
Rule CIC177: Large percent UPDATE option used without WRITE or DELETE

Finding: The CICS interval statistics showed that a large percent of the file control commands with an UPDATE option were issued against a VSAM data set, without a corresponding WRITE or DELETE file control command for the VSAM data set.

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

Logic flow: This is a basic finding, based on an analysis of the CICS interval statistics.

Discussion: A CICS application accesses VSAM data sets using CICS file control commands. These file control commands read records, browse records, write records, and delete records¹.

Optionally, the read commands can specify that an update is to occur with the record being read (keyword UPDATE). The UPDATE option guarantees read integrity for the record.

- One result of this UPDATE option is that the record is locked (and, depending on the type of file, the control interval is locked). CICS serializes updates to recoverable resources so that if a transaction fails, its changes to those resources can be backed out independently of those made by any other transaction. Consequently, a transaction updating a recoverable resource gets control of that resource until the transaction terminates or until the transaction indicates that it wants to commit those changes with a SYNCPOINT command. Other transactions requiring the same resource must wait until the first transaction finishes with the resource.
- Another result of this UPDATE option is that, if the VSAM data set is assigned to a CICS-maintained data table², the VSAM source data set must be referenced by VSAM before the record is referenced in the data table reference. That is, any update or delete action on a record in the data table is automatically applied to the source data set before being applied to the data table.

¹These simple read, write, and delete file control actions have many variations, such as READNEXT, READPREV, etc.

²A CICS-maintained data table is one that CICS keeps in synchronization with their source data sets.

Both results from using the UPDATE option cause overhead and potentially degrade performance. Consequently, the UPDATE option should be used only if the record is actually updated or it is deleted.

It is possible, of course, that the application logic cannot determine whether the record is to be updated or deleted until the record is read. In this case, the UPDATE option must be specified to preserve file integrity.

Some applications exercise the READ UPDATE option without considering the potential overhead or performance degradation, and some applications do not need to use the UPDATE option. For these applications, programming changes would be warranted if a large number of records were read with the UPDATE option, but those records were neither updated nor deleted.

File control statistics are available in MXG file CICFCR. CPExpert uses data in CICFCR to calculate the percent of file control commands that accessed a VSAM data set using the UPDATE option but did not subsequently UPDATE or delete the records. CPExpert uses the following algorithm to calculate the percent unnecessary UPDATE option:

$$\text{Percent unnecessary update option} = \frac{\text{Records updated} + \text{Records deleted}}{\text{GET UPDATE requests} + \text{BROWSE UPDATE requests}}$$

where

Records updated = A17DSWRU
Records deleted = A17DSDEL+A17RMDEL
GET UPDATE requests = A17DSGU
BROWSE UPDATE requests= A17DSBRU (applies to VSAM RLS only)

Please refer to the CICS Performance Guides for a description of the individual variables.

CPExpert produces Rule CIC177 when the percent unnecessary UPDATE option is more than the value specified by the **PCTFCUPD** guidance variable in USOURCE(CICGUIDE). The default value for the **PCTFCUPD** is 25 indicating that CPExpert should produce Rule CIC177 whenever more than 25% of the VSAM file accesses with the UPDATE option did not result in a corresponding change to the VSAM source data set.

CPExpert normally suppresses this finding if less than 500 GET UPDATE file control commands were issued against the file. You can specify a different threshold for suppressing Rule CIC177 by altering the **FCGETUPD** guidance variable in USOURCE(CICGUIDE).

Suggestion: If Rule CIC177 is consistently produced for a VSAM file, you consider the following alternatives:

- Consult with applications personnel to review the applications referencing the VSAM file. You should determine whether there is a logic or coding error that causes records to be read with the update option, but without a subsequent write or deletion of the record.

As mentioned earlier, it is possible, that the application logic cannot determine whether the record is to be updated or deleted until the record is read. In this case, there is no error implied by the CIC177 finding, but the situation is simply a result of correct program logic.

- You can change the PCTFCUPD guidance variable in USOURCE(CICGUIDE) if you believe that Rule CIC177 is produced too often, or if application personnel are unable to take action.
- You can specify a different threshold for suppressing Rule CIC177 by altering the **FCGETUPD** guidance variable in USOURCE(CICGUIDE).

Reference: CICS/ESA Version 4.1.1
CICS Application Programming Guide: Section 3.1.6.
CICS Performance Guide: Appendix A.1.11.

CICS/TS Release 1.1
CICS Application Programming Guide: Section 3.1.6.
CICS Performance Guide: Appendix 1.1.9.

CICS/TS Release 1.2
CICS Application Programming Guide: Section 3.1.5.
CICS Performance Guide: Appendix 1.1.10.

CICS/TS Release 1.3
CICS Application Programming Guide: Section 4.1.7.
CICS Performance Guide: Appendix 1.1.11.

CICS/TS for z/OS Release 2.1
CICS Application Programming Guide: Section 4.1.7.
CICS Performance Guide: Appendix 1.1.11.

CICS/TS for z/OS Release 2.2
CICS Application Programming Guide: Section 4.1.7.
CICS Performance Guide: Appendix 1.1.11.