
Rule WLM112: BTE Phase had large number of Active plus Ready samples

Finding: CPExpert has detected that a large percent of the `begin_to_end` (BTE) phase samples were in the Active state or Ready state. This finding applies only to service classes representing CICS/ESA Version 4 transactions.

Impact: This finding means that non-routed transactions were processed in the service class. The presence of these transactions can distort response time calculations.

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

- Rule WLM104: Subsystem Service Class did not achieve average response goal
- Rule WLM105: Subsystem Service Class did not achieve percentile response goal

Discussion: CICS/ESA Version 4.1 reports two separate views of the transactions: the *begin_to_end phase* and the *execution phase*¹.

- **Begin_to_end phase.** The `begin_to_end` phase starts when CICS/ESA Version 4.1 has classified the transaction². This action normally is done in a CICS Terminal Owning Region (TOR).
- **Execution phase.** The execution phase starts when either CICS/ESA Version 4.1 or IMS Version 5 has started an application task to process the transaction. For CICS, this normally is done in a CICS Application Owning Region (AOR).

CICS provides the System Resources Manager (SRM) with information about the phase (`begin_to_end` or `execution`) of transactions by executing the `IWMMINIT` ("Initialize the Monitoring Environment") macro. The `DURATION` parameter of the `IWMMINIT` macro tells the SRM whether the following information related to a transaction is associated with the `begin_to_end` phase or with the `execution` phase.

¹IMS Version 5 reports only *execution phase* samples.

²Classifying the transaction into a service class is actually done by the Workload Manager when CICS issues the `IWMCLSFY` macro. Please refer to Section 4 for a more complete discussion of the subsystem work manager (e.g., CICS) interaction with the Workload Manager.

The IWMMINIT macro is issued immediately after CICS has issued the IWMCLSFY ("Assigning Incoming Work Requests to a Service Class") macro to establish a service class for a transaction. Thus, the SRM quickly knows (1) the service class to which a transaction belongs and (2) whether the transaction is in its begin_to_end phase or in its execution phase.

CICS or IMS will provide the SRM with information about the state of the transaction (active state, ready state, waiting state, etc.) by issuing the IWMMCHST ("Change State of Work Request") macro. The SRM simply sets bits in a status word to indicate the state of a transaction.

The SRM periodically samples the status word associated with each transaction³, and updates counters representing the state of transactions executing in the service class. There is a status word for the begin_to_end phase and a status word for the execution phase, and separate sets of counters are maintained for the various begin_to_end states and execution states for each service class

Included in the state reported by CICS are the times the transaction is in an Active state and the times the transaction is in a Ready state.

- **Active state.** The active state indicates that there was a program executing on behalf of the work request in the "served" service class, from the perspective of the work manager. In the case of a CICS region, this means that a CICS task has been dispatched by CICS to process the transaction.

However, the active state **does not mean that the task is executing** from the perspective of MVS. It simply means that the task has been dispatched by CICS. Other address spaces with a higher system dispatching priority could preempt the task dispatched by CICS and these other address spaces could be using the CPU. The situation in which the CICS application task is denied use of the CPU is unknown to CICS.

- **Ready state.** The ready state indicates that there was a program ready to execute on behalf of a work request in the "served" service class, but that the work manager has given priority to another work request. In the case of a CICS region, this means that there were more CICS tasks ready to execute in the "served" service class than were dispatched by CICS.

CICS transactions typically enter the system via a CICS TOR. The transactions receive some initial processing in the TOR and are routed to

³With MVS/ESA SP5.1, the SRM takes its samples every 250 milliseconds.

an AOR for actual application processing. CICS signals the beginning of the execution phase for the transaction when the transaction is received by the AOR.

Some transactions are not routed to an AOR, however. These transactions are completely processed in the TOR. Since the AOR signals the beginning of the execution phase, these transactions never enter the execution phase. Consequently, the number of transactions completing the execution phase may be less than the total number of CICS transactions processed by the system.

If non-routed transactions are processed in a service class with a response objective, the non-routed transactions can distort response time calculations.

The service class being analyzed by CPEXpert exceeded its performance objective (as reported by Rule WLM104 or Rule WLM105). Further, CPEXpert had been directed to analyze response time based on the execution phase⁴.

CPEXpert produces Rule WLM112 when the Active samples plus Ready samples account for more than 25% of the number of begin_to_end samples AND when you have directed CPEXpert to analyze response delays based on the execution phase. CPEXpert concludes that a large percentage of non-routed transactions are processed in the service class if more than 25% of the transaction samples occurred in the Active state and Ready state of the begin_to_end phase.

Since CPEXpert is analyzing response delays based on execution phase samples, Rule WLM112 advises you that the analysis is significantly corrupted by the large number of non-routed transactions. Further, the Workload Manager's algorithms will be less effective if non-routed transactions are assigned to the same service class as routed transactions.

Suggestion: CPEXpert suggests that you identify the non-routed transactions and remove them for the service class identified by Rule WLM112. Since the CICS transactions are non-routed, they should not be included in the same service class as routed transactions.

IBM suggests the following guidance for CICS transactions:

- Do not mix CICS-supplied transactions with user transactions

⁴That is, you had specified %LET PHASE=EXECUTION in USOURCE(WLMGUIDE).

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- Do not mix routed with non-routed transactions.
 - Do not mix conversational with pseudo-conversational transactions
 - Do not mix long-running and short-running transactions.

Reference: CICS/ESA Version 4.1 Performance Guide
Section 2.6.3.1: Service Definitions

CICS/TS Release 1.1 Performance Guide
Section 2.6.3.1: Service Definitions

CICS/TS Release 1.2 Performance Guide
Section 2.6.3.1: Service Definitions

CICS/TS Release 1.3 Performance Guide
Section 2.5.7.1: Service Definitions

CICS/TS for z/OS Release 2.1 *Performance Guide*: Chapter 8 (Managing Workloads - Setting up service definitions).

CICS/TS for z/OS Release 2.2 *Performance Guide*: Chapter 8 (Managing Workloads - Setting up service definitions). |