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**Rule CIC281:** CICS-DB2 Entry tasks abended because Entry Thread unavailable

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**Finding:** At least one CICS-DB2 Entry task abended because an Entry thread was unavailable, and the DB2ENTRY THREADWAIT attribute specified abend.

**Impact:** This finding should normally have a HIGH IMPACT on the performance of CICS tasks in the region that use the CICS-DB2 connection.

**Logic flow:** This is a basic finding, based upon an analysis of the CICS statistics. This finding applies only with CICS/Transaction Server for OS/390 Release 1.2 and subsequent releases of CICS.

**Discussion:** The CICS DB2 attachment facility creates an overall connection between CICS and DB2. CICS applications use this connection to issue commands and requests to DB2.

A CICS transaction accesses DB2 via a *thread*, which is an individual connection into DB2. Threads are created when they are needed by transactions, at the point when the application issues its first SQL or command request. The transaction uses the thread to access resources managed by DB2.

There are three types of threads: Command threads, Pool threads, and DB2ENTRY threads,.

C Command threads are used by the CICS DB2 attachment facility for issuing commands to DB2 via the DSNB transaction.

C Pool threads are used for all transactions and commands that are not using a Command thread (because the transaction is not DSNB), are not using an Entry thread (because an Entry thread had not been defined for the transaction), or have been “overflowed” to the pool because a Command thread or an Entry thread was not available.

C One or more Entry thread categories optionally can be defined (using the DB2ENTRY definition) for specific transactions or groups of transactions. Entry threads are used for transactions that need to be managed separately from the normal transactions, or for transactions that have special accounting needs.

When a thread is no longer needed by the transaction, the thread is released. The thread release typically occurs after syncpoint completion. The thread may be terminated immediately upon release or it may be

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retained for a period of time, depending on the type of thread and whether “thread protection” has been specified .

Transactions use Entry threads because (1) they were assigned to the Entry via the DB2ENTRY definition or (2) they were assigned to the Entry via the DB2TRAN definition.

An Entry thread must be available when the transaction attempts to acquire an Entry thread. The maximum number of pool threads is specified via the DB2ENTRY definition of the specific Entry, using the THREADLIMIT attribute. Once the number of Entry threads in use reaches the value of the THREADLIMIT attribute specified on the DB2ENTRY definition, no more Entry threads are available for the specific Entry.

The THREADWAIT attribute for the DB2ENTRY definition controls the action that should be taken if an Entry thread is unavailable:

- **THREADWAIT=YES** means that the transaction will wait (be placed on the Pool Ready Queue) until a Pool thread becomes available.
- **THREADWAIT=POOL** means that requests for Entry threads are transferred to the pool when the value of THREADLIMIT is exceeded. A transaction is then under the control of the PRIORITY<sup>1</sup>, THREADLIMIT, and THREADWAIT attributes for the pool.

When an Entry request is transferred to the pool, this is called “overflowing” to the pool. The transaction keeps the PLAN and the AUTHID/AUTHTYPE values that were specified for the entry thread.

However, the request operates under the THREADLIMIT and THREADWAIT attributes associated with the pool. If the pool has reached the maximum number of active threads specified by the THREADLIMIT attribute of the DB2CONN definition, the Entry transaction will either wait or abend, depending on the THREADWAIT attribute of the DB2CONN definition.

- **THREADWAIT=NO** means that the transaction will be abended (aborted) if no Entry thread is available. The CICS DB2 attachment issues abend code AD3T, when THREADWAIT=NO is coded and the number of Entry threads is exceeded.

When transactions are abended, resources that were required to schedule and initiate the transaction are wasted. Unless there are unusual situations, transactions should not be allowed to abend. If necessary, other techniques should be used to control transaction activity.

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<sup>1</sup>The PRIORITY attribute is not relevant when CICS is connected to DB2 Version 6 or later.

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CICS-DB2 global statistics are available in MXG file CICDB2GL. CPExpert uses data in CICDB2GL to determine whether THREADWAIT=NO was specified for the DB2ENTRY definition, whether the maximum number of threads specified by the THREADLIMIT attribute for the DB2ENTRY definition had been reached, and whether any Entry threads were aborted.

CPExpert produces Rule CIC281 when THREADWAIT=NO was specified for the DB2ENTRY definition, when the maximum number of threads specified by the THREADLIMIT attribute had been reached, and when the number of aborted Entry threads was greater than the **ENTRABND** guidance variable in USOURCE(CICGUIDE).

The default value for the ENTRABND guidance variable is zero, indicating that Rule CIC281 should be produced when any Entry threads were aborted.

**Suggestion:** If Rule CIC281 is produced, you should consider the following alternatives:

- C **Increase THREADLIMIT value.** You can increase the THREADLIMIT value on the DB2ENTRY definition if you wish to allow more threads to be used for the transactions associated with the DB2ENTRY (or as defined by the DB2TRAN specification).
- C **Change the THREADWAIT attribute so transactions wait for an Entry thread to become available.** You can change the THREADWAIT attribute from THREADWAIT=NO to THREADWAIT=YES in the DB2ENTRY definition. This will allow transactions to wait for an Entry thread if no Entry thread is available.
- C **Change the THREADWAIT attribute so transactions overflow to the Pool.** You can change the THREADWAIT attribute from THREADWAIT=NO to THREADWAIT=POOL in the DB2ENTRY definition. This will allow transactions to “overflow” to the Pool if no Entry thread is available. However, please recall that Entry transactions will acquire the THREADWAIT attributes of the Pool, and will be subject to the THREADLIMIT attributes of the Pool.
- C **Use transaction class limits.** If you wish to limit the amount of CISC-DB2 activity, you should consider using transaction class limits rather than using the THREADLIMIT value and THREADWAIT=NO attribute. IBM states that it is better to limit transactions using a transaction class than allow them to queue for threads.

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C **Modify guidance.** You can modify the ENTRABND guidance variable in USOURCE(CICGUIDE) if you feel that Rule CIC281 is produced prematurely.

**Reference:** *CICS/TS Release 1.3 CICS DB2 Guide*: Section 5.4 (Creating, using, and terminating threads)

*CICS/TS Release 1.3 Resource Definition Guide*: Section 5.1.4 (DB2ENTRY) and Section 5.1.5 (DB2TRAN)

*CICS/TS for z/OS Release 2.2 CICS DB2 Guide*: Section 5.4 (How threads are created, used, and terminated)

*CICS/TS for z/OS Release 2.2 Resource Definition Guide*: Section 2.4 (DB2 entry definitions) and Section 2.5 (DB2 transaction definitions)