Rule WLM130: Significant transaction time was in Waiting for Timer state

Finding: A significant amount of the transaction response time for the service class missing its performance goal was spent in the Waiting for Timer state. This finding applies to service classes that are part of a subsystem (e.g., CICS transactions).

Impact: This finding has MEDIUM IMPACT or HIGH IMPACT on performance of the service class. The level of impact depends on the percent of transaction response time spent in the Waiting for Timer state.

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: When CPExpert produces Rule WLM104 or Rule WLM105 to indicate that a subsystem service class did not achieve its performance goal, the logic of these rules tries to identify the cause of the delay. The cause of the delay initially is analyzed from the "served" service class view. The delays from the served service class are reported by CICS (with CICS/ESA Version 4.1 and later) or by IMS (with IMSVersion 5 or later). Interaction with the Workload Manager is accomplished using the Workload Management Services macros[1].

CICS reports two separate views of the transactions: the *begin_to_end phase* and the *execution phase*[2].

- **Begin_to_end phase**. The begin_to_end phase starts when CICS has classified the transaction[3]. This action normally is done in a CICS Terminal Owning Region (TOR).

- **Execution phase**. The execution phase starts when either CICS or IMS (Version 5 or later) has started an application task to process the

[1]Please refer to Section 4 of this document for more detail about the Workload Management Services macros and how the subsystems use these macros to exchange information with the Workload Manager.

[2]IMS Version 5 reports only *execution phase* samples.

[3]Classifying the transaction into a service class is done by the Workload Manager when the subsystem manager 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.

transaction. For CICS, this normally is done in a CICS Application Owning Region (AOR). For IMS, this is done in an IMS Message Processing Region (MPR).

Within each phase, CICS or IMS report the "state" of the transaction, from the view of CICS or IMS. The state of the transaction is reported in the following categories[4]:

- **Idle state**. (Both CICS and IMS report this state.
- **Ready state**. Only CICS reports this state.
- **Active state**. Both CICS and IMS report this state.
- **Wait state**. Both CICS and IMS report this state, but IMS provides only Wait for I/O state and Wait for Lock state.
- **Switched state**. Only CICS reports this state.

If the subsystem supports work manager delay reporting, the delay information is available in the "Work Manager/Resource Manger State Section" of SMF Type 72 (Subtype 3) records. When a transaction service class fails to achieve its performance goal, CPExpert analyzes the information to identify the primary and secondary causes of delay.

The Wait state indicates that a task in support of the transaction was waiting on some activity. The Wait state is broken into several categories: waiting for lock, waiting for I/O, waiting for conversation, waiting for distributed request, waiting for a session to be established (locally, somewhere in the network, or somewhere in the sysplex), waiting for a timer, waiting for another product, waiting for a new latch, waiting for SSL thread, waiting for regular thread, waiting for work table, or waiting for an unidentified resource.

CICS reports the time when a work unit (that is, a task in support of a transaction) was waiting for a timer to expire or for an interval control event to complete. These timer delays normally occur when an application had issued an EXEC CICS DELAY command or EXEC CICS WAIT EVENT command.

CPExpert produces Rule WLM130 when the primary or secondary cause of delay was that the transaction service class was in the Waiting for Timer state for a significant percent of its response time.

[4]Please refer to Section 4 of this document for a more comprehensive discussion of the transaction states and the interaction between the subsystem (CICS or IMS) and the Workload Manager.

The following example illustrates the output from Rule WLM130:

```
RULE WLM130:  SIGNIFICANT TRANSACTION TIME WAS WAITING FOR TIMER

  A significant amount of the transaction response time for CICUSERA Service
  Class was spent waiting for a timer event or an interval control event
  to complete.  For example, an application had issued an EXEC CICS DELAY
  or EXEC CICS WAIT EVENT command.  If this finding occurs often, CPExpert
  suggests that these transactions be identified and placed into their
  own service class.  Tasks that spend a significant amount of time
  waiting for timer expiration normally should not be included in a
  service class with response performance objectives.
```

Suggestion: If this finding occurs often, CPExpert suggests that you consider the following alternatives:

- Identify the transactions that cause the Wait for Timer delay. You should consider placing these transactions into their own service class, as it usually is inappropriate for transactions that wait for a timer to be in a service class with other transactions.

- Alternatively, you may wish to review the performance goal associated with these transactions. It is possible that the transactions have been placed into their own service class, but the performance goal associated with the service class does not adequately account for the timer delays. Since timer delays are typically an application-related function, you may wish to revise the performance goal to account for longer delays.

- Alternatively, the applications may have issued a timer delay because of the unavailability of some CICS resource. You may wish to review the application to determine the cause of the timer delay and whether the delay can be reduced.

Reference: CICS/ESA Version 4.1 Performance Guide
Section 2.7.1.1: The response time breakdown in percentage section
Section 2.7.1.2: The state section

CICS/TS Release 1.1 Performance Guide
Section 2.7.1.1: The response time breakdown in percentage section
Section 2.7.1.2: The state section

CICS/TS Release 1.2 Performance Guide
Section 2.7.1.1: The response time breakdown in percentage section
Section 2.7.1.2: The state section

CICS/TS Release 1.3 Performance Guide

Section 2.6.1.1: The response time breakdown in percentage section
Section 2.6.1.2: The state section

CICS/TS for z/OS Release 2.1 *Performance Guide*: Chapter 8 (Managing Workloads). |

CICS/TS for z/OS Release 2.2 *Problem Determination Guide: Section* 2.3.3.6.7 (The meanings of the WLM_WAIT_TYPE parameter) |

CICS/TS for z/OS Release 2.2 *Problem Determination Guide: Section* 2.3.3.7 (The resources on which tasks in a CICS system can wait) |

