V7.1 WebSphere MQ Client Support on IBMi

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WebSphere MQ Level 2 Support
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Agenda

- Install and Maintenance
- Methods of Connection
- Calling and Creating programs
- Security
- Troubleshooting
- Common Problems
- Useful Links
WebSphere MQ Client for IBM i: Install

- The WebSphere MQ client may be installed as part of the WebSphere MQ v7.1 server product or as a standalone product.
- WebSphere MQ client programs are installed in the QMQM library.
- The WebSphere MQ server may be installed over the WebSphere MQ client, but the WebSphere MQ client cannot be installed over the WebSphere MQ server.
- The client may be obtained from Passport Advantage or from the MQC71 SupportPac.
WebSphere MQ Client for IBM i: Install

- To install the client as part of the WMQ v7.1 server:
  1) RSTLICPGM LICPGM(5724H72) DEV(*SAVF) SAVF(MQ71PROD/MQ71BASE) RSTOBJ(*PGM) OPTION(*BASE) OUTPUT(*PRINT)
  2) RSTLICPGM LICPGM(5724H72) DEV(*SAVF) SAVF(MQ71PROD/MQ71EN24) RSTOBJ(*LNG) LNG(2924) OUTPUT(*PRINT)
WebSphere MQ Client for IBM i: Install

- To install the stand-alone client product:
  1) RSTLICPGM LICPGM(5725A49) DEV(*SAVF) SAVF(MQ71PROD/MQ71CBASE) OPTION(*BASE) OUTPUT(*PRINT)
  2) RSTLICPGM LICPGM(5725A49) DEV(*SAVF) SAVF(MQ71PROD/MQ71CSAMP) OPTION(1) OUTPUT(*PRINT)

- To delete the stand-alone client:
  1) DLTLICPGM LICPGM(5725A49) OPTION(*ALL)
WebSphere MQ Client for IBM i: Maintenance

- To update maintenance for stand-alone client product, download latest level client from the MQC71 supportpac. Technote 4031412.
- To check the maintenance level on a client install
  - CALL PGM(QMQM/DSPMQVER)
- To update maintenance for client installed with WMQ server, download latest FixPack from the Fixes By version for WMQ techdoc. Technote 1254675.
- To check the maintenance level on a server install
  - DSPMQMVER
Notes: WMQ IBMi Client Maintenance

The MQC71 SupportPac zip file contains 4 save files and a README. MQ71CBASE, MQ71CSAMP, MQ71JBASE, MQ71JSAMP and readme.txt

Issue a RSTLICPGM for the MQ71CBASE and MQ71CSAMP to install the maintenance.

To update the client on a server install, update the FixPack level for the server by downloading the ptfs from Fix Central. Load and apply the ptfs after quiescing the QMGR and ending the QMQM subsystem.
Methods of Connection from Client to Server

- Method 1: The MQCNO structure on an MQCONNX call
- Method 2: The MQSERVER environment variable
- Method 3: The MQCHLLIB and MQCHLTAB environment variables
- Method 4: The CHANNELS stanza of the mqclient.ini file
Method 1: MQCNO on the MQCONNX

- WebSphere MQ client application uses the MQCNO structure on the MQCONNX api to reference the channel definition structure, MQCD.

- Client connection attributes are specified at run time.

- Sample source and program code are shipped with the WMQ client and server products.
Method 1: MQCNO Sample program

- CALL PGM(QMQM/AMQSCNXC)
  PARM('-x' 'HostName(Port)'
       '-c' ChannelName QmgrName)

Where:

- HostName(Port) - The IP address or hostname and listening queue manager port of the server.
- ChannelName - The name of the server connection channel.
- QmgrName - The name of the target queue manager.
AMQSCNXC has 3 optional parameters:

1) HostName will default to the client channel table or the MQSERVER environment variable.

2) Channel Name will default to channel, SYSTEM.DEF.SVRCONN and should only be specified if HostName is also specified.

3) QmgrName must be last parameter and will default to blank(default QMGR).

Technote 1643219 discusses this sample program.
Method 2: MQSERVER environment variable

- Create SVRCN channel on server
  - CRTMQMCHL CHLNAME(SVRCN.CH) CHLTYPE(*SVRCN) MQMNAME(QMGRNM)
- Start listener on server
  - STRMQMLSR PORT(1415) MQMNAME(QMGRNM)
- Set environment variable on client
  - ADDENVVVAR ENVVAR(MQSERVER) VALUE('SVRCN.CH/TCP/HostName(1415)') LEVEL(*SYS)
- Use AMQSPUTC or AMQSGETC sample programs to verify set up.
Method 3: MQCHLLIB and MQCHLTAB environment variables - Server

- Create SVRCN and CLTCN channels on server
  - CRTMQMCHL CHLNAME(AS02.CLIENT) CHLTYPE(*SVRCN) MQMNAME(QMGRNM)
  - CRTMQMCHL CHLNAME(AS02.CLIENT) CHLTYPE(*CLTCN) MQMNAME(QMGRNM) TGTMQMNAME(QMGRNM) CONNAME('HOST.NAME.COM(1415)')

- Start listener on server
  - STRMQMLSR PORT(1415) MQMNAME(QMGRNM)

- Transfer a copy of Client Channel Definition Table (CCDT) file from server to client.
  - File Name: AMQCLCHL.TAB.
Notes: MQCHLLIB and MQCHLTAB

The location of the AMQCLCHL.TAB file follows:

On IBMi -
File Location: /qibm/userdata/mqm/qmegr/QMGRNM/&ipcc

On UNIX and Linux -
File Location: /prefix/qmgrs/QMGRNM/@ipcc
Where: Prefix is typically /var/mqm on UNIX and Linux platforms.

On Windows -
File Location:
MQ_INSTALLATION_PATH\data\qmgrs\QMGRNM\@ipcc
Where: MQ_INSTALLATION_PATH is the directory in which WebSphere MQ is installed.

Method 3: MQCHLLIB and MQCHLTAB environment variables - Client

- Place copy of CCDT file from the server into an IFS directory on the IBMi client.
- Specify the location of the CCDT on the IBMi client
  - ADDENVVVAR ENVVVAR(MQCHLLIB) VALUE('/qibm/userdata/ccdt') LEVEL(*SYS)
- Specify the name of the channel table file
  - ADDENVVVAR ENVVVAR(MQCHLTAB) VALUE(AMQCLCHL.TAB) LEVEL(*SYS)
- Use AMQSPUTC or AMQSGETC sample programs to verify set up.
Notes: MQCHLLIB and MQCHLTAB

If MQCHLLIB is not set, the path on the client defaults to: /QIBM/UserData/mqm/.

If the MQCHLTAB is not set, the name of the client file defaults to: AMQCLCHL.TAB.

On a server/client installation, if you set MQCHLLIB at the SYSTEM level, each queue manager will update the same CCDT file. The file will contain the client-connection definitions for all the queue managers on the server, so, if you have multiple queue managers on the same server, channel name uniqueness is very important. If the same definition exists on multiple queue managers, for example SYSTEM.DEF.CLNTCONN, the file will only contain the most recent definition.

Technote 1643674 discusses this environment variable setup.
Method 4: MQCLIENT.INI File

- The mqclient.ini file may be used to specify the equivalent of either of the environment variables by using one of the channel stanzas below.
  - CHANNELS:
    - ChannelDefinitionDirectory=/directory/path/ccdt
    - ChannelDefinitionFile=AMQCLCHL.TAB
    
    or
    
    - ServerConnectionParms=ChlName/TransportType/ConnName(port)

- Use AMQSPUTC or AMQSGETC sample programs to verify set up.
The mqclient.ini file is located in the directory /qibm/proddata/mqm/lib.

On a server/client installation the mqclient.ini file is copied to the /qibm/userdata/mqm directory when a queue manager is created.

APAR for mqclient.ini issue:
SE56381: UNABLE TO CONNECT WMQ IBMI CLIENT USING MQCLIENT.INI FILE.
The Work Arounds are:
1) Place the Channels stanza first in file or
2) Recreate file as ccsid 37.

Technote 1643387 discusses this environment variable setup.
Precedence of Methods

1) MQCONN API call
2) MQSERVER environment variable
3) mqclient.ini file
4) Client Channel Definition Table. The MQCHLLIB and MQCHLTAB environment variables.
ILE C Client Sample Programs

- Put a message from client to server queue
  - CALL PGM(QMQM/AMQSPUTC)
    PARM(TESTQ TESTQMGR)

- Get a message from server queue via the client
  - CALL PGM(QMQM/AMQSGETC)
    PARM(TESTQ TESTQMGR)

- The C client samples are shipped already compiled.
ILE RPG - Compiling Client Programs

- To create RPG programs:
  1) ADDLIBLE LIB(QMQM)
  2) CRTRPGMOD
      MODULE(QMQMSAMP/AMQ3PUT4)
      SRCFILE(QMQMSAMP/QRPGLESRC)
  3) CRTPGM PGM(QMQMSAMP/AMQ3PUT4)
      BNDSRVPGM((QMQM/LIBMQIC))

Note: Use LIBMQIC_R for threaded programs
ILE COBOL - Compiling Client Programs

- To create COBOL programs:
  1) ADDLIBLE LIB(QMQQM)
  2) CRTCBLMOD
     MODULE(QMQMSAMP/AMQ0PUT4)
     SRCFILE(QMQMSAMP/QRPGLESRC)
     LINKLIT(*PRC)
  3) CRTPGM PGM(QMQMSAMP/AMQ0PUT4)
     BNDSRVPGM((QMQM/AMQCSTUB))

Note: Use AMQCSTUB_R for threaded programs
The parameters for the ILE RPG sample programs must be padded out to 48 characters.
`CALL PGM(QMQMSAMP/AMQ3PUT4) PARM(‘HILDA ’ ’BUGS ’)`

The parameters for the ILE COBOL sample programs must be padded out to 48 characters.
`CALL PGM(QMQMSAMP/AMQ0PUT4) PARM(‘ANGEL ’ ’MQAS09 ’)`

OPM programs are not supported as client applications.

C++ and XA clients are also not supported.
Client Authentication

- The UserProfile passed from the client to the server for authentication is determined by one of the methods below:
  - Security Exit on client channel
  - MCAUSRID parameter on client channel
  - Signed on Userid passed from the client
WMQ SSL Client

- MQSSLKEYR - Environment variable identifies the keystore being used on the client. For example,
  - ADDENVVVAR ENVVVAR(MQSSLKEYR) VALUE('SYSTEM')
  - ADDENVVVAR ENVVVAR(MQSSLKEYR)
    VALUE('/Path/To/Keystore/MyKey')
WMQ SSL Client (cont'd)

- **AMQRSSLC** – Tool registers and un-registers client user profile as an application with Digital Certificate Manager when using *SYSTEM store on client. For example,
  - Call PGM(QMQM/AMQRSSLC) PARM('-r' UserProfile)
  - Call PGM(QMQM/AMQRSSLC) PARM('-u' UserProfile)

- **AMQRSSLC** – Tool also stashes the password of the key database file when a private keystore is being used on the client. For example,
  - CALL PGM(QMQM/AMQRSSLC) PARM('-s' /Path/To/Keystore/MyKey)
When the AMQRSSLC program is called with the -r option followed by the client user profile, it will register the user profile as a server application with a unique label of QIBM_WEBSPHERE_MQ_UserProfile in DCM. The user profile will appear as a server application which can have certificates assigned to it.

*ALLOBJ or QMQMADM as your group profile is required to run tool.

*USE authority to the UserProfile is required to register and unregister it. If a user profile is not specified, it will register the user profile running the AMQRSSLC program.

If a private keystore is used on the client then you can stash the password for the key database file by calling the AMQRSSLC program with the -s option followed by the keystore path minus the .kdb extension. This will stash the password in a file with the same name as the key database file except with an extension of .sth. QMQM and QMQMADM will be the owner and primary group of the file.
WMQ SSL Client Setup for *SYSTEM store

1) Set *SYSTEM store in MQSSLKEYR environment variable
2) Set MQCHLLIB and MQCHLTAB environment variables
3) Copy CCDT from Queue Manager into MQCHLLIB directory
4) Import CA certificate from Queue Manager into *SYSTEM store in DCM
5) Register UserProfile that will run client application with DCM
6) Create Server Certificate with label ibmwebspheremquserprofile in DCM
7) Assign Server Certificate to UserProfile application in DCM
8) Export client Server Certificate to Queue Manager
9) Once setup complete on Queue Manager, call client application

NOTE: Steps 1-5 for One Way Authentication
Steps 6-8 for Two Way Authentication
WMQ IBMi Client Error Logging

- WMQ Client error logs and FDCs are located in the IFS directory /QIBM/UserData/mqm/errors.
- The logs and the FDCs are named similarly to the WMQ server, ie. AMQERR01.LOG and AMQpppppp.ss.FDC respectively where: p = process pid and s = sequence number
- The most recent messages will be logged in AMQERR01.LOG.
- When diagnosing problems, check this directory for error messages when no useful information is logged to the joblog.
WMQ IBMi Client Trace

- The WMQ client traces are located in the IFS directory /QIBM/UserData/mqm/trace.
- The traces are named similarly to the WMQ server, i.e. AMQpppppp.TRC where: p = process pid

To start trace

- CALL PGM(QMQM/STRMQTRC) PARM('-e' '-t' 'all' '-t' 'detail')

To end trace

- CALL PGM(QMQM/ENDMQTRC) PARM('-e')

NOTE: Early trace must be used to trace client connection.
WMQ IBMi Client Common Problems

- 2035 MQRC_NOTAUTHORIZED
- 2058 MQRC_Q_MGR_NAME_ERROR
- 2059 MQRC_Q_MGR_NOT_AVAILABLE
- AMQ4036, "Access not permitted. You are not authorized to perform this operation."
Notes: WMQ IBMi Client Common Problems

2035
1) Verify user defined on server.
2) Verify user has appropriate authority to Queue Manager and Destination Queue.
3) Check for message id AMQ8077 in the error logs. The explanation will contain the missing authority.

2058
1) Verify channel name, ip/hostname, and port point to correct Queue Manager.
2) Verify correct Queue Manager name passed to application. Case may sometimes be important.
Notes: WMQ IBMi Client Common Problems

2059
1) Verify channel name, ip/hostname, and port point to correct Queue Manager.
2) Verify correct Queue Manager name passed to application. Case may sometimes be important.
3) Verify Queue Manager is active.
4) Verify port is actively listening.

AMQ4036
1) Verify user defined on server.
2) Verify user has appropriate authority Queue Manager and Destination Queue.
3) Verify the CHLAUTH settings are not blocking access to the Queue Manager.
Related Technotes

- Using AMQSCNXC – 1643219
- Using MQSERVER – 1643263
- Using CCDT – 1643674
- Using MQCLIENT.INI File – 1643387
- Using Trace – 1644167
- Install Failure – 1643209
- Channel Authentication Failure – 1597265
- MCAUSER Authorization Failure – 1433494
- MQCLIENT.INI Apar SE56381 – SE56381
- MQC71 Support Pac – 4031412
- Determine type of client connection – 1321254
- SSL Knowledge Collection – 7027364
Other Useful Links

- Access Control for Clients

- Sample Client Configuration File

- Automatic Client Reconnection

- Channel Authentication

- WMQ Primer

- IBMi DCM
  - http://pic.dhe.ibm.com/infocenter/iseries/v6r1m0/topic/rzahu/rzahurazhудigitalcertmngmnt.htm
Notes: WMQ IBMi Client Related WSTEs

Related WSTEs:

1) Technote 7038186 WMQ Automatic Client Reconnect
2) Technote 7036381 WMQ Channel Authentication
3) Technote 7023472 WMQ SSL Managing Digital Keys and Certificates
4) Technote 7016864 WMQ SSL Diagnostic Hints and Tips
5) Technote 7018213 WMQ SSL Open Mic
6) Technote 7019350 Automating WebSphere MQ for IBM i V6 and V7
Summary

- Install and Maintenance
- Methods of Connection
- Calling and Creating programs
- Security
- Troubleshooting
- Common Problems
- Useful Links
Additional WebSphere Product Resources

- Learn about upcoming WebSphere Support Technical Exchange webcasts, and access previously recorded presentations at: http://www.ibm.com/software/websphere/support/supp_tech.html

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