
Rule WLM080: JES-managed and WLM-managed job classes conflict

Finding: CPExpert has detected that a service class included both JES-managed job classes and WLM-managed job classes.

Impact: This finding should be viewed a LOW IMPACT, MEDIUM IMPACT, or HIGH IMPACT on the performance of the batch jobs assigned to the service class. The level of impact will depend primarily on the number of JES-managed and WLM-managed jobs executing in the conflicting job classes.

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

Discussion: With OS/390 Version 2 Release 4, the Workload Manager allows installations to define job classes as being managed by Job Entry Subsystem (JES) or by the Workload Manager (WLM).

- For jobs assigned to JES-managed job classes, the normal selection of the jobs for initiation will be done. That is, JES initiators will select jobs from the job class queue based on the normal selection criteria (e.g., priority, aging, resource affinity, etc.).
- For jobs assigned to WLM-managed job classes, the WLM will control selection of jobs by dynamically changing the number of WLM initiators and/or their work selection criteria. These actions will be taken by the WLM in an attempt to meet installation defined goals for the service classes to which the jobs are classified.

WLM control of batch work is enabled by changing the mode of a JES2 job class (on a job class by job class basis) to MODE=WLM. When that is done, no job in that JES2 job class will be selected by normal JES2 initiators. Instead WLM will be informed of the jobs waiting execution and will start and stop WLM controlled initiators based the current backlog of work.

After conversion of a job's JCL, JES2 places the job into an appropriate class queue to await execution. If the job class is a JES2 managed class (JOBCLASS MODE=JES), JES2 initiators select a job from the class queue (depending on the job's priority) and pass control to MVS to execute your program. If the job class is a WLM managed class (JOBCLASS MODE=WLM), JES provides the WLM with a list of jobs waiting to execute, by service class. Based on installation goals for the service classes, the WLM can determine whether job queue time is a significant delay to a

service class meeting its performance goal. If so, the WLM might start an initiator for a job class assigned to the service class.

Job initiators for WLM managed job classes are controlled dynamically by workload management. These initiators run under the Master Subsystem and are not assigned JES2 job numbers. WLM can adjust the number of initiators on each system based on:

- The queue of jobs awaiting execution in WLM managed classes.
- The performance goals and relative importance of this work.
- The success of meeting these goals.
- The capacity of each system to do more work.

The WLM evaluates the performance of service class periods relative to the performance goals established by the installation. It is important to appreciate that the performance of a service class period *is based on the work executing in the service class*. Further, the delays to work in the service class *is based on all work executing in the service class*. If the service class consists of jobs from JES-managed queues and jobs from WLM-managed queues, the WLM will be unable to distinguish delays caused by JES-managed jobs from those caused by WLM-managed jobs. Further, the JES-managed jobs could (and probably would) have different execution characteristics from the WLM-managed jobs.

When the WLM examines service class delays, it attempts to manage resource allocation to eliminate the most serious delays, where eliminating the delay would cause performance to be significantly improved.

If the work executing in the service class consists of JES-managed jobs (for which the WLM has no initiator control) and WLM-managed jobs (for which the WLM does have initiator control), the WLM will be unable to effectively determine whether execution queue delay would significantly improve performance of the work executing in a service class.

The OS/390 MVS Planning: Workload Management document specifically states that: *“All jobs with the same service class should be managed by the same type of initiation. For example, if jobs in job classes A and B are classified to the HOTBATCH service class, and JOBCLASS(A) is MODE=WLM, while JOBCLASS(B) is MODE=JES, workload management will have a very difficult time managing the goals of the HOTBATCH service class without managing class B jobs.”*

Prior to OS/390 Version 2 Release 9, only the SMF Type 26 records contained an indication as to whether a job was assigned a job class

with MODE=JES or MODE=WLM. Since SMF Type 26 records are not often kept in a performance data base (and are not available until after a job has ended) analysis of conflicts between JES-managed and WLM-managed initiators was not feasible. Consequently, CPEXpert requested that IBM place an indicator in the SMF Type 30 records so that potential problems with WLM-managed initiators could be analyzed. With OS/390 Version 2 Release 9, IBM created the SMF30WMI indicator as a part of the SMF30PF1 (performance section flag byte) variable.

CPEXpert examines the SMF30WMI indicator in SMF Type 30 records to determine whether a job is assigned to a JES-managed or WLM-managed initiator. CPEXpert then determines the service classes to which the jobs are assigned.

CPEXpert produces Rule WLM080 if any jobs with MODE=JES are assigned to the same service class as jobs with MODE=WLM.

The following example illustrates the output from Rule WLM080:

```
RULE WLM080: JES-MANAGED AND WLM-MANAGED JOB CLASSES CONFLICT

CPEXpert detected that a service class included both JES-managed job
classes and WLM-managed job classes. The Workload Manager might not
effectively meet its goals of managing initiators if some jobs are
initiated through JES and other jobs are initiated through the Workload
Manager. The following information describes the jobs that executed
and whether they were assigned to a job class initiated by JES or to
a job class initiated by the Workload Manager. Additionally, the
information shows whether an operator changed the service class to
which the job was assigned.

      JOB  SERVICE
JOB NAME CLASS  CLASS  INIT INITIATOR TIME      SYSTEM  OPERATOR ACTION
CQQUERY  R   DISCR   WLM 17MAR2000:15:01:09  J90
CQQUERY  R   DISCR   WLM 17MAR2000:15:15:29  J90
CQCHKPT  R   DISCR   WLM 17MAR2000:15:15:34  J90
AS151810 K   DISCR   JES 17MAR2000:15:18:19  JG0      SRV CLS CHG BEFORE INIT
```

The OPERATOR ACTION information provided with Rule WLM080 will include:

- Job service class association was modified by a system operator prior to job initiation.
- Job service class association was modified by a system operator during job initiation.
- Job service initiation was forced by a system operator.
- Job has been restarted.

Suggestion: CPExpert suggests that you change the workload classification scheme or change the job class MODE definition to eliminate the conflicts between jobs assigned to JES-managed and WLM-managed initiators.

Reference: MVS Planning: Workload Management
OS/390 (V2R4): Section 3.3: Batch Workload Management
OS/390 (V2R5): Section 3.3: Batch Workload Management
OS/390 (V2R6): Section 3.3: Batch Workload Management
OS/390 (V2R7): Section 3.3: Batch Workload Management
OS/390 (V2R8): Section 3.3: Batch Workload Management
OS/390 (V2R9): Section 3.3: Batch Workload Management
OS/390 (V2R10): Section 3.3: Batch Workload Management
z/OS (V1R1): Section 3.3: Batch Workload Management
z/OS (V1R2): Section 3.3: Batch Workload Management
z/OS (V1R3): Section 3.3: Batch Workload Management
z/OS (V1R4): Section 3.3: Batch Workload Management