

MQ Queue To SQLite DB (MQ2SDB) Operation Manual



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Last Updated: January 2021.
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1 Introduction

1.1 Overview

MQ Queue To SQLite DB (MQ2SDB) program will offload MQ messages to an SQLite database.

MQ2SDB program can be run from the command line or as an MQ Service. I would strongly recommend that users run MQ2SDB program as an MQ Service on the same queue manager where MQMR (MQ Message Replication) is configured as an MQ API Exit. Hence, when the queue manager is started, MQ2SDB will write MQ messages to the SQLite database right away.

MQ2SDB program will create the database file based on the queue manager's name, the queue name and the current day's date.

File naming convention for the SQLite database file is as follows:

QMgrName-QueueName-YYYY_MM_DD.mqsdb

where

- **QMgrName** is the name of the MQ queue manager
- **QueueName** is the name of the MQ queue
- **YYYY_MM_DD** is the current year, month and day.

When retrieving MQ messages and writing them to an SQLite database, MQ2SDB program will automatically roll to the next file at midnight (or when the next message arrives after midnight).

MQ2SDB has been tested on Windows, IBM i, Unix and Linux environments.

MQ2SDB has an option parameters (*UseCompression & Compression*), that when enabled, will compress the message data.

MQ2SDB has implemented 7 lossless compression algorithms:

- **LZ4** is a lossless data compression algorithm that is focused on compression and decompression speed. It belongs to the LZ77 family of byte-oriented compression schemes. LZ4 algorithm is incredibly fast.
- **LZW** encodes sequences of 8-bit data as fixed-length 12-bit codes. I used Michael Dipperstein's implementation of LZW (Lempel-Ziv-Welch).
- LZMA uses a dictionary compression algorithm, whose output is then encoded with a range encoder, using a complex model to make a probability prediction of each bit (Lempel-Ziv-Markov). MQMC implemented the LZMA SDK from 7-Zip.
 - **LZMA_FAST** uses the LZMA SDK from 7-Zip with a Level set to 4.
 - **LZMA_BEST** uses the LZMA SDK from 7-Zip with a Level set to 5.

- **RLE** (Run Length Encoding) encodes sequences of the same data value occurring over many consecutive data elements are stored as a single data value and count.
- zlib only supports one algorithm, called DEFLATE, which uses a combination of a variation of LZ77 (Lempel–Ziv 1977) and Huffman coding.
 - **ZLIB_FAST** uses zlib with a Level of `Z_BEST_SPEED`.
 - **ZLIB_BEST** uses zlib with a Level of `Z_BEST_COMPRESSION`.

Note: Raspberry Pi is a Linux ARM 32-bit OS (Operating System). Hence, simply follow the Linux 32-bit instructions for installing and using the solution on a Raspberry Pi.

2 Installing MQ Queue To SQLite DB

MQ2SDB is included with MQMR, so there is no extra installation steps.

3 Configuring MQ Queue To SQLite DB

MQ2SDB is included with MQMR, so there is no extra installation steps.

3.1 Creating the MQ2SDB Service

The MQMR distribution includes an MQSC file with 2 MQSC commands. The first command defines the MQ2SDB service to MQ and the final command starts the service.

3.1.1 Windows

The following is the sample MQ2SDB MQSC file for Windows:

```
*
*****
* Create or Update the MQ2SDB Service
*****
*
DEFINE SERVICE(MQ2SDB)  +
    CONTROL(STARTONLY) +
    SERVTYPE(SERVER)   +
    STARTCMD('C:\Capitalware\MQMR\mq2sdb.exe')  +
    STARTARG('C:\Capitalware\MQMR\mq2sdb.ini')  +
    DESCR('MQMR MQ2SDB Service') +
    REPLACE
*
*****
* Start the service
*****
*
START SERVICE(MQ2SDB)
```

3.1.2 Linux 32-bit

The following is the sample MQ2SDB MQSC file for Linux 32-bit:

```
*
*****
* Create or Update the MQ2SDB Service
*****
*
DEFINE SERVICE(MQ2SDB)  +
    CONTROL(STARTONLY) +
    SERVTYPE(SERVER)   +
    STARTCMD('/var/mqm/exits/mq2sdb.exe')  +
    STARTARG('/var/mqm/exits/mq2sdb.ini')  +
    DESCR('MQMR MQ2SDB Service') +
    REPLACE
*
*****
* Start the service
*****
*
START SERVICE(MQ2SDB)
```


3.1.3 Unix/Linux 64-bit

The following is the sample MQ2SDB MQSC file for Unix/Linux 64-bit:

```
*
*****
* Create or Update the MQ2SDB Service
*****
*
DEFINE SERVICE(MQ2SDB)  +
    CONTROL(STARTONLY) +
    SERVTYPE(SERVER)   +
    STARTCMD('/var/mqm/exits64/mq2sdb.exe') +
    STARTARG('/var/mqm/exits64/mq2sdb.ini') +
    DESCR('MQMR MQ2SDB Service') +
    REPLACE
*
*****
* Start the service
*****
*
START SERVICE(MQ2SDB)
```

3.1.4 IBM i

The following is the sample MQ2SDB MQSC file for IBM i:

```
*
*****
* Create or Update the MQ2SDB Service
*****
*
DEFINE SERVICE(MQ2SDB)  +
    CONTROL(STARTONLY) +
    SERVTYPE(SERVER)   +
    STARTCMD('MQMR/MQ2SDB') +
    STARTARG('/QIBM/UserData/mqm/mqmr/mq2sdb.ini') +
    DESCR('MQMR MQ2SDB Service') +
    REPLACE
*
*****
* Start the service
*****
*
START SERVICE(MQ2SDB)
```

4 Starting MQ2SDB

This section describes the starting of MQ2SDB.

4.1 MQ Service

Running MQ2SDB as an MQ service is the recommended approach. The queue manager will automatically start MQ2SDB when it starts and MQ2SDB will stop when the queue manager shuts down.

4.2 Manually

MQ2SDB can be manually started via a Windows Command Prompt, Unix/Linux shell or IBM i shell.

4.2.1 Windows

To use the mq2sdb program on Windows, open a Command Prompt and type the following:

```
cd /D C:\Capitalware\MQMR\  
mq2sdb.exe
```

4.2.2 Linux 32-bit

To use the mq2sdb program on Unix/Linux for MQ 32-bit, open a shell prompt and type the following:

```
cd /var/mqm/exits/  
./mq2sdb
```

4.2.3 Unix and Linux 64-bit

To use the mq2sdb program on Unix/Linux for MQ 64-bit, open a shell prompt and type the following:

```
cd /var/mqm/exits64/  
./mq2sdb
```

4.2.4 IBM i

To use the mq2sdb program on IBM i, issue the following command on the Command Prompt:

```
CALL MQMR/MQ2SDB
```

5 Stopping MQ2SDB

This section describes the stopping of MQ2SDB.

5.1 MQ Service

When the queue manager is stopped, MQ2SDB will automatically end.

5.2 Manually

MQ2SDB can be manually stopped via a Windows Command Prompt, Unix/Linux shell or IBM i shell using the putquit program.

5.2.1 Windows

To use the putquit program on Windows, open a Command Prompt and type the following:

```
cd /D C:\Capitalware\MQMR\  
putquit.exe -m {QmgrName} -q {QueueName}
```

5.2.2 Linux 32-bit

To use the putquit program on Linux for MQ 32-bit, open a shell prompt and type the following:

```
cd /var/mqm/exits/  
./putquit -m {QmgrName} -q {QueueName}
```

5.2.3 Unix and Linux 64-bit

To use the putquit program on Unix/Linux for MQ 64-bit, open a shell prompt and type the following:

```
cd /var/mqm/exits64/  
./putquit -m {QmgrName} -q {QueueName}
```

5.2.4 IBM i

To use the putquit program on IBM i, issue the following command on the Command Prompt:

```
CALL MQMR/PUTQUIT PARM('-m' '{QmgrName}' '-q' '{QueueName}')
```

6 IniFile Parameters

6.1 Logging

- **LogMode** specifies what type of logging the user wishes to have. LogMode supports 4 values [Q/N/V/D] where Q is Quiet, N is Normal, V is Verbose and D is Debug. The default value is N.

LogMode =N

- **LogFile** specifies the location of the log file. The default is as follows:

For Windows:

LogFile=C:\CapitaIware\MQMR\mq2sdb.log

For IBM MQ 32-bit on Linux:

LogFile=/var/mqm/mqmr/mq2sdb.log

For IBM MQ 64-bit on Unix and Linux:

LogFile=/var/mqm/mqmr/mq2sdb.log

For IBM MQ on IBM i:

LogFile=/QIBM/UserData/mqm/mqmr/mq2sdb.log

Token Replacement for LogFile keyword:

- **%QM%** - Substitutes the name of the queue manager
- **%UID%** - Substitutes the UserID
- **%PID%** - Substitutes the Process ID
- **%TID%** - Substitutes the Thread ID

- **RotateLogDaily** specifies whether or not the log files will be rotated on a daily basis. A Y value for 'RotateLogDaily' will activate this feature; otherwise, the log files will left as is. The default value is Y.

In other words, it is possible to keep up to 9 backup log files. The first connection request after midnight (and not at midnight) will cause it to roll/rotate the log files. If there are already 9 backup log files, the ninth backup log file will be deleted and 8 becomes 9, 7 becomes 8, etc...

RotateLogDaily =Y

- **BackupLogFileCount** specifies the number of backup log files that should be kept by MQMR. The default value is 9. This keyword is only used if RotateLogDaily is set to 'Y'.

BackupLogFileCount =9

6.2 MQ

- **QMgrName** specifies the name of the queue manager that MQ2SDB will connect to. There is no default value.

QMgrName=MQA1

- **QueueName** specifies the name of the input queue that MQ2SDB will retrieve messages from. There is no default value.

QueueName=TEST.Q1

- **GetWithConvert** causes MQ2SDB to retrieve messages with or without MQGMO_CONVERT option. GetWithConvert supports 2 values: [Y / N]. The default value is N.

GetWithConvert=Y

- **GetBufferSize** specifies the maximum message size to be retrieved from the input queue. GetBufferSize supports values from 1 to 104857600 (100MB). The default value is 65536.

GetBufferSize=123456

6.3 SQLite

- **IncludeSourceInfo** specifies whether or not the source queue manager name and queue name (if present) be written to the SQLite database. IncludeSourceInfo supports 2 values: [Y / N]. The default value is N.

IncludeSourceInfo =Y

- **PathToSQLiteDB** specifies the path to the file that will be used by SQLite. The default values are as follows:

For Windows:

PathToSQLiteDB=C:\Capitalware\MQMR

For IBM MQ 32-bit on Linux:

PathToSQLiteDB=/var/mqm/exits/

For IBM MQ 64-bit on Unix and Linux:

PathToSQLiteDB=/var/mqm/exits64/

For IBM MQ on IBM i:

PathToSQLiteDB=/QIBM/UserData/mqm/mqmr/

Token Replacement for PathToSQLiteDB keyword:

- **%QM%** - Substitutes the name of the queue manager

6.4 Other

- **UseCompression** specifies whether or not data compress will be used. UseCompression supports 2 values [Y / N]. The default value is Y.

UseCompression =Y

- **Compression** specifies the type of data compress to be used. Compression supports 7 values [LZ4, LZW, LZMA_FAST, LZMA_BEST, RLE, ZLIB_FAST or ZLIB_BEST]. The default value is LZ4. Note: LZMA_Fast and LZMA_Best are currently not available for IBM i.

Compression = ZLIB_BEST

- **HomeDirectory** specifies the full path to where the MQ2SDB IniFile and License file are located. The default values are as follows:

For Windows:

HomeDirectory=C:\Capitalware\MQMR

For IBM MQ 32-bit on Linux:

HomeDirectory=/var/mqm/exits/

For IBM MQ 64-bit on Unix and Linux:

HomeDirectory=/var/mqm/exits64/

For IBM MQ on IBM i:

HomeDirectory=/QIBM/UserData/mqm/mqmr/

7 Log File

To verify that the process flow was successful, you can view the log file for the events that are generated.

7.1 Windows

The log file is located at the following (assuming a default install of C:\Capitalware\MQMR):

C:\Capitalware\MQMR\mq2sdb.log

```
2018/03/07 13:32:00.303 MQ2SDB I: -----
2018/03/07 13:32:00.303 MQ2SDB I: MQ2SDB is now starting.
2018/03/07 13:32:00.304 MQ2SDB I: MQ2SDB version 0.0.0.5 (windows64)
2018/03/07 13:32:00.304 MQ2SDB I: HomeDirectory = C:\Capitalware\MQMR\
2018/03/07 13:32:00.304 MQ2SDB I: IniFile = C:\Capitalware\MQMR\mq2sdb.ini
2018/03/07 13:32:00.304 MQ2SDB I: LogMode = N
2018/03/07 13:32:00.304 MQ2SDB I: LogFile = C:\Capitalware\MQMR\mq2sdb.log
2018/03/07 13:32:00.304 MQ2SDB I: RotateLogDaily = Y
2018/03/07 13:32:00.304 MQ2SDB I: BackupLogFileCount = 9
2018/03/07 13:32:00.305 MQ2SDB I: QMgrName = MQWT1
2018/03/07 13:32:00.305 MQ2SDB I: QueueName = TEST.Q1
2018/03/07 13:32:00.305 MQ2SDB I: GetWithConvert = N
2018/03/07 13:32:00.305 MQ2SDB I: GetBufferSize = 65536
2018/03/07 13:32:00.305 MQ2SDB I: PathToSQLiteDB = C:\Capitalware\MQMR\
2018/03/07 13:32:00.306 MQ2SDB I: -----
2018/03/07 13:32:00.312 MQ2SDB I: Connected to 'MQWT1'
2018/03/07 13:32:00.313 MQ2SDB I: Opened queue 'TEST.Q1'
2018/03/07 13:32:00.313 MQ2SDB I: Begin retrieving messages.
2018/03/07 13:32:15.761 MQ2SDB I: Received quit message - time to exit.
2018/03/07 13:32:15.761 MQ2SDB I: Closed queue 'TEST.Q1'
2018/03/07 13:32:15.761 MQ2SDB I: Disconnected from 'MQWT1'
2018/03/07 13:32:15.761 MQ2SDB I: Statistics of this executions:
2018/03/07 13:32:15.762 MQ2SDB I:     MQ Messages Read : 101
2018/03/07 13:32:15.762 MQ2SDB I:     DB Rows Written  : 100
2018/03/07 13:32:15.762 MQ2SDB I: MQ2SDB is now ending.
```

7.2 Unix and Linux

The log file is located at the following (assuming a default install of /var/mqm/exits64/):

/var/mqm/exits64/mq2sdb.log

```
2018/03/07 13:45:05.313 MQ2SDB I: -----
2018/03/07 13:45:05.313 MQ2SDB I: MQ2SDB is now starting.
2018/03/07 13:45:05.314 MQ2SDB I: MQ2SDB version 0.0.0.5 (Linux64)
2018/03/07 13:45:05.314 MQ2SDB I: HomeDirectory = /var/mqm/exits64/
2018/03/07 13:45:05.314 MQ2SDB I: IniFile = /var/mqm/exits64/mq2sdb.ini
2018/03/07 13:45:05.314 MQ2SDB I: LogMode = N
2018/03/07 13:45:05.314 MQ2SDB I: LogFile = /var/mqm/exits64/mq2sdb.log
2018/03/07 13:45:05.314 MQ2SDB I: RotateLogDaily = Y
2018/03/07 13:45:05.314 MQ2SDB I: BackupLogFileCount = 9
2018/03/07 13:45:05.315 MQ2SDB I: QMgrName = MQWT1
2018/03/07 13:45:05.315 MQ2SDB I: QueueName = TEST.Q1
2018/03/07 13:45:05.315 MQ2SDB I: GetWithConvert = N
2018/03/07 13:45:05.315 MQ2SDB I: GetBufferSize = 65536
2018/03/07 13:45:05.315 MQ2SDB I: PathToSQLiteDB = /var/mqm/exits64/
2018/03/07 13:45:05.316 MQ2SDB I: -----
2018/03/07 13:45:05.317 MQ2SDB I: Connected to 'MQWL1'
2018/03/07 13:45:05.318 MQ2SDB I: Opened queue 'TEST.Q1'
2018/03/07 13:45:05.318 MQ2SDB I: Begin retrieving messages.
2018/03/07 13:45:11.811 MQ2SDB I: Received quit message - time to exit.
2018/03/07 13:45:11.811 MQ2SDB I: Closed queue 'TEST.Q1'
2018/03/07 13:45:11.811 MQ2SDB I: Disconnected from 'MQWL1'
2018/03/07 13:45:11.811 MQ2SDB I: Statistics of this executions:
2018/03/07 13:45:11.812 MQ2SDB I:     MQ Messages Read : 101
2018/03/07 13:45:11.812 MQ2SDB I:     DB Rows Written  : 100
2018/03/07 13:45:11.812 MQ2SDB I: MQ2SDB is now ending.
```

8 Appendix A – mq2sdb.ini file

The table below is the supplied mq2sdb.ini file. The IniFile supports the following keywords and their values:

```
LogMode = N
LogFile = C:\Capitalware\MQMR\mq2sdb.log
RotateLogDaily = Y
BackupLogFileCount = 9
QMGrName = MQA1
QueueName = TEST.Q1
PathToSQLiteDB = C:\Capitalware\MQMR\
GetWithConvert = N
GetBufferSize = 123456
```

Note: Keywords are case sensitive.

The IniFile supports the following keywords and their values:

Keyword	Description of Server-side keywords
BackupLogFileCount	BackupLogFileCount specifies the number of backup logfiles that MQMR will be keeping. The default value is 9. e.g. BackupLogFileCount=9
Compression	Compression specifies the type of data compress to be used. Compression supports 8 values [LZ4, LZW, LZMA_FAST, LZMA_BEST, RLE, ZLIB_FAST or ZLIB_BEST]. The default value is LZ4. Note: LZMA_Fast and LZMA_Best are currently not available for IBM i. e.g. Compression=LZMA_FAST
GetBufferSize	GetBufferSize specifies the maximum message size to be retrieved from the input queue. GetBufferSize supports values from 1 to 104857600 (100MB). The default value is 65536. e.g. GetBufferSize=1048576
GetWithConvert	GetWithConvert specifies whether or not the messages will be retrieved with MQGMO_CONVERT option. GetWithConvert supports 2 values: [Y / N]. The default value is N. e.g. GetWithConvert=Y

Keyword	Description of Server-side keywords
HomeDirectory	<p>HomeDirectory specifies the full path to where the MQ2SDB IniFile and License file is located.</p> <p>The default values for HomeDirectory are as follows:</p> <p>For Windows: HomeDirectory=C:\Capitalware\MQMR\</p> <p>For IBM MQ 32-bit on Linux: HomeDirectory=/var/mqm/exits/</p> <p>For IBM MQ 64-bit on Unix and Linux: HomeDirectory=/var/mqm/exits64/</p> <p>For IBM MQ on IBM i: HomeDirectory=/QIBM/UserData/mqm/mqmr/</p> <p>e.g. HomeDirectory=C:\Capitalware\MQMR\</p>
IncludeSourceInfo	<p>IncludeSourceInfo specifies whether or not the source queue manager name and queue name (if present) be written to the SQLite database. IncludeSourceInfo supports 2 values: [Y / N]. The default value is N.</p> <p>e.g. IncludeSourceInfo=Y</p>
License	<p>License specifies the queue manager's license key. Your license key will look something like: 10S0-AAAA-BBBBBBBB (Note: This is a sample license only and will NOT work).</p> <p>e.g. License=10M0-AAAA-BBBBBBBB</p>

Keyword	Description of Server-side keywords
LicenseFile	<p>LicenseFile specifies the location of License file that contains all of the customer's license keys.</p> <p>The default values for LicenseFile are as follows:</p> <p>For Windows: LicenseFile=C:\Capitalware\MQMR\mqmr_licenses.ini</p> <p>For IBM MQ 32-bit on Linux: LicenseFile=/var/mqm/exits/mqmr_licenses.ini</p> <p>For IBM MQ 64-bit on Unix and Linux: LicenseFile=/var/mqm/exits64/mqmr_licenses.ini</p> <p>For IBM MQ on IBM i: LicenseFile=/QIBM/UserData/mqm/mqmr/mqmr_licenses.ini</p> <p>e.g. LicenseFile=/var/mqm/exits64/mqmr_licenses.ini</p>
LogFile	<p>LogFile specifies the location of the log file. The defaults are as follows:</p> <p>For Windows: LogFile=C:\Capitalware\MQMR \mq2sdb.log</p> <p>For IBM MQ 32-bit on Linux: LogFile=/var/mqm/audit/mq2sdb.log</p> <p>For IBM MQ 64-bit on Unix and Linux: LogFile=/var/mqm/audit/mq2sdb.log</p> <p>For IBM MQ on IBM i: LogFile=/QIBM/UserData/mqm/mqmr/mq2sdb.log</p>
LogMode	<p>LogMode specifies what type of logging the user wishes to have. LogMode supports 4 values [Q / N / V / D] where Q is Quiet, N is Normal, V is Verbose and D is Debug. The default value is N.</p> <p>e.g. LogMode=N</p>
RotateLogDaily	<p>RotateLogDaily specifies whether or not daily log file rotation should take place. RotateLogDaily supports 2 values [Y / N]. The default value is Y.</p> <p>e.g. RotateLogDaily=Y</p>

Keyword	Description of Server-side keywords
PathToSQLiteDB	<p>PathToSQLiteDB specifies the path to the file that will be used by SQLite.</p> <p>The default values for PathToSQLiteDB are as follows:</p> <p>For Windows: PathToSQLiteDB=C:\Capitalware\MQMR\</p> <p>For IBM MQ 32-bit on Linux: PathToSQLiteDB=/var/mqm/exits/</p> <p>For IBM MQ 64-bit on Unix and Linux: PathToSQLiteDB=/var/mqm/exits64/</p> <p>For IBM MQ on IBM i: PathToSQLiteDB=/QIBM/UserData/mqm/mqmr/</p> <p>e.g. PathToSQLiteDB=C:\Capitalware\MQMR\</p>
QMgrName	<p>QMgrName specifies the name of the queue manager that MQ2SDB will connect to. There is no default value.</p> <p>e.g. QMgrName=MQA1</p>
QueueName	<p>QueueName QueueName specifies the name of the input queue that MQ2SDB will retrieve messages from. There is no default value.</p> <p>e.g. QueueName=TEST.Q1</p>
UseCompression	<p>UseCompression specifies whether or not data compress will be used. UseCompression supports 2 values [Y / N]. The default value is Y.</p> <p>e.g. UseCompression=Y</p>

9 Appendix B – MQ2SDB Upgrade Procedures

To upgrade an existing installation of MQ2SDB, please do the following the instructions in Appendix B of the *MQMR Server-side Installation and Operation* manual.

10 Appendix C – Technical Support

The support for MQMR MQ2SDB can be found at the following location (requires a support contract):

By email at:

support@capitalware.com

By regular mail at:

Capitalware Inc.
Attn: MQMR MQ2SDB Support
Unit 11, 1673 Richmond Street, PMB524
London, Ontario N6G2N3
Canada

11 Appendix D – Summary of Changes

- MQ2SDB v1.2.0
 - Added keyword IncludeSourceInfo to support writing source queue manager and queue names (if present) to the database.

- MQ2SDB v1.1.0
 - Added code to append trailing slash for HomeDirectory & PathToSQLiteDB if it is missing.
 - Tuned the logging code

- MQ2SDB v1.0.0
 - Initial release.

12 Appendix E – Notices

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