IBM MQ Cloud – Setup & configuration to run a sample application.

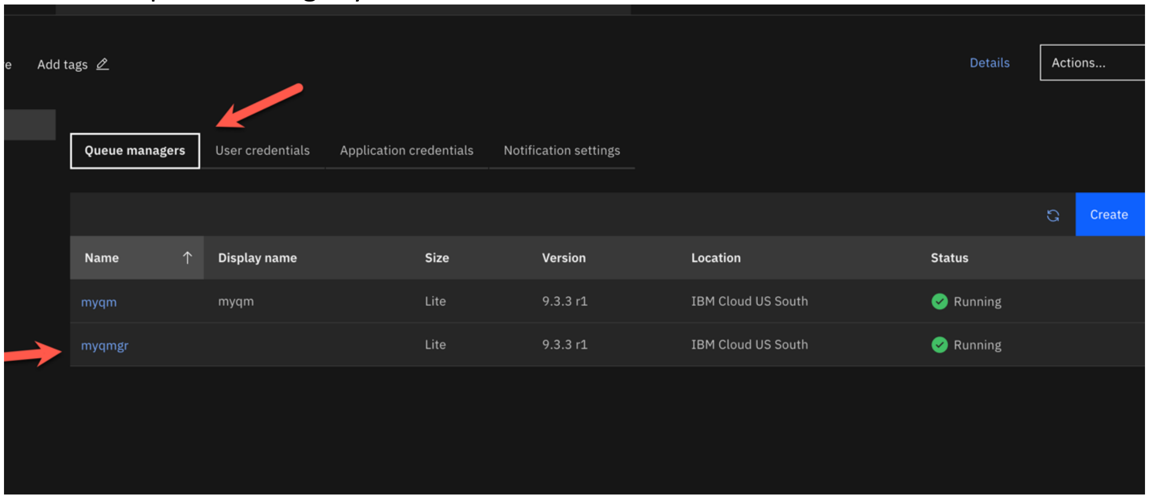
This is an example to demonstrate the configuration and setup for the IBM MQ Queue Manager and the TLS security requirements to connect. While the sample application in this demonstration is Python, the same steps can be used for any other supported application programming language.

Prerequisites

- IBM MQ Service deployed with a running queue manager (Instructions)
- TLS Channel Security (Reference Material)
  - NOTE: *IBM Cloud MQ Service queue manager channels have been pre-configured with TLS. If this is a NEW deployment, you will not need to configure TLS security on the channels.*
- MQ Client must be installed on your local workstation (or the location where you plan to run the client app)
  - For macOS, follow the steps in the MQ macOS Toolkit tutorial.
  - For Windows or Linux MQ clients, download and install one from the IBM Support site.
- Python (The example application is based on Python). You will need to have Python installed on your machine to run the sample application.

Download the TLS Certificate and connection information from your queue manager

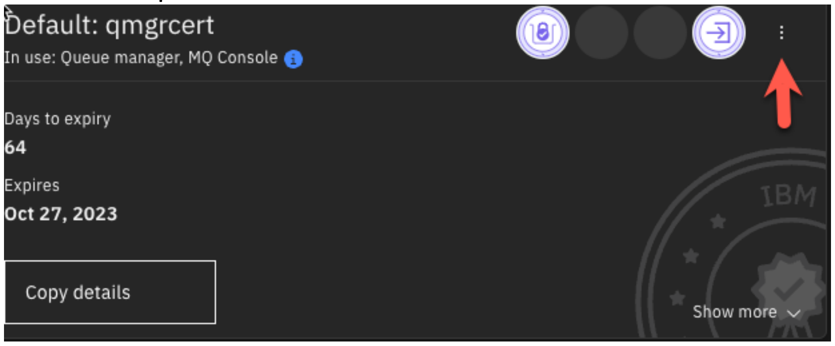
1. Log into your IBM Cloud account and navigate to your "IBM MQ Service". You can find your services in the resource list.
2. Select the queue manager you wish to connect to.

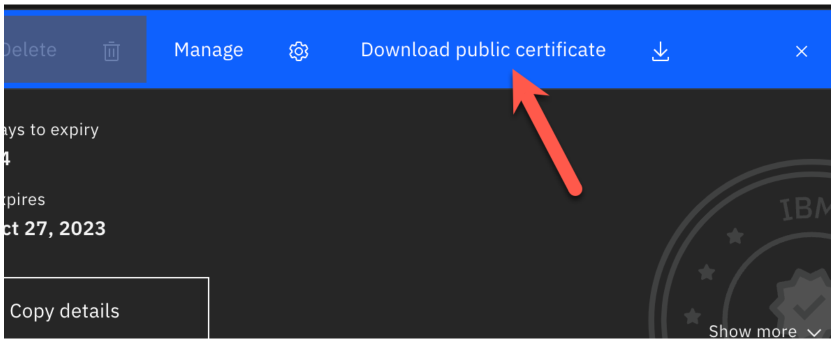


Name	Display name	Size	Version	Location	Status
myqm	myqm	Lite	9.3.3 r1	IBM Cloud US South	Running
myqmgr		Lite	9.3.3 r1	IBM Cloud US South	Running

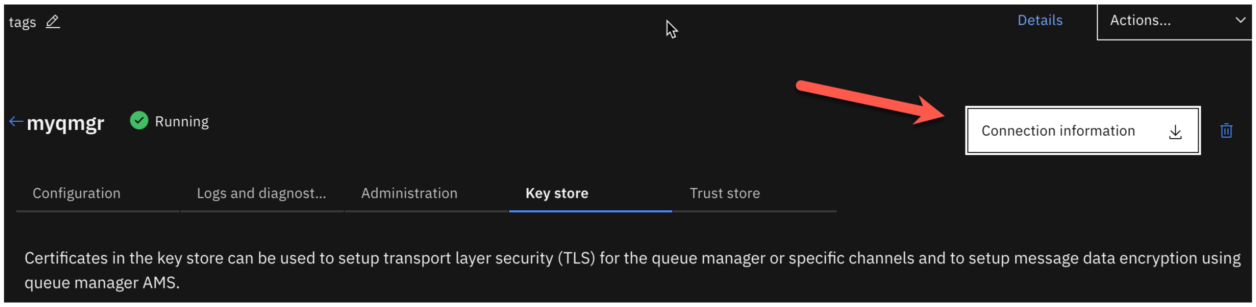
3. Select the Key store tab, to display the certificates associated with your queue manager.

4. Download the certificate by selecting the 3 dots on the certificate and selecting the “Download public certificate” button.



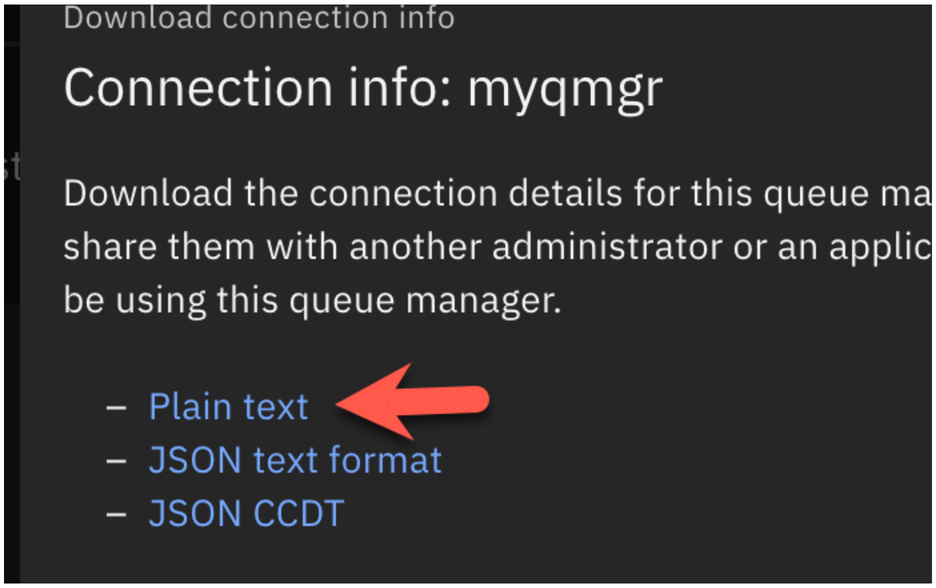


5. Copy the downloaded PEM file to your project folder, where you will run the application from.
6. Download the connection information for your queue manager by selecting the “Connection Information” button.



Certificates in the key store can be used to setup transport layer security (TLS) for the queue manager or specific channels and to setup message data encryption using queue manager AMS.

You can choose the format to download. I selected plain text in my example.

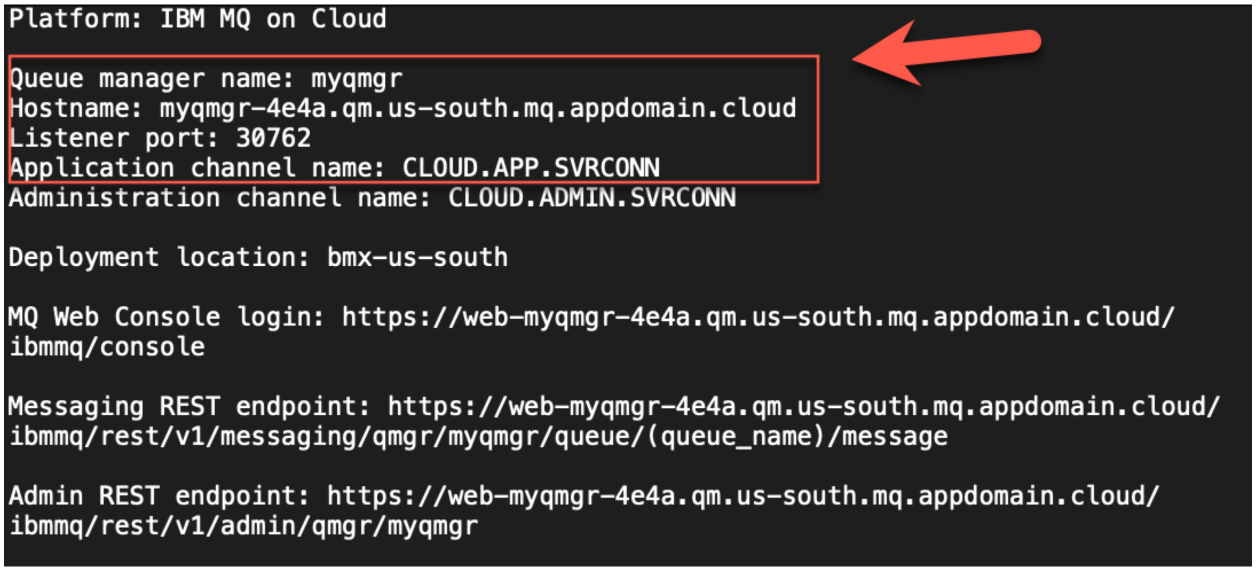

Download connection info

Connection info: myqmgr

Download the connection details for this queue ma
share them with another administrator or an applic
be using this queue manager.

- Plain text
- JSON text format
- JSON CCDT

7. Inspect the connection information. We will need the information outlined in red for connection to our queue manager.


```
Platform: IBM MQ on Cloud

Queue manager name: myqmgr
Hostname: myqmgr-4e4a.qm.us-south.mq.appdomain.cloud
Listener port: 30762
Application channel name: CLOUD.APP.SVRCONN
Administration channel name: CLOUD.ADMIN.SVRCONN

Deployment location: bmx-us-south

MQ Web Console login: https://web-myqmgr-4e4a.qm.us-south.mq.appdomain.cloud/
ibmmq/console

Messaging REST endpoint: https://web-myqmgr-4e4a.qm.us-south.mq.appdomain.cloud/
ibmmq/rest/v1/messaging/qmgr/myqmgr/queue/(queue_name)/message

Admin REST endpoint: https://web-myqmgr-4e4a.qm.us-south.mq.appdomain.cloud/
ibmmq/rest/v1/admin/qmgr/myqmgr
```

******** TASK COMPLETE ***
You now have all the information you need to connect to this queue manager

Create application userid/apikey

Look here for more detailed information on how to setup userid and api key. (Instructions)

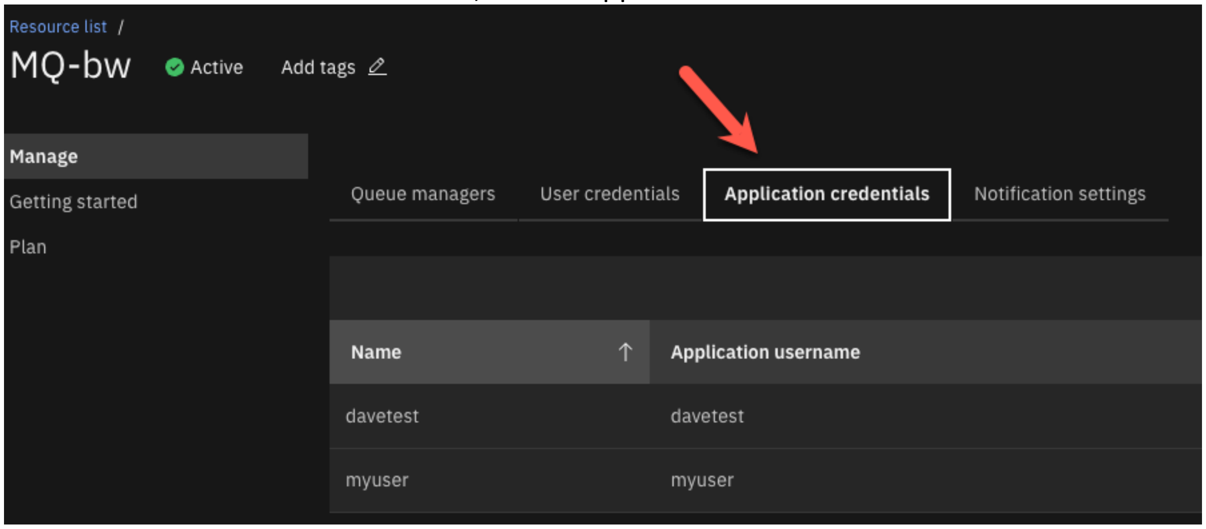
Our sample will use a pre-defined queue, so the authorization record has been automatically configured. See below instructions on how to configure authorization to a custom queue.

Note:

- If you do not intend to use one of the predefined 'DEV.QUEUE.' queues to put and get messages, follow the [Assigning user/group access to a queue]() guide to configure the authorization record required for this queue.

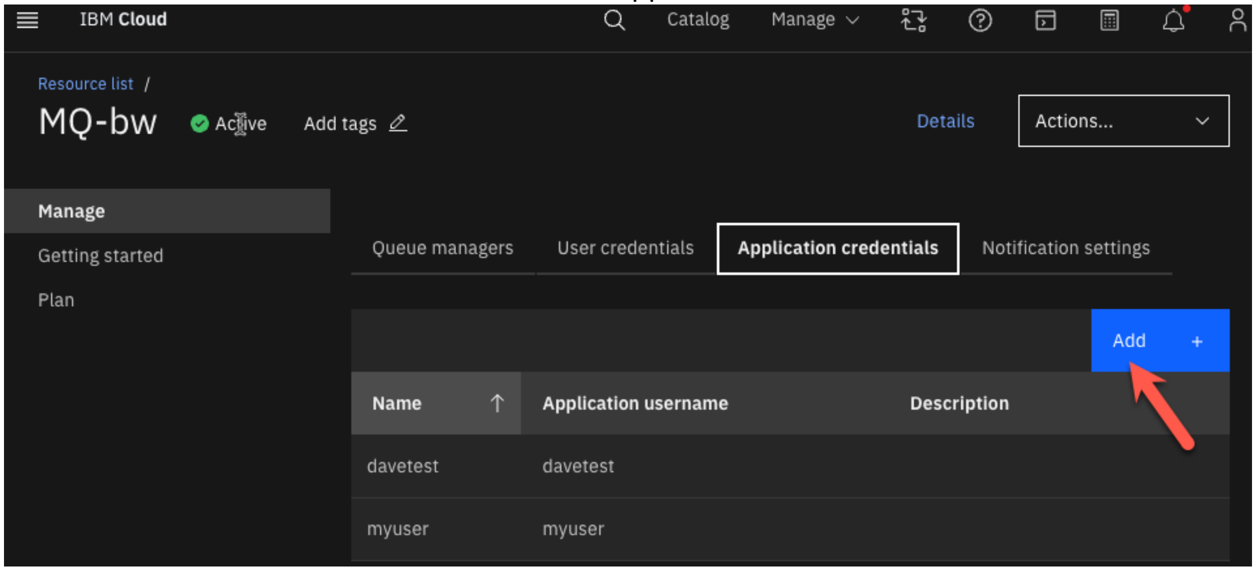
Below are the steps that I took to create a userid / apikey.

1.) On the main IBM MQ Service screen, select "Application Credentials"



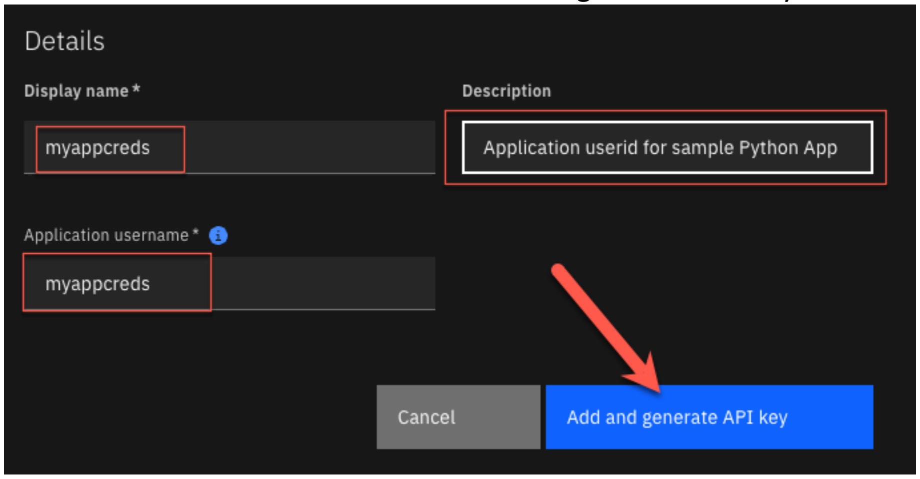
Name	Application username
davetest	davetest
myuser	myuser

2.) Select the "Add" button to create a NEW set of application credentials



Name	Application username	Description
davetest	davetest	
myuser	myuser	

3.) Fill out the information and select “Add and generate API Key”

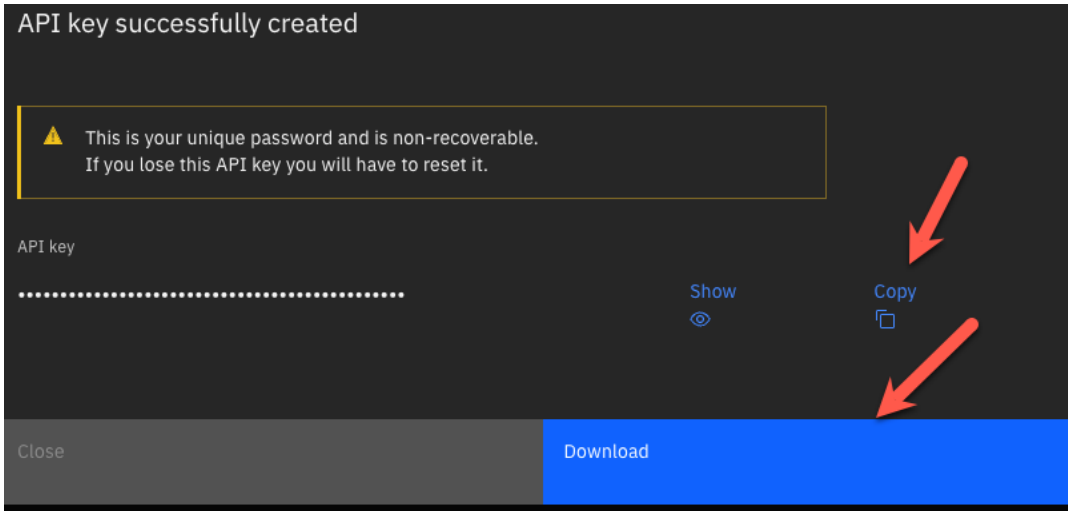

Details

Display name * myappcreds

Description: Application userid for sample Python App

Application username * myappcreds

IMPORTANT: You will ONLY see the API KEY ONE TIME!! Take note of this.. !!


API key successfully created

This is your unique password and is non-recoverable.
If you lose this API key you will have to reset it.

API key
•••

******** TASK COMPLETE **

This will be the Userid & Password used to authenticate to the queue manager.

Create the keystore for the client connection

For this next step, we need to create a keystore file and add our certificate information to the keystore.

1.) Copy the downloaded PEM file (containing the cert) to your project directory. This was downloaded from the IBM Cloud QM Service page in a previous step.

2.) Create the keystore with this command below.

    ****** This command line tool is part of the MQ Developers Kit *******
    runmqakm -keydb -create -db <keystorename>.kdb -pw <password> -type pkcs12 -expire 1000 -stash

    - <keystorename> - You can name your keystore any name you wish
    - <password> - You can set the password for the keystore to anything you wish

    **** My Example ****
    /opt/mqm/bin/runmqakm -keydb -create -db qmgrcert.kdb -pw password -type pkcs12 -expire 1000 -stash

3.) Add the PEM (certificate) to the keystore with this command below.

    ****** This command line tool is part of the MQ Developers Kit *******
    runmqakm -cert -add -label <yourlabel> -db <keystorename>.kdb -stashed -trust enable -file <pemfilename>.pem

    - <yourlabel> - You can add any label you like here, but I recommend using the same name as your keystorename
    - <keystorename> - This must match the keystore name you created in the first command.
    - <pemfilename> - This must match the name of your pem file (should be in the same directory where your running this command.

    **** My Example ****
    /opt/mqm/bin/runmqakm -cert -add -label qmgrcertnew1 -db qmgrcertnew1.kdb -stashed -trust enable -file qmgrcert.pem

4.) Verify that you have the generated kdb and sth files

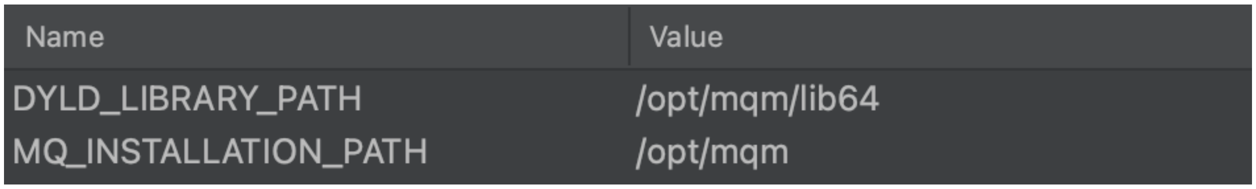
You should see two new files that were generated by these 2 commands above.

- <keystorname>.kdb
- <keystorename>.sth

******** TASK COMPLETE ***
We will use the keystore files to connect to the queue manager via a channel that is TLS enabled.

Test connectivity

The Python “pymqi” library requires you to have the MQ Client installed. This python library is a wrapper to the C client libraries loaded with the MQ Client. We MUST have these environment variables set.



Name	Value
DYLD_LIBRARY_PATH	/opt/mqm/lib64
MQ_INSTALLATION_PATH	/opt/mqm

If you are running these on a linux or Mac machine you can set these variables via the command line using these commands.

```
export DYLD_LIBRARY_PATH=/opt/mqm/lib64
export MQ_INSTALLATION_PATH=/opt/mqm
```

The PATH environment variable should include the mqm libraries. Add these directories to your path. .

```
/opt/mqm/bin:/opt/mqm/lib64:/opt/mqm/samp/bin
```

Below is the sample Python Application. We will need to use the connection information that was downloaded from a previous step to populate the values for the connection.

We will also need to reference the keystore file and set the userid / password (api key)

```python
import pymqi

import logging

queue_manager = 'myqm'
queue_name = 'DEV.QUEUE.1'
message = 'Hello from Python! - This is Dave Krier'

cd = pymqi.CD()
cd.ChannelName = b'CLOUD.ADMIN.SVRCONN'
cd.ConnectionName = b'myqm-4e4a.qm.us-south.mq.appdomain.cloud(30000)'
cd.ChannelType = pymqi.CMQC.MQCHT_CLNTCONN
cd.TransportType = pymqi.CMQC.MQXPT_TCP
cd.SSLCipherSpec = b'ANY_TLS12_OR_HIGHER'
sco = pymqi.SCO()
sco.KeyRepository = b'./qmgrcert' # include file name but not file extension

qmgr = pymqi.QueueManager(None)
qmgr.connect_with_options(queue_manager, user='davetest', password='F-
5QDP8lO_cI0j7521wEchXxzd2Yv7DeA_gPqa28ASBx', cd=cd, sco=sco)

put_queue = pymqi.Queue(qmgr, queue_name)
put_queue.put(message)

get_queue = pymqi.Queue(qmgr, queue_name)
print(get_queue.get())

put_queue.close()
get_queue.close()

qmgr.disconnect()
```

References

- https://developer.ibm.com/tutorials/mq-secure-msgs-tls/#step-1-create-tls-objects
- https://stackoverflow.com/questions/14010551/how-to-convert-between-bytes-and-strings-in-python-3
- https://cloud.ibm.com/docs/mqcloud?topic=mqcloud-mqoc_connect_app_qm
- https://zato.io/pymqi/examples.html
- https://developer.ibm.com/learningpaths/ibm-mq-badge/