

What's new in IBM MQ v9.1.x

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IBM Cloud

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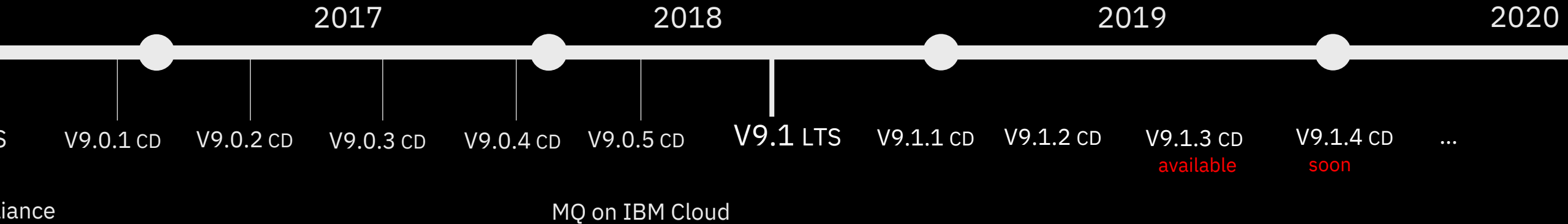
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IBM MQ: long term support and continuous delivery



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.

MQ 9.1.X CD Content So Far



Uniform Cluster automatic application rebalancing	Microsoft .NET Core support	Client connectivity with zCEE	Developer toolkit for MacOS	Automatic TLS CipherSpec negotiation	Enhanced Salesforce Bridge	Build toolkit for zCEE	Idempotent MQSC commands	Browse messages using REST
Channel enabled AMS policies for z/OS	JSON format CCDT	Permitted TLS CipherSpec control	REST messaging performance enhancements	Full JSON-syntax REST administration	MQ Appliance HA event notifications	Improved distributed queue manager restart times	Stream MQ Appliance error logs	Rapid Uniform Cluster rebalancing
New application status checking	ini file and MQSC injection at startup	Escalating end queue manager	MQFT REST list resource monitors	Enhanced Blockchain Bridge	WebSphere Liberty MDB pause	New consistent MQ samples	MFT REST create file transfer	FTP server support on IBM I for MFT
MQ Appliance admin activity audit logging	XA support in Liberty for decoupled JMS connections	Automatic Cluster configuration	Packaged MQ Internet Passthru (IPT)	Highly available MFT Agent deployments	z/OS data set encryption support	User controlled application naming	MQIPT HSM Support	TLS 1.3 support

Introducing the new z15



Providing next level resiliency and data privacy to hybrid cloud infrastructures
Up to 190 GPs, 40TB RAM
25% more capacity than z14 in same data centre footprint!

Make the most of z15 with MQ for z/OS

Data Protection & Privacy

Protected data within IBM Z

- MQ supports z/OS data set encryption as part of a pervasive encryption strategy

End-to-end data protection

- MQ Advanced Message Security secures data throughout the messaging network, protecting against external and internal security threats

Enhanced encryption performance

- Crypto Express7S and CPACF acceleration reduces cost of MQ channel and message level encryption

Business Continuity & Resiliency

Workload restart and recovery

- MQ benefits automatically from System Recovery Boost, speeding queue manager restarts and workload catchup

Service and data high availability

- MQ Queue Sharing Groups exploit the resiliency of IBM Z hardware, providing truly active-active messaging

Embedded operational data and analytics

- MQ SMF data provides KPIs that can feed the diagnostic and analytic capabilities of z15

Cloud Integration

Cloud workloads & management

- MQ runs within z/OS Container Extensions to provide cloud applications with a connectivity gateway to the mainframe
- MQ provides z/OSMF templates for self service provisioning of queue managers and queues via z/OS Cloud Broker

Cloud Native

- Cloud applications can easily access MQ resources via the MQ service provider for z/OS Connect with build toolkit support to automate DevOps pipelines
- MQ REST APIs, web console and CLI available within Zowe framework

Standardized & Flexible for the Cloud Data Center

Modular and Scalable

1-4 frames depending on capacity requirements

Industry Standard

19" Form Factor with choice of power and cooling

On-Chip Acceleration

Compression accelerator reduces cost of messages over MQ channels and storage for persistent messages

z/OS Container Extensions

New with z/OS 2.4, zCX allows you to run zLinux applications in a Docker container directly on a z/OS LPAR

Application developers can develop, and data centers can operate, popular open source packages, Linux applications, IBM software, and third-party software together with z/OS applications and data

Can run on zIIP, no need for IFL

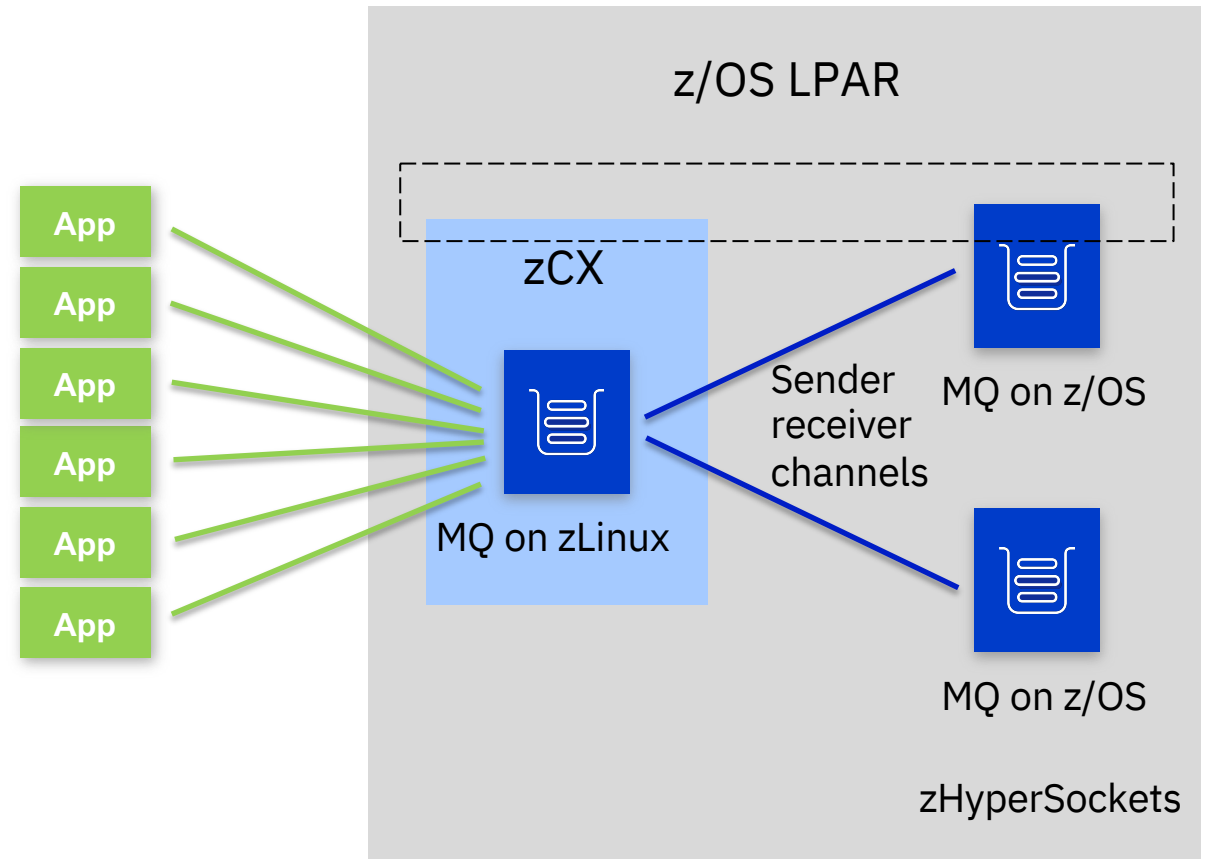
Can exploit HyperSockets

Some interesting MQ options:

- Client concentrator
- Cluster full repository

<http://www.redbooks.ibm.com/abstracts/sg248457.html>

MQ running as client concentrator in zCX

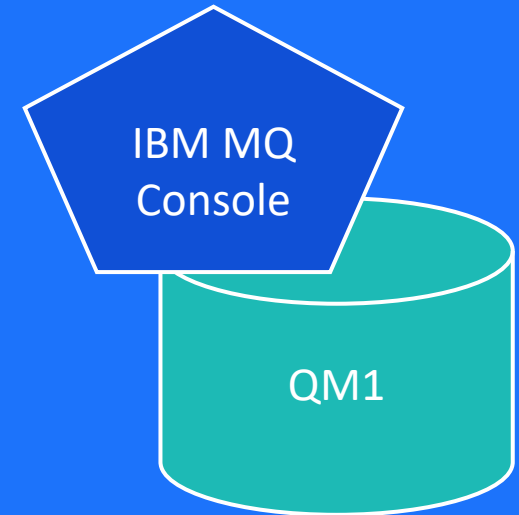


Enhancements to the administrative REST API



New and updated JSON MQSC options

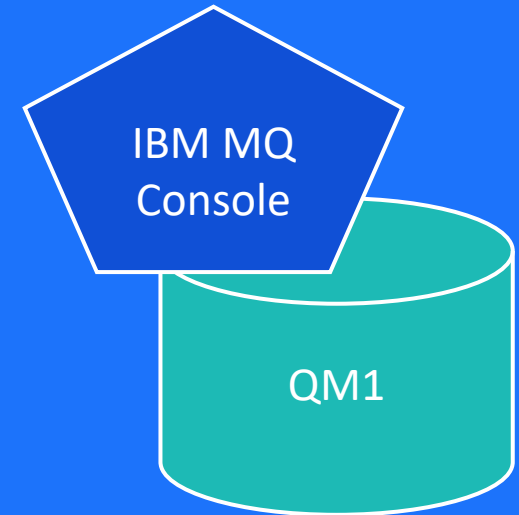
```
{  
  "type": "runCommandJSON",  
  "command": "display",  
  "qualifier": "conn",  
  "name": "*",  
  "parameters": {  
    "type": "HANDLE"  
  }  
}
```



Support has been added for the DISPLAY CONN MQSC commands

New and updated JSON MQSC options

```
{  
  "type": "runCommandJSON",  
  "command": "define",  
  "qualifier": "qlocal",  
  "name": "QL",  
  "parameters": {  
    "descr": "single 'quotation' marks"  
  }  
}
```

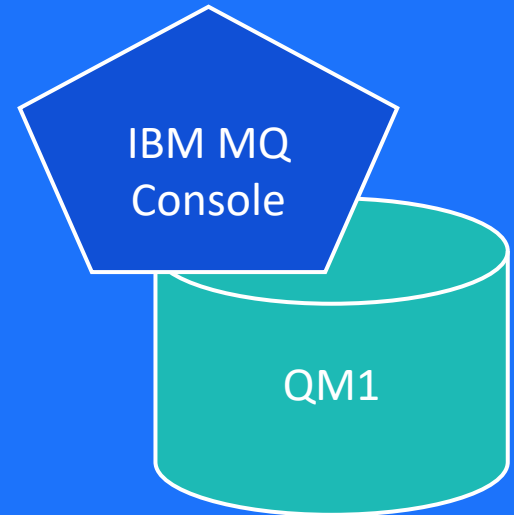


Single quotation marks no longer need to be escaped

New and updated JSON MQSC options



```
{  
  "type": "runCommandJSON",  
  "command": "set",  
  "qualifier": "policy",  
  "name": "POL.Q1",  
  "parameters": {  
    "signer": ["CN=Alice", "CN=Bob"],  
    "recip": ["CN=User1"],  
    "encalg": "RC2",  
    "signalg": "SHA256"  
  }  
}
```

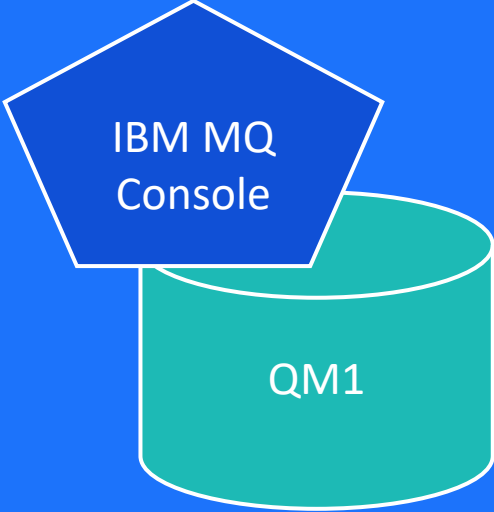


SET POLICY has been updated to support a JSON array of signers or recipients

Better HTTP return codes for REST MQSC



```
{  
  "type": "runCommandJSON",  
  "command": "define",  
  "qualifier": "qolcal",  
  "name": "Q1",  
  "parameters": {  
    "descr": "A test queue"  
  }  
}
```

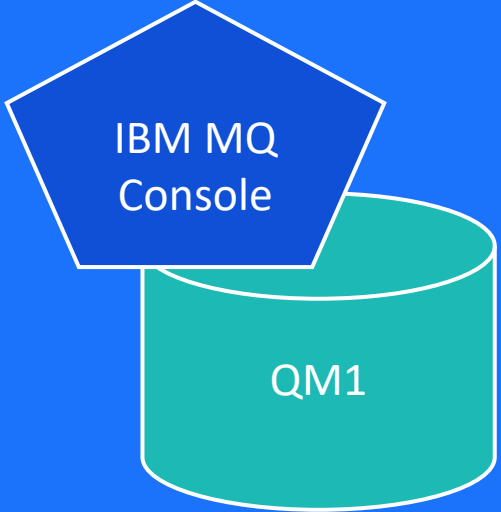


```
{ "commandResponse": [ {  
  "completionCode": 2, "message": [ "AMQ8426I: Valid MQSC commands are" ], "reasonCode": 10 } ],  
  "overallCompletionCode": 2,  
  "overallReasonCode": 10 }
```

Better HTTP return codes for REST MQSC

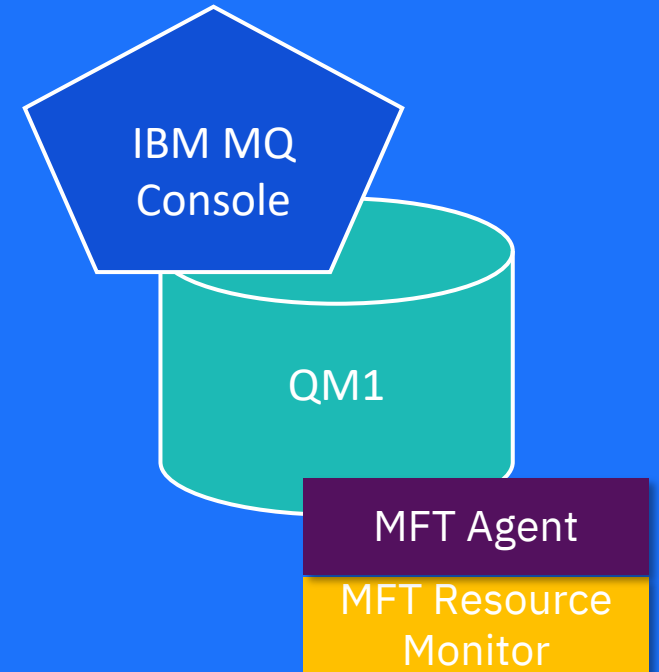


```
{  
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}
```



```
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  "completionCode": 2, "message": [  
    "AMQ8426I: Valid MQSC commands  
    are" ], "reasonCode": 10 } ],  
  "overallCompletionCode": 2,  
  "overallReasonCode": 10 }
```

Managed File Transfer REST API changes



- POST and DELETE calls can be used to managed MFT Resource Monitors
- MQWebUser role can now be used to authenticate users

Replicated Data Queue Managers



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

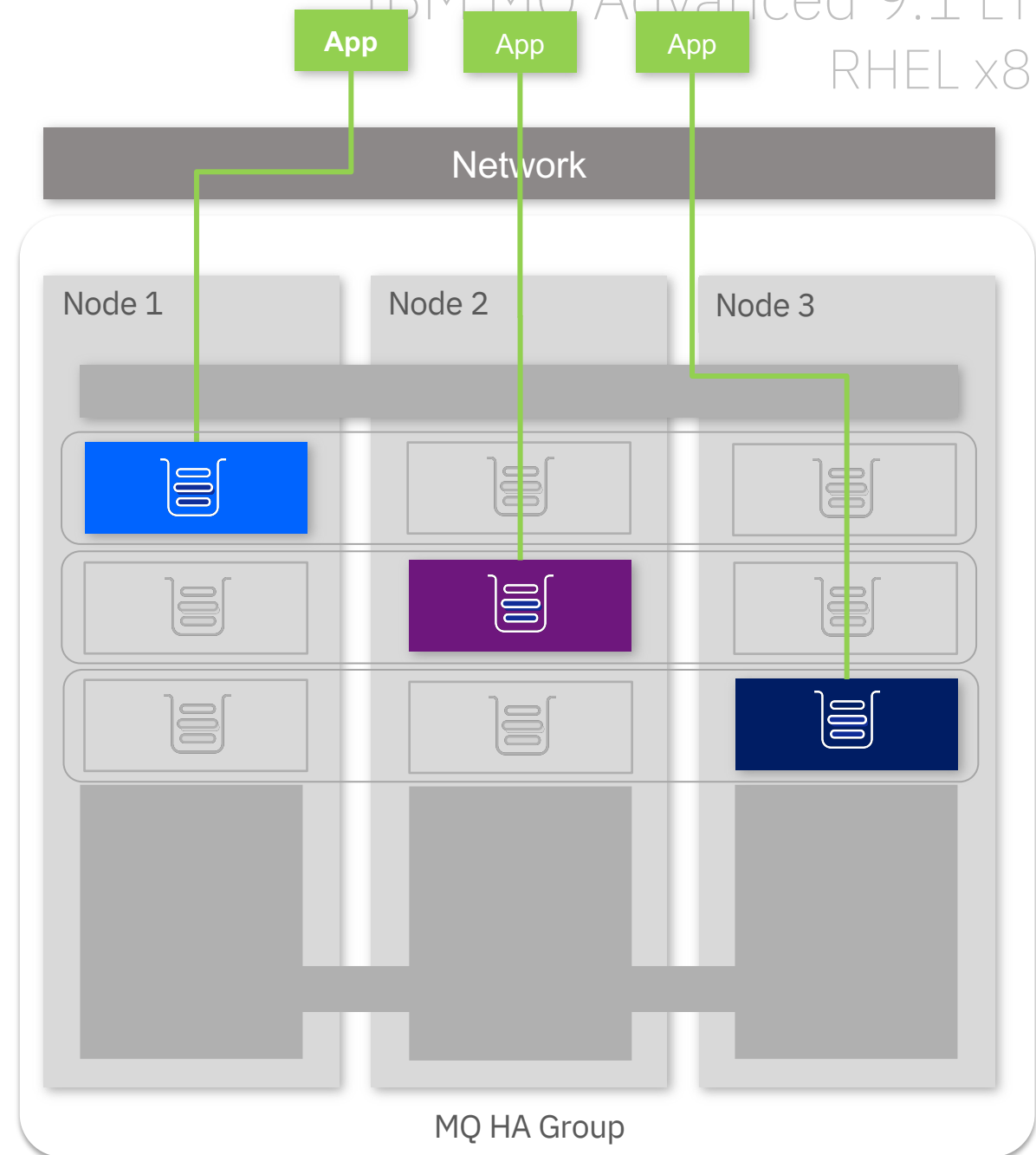
Synchronous data replication for once and once only transactional delivery of messages

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

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

MQ licensing is aligned to maximise benefits

IBM MQ Advanced 9.1 LTS
RHEL x86



Improvements in restart times

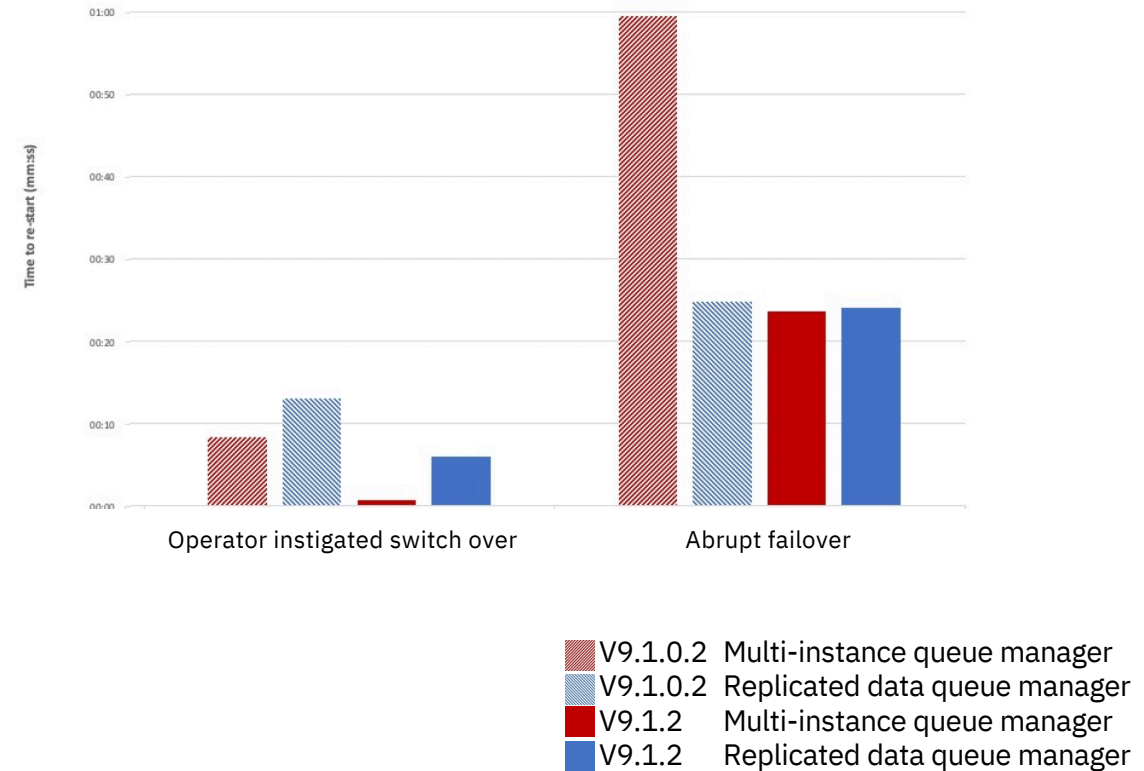
Sub-second queue manager restarts under load* are now possible



In 9.1.4 new ability to set a time limit on how long a queue manager takes to shut down

```
endmqm MQ1 -t 5
```

Shuts queue manager down with a target time of 5 seconds. Essential queue manager tasks are allowed to complete. There is a tp variant which is more aggressive



*500 connected applications, driving 50k-85k msgs/sec

Replicated Data Queue Managers

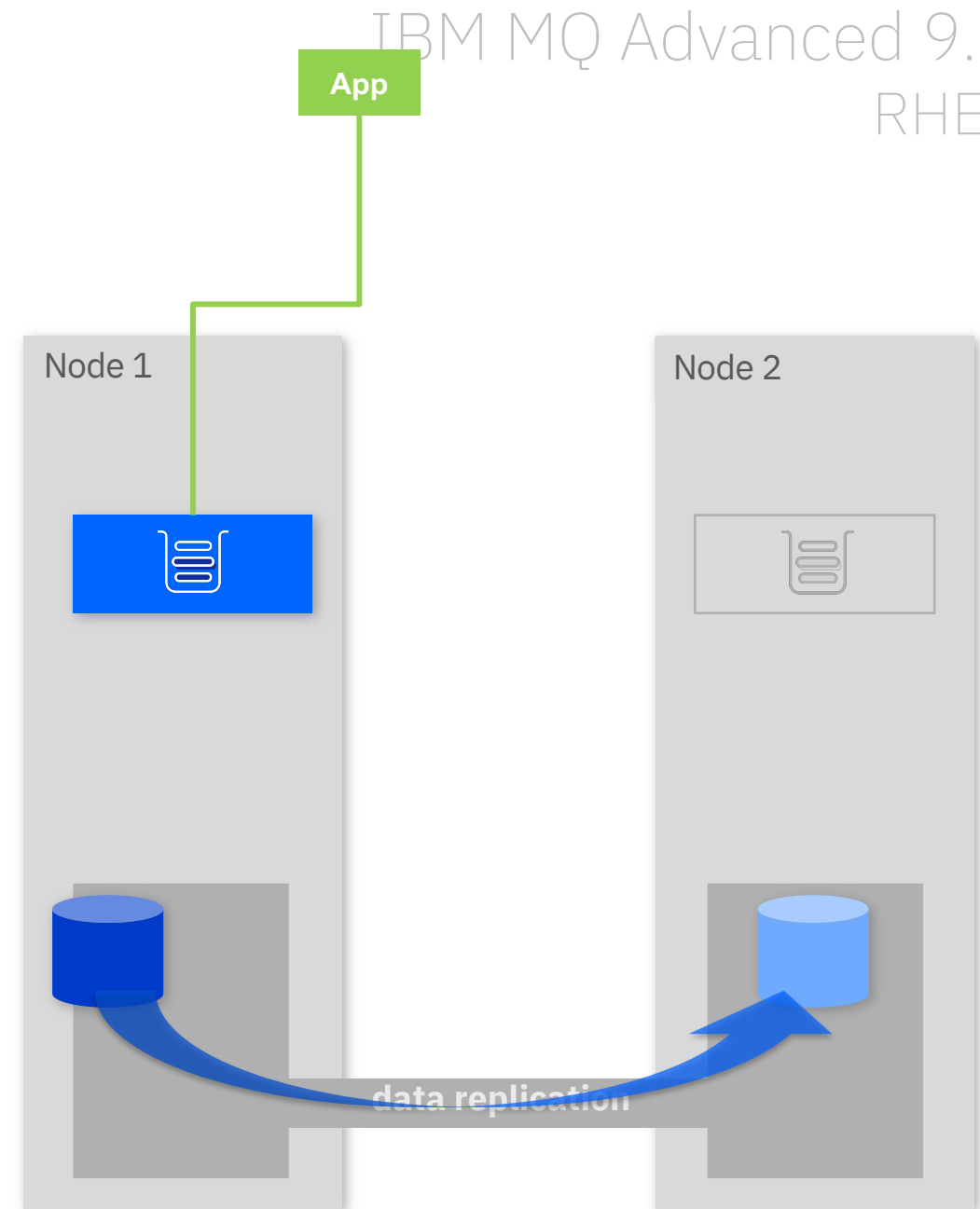
Manual failover

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

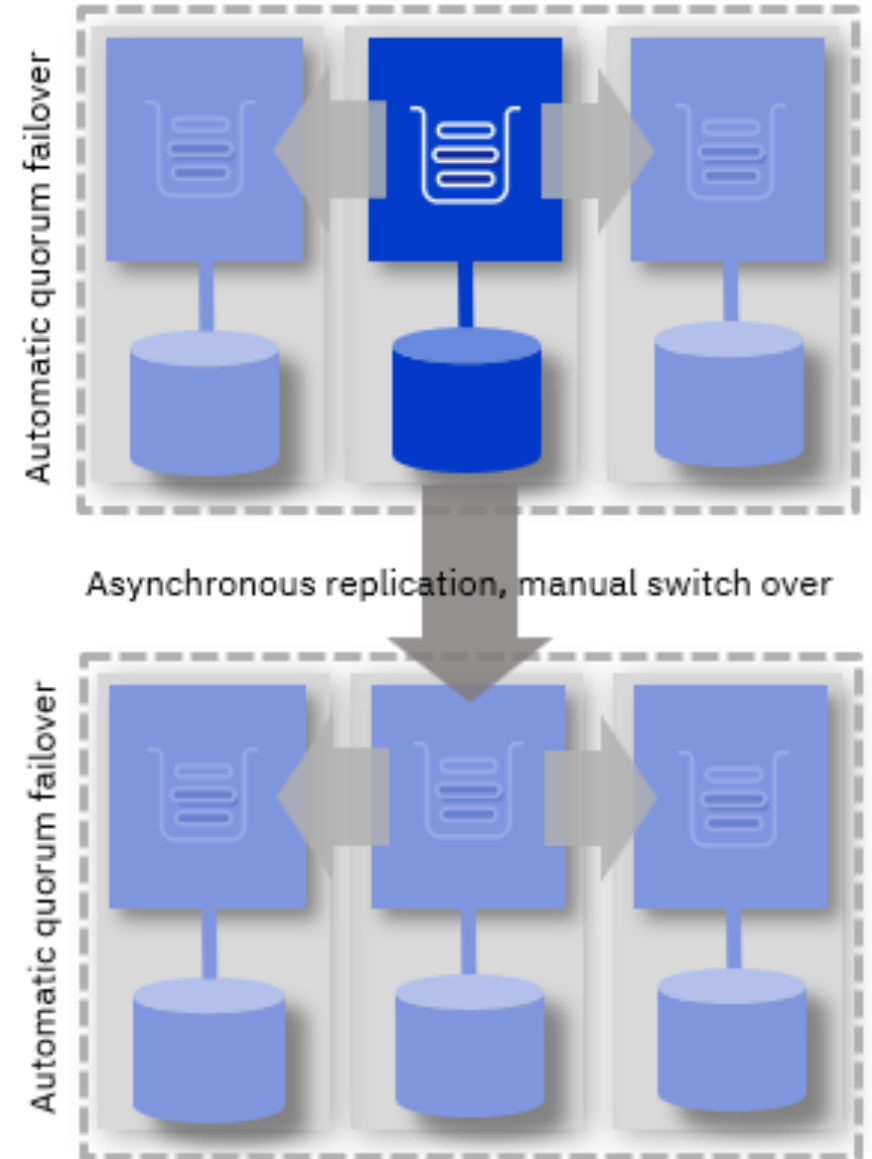
Synchronous for systems on a low latency network



Statement of direction

Enhancements to replicated data queue manager functions in MQ Advanced that will enable the synchronous replication of data for a three-way, high-availability configuration and simultaneous asynchronous replication of data to another three-way, high-availability configuration for disaster recovery

IBM MQ Advanced ???
RHEL x86



Uniform Clusters



Building scalable, fault tolerant, solutions

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

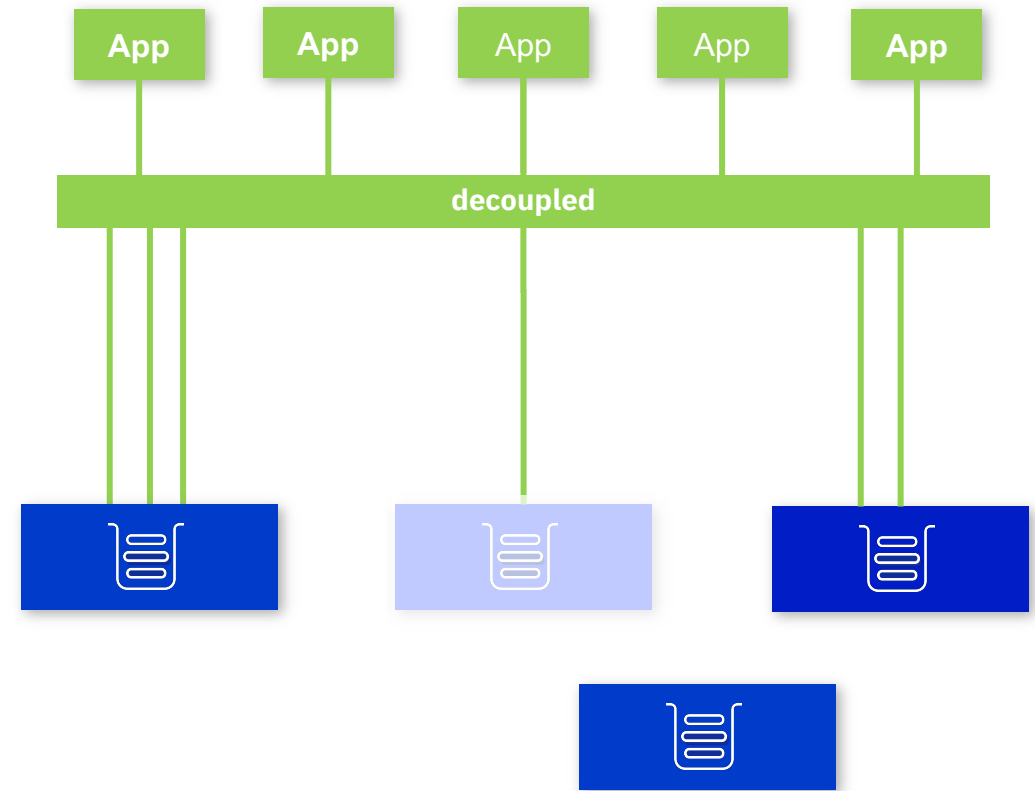
Let's call this the “*uniform cluster*” pattern

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***

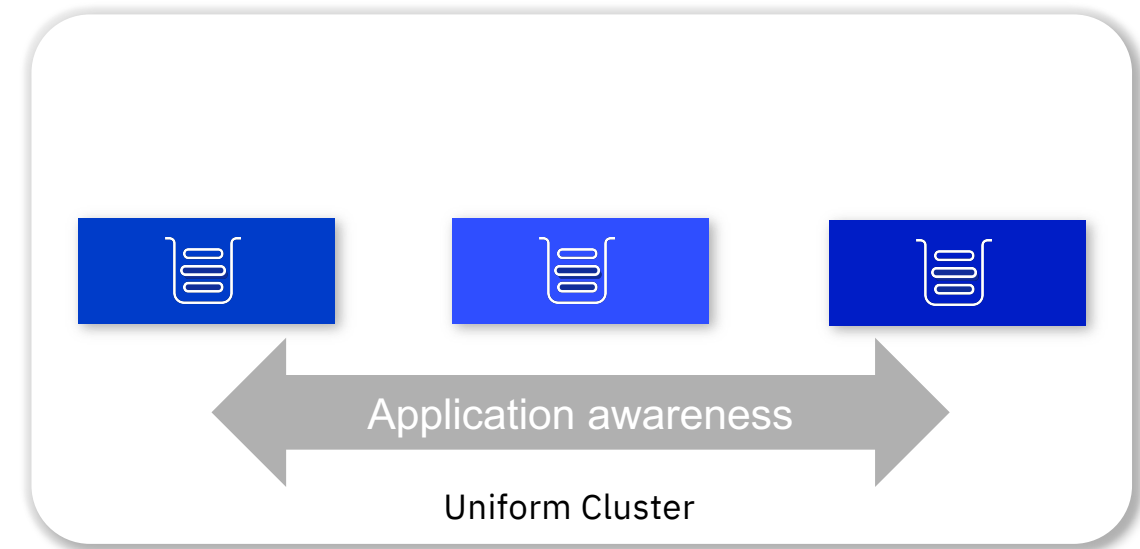
- All members of an MQ Cluster
- Matching queues are defined on every queue manager
- Applications can connect as clients to every queue manager

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

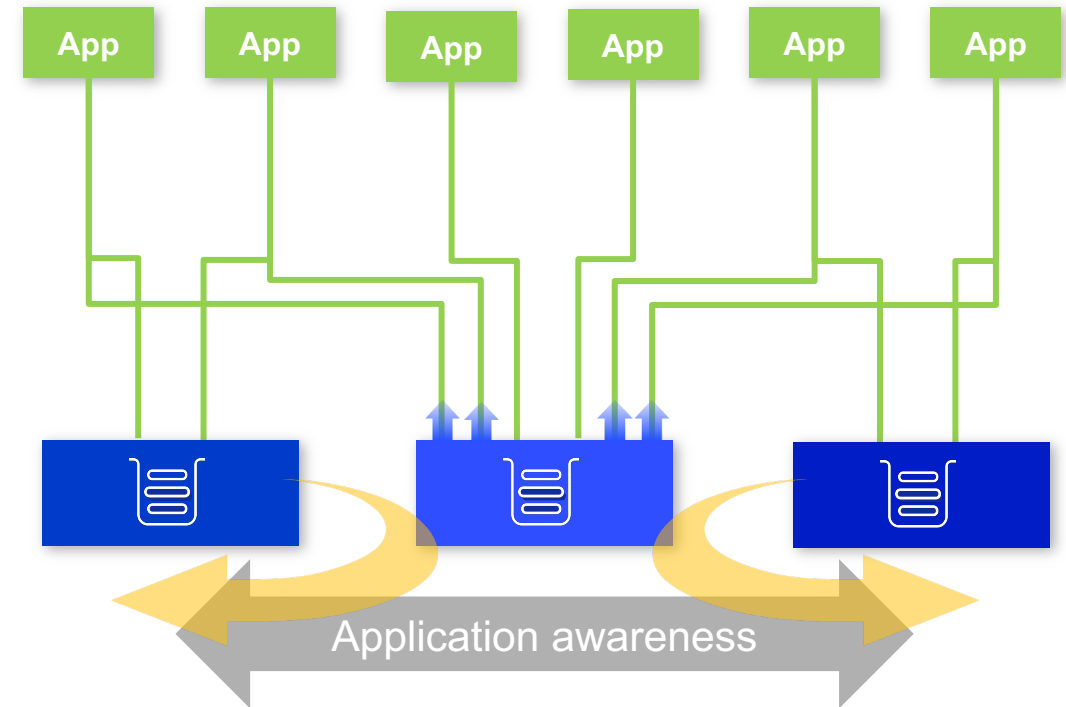
Hosting queue managers will instigate a client *auto-reconnect* with instructions of where to reconnect to

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

9.1.2 CD added support for **C-based** applications

9.1.3 CD has added **JMS SE** support

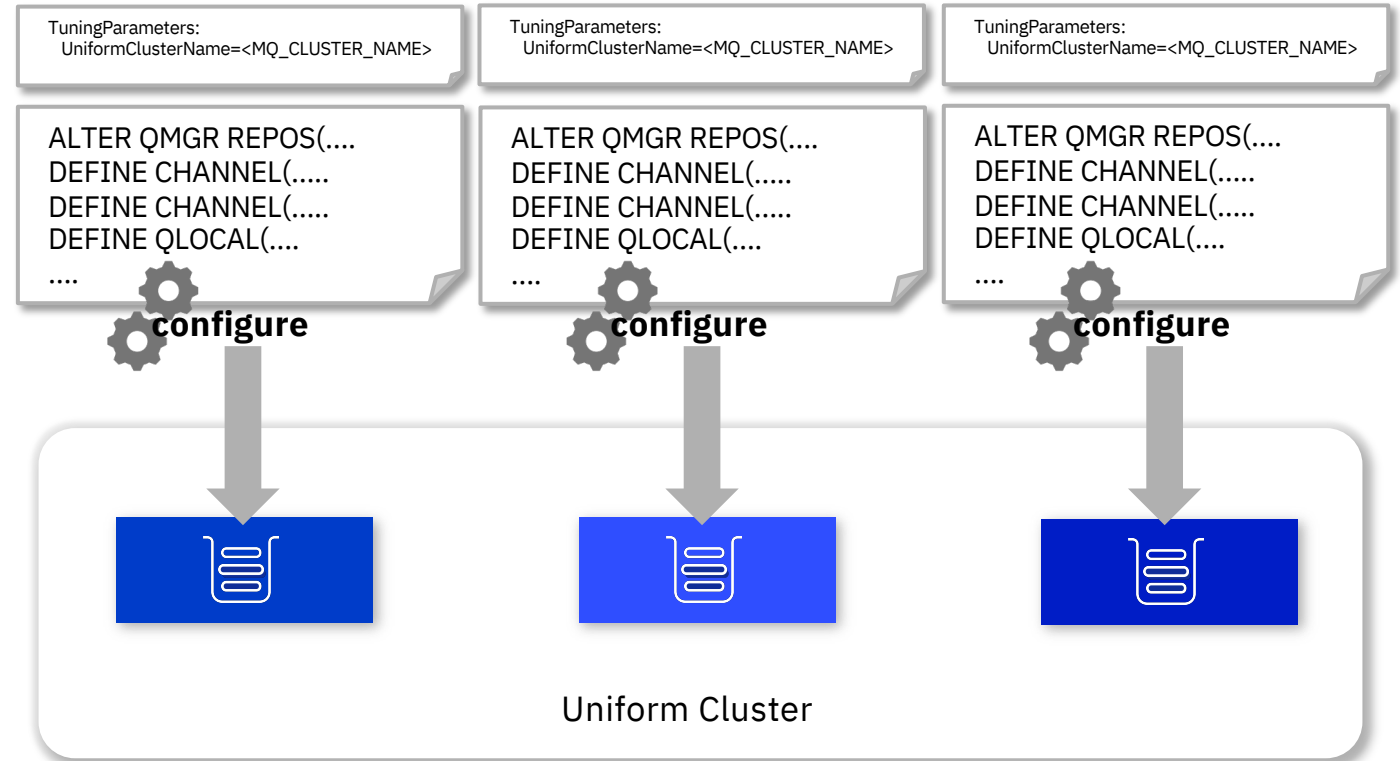
9.1.4 CD adds **.NET** and **XMS .NET** support and speeds up the rebalancing process



Uniform cluster administration

IBM MQ 9.1.2 CD

Uniform clusters currently leave the uniformity to you

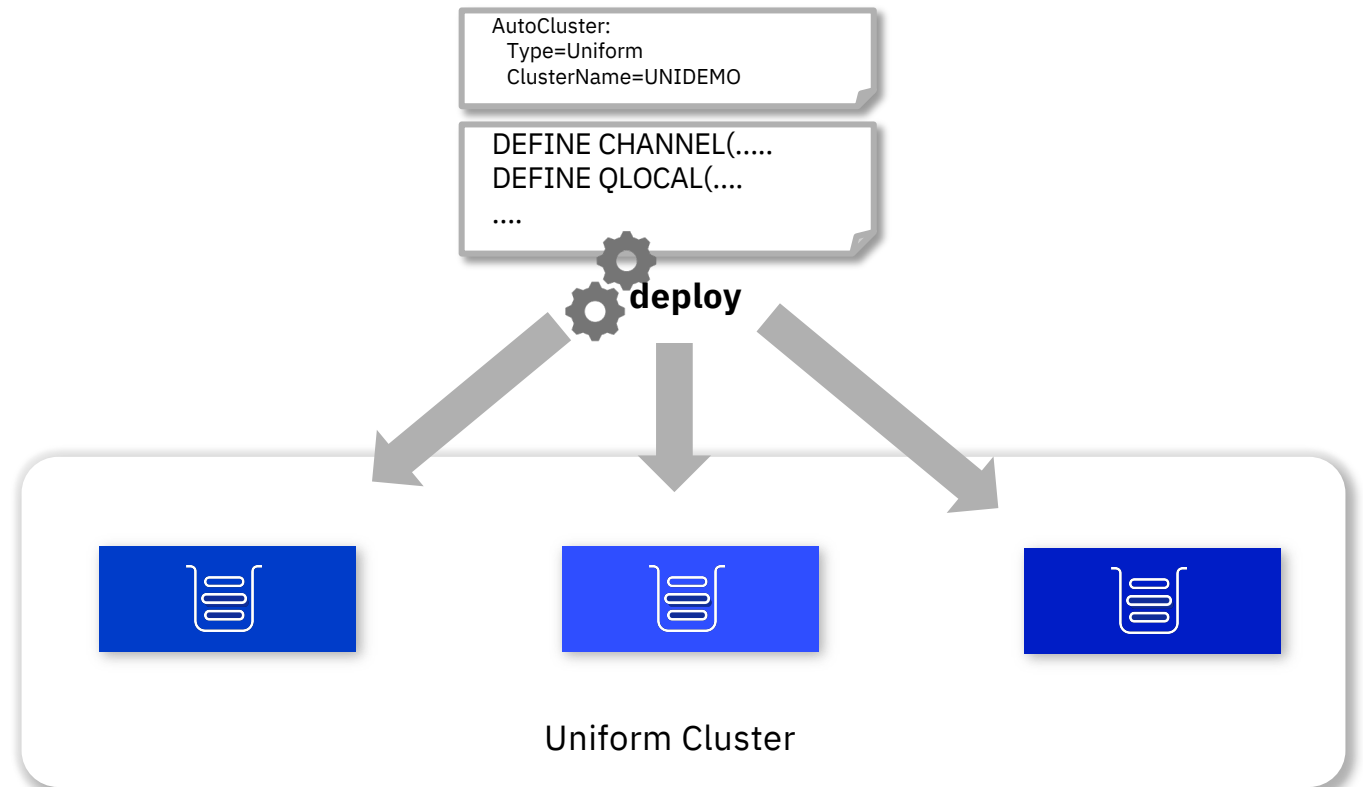


Push one set of configuration into each queue manager in the uniform cluster

This will also add the concept of deploy time configuration to distributed MQ

Create/start time ini and MQSC configuration ingestion

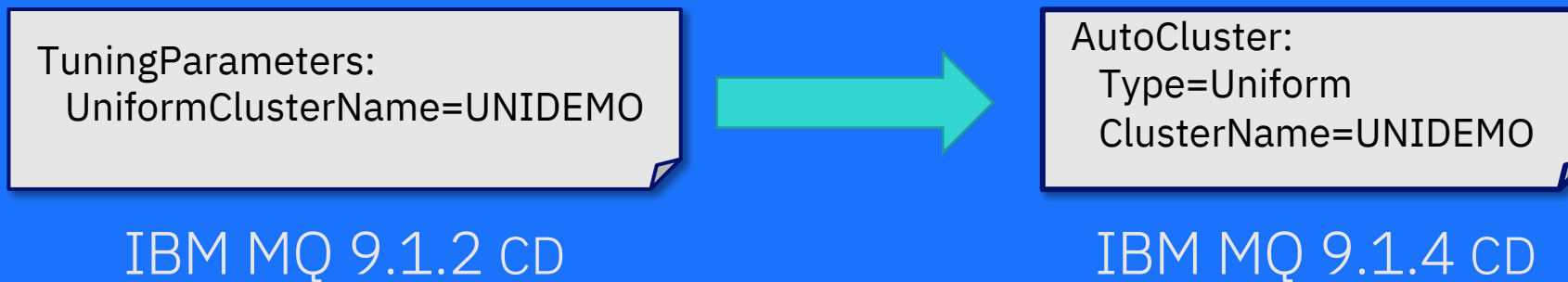
Extended insert expansion support

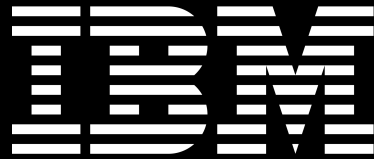


Simplified setup for Uniform clusters

The mechanism for creating a Uniform Cluster has changed:

- New Dedicated qm.ini Stanza and attributes.





A short break

Security Improvements

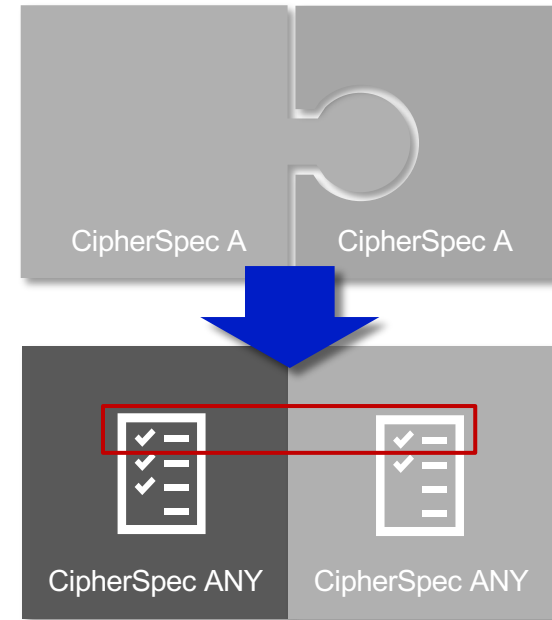


Managing channel CipherSpecs

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



Controlling enabled Ciphers

In 9.1.1 we added capability to provide a custom list of support CipherSpecs:

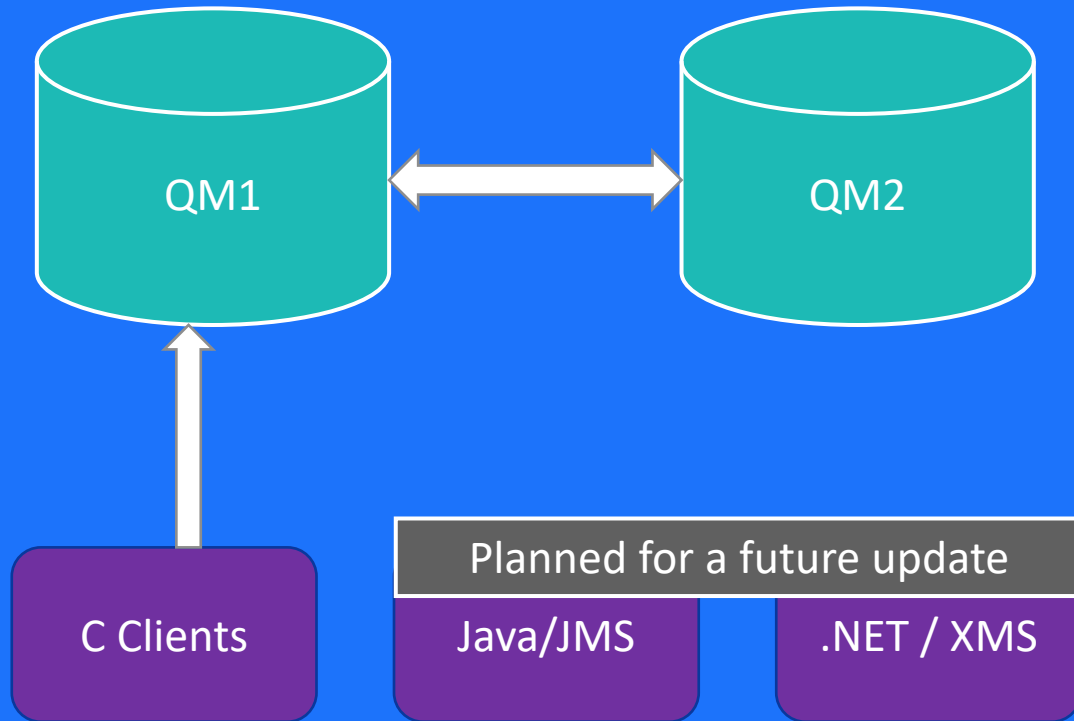
- Can be used to re-enable deprecated CipherSpecs
- Can be used to disable CipherSpecs not allowed by company policy.



SSL:

```
AllowedCipherSpecs=ECDHE_ECDSA_AES_128_CBC_SHA256,  
                    ECDHE_RSA_AES_256_CBC_SHA384,  
                    ...
```

TLS 1.3 Support



TLS 1.3 communication is available in:

- Queue Manager to Queue Manager communications
- C Clients with local bindings
- C Clients with network connections

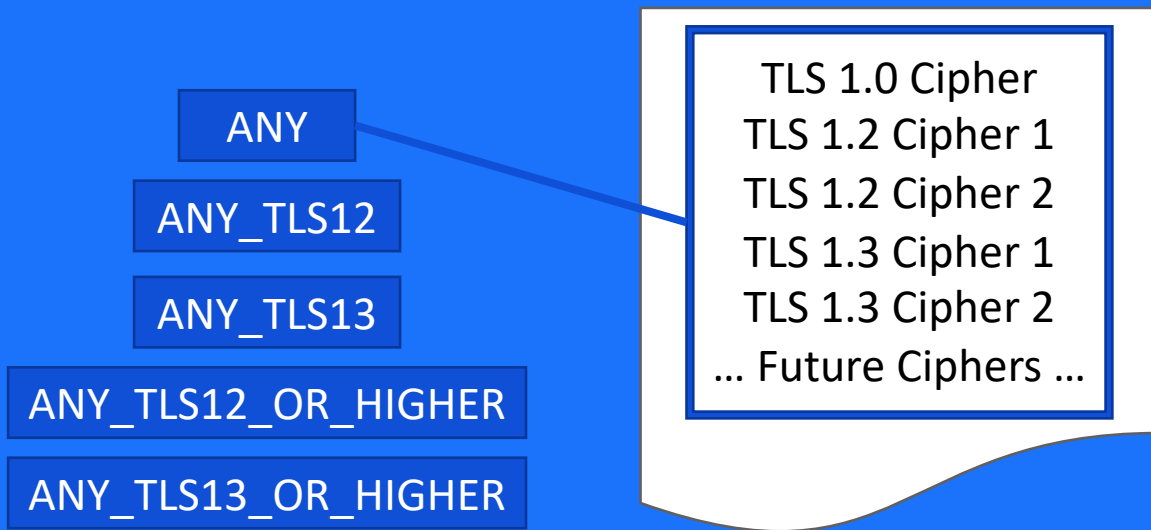
Support for 5 new TLS 1.3 CipherSpecs

Ability to enable/disable TLS 1.3

TLS 1.3 support is dependant on the cryptographic provider

In future continuous delivery (CD) releases, IBM intends to deliver MQ for z/OS support for the TLS 1.3 cryptographic protocol where it is available by the z/OS operating system

New Alias CipherSpecs



4 new Alias CipherSpecs:

- ANY
- ANY_TLS13
- ANY_TLS12_OR_HIGHER
- ANY_TLS13_OR_HIGHER

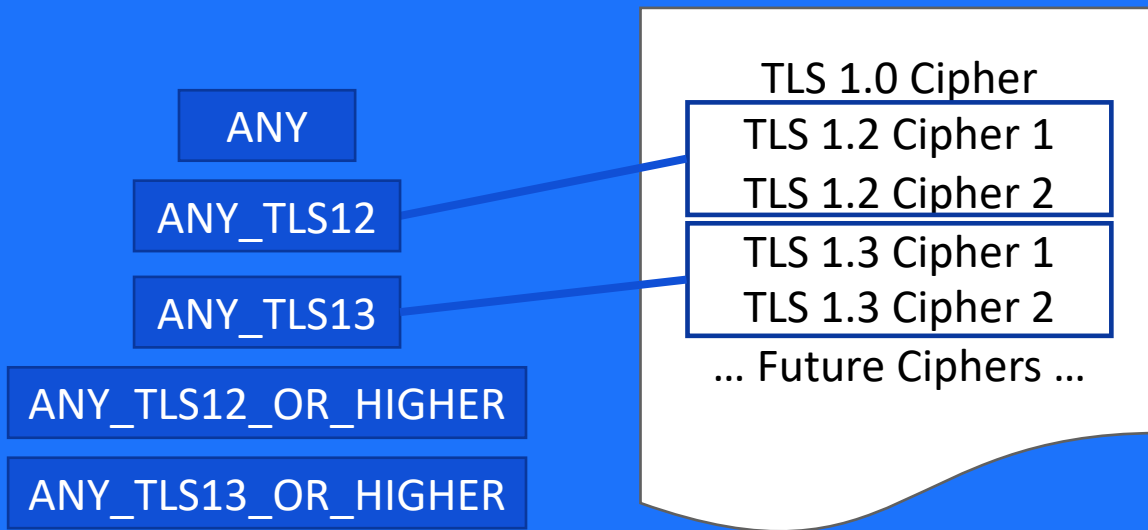
Allows automatic support of new Ciphers in higher protocol versions.

Recommended to set on the server and use Client for fine grained control:

e.g. ANY set on SVRCONN CHANNEL.

TLS_RSA_WITH_AES_128_CBC_SHA256 set on Client.

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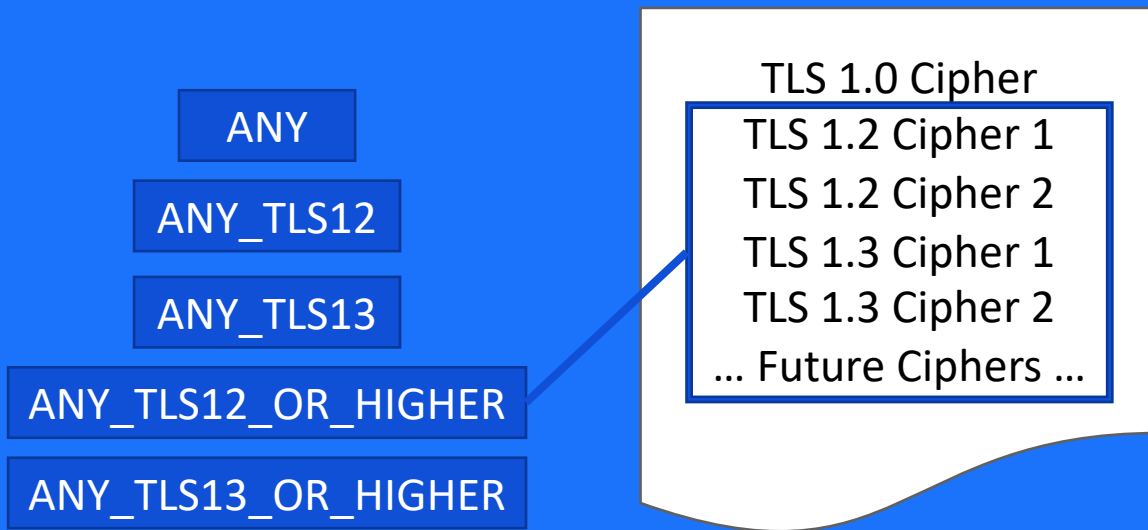
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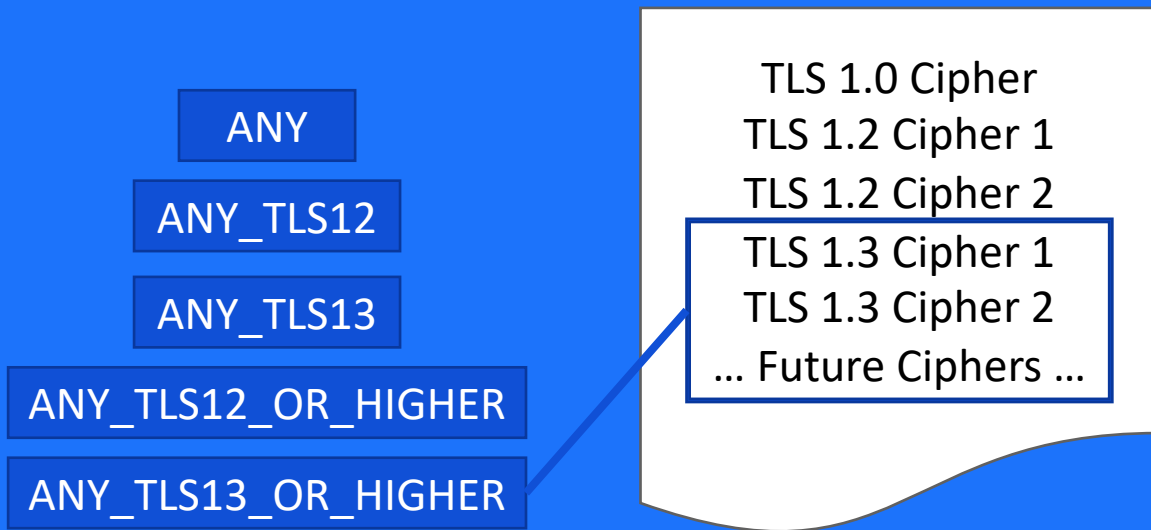
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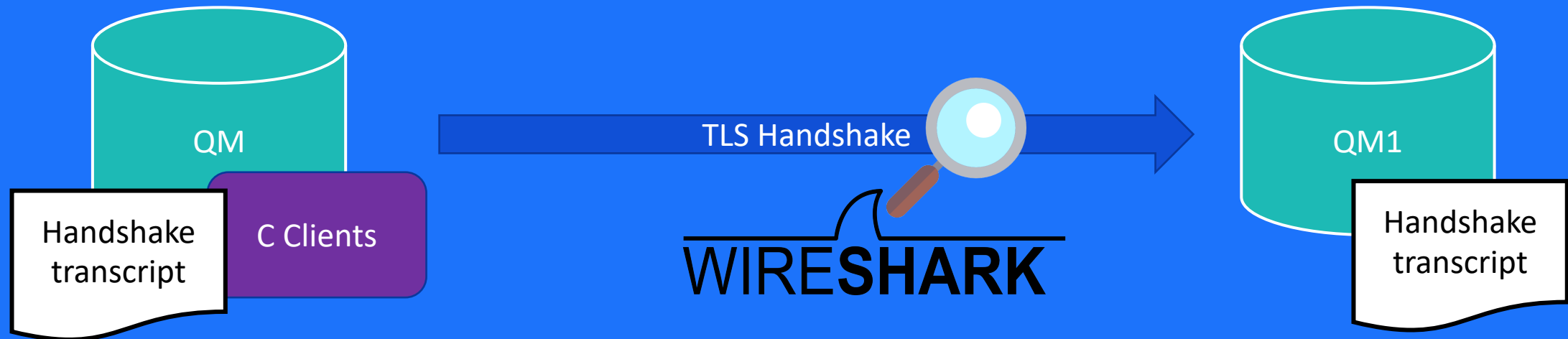
e.g. ANY set on SVRCONN CHANNEL.

TLS_RSA_WITH_AES_128_CBC_SHA256 set on Client.

TLS Handshake Transcript

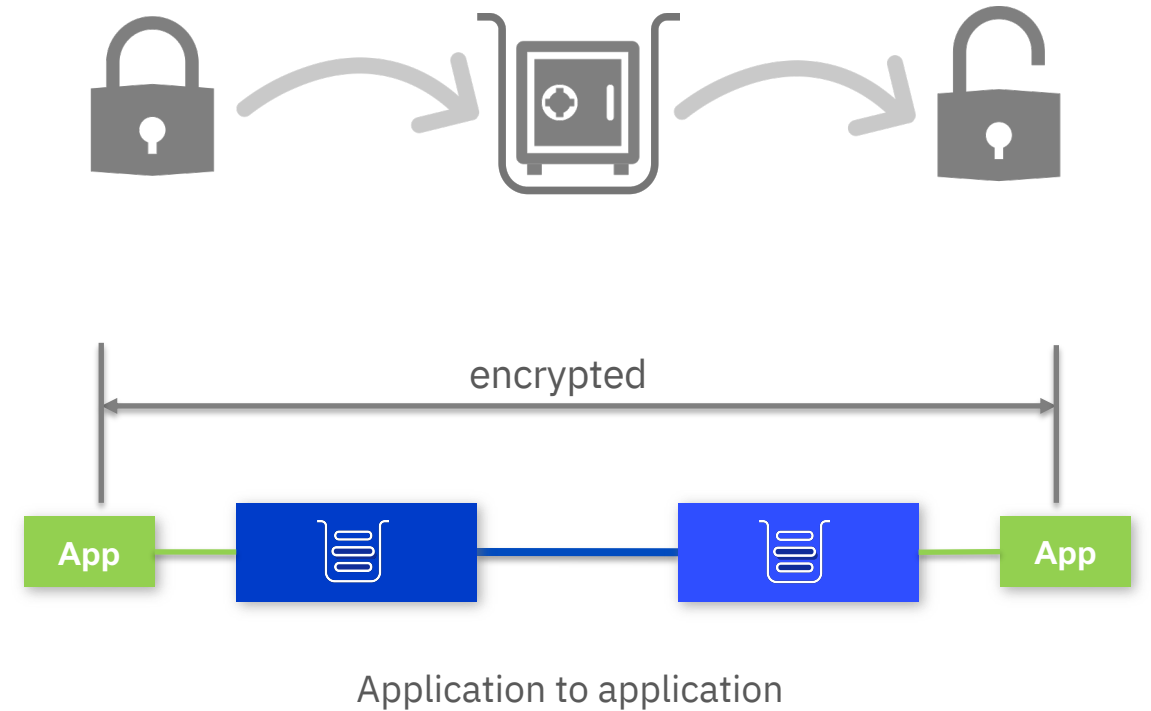
GSKit can be asked to provide a transcript of a TLS handshake

- We will write this to trace:
 - Only written if trace is running
 - {Default} Only if TLS Handshake fails
- Output to the amqrmppa or client application trace.



Advanced Message Security

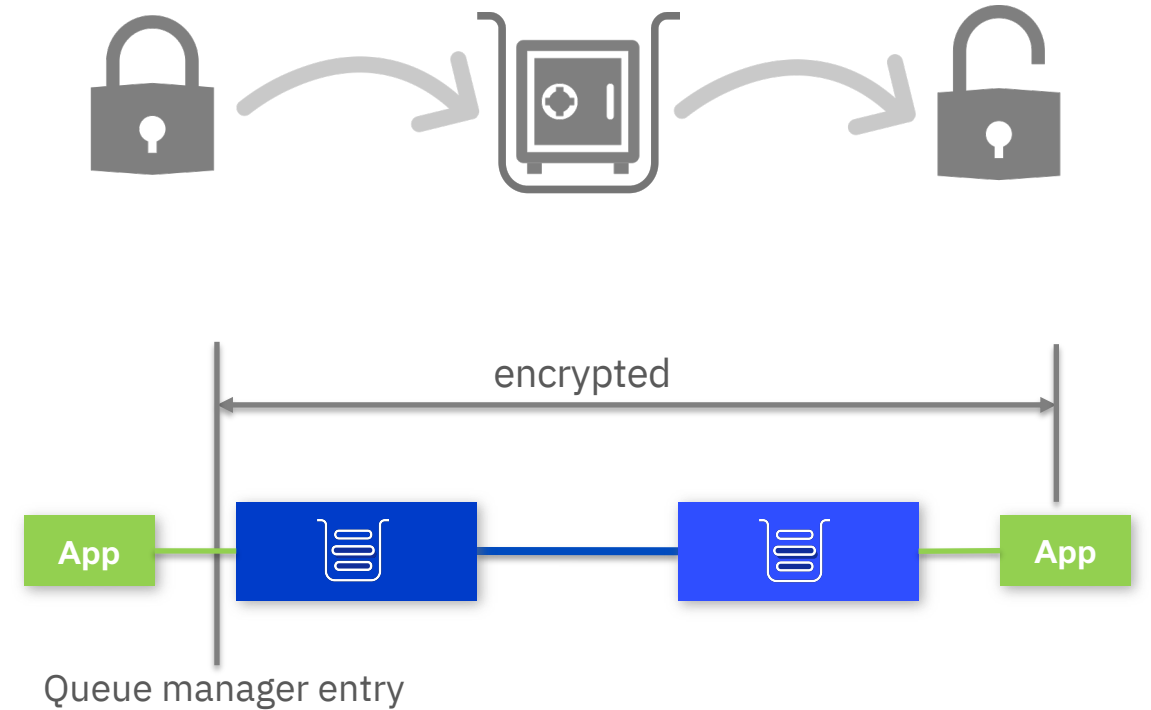
End-to-end application-to-application encryption may give you the highest level of security, but it's not always possible to use. For example, where the applications are not AMS enabled or where the originators or recipients of the messages are outside of your domain



Advanced Message Security

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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



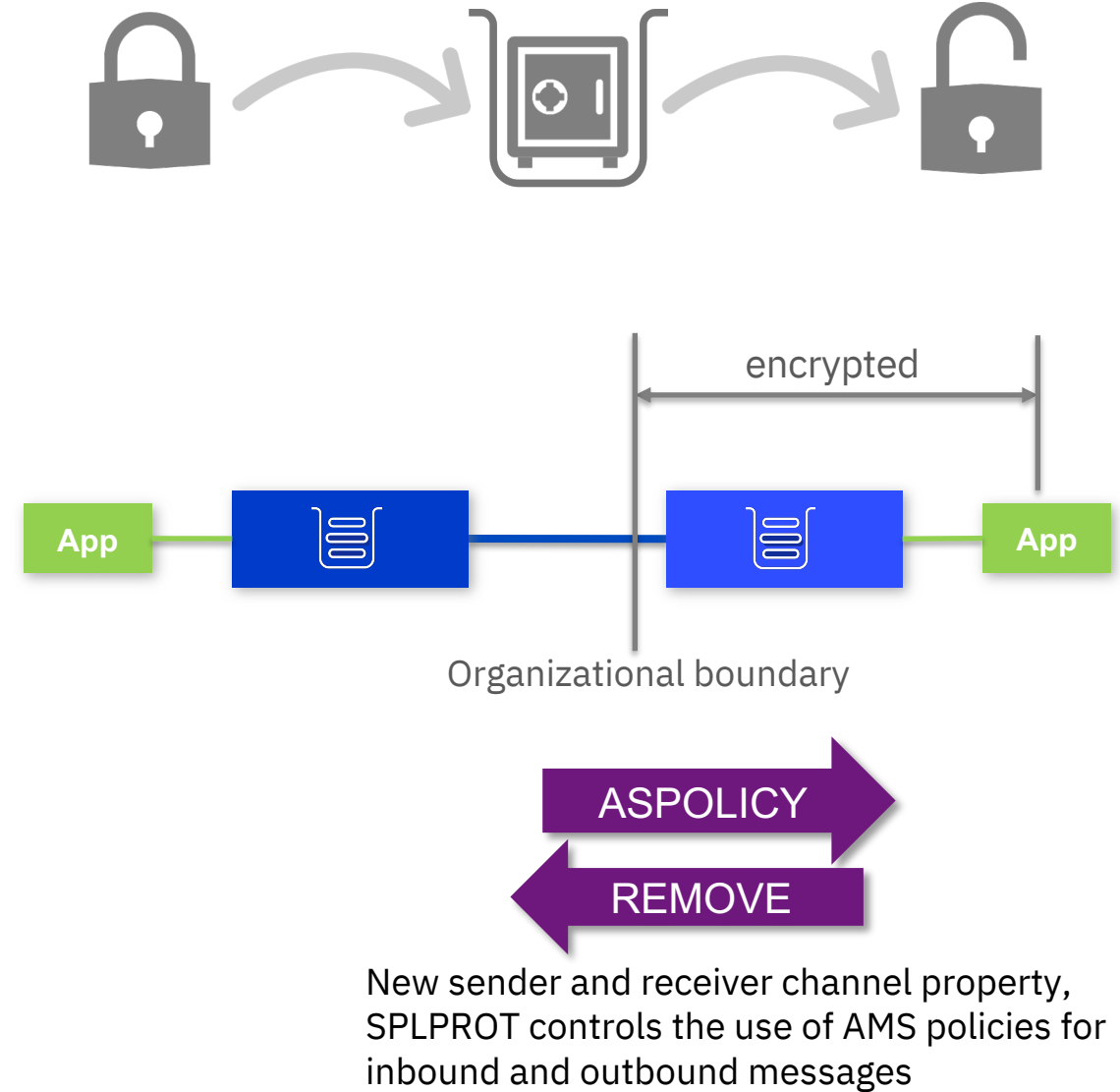
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MQ on Distributed has always had client level interception to apply AMS policies once messages reach or leave their first queue manager

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

There is a statement of direction for adding this function on distributed platforms

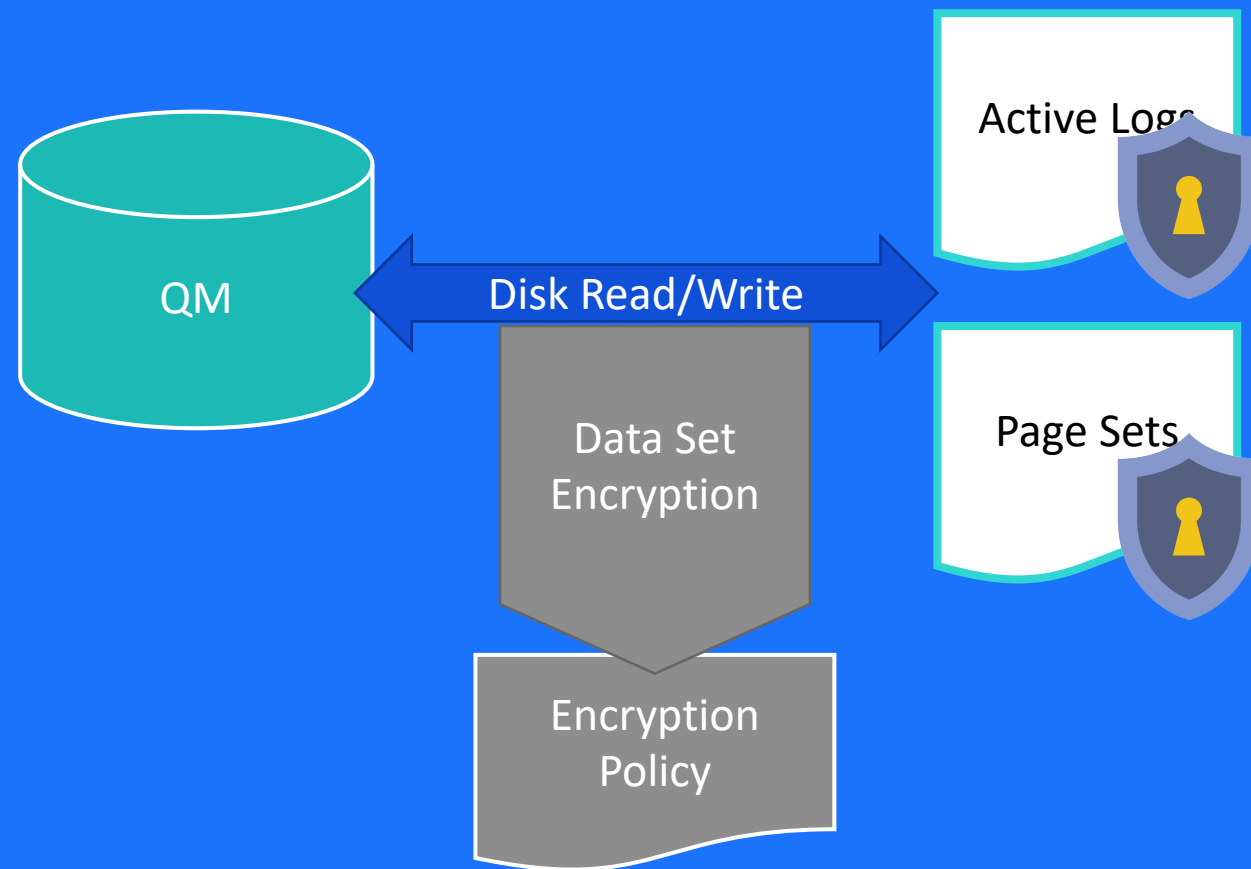


Data Set Encryption

Support for Z Data Set encryption has been extended. Previously only the following MQ data sets could be protected:

- BSDS
- CSQINP
- Archive Logs

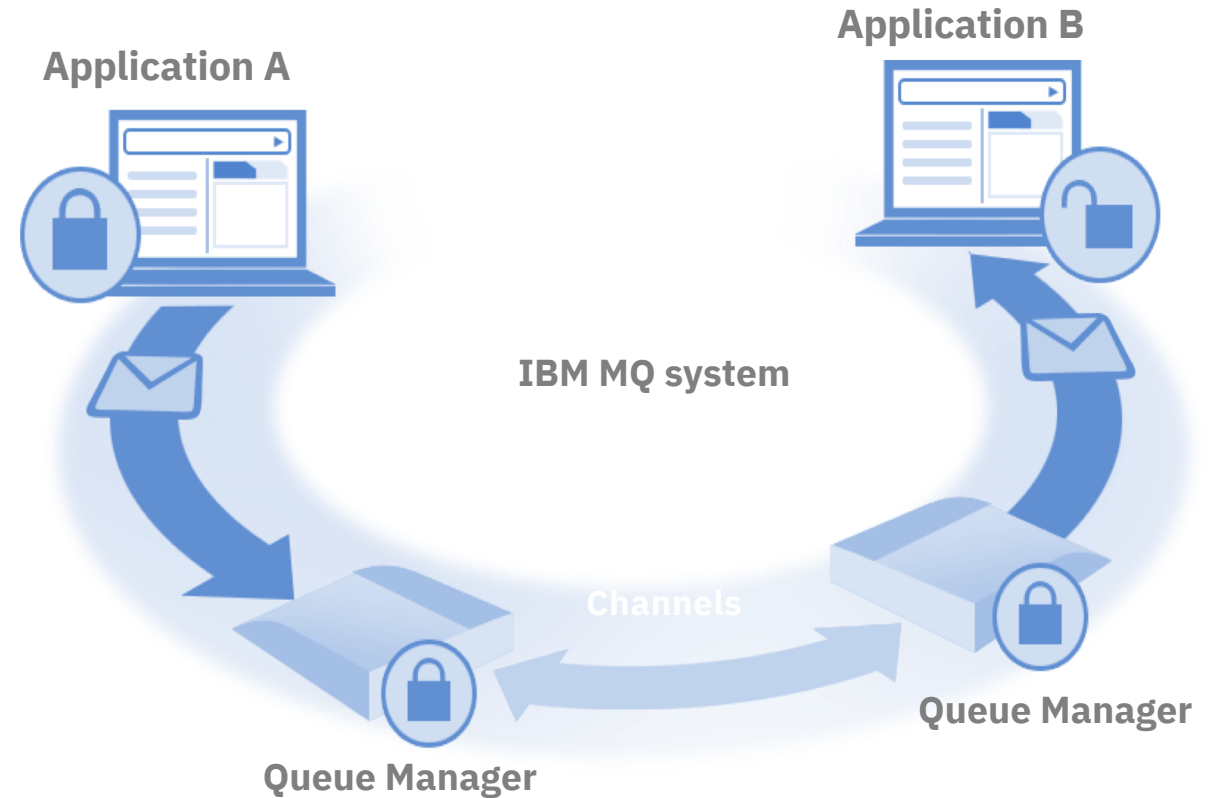
Now, allows the encryption of data contained in active logs and page sets.



Data set encryption: what about AMS?

AMS and data set encryption are complementary technologies. For some scenarios dataset encryption will be enough, for others AMS, or AMS plus dataset encryption will be needed

	TLS	Dataset encryption	CF Encryption	AMS
Protected on the network	✓	✗	✗ ***	✓
Protected on disk	✗	✓	✗	✓
Protected in qmgr/chinit memory	✗	✗	✗	✓
Protected in CF	✗	✗	✓	✓
Protected end to end	✗	✗	✗	✓
Transparent to application	✓	✓	✓	✓



NB: AMS is more efficient than data set encryption but can be more complicated to configure

Statement of direction

In future continuous delivery (CD) releases, IBM intends to deliver MQ for z/OS support for the TLS 1.3 cryptographic protocol where it is available by the z/OS operating system

The next Long Term Support (LTS) release of IBM MQ and IBM MQ Appliance will be the last to provide SSL v3 and TLS 1.0 support. IBM intends to remove support in a future CD release



Additional
improvements



MQIPT updates

The MQ Internet Pass Thru allows messaging solutions to be implemented to remote sites over the internet

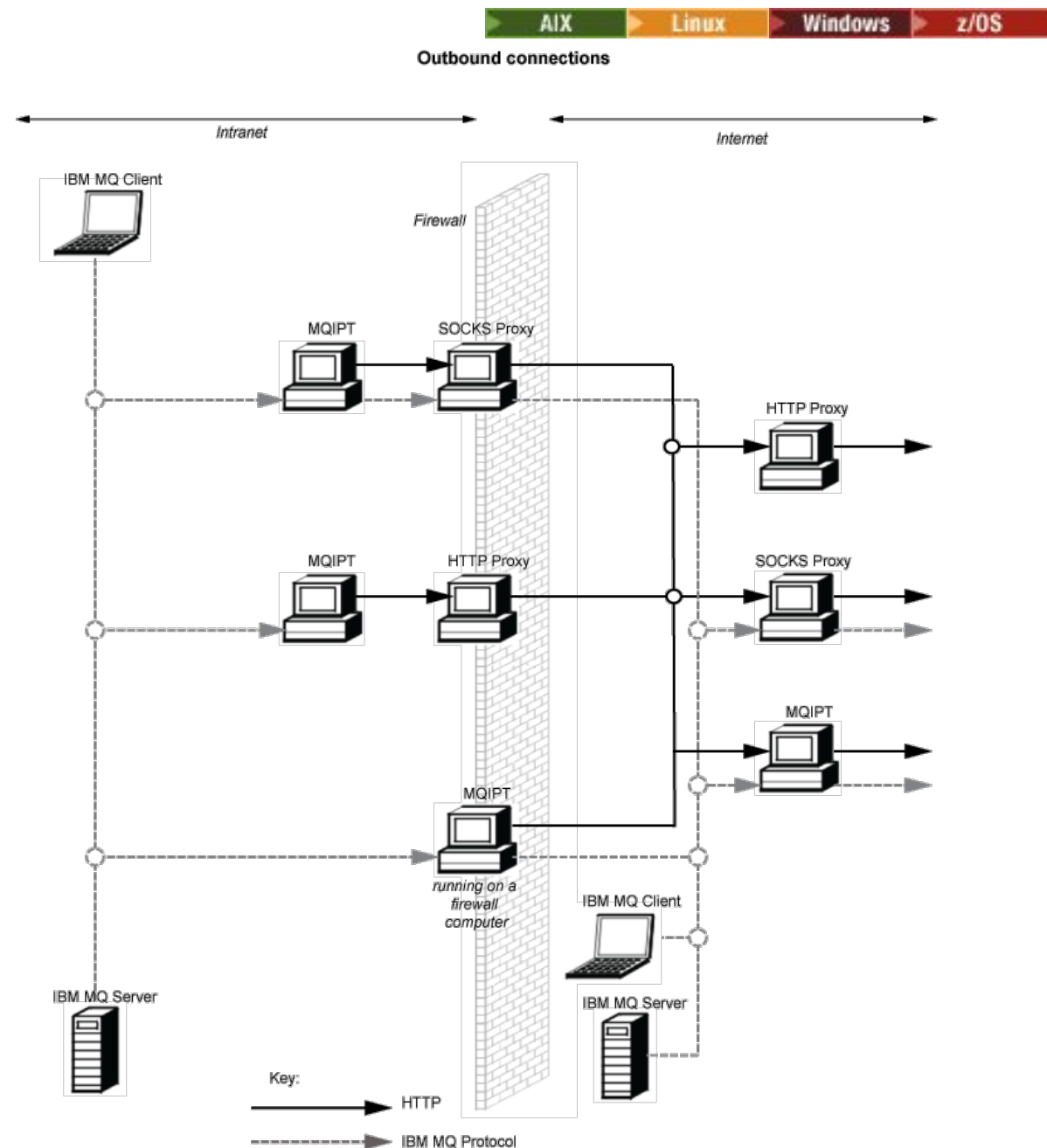
Provides an MQ aware proxy which can optionally be configured for HTTPS tunneling

MQIPT used to be provided via support pack MS81

From 9.1.4 MS81 will be provided on FixCentral and will benefit from improved currency

- Updated to Java 8
- Old SSL/TLS protocols disabled
- TLS 1.2 supported

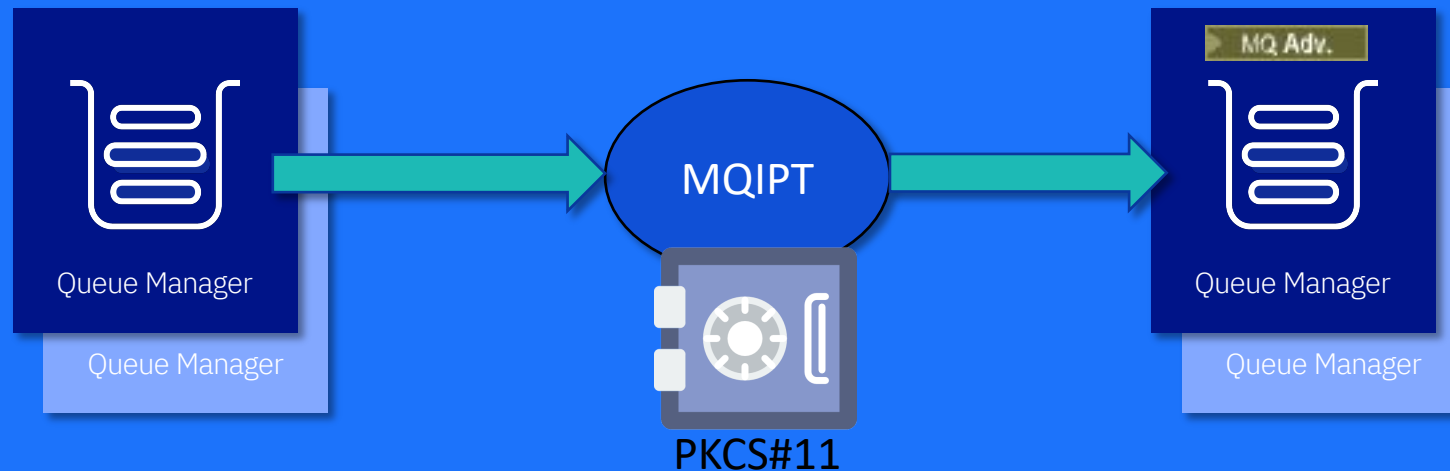
MS81 will reach EOS in April next year



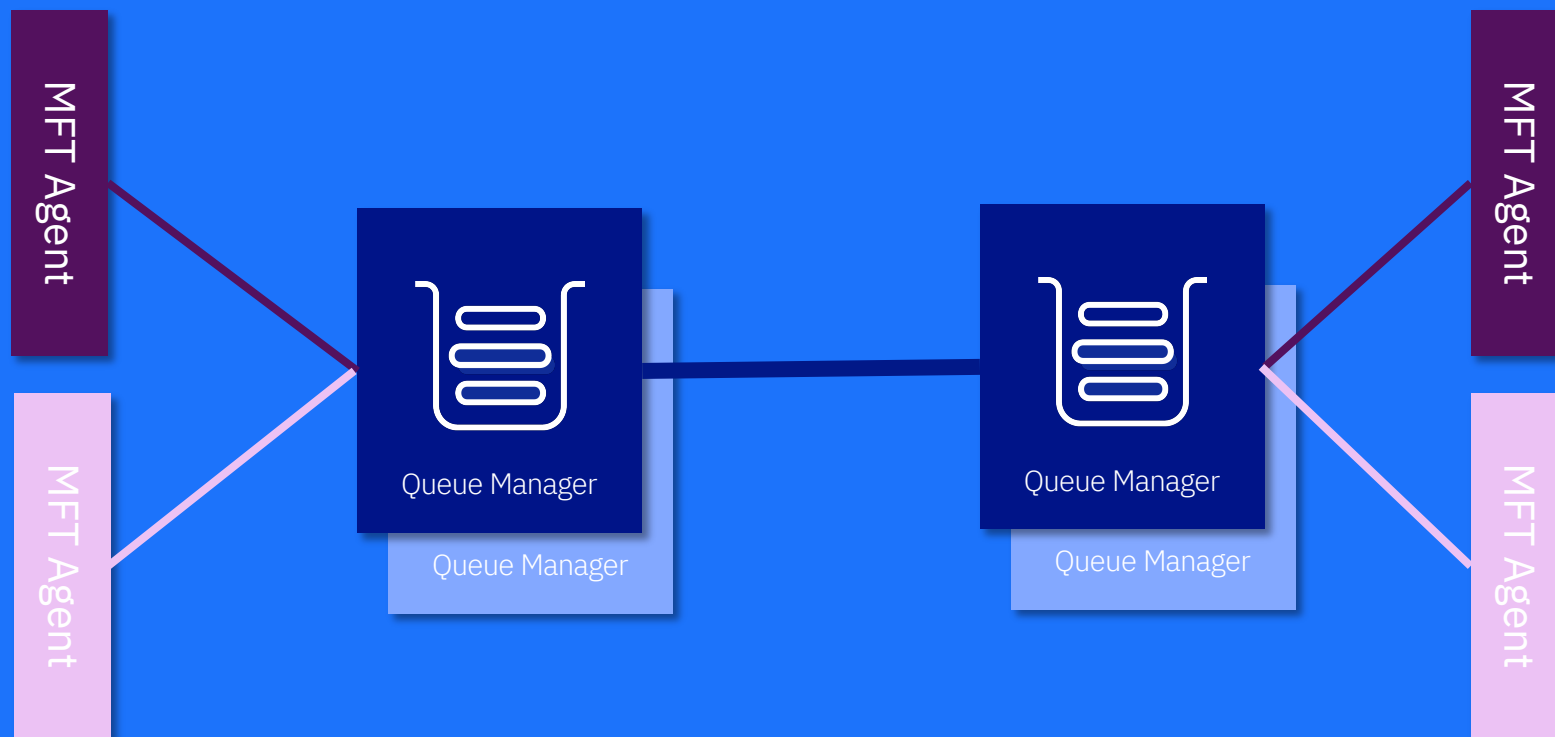
MQIPT HSM Support



MQIPT can now support PKCS#11 HSM devices.
Requires one side of the communication to be a MQ Advanced Queue Manager



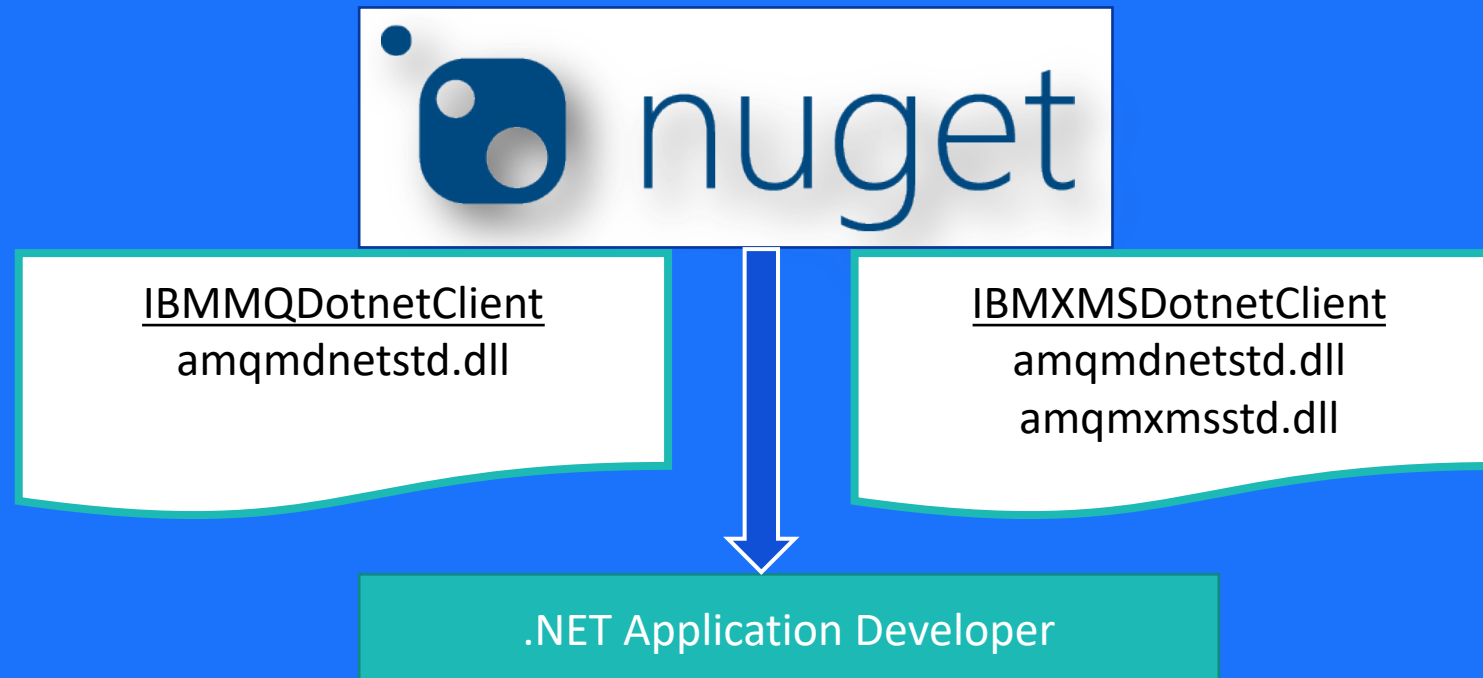
Highly available MFT agents



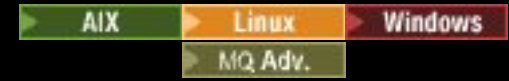
IBM MQ Classes for .NET and XMS .NET Standard in NuGet repo



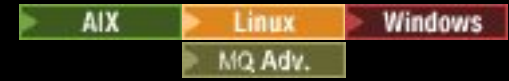
AIX Linux Windows



New support for the IBM MQ Bridge to blockchain



Use of Aspera gateway streaming for IBM MQ messages



Aspera / FASP.io

Accelerates/improves data transport of any existing desktop/server or server/server TCP-based workflows

New FASPV4 protocol

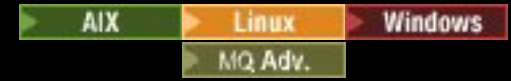
- Lightning speed regardless of the distance and network conditions
- Bidirectional
- Single UDP port and DTLS

MOVING A 10GB FILE				
	Network Bandwidth	Across US	US - Europe	US - Asia
FTP	100 Mbps	10-20 Hours	15-20 Hours	Impractical
	1 Gbps			
	10 Gbps			
Aspera FASP®	100 Mbps	14 Min	14 Min	14 Min
	1 Gbps	1.4 Min	1.4 Min	1.4 Min
	10 Gbps	8.4 Sec	8.4 Sec	8.4 Sec



Statement of Direction: Extend FASP.io Gateway entitlement to MQ Advanced for z/OS VUE. MQ Advanced and MQ Appliance queue managers are entitled to connect to the FASP.io Gateway wherever it is deployed.

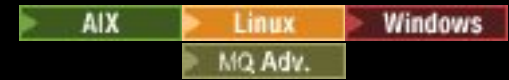
Use of Aspera gateway streaming for IBM MQ messages



Entitled users can obtain the gateway from Passport Advantage for use on x86-64 Linux environments

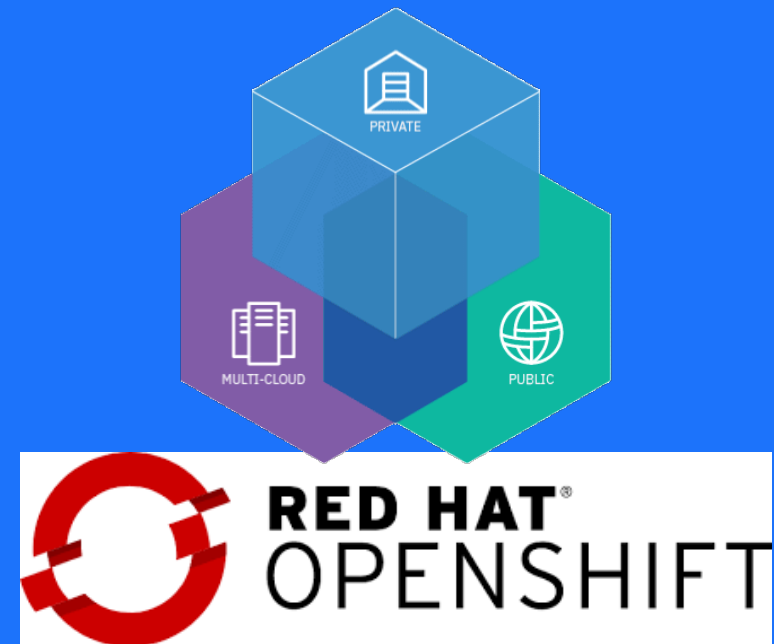
Statement of Direction: Extend FASP.io Gateway entitlement to MQ Advanced for z/OS VUE. MQ Advanced and MQ Appliance queue managers are entitled to connect to the FASP.io Gateway wherever it is deployed.

OpenShift support for the IBM MQ Advanced certified container image



Previously to run IBM MQ Certified Container on Red Hat OpenShift you required IBM Cloud Private

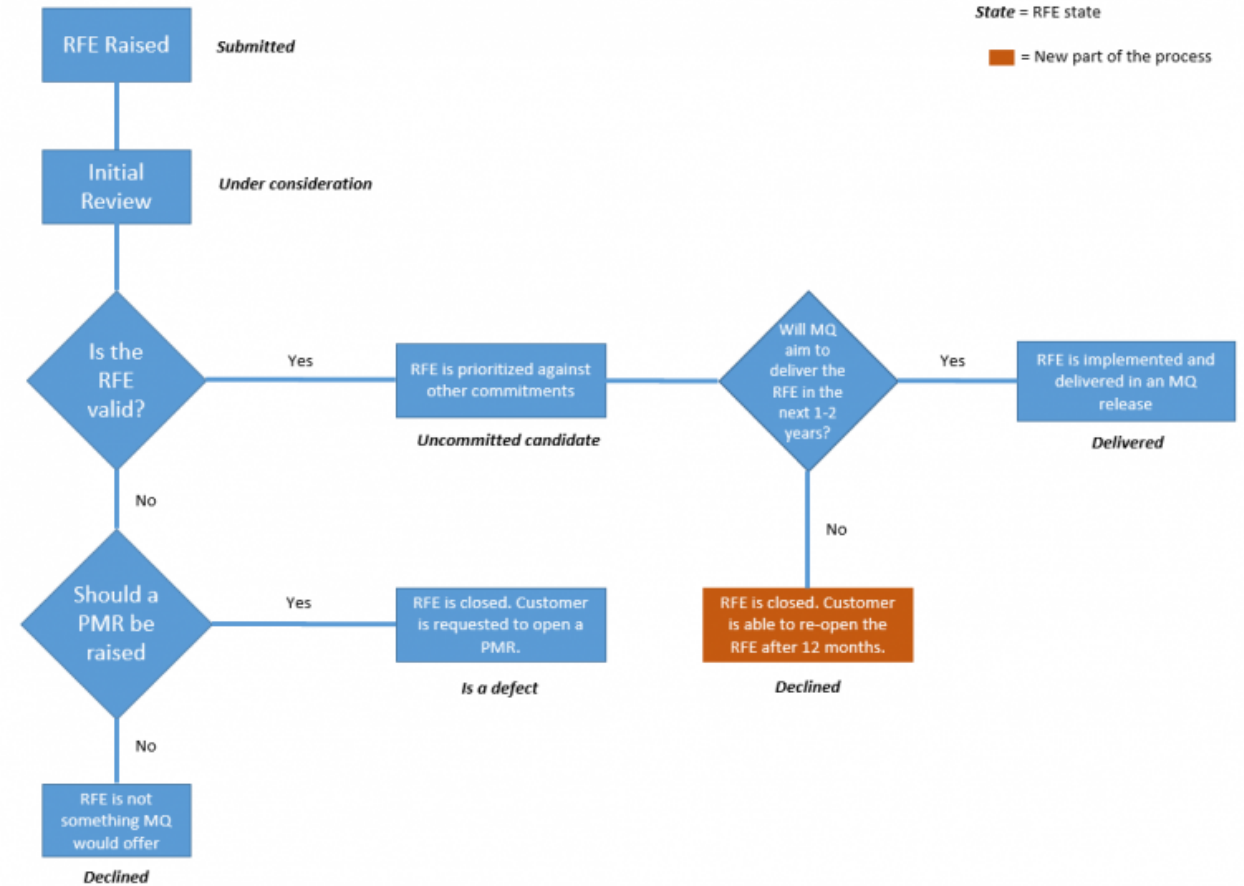
IBM MQ Certified Container now supports OpenShift native deployments.



New MQ RFE process

Steps

- RFE gets **submitted** against MQ
- RFE gets reviewed by development team
- RFE gets **declined** if deemed to be something that we would never do
- RFE gets returned as **a defect** if it should be addressed by raising a case
- If the RFE is valid, but is unlikely to be delivered in the next year or so it gets **declined**
- Otherwise RFE is an **uncommitted candidate**
- Some of the RFEs get **delivered** in an MQ release

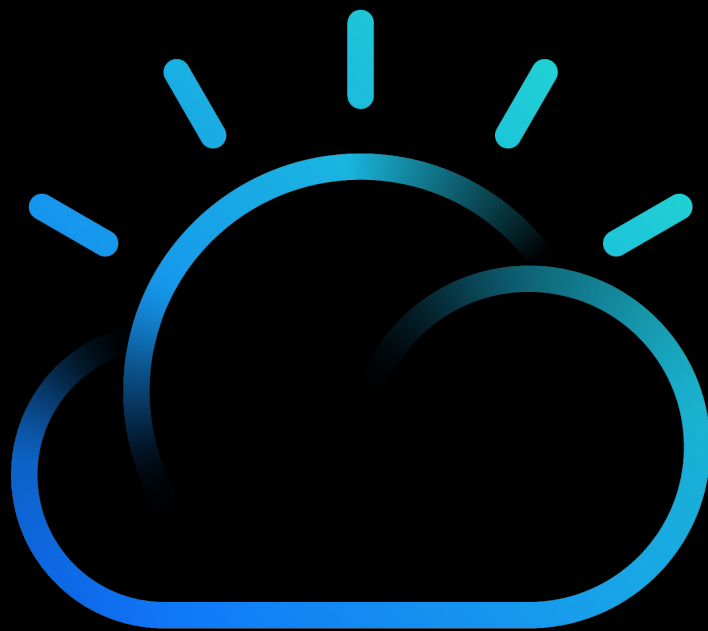


<https://developer.ibm.com/messaging/2019/10/21/reviewing-the-mq-rfe-request-for-enhancements-process/>

Questions?



Thank You



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