Planning for MQ in the Cloud

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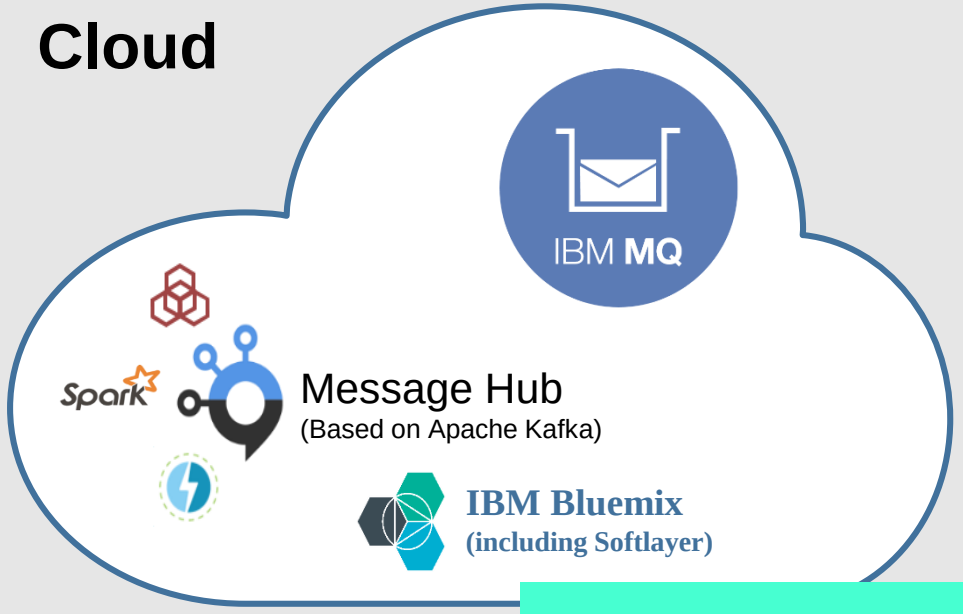
Agenda

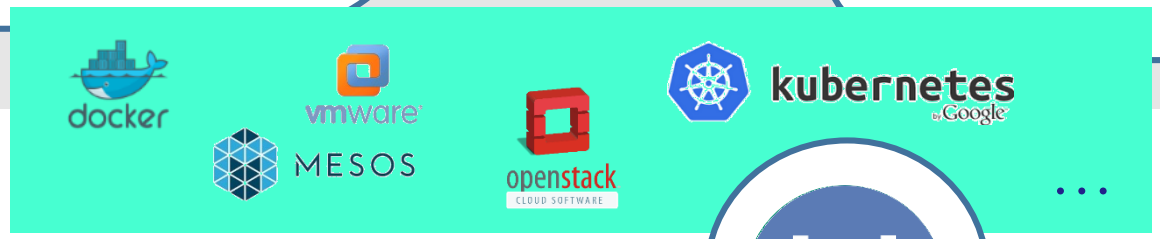
- Introduction
- Generic Cloud considerations
- MQ Specific considerations
- Questions

GENERIC CLOUD CONSIDERATIONS

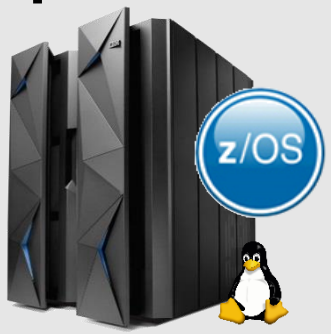
There is a lot of choice of cloud (and it's growing!)

Cloud





On-prem



IBM MQ Appliance

Characteristics of a cloud environment

- Self-service – empowers users to provision resources without requiring human intervention, most likely using a web-based portal or an API.
- Elastic scaling – enables scaling up and down on demand, driving the need for high levels of automation.
- Shared resources – offers economies of scale through the use of shared infrastructure and software, securely separating the resources at a logical level.
- Metered usage – allows pay-as-you-go billing through monitoring, measurement and reporting of usage.

Types of cloud environments

Infrastructure as a Service (IaaS)	Containers as a Service (CaaS)	Platform as a Service (PaaS)	Functions as a Service (FaaS)	Software as a Service (SaaS)
• IBM Bluemix Infrastructure • Amazon Web Services • Microsoft Azure • OpenStack	• IBM Containers on Bluemix • Amazon Elastic Container Service • Microsoft Azure Container Service • Kubernetes • Docker Swarm • Apache Mesos	• IBM Bluemix Cloud Foundry Runtimes • Amazon Elastic Beanstalk • Microsoft Azure App Service • Cloud Foundry • OpenShift	• IBM Bluemix OpenWhisk • Amazon Lambda • Microsoft Azure Functions	• IBM Cloudant (NoSQL database) • Salesforce (CRM platform)

MQ queue managers

MQ client applications

Choice of Cloud

- **When planning for the cloud you should consider provider**
  - Some providers may only offer tools to use them (Vendor locking)
  - What does the provider offer? Public only? Private option?

- **What kind of cloud?**
  - Public – Managed by someone else
  - Private – The cloud is managed by you
  - Mixture.

Choice of Environment

- **Infrastructure**
  - Virtual machines
  - Containers

- **Software as a service?**
  - Messagehub
  - No “IBM MQ” SaaS, but being considered. (at least from IBM anyway)

Choice of tools & which tool for which job

- **Orchestration**
  - How do you want to deploy your environments?
  - Doing it by hand introduces error
- **Management & monitoring**
  - Once you have your environment, how are you going to manage it?
  - You probably already have this system in place so are you going to:
    - A. Work out how to configure cloud Queue Managers to talk to it?
    - B. Create a new system to manage these environments
- **Vendor locking**
  - Some tools are provided by a cloud provider to use with their cloud
  - But if you want to change providers in the future you will have to use another tool.
- **More on this in Matthew Whiteheads talk. (Deploying MQ to the Cloud)**
  - Wednesday 15:50 - Sagewood

How will you slot it into your network?

- **Hybrid cloud?**
  - Private cloud with On Prem
  - Public cloud with on prem?
  - Public cloud talking to Private?

- **What about communication between clouds/on prem?**
  - Secure gateway
  - VPN provided by cloud?
  - TLS
  - AMS

Future Proofing

- **How will you apply updates/patches?**
  - You need to apply a patch, how will you apply it to all of your Queue Managers?
  - You want to upgrade, how do you upgrade all of your Queue Managers?
  - Do you have a way to stage the upgrade/patch?
  - Not just limited to patches/updates of installation, what about configuration?

- **How will you add new instances in?**
  - If you need to scale up how will you connect the new instance with your existing network
  - How will you remove one when you don’t need it anymore.

MQ SPECIFIC CLOUD CONSIDERATIONS

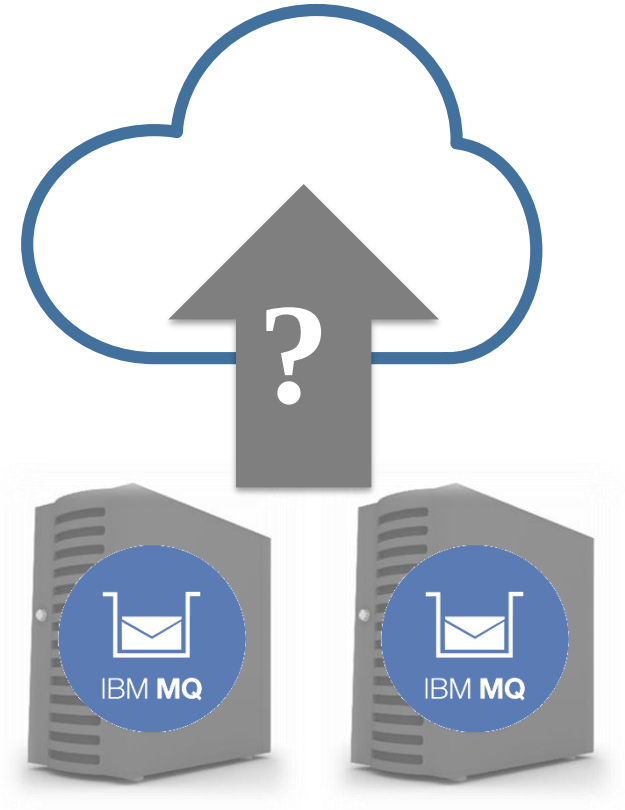
Running in the cloud *could* be as simple as picking up your current infrastructure and moving it to the cloud

You then just manage a bunch of VMs exactly like your datacentre don't you?…

You could, but that would be missing the point

Clouds bring an opportunity for simplified operations and management, better scalability and better service and therefore application quality of service

…



MQ, ready for the cloud

MQ's capabilities were ready for the cloud before the cloud was even a *thing*

- Dynamic client connectivity
- Dynamic scaling
- Workload balancing
- High security
- High scale and robustness
- Repeatable and remote administration and monitoring for cattle, not pets deployments
- Perfect for integrating systems across any cloud
- …

But are you using it that way?

Rethink MQ

Don’t confuse old MQ practices for MQ itself

“MQ is too hard to use”

“Our MQ system is too complicated to change”

“MQ isn’t cloud, it’s too old!”

How many of these do you have?

- Hand crafted, shared queue managers
- Applications hard coding connection details
- Applications bound to a single IP address
- Edge security at most
- Internal architecture complexity exposed to the applications
- A lengthy change control process
- Manual installation, deployment and configuration

Rethink how you use MQ!

Running MQ in the cloud

- **Persistent storage**
- **Security**
- **Scalability**
  - Service discovery
  - Load balancing
- **Error log management**
- **Metrics and monitoring**
  - Centralized metrics
  - Centralized event messages
- **Client applications**

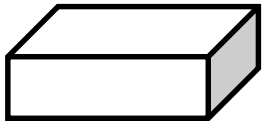
Re-think how you use MQ

Security

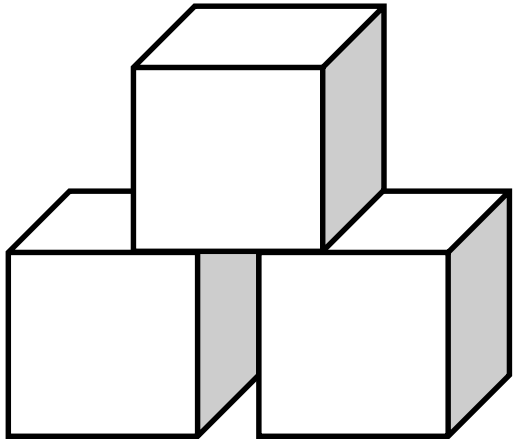
- **No “armadillo” security**
- **All data in motion and at rest needs to be secured**
  - Configure MQ channels with TLS
  - Use channel authentication for access control
  - Configure disk encryption either at the OS or cloud provider level.

  - IBM MQ Advanced Message Security is also available to provide additional security protections, such as per-message encryption.

Persistent storage

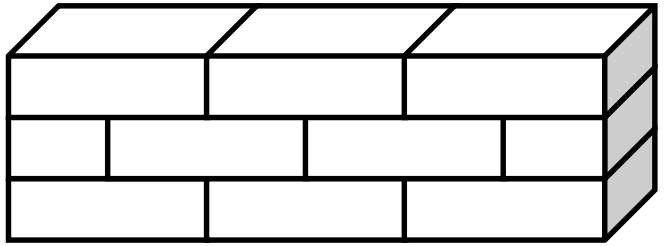


Local storage



Block storage

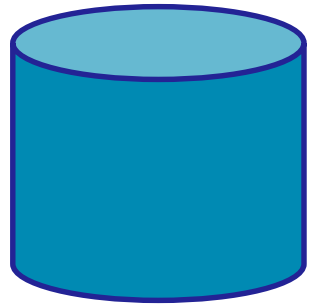
Bluemix Block Storage
Amazon EBS
OpenStack Cinder
Ceph RBD
DRBD



File storage

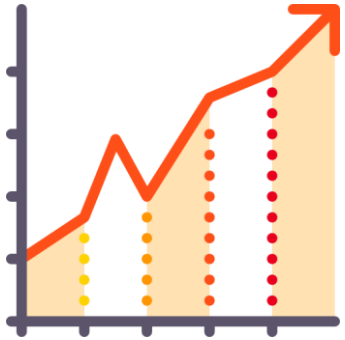
NFS V4
Bluemix File Storage
Amazon EFS
OpenStack Manila
CephFS

Persistent storage



- **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.
  - Some cloud orchestrators will run identical instances of your image. This could lead to lots of copies of "qm1". Other orchestrators, like Kubernetes, allow you to manage separate identities ("qm1", "qm2", etc.).

Scalability



- **In general, scale clients separately from servers**
- **Scaling up is easy**
  - MQ cluster
  - Load-balanced set of identical queue managers
- **Scaling down depends more on your applications**
  - Need to remove a queue manager in a controlled manner making sure that all of the messages are safely processed.
- **Message ordering**
  - Scaling out rather than scaling up, brings concurrent processing
  - Messages could be received out of sequence.
  - MQ provides features to allow groups of messages to be handled in small ordered batches, or you can manage this yourself in your application.

Availability

- **How do you want to handle Availability?**
  - Use existing MQ functionality (Active/Passive Queue Managers)
  - Use systems built into Kubernetes (Demo in the Container talk)
  - Operate across multiple Availability zones
- **Availability zones,**
  - Pay attention to where you operate.
  - Export regulations
- **You are probably already spreading your MQ infrastructure across multiple regions/Data Centres**
- **Do you use existing MQ features or Cloud provider features?**

Error log management

- **To manage large numbers of servers, you don’t want to SSH into them very often (if ever).**
- **You will still need to diagnose problems**
- **Centralized logging is commonly used, where an agent sends MQ error logs and system logs to a centralized location**
  - Store
  - Index to make searchable
  - Analyze
- **For example:**
  - IBM Monitoring & Analytics
  - AWS Cloudwatch
  - ElasticSearch

Metrics and monitoring

- **MQ V9 makes many statistics available through a pub/sub interface**
  - Subscribe to topics under $SYS/MQ for information on:
    - CPU usage
    - Disk usage
    - Connections and disconnections
    - Opening and closing of queues
    - Pub/sub and put/get
    - Syncpoint calls
    - Changes to MQ objects (MQSET and MQINQ)

- **Cloud product insights can be used with IBM MQ.**

- **Other monitoring tools can be used! ELK stack, Prometheus, etc**

Client applications

- **Cloud typically emphasizes *resilience* over *robustness***
- **Reminder: use your MQ client's auto-reconnect feature**
  - Cloud servers are likely to get restarted or moved

```
factory.setClientReconnectOptions(WMQConstants.WMQ_CLIENT_RECONNECT);
```

- **Service discovery will probably be affected**
  - Dynamic IP addresses
  - Scalability may mean multiple equivalent queue managers are available

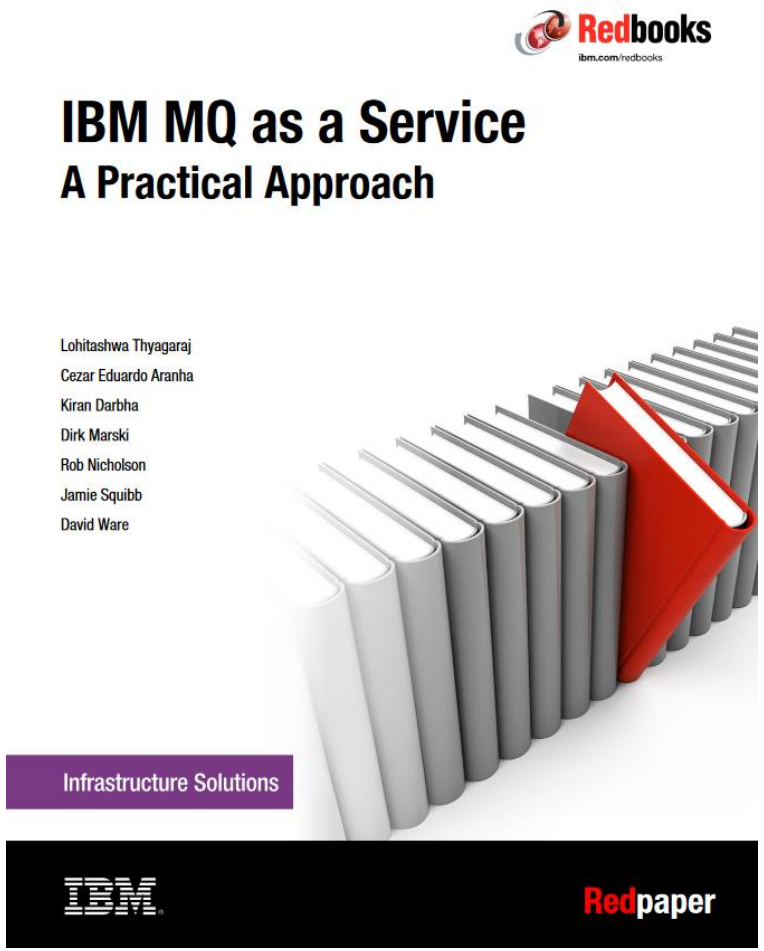
General Principle

- **Create image with IBM MQ.**
  - Docker image, EC2 Ami, etc
- **Create method to customize the MQ Queue Manager depending on variables**
  - Docker example image runs all MQSC files loaded in /etc/mqm
- **Use tools to create as many instances as you need**
  - Scale up and down on requirement
- **Developer works has (and will have)**

examples of different uses of MQ in different scenarios

- Including the automation scripts we used to create and customize our instances

MQ as a Service Redbook



- http://ibm.biz/mqaas_red
- Information about how to build, deploy, and use IBM MQ as a service.
- Explains how to apply as a service methodologies to an IBM MQ environment.

Where can I get more information?

IBM Messaging developerWorks
developer.ibm.com/messaging

IBM Messaging Youtube
https://www.youtube.com/IBMmessagingMedia

LinkedIn
Ibm.biz/ibmmessaging

~~Twitter~~
~~@IBMMessaging~~

~~IBM MQ Facebook~~
~~Facebook.com/IBM-MQ-8304628654/~~

Would you like to take part in IBM MQ Design Research?

- **The IBM MQ team is currently conducting some long term research with our MQ customer base.**
- **With this survey we would like to understand:**
  - Who is interreacting with MQ and what are their responsibilities?
  - Which customers are interested in moving IBM MQ into the cloud?
  - Which customers would like to take part in future research?
- **We estimate the survey should take 4 minutes to complete.**
- **Please note: This survey is for distributed users only.**
- **If you're interested, go to ibm.biz/MQ-Customer-Survey**

Other Cloud sessions from the IBM MQ team.

- **MQ in Containers – Rob Parker**
  - ~~Monday 9:50 – Leopardwood Room~~
  - Wednesday 14:30 – Leopardwood Room

- ~~**MQ Automation: Config Managenment using Amazon S3 – T.Rob Wyatt**~~
  - ~~Monday 15:50 – Aloeswoood Room~~
  - ~~Wednesday 8:30 – Aloeswood Room~~

- **MQ Hybrid Cloud Architectures – Matt Whitehead**
  - ~~Tuesday 8:30 – Sagewood Room~~
  - Wednesday 9:50 – Sagewood Room

- ~~**MQ Automation: Config Management using Baselines, Patterns and Apps – T.Rob Wyatt**~~
  - ~~Monday 9:50 – Aloeswood~~
  - ~~Tuesday 13:00 – Aloeswood Room~~

- **What's up DOCker – Rob Sordillo**
  - ~~Monday 11:15 – Zebrawood Room~~
  - Wednesday 11:15 – Sagewood Room

Other Cloud sessions from the IBM MQ team.

- **Introduction to Kafka (and why you care) – Richard Nikula**
  - ~~Monday 14:40 – Zebrawood Room~~
  - Wednesday 14:30 – Aloeswood Room
- **MQ Console & REST API – Matt Leming**
  - Wednesday 15:50 – Rosewood Room
- **Deploying MQ to the Cloud – Matt Whitehead**
  - ~~Monday 9:50 - Sagewood~~
  - Wednesday 15:50 – Sagewood
- ~~**Meet the experts! – Various**~~
  - ~~Tuesday 15:50 – Zebrawood Room~~

Questions & Answers

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