Running the MQ docker image on the Kubernetes service in Bluemix

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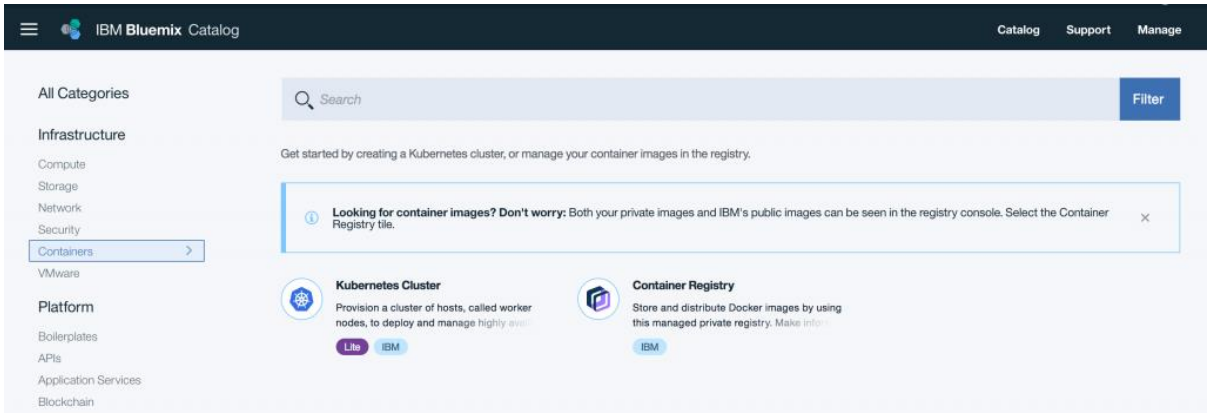
In March, we announced the availability of the IBM MQ Advanced for Developers docker image as part of the Bluemix Container service, which provided a simple way to try out IBM MQ using a cloud deployment. Since that time, the original version of the Bluemix Container Service has been deprecated in favour of the new Kubernetes service on Bluemix which provides a single tenant Kubernetes cluster into which you can deploy the Docker containers of your choice.

Importantly, IBM's public images (like MQ) and any private images that you uploaded to the container registry are **still available** for use with the new Kubernetes service. You can continue to try out IBM MQ Advanced for Developers for free, using these three simple steps;

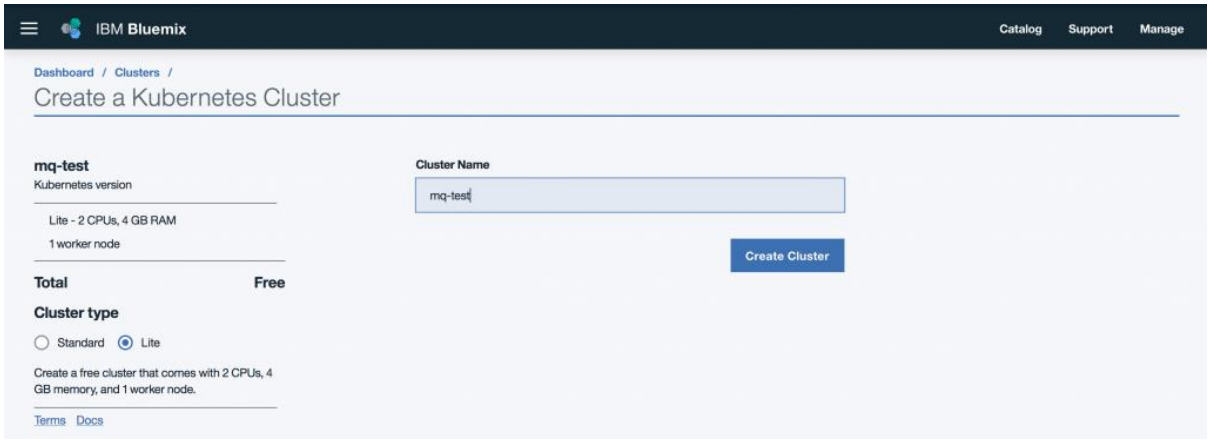
1. Launch a free Kubernetes cluster using the Kubernetes service in Bluemix
2. Deploy the IBM MQ Advanced for Developers container image into your cluster
3. Connect your favourite administration tooling and applications to try it out!

Step 1: Launch a free Kubernetes cluster using the Kubernetes service in Bluemix

You can launch a free Kubernetes cluster using the Bluemix user interface by selecting the Kubernetes Cluster service in the service Catalog as shown in the following screenshots, or otherwise use the Bluemix CLI commands shown below.



The Containers page in the Bluemix catalog



Creating a “lite” Kubernetes cluster

To create your cluster using the CLI, and to complete the remainder of this tutorial you will need the following command-line tools installed on your laptop;

- Install the Bluemix CLI as described here
- Install the “container-service” CLI plugin to manage the Kubernetes cluster, for example with the following Bluemix CLI command. (Note that this is different to the “IBM-Containers” plugin which is for the original style Bluemix Container Service)

  bx plugin install container-service -r Bluemix

- Install the Kubernetes CLI to allow you to deploy containers

Once you have the tools installed you can use the following commands to create a free “lite” cluster in the Kubernetes service in Bluemix.

```
# Log in to Bluemix (use the "--sso" option if you have a federated ID)
bx login

# Set the Bluemix endpoint for your preferred region
bx api https://api.eu-gb.bluemix.net

# Set the target org and space.
# You can use "bx iam orgs" and "bx iam spaces" to get your org/space names
bx target -o "orgName" -s spaceName

# Initialise the container service connectivity if you haven't done so already
bx cs init

# Create a free Kubernetes cluster (equivalent of the UI steps above)
bx cs cluster-create --name mq-test

# List your clusters to check the status of the new cluster
bx cs clusters
```

Initially your cluster will be in the “deploying” state. You must wait until it reaches the “normal” or “ready” state before you proceed to the next step – this may take some time so be patient!

Once your cluster reaches “normal” or “ready” state you can connect to your cluster using the instructions shown in the “Access” section of the details about your Kubernetes cluster in the Bluemix UI. This downloads the kube-config file to your machine.

```
bx cs cluster-config mq-test
```

You must then follow the provided instructions to export the KUBECONFIG environment variable so that you can execute commands against your cluster.

```
export KUBECONFIG=...
```

You can then verify your worker nodes by typing the following, and confirm you have a single worker node in status “Ready”;

```
kubectl get nodes

NAME           STATUS    AGE
10.126.110.230   Ready     2m
```

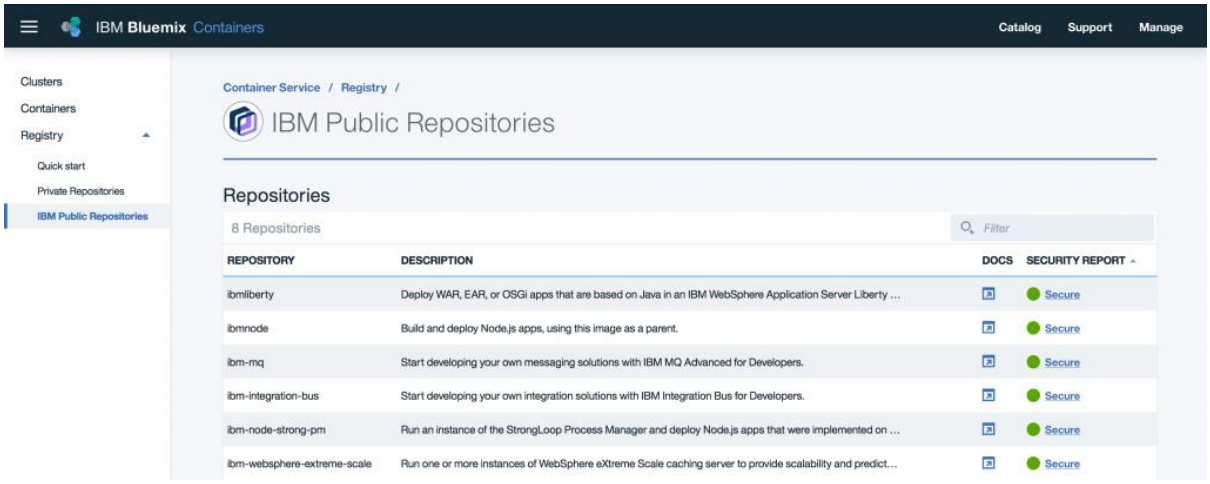
If you wish, you can optionally set up a proxy to access the Kubernetes dashboard by typing the following command;

```
kubectl proxy
```

With the kubectl proxy running you can then access the Kubernetes console by opening a web browser to http://127.0.0.1:8001/ui.

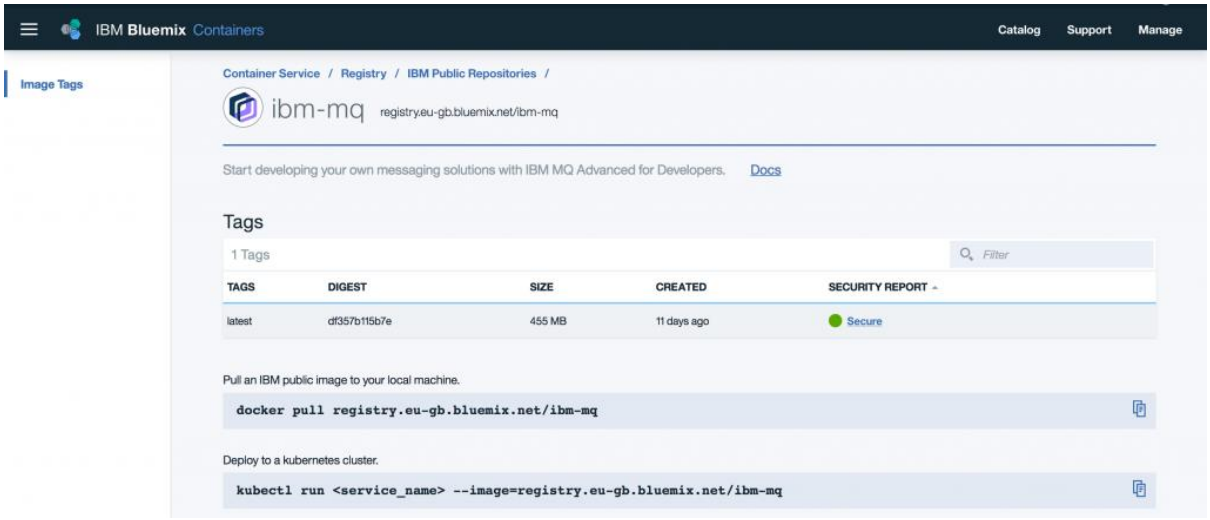
Step 2: Deploy the IBM MQ Advanced for Developers container image into your cluster

You can see the IBM Public images in the Bluemix user interface by going to the Bluemix Catalog and selecting Containers > Container Service > Registry > IBM Public Repositories.



IBM Public images in the Container Registry

Click on the “ibm-mq” image to see how to deploy an instance of that container to your cluster using the command line;



IBM MQ image in the public repository

Note: You do NOT have to execute the docker pull command shown in the screenshot above for the purposes of this exercise – that step is only required if you want to use the docker image locally on your laptop, for example to deploy to minikube or similar.

The following command will launch an instance of the container in your Kubernetes cluster, where “my-mq” is a name of your choice that will be given to your Kubernetes deployment (you can choose any name you like that meets the validation rules imposed by Kubernetes). Note that the environment variables ACCEPT and MQ_QMGR_NAME are important as they control the configuration of your container when it first starts up, as described in step 8 of the container image documentation here.

```
kubectl run my-mq --image=registry.eu-gb.bluemix.net/ibm-mq \
  --env="LICENSE=accept" --env="MQ_QMGR_NAME=QM1"
```

Check that the container has started successfully by confirming that the pod status is "Running";

```
kubectl get pods

NAME                READY   STATUS    RESTARTS   AGE
my-mq-1814346958-s0crs   1/1     Running   0          4s
```

Make a note of the pod name (e.g. "my-mq-1814346958-s0crs"), then wait for a few seconds then check the container logs to confirm that the queue manager has finished being configured and started;

```
kubectl logs my-mq-1814346958-s0crs

...
Monitoring Queue Manager QM1
QMNAME(QM1)                                   STATUS(Running)
IBM MQ Queue Manager QM1 is now fully running
Server mqweb started with process ID 334.
```

Step 3: Connect your favourite administration tooling and applications to try it out!

There are two basic options for connecting to your new container;

a. Set up port forwarding from your local machine directly to the container
b. Configure Kubernetes to make your container accessible over the public internet

In both cases you will need to know the default credentials that have been configured for you inside the container as described [on GitHub here](#).

Step 3a: Set up port forwarding from your local machine directly to the container

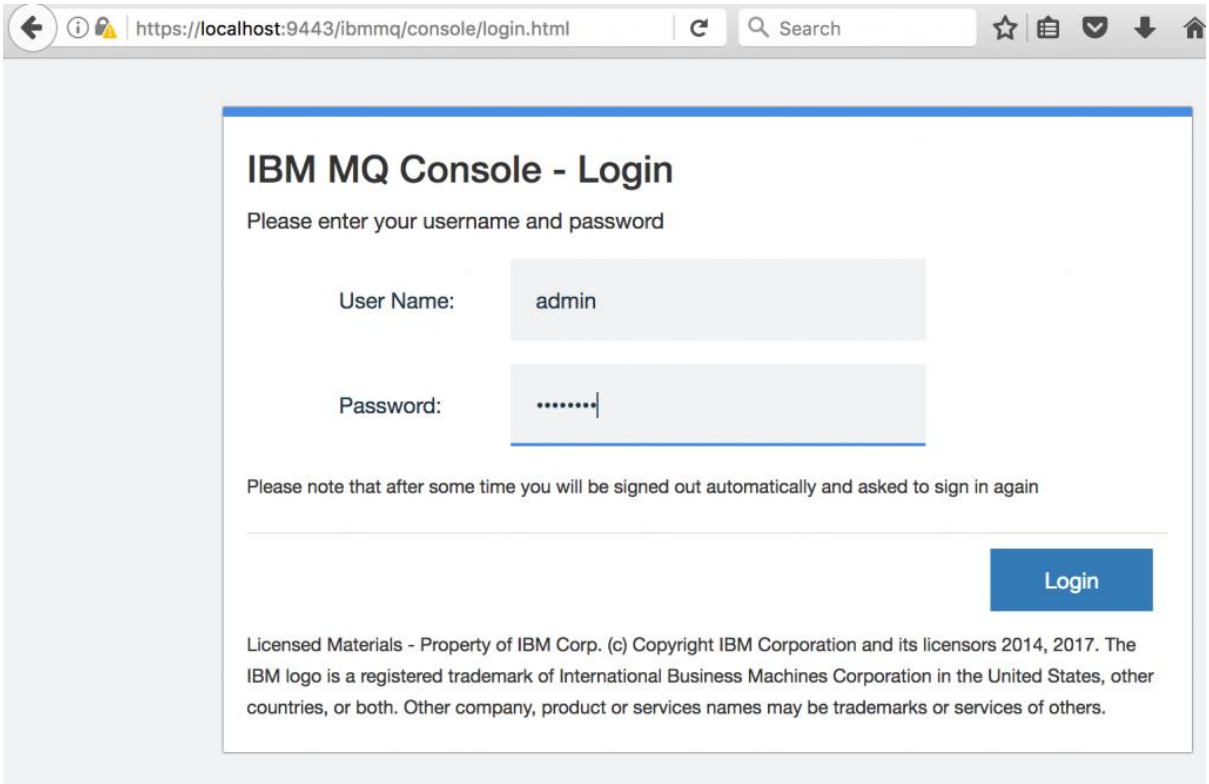
Use the following command to set up port forwarding from your local machine to the container for the 1414 (MQ Channel) and 9443 (MQ Web Console) ports. This has the advantage that your queue manager cannot be accessed over the public internet, but can only be accessed from the laptop where the port forwarding has been configured (unless you set up further network configuration to allow other instances to route through the local machine).

```
kubectl port-forward my-mq-1814346958-s0crs 9443 1414
```

You can now access your container by connecting to localhost and the port required for the action you want to carry out, for example;

- To load the MQ Web Console you can point your browser to https://localhost:9443/ibmmq/console and use the default credentials of *admin / passw0rd*

- Similarly you can attach MQ Explorer or messaging applications to localhost:1414 (the default channel name is DEV.ADMIN.SVRCONN).



Log in to the MQ Web Console via port forwarding

Step 3b: Configure Kubernetes to make your container accessible over the public internet

Alternatively you can use Kubernetes to make your container accessible over the public internet. For development and test purposes the simplest approach is to create a Kubernetes service that exposes the necessary endpoints using a NodePort, and since our free cluster only has one worker we don't have to worry about the worker IP address changing.

The following commands create a service for each of the two ports that we want to access in our container;

```
kubectl expose pod my-mq-1814346958-s0crs --port 1414 --name mqchannel --type NodePort
kubectl expose pod my-mq-1814346958-s0crs --port 9443 --name mqwebconsole --type NodePort
```

Having created the service you now need to look up the port numbers that have been allocated to the NodePort using the "get services" command. In the example below the MQ Channel is exposed publicly on port 30063 and the MQ Web Console on port 32075.

```
kubectl get services

NAME          CLUSTER-IP     EXTERNAL-IP   PORT(S)          AGE
kubernetes    10.10.10.1     none          443/TCP          22h
mqwebconsole  10.10.10.128   nodes         9443:32075/TCP   2m
mqchannel     10.10.10.44    nodes         1414:30063/TCP   2m
```

Lastly you need to obtain the public IP address of the worker node, for example in the example shown below the public IP address of the worker is 169.51.10.240;

```
bx cs workers mq-test

ID                                                  Public IP       Private IP      Machine Type   State    Status
kube-par01-pa7f800000007845aaaaf806224d5a53dc-w1    169.51.10.240   10.126.110.230   free           normal   Ready
```

Combine the IP address and the port number together to access the relevant endpoint over the internet, for example;

- MQ Web Console: https://169.51.10.240:32075/ibmmq/console/ (admin / passw0rd)
- MQ Explorer: 169.51.10.240, port 30063 (admin / passw0rd, channel=DEV.ADMIN.SVRCONN)

Summary

In this article we described how to try out MQ Advanced for Developers for free using the Docker container image and the Kubernetes service in IBM Bluemix. We described how to create a free Kubernetes cluster, deploy the MQ Docker image into that cluster and successfully connect to the container to use the deployed queue manager.

Happy Messaging!