Rule WLM005: Velocity Goal may be too high for batch service class

Finding: CPExpert noticed that a high velocity goal was specified for a service class, and CPExpert believes that the service class describes batch workloads.

Impact: This finding can have a HIGH IMPACT on performance of your computer system.

Logic flow: This is a basic finding. There are no predecessor rules.

Discussion: Installations may specify an *execution velocity goal* for a service class. An execution velocity goal is a measure of how fast work should run when the work is **ready** to run, without being delayed waiting for WLM-managed resources. Delays for WLM-managed resources include delays waiting for access to a CPU, delays waiting for storage-related activities, and delays waiting for I/O access.

- Delays waiting for storage-related activities include:
  Paging delays
  Swapping delays
  Multiprogramming level (MPL) delays
  Server address space creation delays
  Initiation delays for batch jobs in WLM-managed job classes.

- Delays waiting for I/O access:
  IOS queue delays
  Subchannel pending delays
  Control unit queue delays

With z/OS Version 2 Release 2, IBM includes[1] the following discussion:

> Velocity goals are more sensitive to configuration changes than response time goals and should be monitored and adjusted when required after configuration changes. These configuration changes include:
> - Change to the physical configuration, such as a new processor type.
> - Changes to the capacity that is available to a system.
> - Changes to the logical configuration, such as significant changes to the number of online processors, or implementation of HiperDispatch, or implementation of multi-threading

[1] MVS Planning: Workload Management Version 2 Release 2 (Chapter 8. Defining service classes and performance goals (Defining velocity goals)

The purpose of specifying an execution velocity is to allow installations to specify how important it is to have work being processed, when the work has no time-related measure (that is, a response requirement is not associated with the work). An execution velocity goal is suitable for most batch work and most started tasks.

Many installations will specify an execution velocity goal for batch work, and base the actual goal on the batch execution velocity presented in the RMF *Workload Activity Report* produced in Compatibility Mode. The batch execution velocity in the RMF *Workload Activity Report* reflects what **was achieved** by the system executing in Compatibility Mode, but does not necessarily reflect **what should be achieved**.

There often is a dramatic difference between what **was** achieved and what **should be** achieved. Batch work often will achieve a relatively high execution velocity. This execution velocity is not often suitable for a batch performance goal unless the workload is extremely stable.

For example, the resource requirements of system workloads often vary from day to day or week to week. This variance may allow batch work executing in Compatibility Mode to achieve a high execution velocity in periods of relatively low overall system demand. This high execution velocity may not be required to meet installation objectives.

A high execution velocity goal can cause significant system problems if there is the possibility of batch work (or other types of work, for that matter) to be erratic in nature. For example, if batch jobs can enter into a CPU loop, the batch workload may "seize" the system for whatever percentage was specified as the execution velocity. To illustrate, suppose that an execution velocity of 50 was specified for a batch service class. A CPU-intensive batch job (or CPU-looping job) could require 50% of the CPU and deny CPU access to all work of equal or lower importance.

IBM Workload Manager developers have suggested that an execution velocity of 10 or 20 should be adequate for most batch service classes. These values are based on their observations that most batch jobs are naturally I/O intensive, rather than CPU intensive.

CPExpert scans the Service Class Description (SMF Type 72 field R723MCDE) for the word "batch" and assumes that the service class describes batch workloads if "batch" is encountered. Two considerations apply:

- It is, of course, possible that the service class does not describe batch workloads even though "batch" is in the description. This instance is

unlikely, as most installations will use the word "batch" in a description of only batch work.

- It also is possible that the word "batch" will not be in the description of a service class of batch workload. CPExpert will be unable to detect these situations.

If CPExpert detects "batch" in the Service Class Description, CPExpert examines the performance goal type to see whether the goal type is execution velocity. If the goal type is execution velocity, CPExpert examines the performance goal. CPExpert produces Rule WLM005 if the performance goal is greater than the **MAXVEL** guidance variable in USOURCE(WLMGUIDE).

The default value for the MAXVEL guidance variable is 20, indicating that Rule WLM005 will be produced if more than 20 had been specified as an execution velocity goal for a service class containing batch workload.

The following example illustrates the output from Rule WLM005:

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RULE WLM005:  VELOCITY GOAL MAY BE TOO HIGH FOR BATCH SERVICE CLASS

   CPExpert noticed that BATCHA Service Class (Period 1) had an execution
   velocity goal of 30.  The BATCHA Service Class had the word "batch"
   in its Service Class Description.  Consequently CPExpert assumes that
   the service class consists of batch jobs.  Specifying a relatively
   high velocity goal of 30 for batch jobs may cause performance problems
   unless the batch jobs are well-behaved.  Under some circumstances, this
   velocity goal could result in 30% of the system being used by batch
   workload.  Please refer to Rule WLM005 in the WLM Component User Manual
   for a discussion of this issue.
```

Suggestion: CPExpert suggests that you consider lowering the execution velocity goal for the service class containing batch workload.

Alternatively, if you believe that your specification is appropriate, you can use the MAXVEL guidance variable to provide guidance to CPExpert. Since 99 is the maximum execution velocity specification for the Workload Manager, you can disable Rule WLM005 by specifying a value of 99 for the MAXVEL guidance variable.

Reference: MVS Planning: Workload Management

MVS/ESA(SP 5):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V1R1):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V1R2):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V1R3):	Chapter 8: Defining Service Classes and Performance Goals

OS/390 (V2R4):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V2R5):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V2R6):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V2R7):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V2R8):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V2R9):	Chapter 8: Defining Service Classes and Performance Goals
OS/390 (V2R10):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R1):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R2):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R3):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R4):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R5):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R6):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R7):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R8):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R9):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R10):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R11):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R12):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V1R13):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V2R1):	Chapter 8: Defining Service Classes and Performance Goals
z/OS (V2R2):	Chapter 8: Defining Service Classes and Performance Goals

"MVS WLM: What it is and what you should know to use it", Bernie Pierce (Candle Corporation; previously at IBM Corporation as Workload Manager Developer), 1995 SHARE Winter Meeting

"MVS Workload Manager velocity goals: what you don't know can hurt you," John Arwe, IBM Corporation, 522 South Road, Poughkeepsie, NY 12601-5400 (http://www-03.ibm.com/systems/resources/servers_eserver_zseries_zos_wlm_pdf_velocity_pdf_velocity.pdf)

