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**Rule CIC101:** The CICS region reached MAX tasks too often

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**Finding:** CPExpert has detected that the CICS region reached maximum tasks (MXT value) too often.

**Impact:** This finding has a MEDIUM IMPACT on the performance of the CICS region. If this is a MRO environment, the finding can have a HIGH IMPACT on performance, since CICS can become deadlocked if MXT limits AOR/TOR/FOR regions.

**Logic flow:** This is a basic finding, based upon an analysis of the daily CICS statistics.

**Discussion:** The MXT operand in the System Initialization Table (SIT) limits the total number of concurrent tasks in the CICS region. For CICS versions prior to Version 1.7, CICS stops inviting input messages when the number of tasks concurrently in the region reaches the MXT value.

Beginning with CICS Version 1.7, CICS will not create a Task Control Area (TCA) for a new task when the number of tasks concurrently in the region reaches the MXT value.

The MXT operand is used to limit the resources used by CICS tasks. There are two general reasons for restricting the number of concurrent tasks:

- CICS is becoming short on storage, encountering a stress condition, and overall performance suffers. Under these circumstances, it may be better to limit the number of concurrent tasks so that CICS does not enter a stress condition. This limit may be necessary until actions are taken to relieve storage constraint or until additional resources are acquired.
- Processor resources are significantly constrained and management has decided to limit the processor demands of CICS. MXT can be used to limit the size of the CICS active and suspended task chains and minimize the processor resources used in task control.

The MXT operand normally should be used only to restrict the use of storage resources (the AMXT operand can be used to limit the number of tasks using other resources, such as processor resources). If storage is not a constraint, the MXT operand generally should not limit access to CICS.

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CICS performance can be unnecessarily degraded if the MXT value is used to restrict the number of concurrent tasks, and if the system is capable of handling more tasks.

Additionally, CICS deadlocks can occur if the MXT operand is set too low. This particularly can occur in a MRO environment. If a slowdown occurs for some reason, tasks can become backed up in one or more of the AOR/TOR/FOR regions and CICS can enter a deadlock.

Some installations have specified MXT=999, with the intention of allowing an unlimited number of tasks in storage. In fact, this specification is recommended by IBM's CICS MOR Tuning and Performance Guide. This specification can have an adverse effect on CICS performance for CICS Version 3 (see Rule CIC104).

CPEXpert produces Rule CIC101 if the CICS statistics reported that the maximum tasks value was reached more than the MAXTASK guidance variable and CPEXpert did not detect a storage constraint. The default for the MAXTASK guidance variable is zero.

**Suggestion:** CPEXpert suggests that you consider increasing the MXT value in the SIT. The value for the MXT operand normally should be sufficiently high that tasks are not restricted by MXT. Of course, if storage is a constraint, you might have to use the MXT operand to restrict access to CICS by tasks. However, be very careful not to allow the MXT value to be reached in a MRO environment (unless you have a very unusual environment).

IBM suggests that an effective way of finding the appropriate setting of the MXT value is to try a range of values during peak system times while monitoring the system's use of the processor and storage. There are a few comments about applying this technique:

- Note that after CICS Version 1.7, a Dispatch Control Area (DCA) is built for any task received from VTAM regardless of whether the MXT (or CMXT) ceiling has been reached.
- A Task Control Area (TCA) is created at dispatch time (which is where the decision is made as to whether or not the region is at MXT or CMXT). If the region is at MXT or CMXT at dispatch time, the TCA is not created.
- Therefore, the MXT limit in CICS 1.7 is a limit on the number of tasks that are permitted to acquire a TCA. A task is not included in the AMXT calculation until it has been permitted to acquire its TCA even though its DCA appears on the chain of "active" tasks.

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- CEMT looks at the DCA chain and reports on the existence of DCAs. This reported value is very misleading as to the number of tasks in the system.

CPEXpert suggests that you not simply set MXT to its maximum value (999). Such a value can seriously impact performance in CICS Version 3.1.1 and later versions. See Rule CIC104 for additional information.

If you are an MRO environment, be sure to set MXT greater than the number of sessions allowed. (Alternatively, lower the number of allowed sessions to less than the MXT value - whichever best fits your environment.)

**NOTE:** The significance of this finding depends upon whether the finding is based upon analyzing daily information or based upon analyzing historical information.

- If this finding is based upon an analysis of daily information, the finding may be applicable only to the performance of CICS for this day. Unless you feel that the analysis is generally applicable (or unless the workload processed on this day is particularly critical), please wait until CPEXpert performs an analysis of historical information before taking action.
- If this finding is based upon an analysis of historical data covering a prolonged period, the finding is more definite than a tentative finding based upon analysis of only a single day's data.

**Reference:** *CICS/OS/VS Version 1.7 Performance Guide*: pages 48 and 192.

*CICS/MVS Version 2.1.2 Performance Guide*: pages 235 and 376.

*CICS/ESA Version 3.1.1 Performance Guide*: page 53, page 295, and page 307.

*CICS/ESA Version 3.2.1 Performance Guide*: page 191, page 203, and page 271.

*CICS/ESA Version 3.3.1 Performance Guide*: page 201, page 221, and page 291.

*CICS/ESA Version 4.1.1 Performance Guide*: Section 4.7.3, Appendix A.1.4, and Appendix C.7.

*CICS/TS Release 1.1 Performance Guide*: Section 4.7.3, Appendix 1.1.3, and Appendix 1.4.8.

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*CICS/TS Release 1.2 Performance Guide*: Section 4.7.4, Appendix 1.1.4.  
and Appendix 1.1.29.

*CICS/TS Release 1.3 Performance Guide*: Section 4.11.3, Appendix 1.1.5.  
and Appendix 1.1.32.

*CICS/TS for z/OS Release 2.1 Performance Guide*: Chapter 23 (MXT) and  
Appendix A (Table 131).

*CICS/TS for z/OS Release 2.2 Performance Guide*: Section 4.10.3 Setting  
the maximum task specification (MXT) |

*CICS MRO Tuning and Performance Guide*: page 37.

IBMLINK, Document Q579023.

IBMLINK, Document Q465409.