Running IBM MQ in Containers

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Agenda

- Introduction to Containers
- MQ in Containers
- Things to consider before running MQ in containers
- Demo (?)
- Questions
INTRODUCTION TO CONTAINERS
Containers

- Containers provide a similar environment to a VM but lighter in weight
  - A virtual machine provides an abstraction of the physical hardware
  - A container abstracts the OS level, typically at the user level

- Linux containers
  - Containers all share the same OS kernel
  - Images are constructed from layered filesystems
  - Containers isolate applications from each other and the underlying infrastructure
Benefits of Containers

- Each container/process only sees its own process(es)

- Each container/process only sees its own filesystem

- Fast startup time – just the time to start a process, setup networks, etc

- Better resource utilization – can fit far more containers than VMs into a host
Containers? Do you mean Docker?

- No. Linux containers have been around longer than Docker.

- Docker is tooling that allows you to easily create, run and manage Linux Containers.
  - There are many other container management programs you can use instead of Docker.

- Container images are now a OSCl Specification so can be ran by Docker, Podman or any other Container running software.
Orchestration of containers

Orchestration tools
- **kubernetes** by Google
- Docker Swarm
- MESOS

Public cloud container services
- Windows Azure
- Amazon Web Services
IBM MQ IN CONTAINERS
What is supported?

- MQ is supported in Docker containers
- IBM will support MQ issues, agnostic to the orchestration environment
- The orchestration vendor will need to support and provide assistance for orchestration issues
- Applies to MQ V8.0.0.4 onwards
- IBM recommends using MQ V9 Continuous Delivery release
  - Adds web console
  - Adds REST APIs
  - Easier storage management (crtmqdir)
  - Quicker to receive new features
# What is supported?

<table>
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<tr>
<th>Component/arch</th>
<th>IBM Cloud Kubernetes Service</th>
<th>IBM Cloud Private</th>
<th>Red Hat OpenShift</th>
<th>Microsoft Azure Container Service</th>
<th>Amazon Elastic Container Service</th>
<th>Other</th>
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- **MQ Server**: Supported with sample
- **MQ Advanced Server**: Supported, and you need to build your own image (samples/blog available)
- **MQ Advanced Managed File Transfer Agent**: Supported, and you need to build your own image.
- **MQ Salesforce Bridge**: Supported, and you need to build your own image.

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MQ and image supported
Supported image and Helm chart available

MQ supported with sample
Supported, and you need to build your own image (samples/blog available)

MQ supported with no sample
Supported, and you need to build your own image.
What is Supported?

**IBM Middleware, Data, Analytics and Developer Services**
Cloud enabled middleware, messaging, databases, analytics, and cognitive services to optimize current investments while rapidly innovating

**Core Operational Services**
Simplify Operations Management, Security, and Hybrid integration
Provision infrastructure and apps across Multi-Cloud environments

**Kubernetes-based Container Platform**
Industry leading container orchestration platform across private, dedicated & public clouds

**Cloud Foundry**
For prescribed app development & deployment

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**Runs on existing IaaS:**
- VMware
- OpenStack
- Power Systems
- System Z
- IBM Spectrum
- CMS

**Third Party alliances:**
- Dell
- Cisco
- NetApp
- Lenovo
- Canonical
- ...
How to get started?

- Based on IBM MQ Advanced for Developers, but can be re-built with your licensed copy of IBM MQ or IBM MQ Advanced
- MQ itself is formally supported, but the Docker-specific Bash scripts are only informally supported by GitHub issues
- Source code available from https://github.com/ibm-messaging/mq-container
- Pre-built image available from:
  - Docker Hub: https://hub.docker.com/r/ibmcom/mq/
  - Docker Store: https://store.docker.com/images/ibm-mq-advanced
How to get started?

- Available from IBM Passport Advantage
- Docker-specific tools supported by IBM for use in IBM Cloud Private
- Source code available from https://github.com/ibm-messaging/mq-container

Docker-specific samples (go program)

IBM MQ Advanced V9.1.0

Ubuntu 16.04/RHEL
IBM MQ Hourly Model

- Fully portable, cloud native model - deploy containers wherever you want, and move them with ease - ideal for microservices

- Workloads running 24/7 have a monthly price cap

- Available for Docker (including Kubernetes and OpenShift) and CloudFoundry both on-prem and in the cloud
  - Also available for VM deployments on public & dedicated (off-prem) clouds

- No ILMT requirement
  - On-prem metering service provided in IBM Cloud Private used to track usage
IBM MQ Hourly Model

VPC/PVU pricing today
Pay for maximum concurrency
=60 VPCs or 4,200 PVUs

Proposed hourly pricing
Pay for total hours of runtime
= 105 core hours
(cheaper than 60 VPC)

✔ Pre-purchase “core hours”
- Each instance consumes these hours as they run
- Core hours consumption is multiplied by the number of CPU cores available to an instance
- Core hours can be consumed at any rate during 12 month period
Container use cases: Version Management

- Containers run from images which are prebuilt.
  - These images an entry program and all of its dependencies.

- You can create a container with a persistent volume (mounted file system) that stores data outside of a container’s filesystem.

- You can update the MQ version by running a container with a new version of MQ and an existing persistent volume.
Container use cases: Faster deployments

- Containers are smaller than VMs giving them a faster start-up time.

- You can take advantage of this faster startup time in order to deploy single, resource isolated queue managers faster.

- This allows:
  - Developers to quickly provision their own queue manager
  - Fast scaling up of queue managers.
Container use cases: Integration

- IBM MQ is supported on a large number of container service and container orchestration services.

- The support statement for IBM MQ and container does not specify specific container technologies but does set some requirements.

- This flexibility allows you to place IBM MQ in containers alongside other IBM products and connect them.
Is anyone actually doing this?

- Yes!

- We have had many conversations with many customers who are in different stages of implementing MQ in Containers

- IBM is also investing in containers
  - IBM Cloud Kubernetes Service
  - MQ on IBM Cloud service
THINGS TO CONSIDER BEFORE RUNNING MQ IN CONTAINERS
Storage

- Container storage is ephemeral. If the container is deleted then the storage is lost (even though it did exist on the host)
  - To prevent data loss you should use a persistent volume.
  - You can mount a portion of the host filesystem as a volume
  - Cloud container systems provide interfaces to use other storages.

- Reliability of storage
  - Replicated across failure domains / availability zones?
  - Are disk writes cached?
  - What's the failure rate of disks?

- Connecting to the right persistent storage
  - When a queue manager’s is moved (e.g. run a container in a different VM), then something needs to re-connect the queue manager to the correct storage.
Log Management/Monitoring

- **Containers only run as long as their control program runs**
  - If you have tied this in to the life of the queue manager a container will stop with the queue manager

- **If there is a problem you may not be able to log into the container to get error logs**
  - Although you should be avoiding this as much as possible.
  - You may also only know where the problem is later and so now you can’t identify the failing container.

- **Containers could also be running anywhere which makes locating a particular container troublesome**

- **You should be centralizing your logs and monitoring data so you can quickly see your full infrastructure and debug even if a container is failing.**
Security/User Management

- What will you use as a user repository?

- IBM MQ supports many different user repositories
  - OS
  - LDAP
  - PAM

- OS may not work effectively in a container.
  - OS uses user details stored in /etc/passwd
  - If this isn’t stored in a persistent volume it will be reset.
Certificate Management

- Certificate management has similar problems as User management.

- Keystore should be stored under `/var/mqm` which should be on a persistent volume.

- But how can you quickly and effectively update certificates if needed?
High Availability

Single resilient queue manager
- Cloud manages fail-over to somewhere with spare capacity
- Networked storage (block or filesystem), managed by separate subsystem

Multi-instance queue manager
- MQ manages fail-over
- Networked storage (filesystem), managed by separate subsystem

Replicated data queue manager
- MQ manages fail-over
- Local block storage, synchronously replicated by MQ
DEMO (?)
Where can I get more information?

IBM Messaging developerWorks
developer.ibm.com/messaging

IBM Messaging Youtube
https://ibm.biz/MQplaylist

LinkedIn
https://ibm.biz/ibmmessaging

MQ Labs here at MQTC!

Blog posts tagged with “cloud”
Questions & Answers
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