



## WLM Quickstart Policy Update

Cheryl Watson  
Session 2541; SHARE 101 in Washington, D.C.  
August 12, 2003

Watson & Walker, Inc.  
publishers of “Cheryl Watson’s TUNING Letter” & BoxScore



## WLM Quickstart Policy Update

- What’s New for WLM in z/OS
- Quickstart Track Record
- Quickstart Policy
- Recommendations
- Common Mistakes

## What's New for WLM



- History is on WLM home page at:  
[www.ibm.com/zseries/zos/wlm](http://www.ibm.com/zseries/zos/wlm)

## What's New for WLM



- z/OS 1.1
  - zSeries Intelligent Resource Director (IRD)
    - LPAR CPU Management – WLM can change LPAR weights and number of logical processors
    - Dynamic Channel Path Management – WLM can move channel paths on the ESCON Director
    - Channel Subsystem Priority Queueing – WLM can assign I/O priorities
  - New classification qualifiers
    - system name, sysplex name, scheduling environment name, subsystem collection name (back to OS/390 R10)

## What's New for WLM



- z/OS 1.1
  - Storage Critical Classification Option (back to OS/390 R10)
  - CICS/IMS Region Management (back to OS/390 R10)
  - CPU Critical Classification Option (back to OS/390 R10)

## What's New for WLM



- z/OS 1.1
  - WLM Queuing Manager Services to limit number of server instances (back to OS/390 R7)
  - WLM Temporal Affinity (used by WebSphere; back to OS/390 R8)
  - Validity Checking of Service Definition (back to OS/390 R10)

## What's New for WLM



- z/OS 1.2
  - WLM Self Management - i.e. manages Linux LPARs
  - Application Environment Enhancements – WLM can dynamically manage the number of server tasks
  - Reporting Enhancements
    - Report classes can report same data as service classes
    - Using and delay for crypto processors
  - Enclave Registration Service (back to OS/390 R7)

## What's New for WLM



- z/OS 1.3
  - Removal of Compatibility Mode
  - Paging Availability Enhancement – WLM can use PAVs for paging devices to reduce paging delays (especially good for SVC dumps)
  - WLM Enclave Service Class Reset – SDSF can reset, resume or change enclaves
  - WLM Support for RMF III – WLM provides sub-capacity pricing capacity in MSUs for RMF (back to z/OS 1.2)
  - Remove Disconnect Time from I/O Using Samples – **Yippee!** (back to OS/390 R8)

## What's New for WLM



- z/OS 1.4
  - WLM Managed Batch Initiator Enhancements
    - WLM can turn on/off initiators across images in a sysplex in order to balance systems and meet goals
  - Application State Reporting
    - WLM adds subsystem work states for enclaves by using report performance blocks (PBs); PBs enhanced to add more state delays (e.g. waiting on SSL thread); report PBs can now be used for all types of goals, not just response goals; report PBs can be used for multi-period service classes (back to z/OS 1.2)

## What's New for WLM



- z/OS 1.4
  - New Classification Rules for WebSphere – TC & TN (back to OS/390 R8)
- z/OS 1.5 (?)
  - Initiator Dispatch Control
    - IEAOPTxx option called INITIMP to set the dispatch priority of the initiators
    - Look at APARs **OW55344**, **OA03581**, **OA03870**

## What's New for WLM



- Future – Enterprise Workload Management
  - First step - Report end-to-end response time even for transactions that move across multiple platforms
  - Second step – Set end-to-end response time goals that can be used for managing resources on each platform
  - Phased approach – sessions tomorrow:
    - 2534 – 9:30 - Enterprise Workload Manager: An Overview
    - 2535 – 1:30 - Enterprise Workload Management: Behind the Scenes

## Quickstart Track Record



- Introduced May/June 1995 in "Cheryl Watson's TUNING Letter" and available on our home page:  
[www.watsonwalker.com](http://www.watsonwalker.com)
- Used as basis of policy in several hundred installations
- High success rate
- Published in Stephen Samson's latest book, "MVS Performance Management" by McGraw-Hill
- Published on IBM's WLM Home Page:  
[www.ibm.com/zseries/zos/wlm](http://www.ibm.com/zseries/zos/wlm)

## Feedback



- In almost all cases, WLM goal mode is more successful than compatibility mode
- In almost all cases, WLM is able to react to obsessive workload faster
- In most cases, WLM can get batch turned faster at night even if using discretionary for majority of work
- Takes 1-2 weeks to implement in most sites; learning curve is high without classes or conferences like SHARE

## Current Policy



- 7 STC service classes (SCs) including SYSSTC (all single periods)
- 7 batch service classes (all single periods)
- 2 online transaction service classes
- 1 two-period TSO service class
- 2 new work service classes
- 2 system service classes
- Total of 18 periods with non-discretionary goals
- Percentile response times used whenever possible
- Wide ranges of velocities (5, 30, 50%)

## Recent Changes to Quickstart



- Described in Cheryl's List #76, April 10, 2003
- Changed STC classification rules to use default of STCLO instead of SYSSTC by using the SPM rules
- Enabled the I/O Priority Management option
- Updated the description of CICS and IMS subsystems to recommend using response time goals initially

## Recent Changes to Quickstart



- Assigned transaction versus region management for production online systems, but still retained region management for test and older online systems
- Added a new SC, NEWWORKV, for new work that requires a velocity goal instead of a response goal - changed some new workloads to use NEWWORKV instead of NEWWORK
- Set the Dynamic Alias Management service option to NO (the default)



## Recent Changes to Quickstart



- Added a PRDBATMD service class for medium-priority batch work
- Changed some velocities (PRDBATHI) so that a velocity of 30% would always have higher priority than discretionary work
- Added new workloads for MQSeries (MQ), NetView (NETV), Oracle (ODSI), SAP R/3 (SAP) and WebSphere (CB)

## Recent Changes to Quickstart



- Changed all report class names to begin with 'R'; added report classes to every service class
- Changed service class names ONLPRDLO and ONLPRDHI to TRANLO and TRANHI (too similar to region managed SCs of ONLPRD and ONLTST); added classification groups for these
- Added description fields to classification rules and groups

## Recent Changes to Quickstart



- Revised the contents of many of the classification group contents
- Updated some of the documentation to provide more thorough explanations
- Updated level to OS/390 R10 for distribution of PDS containing the policy

## Recommendations



- Consider two-period TSO
  - Many sites can use just two periods if you need more service class periods
  - Look at volume of second period and, if small, then could include into first period
  - Caution: reported first period average response time will increase
- Use wide velocity ranges (over 5 or 10 between velocities)

## Recommendations



- Cautions:
  - If running OpenEdition transactions in TSO
    - The work is run in a server address space, so TSO doesn't accumulate service
    - Therefore, TSO user could stay in first period for a long period of time
    - Therefore, TSO response times in first period could be very long (e.g. 20 seconds)
    - So be sure to use percentile goals, not average goals
  - Define all subsystems because often the default (like for DDF) is to have all work fall into discretionary

## Recommendations



- I/O Priority Management Started with OS/390 R3
  - Option on Service Definition Panel
    - I/O using = connect plus disconnect
    - I/O delay = pending plus IOSQ
  - This simply didn't work, so recommendation was to turn it off
- We now recommend turning it on
  - Starting with z/OS 1.3, disconnect samples were removed from sampling
    - Or APAR **OW47667**, back to OS/390 R8

## Recommendations



- Learn to analyze WLM reports
  - First analyze WLM by sysplex
    - This is WLM's view of the workload
    - A P.I. of 1.0 at the sysplex level doesn't necessarily mean that all systems are meeting the goal
  - Then analyze WLM for each system
    - This is what's really going on
  - For P.I.s over 1.0, look for largest delay reason
    - If other, then you have external tuning to do

## Recommendations



- Plan on re-evaluating all goals after any hardware change (Velocity of 40 could be 90 after an upgrade)
- Restrict abusive users with resource group capping
- Handle small use, but important, transactions by combining them with other transactions

## Recommendations



- Use transaction response goals (and maybe CPU Critical) to CICS. The sampling is every .25 seconds for regions with transaction goals and 2.5 seconds for regions with region goals.
- One example from **Jim Petersen** of HomeSide Lending: "We 1) set all of our Production Regions to Transaction Management 2) set all of our other CICS regions to Region Management, and 3) set the CICS Transaction Management groups to CPU Critical. Our average response time per transaction has dropped from .15 sec to .06 sec."

## Recommendations



- For migration add some dummy service classes
  - SCVEL10 - 10%
  - SCVEL20 - 20%
  - SCVEL30 - 30%
  - SCVEL40 - 40%
  - SCVEL50 - 50%
  - SCVEL60 - 60%
  - SCVEL70 - 70%
  - SCVEL80 - 80%
  - SCVEL90 - 90%
- Don't classify any work to these (then no overhead)
- Use operator command to move work to one of these if response times are unacceptable with assigned velocities
- This saves activating a new policy

## Common Mistakes



- Not ensuring that enough transactions complete in an interval
  - Recommendation is that you have at least ten ended transactions in a twenty minute period before using an average or percentile response goal - else use velocity goal or discretionary
- Having too many service class periods
  - Recommendation is that you have no more than 25 service class periods with non-discretionary goals
  - Result is less effective management of workloads, especially at the low importance service classes

## Common Mistakes



- Not reducing MSO service definition
- Reducing MSO, CPU, SRB, IOC coefficients and not changing duration
  - Result is WLM will be more aggressive and give more service to these users at the expense of others
  - My recommendation is: CPU=1, SRB=1, IOC=.1, MSO=0

## Common Mistakes



- Not understanding that WLM is more aggressive with paging
  - Paging rate will almost always go up when goal mode activated
  - You absolutely need multiple local page data sets (6 to 10); if you don't normally do paging, then can put on non-dedicated volumes
  - One suggestion: define some page volumes with a page data set from each system in the sysplex (likelihood that two at a time will incur high paging at the same time is slim)

## Common Mistakes



- Using response times or velocities collected over a long period as basis for setting goals
  - These will always be low response times and high velocities
  - During peak period, this work will be favored at expense of others
  - Use peak interval (e.g. 15-minute) for determining goals

## Frequent Problem



- This occurs mainly on uni- or dyadic machines
- High importance work uses a lot of CPU, exceeding its goal and using cycles that could be used by discretionary (e.g. CICS response time is .3 seconds instead of goal of 1 second)
- Two problems:
  - Discretionary doesn't get the excess cycles and languishes a long time
  - Users get used to rapid response and complain when response time drops to the goal you all agreed upon

## Frequent Problem



- Only known solutions:
  - Put resource group cap on loved one, but not an ideal solution because –
    - this only applies when the activity is very high
    - it could hurt loved one if the increased CPU is due to increased transactions
    - It must continually be monitored
  - Put discretionary in a low velocity goal
    - I.e. guarantee discretionary some minimum service
    - This must also be continually monitored



## Winners!



- WLM Managed Batch Initiators
- CPU Critical (although I think it is often over-used)
- CICS transaction goals
- Resource groups for capping individual workloads
- Dynamic PAVs

## Questions?



- **Email:**  
[cheryl@watsonwalker.com](mailto:cheryl@watsonwalker.com)
- **Web site:**  
[www.watsonwalker.com](http://www.watsonwalker.com)