



Tutorial

MDRapid  
from  
Midrange Dynamics

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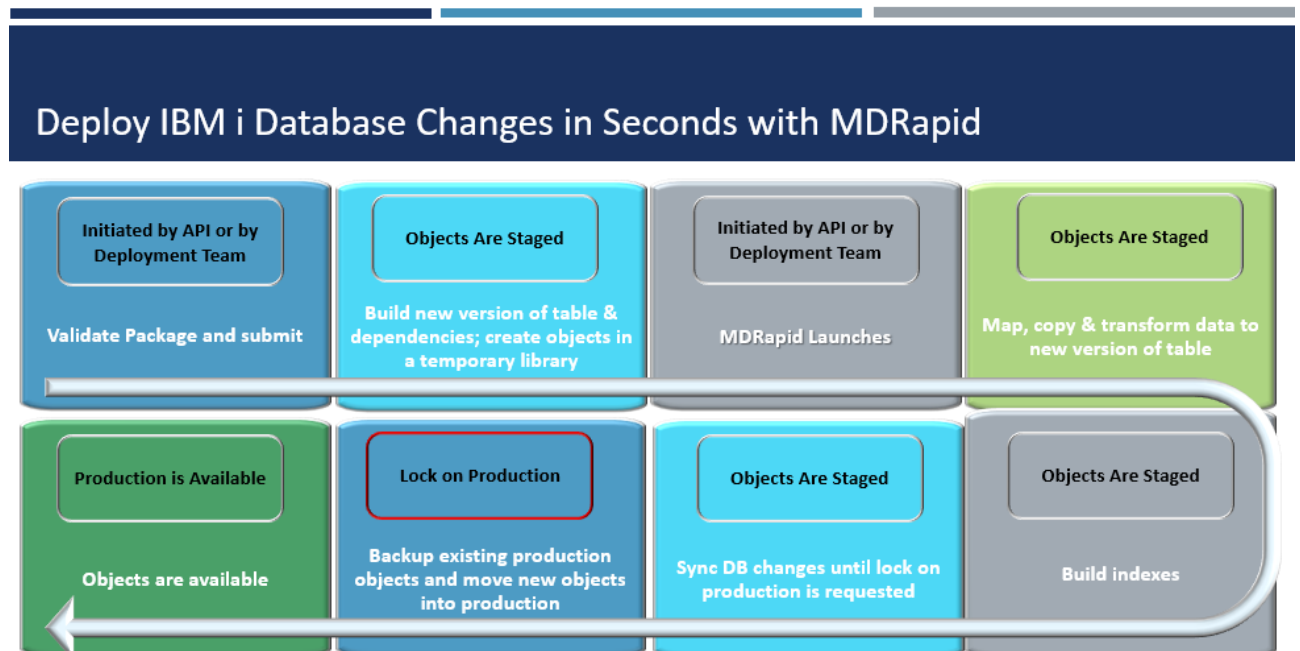
# 1 Overview

## 1.1 What is MDRapid?

MDRapid is a software product that runs on the IBM i to minimize downtime when making database changes.

The changes are prepared in a copy of the impacted tables. All existing data is transformed and mapped from the live tables to the new version of the tables while the applications are still running. Any database transactions that occur during this time period are also transformed and mapped to the new version of the tables. Any database relations over those tables are also prepared while the applications are still running.

When it is time to deploy the new version of the tables and their database relations into the applications, MDRapid merely has to move them, which requires only fractions of a second per object.



## 1.2 Prerequisites for using MDRapid

- An active MDChange (MDCMS), MDRapid and MDTransform License on each IBM i partition where the product will be used.
- The IBM i operating system must be V7R1M0 or newer.
- The user that will initially install the product must have \*SECADM and \*ALLOBJ authority. A strong user profile is not required for the actual use of the product.
- Sufficient disk space must be available to allow for a temporary doubling of the disk usage for the table(s) to be modified. MDRapid will not proceed if the disk utilization is projected to exceed 95%.
- Journal Receivers for the transaction journals applied to the impacted tables must be retained for the duration of the staging process.
- The ability to briefly obtain an exclusive lock on the impacted tables during the deployment time window.



### 1.3 The MDRapid Process

#### 1.3.1 Launch MDRapid

When MDRapid is launched, a job is submitted to prepare everything for copying/submitted.

The launch job performs the following tasks:

- 1) It creates a temporary library for each distinct target library. The library name will have the same prefix as the temporary install library, then the letters RP, followed by a 5-digit number.

**IMPORTANT:** If you use a DR product such as Mimix, it is very important to omit all libraries that begin with the temporary install library prefix. The default prefix is MDI, but can be set to a different value in the MDCMS System Settings if it conflicts with other libraries on your system.

If you use the IBM Db2 Mirror for i product, MDRapid automatically omits the temporary libraries for you.

- 2) For each table that is requested for modification or recompile, the table is copied from the temporary install library to the temporary MDRapid library.
- 3) For each table that is requested for update (alter), the table is copied without data from the target application library.
- 4) If the table in the target application library is not currently journaled, MDRapid will create a journal and journal receiver in the temporary install library and start journaling for the table. For this to be successful, MDRapid must briefly be able to get an EXCLRD lock on the table.
- 5) The MDRapid Monitor job is submitted to the job queue defined on the MDRapid Usage Template for tracking and processing all ongoing tasks.

#### 1.3.2 Monitor MDRapid

The monitor job is named MnnnnnnnMO whereby n is the RFP number. It runs for the duration of the copying and syncing process to start and monitor the progress of each file's MDRapid job.

The monitor job performs the following tasks:

- 1) Start the MDRapid job for the table with the largest number of records
- 2) If multiple parallel copy jobs are allowed, based on the MDRapid Usage Template, the next largest table will be started, and so on until max number of parallel jobs are started.
- 3) Once the copy portion of an MDRapid job is complete, the monitor job will start the MDRapid job for the next table in the queue. This continues until all MDRapid table jobs have been started.
- 4) Once the copy portion of an MDRapid table job is complete, the monitor job checks if there are any indexes or views that are based on the table and submits a job to create them. If the view or logical file is based on multiple tables, the creation is delayed until the copy is complete for all of the based on tables.
- 5) Update status for a job if it abnormally ends or remains stuck in the job queue.



### 1.3.3 Copy Phase of MDRapid

The MDRapid Copy and Sync job for a table is named Mnnnnnnzz whereby n is the RFP number and z is an identifier. It runs for the duration of the copying and syncing process.

The MDRapid table job performs the following tasks during the copy phase:

- 1) If the table was requested for update, any defined update commands are invoked and applied to the new version of the table in the MDRapid temporary library.
- 2) Check if any uniquely keyed logical files are based on the table and create them before copying data to ensure the unique constraints are supported and avoid potential for duplicate errors during the syncing process.
- 3) Mark the start time and initial journal receiver required for when the sync phase begins, in order to avoid missing out on any transactions occurring during the copy phase.
- 4) Copy the rows in the live table to the new version of the table. This is performed in batches of 10,000 rows. After each batch, the status is updated for viewing in the console.

### 1.3.4 Sync Phase of MDRapid

The MDRapid table job performs the following tasks during the sync phase:

- 1) Check the journal for the table for any record or member transactions and replicate those transactions in the new version of the table, transforming the information to match the defined MDTransform column result configuration.
- 2) Once all outstanding journal transactions are processed, enable any check and referential constraints and set status for table to Sync/Idle, indicating that installation of the table can occur.



### 1.3.5 Install Phase of MDRapid

Once all tables are in Sync/Idle state and all database relations are created, the RFP is set to status 03=Ready for Installation. The installation will then either automatically install, if defined to do so, or syncing will continue until a user manually requests to start the installation.

The Installation Steps:

- 1) Run any defined pre-installation commands and scripts, for example to end application jobs.
- 2) Validate that all MDRapid sync jobs are active, to ensure no final transactions will be missed.
- 3) Obtain an \*EXCLRD lock on the tables in the live application
- 4) Wait for the MDRapid sync jobs to complete and end
- 5) Obtain an exclusive lock on all tables, indexes and views that will be replaced by the new versions.
- 6) Move the current versions to a temporary backup library
- 7) Move the new versions to the application library
- 8) Apply journaling and any defined triggers to the new versions
- 9) Run any defined post-installation commands and scripts, for example to restart application jobs.



## 2 Install MDRapid

### 2.1 Download the Product

MDRapid is bundled with the core MDChange product. This can be downloaded from <https://www.midrangedynamics.com/article-categories/mdcms/>

The download consists of a zip file containing installation instructions and a number of save files.

Unpack the zip file and place the save files in an IFS folder or in a library on the target partition.

### 2.2 Obtain License Keys for the Product

Contact Midrange Dynamics or your local MD business partner in order to purchase and acquire the License Keys. Keys are generated per Serial Number/Partition Number and the duration of the keys depend on if you purchase a perpetual license or a subscription.

Once the keys are generated, you can retrieve them from <https://mdlicense.mdcms.ch/>

Download the keys as a save file, name it MDLICENSE.savf and place it in the same IFS folder or library that the product save files were placed in.

### 2.3 Install the Product

Carefully review and follow the installation instructions in the PDF that is included in the zip file of the product.

Example MDINSSAVF command when MDRapid will be used to transition single-member tables to partitioned tables:

```
MDINSSAVF REP (*NO)           -- will only use green screen client
          LTYP (*LIB)         -- save files are in a library
          LIB (MDSAVF)        -- the name of the library is MDSAVF
          ASPD (IASP05)       -- product should be installed in ASP device IASP05
          SECU (*USER)        -- authorize the current job user to the product
          LOCT (SAP)          -- the location type and ID will be set to SAP
          SBSDB (QGPL/MDRAPID) -- create a subsystem in QGPL named MDRAPID
          JOBQ (QGPL/MDRAPID) -- create a job queue in QGPL name MDRAPID
          SAPLIB (R3SD4DATA)   -- create settings for updating tables in R3SD4DATA
```

### 3 Configure MDRapid

Once MDChange (MDCMS) is installed, the product is available from a 5250 command line using command **MDCMS**.

Once in the MDCMS Main Menu, use option 1 to navigate to the MDCMS Setup Menu

If a value for the SAPLIB (SAP Library) parameter was provided when MDINSSAVF was invoked to install MDRapid, then the necessary Application, Level, Attribute and MDRapid Usage Template will have been pre-configured.

Otherwise, refer to the MDCMS User Manual for instructions on configuring Applications, Promotion Levels and Attributes.

#### 3.1 Configure the MDRapid Usage Template

A MDRapid Template defines the rules and behavior for usage of MDRapid for those MDCMS Attributes that are then applied to it. Multiple templates can be created, though only one of them can be applied to a specific attribute for a given Promotion Level.

```

MDCTMRP                                T85 Demo Production                                8.02.23
SCRN1                                  MDRapid Usage Templates                                20:52:59
                                           Used by:
                                           Appl  Lvl
-----
Type options, press Enter.
  2=Edit  3=Copy  4=Delete  5=View  7=Rename  A=Attributes

Opt  Template  Atr  Min Rcd Cnt  Job Queue  Jobq Lib  LFs  Max Cpy Max LF Pri
-----
  -  RAPID      Y           50,000  MDCMS     QGPL      Y      4      6  30
  -  RAPID2                    25  MDCMS     QGPL      Y      4      6  30
  
```

Bottom

F3=Exit   F4=Browse   F5=Refresh   F6=Add   F10=Attributes   F21=Sys Command

#### Screen Definitions:

##### Used By

Filter to list only templates that are used by attributes for the entered Application or Level.

##### Position to Template

A value can be entered into the field above the Template column to position the cursor to the first entry in the list greater than or equal to the value.





### Options

- 2 – Edit an existing Template definition
- 3 – Copy the definition for a Template to a new Template name
- 4 – Delete a Template definition
- 5 – Display all details of the Template definition
- 7 – Rename the Template; all attributes using the template will automatically be updated
- A – List all attributes using the template / Apply attribute to MDRapid

### Function Keys

- F3=Exit
- F4=Browse – Browse the list of valid values for a filter field.
- F5=Refresh
- F6=Add – Add a new Template Definition
- F10=Attributes – List all attributes to be able to view and change the usage of the Templates

### **Fields**

#### Template

A 10-Character name for the template definition.

#### Atr

Y – The template is assigned to 1 or more MDCMS attributes

#### Minimum Record Count

The minimum number of records that must exist in the current version of the file (across all members) for that file to be included by default in the MDRapid process. This can be overridden for specific file requests in the Object Manager.

#### Job Queue

When MDRapid runs, a single monitor job is submitted for the entire RFP and a job is submitted for each target physical and logical file. Enter the name of the job queue that these jobs should be submitted to. It should be a queue that allows enough jobs to be concurrently active.

The subsystem that the Job Queue belongs to should also be defined to allow enough jobs to be concurrently active.

#### Job Queue Library

The library that Job Queue exists in. If left blank, MDCMS will attempt to retrieve the library from the library list.

#### Use for Standalone LFs

If MDRapid should be used for logical files when the physical files they are based on are not in the RFP. This is useful when the files will be replicated to many libraries in order to speed up the installation of those replications. This flag will be considered for a logical file, if the template is applied to the logical file's attribute for the target promotion level.



### Max Parallel Copy Jobs

The data for each physical file in an RFP being copied using MDRapid gets its own copy job to allow for parallel copying to speed up the process. However, data copies are Database- and CPU-intensive processes, so to throttle resource consumption, the maximum number of parallel copy jobs for an RFP can be set. A number between 5 and 20 is recommended, depending on resources available. MDRapid then starts n copy jobs for the files in the RFP in descending order of the number of records in the file so that the largest files start first. Once the copy step is finished for a file, the next pending copy job is started.

If the value for the Max Parallel Copy Jobs is 0, then the default of 20 will be used.

### Max Parallel LF Jobs

Each logical file will be created using its own batch job. The number of logical file creation jobs can be set with this parameter. A number between 3 and 10 is recommended, depending on resources available. MDRapid then allows up to n logical files to be created in parallel.

If the value for the Max Parallel LF Jobs is 0, then the default of 20 or the number of Max Parallel Copy Jobs will be used, whichever is lower.

### Job Run Priority

The run priority can be set for the jobs that are submitted by MDRapid so that they get more or less resource priority than other jobs on the system.

If the value for the Job Run Priority is 0, then the default of 20 will be used.

## 3.2 Apply Attributes to MDRapid Usage Template

Within the listing screen for the MDRapid Usage Templates, use option A to list all attributes that are currently applied to the template. If no attributes are currently applied, then all potentially relevant attributes will be listed.

MDCMS Attributes of type \*SQLTAB, \*SQLIDX and \*SQLVW will be listed as well as Attributes of type \*FILE when the Dft Source Type is PF or LF.

Use option 1=Assign Template to assign any \*SQLTAB or \*FILE/PF attributes that should be considered for MDRapid processing.

If using MDRapid for faster deployment of Standalone LFs (New or modified logical files, indexes or views that don't include the based-on files in the RFP), then also assign the template to those attributes. MDRapid will automatically be used for dependent database relations, even if they aren't assigned to a MDRapid Template.



### 3.3 Recommended Subsystem Storage Settings for MDRapid

In order to avoid negatively impacting the performance of your production application jobs, it is highly recommended that the subsystem that the MDRapid Usage Template Job Queue belongs to has dedicated memory storage in a separate shared Storage Pool.

In order to configure this, use command CHGSBSD for the subsystem and set the POOLS parameter to one of the 60 shared pools that are not used by other processes. For the Activity level portion of the parameter, it is recommended to grant 250 MB per concurrently altered table for this value.

Example CHGSBSD command for 2 concurrent table changes:

```
CHGSBSD SBSD(QGPL/MDRAPID) POOLS((01 *SHRPOOL1 500 *MB))
```

If the partition is not being used for production and/or has limited base storage, then leaving the Storage size to \*BASE may be the better option.

### 3.4 Relevant Promotion Level Settings for MDRapid

#### Auto Launch MDRapid

Y – as soon as the tables have been created and validated and the RFP (Request for Promotion) has been approved, begin the copy of the data from the target application library to the MDRapid temporary library containing the new version of the tables.

N – The launch of MDRapid will wait until a user manually decides to execute it.

#### Auto Install

Y – as soon as the table rows have been copied and the tables are fully in sync with the live application, MDCMS will attempt to get an exclusive lock on the application tables and move in the new version of the tables.

N – MDRapid will continue to sync transactions in the background until a user manually decides to disrupt the application to perform the installation.

R – RFPs that require MDRapid will not auto install, but those that do not require MDRapid will auto install.





## 4.1.2 Object Request Options for MDRapid

### Option M=Modify Object

Use option M if you will be modifying the SQL script containing the CREATE TABLE statement for a table or modifying the DDS source member for a physical file. This is typically done to add/change/remove fields or keys. MDCMS will then create the \*FILE object from the source code and MDRapid will copy the data from the live version of the table to the newly created version.

#### Prerequisites for using Option M

- Your MDCMS core license includes at least one developer
- You have authority to MDSEC Function Code 28 for the target Promotion Level
- You have defined the location of the source code for the MDCMS Attribute
- You have defined the Compile command for the MDCMS Attribute

Example Compile command for a PF Attribute:

```

CMCCMST          T85 Demo Production          9.02.23
SCRN2            MD Default Command Maintenance 15:33:32

Appl.....: TLCL                               Run for Modifications: Y  Y/N
Lvl.....: 10                                   Recompiles...: Y  Y/N
Attribute: PF      Attribute, *RFP              Deletes.....: N  Y/N
                                                    Updates.....: N  Y/N
Type.....: C  Compile                          Ignore Errors.....: N  Y/N
Sequence.: _____ Keep MD Libs in Libl.: N  Y/N
                                                    Run as User Profile..: *USER _____

Command
CRTPF FILE(##OBJLIB##/##OBJNAM##) SRCFILE(##SRCLIB##/##SRCFIL##) SRCMBR(##SRCNAM
##)

```

Example Compile command for a SQLTAB Attribute:

```

CMCCMST          T85 Demo Production          9.02.23
SCRN2            MD Default Command Maintenance 15:41:36

Appl.....: TLCL                               Run for Modifications: Y  Y/N
Lvl.....: 10                                   Recompiles...: Y  Y/N
Attribute: SQLTAB  Attribute, *RFP              Deletes.....: N  Y/N
                                                    Updates.....: N  Y/N
Type.....: C  Compile                          Ignore Errors.....: N  Y/N
Sequence.: _____ Keep MD Libs in Libl.: N  Y/N
                                                    Wildcards in SQL.....: N  Y/N
                                                    Run as User Profile..: *USER _____

Command
RUNSQLSTM SRCFILE(##SRCLIB##/##SRCFIL##) SRCMBR(##SRCNAM##) COMMIT(*NONE) NAMING
(*SYS)

```

### Option R=Recompile Object

Use option R if you have the SQL script containing the CREATE TABLE statement for a table or have the DDS source member for a physical file, but will not be making any changes to the source. This is typically done to pick up changes in a reference file. MDCMS will then create the \*FILE object from the source code and MDRapid will copy the data from the live version of the table to the newly created version.

#### Prerequisites for using Option R

- You have authority to MDSEC Function Code 30 for the target Promotion Level
- You have defined the location of the source code for the MDCMS Attribute
- You have defined the Compile command for the MDCMS Attribute. The command definition is the same as for a Modify.

### Option U=Update Object

Use option U if you will not be creating a new version of the table from source. Instead, MDRapid will perform a CRTDUPOBJ of the live version to the temporary MDRapid library and copy the data to it.

#### Prerequisites for using Option U

- You have authority to MDSEC Function Code 30 for the target Promotion Level

#### Example Use Cases for Option U

- Alter a table to add partitioning to it
- Run a CHGPF command to change something about it
- Make no alterations to the object, but be able to purge deleted records with minimal downtime by copying the active records to the copy of the table.

### 4.1.3 Completing the Object Request

1. Enter option M, R or U
2. Enter the name of the Table or Physical File. You can enter the system name or Press F2 to enter the SQL long name.
3. Enter the Attribute or press F4 to select from a list. The attribute will typically be PF or SQLTAB, depending on if it is generated from DDS or DDL.
4. Press Enter
5. If the option was for M=Modify, you will be prompted for the location to copy the source from and copy the source to for editing. For version control reasons, the source cannot be edited directly in the target library/folder, so a copy is made. Set the values and Press Enter. Afterwards, the source can be edited within the Object Manager by using option S.



### 4.2 Create Object-Specific Update Commands

If the Object was requested with option U=Update, and something about the table should be altered, then the command to execute for the alteration needs to be defined for the Object Request.

Steps:

- 1) Use option C=Commands for Object in the Object Manger for the Object Request
- 2) Press F6 to create a command
- 3) Set Type = U for Update Object
- 4) Set Reuse Command = N
- 5) The default values for the other parameters are typically fine as is
- 6) Enter the command that will be executed.  
Use the ++OBJLIB++ or ##OBJLIB## wildcard to qualify the object rather than a fixed library value, since the command will be executed for the table in a temporary library.

Example command for adding hash partitioning:

```
RUNSQL SQL('ALTER TABLE ++OBJLIB++.VBFA ADD PARTITION BY HASH (VBELV) INTO  
10 PARTITIONS') COMMIT(*NONE)
```

Example command for adding range partitioning:

```
ALTER TABLE ++OBJLIB++.DATETABLE ADD PARTITION BY RANGE (ADATE)  
(STARTING('2000-01-01') ENDING('2024-01-01') EVERY(1 YEARS))
```

Example command for changing a physical file:

```
CHGPF FILE(##OBJLIB##/MYFILE) MAXMBRS(8) REUSEDLT(*YES) CCSID(*HEX)
```

### 4.3 Force MDRapid On/Off for Object Request

If the object request was for Modify or Recompile, MDRapid will automatically be used if the current number of records in the table meet or exceed the minimum defined for the MDRapid Usage Template.

If the object request was for Update, MDRapid is not used by default.

To override the default, use option 2=Edit on the Object Request.

Position the cursor to parameter Use MDRapid.

\*DEFAULT – MDRapid usage based on record count for modify/recompile or not at all for update

\*YES – MDRapid will explicitly be used

\*NO – MDRapid will explicitly not be used



### 4.4 Set Unique Keys or Special Column Result Values

MDRapid relies on MDTransform to copy the data from the live version to the new version of a table. MDTransform has the ability to transform values for new or existing tables, leveraging all of the capabilities of SQL. This helps you avoid having to write a program or script to run after a file is deployed, saving you development time and application downtime.

Additionally, if using MDRapid to add partitioning to a table, MDRapid needs to know the set of columns that combine to uniquely identify each row in the table.

To manage the MDTransform definition for a table, use option F=File Data Transformation on the object request.

```

MDCRAPF                                SAP                                9.02.23
SCRN1                                  Data Transformation          16:24:08
File...: VBFA
Enabled: Y  Filter by Field: _____ Type: _ Desc: _____ Key: _

Type options, press Enter.
  2=Edit  4=Remove Custom Result  5=Display  K=Add/Remove Key for MDRapid

opt  Field Name   Len Typ Dec Description           S Result Value
---  -
  K MANDT         6  G      F.MANDT
  K VBELV        20  G      F.VBELV
  K POSNV        12  G      F.POSNV
  K VBELN        20  G      F.VBELN
  K POSNN        12  G      F.POSNN
  K VBTYP_N       2  G      F.VBTYP_N
  RFMNG         15  P      3      F.RFMNG
  MEINS          6  G      F.MEINS
  RFWRT         15  P      2      F.RFWRT
  WAERS         10  G      F.WAERS
  VBTYP_V        2  G      F.VBTYP_V
  PLMIN          2  G      F.PLMIN
More...

F3=Exit  F7=View SQL  F8=New/Diff/Custom only  F9=SQL Names  F10=Disable

```

When you first invoke this option, MDTransform will check the table for a primary key constraint, unique key constraint or directly defined unique access path. If one of those exists, it will pre-designate the columns that combine to uniquely identify a row in the table. Use option K to add or to remove a column from the group. If not using MDRapid to add partitioning, keys are not required, but they are recommended to reduce disk utilization during the copy and sync process.

Use option 2=Edit to define a custom result value for a column for each row that will be copied/synced. Use the same syntax that you would use in an SQL SELECT statement. The value can include function calls.

If MDTransform complains during the validation phase that the SQL is invalid, you can press F7 from this screen to see the full INSERT/SELECT statement and test it in an SQL session.

Use option 4=Remove Custom Result to reset a result value back to the default.





### 4.4.1 Handling Generated Always Columns

If your SQL Table contains the Generated Always clause for Temporal Table columns, please consult the following table:

Db2 for i Enhancement	IBM i 7.5	IBM i 7.4	IBM i 7.3	IBM i 7.2
--- Enhancements from 2022 ---				
Geospatial Analytics	SF99950 Level 3	SF99704 Level 23	Not Supported	Not Supported
REMOTE TABLE	SF99950 Level 3	SF99704 Level 23	Not Supported	Not Supported
REPLICATION_OVERRIDE global variable for system generated values	SF99950 Level 3	SF99704 Level 23	Not Supported	Not Supported

If your operating system has not reached the necessary minimum version or level, SQL cannot be used to copy the data to the new version and MDTransform/MDRapid will be disabled by default. This does not apply to identity columns – those can be overridden in older releases too.

You can override this by pressing F10=Enable from the File Transformation screen. In this case MDRapid will copy the rows, but the Generated Always columns will receive new values.

If your operating system has reached the minimum version and level, MDTransform/MDRapid recognize this and will remain enabled, because they can copy the old values to the new version of the table, as long as the following prerequisites are met:

- You are using MDCMS version 8.5 or newer
- QIBM\_DB\_GENCOL\_OVERRIDE Function Usage is allowed either by default or for the user defined on the job description for the target promotion level.  
You can check this with command:  
`WRKFCNUSG FCNID(QIBM_DB_GENCOL_OVERRIDE)`



### 4.5 Submit the RFP for Validation

Once all Object Requests are ready, press F7=Submit RFP from the Object Manager. This will bring up the RFP Manager in Submit mode.

From here, use option 1 to submit the RFP.

If there are any database relations over the requested tables (logical files, indexes, views) that have not already been requested for the same RFP, they will be listed at this time. Include them in the RFP by using option R=Recompile if they should be recreated from source or by using option U=Update to create them into the temporary library as a duplicate from the live library.

Then, a confirmation screen will be displayed for submitting the validation job to batch. This can be scheduled for starting at a later date/time or you can press Enter to immediately begin validation of the RFP's objects.

The job will be submitted to the job queue defined for the job description that is applied to the target Promotion Level.

If any errors occur during validation, a message will be sent to your message queue. Full diagnostic information is available by using option L=Log on the RFP.



### 4.6 Launch MDRapid

If the Promotion Level is defined to auto-launch MDRapid, it will begin as soon as the validation phase is complete.

If not, it can be manually launched by pressing F9 from within the RFP Manager to toggle to Launch/Install mode. Then, use option 1 to submit the launch.

The following confirmation screen will be displayed:

```
CMC228                                SAP                                9.02.23
SCRN5                                MDRapid Completion Parameters 22:26:45

Application: SAP      Level: 100   Assigned to.: MMORGAN   Date
RFP Number.: 8                                             09.02.23

RFP Description
MDRapid Tutorial

Auto-Install Objects when Data Copy Complete: _  Y=Yes
                                                    N=No
                                                    W=Yes when in Time Window

<...Minimum...> <...Maximum...>
Date      Time      Date      Time
Time Window for Auto-Install: 09.02.23 22:26:45 09.02.23 23:30:00

Enter=Confirm  F12=Cancel
```

#### Auto-Install Objects when Data Copy Complete

Y – once all data copying and syncing is complete, immediately disrupt the target application by moving the new version of the tables to the target library.

N – continue syncing changes to the new version of the tables until a user manually decides to install the changes.

W – Yes when in Time Window – Enter the Minimum and Maximum Date and Time of the window. If MDRapid finishes copying prior to the minimum, it will sync until then and then begin the install. If MDRapid requires more time than the maximum for the window, a user must manually decide when to install the changes.



## 4.7 The MDRapid Console

From within the RFP Manager, option D=MDRapid Console for RFP can be used to view and manage the progress of the copy of data and transaction syncing for each table in the RFP.

```
CMC247          SAP          10.02.23
SCRN1          MDRapid Copy Status      19:03:10

Appl: SAP      Lvl: 100  RFP:      8      Start: 10.02.23 19:01:33
Status: 03-Waiting for Installation      End: 10.02.23 19:01:44
Filter by File: _____ Library: _____ Active: _ Y/N Errors: _ Y/N
Type options, press Enter.
5=Details E=End H=Hold I=Init+Restart J=Job R=Rec Errors S=Restart
Target      Source      F      Usage      Est/Actual End
0 File      Library      T Status      Initial Recs Pct hh:mm:ss Date Time
┌ BIGKEYF   R3SD4DATA  P Sync/Idle      20,157 100 7 10.02.23 19:01
┌ FAGLFLEXA R3SD4DATA  T Sync/Idle        11 100 10.02.23 19:01
┌ VBFA      R3SD4DATA  T Sync/Idle       118 100 10.02.23 19:01
┌ FAGL50012 R3SD4DATA  I LF Created      100 10.02.23 19:01
┌ FAGL50013 R3SD4DATA  I LF Created      100 10.02.23 19:01
┌ FAGL50014 R3SD4DATA  I LF Created      100 10.02.23 19:01
┌ FAGL50015 R3SD4DATA  I LF Created      100 10.02.23 19:01
┌ Monitor   M Running

F3=Exit F5=Refresh F13=Repeat Opt F17=Top F18=Bottom Bottom
```

The console screen lists all files that are utilizing MDRapid to copy across data from the live version of the file. It also lists the indexes and views that are based on the files.

The list can be filtered by the following fields:

### File

Enter a value to limit the listing to only those file system names that contain the filter value. For example, if BF were to be entered above, only VBFA would be listed.

### Library

Enter a value to limit the listing to only those library system names that contain the filter value. For example, if R3 were to be entered above, only files in Source Library R3SD4DATA would be listed.

### Active

Y – only list a file if a copy or syncing job is actively running for it  
N – only list a file if a copy or syncing job is not actively running for it

### Errors

Y – only list a file if it is in an Error state  
N – only list a file if it is not in an Error state



## 4.7.1 Console Options

5=Details – View detailed processing and error information

E=End – End the MDRapid Copy/Sync or Monitor job

H=Hold – Hold the MDRapid Copy/Sync or Monitor job. The job will continue running but won't perform any intensive processing until the job is restarted.

I=Init+Restart – Clear any records copied so far and restart the MDRapid Copy/Sync job from the very beginning.

J=Job – perform a WRKJOB for the job responsible for the row in the list.

R=Rec Errors – view a list of any record-level errors that are currently present for the table. When errors are present, this option can also be used to tell MDRapid to ignore the errors, so the installation will be allowed to proceed in spite of the errors.

S=Restart – either release a held job or restart the MDRapid job from the point where the prior job had left off.

## 4.7.2 Console Detail View

```

CMC247                                SAP                                11.02.23
SCRN2                                MDRapid Copy Status          14:38:05

Appl/Lvl . . . . . SAP      100
RFP . . . . .          8 MDRapid Tutorial
Source File . . . . . BIGKEYF
Library . . . . .      R3SD4DATA
Target File . . . . . BIGKEYF
Library . . . . .      SDIRP00044
File Type . . . . . Physical
Init Mbr Count . . . . . 1
Init Rcd Count . . . . . 20,157 Sync Point Cnt Source: 20,157
Records Copied . . . . . 20,157 Sync Point Cnt Target: 20,157
Record Errors . . . . .
% Complete . . . . . 100
Elapsed Time . . . . . 7 (hhhh:mm:ss)
Status . . . . . Sync/Idle
Error Reason . . . . .
Start Date/Time. 10.02.23 19:01:35
End Date/Time. 10.02.23 19:01:43
Journal Trx Cnt. Oldest Receiver Req.: MDRAP00001
Sync Date/Time. 11.02.23 14:37:48
F3=Exit F5=Refresh
  
```

### Source File/Library

The Application Library and System File name that data is being copied from

### Target File/Library

The Application Library and System File name that data is being copied to



### File Type

Index – An SQL Index

Logical – A DDS logical file

Monitor – the MDRapid Monitoring job

Physical – A DDS physical file

Table – An SQL Table

View – An SQL View

### Init Mbr Count

The number of members or partitions that the Source File contained when the bundle phase for the RFP was performed.

### Init Rcd Count

The total number of non-deleted records across all members or partitions that the Source File contained when the bundle phase for the RFP was performed.

### Records Copied

The number of records that have been copied from the Source File to the Target File during the copy phase of the MDRapid job.

### Sync Point Cnt Source

The total number of records in the Source File during the most recent Sync Point.

A sync point is reached when all records have been copied and all journal transactions have been processed.

### Sync Point Cnt Target

The total number of records in the Target File during the most recent Sync Point.

A sync point is reached when all records have been copied and all journal transactions have been processed.

If the number of records in the Source File don't match the number of records in the Target File, the table is considered to be in error and an installation will be blocked unless you use option R=Rec Errors and then press F10 to allow record errors to be ignored.

Ignoring record errors is only recommended if the reason has been analyzed and accepted due to the nature of what was modified in the new version of the table.

### Record Errors

The total number of records that are in error. This occurs if an insert, update or delete fails.

If the number of record errors > 0, the table is considered to be in error and an installation will be blocked unless you use option R=Rec Errors and then press F10 to allow record errors to be ignored.

Ignoring record errors is only recommended if the reason has been analyzed and accepted due to the nature of what was modified in the new version of the table.

**NOTE:** a common reason record errors will occur is if there is a unique constraint on the table or a unique access path over the table. While MDRapid is copying data from the Source File, the application may be busy deleting and updating records and those transactions won't be completely reflected in the target file until the sync process is reached a Sync Point. Normally, record errors that occur because of this will disappear once the Sync Point is reached, so you don't have to worry about them. However, if there are still record errors when a value for the Sync Point Cnt is displayed, then there is a serious situation that will need to be analyzed.



### % Complete

The percentage of records that have been copied, based on the initial record count for the Source File. Once the copy process is complete, the percentage will be set to 99%. Once a Sync Point is reached, the percentage will be set to 100%.

### Elapsed Time

The amount of time that has elapsed for the copy phase of the MDRapid job. The amount is in the format of hours:minutes:seconds.

### Status

Pending	The file hasn't begun processing yet
Job Queue	The MDRapid job has been submitted to the job queue
Resetting	A reset to Copy Pending has been requested for the RFP
Reset	A reset to Copy Pending has completed for the RFP
Launch Err	Error occurred trying to submit the launch of the file for MDRapid processing
Copying	The current data in the origin file is being copied to the new version of the file
Copying/RE	The current data in the origin file is being copied to the new version of the file, and one or more of the records failed to be copied. Use option R for more details. The errors may potentially be automatically resolved during the sync process.
Copy Held	A user has held the copy job
Copy Ended	The copy job has ended without reaching completion
Copy Error	Error occurred during the copy of data
Copy Resume	A user has requested that a copy job resume processing
LF Building	A logical file is in the process of getting built over its physical file(s)
LF Built	A logical file has finished the build process
LF Error	Error occurred during the logical file build
Syncing	The copy process is complete and outstanding Journal transactions are in the process of being synced to the new version of the file
Syncing/RE	The copy process is complete and outstanding Journal transactions are in the process of being synced to the new version of the file and one or more of the records failed to be copied. Use option R for more details.
Sync/Idle	All copying and transaction syncing is complete, will continue to sync new transactions as they occur
Sync/IdleRE	All copying and transaction syncing is complete, will continue to sync new transactions as they occur and one or more of the records failed to be copied. Use option R for more details.
Sync Held	A user has held the sync job
Sync Ended	The sync job has ended without reaching completion
Sync Error	Error occurred during the sync of journal transactions
Sync Resume	A user has requested that a sync job resume processing
Finish Pending	The RFP install job has requested the sync job to finish any outstanding transactions and then end so that the deployment of the files can occur.
Sync Comp	The job for the file has completed so that the installation can proceed
Running	The monitor job is actively observing the individual file jobs
Monitor Held	A user has held the monitor job
Monitor Ended	The monitor job has ended
Monitor Error	Error occurred
Monitor Resume	A user has requested that the monitor job should resume processing

### Error Reason

A summary description of the technical reason why job processing failed. For further details, use option J=Job for the entry to view the job log.



### Start Date/Time

The date and time that the copy phase began for a table or creation began for a logical file.

### End Date/Time

The date and time that the copy phase finished for a table or creation finished for a logical file. If the copy phase for a table is still in progress, the End Date/Time is an estimate of when the copy phase will be complete. This estimate is recalculated after each block of 10,000 records are copied.

### Journal Trx Cnt

The number of journal transactions that have been processed during the Sync phase of the MDRapid job.

### Oldest Receiver Req

The oldest journal receiver for the journal that tracks transactions for the Source File that is required for the MDRapid job. Any older receivers than the oldest can be deleted in order to recover disk space.

### Sync Date/Time

The date and time of the most recent journal transaction that the MDRapid job has processed.

## 4.8 Deploy Table Changes

Once all of the table records have been copied and all journal transactions are synced, the RFP can be installed. If the choice was to auto-install, then this step will occur without a user action being necessary. However, if a manual install is required, take the following steps:

- 1) Command MDCMS from a command line
- 2) Option 3=RFP Manager
- 3) If the RFP in question is not listed, adjust the filter values and also use the F9 key to toggle to install mode.
- 4) If the Status of the RFP is currently 03 (Ready to Install), use option 1=Install to bring up the confirmation screen.
- 5) Set the date and time to install, if it should not occur immediately, and then press Enter.

## 4.9 Completely Reset MDRapid

If the install step has not occurred yet and you would like to reset the MDRapid processing for all requested tables and logical files for an RFP, take the following steps:

- 1) Command MDCMS from a command line
- 2) Option 3=RFP Manager
- 3) If the RFP in question is not listed, adjust the filter values and also use the F9 key to toggle between install mode and manage mode.
- 4) If the Status of the RFP is currently 03 (Ready to Install) or CR (MDRapid Copy Running), use option 7=Reset to end the MDRapid jobs, delete the temporary MDRapid libraries and reset the RFP to status CP (MDRapid Copy Pending)

If the decision is made that the RFP should never be used, repeat option 7=Reset until the status is 00 (Empty) and then use option 9=Close to close the RFP.



### 4.10 Optional Cleanup after MDRapid Deployment is Complete

#### 4.10.1 Delete Backup Libraries

By default, the backup libraries for the tables that were replaced are retained on the system for a minimum of 3 days and won't be automatically deleted unless the MDCLEAN job runs after the 3 days have passed.

However, to recover disk space more quickly, once any validation has shown that the prior version of the data and objects are no longer necessary, The libraries can be deleted.

By default, the name of these libraries will begin with MDU. The actual name(s) used can be viewed from the RFP Deployment Log for the RFP number that was used for the deployment. Completed RFPs are viewable from the MDCMS Main Menu option 4 – RFP History.

#### 4.10.2 Reclaim \*BASE Memory

If the subsystem used by MDRapid was configured to use a separate memory pool, then the memory will continue to be allocated only for that subsystem until such time that the subsystem is deleted or the configuration is modified.

If you will not be performing another MDRapid deployment in the near future, you can release this memory back to \*BASE with the CHGSBSD command.

Example CHGSBSD command for remove from separate shared pool:

```
CHGSBSD SBSD(QGPL/MDRAPID) POOLS((1 *BASE))
```

#### 4.10.3 Uninstall MDRapid

If MDRapid is only being used for a short-term project, the following components can be removed from the partition when finished:

##### Libraries

MDCMS  
MDREP  
MDSEC  
MDXREF

##### IFS Folder

/MDCMS

##### QGPL Objects

MDCMS  
MDSEC  
MDXREF

##### User Profile

MOWNER

And any subsystem and job queue created for use only by MDRapid can be deleted as well.



## 5 Systematic Start/End of MDRapid Jobs

### 5.1 MDSTRRAP – Restart MDRapid Jobs command

MDCMS is delivered with a command-based API that allows external processes to restart MDRapid jobs for an RFP. An RFP must have status CR (MDRapid Copy Running) or 03 (Ready to Install) in order to be considered by the API.

The MDCMS command is named **MDSTRRAP** and is in library MDCMS. All MDSTRRAP API transactions are logged to file MDCMS/MDDARAP.

MDSTRRAP Parameter Table

Name	Type	Length	Description
APPL	CHAR	6	Application Code (required)
RFP	INTEGER	7	RFP Number. 0=Restart MDRapid for all RFPs in the Application that were previously started and are currently in status CR=Copy Running or 03=Waiting for Installation
MINF	CHAR	10	Minimum File Name Value – the minimum alphabetic value of files in the list to restart *FIRST = Files beginning with the first file in the list
MAXF	CHAR	10	Maximum File Name Value – the maximum alphabetic value of files in the list to restart *LAST = Files ending with the last file in the list
MON	CHAR	4	Restart Monitor Job – if the MDRapid monitor job should be restarted *YES – if the monitor job is not active, it will be restarted *NO – do not restart the monitor job
ENV	CHAR	4	Specifies the MDCMS environment that should be used to place the Request. The ID correlates to the suffix of the MDCMS library name. For example, TEST correlates to library MDCMSTEST. *DFT = The default environment will be used. This correlates to library MDCMS.
EMSG	CHAR	7	Specifies if and to what extent an exception message should be returned to the calling program. An exception message occurs when an input parameter value is invalid, causing the addition of the request to fail. *DIAG = A diagnostic message will be placed in the calling program's message queue in the following format: MDINSRFP Exception. Object=<OBJN>, Reason=<the error reason> *ESCAPE = The full diagnostic message as described above will be placed in the calling program's message queue and then followed by escape message CPF0001 for which the calling program can monitor. *NONE = An exception message will not be returned to the calling program's message queue.



## 5.2 MDENDRAP – End MDRapid Jobs command

MDCMS is delivered with a command-based API that allows external processes to end MDRapid jobs for an RFP. An RFP must have status CR (MDRapid Copy Running) or 03 (Ready to Install) in order to be considered by the API.

The MDCMS command is named **MDENDRAP** and is in library MDCMS. All MDENDRAP API transactions are logged to file MDCMS/MDDARAP.

MDENDRAP Parameter Table

Name	Type	Length	Description
APPL	CHAR	6	Application Code (required)
RFP	INTEGER	7	RFP Number 0=End MDRapid for all RFPs in the Application that were previously started and are currently in status CR=Copy Running or 03=Waiting for Installation
MINF	CHAR	10	Minimum File Name Value – the minimum alphabetic value of files in the list to end *FIRST = Files beginning with the first file in the list
MAXF	CHAR	10	Maximum File Name Value – the maximum alphabetic value of files in the list to end *LAST = Files ending with the last file in the list
MON	CHAR	4	End Monitor Job – if the MDRapid monitor job should be ended *YES – if the monitor job is active, it will be ended *NO – do not end the monitor job
ENV	CHAR	4	Specifies the MDCMS environment that should be used to place the Request. The ID correlates to the suffix of the MDCMS library name. For example, TEST correlates to library MDCMSTEST. *DFT = The default environment will be used. This correlates to library MDCMS.
EMSG	CHAR	7	Specifies if and to what extent an exception message should be returned to the calling program. An exception message occurs when an input parameter value is invalid, causing the addition of the request to fail. *DIAG = A diagnostic message will be placed in the calling program's message queue in the following format: MDINSRFP Exception. Object=<OBJN>, Reason=<the error reason> *ESCAPE = The full diagnostic message as described above will be placed in the calling program's message queue and then followed by escape message CPF0001 for which the calling program can monitor. *NONE = An exception message will not be returned to the calling program's message queue.