DBCONTROL

INTRINSIC NUMBER 411

Allows a process accessing the database to have control over some `DBUTIL` options. In exclusive mode (`DBOPEN` mode 3), `DBCONTROL` can be used to enable or disable the deferred output (`AUTODEFER`) option and perform several B-Tree related tasks such as adding, dropping, or rebuilding a B-Tree index. It can also be used to set `BTREEMODE1` option to ON or OFF and specify the wildcard character for the current `DBOPEN` or for the database (permanent).

For database access modes 1, 3, and 4, `DBCONTROL` can be used to temporarily enable or disable the critical item update (`CIUPDATE`) option, depending on the setting for the database, without impacting other processes operating on the same database. Using `DBCONTROL` does not alter the permanent `AUTODEFER` or `CIUPDATE` settings for the database set with `DBUTIL`. However, the permanent setting for `BTREEMODE1` and wildcard character can be altered based on the `DBCONTROL` mode.

OPENTURBO vs TurboIMAGE Difference

Supported Mode:

5 Turn CIUPDATE ON
6 Turn CIUPDATE OFF
7 Allow Dynamic Multiple DB Transaction

OpenTURBO Mode:

88 Set OpenTURBO Debugger Level Remotely
89 Set OpenTURBO Debugger Output Filename Remotely
90 Set IGNORE_RETURN_STATUS ON
91 Set IGNORE_RETURN_STATUS OFF
92 Set ONE_DIRECTION_CHAIN_GET ON
93 Set ONE_DIRECTION_CHAIN_GET OFF
94 Enlarge MAX_CURSOR_ALLOWED (A.03.00 Version Only)
95 Clear All Open Cursors
96 Set OT_SERIALGET_ORDERBY ON
97 Set OT_SERIALGET_ORDERBY OFF
101 Set Last_Used_Sequence_No and Return its value
102 Set IMAXSOFT13_SEQ_NO = IMAGE_Recnum

OPENTURBO Performance Enhancement

N/A.

OPENTURBO Additional Features

88 - Set OpenTURBO Debugger Level Remotely
qualifier[0] = Debugger Level, valid values are 1 through 31
qualifier[1] = 1 (ON), 0 (OFF)
qualifier[0] and qualifier[1] are 2-bytes short
89 - Set OpenTURBO Debugger Output Filename Remotely
qualifier[] contains Debugger Output Filename
90 - Set IGNORE_RETURN_STATUS ON
qualifier[] contains Dataset Name or Dataset Number (2-bytes short);

if the first byte contains an @, sets all Datasets

91 - Set IGNORE_RETURN_STATUS OFF
qualifier[] contains Dataset Name or Dataset Number (2-bytes short);
if the first byte contains an @, sets all Datasets

92 - Set ONE_DIRECTION_CHAIN_GET ON
qualifier[] contains Dataset Name or Dataset Number (2-bytes short);
if the first byte contains an @, sets all Datasets

93 - Set ONE_DIRECTION_CHAIN_GET OFF
qualifier[] contains Dataset Name or Dataset Number (2-bytes short);
if the first byte contains an @, sets all Datasets

94 - Enlarge MAX_CURSOR_ALLOWED
qualifier[0] = Max Number of Concurrent Cursors (2-bytes short)

95 - Clear All Open Cursors

96 - Set OT_SERIALGET_ORDERBY ON
qualifier[] contains Dataset Name or Dataset Number (2-bytes short);
if the first byte contains an @, sets all Datasets

97 - Set OT_SERIALGET_ORDERBY OFF
qualifier[] contains Dataset Name or Dataset Number (2-bytes short);
if the first byte contains an @, sets all Datasets

Syntax

DBCONTROL, base, qualifier, mode, status

Parameters

`base` is the name of the array used as the base parameter when opening the database. The first element of the array must contain the base ID returned by `DBOPEN`. (Refer to `DBOPEN` for more information about the base ID.)

`qualifier` used only for certain `DBCONTROL` modes.

`mode` must be an integer equal to 1, 2, 5, 6, 7, 9, 10, 13, 14, 15, 16, 18, 19 or 20 indicating the following:

Mode 1: Turn on the deferred output option. If `AUTODEFER` has not been enabled for the database (using `DBUTIL >>ENABLE`), mode 1 enables the deferred output option for the duration of only the current `DBOPEN`. When the database is closed, `AUTODEFER` will no longer be enabled. Mode 1 is not allowed while a dynamic transaction is active.

Mode 2: Turn off the deferred output option. If `AUTODEFER` has been enabled for the database (using `DBUTIL >>ENABLE)`, mode 2 disables the deferred output option for the duration of only the current `DBOPEN`. When the database is closed, `AUTODEFER` will again be enabled.

Mode 5: Enable the critical item update option. If `CIUPDATE` is ALLOWED for the database (default or by using `DBUTIL >>SET)`, mode 5 enables the option for the current `DBOPEN` until either a `DBCONTROL` mode 6 call disables the option or the database is closed. You can call mode 5 successfully if the `CIUPDATE` setting for the database equals ON, but the call has no impact on the option setting for the current process unless an intervening call to DBCONTROL mode 6 disabled the option. If the CIUPDATE flag is DISALLOWED, a call to mode 5 returns an error. The CIUPDATE option is available only in database access modes 1, 3, and 4.

Mode 6: Disable the critical item update option. If CIUPDATE has been set to ON for the database (using DBUTIL>>SET), mode 6 disables the option for the current DBOPEN until either a DBCONTROL mode 5 call enables the option or the database is closed. If the CIUPDATE option setting for the database equals ALLOWED and the process has called DBCONTROL in mode 5 to enable the option, then mode 6 disables the option for that same process. The CIUPDATE option is available only in database access modes 1, 3, and 4.

Mode 7: Allow the database to be included in the **dynamic** multiple database transaction (DMDBX). DBCONTROL mode 7 needs to be done once, for every database, before including it in DBXBEGIN mode 3 call for DMDBX. Mode 7 is used programmatically to allow it for DMDBX and remains activated until the database is closed or the application terminates.

Mode 7 also activates the database for deadlock detection. In case of a deadlock, DBLOCK will return an error, 26, instead of causing a process hang. Note that mode 7 will activate both deadlock detection and inclusion in DMDBX. If you only want deadlock detection and not DMDBX, your DBXBEGIN call can use mode 1 instead of 3.

Mode 9: Enable the HWMPUT option of DBPUT for the current DBOPEN. This causes DBPUT to try placing entries at the high-water mark first instead of at the delete chain head first.

Mode 10: Disable the HWMPUT option of DBPUT for the current DBOPEN. This causes DBPUT to try placing entries at the delete chain head first. This is the default action if DBCONTROL is not called.

Mode 13: Allow a privileged mode caller to perform B-Tree related tasks such as adding, dropping, rebuilding, releasing, or securing a B-Tree index file. Exclusive database access is required to add, drop, or rebuild a B-Tree index. Qualifier has a structured record containing dataset information and directives. Refer to chapter 11, “B-Tree Indices” for the qualifier layout.

Mode 14: Allow a privileged mode caller to set BTREEMODE1 option to ON or OFF and set wildcard character for the database (permanent). Refer to chapter 11, “B-Tree Indices” for the qualifier layout.

Mode 15: Enable B-Tree wildcard search for DBFIND mode 1, X and U types, for the master data set’s key item and its corresponding search items in details, if the key item has a B-Tree index. In other words, turn on the BTREEMODE1 flag for the current database open. The first byte of the qualifier is examined. If it is null or blank, then the current wildcard character is not changed. If it is in the ASCII range (33...126), then the wildcard character is changed to that value for the current DBOPEN. If the qualifier is any other value, DBCONTROL returns an error. Affects only the current database open. It needs to be done once per database and remains activated until the database is closed or the application terminates. This mode allows you to perform B-Tree searches on ASCII types without making application changes.

Mode 16: Disable B-Tree wildcard search for DBFIND mode 1 regardless of the existence of a B-Tree index. That is, turn off the BTREEMODE1 flag for the current database open. The qualifier is ignored, and BTREEMODE 1 is turned off. Affects the current database open only. It needs to be done once per database and remains activated until the database is closed or the application terminates.

Mode 18: Enables the XM to return a warning when the dynamic transaction exceeds the 28MB threshold. The maximum dynamic transaction size of a given process is 32 MB. However, if a process hit this limit, the process will be aborted by the transaction manager and the transaction will be rolled back. In order to give user a chance to save the transaction, user can call DBCONTROL mode 18 before the transaction started. If the flag set and the transaction size hit 28 MB, an error will return to the program. User then can choose either commit the transaction (call DBXEND) or abort the transaction (call DBXUNDO). The error number is –1025, which may be returned by DBDELTE, DBPUT and DBUPDATE.

Mode 19: Disables the XM to return a warning when the dynamic transaction exceeds the 28MB threshold. Unlike DBCONTROL mode 18, DBCONTROL mode 19 can be called within a dynamic transaction.

Mode 20: Allows the program to overwrite the DBUTIL 'OLDINFOLIMITS' setting. DBINFO mode 103 returns data items in a database; DBINFO mode 203 returns data sets in a database; DBINFO mode 204 returns all data sets with an item and DBINFO mode 301 returns paths for a specific data set. If a user program allocates arrays to store the data returned from above DBINFO calls and the size of the arrays are defined by the old TurboIMAGE/XL item/set limit. Then a database with new item/set limit may cause the program to abort. User can enable a DBUTIL flag – OLDINFOLIMITS to prevent program abort, instead, the program will return an error stated that data returned may overrun the buffer. However, for a new program, which already change the array size to new limit, doesn't want this error. The program can call DBCONTROL mode 20 before calling DBINFO to prevent the error.

If your database is enabled for third-party indexing (TPI), refer to your vendor documentation for additional DBCONTROL modes. The section on DBUTIL in chapter 8 of this book has a brief description of the TPI option.

status is the name of an array of 10 halfwords in which TurboIMAGE/XL returns status information. If the procedure executes successfully, the status array contents are as follows:

Element **Contents**

1 If the procedure succeeds, the return status is 0. Table 5-6. describes the contents of element 1 when the procedure does not succeed.

2-4 Unchanged from previous procedure call using this array.

5-10 Procedure call information. Refer to "Library Procedure Error Messages" in appendix A for a description of this information.

Discussion

DBCONTROL can be called by a program for the following purposes:

- To enable or disable the AUTODEFER option for the current mode 3 DBOPEN.
- To enable or disable the critical item update option for the current process accessing the database in mode 1, 3, or 4 depending on the CIUPDATE setting for the database.
- To enable or disable the HWMPUT for the current DBOPEN.
- To include a database in dynamic multiple database transaction.
- To activate deadlock detection for the database.
- To perform B-Tree index related tasks.

In TurboIMAGE/XL default mode, MPE/iX Transaction Management (XM) is used to log database modifications (DBPUTs, DBDELETEs, DBUPDATEs) to the XM log file. With deferred output, MPE/iX Transaction Management is not used. Instead, the MPE/iX file system default mode is used. This mode keeps data pages in memory for as long as possible, either until file close time or until no more memory is available.

Thus, with deferred output, database modifications caused by calls to DBPUT, DBUPDATE, or DBDELETE cannot be written to the disk (or can only be partially written). Although TurboIMAGE/XL generally operates more efficiently in this mode, a system failure while the database is operating in this mode has a very high probability of causing internal structural damage to the database.

A program that opens the database exclusively can call DBCONTROL mode 1 to enter the deferred mode of operation, except when a dynamic transaction is active. In this case, all database modifications will be kept in memory for as long as possible, either until the database is closed or until no more memory is available.

A program that opens the database exclusively can call DBCONTROL mode 2 to turn off the deferred mode of operation. In this case, all database modifications will be written to the MPE/iX Transaction Management log file until the database is closed.

Programs that are designed to modify the values of detail data set search and sort items can call DBCONTROL mode 5 if the CIUPDATE setting for a database equals ALLOWED. The CIUPDATE option is available only in database access modes 1, 3, and 4. The mode 5 call enables CIUPDATE for only this process until either a DBCONTROL mode 6 call disables the option for the process or the database is closed. Other processes operating on the same database are not impacted by these calls.

A program, which must ensure that the values of detail data set search and sort items remain unchanged for the duration or a portion of the process, can call DBCONTROL mode 6 to disable CIUPDATE if this option has been set to ON for the database, or if the option is ALLOWED (default or set by DBUTIL) and an earlier call to DBCONTROL mode 5 enabled the option. CIUPDATE is available only in database access modes 1, 3, and 4. When DBCONTROL mode 6 is used to disable CIUPDATE, the option is disabled for that process alone until a call to DBCONTROL mode 5 enables the option for the process or the database is closed. Other processes operating on the same database are not affected by these calls.

NOTE If HWMPUT is enabled, DBPUT will not inform you when it has reached the end of file and has started using the delete chain head. In general, it is not a good practice to toggle HWMPUT.

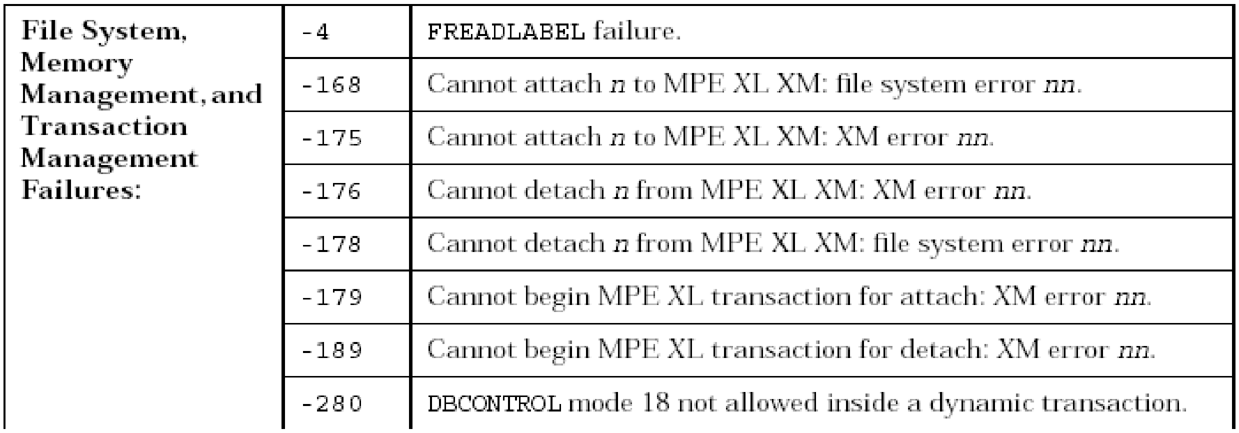
If you plan to use roll-forward recovery, do not toggle HWMPUT after storing the database.

By default, DBPUT first checks the delete chain head, then if it is empty, DBPUT places the new entry at the high-water mark. If the high-water mark option (HWMPUT) is enabled, DBPUT will place the entry at the high-water mark first; after the high-water mark reaches the file limit, DBPUT will use the delete chain head. Use DBCONTROL mode 9 to enable or mode 10 to disable this feature.

DBCONTROL allows DBUTIL and privileged callers to perform several B-Tree index file related functions such as adding, deleting, or rebuilding of a B-Tree index file for a specified master dataset. There are four new DBCONTROL modes pertaining to B-Tree indices: modes 13, 14, 15, and 16. Refer to chapter 11, "B-Tree Indices," for more information.

Consult appendix A for more information about the conditions for the return status values shown in Table 5-7.

Table 5-7 DBCONTROL Return Status Values



File System, Memory Management, and Transaction Management Failures:	-4	FREADLABEL failure.
	-168	Cannot attach *n* to MPE XL XM: file system error *nn*.
	-175	Cannot attach *n* to MPE XL XM: XM error *nn*.
	-176	Cannot detach *n* from MPE XL XM: XM error *nn*.
	-178	Cannot detach *n* from MPE XL XM: file system error *nn*.
	-179	Cannot begin MPE XL transaction for attach: XM error *nn*.
	-189	Cannot begin MPE XL transaction for detach: XM error *nn*.
	-280	DBCONTROL mode 18 not allowed inside a dynamic transaction.

Calling Errors:	-11	Bad database reference.
	-14	Illegal intrinsic in current access mode.
	-31	Bad mode.
	-80	Output deferred not allowed when ILR enabled.
	-81	Output deferred not allowed with roll-back enabled.
	-82	CIUPDATE is set to DISALLOWED; cannot use critical item update.
	-222	Only DBXUNDO allowed when a dynamic transaction encounters an error.
	-224	DBCONTROL mode 1 not allowed inside a dynamic transaction.
	-421	BTE: unknown qualifier value for DBCONTROL mode 13.
Calling Errors (cont):	-422	BTE: data set# not in valid range.
	-423	BTE: B-Tree already exists.
	-424	BTE: Failed to create B-Tree.
	-425	BTE: DB not opened exclusively.
	-426	BTE: B-Tree doesn't exist.
	-427	BTE: FCLOSE, purge failed.
	-428	BTE: Rebuildindex failed.
	-432	BTE: Bad wildcard character.
	-434	BTE: Data set is detail and not master.
	-436	BTE: Failed to extract data from root file.
	-440	BTE: XM Attach of index file failed
	-441	BTE: XM Detach of index file failed.
	-442	BTE: RELEASE of index file failed.
	-443	BTE: SECURE of index file failed.
	-451	BTE: Root version less than "C"4.
	-452	BTE: Key length greater than 252 bytes (maximum index key size).
	92	Need PM capability.
Communications Errors:	-102	DSWRITE failure.
Exceptional Conditions:	63	DBG disabled; potential damage; only DBCLOSE allowed.