What's new in IBM MQ?

Jamie Squibb
IBM UK

November 2019
Session JL

IBM MQ is *the* solution for business critical messaging

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

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

IBM Messaging

Simple

Scalable

Precise

Connected

Reliable

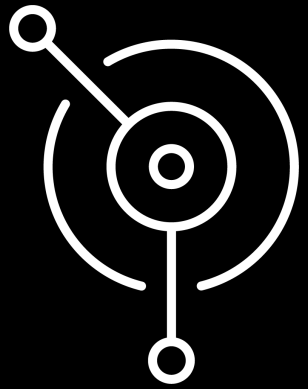
Secure

*Correct as of end 2016 against http://www.relbanks.com/worlds-top-banks/assets and http://beta.fortune.com/fortune500/list/

IBM **MQ**

Messaging, how you need it, where you need it

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



On-premise, software and the MQ Appliance

Run MQ yourself in public or private clouds

Let IBM host MQ for you with its managed SaaS MQ service in public clouds, IBM Cloud and AWS

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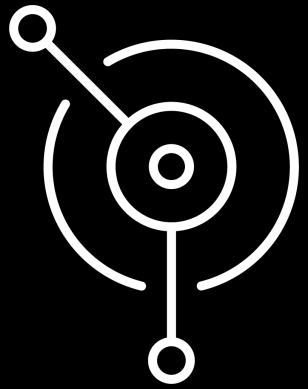

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MQ on Cloud service

Managed for You

Up and Running in Minutes

Hourly billing

Enabled for Hybrid Cloud Connectivity

IBM **Cloud**

powered by aws

Configured & monitored by the **customer**

- Queues, topics, channels, clustering, applications

Managed & operated by **IBM**

- MQ installation, basic configuration, security, maintenance
- Hardware, virtualization, servers, network, storage

Try the service for free **www.ibm.com/cloud/mq**

MQ in Containers, continually evolving

MQ first supported Docker containers in 2015, showing how a stateful solution can run in an often stateless world.

MQ was one of the first certified containers available on IBM's Kubernetes platform, IBM Cloud Private, showing how to run MQ in a managed container environment.

MQ added support for running on Red Hat OpenShift

MQ is a key component of IBM's Cloud Pak for Integration, providing enterprise messaging for the Integration Platform solution

2015 **hub.docker.com/r/ibmcom/mq** **github.com/ibm-messaging/mq-container** 2019

Introducing the MQ Appliance M2002

The scalability and security of IBM MQ

The same familiar administration model for administrators with MQ skills

Supports the same MQ applications

But, with the convenience, fast time-to-value and low total cost of ownership of an appliance

Easy Integration

Integrates seamlessly into MQ networks and and clusters

Improved Availability

Built-in support for High Availability and Disaster Recovery

Simplified ownership

Repeatable and fast, with less configuration or tuning required

Minimises dependencies on other resources and teams

Simpler licensing and easier to assess for security compliance and audit

The new M2002

New in third quarter 2018, replacing the M2001

Choice of A/B models as today

Adds new 40GB network connectivity
- Particularly useful for HA replication

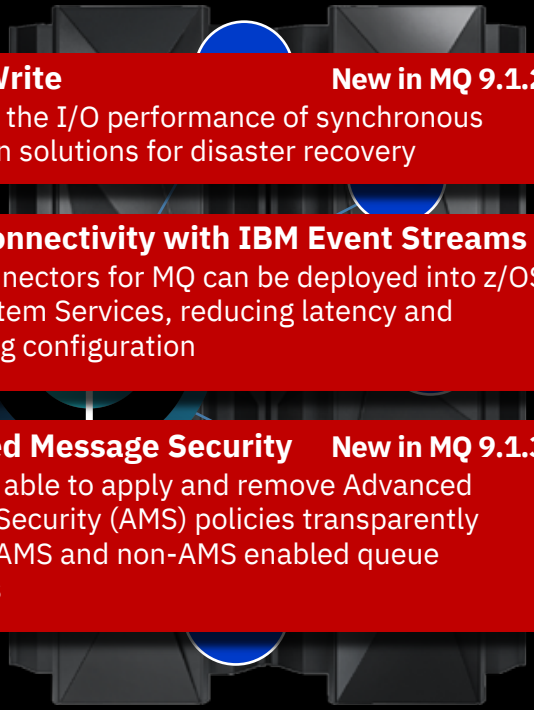
Doubled storage capacity with new RAID10 controller for improved performance

Based on latest MQ V9.1: Available to run both LTS and CD releases on the MQ Appliance

M2002 headline numbers
- Over **200 thousand persistent**, HA replicated, messages produced and consumed per second
- Over **600 thousand non-persistent** messages produced and consumed per second

MQ for z/OS

Maximum resilience, performance, and secure connectivity



zHyperWrite **New in MQ 9.1.2**

Improves the I/O performance of synchronous replication solutions for disaster recovery

Direct connectivity with IBM Event Streams

Kafka connectors for MQ can be deployed into z/OS UNIX System Services, reducing latency and simplifying configuration

Advanced Message Security **New in MQ 9.1.3**

Users are able to apply and remove Advanced Message Security (AMS) policies transparently between AMS and non-AMS enabled queue managers

Resilience

Queue sharing groups exploit the z/OS Parallel Sysplex for unparalleled high availability

Performance

Create high performance environments able to process millions of messages every second

Secure connectivity

Adapters and bridges provide tight integration with your business critical Systems of Record

Consistent connectivity with a range of other on-premise and cloud platforms

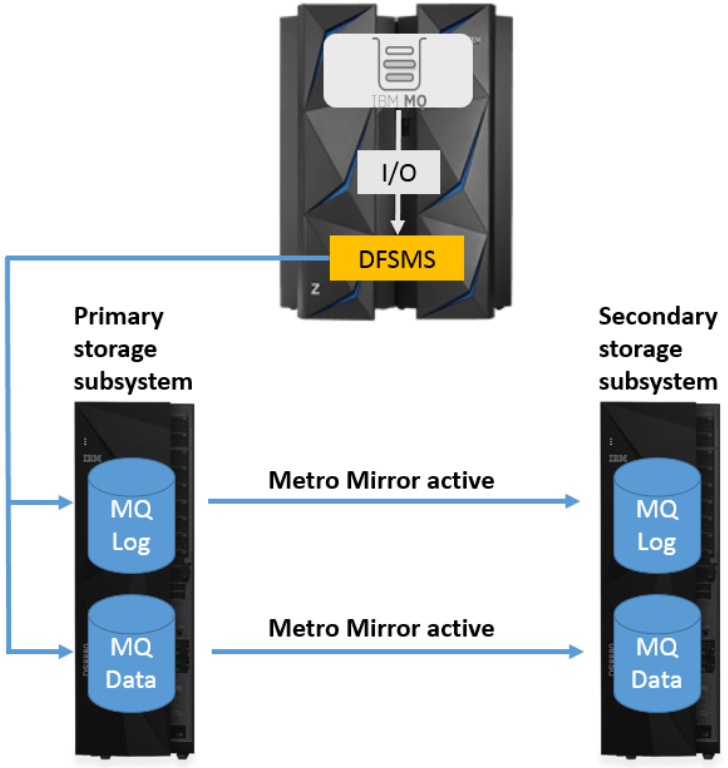
MQ exploits System SSL on z/OS to utilize CPACF and CryptoExpress cards for pervasive encryption

Optimize by exploiting zHyperWrite

Many customers use Metro Mirror (Synchronous PPRC) with MQ to mirror their datasets

This protects against storage subsystem failure, and can be part of an HA/DR strategy

Mirroring has a performance impact, even at zero distance because the write from MQ doesn't complete until the writes to both primary and secondary complete, and these happen in series



Optimize by exploiting zHyperWrite

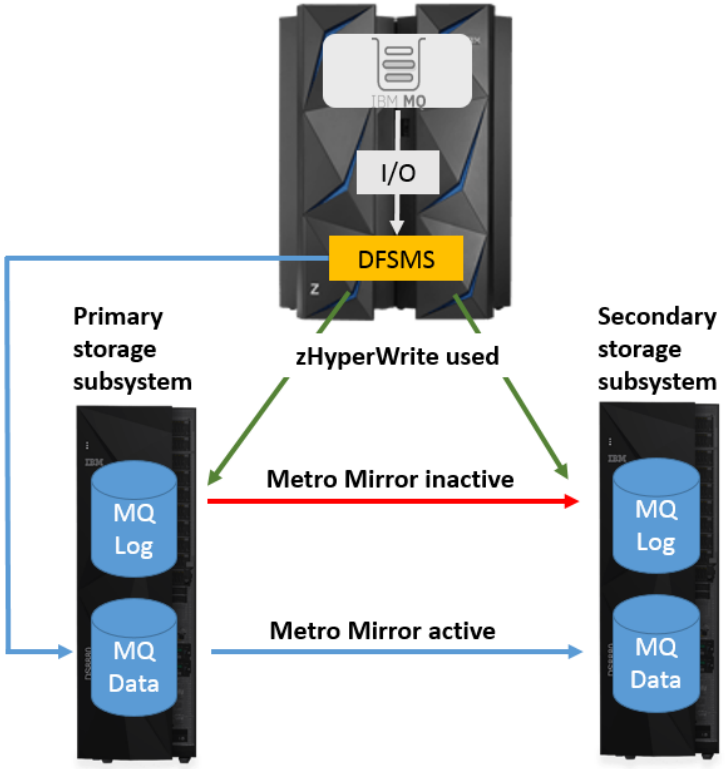
zHyperWrite was introduced to minimize the performance impact of Metro Mirror

Collaboration between DS8K and DFSMS, originally done for Db2

With zHyperWrite the writes to primary and secondary are issued in parallel at the DFSMS level, meaning the write can complete earlier

If a zHyperWrite write fails then it falls-back transparently to Metro Mirror

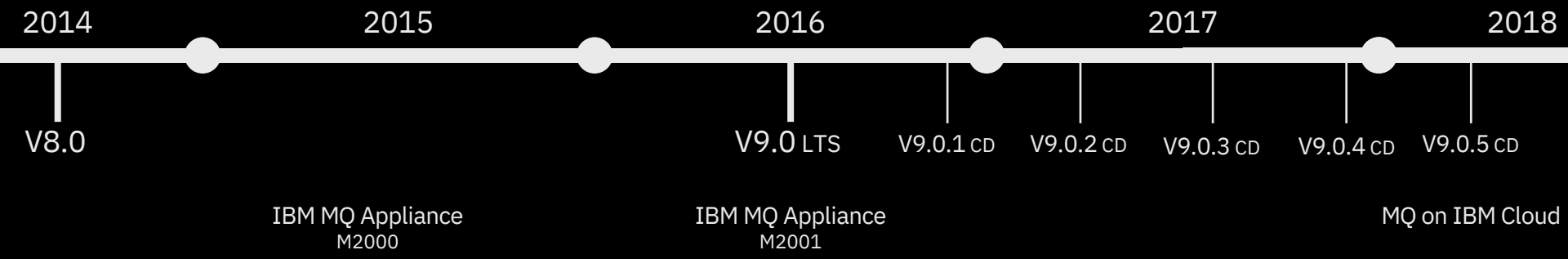
In 9.1.2 MQ added support for zHyperWrite for active log datasets



IBM **MQ**

Continuous delivery and innovation

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.

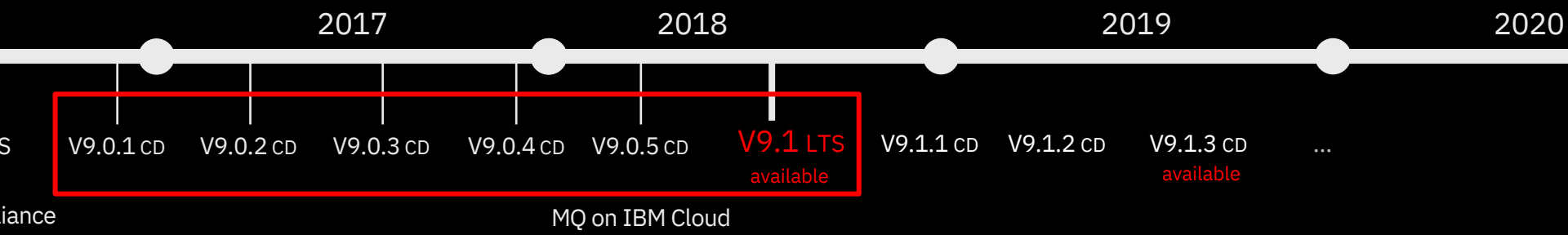
Required by those looking for fixed function.

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 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, now 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 performance improvements	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

Fault tolerance

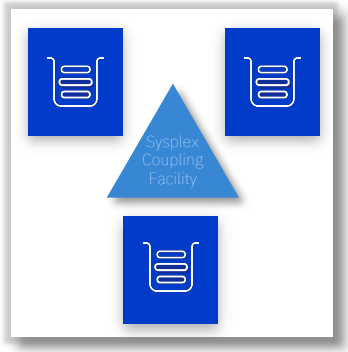
Protecting your critical data

Fault tolerance

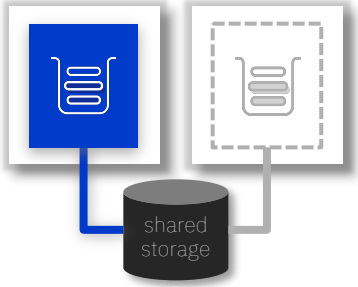
MQ delivers HA through the ability to build horizontally scaled, active-active systems and typically **active-passive HA** of the data itself*, the messages.

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.

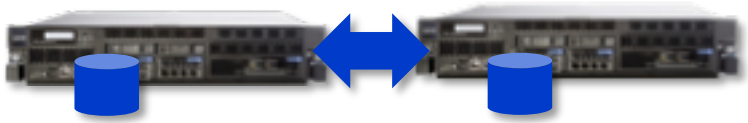
The **MQ Appliance** changed this with a fully integrated HA solution, providing built in machine to machine data replication and failover.



z/OS Queue Sharing Groups



Multi-instance queue managers and HA Cluster



MQ Appliance

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

Replicated Data Queue Managers

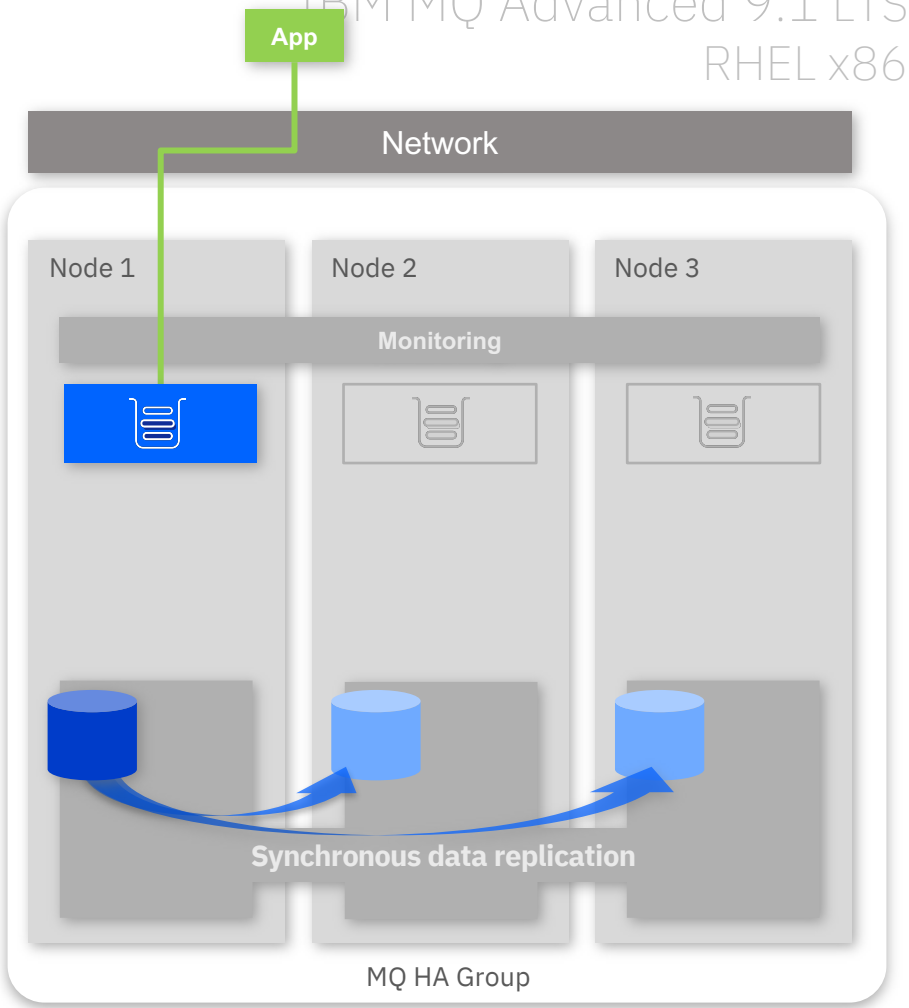
Linux only, MQ Advanced HA solution with no need for a shared file system or HA cluster

Three-way replication and monitoring for quorum support

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

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

MQ Advanced for RHEL x86-64



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

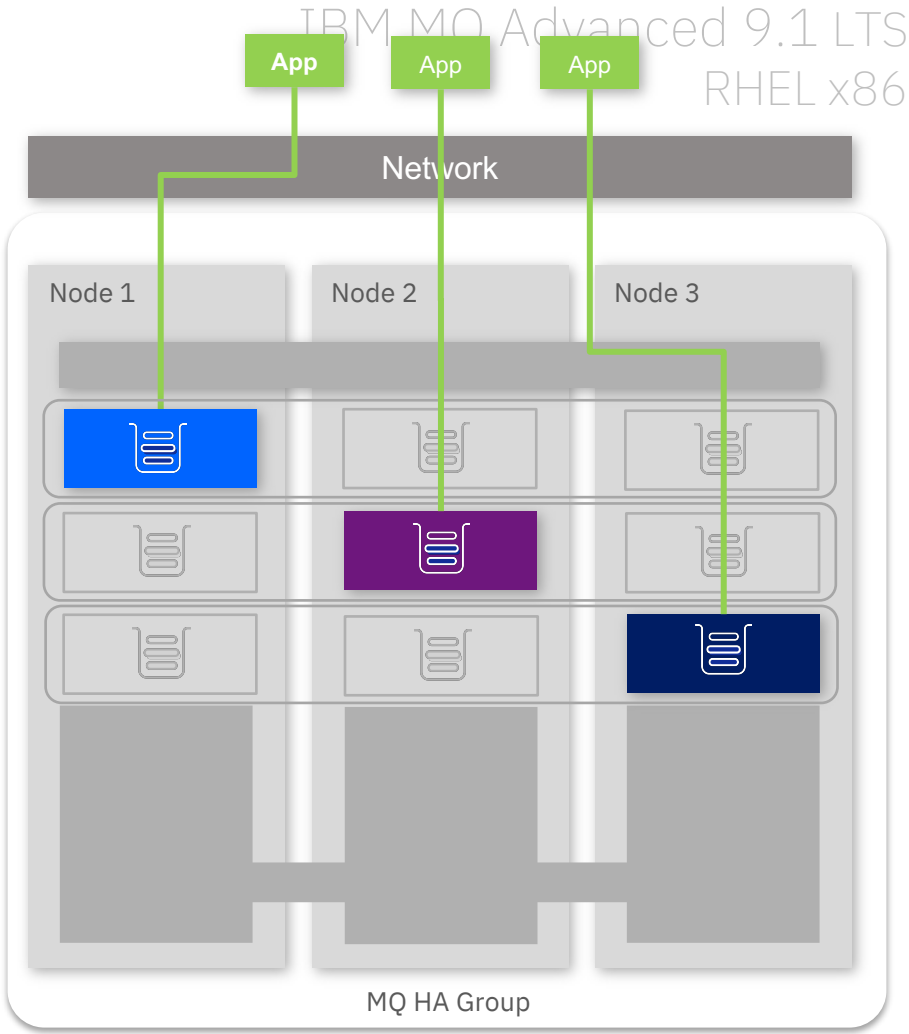
Per queue manager control to support active/active utilisation of nodes

MQ **licensing** is aligned to maximise benefits

Improvements in queue manager restart times

9.1.1 9.1.2

MQ Advanced for RHEL x86-64



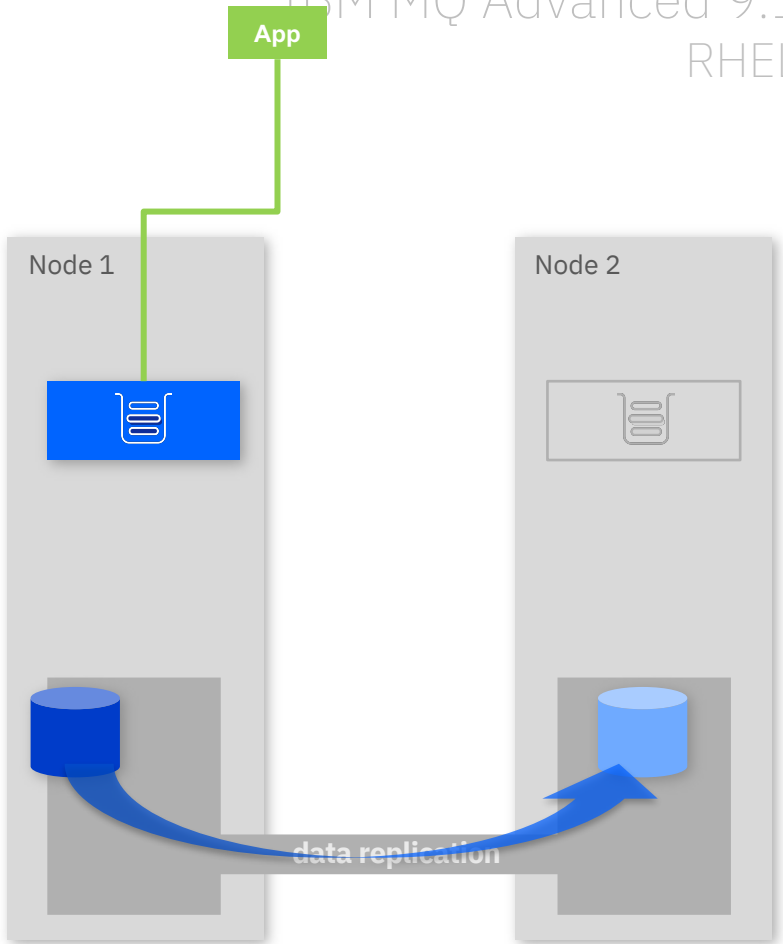
Replicated Data Queue Managers

Manual failover

RDQM also supports a looser coupled pair of nodes for data replication but with no automatic failover, often for **Disaster Recovery**

Data replication can be

- **Asynchronous** for systems separated by a high latency network
- **Synchronous** for systems on a low latency network



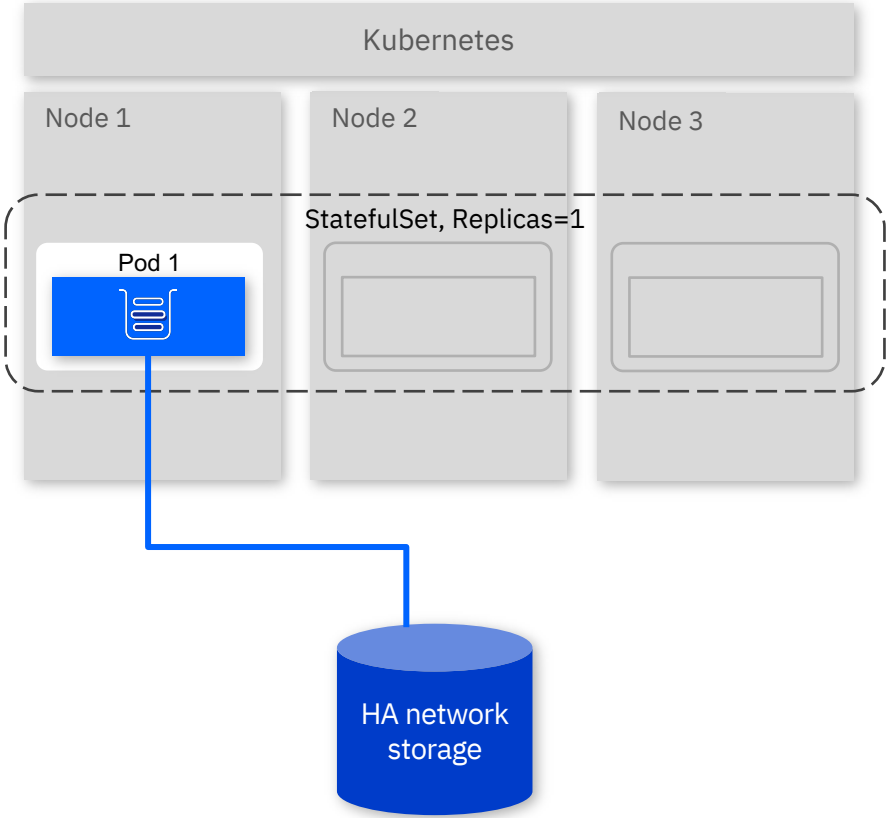
MQ Advanced for RHEL x86-64

High Availability with Kubernetes

The RDQM solution does not apply to container environments

High availability of the MQ data requires highly available replicated storage

Container orchestrators such as Kubernetes handle much of the monitoring and restart responsibilities...



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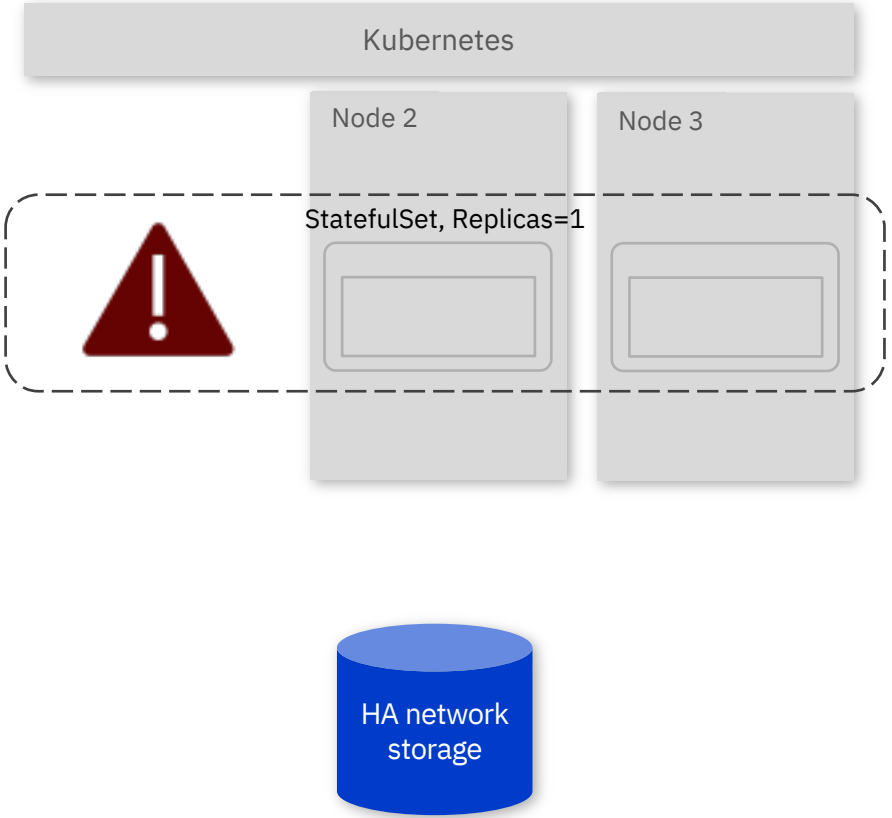

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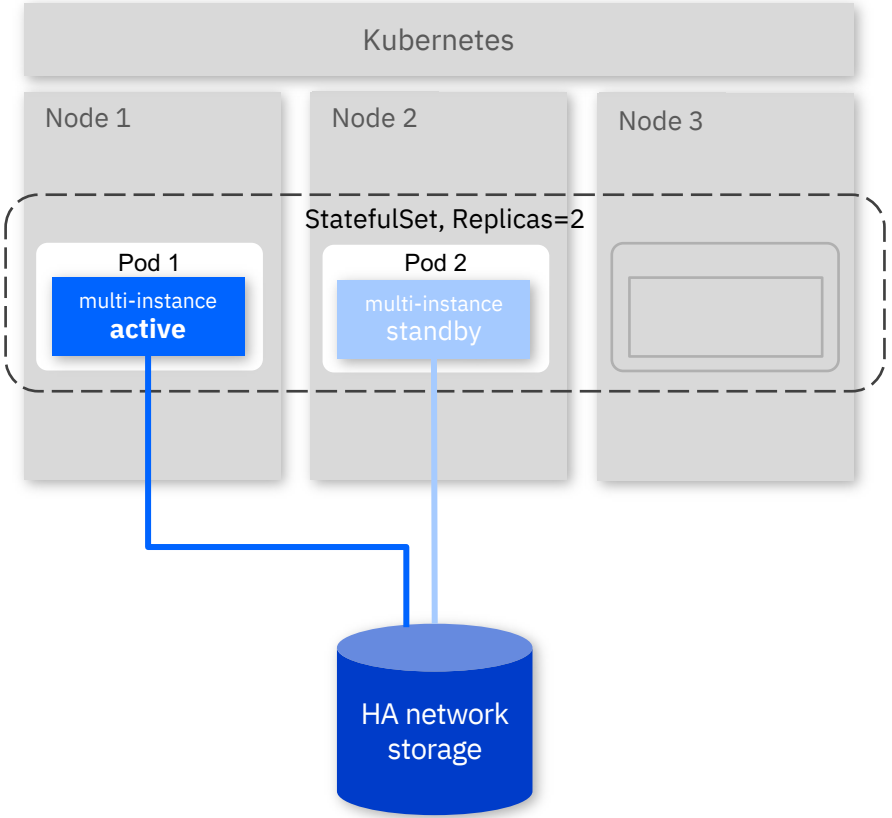
The MQ container image and Certified Container now supports a two-replica multi-instance queue manager deployment pattern to handle Kubernetes node failures



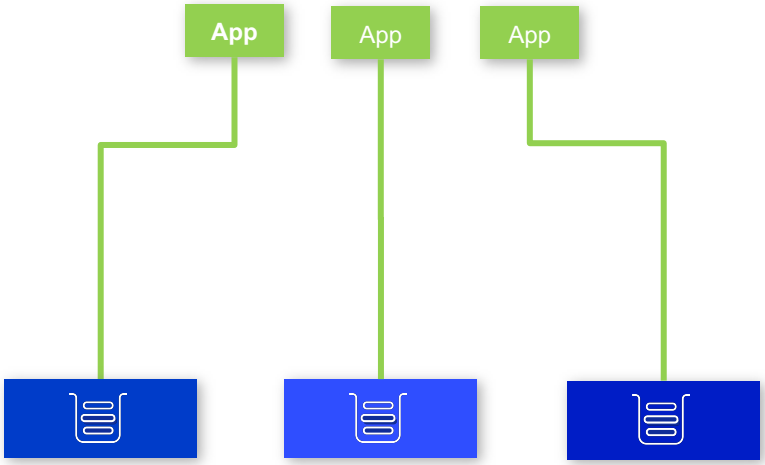
Cloud Native Messaging

Building scalable, fault tolerant, solutions

Building scalable, fault tolerant, solutions

Many of you have built your own continuously available and horizontally scalable solutions over the years

Let's call this the *"**uniform cluster**"* pattern



Building scalable, fault tolerant, solutions

Many of you have built your own continuously available and horizontally scalable solutions over the years

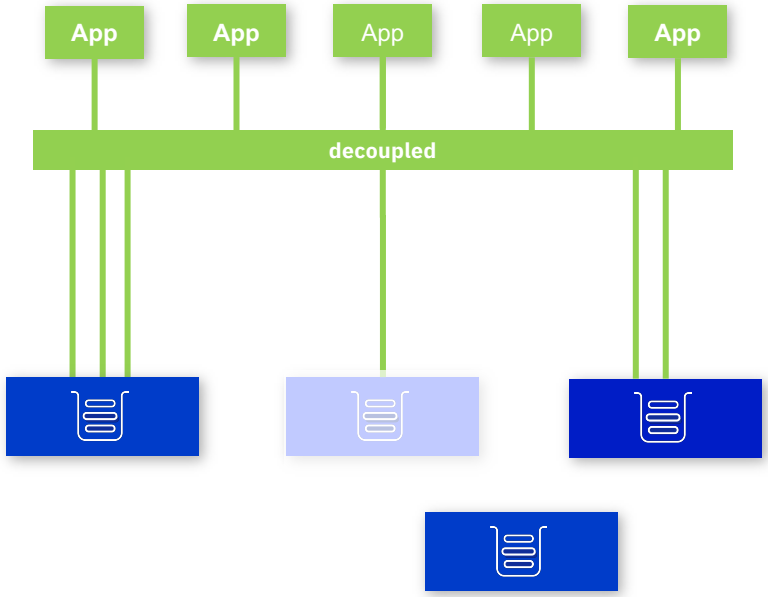
Let's call this the *"**uniform cluster**"* pattern

MQ has provided you many of the building blocks -

- Client auto-reconnect
- CCDT queue manager groups

But you're left to solve some of the problems, particularly with long running applications -

- Efficiently distributing your applications
- Ensuring all messages are processed
- Maintaining availability during maintenance
- Handling growth and contraction of scale



MQ 9.1.2 started to make that easier

For the distributed platforms, declare a set of matching queue managers to be following the ***uniform cluster pattern***

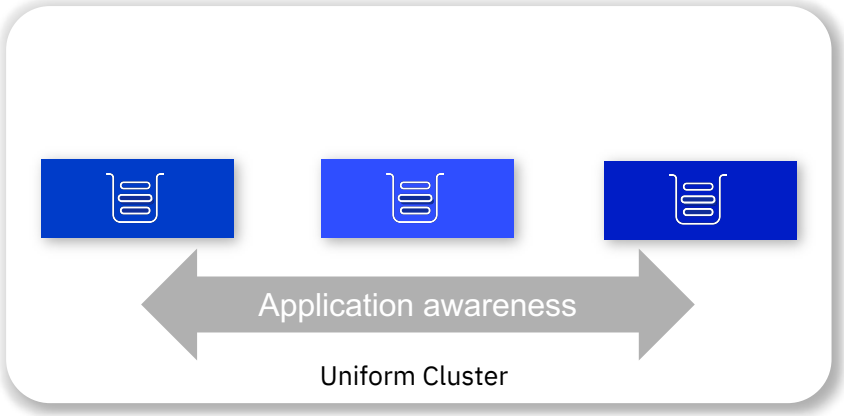
- All members of an MQ Cluster
- Matching queues are defined on every queue manager
- Applications can connect as clients to every queue manager

MQ will automatically share application connectivity knowledge between queue managers

The group will use this knowledge to automatically keep matching application instances balanced across the queue managers

- Matching applications are based on *application name* (new abilities to programmatically define this)

MQ is incrementally rolling out the client support for this through the CD releases



Automatic Application balancing

Application instances can initially connect to any member of the group

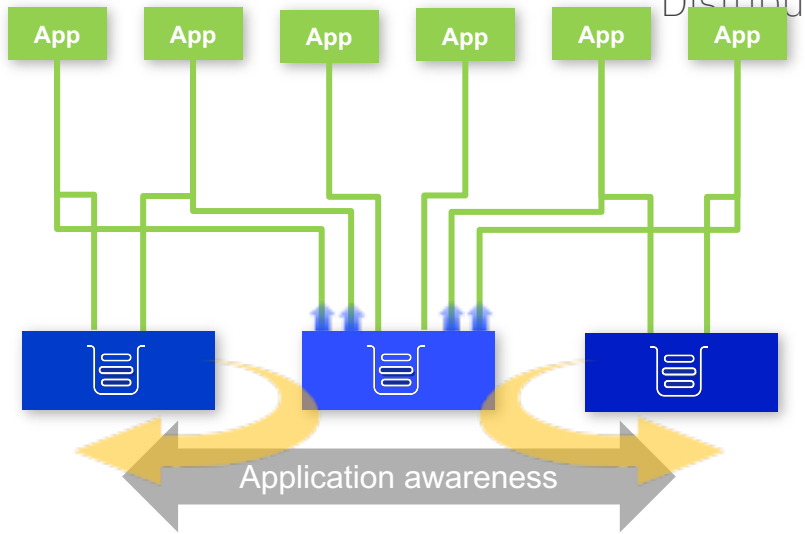
- We recommend you use a queue manager group and CCDT to remove any SPoF

Every member of the uniform cluster will detect an imbalance and request other queue managers to donate their applications

Hosting queue managers will instigate a client *auto-reconnect* with instructions of where to reconnect to

Applications that have enabled *auto-reconnect* will automatically move their connection to the indicated queue manager

- So far, 9.1.2 CD added support for **C-based** applications, 9.1.3 CD has added **JMS SE** support

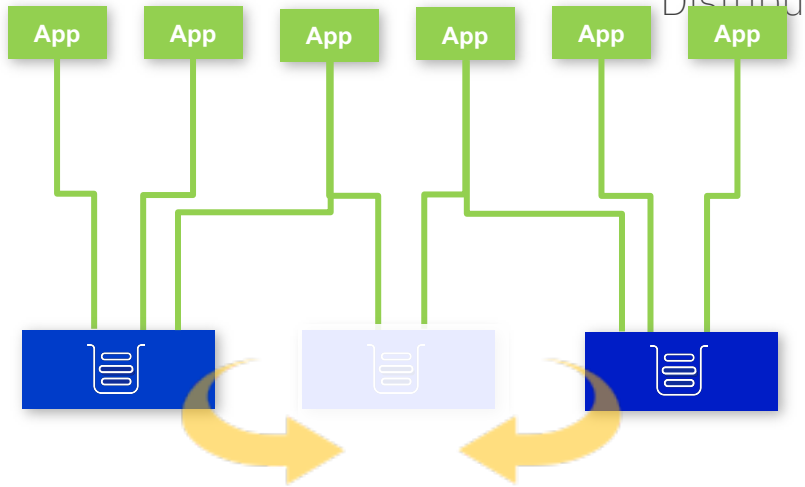


Automatic Application balancing

IBM MQ 9.1.2+ CD Distributed

Automatically handle rebalancing following planned and unplanned queue manager outages

- Existing client auto-reconnect and CCDT queue manager groups will enable initial re-connection on failure
- Uniform Cluster rebalancing will enable automatic rebalancing on recovery



MQ 9.1.2 CD was the ***start*** of the Uniform Cluster journey
ibm.biz/MQ-UniCluster

Join the **MQ Beta** program to see how the Uniform Cluster pattern and client support will evolve

MQ.Early.Program@uk.ibm.com

Building scalable and available solutions

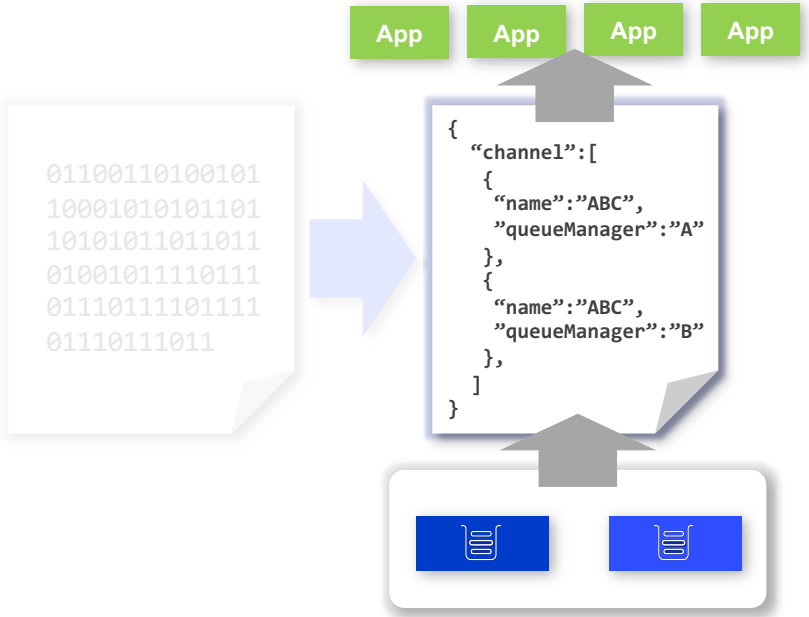
JSON CCDT

Build your **own JSON format CCDTs**

Supports multiple channels of the same name on different queue managers to simplify the building of uniform clusters

Available with all 9.1.2 clients

C, JMS, .NET, Node.js, Golang clients

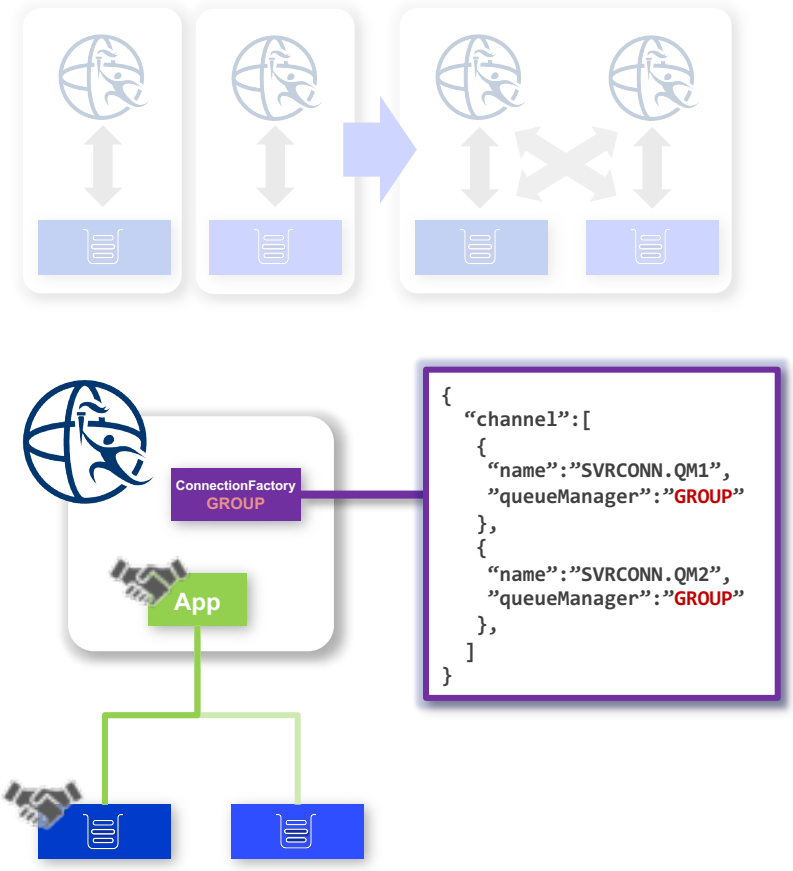


Building scalable and available solutions

WebSphere Liberty Transactions

Global transactions currently require a single queue manager to be named when connecting, complicating deployment and introducing single points of failure

WebSphere Liberty 18.0.0.2 and MQ 9.1.2 support the use of CCDT **queue manager groups** when connecting to enable workload balancing of connections for better availability and scaling



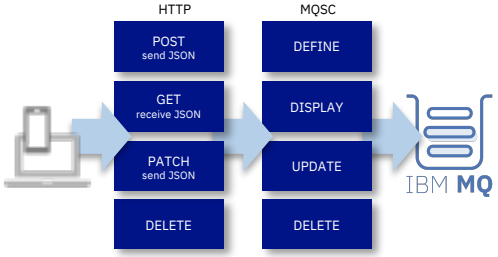
Managing MQ

Living with your enterprise messaging system

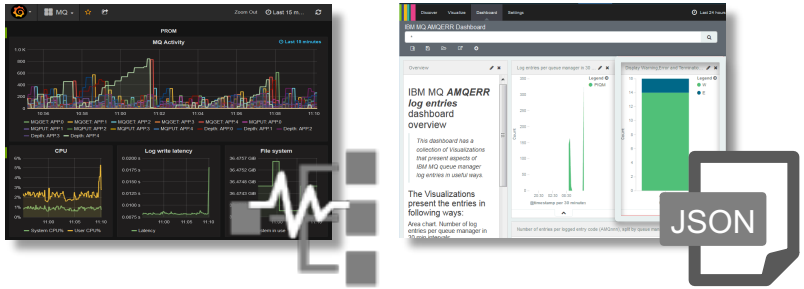
Making management simpler

Web console
Simple to use, web based administration

RESTful administration
Administer and manage your queue managers over HTTPS



Logging and monitoring
Simplify the streaming of logs and metrics for centralized storage and analyzes

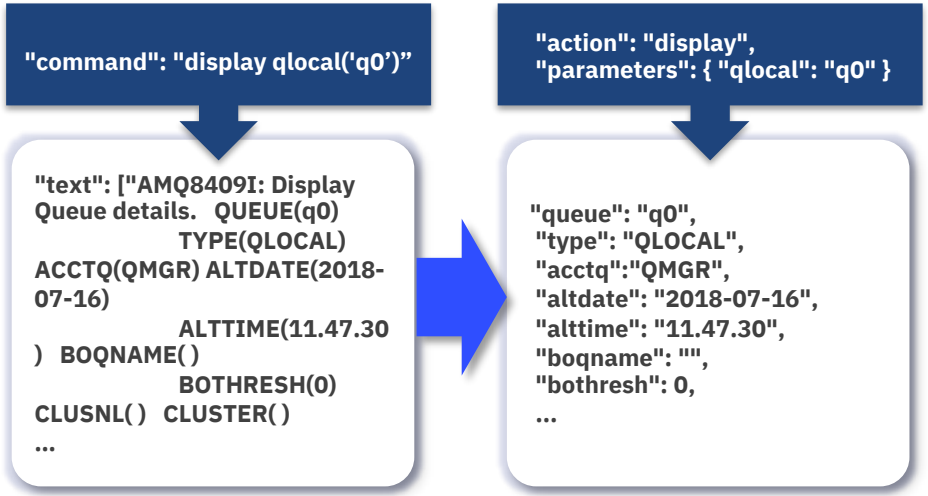


REST Administration

MQ REST administration has been evolving to the point where MQ 9.1.3 delivers extensive coverage of the MQ commands and objects across all platforms in a REST native way

It reuses the names and values familiar to many through runmqsc, presented in a REST friendly JSON payload, removing the need to understand runmqsc syntax

The previous runmqsc-syntax REST calls continue to be supported for ease of migration of existing scripts to REST

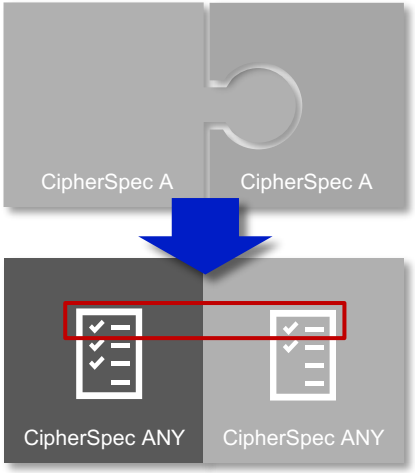


Managing channel CipherSpecs

Making it easier to keep up-to-date with ever changing ciphers, simplifying migration

Rather than needing to match the CipherSpec on both ends of a channel, MQ 9.1.1 CD (all platforms) introduced ***ANY_TLS12*** and MQ will negotiate the strongest CipherSpec available to both ends

For 9.1.1, the distributed platforms also added the ability to whitelist *exactly* which CipherSpecs a queue manager will accept



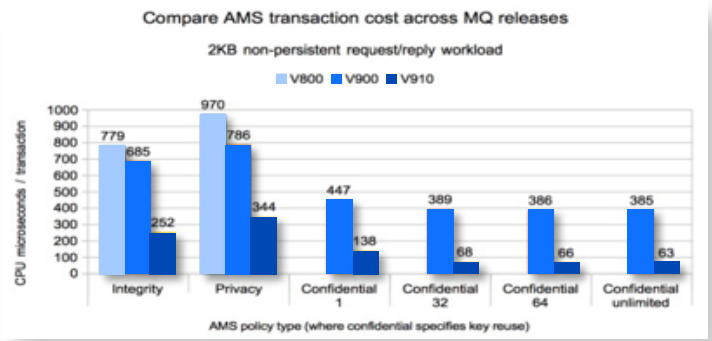
Advanced Message Security

End-to-end message encryption is now even easier to adopt, thanks to ever improving performance

MQ 9.0 LTS started to drive down the overhead of AMS with the introduction of the *confidentiality* policy

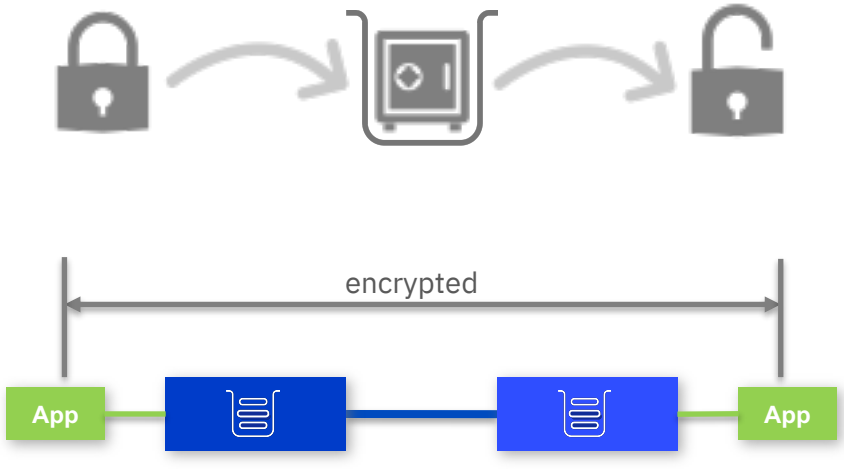
MQ 9.0.1 CD was the point that all platforms benefitted fully from those improvements

AMS on z/OS can now be as efficient as TLS just on the channels



Advanced Message Security

End-to-end application-to-application encryption may give you the highest level of security, but it's not always possible to use. For example, where the applications are not AMS enabled or where the originators or recipients of the messages are outside of your domain



Application to application

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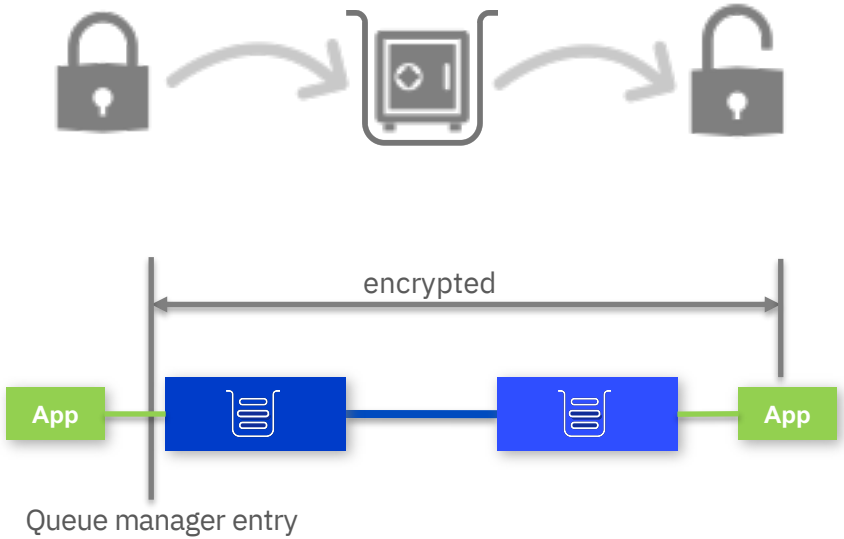
MQ on Distributed has always had client level interception to apply AMS policies once messages reach or leave their first queue manager



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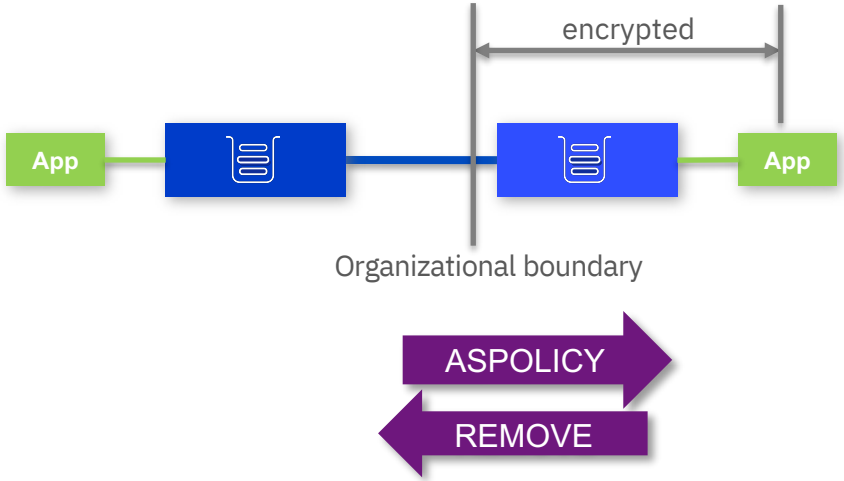
MQ on Distributed has always had client level interception to apply AMS policies once messages reach or leave their first queue manager

MQ 9.1.3 on z/OS adds the ability to apply those policies at a queue manager-to-queue manager boundary. This enables the use of AMS within one domain without affecting another



New sender and receiver channel property, SPLPROT controls the use of AMS policies for inbound and outbound messages

Managed File Transfer

MFT manages your file transfers, and now it's even easier for you to manage MFT...

IBM MQ Advanced 9.1 LTS + All platforms

Simplified MFT Agent licensing
No need to track individual agents with MQ Advanced queue managers

Redistributable MFT agent
Simply download and unpack

Failed transfer timeout
Automatically stop transfers after repeated failures

Resource monitor backups
Simple, single command to backup and restore resource monitors

MFT agent, transfer and resource monitor monitoring through REST 9.1.1

File transfer initiation through simple REST call 9.1.2

Helping developers

Making it easy to build MQ into your applications

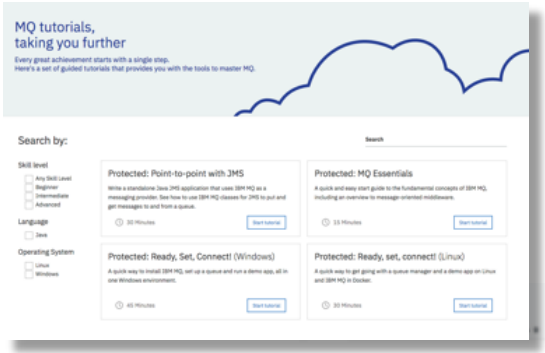
Getting Started

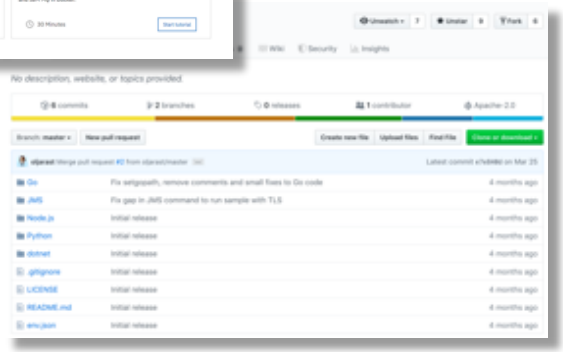
Teach yourself the basics of MQ

ibm.biz/learn-mq

Build on top of simple samples

ibm.biz/mq-dev-patterns





...and prove your skills

Demonstrating the simplicity of MQ

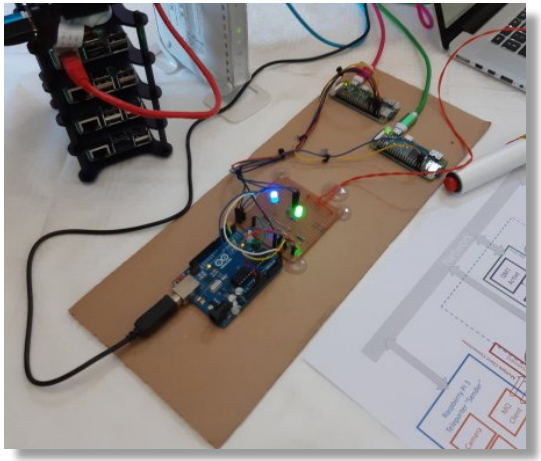
There's nothing like flashing lights and wires to grab people's attention. We want everyone to know how easy it is to write messaging applications and how powerful MQ is in supporting them

Ever tried **Scratch,** a graphical way to code, aimed at kids but ideal to show how easily asynchronous messaging can improve your applications with an MQ plugin

ibm.biz/ibmmq-scratch

Heard of the **Raspberry PI**? You think MQ is a heavyweight solution? We run an HA pair of queue managers on two $5 Raspberry PI Zeros!

ibm.biz/ibmmq-pi



Developing applications

Build your applications simply, with no need for an MQ installation

- Pull Java directly from the Maven repository since MQ 9.0.4 CD
- MQ 9.1.1 CD added the **SDK** to the MQ redistributable client
- The redistributable client is now available directly, no need to log into IBM

ibm.biz/mqclientdownload

Develop your applications on the platform of your choice with the addition of the MacOS version of the 9.1.1 MQ client and SDK for Developers

ibm.biz/mqmacos

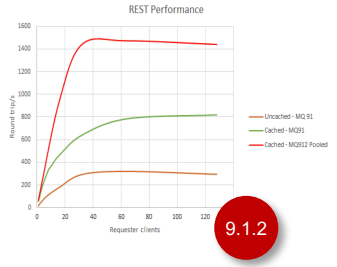
(The MQ for MacOS toolkit includes runmqsc)

Writing new applications

REST Messaging

Providing a very simple way to get messages in and out of your MQ system
9.1.2 CD boosted the performance capability
9.1.3 CD added message browse

REST



Put, get, browse

9.1.2

9.1.3

.NET Core

9.1.1 CD brought support for .NET Core on Windows
9.1.2 CD added Linux support

.NET Core

Windows

9.1.1

Linux

9.1.2

Open Source language bindings

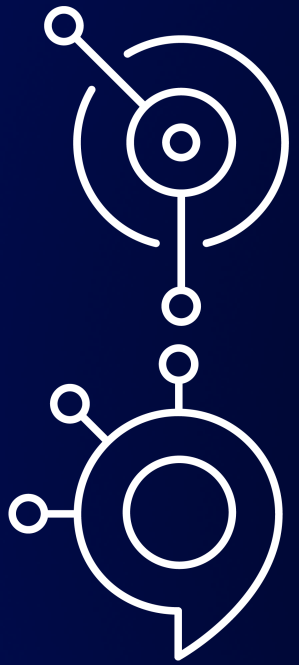
Write MQI applications in Node.js and Golang
New simpler JMS style API for Golang

github.com/ibm-messaging

Node.js MQI

Golang MQI

Golang JMS



Events

† also known as ***commands*** or ***operations***

Messages or Events?

Messages† are *"work that needs to be done"*

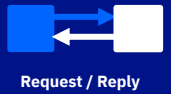
Events are *"things that have happened"*

Generalised solution

IBM **MQ**

Specialised technology

IBM **MQ**



Request / Reply

Assured Delivery

IBM Event Streams

Stream History

Decoupled consumption

Specialised for **message exchange** and **transactions**

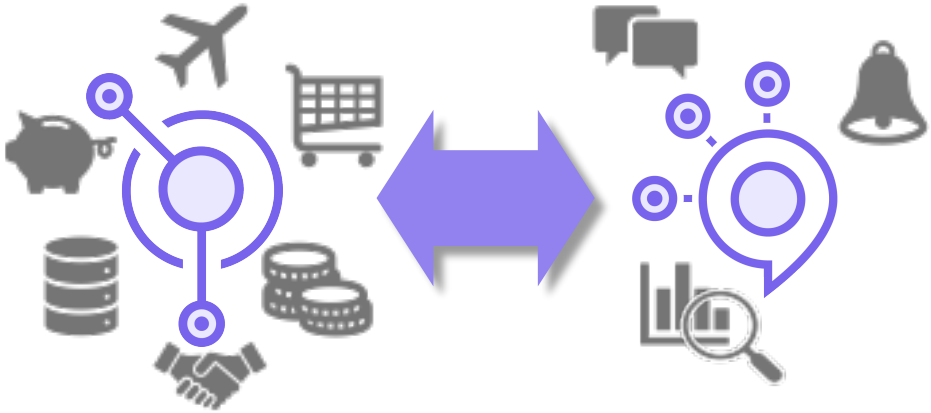
Specialised for **streaming** of **events**

IBM MQ with IBM Event Streams

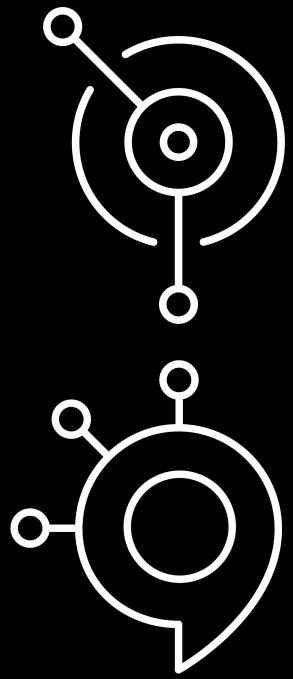
IBM MQ connects mission-critical systems, requiring **transactional**, **once-only delivery**

Event Streams distributes and processes streams of events in real-time to intelligently engage with customers

Connecting the two together, flowing messages and events between then, with the **supported connectors** enables you to unlock the potential of your data



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



Thank you

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