

# What's New in IBM MQ

Jamie Squibb  
IBM UK

November 2018  
Session J1



# IBM MQ is *the* solution for business critical messaging

Your bank transfers complete without losing your money, with **all of the worlds top 50 banks using IBM MQ\***

The world depends on reliable, secure messaging and **85% of the fortune 100 depend on IBM MQ\***

Celebrating  
**25**  
years

**1 + 1 = 2**

Simple



Reliable



Precise

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Celebrating  
**25**  
years



Scalable



Connected



Secure


Run IBM MQ in any location or cloud exactly as you need it



Celebrating  
**25** years

On-premise, software and the MQ Appliance



**IBM Z**   
**Linux** **AIX**  
**Windows** **Solaris**  
**HPE** **IBMi**  
**Appliance** **...**



Run it yourself in any cloud, public or private



Let IBM host it for you with its managed SaaS MQ service in public cloud



# MQ on Cloud

## MQ as a Service

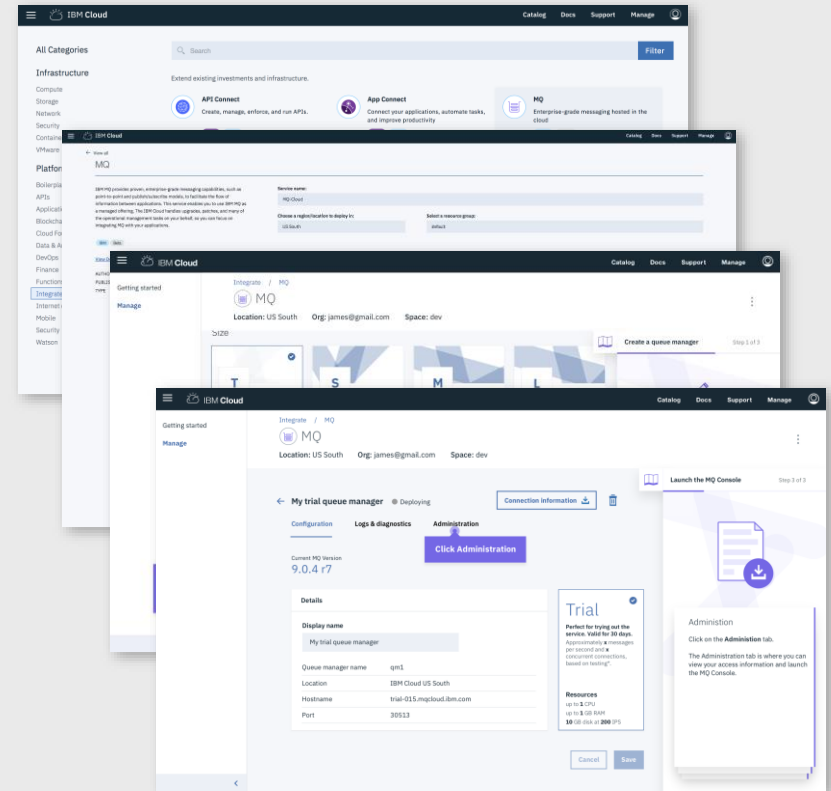
# MQ on Cloud

Have IBM provision your queue managers directly into the Cloud

IBM owns the infrastructure and the responsibility to keep the systems up to date and running

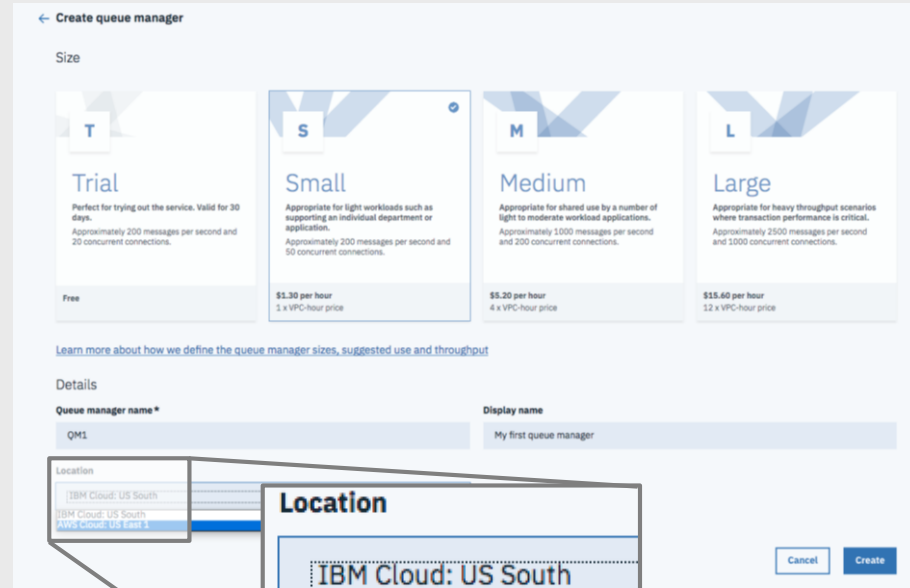
The user owns the configuration and the monitoring of the messaging

Try the service for free  
[www.ibm.com/cloud/mq](http://www.ibm.com/cloud/mq)



# MQ on Cloud

MQ on Cloud queue managers can now be provisioned onto infrastructure in **IBM Cloud** and **AWS** ensuring that MQ is exactly where you need it - close to your applications.



**Create queue manager**

Size

Size	Description	Price
Trial	Perfect for trying out the service. Valid for 30 days. Approximately 200 messages per second and 20 concurrent connections.	Free
Small	Appropriate for light workloads such as supporting an individual department or application. Approximately 200 messages per second and 50 concurrent connections.	\$1.30 per hour 1 x VPC-hour price
Medium	Appropriate for shared use by a number of light to moderate workload applications. Approximately 1000 messages per second and 200 concurrent connections.	\$5.20 per hour 4 x VPC-hour price
Large	Appropriate for heavy throughput scenarios where transaction performance is critical. Approximately 2500 messages per second and 1000 concurrent connections.	\$15.60 per hour 12 x VPC-hour price

[Learn more about how we define the queue manager sizes, suggested use and throughput](#)

Details

Queue manager name\*  Display name

Location

- IBM Cloud: US South
- IBM Cloud: US South
- AWS Cloud: US East 1

**Location**

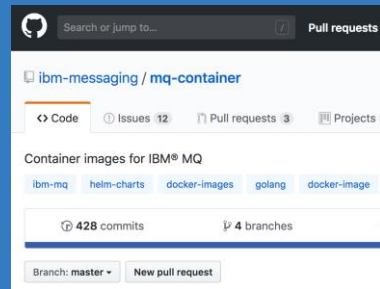
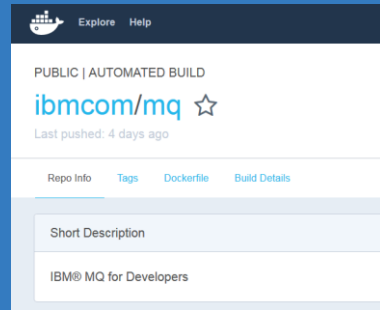
- IBM Cloud: US South
- IBM Cloud: US South
- AWS Cloud: US East 1





# MQ in Containers

MQ has been supporting Docker containers since 2015 with images on Docker Hub and Docker Store and sample setups on Github



[github.com/  
ibm-messaging/  
mq-container](https://github.com/ibm-messaging/mq-container)

MQ provides Helm charts for deploying MQ into Kubernetes platform, on-prem or on cloud, such as IBM Kubernetes Service



MQ Advanced is available as a fully supported product with **IBM Cloud Private**

deploy IBM certified software containers into an IBM provided Kubernetes platform or an existing Red Hat OpenShift **new**



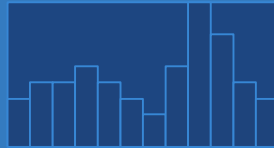
## Hourly licensing

IBM has introduced the ability to purchase an entitlement based on the container size in Virtual Processor Cores and the number of hours that MQ was deployed in each container

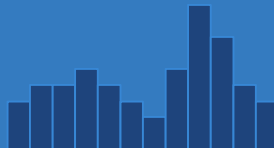
New for  
MQ 9.1

## Pre-purchase core hours

Use the hours as needed, whether that's constant or varies across the day, week or year.



Traditional licensing

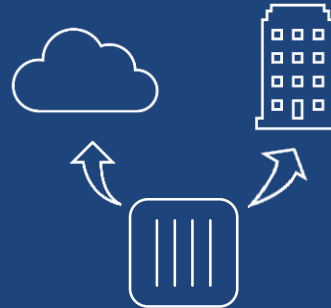


Hourly licensing

## Fully portable

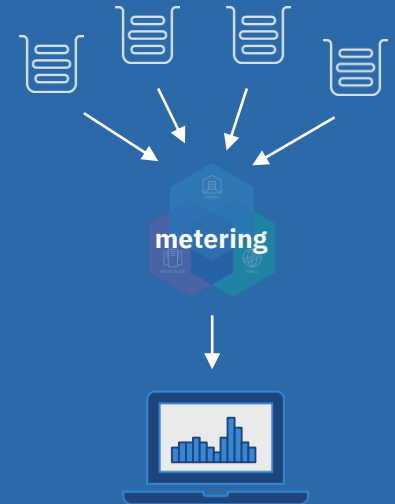
Deploy containers wherever and whenever you want, and move them with ease

Available for Docker containers (including Kubernetes and OpenShift) both on-prem and in the cloud



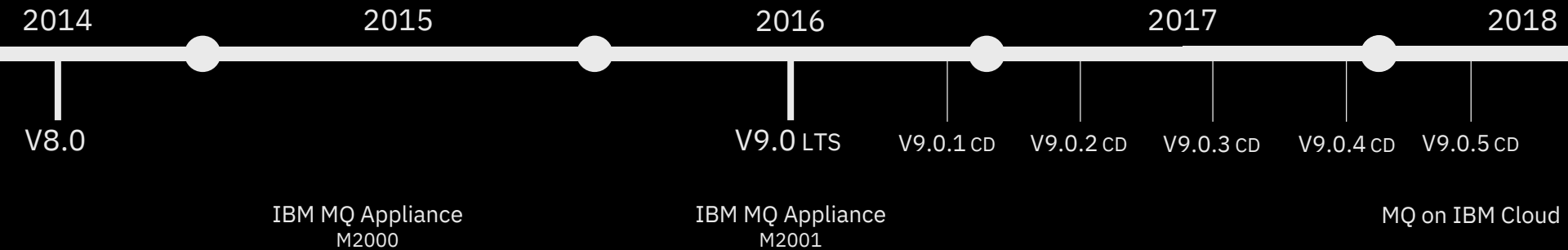
## No ILMT requirement

On-prem metering service provided in IBM Cloud Private used to track usage



# Continuous delivery of new MQ capabilities

# IBM MQ: long term support and continuous delivery



In 2016 MQ introduced a dual Long Term Support and a Continuous Delivery model

## Continuous Delivery

New CD versions of MQ are released approximately every four months, incrementally introducing new product capabilities.

Intended for those that can continually integrate.

## Long Term Support

Approximately every two years a new LTS version is released, rolling up many of the CD capabilities into a release with 5+3 support attached.

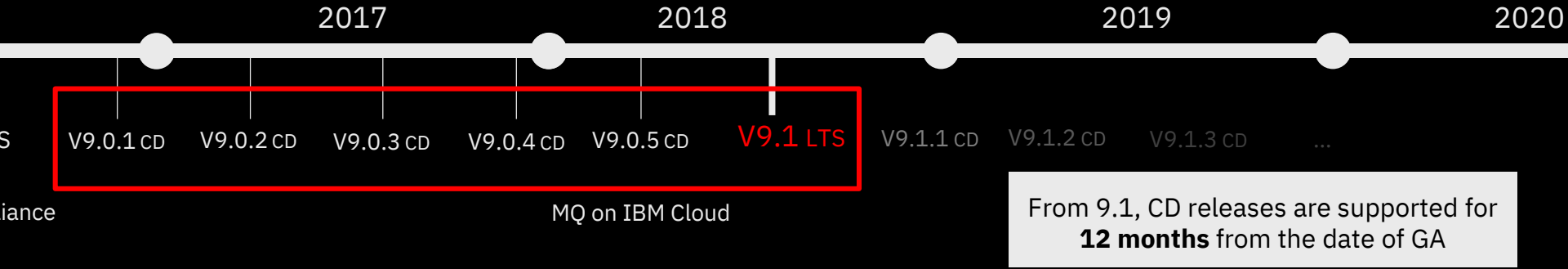
Required by those looking for fixed function.

## Mix and Match

Both are available under the same license.

Both can interoperate, just like any previous version of MQ.

# IBM MQ: long term support and continuous delivery



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The function previously delivered in the 9.0.x CD releases is now available in the long term support release **V9.1 LTS**

# MQ 9.0.x CD content, available with V9.1 LTS

Replicated Data  
Queue Manager  
for MQ  
Advanced

Linear logging  
automation and  
performance

RESTful  
administration

Error log  
formatting

Web Console

RESTful  
messaging

MQ Appliance  
SAN support

MQ JMS in CICS  
Liberty Profile

Salesforce  
bridge

AMS  
confidentiality  
performance on  
z/OS Advanced

Blockchain  
bridge for MQ  
Advanced

Floating IP  
support for MQ  
Appliance

Code repository  
integration

Backup and  
Restore on MQ  
Appliance

Redistributable  
MFT agent for  
MQ Advanced

Enhanced MFT  
diagnostics

Cross LPAR MFT  
agents for z/OS  
Advanced

SNMP and REST  
support for MQ  
Appliance

# High availability and disaster recovery

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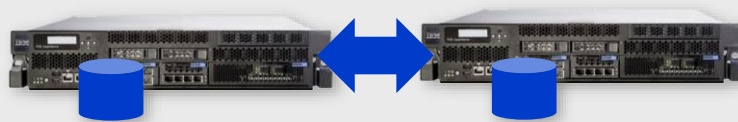
# HA, there are no excuses

MQ delivers HA through the ability to build horizontally scaled, active-active systems and typically **active-passive HA** of the data itself\*, the messages.

Traditionally active-passive HA has been achieved through **HA clusters** or **multi instance** queue managers. Both rely on highly available infrastructure to be setup and relied on.

The **MQ Appliance** changed this with a fully integrated HA solution, providing built in machine to machine data replication and failover.

\* z/OS shared queue provides active-active HA of the message data!



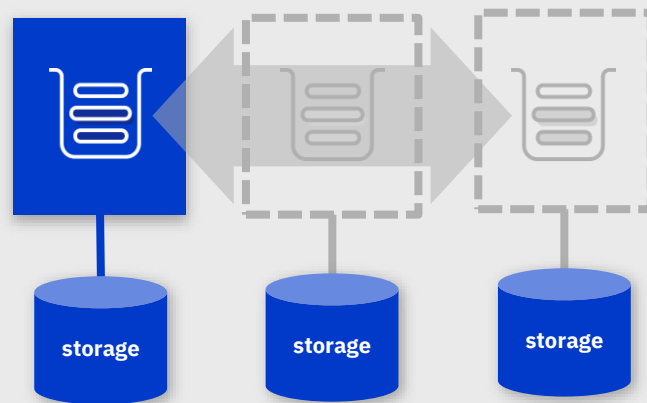


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# Replicated Data Queue Managers

**Linux only, MQ Advanced** HA solution with no need for a shared file system or HA cluster

MQ configures the underlying resources to make setup and operations natural to an MQ user

Three-way replication for quorum support

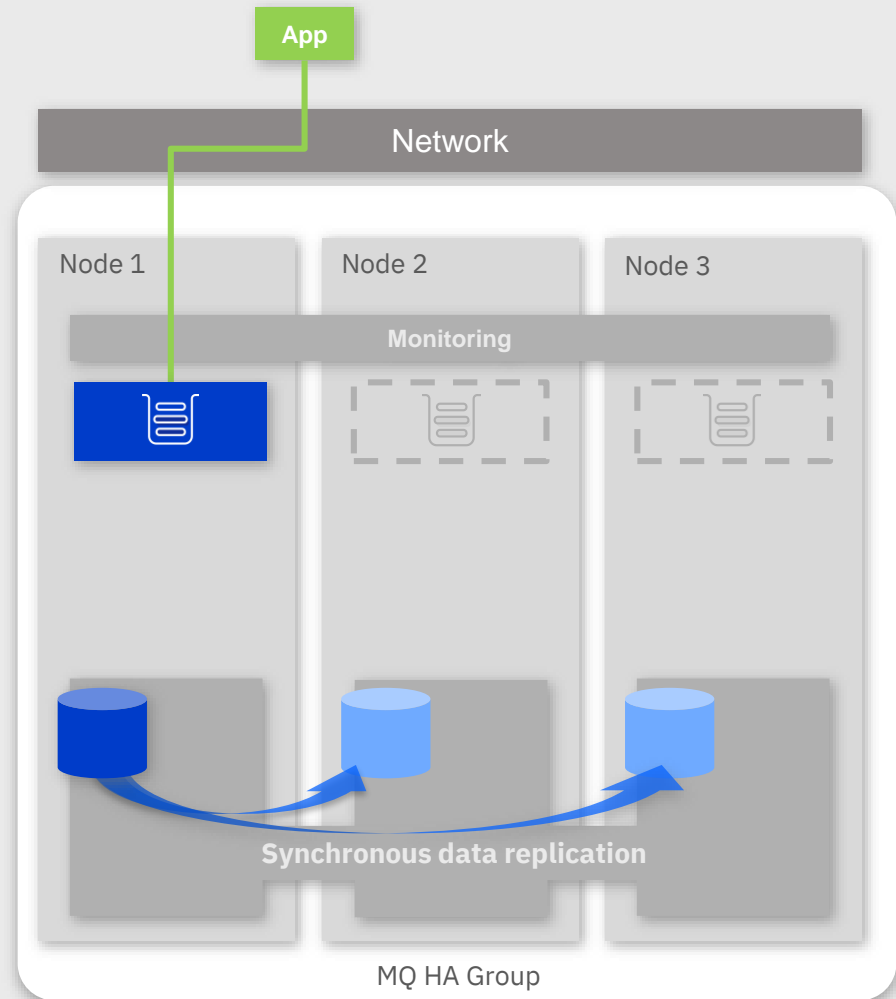
**Synchronous** data replication for once and once only transactional delivery of messages

Active/passive queue managers with **automatic takeover**

Per queue manager control to support active/active utilisation of nodes

Per queue manager **IP address** to provide simple application setup

Supported on **RHEL v7 x86-64 only**



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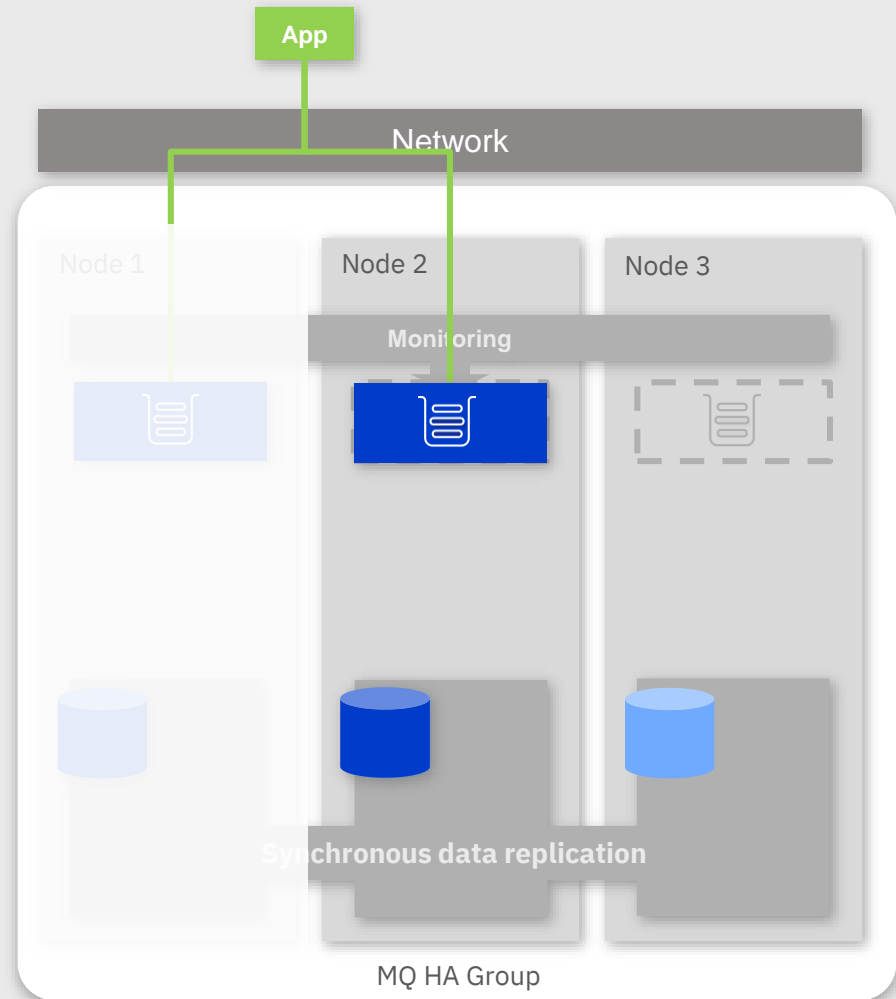
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# Replicated Data Queue Managers

Recommended deployment pattern:

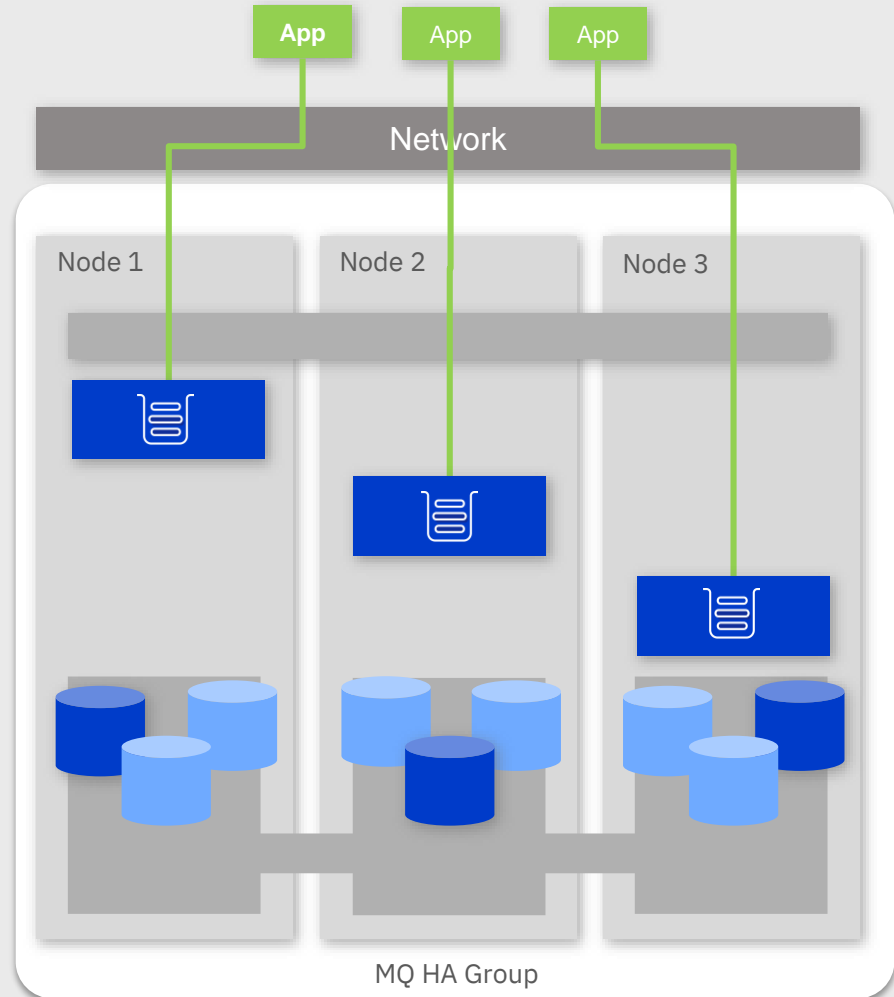
Spread the workload across multiple queue managers and distribute them across all three nodes

Even better, more than one queue manager per node for better failover distribution

Use MQ Clusters for additional routing of messages to work around problems

MQ **licensing** is aligned to maximise benefits

One full **IBM MQ Advanced** license and two **High Availability Replica** licenses (previously named *Idle Standby*)



# Replicated Data Queue Managers

## Manual failover

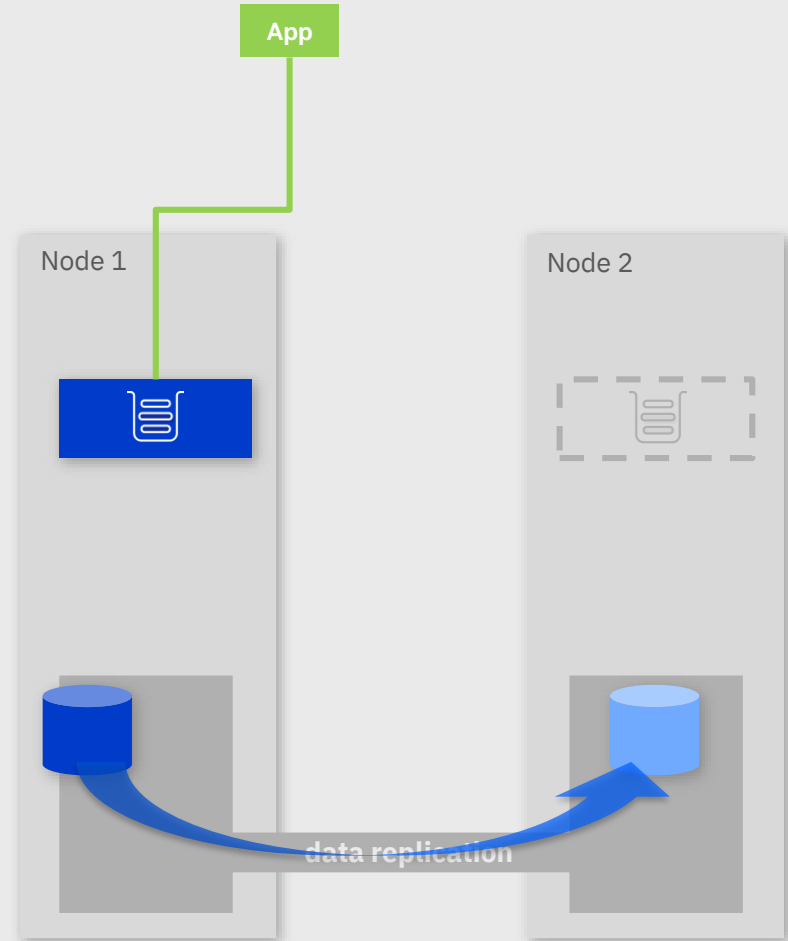
9.0.5 CD MQ Advanced adds the ability to build a looser coupled pair of nodes for data replication but no automatic failover, typically for **Disaster Recovery**

Data replication can be

**Asynchronous** for systems separated by a high latency network

**Synchronous** for systems on a low latency network

No automatic takeover means no need for a third node to provide a quorum



# Supporting developers

Replicated Data  
Queue Manager  
for MQ  
Advanced

Linear logging  
automation and  
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RESTful  
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Error log  
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# Mission Statement

To enable a user instructed to use MQ for the first time, to go from zero understanding to running a sample application in a sandbox environment with a fundamental understanding of MQ concepts in two hours

To enable an application developer, instructed to use MQ for the first time, to go from zero understanding to writing their first MQ application in the language and environment of their choice within an afternoon

Finding it hard to get developers started with MQ?

Point them to:

[developer.ibm.com/messaging/learn-mq](https://developer.ibm.com/messaging/learn-mq)



## Totally new to MQ? Learn the basics

**The basics of MQ**  
With us so far? Great.

**Message packages of data produced and consumed by applications.**

**Queue:** addressable locations to deliver messages to and store them until they need to be consumed.

**Queue managers:** control MQ engines, the servers that host the queues.

**Channels:** the way queue managers communicate with each other and with the applications.

**MQ networks:** loose collections of interconnected queue managers, all working together to deliver messages between applications and locations.

**MQ clusters:** tight groupings of queue managers, enabling higher levels of scaling and availability.

## Step-by-step guide to getting up and running with MQ

**Ready, set, connect!**  
Connect your first application to a queue manager.

**Pick your platform**

- MQ on Windows:** A quick way to learn IBM MQ, get up and running and use the IBM MQ console to manage your queues and channels.
- MQ on Docker:** A quick way to get going with a queue manager and a message client on IBM MQ.
- MQ on Cloud:** A quick way to learn about IBM MQ queue managers in the cloud and connect to your systems using cloud-native messaging.

**What you will learn**

1. Installing MQ queue managers
2. A first IBM MQ console
3. The basics of queue manager messaging

**What you will need**

- 1. Docker
- 2. The latest IBM MQ Docker image
- 3. IBM MQ queue manager

**Contents**

- 1. Install Docker
- 2. Get the MQ in Docker image
- 3. Run the container from the image

**What do I need to start this tutorial?**  
Just your laptop - or a big old PC.

**1. Install Docker**  
This article has Docker version 17.0.3 as the first section. To find Docker for your platform, go to Docker Community Edition and install. There are links to download the software.

**2. Get the MQ in Docker image**  
IBM MQ is the first message queue manager that supports containers. It is available as the mq Docker image from Docker Hub. You can get the image for your platform and get a working MQ container on your laptop or server. We will then connect to the queue manager, including the console that the IBM MQ console application has for your platform.

**3. Run the container from the image**  
Now that you have the image, you can run it on your system. You will need to have Docker installed on your system. You can get the image from Docker Hub. You can get the image for your platform and get a working MQ container on your laptop or server. We will then connect to the queue manager, including the console that the IBM MQ console application has for your platform.

## Tutorials on building your applications

**MQ tutorials, taking you further**  
Every great advancement starts with a single step. Here's a series of guided tutorials that provide you with the tools to master MQ.

**Search by:** [Search bar]

**Skill level:** Beginner, Intermediate, Advanced

**Language:** Java, C++

**Operating System:** Linux, Windows

**Protected: Point-to-point with JMS**  
Write a application that uses JMS to send and receive messages to and from a queue.

**Protected: MQ Essentials**  
An article that starts with the fundamental concepts of IBM MQ, including an overview to message-oriented middleware.

**Protected: Ready, Set, Connect (Windows)**  
A quick way to install IBM MQ, set up a queue manager and connect to it from a Windows environment.

**Protected: Ready, set, connect (Linux)**  
A quick way to get going with queue manager and a client app in Linux with IBM MQ Docker.

**Point to point with JMS**  
Write and run your first IBM MQ JMS application

**What you will learn**

1. MQ JMS console
2. How to use the JMS console to send and receive messages
3. How to use the JMS console to send and receive messages

**What you will need**

- 1. IBM MQ console
- 2. IBM MQ console for JMS
- 3. IBM MQ console for JMS

**Contents**

- 1. Point to point with JMS and IBM MQ

**1. Point to point with JMS and IBM MQ**  
This article will show you how to write a simple application that sends and receives messages to and from a queue. You will use the JMS console to send and receive messages to and from a queue. You will use the JMS console to send and receive messages to and from a queue. You will use the JMS console to send and receive messages to and from a queue.

**1. Set up your environment**  
This article will show you how to set up your environment for running the application. You will use the JMS console to send and receive messages to and from a queue. You will use the JMS console to send and receive messages to and from a queue. You will use the JMS console to send and receive messages to and from a queue.



# Developing with MQ

MQ JMS jars available through Maven

[mvnrepository.com/artifact/  
com.ibm.mq/com.ibm.mq.allclient](https://mvnrepository.com/artifact/com.ibm.mq/com.ibm.mq.allclient)

New open source language bindings for MQI

[github.com/ibm-messaging/mq-mqi-nodejs](https://github.com/ibm-messaging/mq-mqi-nodejs)  
[github.com/ibm-messaging/mq-golang](https://github.com/ibm-messaging/mq-golang)

Redistributable clients available over direct  
download

[ibm.biz/mqclientdownload](https://ibm.biz/mqclientdownload)

Spring Boot starter for MQ

[ibm.biz/mqspringboot](https://ibm.biz/mqspringboot)

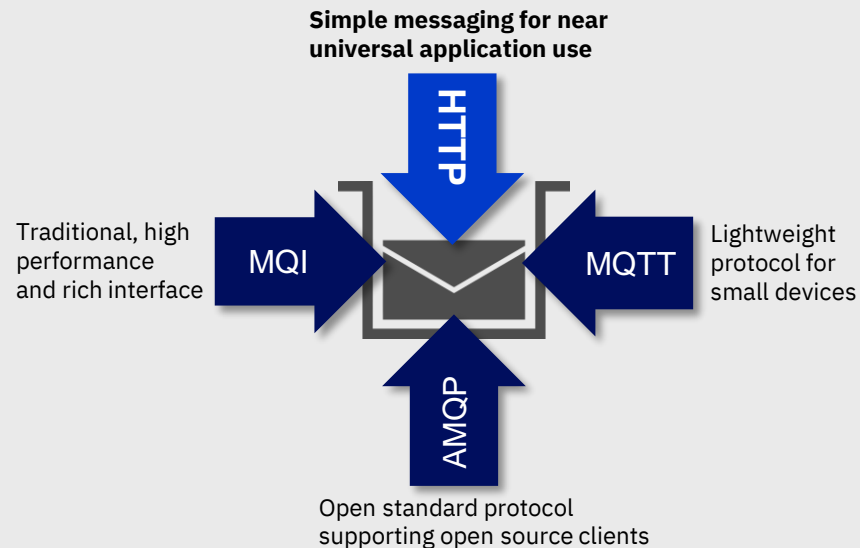
# RESTful messaging

MQ supports multiple protocols and APIs

HTTP and REST are the de facto standard for simple, micro service, applications

Messaging over REST provides *good enough* messaging for many applications and an excellent way to get data into a real messaging system as quickly as possible

MQ 9.0.4 delivered the first phase of the new REST messaging support. Providing a simple point-to-point messaging capability, integrated with the MQ installation



We see an ever growing need for messaging  
of many different types

Logging

Request

Status

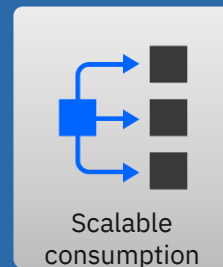
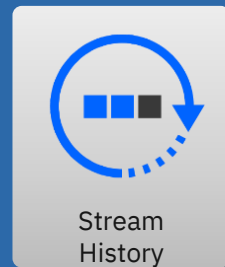
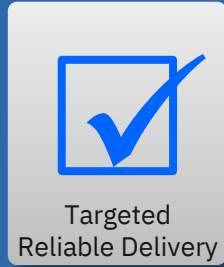
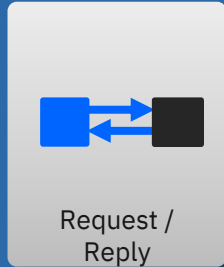
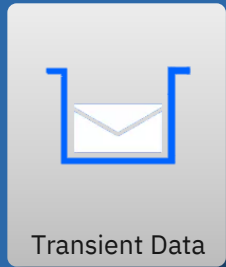
Monitoring

Updates

Errors

Response

# Which require a widening range of capabilities



# Special problems require specialised solutions



Transient Data



Request /  
Reply

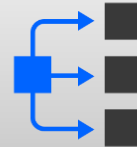


Targeted  
Reliable Delivery

Business critical operations



Stream  
History



Scalable  
consumption

Event streaming



Immutable  
data

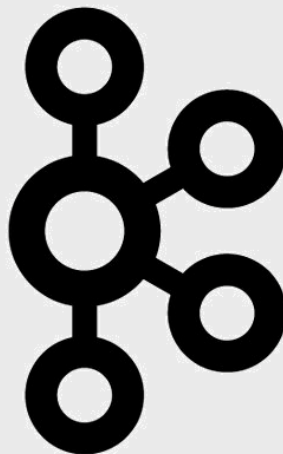
# Announcing IBM Event Streams!

*Apache Kafka for the Enterprise*

*React to events in real-time to deliver more engaging experiences for your customers*

Deploy **production ready Apache Kafka** onto IBM Cloud Private **in minutes**

Build intelligent apps on Kafka with the **confidence IBM is supporting you**



APACHE  
**kafka**®

Rely on disaster recovery & security designed for **mission-critical use**

**Exploit existing data** to become a real Event Driven Enterprise

# Connectivity

Replicated Data Queue Manager for MQ Advanced	Linear logging automation and performance	RESTful administration	Error log formatting	Web Console	RESTful messaging
MQ Appliance SAN support	MQ JMS in CICS Liberty Profile	<b>Salesforce bridge</b>	AMS confidentiality performance on z/OS Advanced	<b>Blockchain bridge for MQ Advanced</b>	Floating IP support for MQ Appliance
Code repository integration	Backup and Restore on MQ Appliance	Redistributable MFT agent for MQ Advanced	Enhanced MFT diagnostics	Cross LPAR MFT agents for z/OS Advanced	SNMP and REST support for MQ Appliance

## Bridging to MQ

As well as connecting a wide array of applications directly to an MQ system, there are a growing set of bridges and connectors between MQ and external systems

### Salesforce

Integrate MQ's publish/subscribe with Salesforce. Exchange **Salesforce events** and **MQ publications** using the MQ Bridge for Salesforce with no need for your backend applications to connect to Salesforce directly.

Salesforce



### Blockchain

Use MQ messages to query and update a Blockchain ledger. Connects to **Hyperledger** Fabric networks in IBM Cloud and locally. Supported for use with V9.0.x **MQ Advanced** queue managers

Blockchain



### Kafka

IBM MQ sink and source connectors are currently being openly developed by IBM and provides **as-is**, allowing you to connect your MQ systems with your Kafka clusters

[www.confluent.io/product/connectors](http://www.confluent.io/product/connectors)

Kafka





# Managing MQ

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support for MQ  
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# MQ Web Console

Point a browser at the MQ installation to create and manage queue managers and their resources

Provides a very simple way to access MQ resources

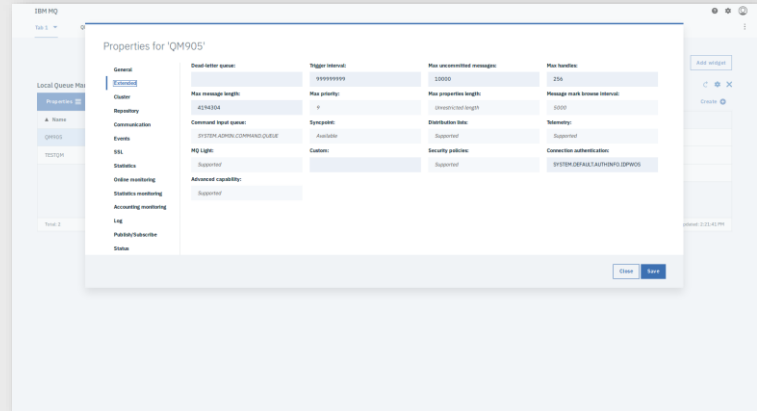
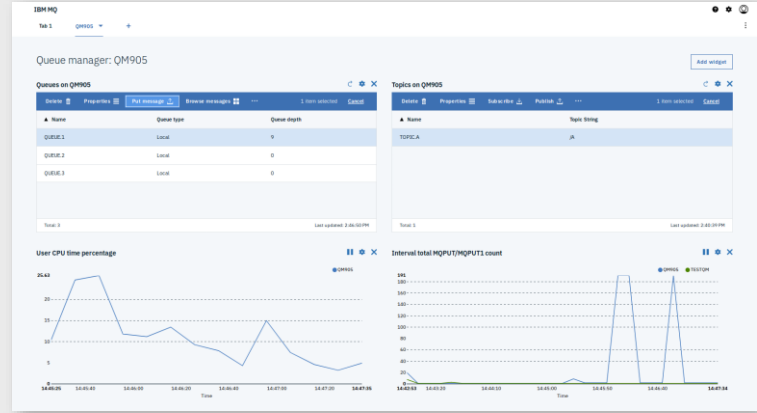
The same solution for all forms of MQ

MQ for Distributed

MQ for z/OS

MQ Appliance

MQ on Cloud

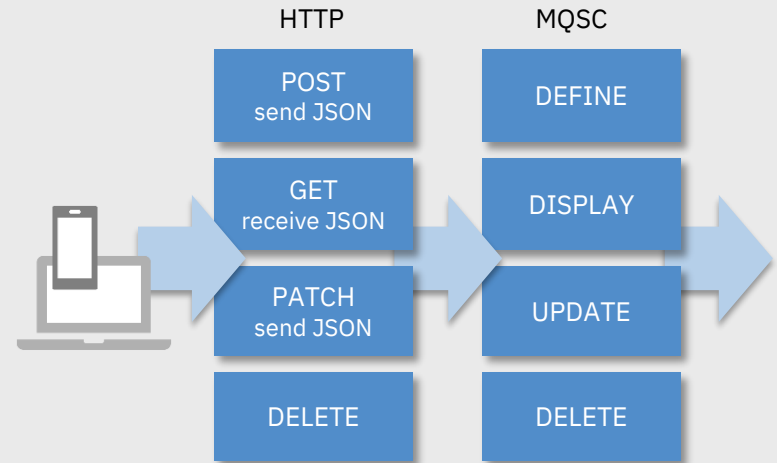


# Restful administration

MQ has supported scripting and programmatic administration for many years, but it requires MQ knowledge and tooling.

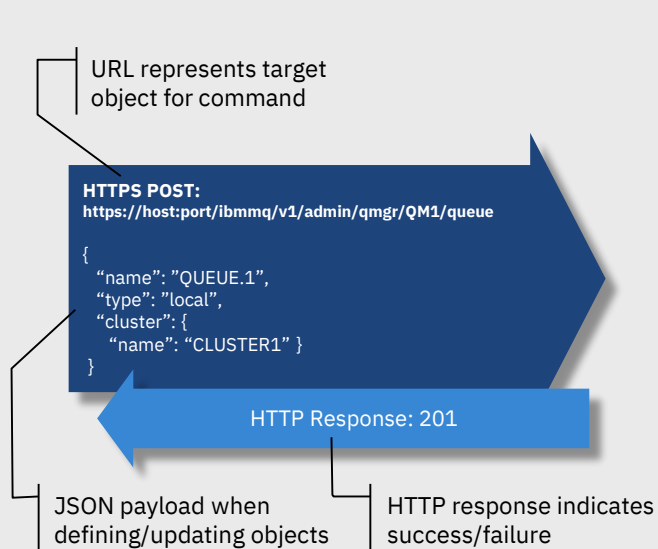
MQ has been incrementally increasing support for RESTful administrative APIs to provide equivalents of what's available today with MQSC and PCF.

Being over **HTTPS** enables the embedding of MQ administrative operations into many environments and tools that previously would not be possible



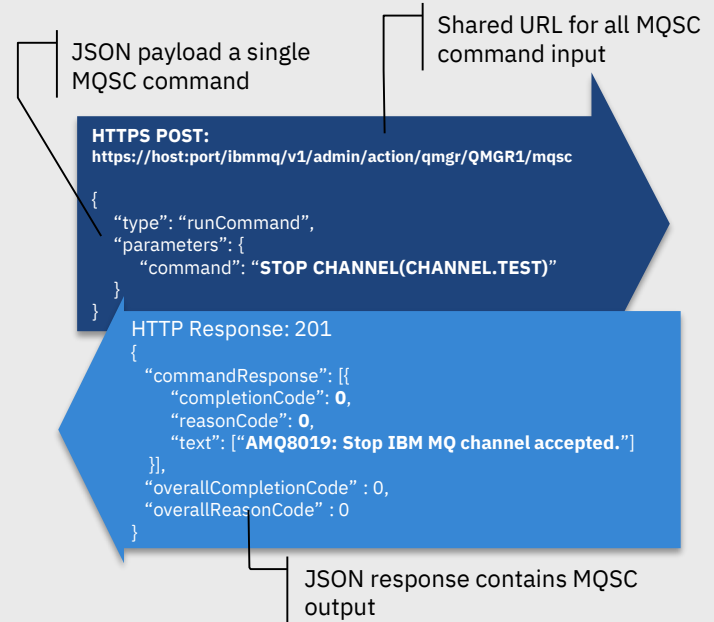
# Two approaches

## Per object REST



Native JSON based REST calls

## MQSC over REST



Direct MQSC command input over REST  
MQSC output over REST, minimal parsing

# Two approaches

## Per object REST

- URL represents target object for command
  - Natural REST APIs
  - Restructured definitions to aid understanding
  - Further definition validation
  - Not a straight swap for existing users
  - Incomplete coverage of MQ administration
- JSON payload when defining/updating objects
- HTTP response indicates success/failure

Native JSON based REST calls

## MQSC over REST

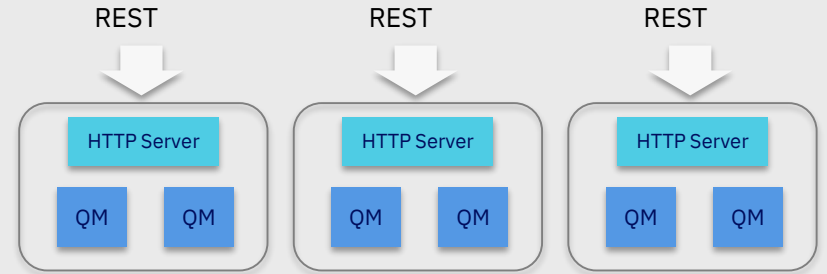
- Shared URL for all MQSC command input
  - JSON payload a single MQSC command
  - Simple mapping from existing scripts
  - Complete coverage of MQSC capabilities
  - Not pure REST
  - Just as *simple* as existing runmqsc for input and parsing of output
- ```
HTTPS POST:
https://host:port/ibmmq/v1/admin/action/qmgr/QMGR1/mqsc
{
  "parameters": {
    "command": "STOP CHANNEL(CHANNEL.TEST)"
  }
}
```
- JSON response contains MQSC output

Direct MQSC command input over REST  
MQSC output over REST, minimal parsing

# Enabling your whole estate for REST administration

## Option 1

Administer each MQ installation separately, they must all be on the MQ 9.0.x CD release or MQ 9.1 LTS

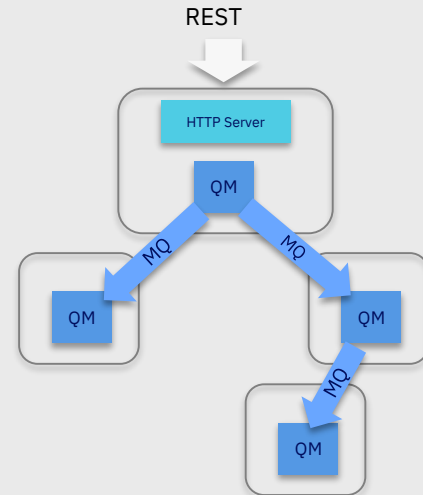


## Option 2

Manage a network of systems through gateway entry points

Not every queue manager will need to expose HTTPS endpoints

Pre-9.0.x queue managers are able to be administered through those gateways



# Restful administration with Managed File Transfer

As well as queue manager administration, MQ has added support for monitoring your Managed File Transfer system with **agent** and **transfer** status lists over REST

**HTTPS GET:**  
**<https://host:port/ibmmq/v1/mft/transfer>**

```
{
  "transfer": [
    {
      "destinationAgent": {"name": "AGENT.X.BANK"},
      "originator": {
        "host": "192.168.99.1",
        "userId": "ramsubbarao"
      },
      "sourceAgent": {"name": "TESTAGENT"},
      "statistics": {
        "endTime": "2018-01-08T16:22:15.569Z",
        "numberOfFileFailures": 0,
        "numberOfFileSuccesses": 2,
        "numberOfFileWarnings": 0,
        "numberOfFiles": 2,
        "startTime": "2018-01-08T16:22:15.242Z"
      },
      "status": {
        "state": "successful"
      },
      "id": "414D51204D465444454D4F33202020513E525A21109908"
    }
  ]
}
```

# Managing diagnostic data

The need to centrally collect and analyse diagnostic data is increasing, using tools such as Splunk, Elasticsearch and Grafana

MQ generates a wide range of information and has demonstrated how this can be collected using off the shelf tooling

Subscribing to metrics with *system topics* in MQ V9 makes that even easier

MQ has seen enhancements to the error log data it generates to aid such solutions

Universal timestamps

severity levels

separated inserts

JSON output

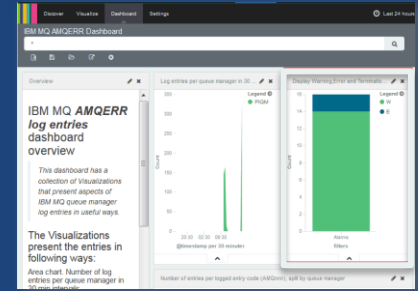
Multiple logs

Syslog output

Publish MQ statistics to Prometheus and Grafana



Forward MQ error logs to Elasticsearch or Splunk



Error logs output JSON for easy parsing

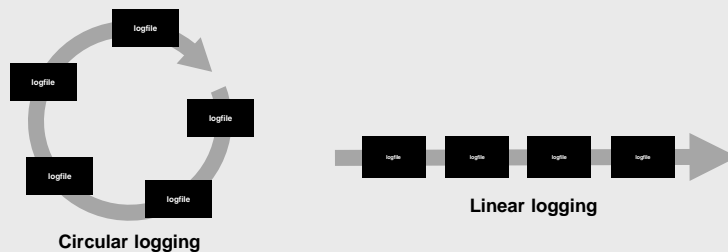
```
{
  "ibm_messageId":"AMQ6287I",
  "ibm_arithInsert1":0,
  "ibm_arithInsert2":0,
  "ibm_commentInsert1":"Linux 4.13.0-36-generic (MQ Linux (x86-64 platform) 64-bit)",
  "ibm_commentInsert2":"/opt/mqm (Installation1)",
  "ibm_commentInsert3":"9.0.5.0 (p905-L180228.1)",
  "ibm_datetime":"2018-03-04T13:18:27.506Z",
  "ibm_serverName":"QM905",
  "type":"mq_log",
  "host":"david-VirtualBox",
  "loglevel":"INFO",
  "module":"amqxeida.c:6238",
  "ibm_sequence":"1520169507_506462655",
  "ibm_processId":2119,
  "ibm_threadId":1,
  "ibm_version":"9.0.5.0",
  "ibm_processName":"strmqm",
  "ibm_userName":"david",
  "ibm_installationName":"Installation1",
  "ibm_installationDir":"/opt/mqm",
  "message":"AMQ6287I: IBM MQ V9.0.5.0 (p905-L180228.1.)"
}
```



# Distributed recovery logs

## Linear logging

MQ always logs all the data you need to recover from a queue manager failure in a recovery log. Linear logging adds media recovery support to rebuild MQ resources in the event of losing or corrupting MQ data



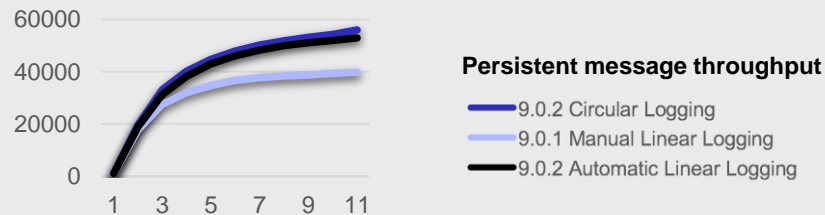
## Automatic media imaging

Media images can now be automatically scheduled by the queue manager, simplifying the administrative tasks and smoothing out the performance impact, simplifying the problem of when to take an image



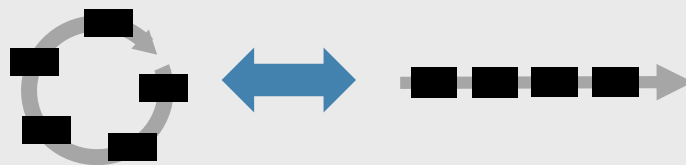
## Automatic log reuse

Constantly creating new linear logs reduces MQ's performance. Logs can now be reused by a queue manager to regain that performance. Choosing automatic reuse removes another administrative task of constantly deleting linear logs



## Migrating between linear and circular

MQ now makes it possible to migrate a queue manager from linear to circular logging and vice versa



# MQ on z/OS

Replicated Data  
Queue Manager  
for MQ  
Advanced

Linear logging  
automation and  
performance

RESTful  
administration

Error log  
formatting

Web Console

RESTful  
messaging

MQ Appliance  
SAN support

MQ JMS in CICS  
Liberty Profile

Salesforce  
bridge

AMS  
confidentiality  
performance on  
z/OS Advanced

Blockchain  
bridge for MQ  
Advanced

Floating IP  
support for MQ  
Appliance

Code repository  
integration

Backup and  
Restore on MQ  
Appliance

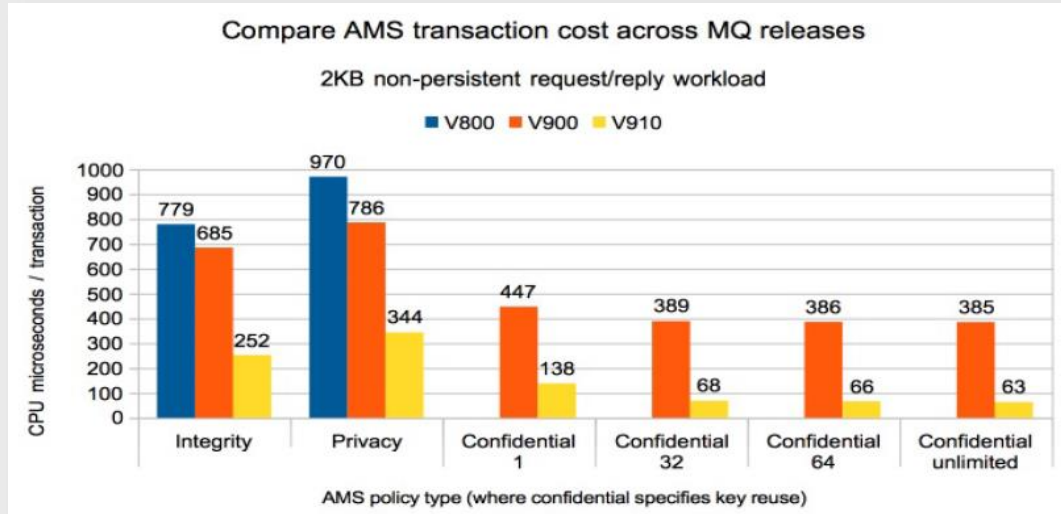
Redistributable  
MFT agent for  
MQ Advanced

Enhanced MFT  
diagnostics

Cross LPAR MFT  
agents for z/OS  
Advanced

SNMP and REST  
support for MQ  
Appliance

# Significant improvement in performance when applying AMS policies



A cost comparison between version 9.1.0 and 9.0.0 shows:

**Integrity:** 37% of the equivalent version 9.0.0 measurement

**Privacy:** 44% of the equivalent version 9.0.0 measurement

**Confidentiality:** 17-32% of the equivalent version 9.0.0 measurements

# MQ Appliance

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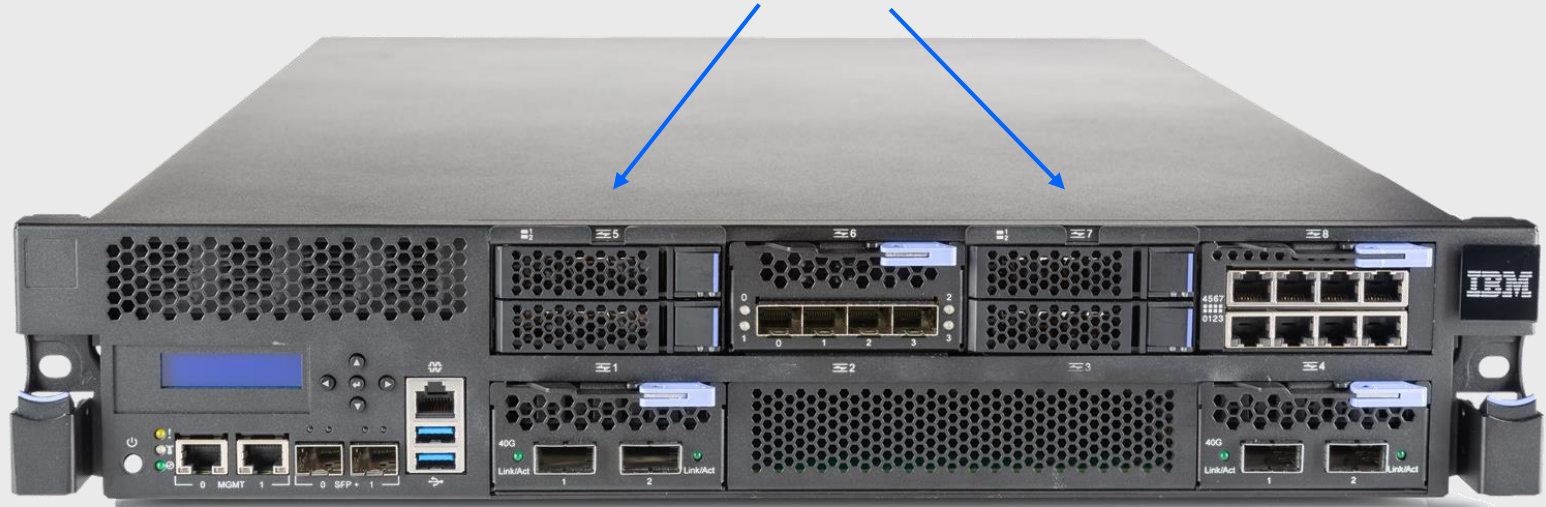
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Cross LPAR MFT  
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Advanced

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# Introducing the M2002

4 High capacity, High speed SSDs with hardware RAID10



Additional 10GB SFP+ interfaces

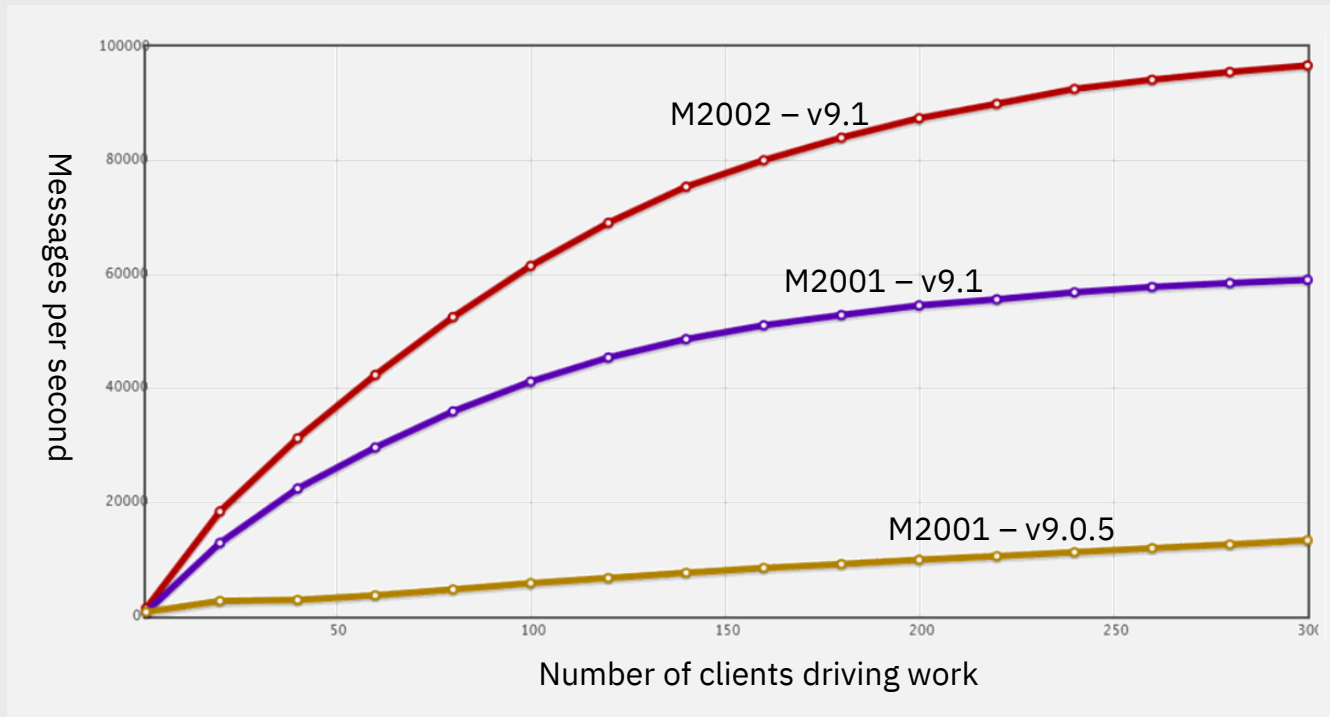
NEW 40GB QSFP+ modules

Plus what you can't see...

- increased CPU cores
- significant jump from Intel™ 'Ivy Bridge' to 'Skylake' architecture
- Doubled RAID cache for increased I/O performance

# Appliance performance

(multi-queue manager, Highly Available, many client applications)



# Platform Coverage for IBM MQ

## Historically 'niche' offerings

### MQ for HP OpenVMS

- IBM version now EOS
- 3<sup>rd</sup> party version available from Willow Technology

### MQ for HPE NonStop Server

- Continuing to be developed
- V8.0.3 now available

### MQ Low Latency Messaging

- IBM version EOM. EOS April 2019.
- 3<sup>rd</sup> party version available as Confinity Low Latency Messaging

## Core MQ platform news

### MQ on HP-UX

- Not on CD stream: Last release: MQ **V9.0** LTS
- Statement of Direction:  
No further releases

### MQ on Solaris

- Not on CD stream: Last release: MQ **V9.1** LTS
- Statement of Direction:  
No further releases after 9.1

### Already announced End of Support dates:

- MQ V7.1: September 30 2017
- MQ V7.5: April 30 2018
- MQ V8.0: April 30 2020

# And a few little extras since 9.0.0.0 LTS that are easy to miss...

We'll fix your bad apps!

Faster non-transacted  
persistent puts

TLS 1.0 is now turned off

Customise your prompt  
in runmqsc

No more OPMODE!

It confused the heck out  
of you (and us)

Lose the JRE

If you don't need it, don't  
install it

Transactions get a  
timestamp in dmpmqlog

Universal timestamps and  
severities in the error logs

(did I mention that  
already?)

MFT agents are now  
included in the  
MQ Advanced license




Run IBM MQ in any location or cloud exactly as you need it



Celebrating  
**25** years

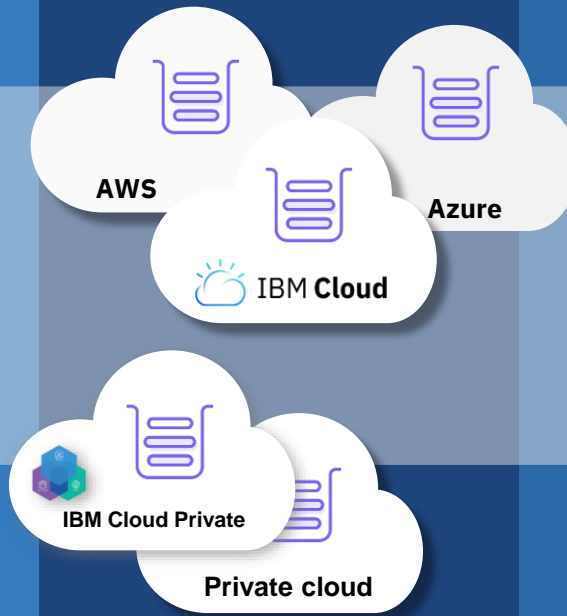
On-premise, software and the MQ Appliance



**IBM Z**   
**Linux** **AIX**  
**Windows** **Solaris**  
**HPE** **IBMi**  
**Appliance** ...



Run it yourself in any cloud, public or private



Let IBM host it for you with its managed SaaS MQ service in public cloud





Celebrating  
**25** years

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  - <http://conferences.gse.org.uk/2018/feedback/JI>
- Paper feedback forms are also available from the Chair person
- This session is **J1**

