when?

BECOME FAMILIAR WITH SYSPLEX

Before you can implement goal mode, you'll need to implement at least a monoplex (single system) sysplex. Therefore, it would be useful to become familiar with sysplex well before you're ready to convert to goal mode, even in a single-system installation. You'll need to understand

how to define and manage the supporting data sets (called couple data sets), parameters for the related parmlib members, and how to operate a sysplex. You can start the process if you're at SP 4 or later with the standard sysplex support. SP 5 expands that support with parallel sysplex facilities.

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SUMMARY

As you can see, there are plenty of things you can do to prepare for SP 5. Almost all of the preparatory items will provide some advantages to you in any environment from MVS/XA on. If you've completed the items in the checklist from Figure 1, your migration to SP 5 will be easy and productive.