


#ibminternconnect

IBM MQ update including MQ and security

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InterConnect2015

The Premier Cloud & Mobile Conference

February 22 – 26

MGM Grand & Mandalay Bay | Las Vegas, Nevada

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IBM Messaging – Market segments



Deliver Messaging Backbone for Enterprise

Focus on traditional MQ values, rock-solid enterprise-class service, ease-of-operation, breadth of platform coverage, availability, z/OS exploitation



Capture Big Data from Mobile and Internet of Things

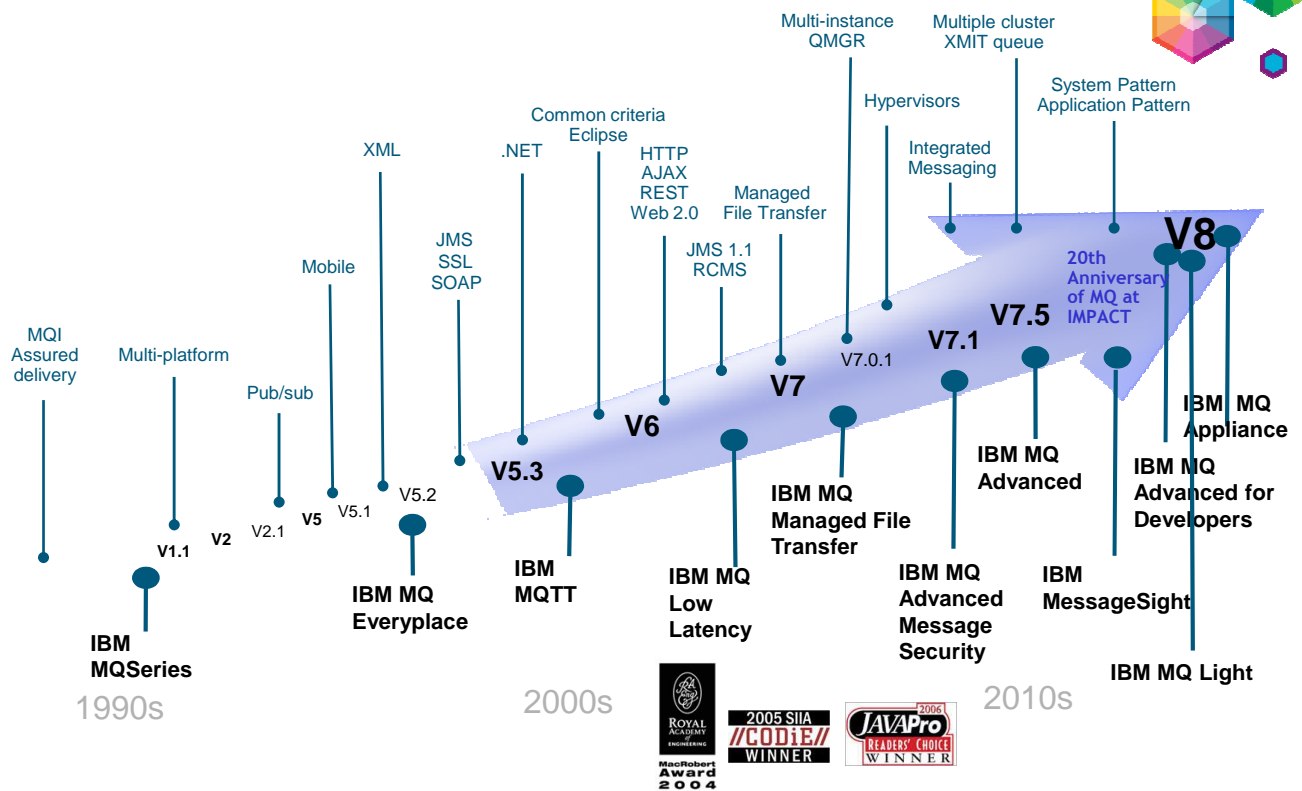
Focus on Internet-scale events, m2m device enablement, zero-admin, security and privacy, feed into real-time analytics, location-based notifications



Enable Developers to build more scalable, responsive applications

Focus on new app dev use cases, breadth of languages, ease-of-deployment, lightweight services, integration with developer frameworks

Timeline



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End of Service for old platforms and versions

- MQ V7.0.0 and V7.0.1 for multiplatforms – EOM, EOS effective **September 2015**
 - V7.0 will have had more than 7 years of support
- MQ V7.0.1 for z/OS – EOM, EOS effective **September 2015**
 - V7.0 .0 already out of service
- MQ V3 for VSE – EOM, EOS effective **September 2015**
 - Extended support contracts available
- MQ V6 for OpenVMS: EOS effective **April 2016**

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MQ Appliance

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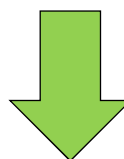
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Introducing IBM MQ Appliance



- The scalability and security of IBM MQ V8
 - Integrates seamlessly into MQ networks and clusters
 - Familiar administration model for administrators with MQ skills
- The convenience, fast time-to-value and low total cost of ownership of an appliance
- Ideal for use as a messaging hub running queue managers accessed by clients, or to extend MQ connectivity to a remote location
- General availability 13 March 2015



| Stream | 09:30 | 10:30 | 11:00 | 12:00 | 12:30 | 13:30 | 14:30 | 15:30 | 16:00 | 17 |
|-----------|---|--------|------------------------------|------------------------|-------|--|----------------------------|--------|---------|----|
| Messaging | IBM MQ update including MQ and security | Coffee | IBM MQ and High Availability | Meet the Experts / Q&A | Lunch | Introduction to the new IBM MQ Appliance | IBM MQ, Cloud and MQ Light | Coffee | (empty) | CI |

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MQ News




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IBM MQ V8 delivering best in class enterprise messaging



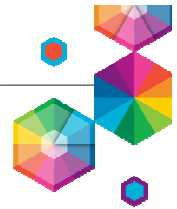
| <i>Platforms & Standards</i> |  <i>Security</i> |  <i>Scalability</i> |  <i>System z exploitation</i> |
|--|--|---|---|
| 64-bit for all platforms | Userid authentication via OS & LDAP | Multiplexed client performance | 64-bit buffer pools in MQ for z/OS means less paging, more performance |
| Multiple Cluster Transmit Queue on all platforms | User-based authorisation for Unix | Queue manager vertical scaling | Performance and capacity |
| Support for JMS 2.0 | AMS for IBM i & z/OS | Publish/Subscribe improvements | Performance enhancements for IBM Information Replicator (QRep) |
| Improved support for .Net and WCF | DNS Hostnames in CHLAUTH records | Routed publish/subscribe | Exploit zEDC compression accelerator |
| SHA-2 for z, i & NSS | Multiple certificates per queue manager | | SMF and shared queue enhancements |

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MQ V8 Dates



- Announce: 22 April 2014
- Availability:
 - 23 May 2014 (eGA Distributed)
 - 13 June 2014 (z/OS and pGA Distributed)
- FP1 and FP2 for Distributed platforms now available
- On z/OS, PI19721 for migration PTF
 - Also recommended PI19991 QTYPE APAR

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IBM MQ V8 summary

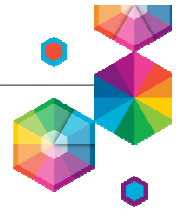


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- Apart from showing a summary of the items in IBM MQ V8 which we will go through on the next few pages, the title of the table page also highlights one other change – our name.
- IBM WebSphere MQ is now known as IBM MQ.
- Please take careful note of the various dates on this page. Various older versions are going End of Service.

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Platforms



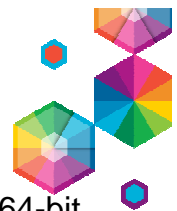
- 64-bit server support for all queue manager platforms
 - Completion of platform coverage by adding Windows 64-bit engine
 - Requires Windows 7 or later
- New MQ platform: Power Linux little-endian
 - Part of a broader portfolio of IBM software for this platform
- Statement of Direction for MQ V8 on HP NonStop
 - "IBM® intends to introduce a new release of IBM MQ for the HP NonStop platform that is based on IBM MQ V8. It is intended for this offering to be available for both the HP Integrity NonStop servers on Intel™ Itanium™, and compatible also for the new HP NonStop platform on x86 architecture. It is planned for this offering to be designed to deliver the capabilities of the current IBM MQ V8 product, but with optimizations for the HP NonStop platform, and will work with other IBM MQ and WebSphere® MQ offerings."
 - <http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=AN&subtype=CA&htmlfid=897/ENUS214-535&appname=USN>

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MQ platforms

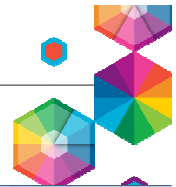


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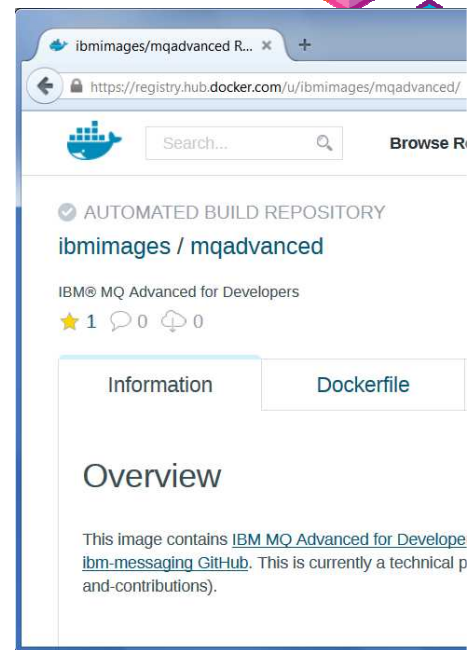
- This release has all the Distributed queue managers fully supporting 64-bit operations. The final remaining platform had been Windows, but now the queue manager runs as 64-bit processes. Existing 32-bit applications continue to work of course, but this should bring additional capacity and scalability to the queue managers on that OS. The lowest level of Windows now supported is Windows 7; older versions are not supported. A client-only package for 32-bit versions of Windows is provided, but the qmgr requires the 64-bit OS.

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Platforms - MQ in Docker




- A technical preview Docker image for MQ Advanced for Developers is now available on Docker Hub.
 - <https://registry.hub.docker.com/u/ibmimages/mq/>
- Runs an MQ queue manager inside a container, isolated from the rest of your system
- You can create your own customized image, using this image as a parent, for example, to:
 - Run MQSC commands to configure the queue manager
 - Add users and groups
- This is a technical preview and we would like to receive feedback

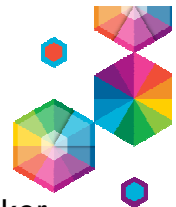


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MQ in Docker

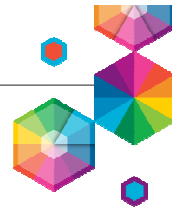


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- There is now an MQ Advanced for Developers technical preview Docker image available on Docker Hub.

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MQ product consistency



- Multiple Cluster Transmit Queue availability on z/OS and IBM i platforms
 - Permits separate monitoring of cluster traffic and prevents one message stream from affecting throughput of others
- Integration of AMS and MFT capabilities into z/OS and IBM i platforms
 - Previously separately installable products
- Client Attach Feature no longer needed on z/OS
 - Single price includes support for clients

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MQ product consistency

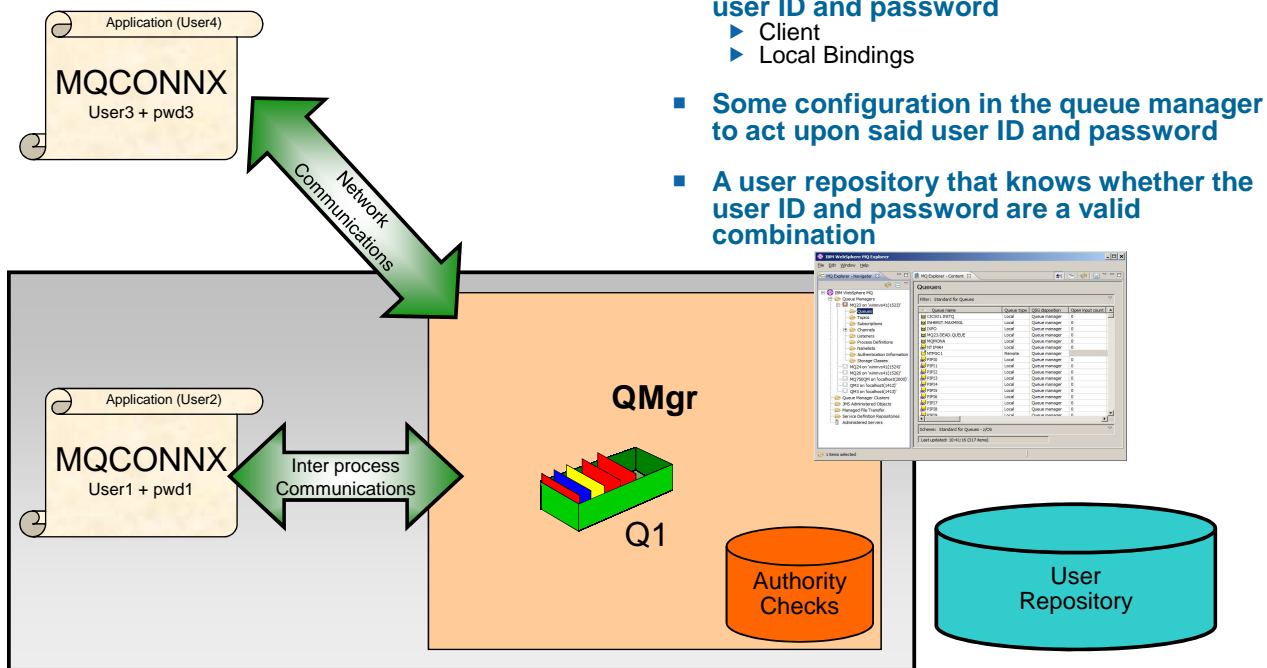
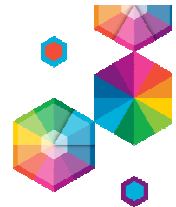


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- Another big feature of V7.5 was the closer integration of AMS and File Transfer (MFT). As we will see later, this pattern has been followed on z/OS and IBM i. On z/OS the features are still separately licensed, but are better integrated than previously.
- On z/OS, the CAF has been removed both as an installable feature and as a licensing option. All V8 queue managers are now capable of having any number of MQ clients directly connected. For customers who previously used the lack of a CAF to block client connections, we would strongly recommend they look at the other security-related controls such as CHLAUTH and SSL/TLS, or MAXINST values, to continue to prohibit clients. If you extend the number of directly-attached clients in your environment, make sure you first evaluate things such as CPU costs, performance, capacity etc.

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Connection Authentication – What is it?



- The ability for an application to provide a user ID and password
 - ▶ Client
 - ▶ Local Bindings
- Some configuration in the queue manager to act upon said user ID and password
- A user repository that knows whether the user ID and password are a valid combination

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Connection Authentication – What is it? – Notes



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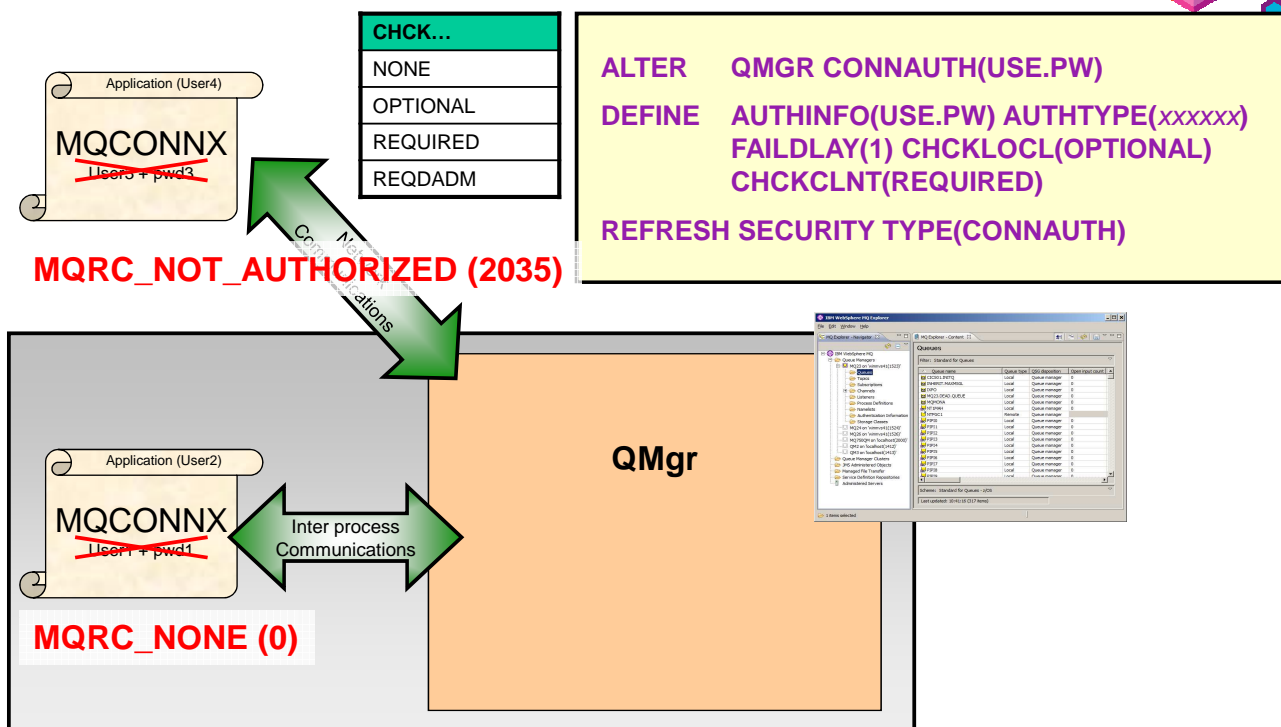
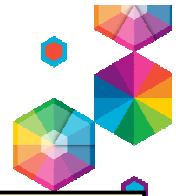
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- This picture shows the landscape we're going to use to discuss various patterns and then the changes in WebSphere MQ V8 in order to support these patterns. Just to ensure everyone is familiar with the parts on the diagram we'll briefly look at them first from left to right.
- On the left of this picture we see applications making connections, one as a client and one using local bindings. These applications could be using a variety of different APIs to connect to the queue manager, but all have the ability to provide a user ID and a password. The user ID that the application is running under (the classic user ID presented to WebSphere MQ) may be different from the user ID provided by the application along with its password, so we illustrate both on the diagram.
- In the middle we have a queue manager with configuration commands and managing the opening of resources and the checking of authority to those resources. There are lots of different resources in WebSphere MQ that an application may require authority to, in this diagram we are just going to use the example of opening a queue for output, but the same applies to all others.
- On the right we have a representation of a user repository – i.e. containing user IDs and passwords, more on this later.

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Connection Authentication – Configuration

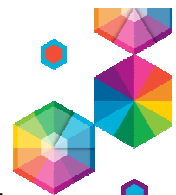


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Connection Authentication – Configuration – Notes

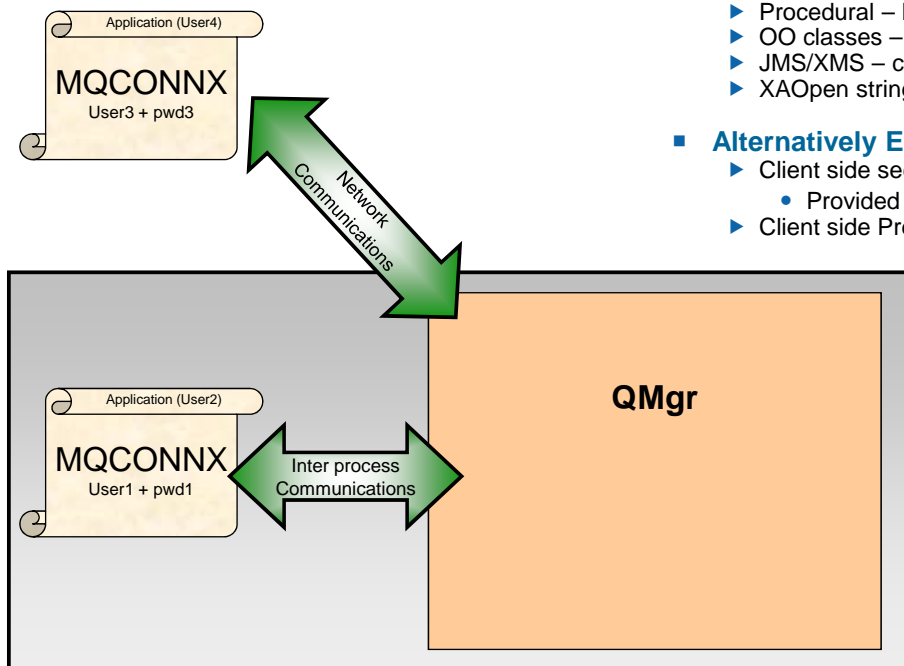


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- We'll start with the basic configuration side of things. How do I turn on this connection authentication feature on the queue manager.
- On the queue manager object there is a new attribute called CONNAUTH (short for connection authentication) which points to an object name. The object name it refers to is an authentication information object – one of two new types. There are two existing types of authentication information objects from earlier releases of WebSphere MQ, these original two types cannot be used in the CONNAUTH field.
- The two new types are similar in quite a few of the basic attributes so we will look at those first. We'll come back to more of the attributes later. We show here a new authentication information object which has two fields to turn on user ID and password checking, CHCKLOCL (Check Local connections) and CHCKCLNT (Check Client connections). Changes to the configuration of this must be refreshed for the queue manager to pick them up.
- Both of these fields have the same set of attributes, allowing for a strictness of checking. You can switch it off entirely with NONE; set it to OPTIONAL to ensure that if a user ID and password are provided by an application then they must be a valid pair, but that it is not mandatory to provide them – a useful migration setting perhaps; set it to REQUIRED to mandate that all applications provide a user ID and password; and, only on Distributed, REQDADM which says that privileged users must supply a valid user ID and password, but non-privileged users are treated as per the OPTIONAL setting.
- Any application that does not supply a user ID and password when required to, or supplies an incorrect combination even when it is optional will be told 2035 (MQRC_NOT_AUTHORIZED). N.B. When password checking is turned off using NONE – then invalid passwords will not be detected.

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Connection Authentication – Application changes



- **Code changes**
 - ▶ Procedural – MQCSP on MQCONN
 - ▶ OO classes – MQEnvironment
 - ▶ JMS/XMS – createConnection
 - ▶ XAOpen string
- **Alternatively Exits can provide MQCSP**
 - ▶ Client side security exit
 - Provided
 - ▶ Client side Pre-conn exit

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Connection Authentication – Application changes – Notes

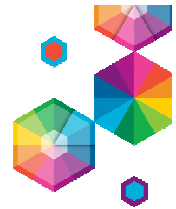


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- Since WebSphere MQ V6.0, an application has been able to provide a user ID and password (in the Connection Security Parameters (MQCSP) structure in the MQCNO) at MQCONN time. These were passed to a user written plug-point in the OAM on distributed to be checked. If the application was running client bound, this user ID and password were also passed to the client side and server side security exits for processing and can be used for setting the MCAUser attribute of a channel instance. The security exit is called with ExitReason MQXR_SEC_PARMS for this processing.
- This pre-existing feature of the MQI is being used to provide the user ID and password to the queue manager for checking. Previously a custom Authorization Service was required to check this (or a security exit if the applications were connecting as clients), now the Object Authority Manager (OAM) supplied with the queue manager and the z/OS Security component within the queue manager will deal with these user IDs and passwords. Whether z/OS or distributed, the component that deals with the user IDs and passwords will call out to a facility outside of MQ to do the check – more on that later.
- In WebSphere MQ V8 this will be available in all our interfaces listed, even where some of those were not made available in the WebSphere MQ V6 timeframe when the programming interface was originally provided.
- In prior releases the MQCSP had no architected limits on the user ID and password strings that were provided by the application. When using them with these MQ provided features there are limits which apply to the use of these features, but if you are only passing them to your own exits, those limits do not apply.
- The XAOpen string has also been updated to allow the provision of a user ID and password.
- Sometimes of course, it can be hard to get changes into applications, so the user ID and password can be provided using an exit instead of changing the code. Client side security exits or the pre-connect exit, can make changes to the MQCONN before it is sent to the queue manager, and the security exit in fact is designed to allow the setting of the MQCSP since V6 (so clients do not need to be updated to the new version in order to use this).

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Procedural MQI changes



- **MQCSP structure**
 - ▶ Connection Security Parameters
 - ▶ User ID and password
- **MQCNO structure**
 - ▶ Connection Options
- **WebSphere MQ V6**
 - ▶ Passed to OAM (Dist only)
 - ▶ Also passed to Security Exit
 - Both z/OS and Distributed
 - MQXR_SEC_PARMS
- **WebSphere MQ V8**
 - ▶ Acted upon by the queue manager (all platforms)

```
MQCNO cno = {MQCNO_DEFAULT};

cno.Version = MQCNO_VERSION_5;

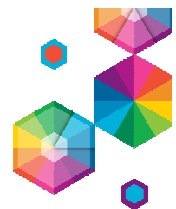
cno.SecurityParmsPtr = &csp;

MQCONN (QMName,
        &cno,
        &hConn,
        &CompCode,
        &Reason);
```

```
MQCSP csp = {MQCSP_DEFAULT};

csp.AuthenticationType = MQCSP_AUTH_USER_ID_AND_PWD;
csp.CSPUserIdPtr       = "hughson";
csp.CSPUserIdLength    = 7;          /* Max: MQ_CLIENT_USER_ID_LENGTH */
csp.CSPPasswordPtr     = "passw0rd";
csp.CSPPasswordLength  = 8;          /* Max: MQ_CSP_PASSWORD_LENGTH  */
```

Object Oriented MQ classes changes



```
MQEnvironment.properties = new Hashtable();
MQEnvironment.userID = "hughson";
MQEnvironment.password = "passw0rd";
```

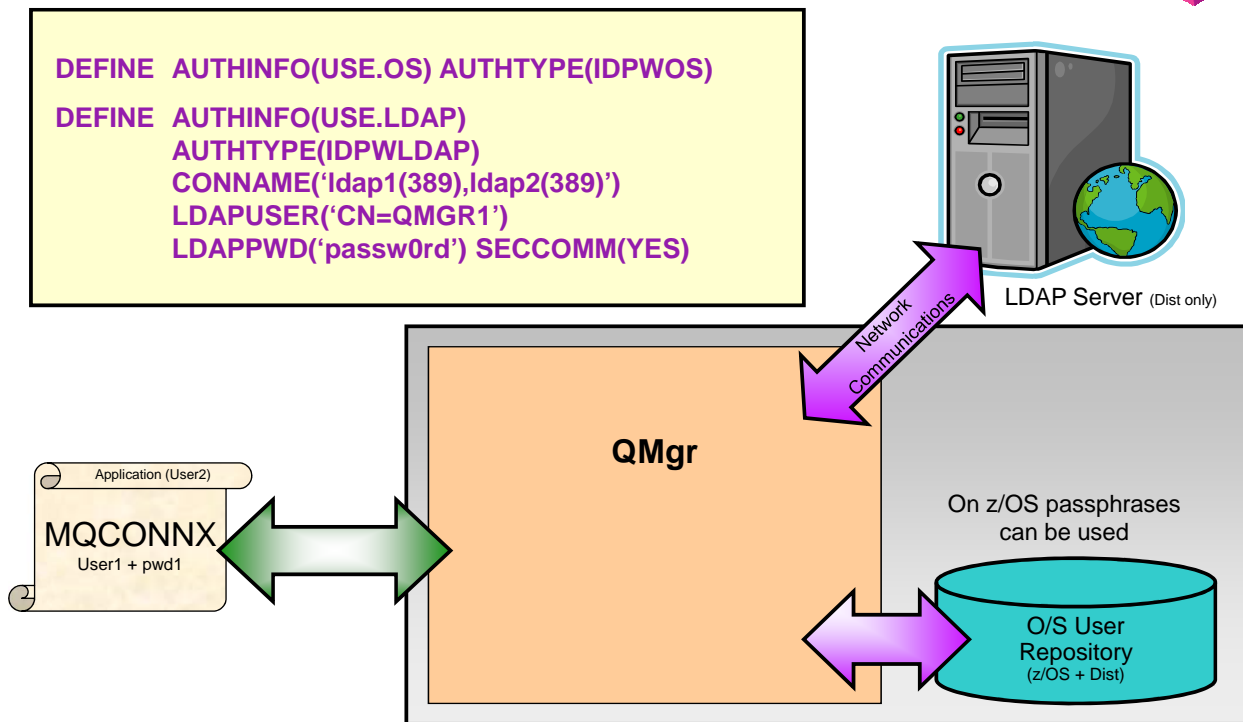
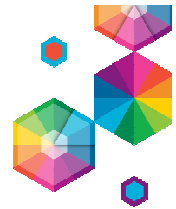
```
System.out.println("Connecting to queue manager");
MQQueueManager qMgr = new MQQueueManager(QMName);
```

JMS/XMS classes changes

```
cf = getCF();

System.out.println("Creating the Connection with UID and Password");
Connection conn = cf.createConnection("hughson", "passw0rd");
```

Connection Authentication – User Repositories

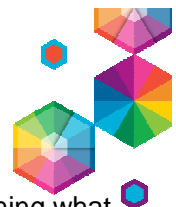


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Connection Authentication – User Repositories – Notes

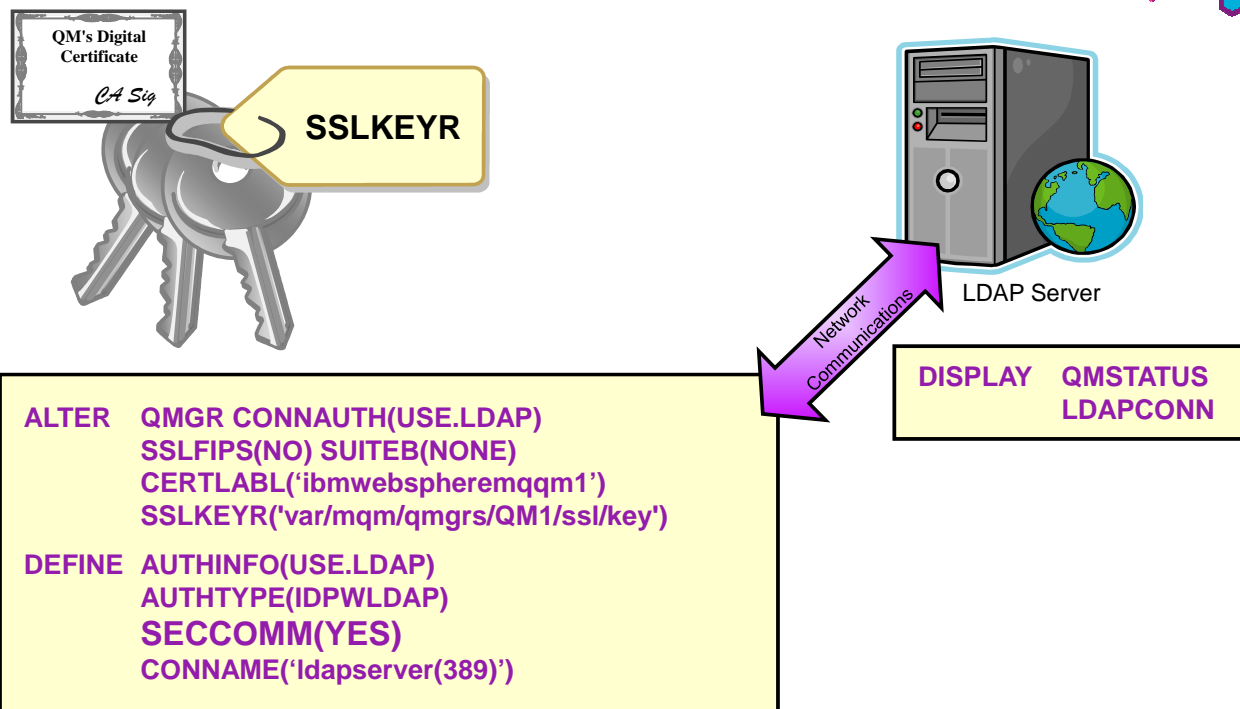


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- So far we have spoken about user ID and password authentication without mentioning what is actually doing the authentication. We've also shown that there is a new type of authentication information object without showing you the object type. Here we introduce two new object types of authentication information objects.
- The first type is used to indicate that the queue manager is going to use the local O/S to authentication the user ID and password. This type is IDPWOS.
- The second type is used to indicate that the queue manager is going to use an LDAP server to authenticate the user ID and password. This type is IDPWLDAP and is not applicable on z/OS.
- Only one type can be chosen for the queue manager to use by naming the appropriate authentication information object in the queue manager's CONNAUTH attribute.
- We have already covered everything there is to say about the configuration of the O/S as the user repository as the common attributes are all there is for the O/S. There is more to say about the LDAP server as an option though.
- Some of the LDAP server configuration attributes are probably fairly obvious. The CONNAME is how the queue manager knows where the LDAP server is, and SECCOMM controls whether connectivity to the LDAP server will be done using SSL/TLS or not. The LDAPUSER and LDAPPWD attributes are how the queue manager binds to the LDAP server so that it can look-up information about user records. It is likely this may be a public area of an LDAP server, so these attributes may not be needed.
- It is worth highlighting that the CONNAME field can be used to provide additional addresses to connect to for the LDAP server in a comma-separated list. This can aid with redundancy if the LDAP server does not provide such itself.

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Secure connection to an LDAP Server



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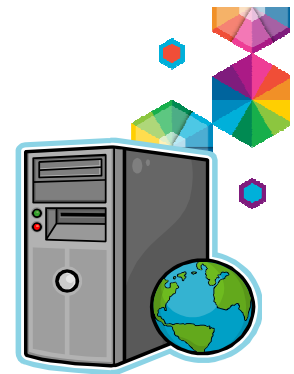
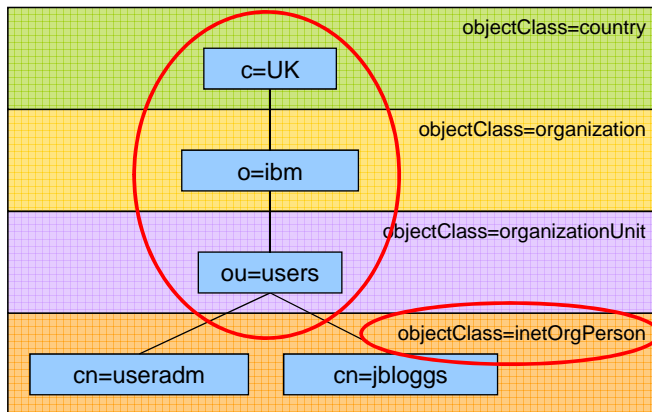
Secure connection to an LDAP Server – Notes

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- Unlike on channels, there is no SSLCIPH parameter to turn on the use of SSL/TLS for the communication with the LDAP server. In this case MQ is acting as a client to the LDAP server so much of the configuration will be done at the LDAP server. Some existing parameters in MQ will be used to configure how that connection will work as shown on this slide.
- The overall switch to choose SSL/TLS communication or not, we already saw on the previous page – SECCOMM.
- In addition to this attribute, we will also pay attention to the queue manager attributes SSLFIPS and SUITEB to restrict the set of cipher specs that will be chosen. The certificate that will be used to identify the queue manager to the LDAP server will be the queue manager certificate, either 'ibmwebspheremq<qmgr-name>' or the newly added CERTLABL attribute which we'll talked about in an earlier section of this presentation.
- Certificate revocation will be checked by using the OCSP servers that are named in the AuthorityInfoAccess (AIA) certificate extensions. This can be turned off by using the qm.ini SSL stanza attribute OCSPCheckExtensions.
- Connection to an LDAP Server is made as a network connection (which is why you may wish to consider using a secure connection). The status of this connection from the queue manager to the LDAP server is shown in DISPLAY QMSTATUS.

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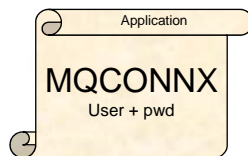
LDAP User Repository



LDAP Server

```

DEFINE AUTHINFO(USE.LDAP)
  AUTHTYPE(IDPWLDAP)
  CONNAME('ldapsrv(389)')
  CLASSUSR('inetOrgPerson')
  BASEDNU('ou=users,o=ibm,c=uk')
  USRFIELD('cn')
  
```



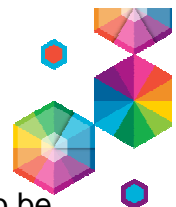
| Application provides | USRFIELD | BASEDNU |
|--------------------------------|----------|--------------------------|
| cn=useradm,ou=users,o=ibm,c=uk | | |
| cn=useradm | | Adds ou=users,o=ibm,c=uk |
| useradm | Adds cn= | Adds ou=users,o=ibm,c=uk |

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LDAP User Repository – Notes

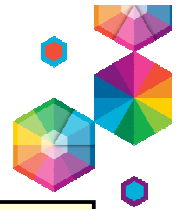


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- When using an LDAP user repository there is some more configuration to be done on the queue manager other than just to tell the queue manager where the LDAP repository resides.
- User IDs records defined in an LDAP server have a hierarchical structure in order to uniquely identify them. So an application could connect to the queue manager and present its user ID as being the fully qualified hierarchical user ID. This however is a lot to provide and it would be simpler if we could configure the queue manager to say, assume all user IDs that are presented are found in this area of the LDAP server and add that qualification onto anything you see. This is what the BASEDNU attribute is for. It identifies the area in the LDAP hierarchy that all the user IDs are to be found. Or to look at it another way, the queue manager will add the BASEDNU value to the user ID presented by an application to fully qualify it before looking it up in the LDAP server.
- Additionally, your application may only want to present the user ID without providing the LDAP attribute name, e.g. CN=. This is what the USRFIELD is for. Any user ID presented to a queue manager without an equals sign (=) will have the attribute and the equals sign pre-pended to it, and the BASEDNU value post-pended to it before looking it up in the LDAP server. This may be a useful migratory aid when moving from O/S user IDs to LDAP user IDs as the application could very well be presenting the same string in both cases, thus avoiding any change to the application.

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Relationship to Authorization – LDAP



Logfiles Help

Edit an entry cn=useradm,ou=users,o=ibm,c=uk

Object class inheritance: inetOrgPerson

Distinguished name (DN)

Relative DN: cn=useradm Parent DN: ou=users,o=ibm,c=uk

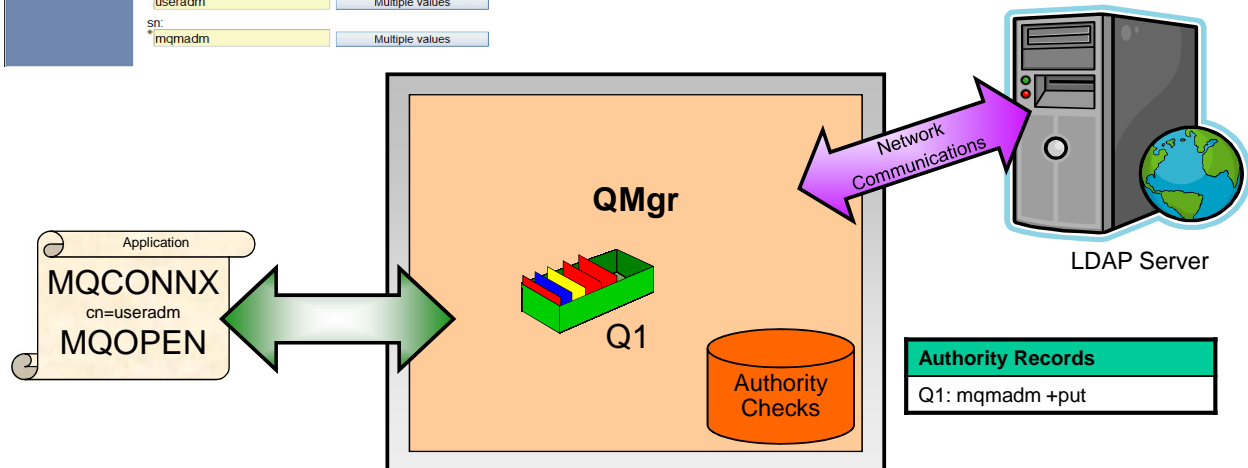
Required attributes

Enter the values for the attributes of the entry. For multiple values click **Multiple values** next to the attribute.

cn: useradm Multiple values

sn: mqmadm Multiple values

```
DEFINE AUTHINFO(USE.LDAP)
AUTHTYPE(IDPWLDAP)
CONNAME('ldap(389)')
ADOPTCTX(YES)
SHORTUSR('sn')
```



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Relationship to Authorization – LDAP - Notes

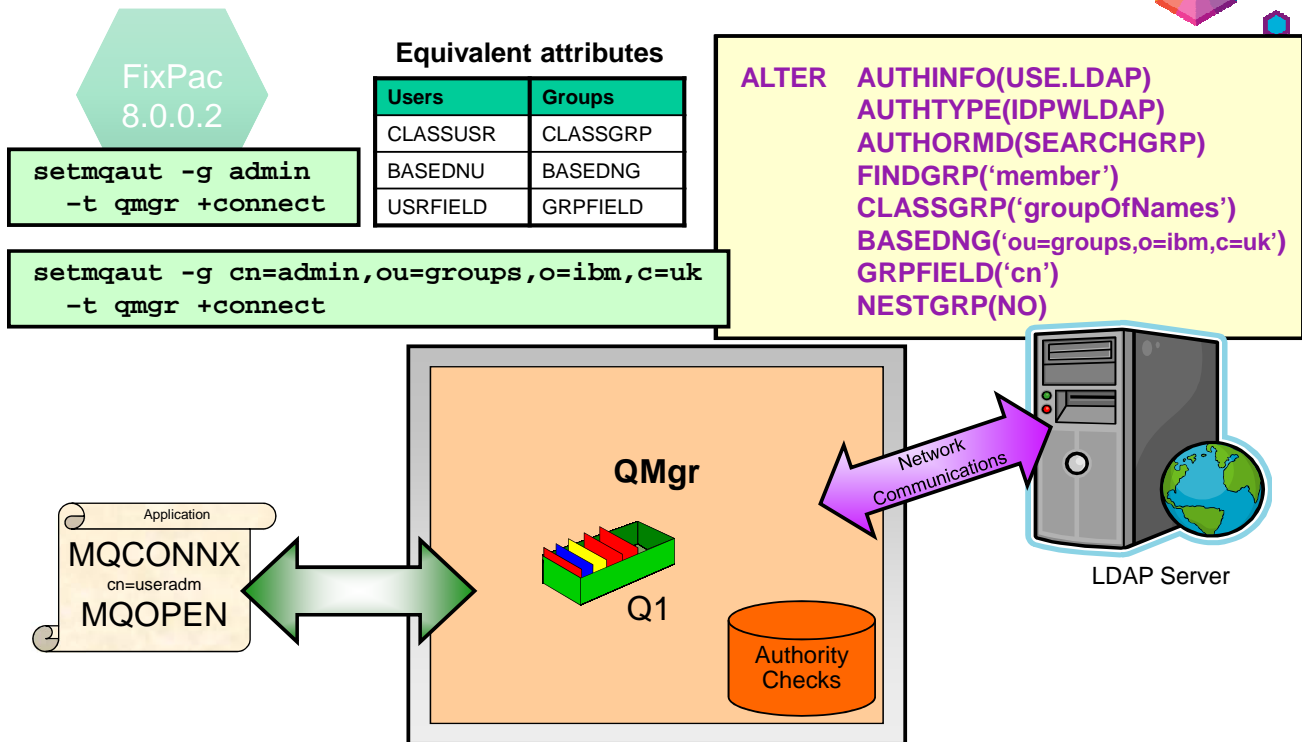


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- We spoke earlier about the ability to adopt the authenticated user ID as the context for this connection. So how does this work if you are using LDAP as the user repository but your authorization is being done using O/S user IDs?
- We need to get a user to represent the LDAP user that has been presented, as an O/S user ID. We find this from the LDAP user record. This can be any field that is defined in the user record, perhaps something like the short name field (sn=) that is a mandatory part of the definition of the inetOrgPerson class, or perhaps something defined more specifically for the purpose such as a user ID (uid=) field.
- The queue manager will use that information to determine what O/S user ID will be used as the context for this connection. You configure it using SHORTUSR to say what the field to locate in the user record is.

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Authorization using LDAP credentials

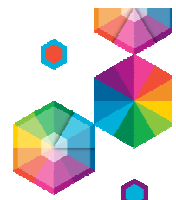


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Authorization using LDAP credentials - Notes

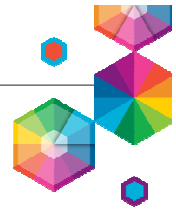


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- In FixPac 8.0.0.2 and the MQ Appliance, there is now the option, on UNIX queue managers, to choose to have the authorization checks done using the presented LDAP credentials, instead of the behaviour on the previous page where they are mapped to an OS user for authorization checks.
- In order to use this feature, you need to have your queue manager running with a command level (CMDLEVEL) of 801 which is an explicit action to increase, due to the function being delivered in a FixPac.
- Then we need to know a few more things about the shape of your LDAP user repository; i.e. where the groups live in the hierarchy.

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MQ Security - Other



- Use DNS hostnames in CHLAUTH records
 - Also provide a way to disable reverse lookup
- Configurable default certificate label for qmgrs and clients
 - Instead of "ibmwebspheremq<qmgr>" or "ibmwebspheremq<userid>"
- Channel-level certificates
 - To support different business partners using different CAs.
 - For queue managers and C clients
 - Not Java yet, because Java 7 JSSE does not fully support SNI
 - Both ends must be V8
- Make Unix OAM userid-based
 - Optional configuration
 - Consistent with other platforms
 - Will no longer add primary group to authorities during setmqaut
 - Chosen at queue manager creation or by editing qm.ini
 - Default is still group-based authorisations
- Delete Authority record by SID
 - Solve problem of orphaned authorities when Windows id is deleted


```
$ crtmqm -oa user QMU
```

Service:

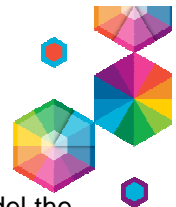
Name=AuthorizationService
EntryPoints=14
SecurityPolicy=User

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MQ Security - Authorisation

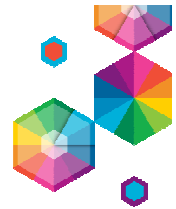


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- One further point of consistency in this release is making the Unix authorisation model the same as for Windows – permissions can now be set for individual users, and not just groups. So running a command such as "setmqaut -t qmgr -p usr1 +connect" works for just that user, and not the primary group.
- This is configured by either creating the queue manager with the "-oa user" option or by editing the ini file as shown for existing queue managers – restarting the queue manager sets it to work in the new mode. The change is deliberately not dynamic, and requires the restart, because it is so fundamental to how the queue manager permissions operate, and is not something we would expect to be done frequently.
- All existing permissions are left unchanged when you switch to user-mode authorisations, so the group permissions that have been set remain, but new permissions can be set for the users.
- The user-based model is not the default for new queue managers; to keep compatibility with older systems, the default is still the group-based model.
- One final security feature is specifically for Windows, to deal with situations where users have been deleted from the system but their MQ permissions have not been deleted from the OAM. You can now use the setmqaut command to delete permissions based on SID instead of name, and this will remove the orphaned entries.

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MQ Security - CHLAUTH

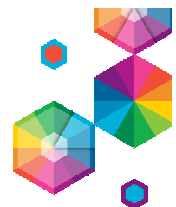


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- The CHLAUTH rules that were introduced in V7.1 have been extended to meet the most frequently-requested enhancement – the ability to use hostnames in the rules as well as IP addresses. Names can be used all the same rules, and in the same way, as IP addresses with the one exception of the listener blocking which is still only address-based.
- The hostnames can include wildcard patterns such as "*.example.com". The matching is simple string-based; the "." characters are not treated as special separators.

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MQ Security - Certificates

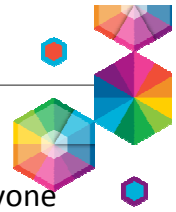


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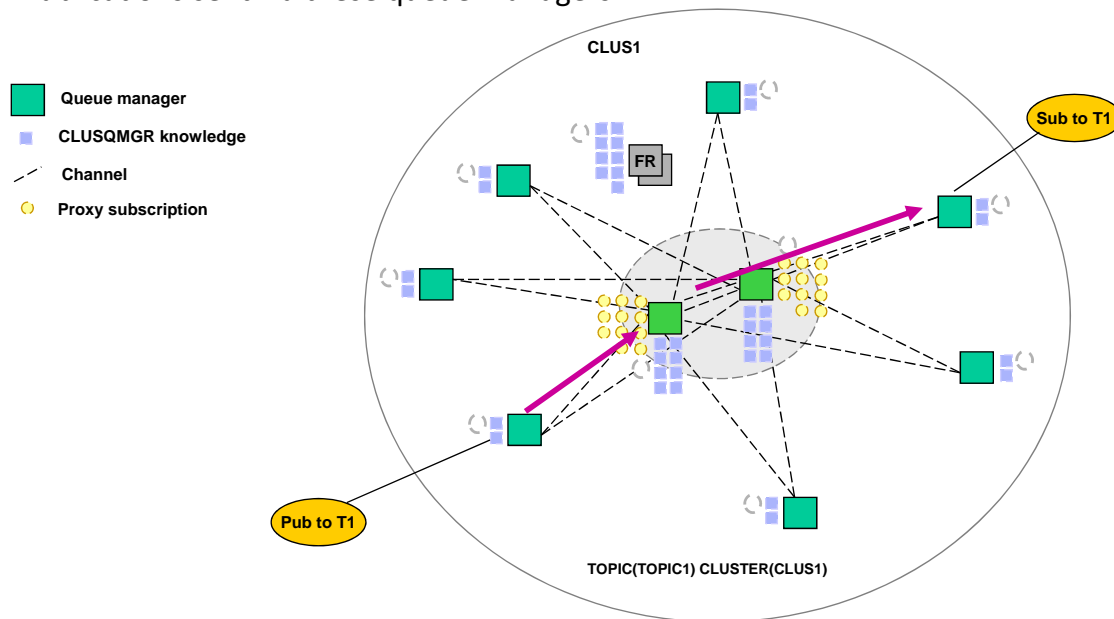
- The label used to find the queue manager or client's certificate in the SSL keystore is now configurable. This gives more flexibility in naming, and can even permit sharing of the keystore between multiple queue managers if you wish. On z/OS, there is in addition a configuration attribute for the QSG-related certificate (traditionally "ibmwebspheremq<qsgname>").
- A further extension for certificate use is designed for scenarios where you may wish to use different certificates when communicating with different partners. A common reason for this is when a queue manager is used for both "internal-facing" channels and for connections to a partner, who may have different certificate requirements, such as using a different CA. You can now configure a different certificate label to be used on individual channels. The implementation of this requires both ends of the channel to be at MQ V8, as there has to be cooperation between the sending side and the receiving side of the channel. And it is not available in all environments; in particular, Java clients cannot currently participate as the standard JSSE provider does not yet support the Server Name Indication (SNI) flows that go alongside the socket setup calls.

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Pub/sub scalability - cluster behaviour with V8



- New concept of "**routed**" topics
- Configure subset of queue managers to know everything and connect to everyone
- Publications sent via these queue managers



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Routed topics

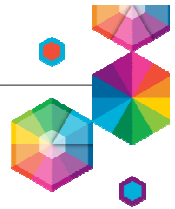


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- Publish/subscribe across a cluster previously required direct connectivity between all publishing queue managers and subscribing queue managers.
- Now routing via intermediary queue managers in the cluster is possible
 - The aim is to allow topologies where queue manager-to-queue manager connectivity and knowledge is restricted
- With DIRECT pub/sub:
 - Direct publication routing
 - Every queue manager must scale with the size of the system
- With ROUTED pub/sub
 - The load on the majority of queue managers is independent from the size of the system
 - Publications may incur additional hops
- Messages published on topic host routed topics are similar to messages put to clustered queues:
 - Think of a routed topic def as a clustered queue and a publisher to the topic as an app putting to that queue
 - Each message published is sent to one of the topic host queue managers, and from there onto the queue managers where subscriptions exist
 - Messages are workload balanced across all topic hosts with available channels from the publishing queue manager to the topic hosts
 - Unavailable topic hosts are avoided
 - Workload balancing behaviour is as for a clustered queue using all default settings (CLWLPRTY, CLWLRANK, etc.) except for DEFBIND, which is effectively set to NOT_FIXED
 - Each individual message is 'evenly' workload balanced across topic hosts
 - Workload balancing is based on the cluster channel rather than the topic (as for queues), so channel workload balancing control still applies (CLWLPRTY, CLWLRANK, CLWLWGHT)

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Changes to runmqsc



- Can now be run by any user (not just mqm group)
 - Can take a userid/password for authentication: new "-u" flag
- Can now connect as a client to remote systems: new "-c" flag
 - Client channel definitions located by MQSERVER -> MQCHLLIB -> MQCHLTAB
- Can act as standalone program to create local CCDT: new "-n" flag
 - Does not connect to queue manager; commands subset to update local channel definition file

- Ease of use
 - Customisable prompt using environment variable
 - New "exit" and "quit" synonyms for "end"


```
$ ls -l runmqsc
-r-xr-xr-x  1 mqm    mqm    25930 06 Mar 04:46 runmqsc

$ export MQPROMPT="MQ +MQ_INSTALLATION_NAME+> "
$ runmqsc -u metaylor QM1
5724-H72 (C) Copyright IBM Corp. 1994, 2014.
Enter password:
*****
Starting MQSC for queue manager QM1.

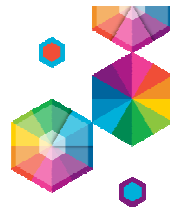
MQ Installation5> DIS QMGR
...
```

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Changes to runmqsc

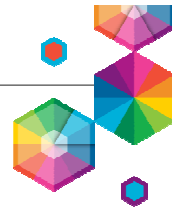


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- This release introduces a number of changes to the runmqsc program
- Firstly, it is now executable by any user, not just members of the mqm group. Security controls still apply of course, but the security is checked on each individual command. This makes it easier to have MQ administrators who have been granted full access to objects, but who are not in the mqm group.
- Another reason for making runmqsc world-executable was to make it usable on machines which do not have queue managers installed. It is now installed even on client-only systems, and it can be run either as a client program connecting directly to a remote queue manager, or as a completely standalone program to permit local creation of the Client Channel Definition Table. So you can create and modify a CCDT with no queue manager access at all.
- The program is one of several that have been updated to accept a userid for authentication. If the -u flag is given, then a password is requested. Note that the password is read from stdin so that it can be redirected from a file if necessary. If you also use scripts piped into runmqsc, then you can group commands to avoid having to put the password in the same script as the MQSC commands.
 - Unix: (cat password.stash ; cat script.mqsc) | runmqsc -u userid QM1
 - Windows: (type password.stash & type script.mqsc) | runmqsc -u userid QM1
- There are also a couple of usability enhancements. Firstly, there are some synonyms added to complete an MQSC session – END, QUIT and EXIT can all be used so you don't have to try them all. Different scripting environments for different products typically use one of these commands, and it's annoying to have to remember which goes with which.
- Secondly, you can now make it easier to see that you are in an MQSC command environment and some details of the current environment by setting the MQPROMPT environment variable. Replaceable inserts are recognised such as date and time, and installation-specific details. These are the same variable substitutions as available for SERVICE objects.

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Distributed Performance



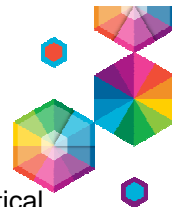
- Improvements to distributed queue manager scaling
 - Improve efficiency
 - Better exploitation of wider SMP machines
- Multiplexed client performance
 - Increase the performance of multiplexed client channels (`SHRCONV > 0`)
 - Especially for `SHRCONV=1`
- Other areas that helped:
 - Cache alignment for internal structures
 - Extended 64-bit exploitation for locking primitives
 - RFH2 handling, particularly for waiting-getter
 - Fewer copies of data are needed
 - Better compiler optimisations
 - Faster data conversion (especially for 1208)
 - Many messages are in 1208 codepage
 - Optimised handling when the queue manager needs to convert them
- Most performance reports now available

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Performance improvements

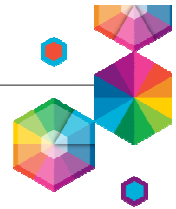


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- A number of enhancements have been implemented in version 8 to improve the vertical scaling of queue managers on the distributed platforms. Some of these improvements are listed on the previous slide.
- We've also updated the focus of our performance testing to be less reliant on some internal benchmarks that do not represent realistic customer workloads. Although each customer workload is different, so guarantees are not possible, the performance improvements in version 8 are more likely to be relevant to real-world scenarios.
- Prior to version 7 each client conversation uses a separate socket and channel instance. If clients establish multiple conversations using different threads this can create a large demand for sockets on the server. Each channel instance also requires storage on the queue manager.
- In version 7 support was added to allow client conversations to share the same socket/channel instance. This can significantly reduce the resource overhead associated with these connections. Support for bi-directional communication was also introduced that supports new capabilities, such as heartbeats, read-ahead and asynchronous message consumption.
- However, if multiple conversations share the same socket, contention can arise if the total workload for the conversations exceeds the capacity of the socket. Additionally, an overhead is also introduced to serialize access when sending and receiving TCP/IP data.
- `SHARECNV(0)` disables all version 7 enhancements. `SHARECNV(1)` can be used to disable only conversation sharing. Unfortunately, in version 7 the latter incurs a notable performance overhead as a result of enabling the other version 7 capabilities. In version 8, support for `SHARECNV(1)` has been optimized to achieve parity with `SHARECNV(0)`.

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MQ for z/OS: 64-bit bufferpools



- 64-bit buffer pools in MQ for z/OS
 - Allows large numbers of messages to be cached before writing to pagesets
 - Allows MQ to exploit the vast amount of storage on today's machines
- Improves performance of putting/getting messages by minimizing disk I/O
- Minimizes administrative overhead of managing buffer pools
- Buffer pool LOCATION attribute says where it is located relative to the bar
 - BELOW: The default. Buffer pool is located below the bar in 31 bit storage
 - ABOVE: Buffer pool is located above the bar in 64 bit storage
 - This can be altered dynamically
- Storage can be pinned based on pageclass attribute

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Buffer pool problems before V8

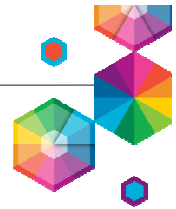


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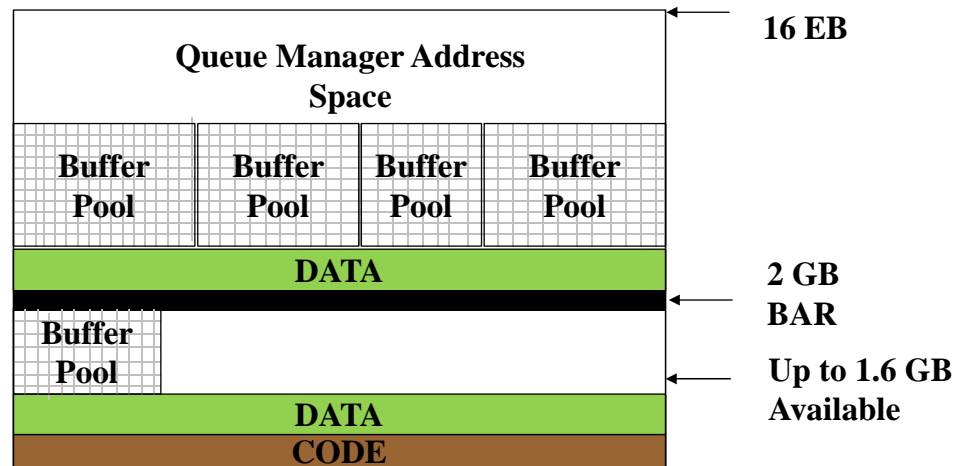
- There is not much space below the bar for buffer pools once queue manager code and data is taken into account. Maximum 1.6GB available for buffer pools depending on common area
- Putting/getting messages into the buffer pool works at 'memory' speed, putting/getting messages from the page set works at 'disk' speed
- For scenarios where several applications read and/or write large number of messages to the same buffer pool a lot of time is spent getting pages from page set into buffer pool and getting pages from buffer pool into page set
 - This is detrimental for performance
- A maximum of 16 buffer pools are supported while up to 100 page sets are supported
- This can result in a lot of time spent tuning buffer pool sizes and the relationship between queues, buffer pools and page sets
- These problems are resolved by allowing bufferpools to be defined in 64-bit space, above the bar

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MQ for z/OS: 64-bit bufferpools



- Buffer pools above the bar can (theoretically) use up to 16 EB storage
- Increased maximum size of pool to 999,999,999 buffers
 - Was 500,000
- Allows up to 100 buffer pools
 - Was 16
 - Can have a 1-1 page set – buffer pool mapping

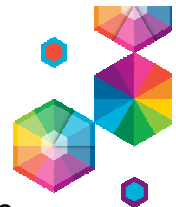


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MQ for z/OS: 64-bit bufferpools

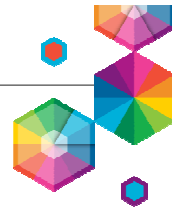


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- 64-bit bufferpools can now theoretically use a huge amount of storage
- Having the same number of pools and pagesets makes it much simpler to monitor and control the usage of these resources
- SMF 115, subtype 215
 - Up to 100 buffer pools are now supported. However there is not enough space for 100 buffer manager statistics records (QPST) in the existing SMF 115, subtype 2, record
 - If OPMODE(NEWFUNC,800) is specified in system parameters then an SMF 115, subtype 215, record will be cut for buffer manager statistics. The SMF 115, subtype 2, record will still contain the self-defining section for buffer manager but it will be all zeros
 - If OPMODE(COMPAT,800) is specified in system parameters then buffer manager statistics will continue to be in SMF 115, subtype 2.

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MQ for z/OS: Performance and Capacity



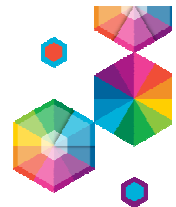
- Log RBA constraint relief
 - Already improved messages to warn of approaching RBA
 - Now widening RBA field from 6 to 8 bytes
 - At 100MB/sec this will now take about 5578 years to fill
- Support for LP64 batch/RRS C applications
- Performance enhancements for IBM Information Replicator (QRep) and similar application patterns
 - Read-ahead and changes to deferred write processing allows MQ to increase sustainable data rates
- General improvements to channel performance

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Log RBA extensions

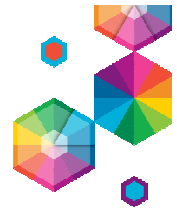


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- WebSphere MQ for z/OS V7 implements a 6 byte Log RBA (Relative Byte Address)
 - This give an RBA range of 0 to x'FFFFFFFF' (= 255TB)
 - Some customers are now reaching this limit in 12 months
- If we reach the end of the Log RBA range (i.e. “wrap”):
 - Queue Manager terminates and requires a cold start – a disruptive outage
 - Potential for loss of persistent data
- To avoid an outage:
 - Run CSQUTIL RESETPAGE, at regular planned intervals, to RESET the LOG RBA
- With current maintenance, MQ V7.x issues warning messages when approaching maximum
 - Then terminates, to prevent loss of data, if log RBA reaches x'FFF80000000'.
- V8 increases size of Log RBA to 8 bytes
 - Upper limit on logical log will be 64K times bigger
 - Format of BSDS and log records will change to accommodate 8 byte RBAs, URIDs will become 8 bytes long
 - Like DB2, the control point for new function is a BSDS conversion utility
 - Run the new CSQJUCNV utility
 - utility will check that entire QSG is at correct level
 - copies data from old primary / secondary BSDS pair to new primary / secondary pair
- All V8 queue managers can read data in both the old and new formats
- All V8 queue managers and utilities will display all log RBAs as 8 bytes
- V8 will ONLY write in new format, once BSDS has been converted

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LP64 Support



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- Externalising technology previously used by Broker and JMS
- Limited to C language (no 64bit COBOL)

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- LP64 compile option
- Supported by cmqc.h
- Restricted environments
- Batch, TSO, USS
- CICS and IMS do not support 64bit apps

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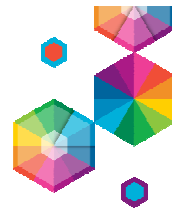
- Must use sidedeck & DLL, not stubs:
- csqbm2x (uncoordinated batch & USS)
- csqbrr2x (RRS coordinated, srccmit())
- csqbri2x (RRS coordinated, MQCMIT)

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Performance improvements



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- QRep has implemented a common application pattern – basically a single-stream reading or writing of messages. That program, and others that follow the same pattern, can benefit from some of the performance enhancements in MQ. For example, fetching data for the "next message" from a pageset at the same time as for the "current message" (readahead) can reduce the I/O operations and hence reduce CPU and increase throughput.

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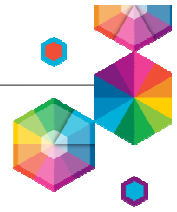
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AMS and MFT integration with z/OS



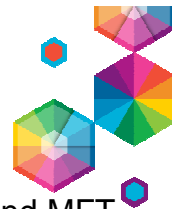
- Following the model used by MQ V7.5 on distributed for closer integration
- AMS
 - Starts automatically with qmgr
 - Reduced overhead (now only one started task instead of 2)
 - Policies and their administration remain unchanged
- MFT
 - Now looks more natural for a z/OS person
 - Closer integration with standard system facilities such as ARM
 - Started task templates
 - Supported JCL provided instead of samples
 - Job info logged to JCL task
- Both features still separately licensed

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AMS and MFT integration with z/OS

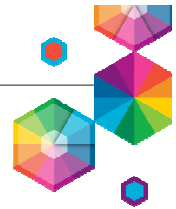


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- Since there was no V7.5 on IBM i and z/OS, the integration of AMS and MFT into the Base MQ product was done in MQ V8.

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JMS 2.0




- Long-awaited update from JMS 1.1 standard
- JMS 2.0 – JSR 343 Java Message Service (JMS 2.0)
 - Final release on 21 May 2013.
 - <https://java.net/projects/jms-spec/pages/JMS20FinalRelease>
- New Messaging Features
 - Delivery Delay
 - Asynchronous Send
 - Subscriptions can be shared across a messaging provider
- API Changes
 - Use of `java.lang.AutoCloseable`
 - Simplified API [combined connection/session]
 - Session doesn't need parameters (for Java EE)
- Java 7 prereq
- Java EE 7 prereq for use of the Resource Adapter in Application Servers

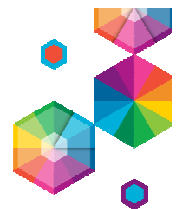
<http://www.slideshare.net/calanaais/ibm-mq-v8-and-jms-20>

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JMS 2.0

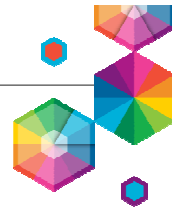


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- The JMS 2.0 specification now requires JMS providers to implement both P2P and Pub-Sub.
- The following new messaging features have been added in JMS 2.0:
 - Delivery delay: a message producer can now specify that a message must not be delivered until after a specified time interval.
 - New send methods have been added to allow an application to send messages asynchronously.
 - JMS providers must now set the `JMSXDeliveryCount` message property.
- The following change has been made to aid scalability:
 - Applications are now permitted to create multiple consumers on the same durable or non-durable topic subscription. In previous versions of JMS only a single consumer was permitted.
- Several changes have been made to the JMS API to make it simpler and easier to use:
 - Connection, Session and other objects with a close method now implement the `java.lang.AutoCloseable` interface to allow them to be used in a Java SE 7 try-with-resources statement.
 - A new "simplified API" has been added which offers a simpler alternative to the standard API, especially in Java EE applications.
 - New methods have been added to create a session without the need to supply redundant arguments.
 - Although setting client ID remains mandatory when creating an unshared durable subscription, it is optional when creating a shared durable subscription.
 - A new method `getBody` has been added to allow an application to extract the body directly from a Message without the need to cast it first to an appropriate subtype.
- New methods have been added to Session which return a MessageConsumer on a durable topic subscription. Applications could previously only obtain a domain-specific TopicSubscriber, even though its use was discouraged.
- The specification has been clarified in various places.
- JMS 2.0 implementations require Java 7 for the runtime. They also require Java EE 7 for use of the Resource Adapter in Application Servers. Not all App Servers currently support Java EE 7. However, as with all client implementations, older versions of the RA still work when communicating to an MQ V8 queue manager.

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JMS and Java (2)



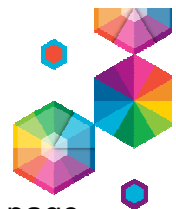
- JMS to be supported inside CICS
 - CICS APAR
 - For V5.2 PI32151
 - MQ APARs
 - For V71: JMS PI29770 (supercedes 7.1.0.6) or later CSD
 - For V8: JMS 8.0.0.2 or later CSD + MQ base PI28482
- CipherSuite names for non-IBM Java runtimes
 - There is no fixed standard across Java providers for CipherSuite names
 - When POODLE SSL vulnerability announced, it was difficult to use TLS algorithms in MQ Java because names in configuration had to match IBM's Java names
 - Have now relaxed some of that checking to make use of other Javas easier
 - IV66840: ADD SUPPORT FOR SELECTED TLS CIPHERSPECS WHEN RUNNING IN NON-IBM JAVA RUNTIME ENVIRONMENT
 - <http://www-01.ibm.com/support/docview.wss?uid=swg1IV66840>
- Java client now available for simpler redistribution
- Updates planned to Java documentation to make is easier for non-MQ people
 - For example, people administering app servers don't necessarily know messaging terms

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Other Java changes

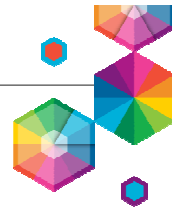


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- There are a number of other changes in the Java area shown on this page.

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.Net enhancements



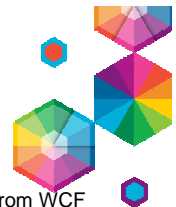
- MQ .Net classes can now use SSL without needing the C client installed
 - A secure fully-managed .Net implementation
 - Uses Windows native certificate stores
- For MQ .NET classes (aka Base .NET Classes) SSL properties can be set at
 - MQEnvironment.cs
 - Hashtable properties (input parameter to MQQueueManager constructor)
- For XMS .NET, SSL properties can be set as ConnectionFactory properties
- WCF interface extended to non-SOAP, non-JMS messages
 - Making it easier for apps using WCF to communicate with any other MQ application
- MQ .Net classes restructured for easier deployment (New in FP2)
 - Applications can be deployed incorporating the MQ assembly
 - Includes Azure environment

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.Net enhancements: SSL

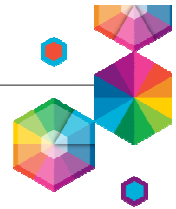


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- MQ .NET in unmanaged mode has supported the use of SSL since MQ v6.0.1. It was based on the C Client (and GSKit).
- In V8 MQ .NET Managed mode now supports SSL based on Microsoft SSLStreams/Security kit.
- There are some limitations when using SSL with Managed .NET.
- CipherSpec setting can be made only at Windows Group policy (gpedit.msc).
 - CipherSpec set on client channel is used only to determine SSLProtocol.
 - Make sure you set same cipherspec on Windows group policy and client channel to make sure correct protocol version is flowed.
- KeyRepository uses Windows Key Store only.
 - Set value as *SYSTEM for accessing certificates under Computer Account
 - Set value as *USER for accessing certificates under User account
- FIPS can be enabled only from Windows group policy.
- KEYRESET is not supported by Microsoft SSLStreams
 - This limitation is overridden by using KEYRESETCOUNT and Client Auto Reconnect feature of MQ.
 - Application can set KEYRESETCOUNT during connection, once the number of bytes sent/received reaches the count, connection will be forcibly broken. If Client Auto Reconnect facility is enabled, connection will be automatically reconnected.
- No managed way to support Cryptographic hardware
- Product samples have been updated to demonstrate SSL Connections. These can be found in WebSphere MQ\tools\dotnet\samples\cs\base\Simple
- Additional model for sending MQ messages from WCF applications
 - Both SOAP/JMS and MQMessaging can be used
- SOAP/JMS
 - Supported since MQ v7.0.1
 - Based on XMS .NET and makes JMS-like calls for MQI
 - Uses JMS nomenclature for URI(jms:\) and Bindings
 - Now also supports "wmq:\\" style of URI
 - Uses MA93 supportpac specification for URI format/syntax
 - Messages can be delivered only to SOAP enabled Client/Service
- MQMessaging
 - New in MQ V8.0
 - Transmits MQ Messages over the WCF Channel without any SOAP headers
 - Use "wmq:\\" style of URI
 - Uses MA93 supportpac specification for URI format/syntax
 - Messages can be delivered to SOAP or NON-SOAP MQ applications

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Further information in real books

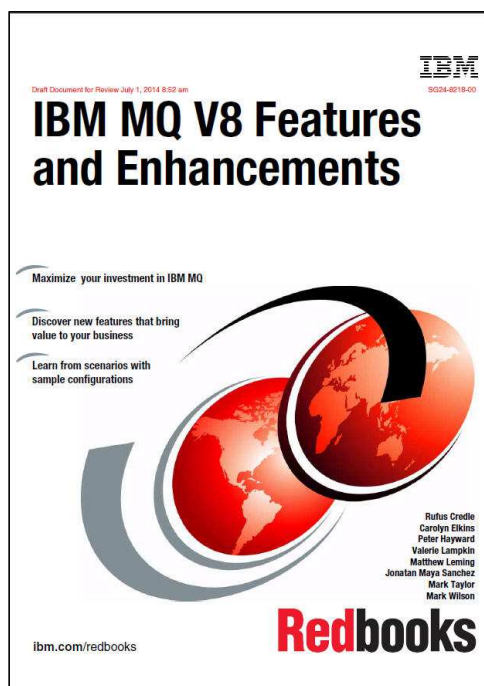
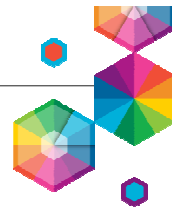


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And ... already available

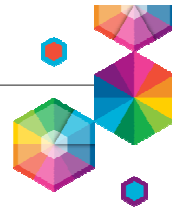


<https://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg248218.html>

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MQ Light

MQ Light as a Service

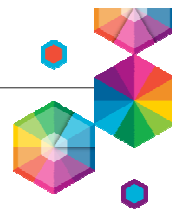
MQ Light in MQ

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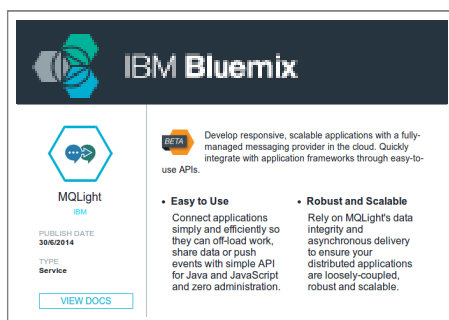
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MQ Light : Software and Cloud



- Messaging that application developers will love to use, helping them make responsive applications that scale easily
- 3 ways to get it:
 - MQ Light software download
 - Bluemix service
 - *Statement of Direction for support in MQ Version 8.*



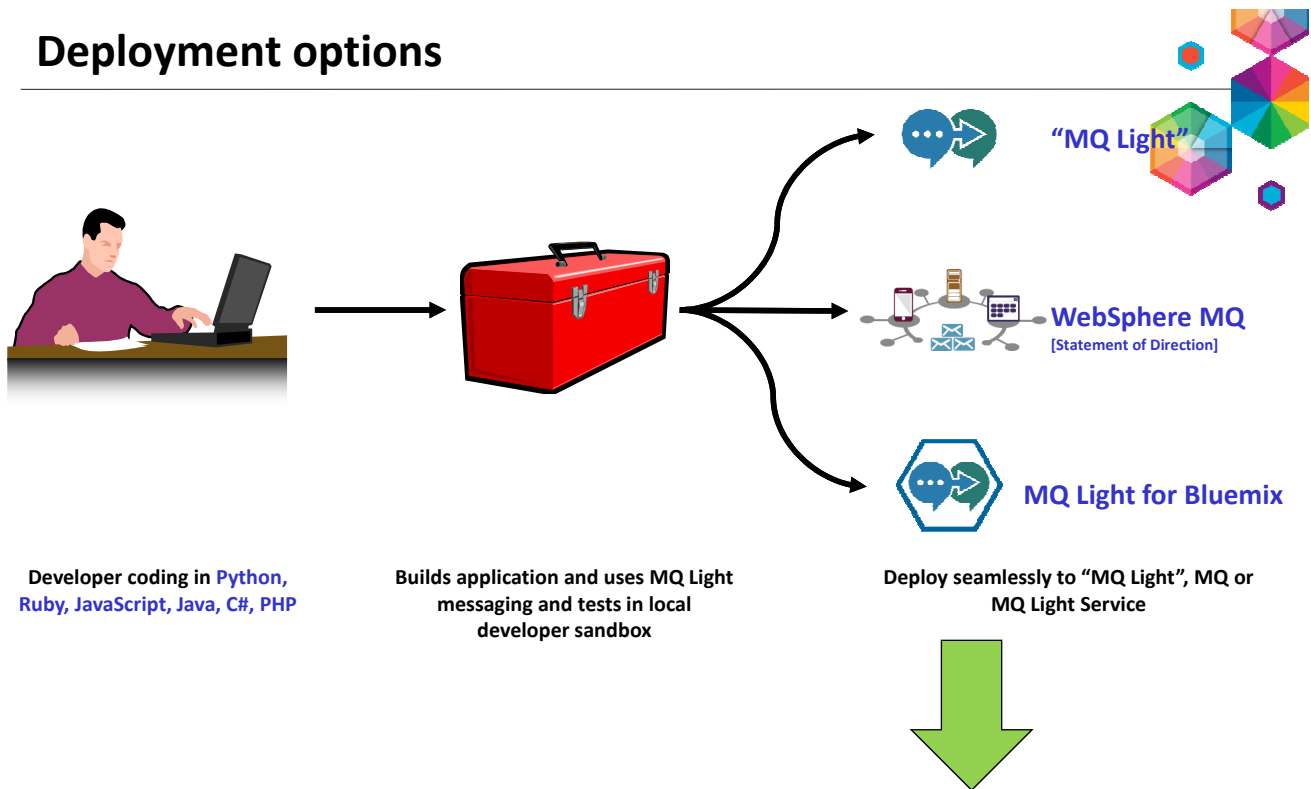
- Open APIs crafted to feel natural in a growing range of popular languages
- Tooling that makes modular app development easy

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Deployment options



| Stream | 09:30 | 10:30 | 11:00 | 12:00 | 12:30 | 13:30 | 14:30 | 15:30 | 16:00 | 17 |
|-----------|---|--------|------------------------------|------------------------|-------|--|----------------------------|--------|---------|----|
| Messaging | IBM MQ update including MQ and security | Coffee | IBM MQ and High Availability | Meet the Experts / Q&A | Lunch | Introduction to the new IBM MQ Appliance | IBM MQ, Cloud and MQ Light | Coffee | (empty) | CI |

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MQ Light in Docker

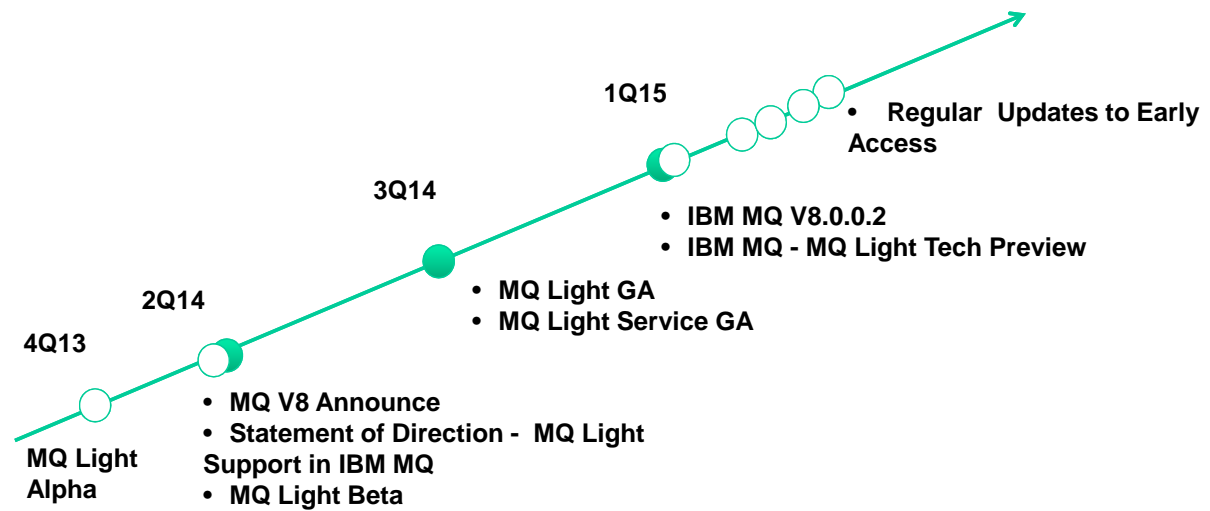
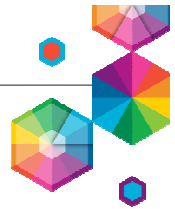
- A Docker image for MQ Light is now available on Docker Hub.
 - <https://registry.hub.docker.com/u/ibmimages/mqlight/>
- MQ Light runs inside a container, isolated from the rest of your system:
 - Process isolation – all the processes associated with MQ Light are run in their own process space, and can't see any other processes running on your server
 - Resource isolation – you can limit the amount of memory and CPU you allocate to a container
 - Dependency isolation - all software which MQ Light depends on is included in the MQ Light image, except the Linux kernel itself.
- Docker also helps with fast, reliable deployments in cloud environments
- One command to download and run MQ Light:
 - `docker run -e LICENSE=accept -P ibmimages/mqlight`



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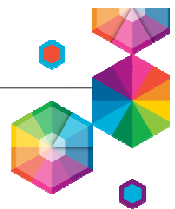
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IBM MQ – MQ Light Tech Preview

- Platforms
 - Windows , Linux x86_64
- Installation
 - Prereq is IBM MQ V8.0.0.2
 - **Add** Tech Preview install media (zip, rpm)
- Adds AMQP 1.0 channels
 - Fully interoperable with MQ FAP and MQTT Channels
- MQSC and PCF support
 - Defining AMQP channels
 - Start, stop and end channel
- Tech Preview will evolve to include more integration features



For Additional Information



Where can I find MQ V8 information?

This blog post pulls together all the sources of information telling you all about MQ V8. We'll continue to add to it so come back and visit often.

Over the months since MQ V8 GAed in May 2014, there have been quite a number of different sources of information telling you all about MQ V8. Some of those sources have been here on the MQDev Blog and then there have been others too. I wanted to pull these all together into one location that I could then point people to instead of giving them a page full of different links. I'll try to keep this page updated when other new sources appear, but please do add comments to point me at any sources I have missed.

<https://ibm.biz/MQV8Info>

Reading material

The first stop for all MQ V8 information is [Knowledge Center](#).

There is also a redbook, [IBM MQ V8 Features and Enhancements](#), and a number of blog posts:-

- [Series of Bitesize Blog Posts about MQ V8](#)
- [RFEs delivered in MQ V8](#)
- [MQ V8 Blog posts on developerWorks](#) (including ones above)
- [MQ V8 Blog posts on the WebSphere and CICS Support Blog](#)



Videos

These are the videos/demos that have been recorded about MQ V8.

- [What's New in MQ V8 with Pete and Morag](#)
- [What's New in MQ V8 Tech Talk](#)
- [MQ V8 CHLAUTH Tech Talk](#)
- [MQ V8 Security Features Deep Dive Tech Talk](#)
- [MQ V8 Security Demo](#)
- [MQ V8 and Java](#)

Presentation material

MQ V8 has been covered at a number of conferences since it was announced. The materials from those conferences are available in a variety of different places depending on the conference in question.

- **Presentation Material:** [IMPACT 2014](#)
- **About:** [GSE France Presentation Material:](#) [GSE France](#)
- **About:** [WebSphere Integration User Group Presentation Material:](#) [WIUG](#)
- **Presentation Material:** [SHARE - Pittsburgh](#)
- **About:** [Capitalware's MQ Tech Conference 2014 Presentation Material:](#) [MQTC 2014](#)
- **About:** [WebSphere Technical University Presentation Material:](#) [WTU 2014](#)
- **About:** [MQ at GSE UK Presentation Material:](#) [via BYOA on GSE website](#)

Morag Hughson is the WebSphere MQ Base Architect

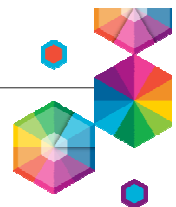
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Summary



- Enterprise Messaging where MQ continues to lead
- Messaging for Mobile and the Internet of Things
- Supporting Cloud deployments with Messaging services
- Helping developers use Application Messaging to create better applications



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