

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

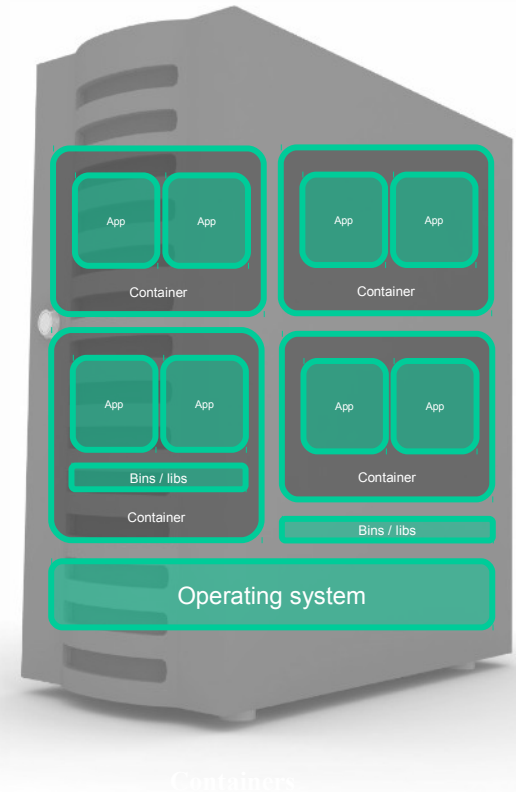
Containers

- 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

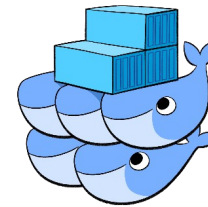
- Each container/process only sees its own process(es)
- Each container/process only sees its own filesystem
- Fast startup time – just the time to start a process, setup networks, etc
- Better resource utilization – can fit far more containers than VMs into a host

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 OSCI Specification so can be ran by Docker, Podman or any other Container running software.**

Orchestration of containers

Orchestration tools



Docker Swarm



Public cloud container services



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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?

Component/ arch	IBM Cloud Kubernetes Service		IBM Cloud Private		Red Hat OpenShift	Microsoft Azure Container Service	Amazon Elastic Container Service	Other
	x86_64	x86_64	ppc64le (POWER)	s390x (z/Linux)	x86_64	x86_64	x86_64	*
MQ Server	●	●	●	●	●	▲	▲	▲
MQ Advanced Server	●	★	★	★	★	▲	▲	▲
MQ Advanced Managed File Transfer Agent	▲	▲	▲	▲	▲	▲	▲	▲
MQ Salesforce Bridge	▲	▲	▲	▲	▲	▲	▲	▲

★ **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



Enterprise grade services for Middleware, Data, Analytics, DevOps



Core Operational Services

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

Enterprise grade operations across your Hybrid IT environment



Kubernetes-based Container Platform

Industry leading container orchestration platform across private, dedicated & public clouds



Cloud Foundry

For prescribed app development & deployment

CLOUDFOUNDRY

Open by design, preventing vendor lock-in

Runs on existing IaaS:



System Z



IBM Spectrum

CMS

Leverage existing investments

Third Party alliances:

Dell

Cisco

NetApp

Lenovo

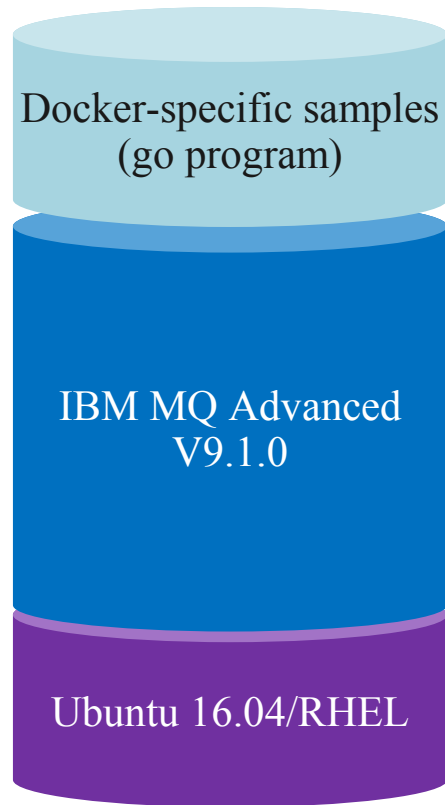
Canonical ...

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?

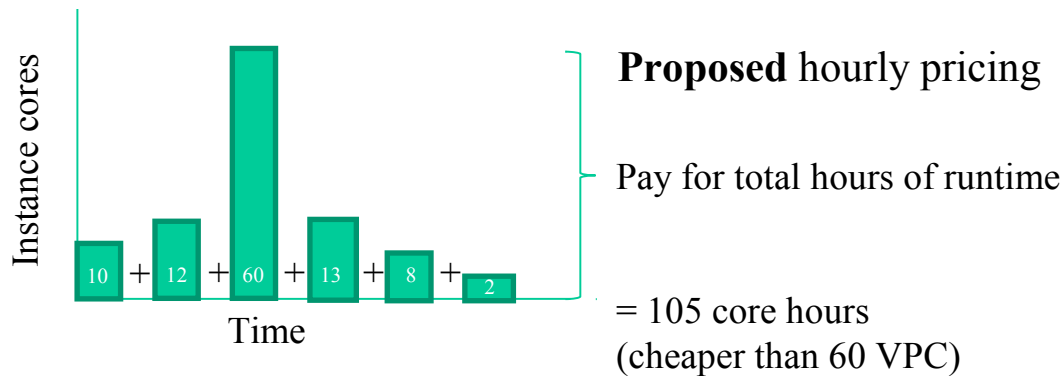
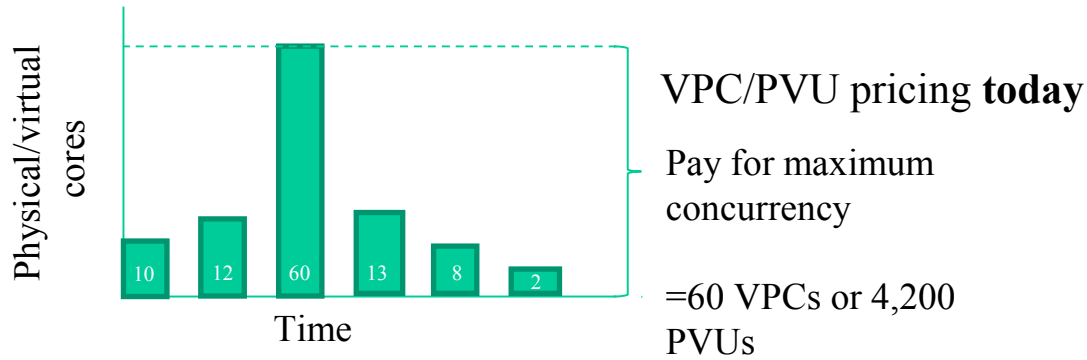


- Available from IBM Passport Advantage
- Docker-specific tools supported by IBM for use in IBM Cloud Private
- Source code available from <https://github.com/ibm-messaging/mq-container>

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

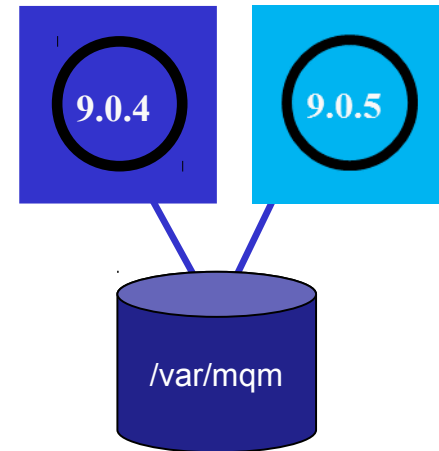


✓ Pre-purchase “core hours”

- 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

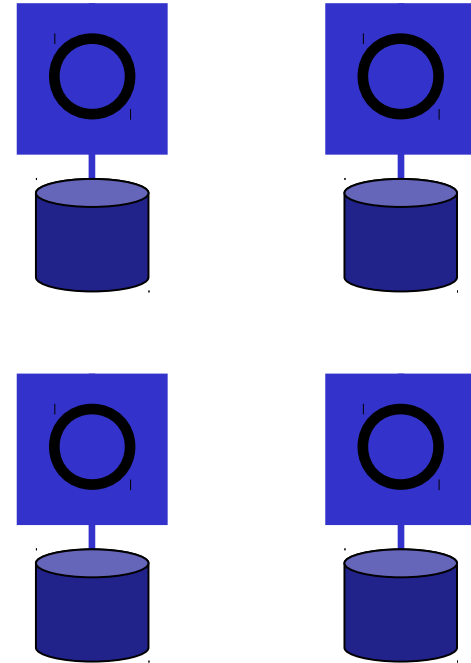
Container use cases: Version Management

- Containers run from images which are prebuilt.
 - These images contain 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.



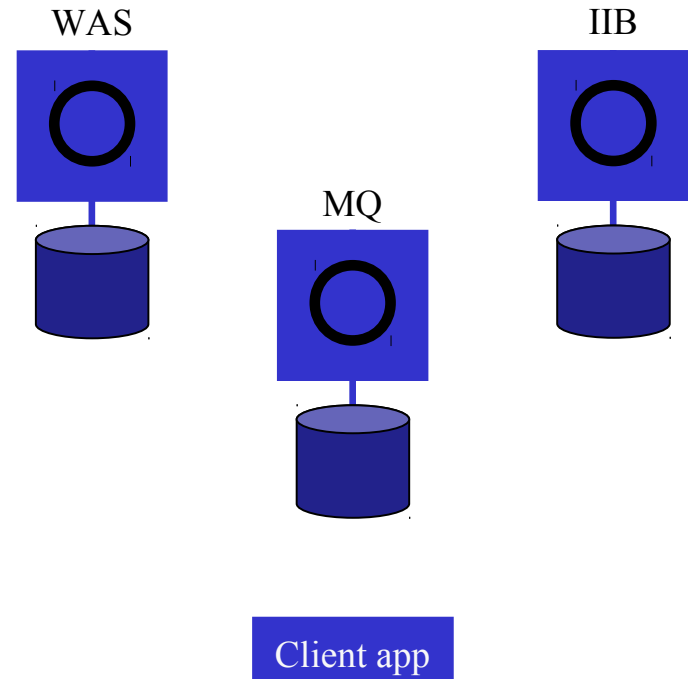
Container use cases: Faster deployments

- 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.**

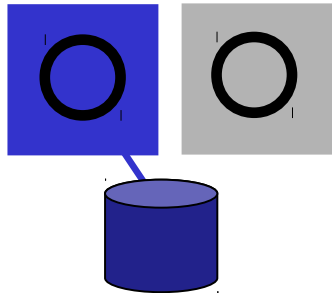
Security/User Management

- 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

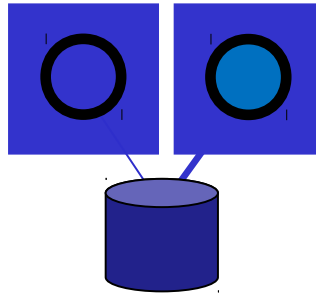
- Certificate management has similar problems as User management.
- Keystore should be stored under `/var/mqm` which should be on a persistent volume.
- But how can you quickly and effectively update certificates if needed?

High Availability



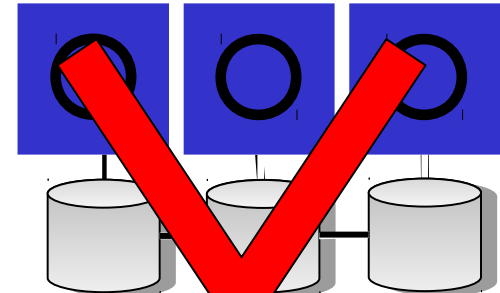
Single resilient queue manager

- 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

Blog posts
tagged with
“cloud”

IBM Messaging Youtube
[https:// ibm.biz/MQplaylist](https://ibm.biz/MQplaylist)

LinkedIn
<https://ibm.biz/ibmmessaging>

MQ Labs here at MQTC!



Questions & Answers



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