Rule WLM023: Too many service class periods may have been specified

Finding: CPExpert believes that too many service class periods may have been specified in the service definition.

Impact: This finding has a HIGH impact on the performance of service class periods.

Logic flow: The following rules cause this rule to be invoked:

Rule WLM101:	Service Class did not achieve average response goal
Rule WLM102:	Service Class did not achieve percentile response goal
Rule WLM103:	Service Class did not achieve execution velocity goal
Rule WLM104:	Subsystem Service Class did not achieve average response goal
Rule WLM105:	Subsystem Service Class did not achieve percentile response goal

Discussion: Users assign workload to a service class and specify the performance goal and goal importance of the service class. A service class can represent any collection of workload that can be classified using the workload classification schemes available with the Workload Manager. Each service class has Period 1 automatically defined. Optionally, users also may define multiple performance periods for service classes.

Service classes are much like performance groups available with MVS prior to Goal Mode, in that a workload classification scheme is used assign workloads to both service classes and performance groups. Another (unfortunate) similarity is that up to 999 performance groups can be defined and up to 1000 service classes can be defined. One result of these similarities is that users may perform a simple conversion of pre-Goal Mode performance group periods to Goal Mode service class periods.

This straightforward conversion is not a sound policy.

There was little performance impact of defining a large number of performance groups with pre-Goal Mode. There can be a **significant** performance impact of defining a large number of service class periods!

- The Workload Manager will adjust system resource allocation in an attempt to improve performance of only one service class period during

a policy adjustment interval[1]. Adjustment to improve performance of only one service class period is done because the Workload Manager must observe the results of the adjustment; whether the adjustment helped performance, hurt performance, or had no effect. If adjustments were made to improve performance of more than one service class period, it would be impossible to determine which adjustment helped or hurt which service class period. Consequently, actions to improve the performance of only one service class period is done during each policy adjustment interval.

The policy adjustment interval is 10 seconds. If too many service class periods have been defined, the Workload Manager may be able to adjust system resource allocation to help only a few service class periods (the most important service class periods with the worst performance). Performance of other service class periods may never be improved, or performance improvement actions may take a long time - simply because of the elapsed time necessary for the Workload Manager to make changes, collect data, analyze the effect of the changes, make additional changes, collect more data, and continue the process.

- Perhaps of equal significance is the overhead associated with analyzing service class periods. The Workload Manager tries to improve performance of the service class period with the worst performance at the highest goal importance. Resources may be taken from the least important service class period with the best performance. The Workload Manager will not simply remove and add resources; rather, the Workload Manager will analyze the net value of the planned action.

  The Workload Manager will not add resources unless there is an appreciable net gain to the service class period receiving the resources. Within the same goal importance, the Workload Manager will not remove resources from a service class period unless the net gain to the receiver outweighs the net loss to the service class period the resources are being removed from. The overhead involved with the analysis and decision process increases as the number of service class periods becomes large.

IBM SRM/WLM developers have indicated that a small number of service class periods is desirable. They have observed that the Workload Manager algorithms typically become increasingly ineffective as the number of service class periods grows. As "rule of thumb" guidance, the developers have stated that most users should use only 25 service class

[1]The Workload Manager will consider adjustments to improve performance of several service classes (starting with the most important service class which has the highest Performance Index). If performance of the first service class analyzed cannot be appreciably improved, the Workload Manager will select the next worst performing service class, etc. After the Workload Manager has "committed" to a policy adjustment for a service class, it will stop analysis and adjust resources for no other service class.

periods and that no more than 30 service class periods normally should be defined.

From a practical matter, service class periods with a discretionary goal do not cause concern. This is because the Workload Manager groups all service class periods with a discretionary goal (and not assigned to a resource group) into the **$SRMDI00** internal service class, and treats them as a single service class.

CPExpert produces Rule WLM023 when it detects that (1) at least one service class period did not achieve its performance goal and (2) more than 30 service class periods with non-discretionary goals were defined.

The following example illustrates the output from Rule WLM023:

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RULE WLM023:  TOO MANY SERVICE CLASS PERIODS MAY HAVE BEEN DEFINED

  CPExpert believes that you may have defined too many service class
  periods.  At least one service class did not meet its service goal,
  and a relatively large number of service class periods were defined.
  If too many service class periods are defined, the Workload Manager
  may not be able to adjust its resource allocation policies to meet
  the service goal of every service class period.  You specified a total
  of 41 service class periods with non-discretionary service goals.
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Suggestion: CPExpert suggests that you revise your Service Policy to reduce the number of service class periods.

Reference: MVS Planning: Workload Management

OS/390 (V2R4):	Chapter 8.3: Using Performance Periods
OS/390 (V2R5):	Chapter 8.3: Using Performance Periods
OS/390 (V2R6):	Chapter 8.3: Using Performance Periods
OS/390 (V2R7):	Chapter 8.3: Using Performance Periods
OS/390 (V2R8):	Chapter 8.3: Using Performance Periods
OS/390 (V2R9):	Chapter 8.3: Using Performance Periods
OS/390 (V2R10):	Chapter 8.3: Using Performance Periods
z/OS (V1R1):	Chapter 8.3: Using Performance Periods
z/OS (V1R2):	Chapter 8.3: Using Performance Periods
z/OS (V1R3):	Chapter 8.3: Using Performance Periods
z/OS (V1R4):	Chapter 8.3: Using Performance Periods

"Effective use of MVS Workload Manager Controls", Berkel, Ed and Enrico, Peter (IBM Corporation), *CMG'95 Proceedings*, page 14.