
Rule CIC423: High percent entries (either table or item) not found in CFDT

Finding: The CICS Coupling Facility Data Table (CFDT) list structure statistics showed that a large percent of entries (either table or item) were not found.

Impact: This finding has a LOW IMPACT or MEDIUM IMPACT on the performance of the CICS region.

Logic flow: This is a basic finding, based on an analysis of the data. The finding applies only with CICS/Transaction Server for OS/390 Release 1.3, or for z/OS.

Discussion: The CICS Coupling Facility Data Tables provide a significant enhancement to shared data tables in a parallel sysplex. The CFDT design provides an excellent way to share file data using CICS file control, without resorting to VSAM record level sharing (RLS). The CFDT design eliminates the requirement for having a File Owning Region (as is required with normal shared data tables).

CICS CFDT support is designed to provide sharing of working data within a sysplex, while maintaining update integrity of the data. The working data is held in a coupling facility data table, which is contained in a *named pool* located in coupling facility list structure. There can be multiple CFDT pools, each containing one or more CFDTs. Each CFDT pool is defined, using MVS cross-system extended services (XES), as a list structure in a coupling facility.

Access to a CFDT is via a *CFDT pool server* that supports a specific named pool. A CFDT pool server is started in an MVS image by starting a pool server region (as either a batch job or a started task) for each CFDT pool. Starting the pool server region invokes the pool server region program, DFHCFMN, which resides in an APF-authorized library. Each CFDT pool server provides access to only one CFDT pool, so there must be multiple CFDT pool servers if there are multiple CFDT pools.

Applications access data in a CFDT using standard file control commands (read, write, delete, etc.).

Records are placed into a CFDT in one of two ways: (1) records placed in the CFDT by the initial loading of the CFDT from the source data set (if a source data set is defined), and (2) new records written to the CFDT after the CFDT has been loaded.

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- **Initial loading of the CFDT.** Unlike a shared data table, a CFDT does not require a source data set. A CFDT file definition can specify that there is no associated source data set, allowing an empty CFDT to be created. Alternatively, a CFDT may have a source data set (just as with a data table), and the CFDT is loaded when the source data set is first opened. If initial loading of the CFDT occurs, CICS reads the entire VSAM KSDS file and attempts to place all records in the CFDT. The XDTRD user exit can be used to limit the records that are placed in the CFDT (using screening criteria appropriate to the applications sharing the data). If all records that pass the screening criteria (if any) will not fit into the CFDT¹, a “table full” condition applies during the initial loading of the CFDT.
 - **New records written to the CFDT.** New records can be added to a CFDT via the WRITE file control command. The XDTAD global user exit program can be used to limit the records that are added to the CFDT as a result of a WRITE request issued to the CFDT. If all records that pass the screening criteria (if any) will not fit into the CFDT², a “table full” condition is generated and the write is rejected.

Applications can reference the CFDT during initial loading. These references will produce a “record not found” condition if the references are to records outside the range of those already loaded into the data table. These conditions should be small and can normally be ignored.

The “record not found” condition should not occur after loading of the data table. Since the VSAM source data set is not available after the initial loading of the CFDT (if a source data set existed), any “record not found” condition normally indicates (1) a coding or logic error with the application, (2) an attempt to reference a record that should be in the CFDT (but was not in the CFDT because, for example, the MAXNUMRECS had been reached or the record had been suppressed by one of the user exits mentioned above), or (3) a deliberate reference to determine whether the record exists.

CFDT list structure statistics for the coupling facility are available in MXG file CICCFS6D. The S6RSP3CT variable contains a count of the number of times CICS attempted to read a record from the CFDT, but was unable to satisfy the read request because the record was not in the CFDT.

¹The MAXNUMRECS parameter of the DEFINE FILE command can be used to limit the number of records that can be placed in the data table. The MAXNUMRECS parameter has a default maximum of NOLIMIT, which means that the entire VSAM KSDS file can be placed in the CFDT (subject, of course, to screening criteria applied by the XDTRD user exit).

²The MAXNUMRECS parameter of the DEFINE FILE command can be used to limit the number of records that can be added to the data table. The MAXNUMRECS parameter has a default maximum of NOLIMIT, which means that there is no limit to the number of records that can be added to the data table (subject, of course, to screening criteria applied by the XDTAD user exit).

CPEXpert calculates the percent of requests that encountered a “specified entry (table or item) not found” condition, using the following algorithm:

$$\text{Percent entries not found} = \frac{S6RSP3CT}{S6RSP1CT + \text{Abnormal responses}}$$

where S6RSP1CT = Number of normal responses
Abnormal = S6RSP2CT + S6RSP3CT + S6RSP4CT +
S6RSP5CT+ S6RSP6CT + S6RSP7CT +
S6RSP8CT

S6RSP2CT = Entry data was larger than the input buffer length

S6RSP3CT = Specified entry (table or item) not found

S6RSP4CT = Version check failed for entry being updated

S6RSP5CT = List authority comparison failed

S6RSP6CT = A table reached maximum number of items

S6RSP7CT = List structure became full

S6RSP8CT = Other IXLLIST return code occurred

CPEXpert produces Rule CIC423 when the percent requests that resulted in an “entry (table or item) not found” condition is greater than the **CFPCTRNF** guidance variable in USOURCE(CICGUIDE). The default value for the **CFPCTRNF** guidance variable is 0.1, indicating that CPEXpert should produce Rule CIC423 when more than 0.1% of the requests resulted in an “entry (table or item) not found” condition.

Suggestion: If this finding is produced, you should consider the following alternatives:

- Under normal conditions, Rule CIC402 or Rule CIC403 should have been produced to identify the shared data table to which this rule (Rule CIC423) applies. Examine the applications using the shared data table to determine why the “specified entry (table or item) was not found” condition is encountered in the CFDT. With many situations, this condition should be considered a program error and should be remedied.
- As mentioned earlier, there *are* situations in which some number of “specified entry (table or item) was not found. As examples, (1) an attempt to reference a record that should be in the CFDT (but was not in the CFDT because, for example, the MAXNUMRECS had been reached or the record had been suppressed by one of the user exits mentioned above), or (2) a deliberate reference was made to determine whether the record exists. If these situations exist, the CFPCTRNF guidance variable should be changed.

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- Change the **CFPCTRNF** guidance variable in USOURCE(CICGUIDE) so Rule CIC423 is produced only when you wish to be aware of a larger percent of “specified entry (table or item) was not found” condition.
 - You can specify **%LET CFPCTRNF = 100;** in USOURCE(CICGUIDE) to suppress this finding (the percent requests encountering entries not found in CFDT) cannot be greater than 100), or you can “turn off” the rule using the process described in Section 3 of this User Manual.

Reference: CICS/TS for OS/390 Release 1.3
CICS System Definition Guide: Section 2.10.8 (Coupling facility data tables)

CICS Customization Guide: Section 1.1.7 (Data tables management exits XDTRD, XDTAD, and XDTLC)

CICS/TS for z/OS Release 2.1
CICS System Definition Guide: Chapter 27 (Starting a CFDT server)

CICS Customization Guide: Chapter 23 (Data tables management exits XDTRD, XDTAD, and XDTLC)

CICS/TS for z/OS Release 2.2
CICS System Definition Guide: Section 4.3 (Starting a CFDT server)

CICS Customization Guide: Section 1.1.7 (Data tables management exits XDTRD, XDTAD, and XDTLC)