

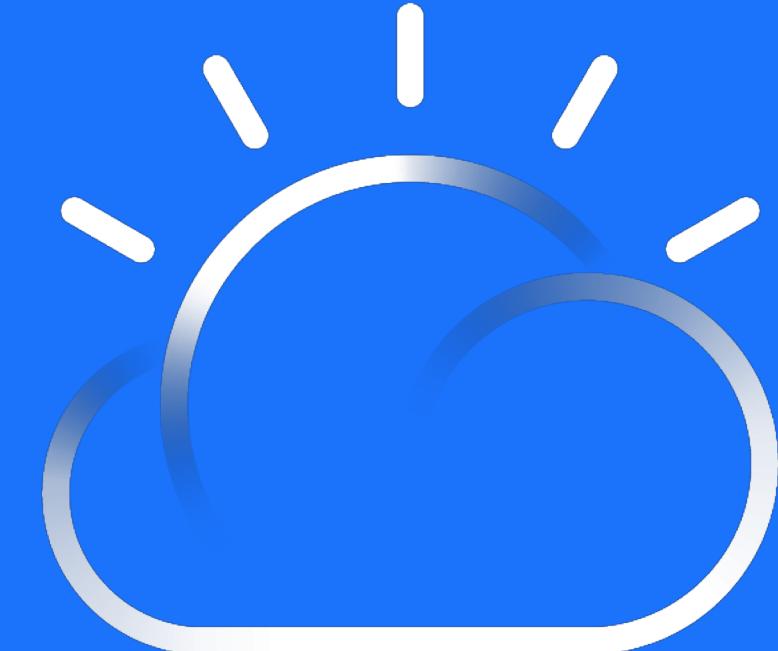
M11 – Securing your MQ environment.

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Agenda



- Security features in MQ Queue Managers
 - Common features
 - Connection authentication
 - Authorization
 - TLS
 - Advanced Message Security
 - Channel Authentication records
 - Security Exits
 - Interactions between security features
- Security options for REST/MQ Console

More in depth session:

M14 – MQ Security
Deep Dive.
Wednesday 16:10



Security features in Queue Managers



Security features in Queue Managers



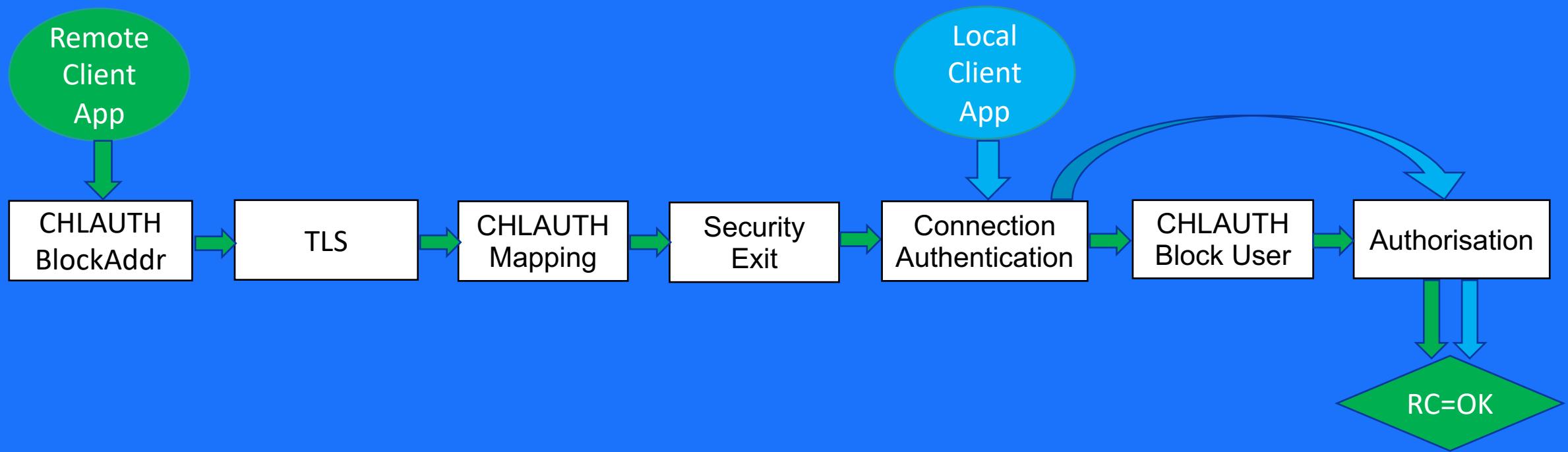
Common Features

- Security features are configured on the queue manager
 - Clients need to be configured to match the qm configuration
 - Most features can be enabled/disabled through configuration
- Security checks are performed in the same order on clients that connect
 - Both network clients and local binding clients
 - Local bindings have a subset of checks performed.
- When a client fails a security check it will receive a 2035 return code
 - It will not receive any details on what check it failed or why.
 - Administrators can check the queue manager error logs for more details.

Security features in Queue Managers

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Common Features



Security features in Queue Managers

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Connection Authentication

- Connection authentication feature available in MQ v8 and above.
 - Allows authentication using user credentials supplied by client applications.
- User ID can be validated against a number of user repositories
 - OS, LDAP, PAM modules
- IBM MQ clients send two different userids in the connection data.
 - The userid that is running the application.
 - The userid and password that the application wants to authenticate with.
- Allows granular controls over whether an application *has* to provide valid credentials

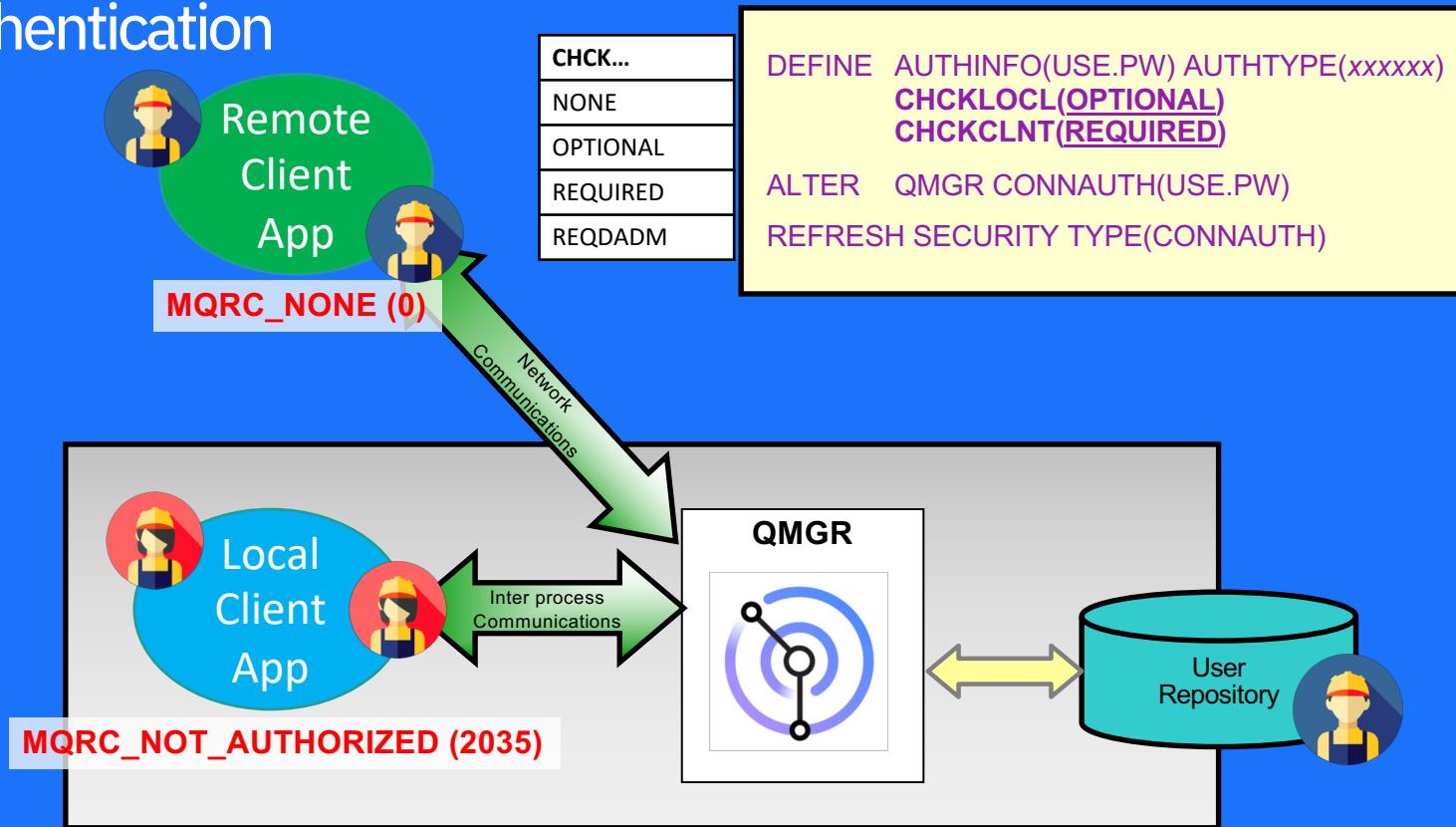


EarlyAdopt

Security features in Queue Managers

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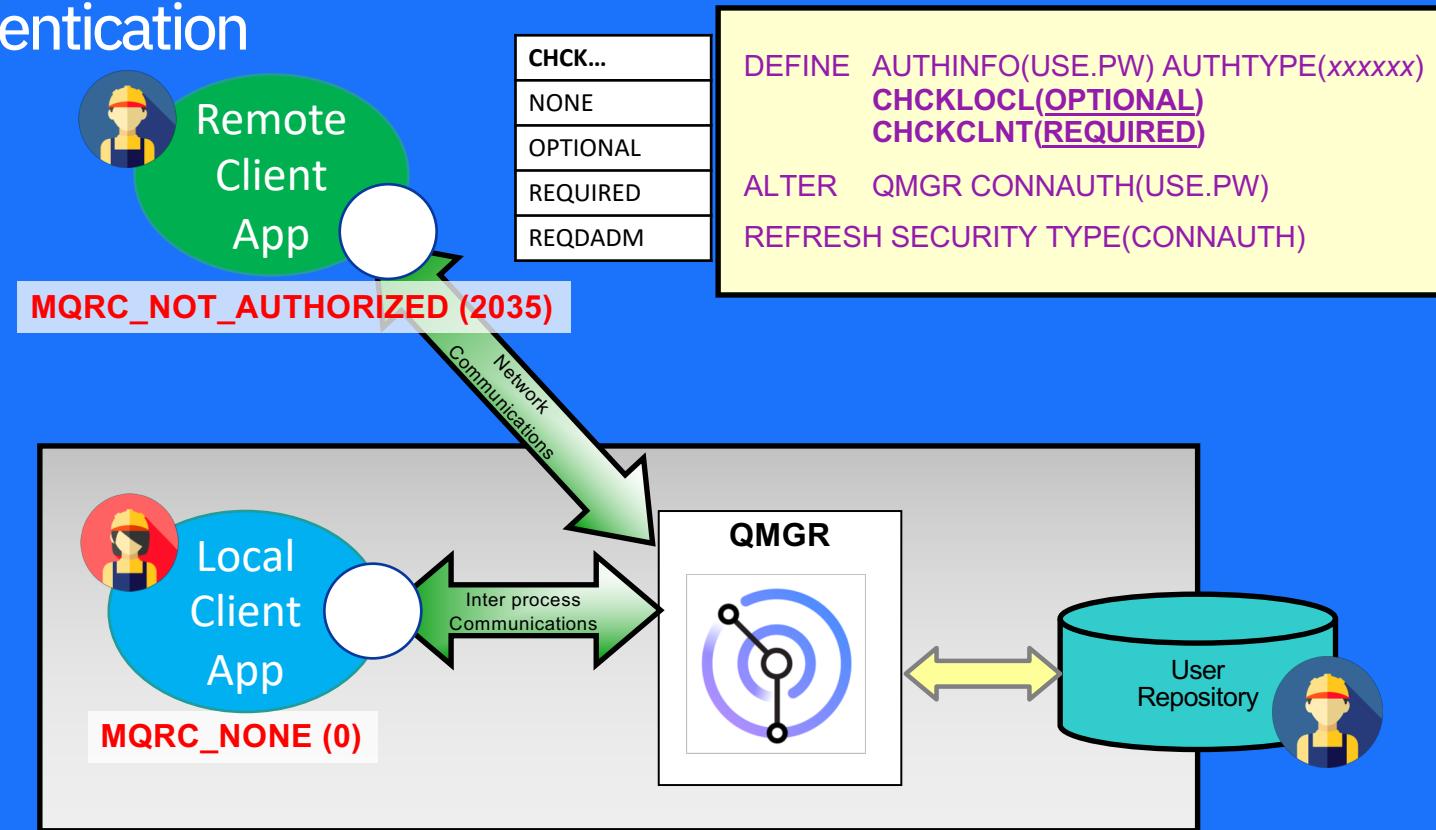
Connection Authentication



Security features in Queue Managers

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Connection Authentication



Security features in Queue Managers

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Authorization

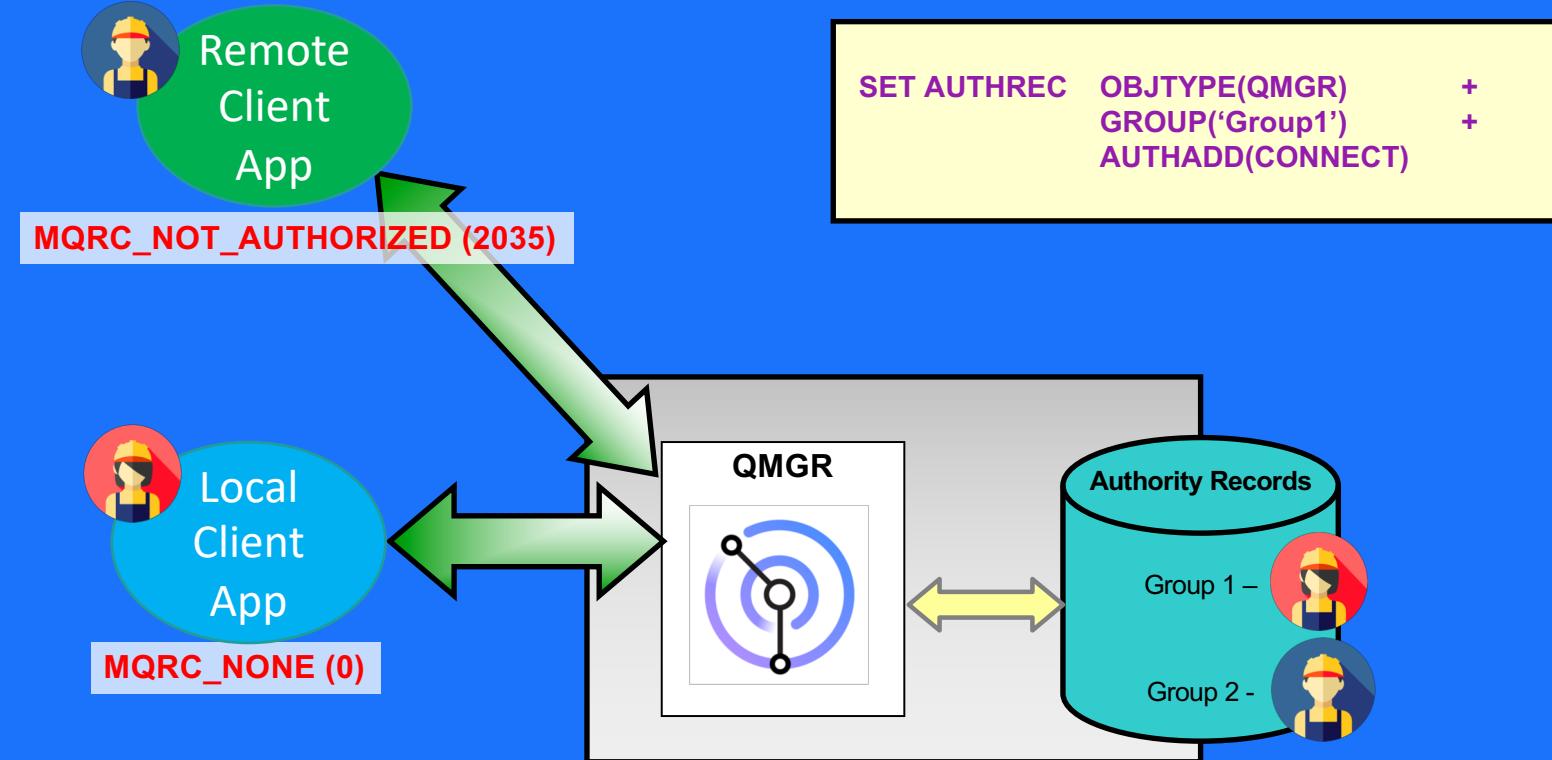
- This is performed by creating authority records
 - We create authority records for a specific user or group.
- Authority is given on MQ objects and dictate what actions they can perform (PUT, GET, OPEN, etc)
- If a user or group does not have authority to do what they are trying to do, they get blocked.
 - Authority is built up from all authority record sources
 - Users who are members of the mqm group have full administrator access.
- A channel or channel authentication rule can change the userid used for authority checks

What user is
used for
Authorization?

Security features in Queue Managers

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Authorization



Security features in Queue Managers



TLS

- IBM MQ's integration of TLS provides the following features:
 - ▶ Encryption of transmissions between client/queue manager to queue manager.
 - ▶ Integrity of transmissions between client/queue manager to queue manager.
 - ▶ [optional] Authentication with a queue manager.
- Requires Certificates in order to function
 - ▶ Supports both RSA and ECDSA certificates
 - ▶ Stored in a keystore.
- MQ supports a number of TLS providers
 - ▶ GSKit
 - ▶ JSSE
 - ▶ .NET

Security features in Queue Managers



TLS

- Certificates are created, stored and managed using tools supplied with IBM MQ
 - runmqakm
 - runmqckm
 - iKeyman (strmqikm)
- IBM MQ Channels can only have a single CipherSpec set on them
 - A CipherSpec is a string which details the hashing and encryption algorithm to use.
 - CipherSpec given by client must match the Channel's CipherSpec
 - ANY_TLS12 was added to allow you to specify multiple valid Ciphers (v9.1.1)

Security features in Queue Managers



TLS

- IBM MQ allows clients to either connect anonymously or with mutual authentication
 - If a client connects with a certificate then it must be known and trusted by the queue manager.
- CipherSpec lists are updated when new vulnerabilities arise
 - In later versions of IBM MQ you may notice the list size changing.
 - We do not delete CipherSpecs, we disable them by default.
- MQv8 added in multiple certificates feature
 - Allows you to specify a different certificate to use at the channel level
 - Allows you to specify a certificate to use on the queue manager
 - Before you would be forced to name your certificate **ibmwebspheremq<QM_name>**

Security features in Queue Managers

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TLS

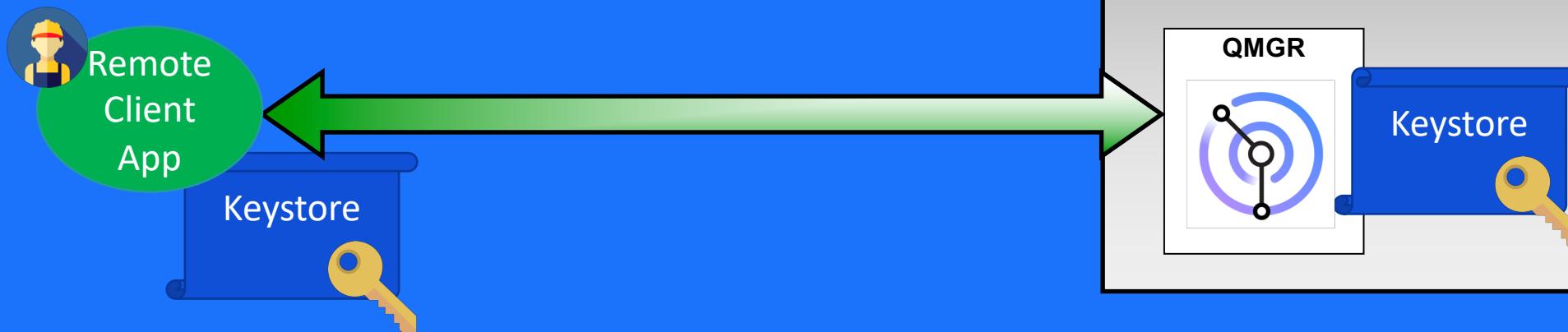
MQSCO:

KeyRepository=location of key repository

MQCD:

SSLCipherSpec= ECDHE_RSA_AES_256_GCM_SHA384

```
DEFINE CHANNEL(ENTRY) CHLTYPE(SVRCCONN)  
SSLcipH('ECDHE_RSA_AES_256_GCM_SHA384')
```



Security features in Queue Managers

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Advanced Message Security

- AMS:
 - It is message level security
 - It is an MQ Advanced feature
- AMS is an end-to-end security model, messages stay signed/encrypted through the whole lifetime of a message
 - In transit **and** At rest
- With AMS you can create policies for a queue that describe how messages should be protected when applications put or get messages using that queue name.
 - Signed
 - Encrypted



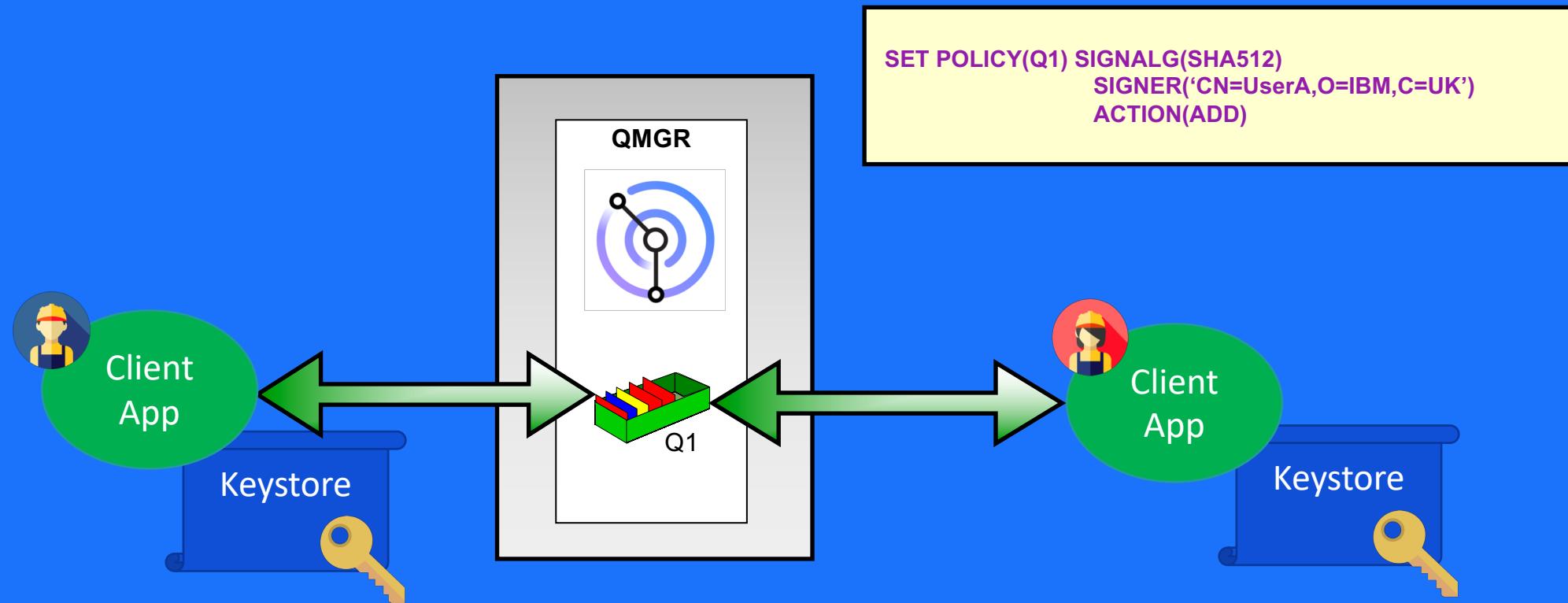
Advanced Message Security

- AMS does not perform any access control:
 - Only privacy and integrity protection
- Encryption level protection prevents unauthorised users reading message data.
 - Including MQ administrators.
- Signing protection prevents messages from being altered.
- AMS use certificates – Same as TLS.
 - But has extra requirements
- No application code changes required to use AMS.

Security features in Queue Managers



Advanced Message Security



Channel Authentication Records

- Channel authentication rules are filters that can be applied for incoming connections
 - Allowlisting – Allow connections based on a filter
 - Blocklisting – Block a connection based on a filter
- The filters are applied on channels and are applied to all incoming connections for that channel
 - The filter can be either very specific or generic. (Exact channel name or wildcard)

Security features in Queue Managers



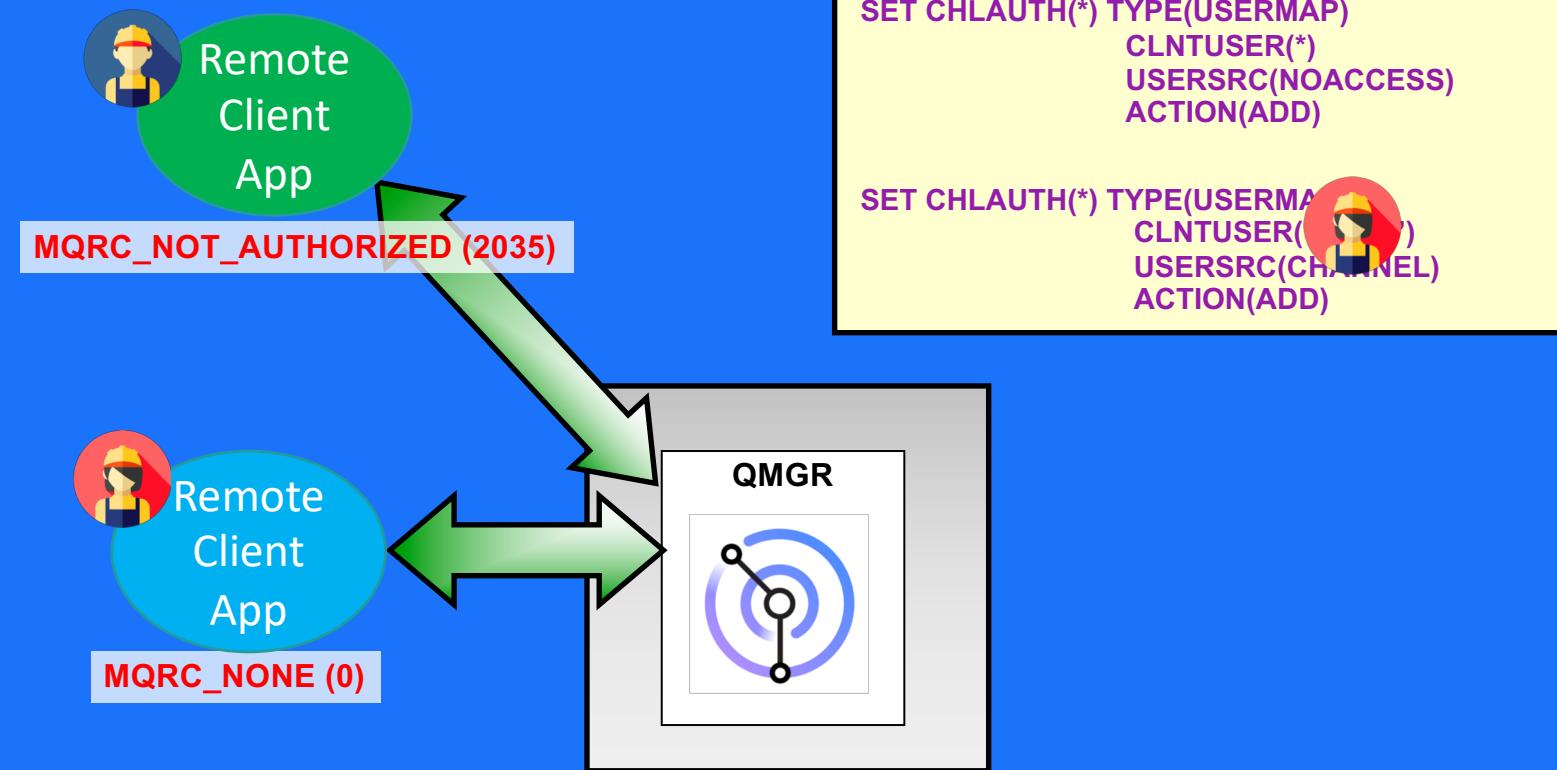
Channel Authentication Records

- There are four types of filters:
 - TLS Distinguished name (Issuer and Subject)
 - Client User ID name
 - Remote Queue Manager name
 - IP/Hostname
- For IP/Hostname the connection can be allowed/blocked at the listener or channel
- For Client user ID, the userid blocked can be the userid connected with or the final adopted userid

Security features in Queue Managers



Channel Authentication Records



Security Exits

- Security exits are bespoke, customer created exits that are ran during the security checking.
- MQ comes with an API that can interact with MQ to provide extra control over a connection.
 - They allow customers to expand MQ's security to suit their needs.
 - For example a customer could write a security exit to only allow connection to a channel during 08:00 to 17:00.
- Before MQ v8 they could be used to provide connection authentication functionality.
- When executed the security exit will have access to the channel definition, information about the incoming connection and information
 - It will also have a piece of data passed to it that is set on the channel - SCYDATA

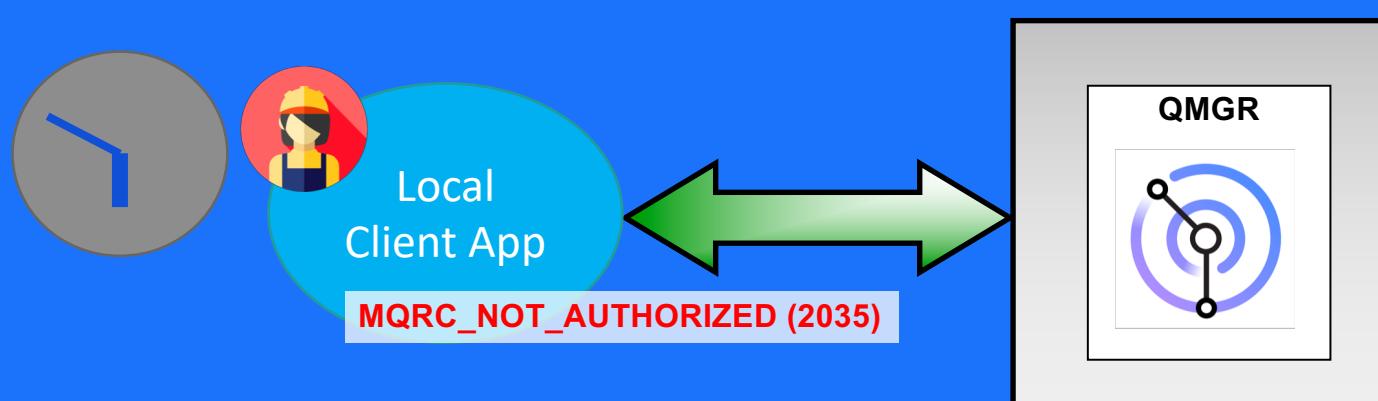
What user will be authorized?

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Security Exits

Exit:
If time range is not 09:00 – 17:00. Block

```
DEFINE CHANNEL(IN) CHLTYPE(SVRCONN) SCYEXIT('Exit')
```



Security features in Queue Managers

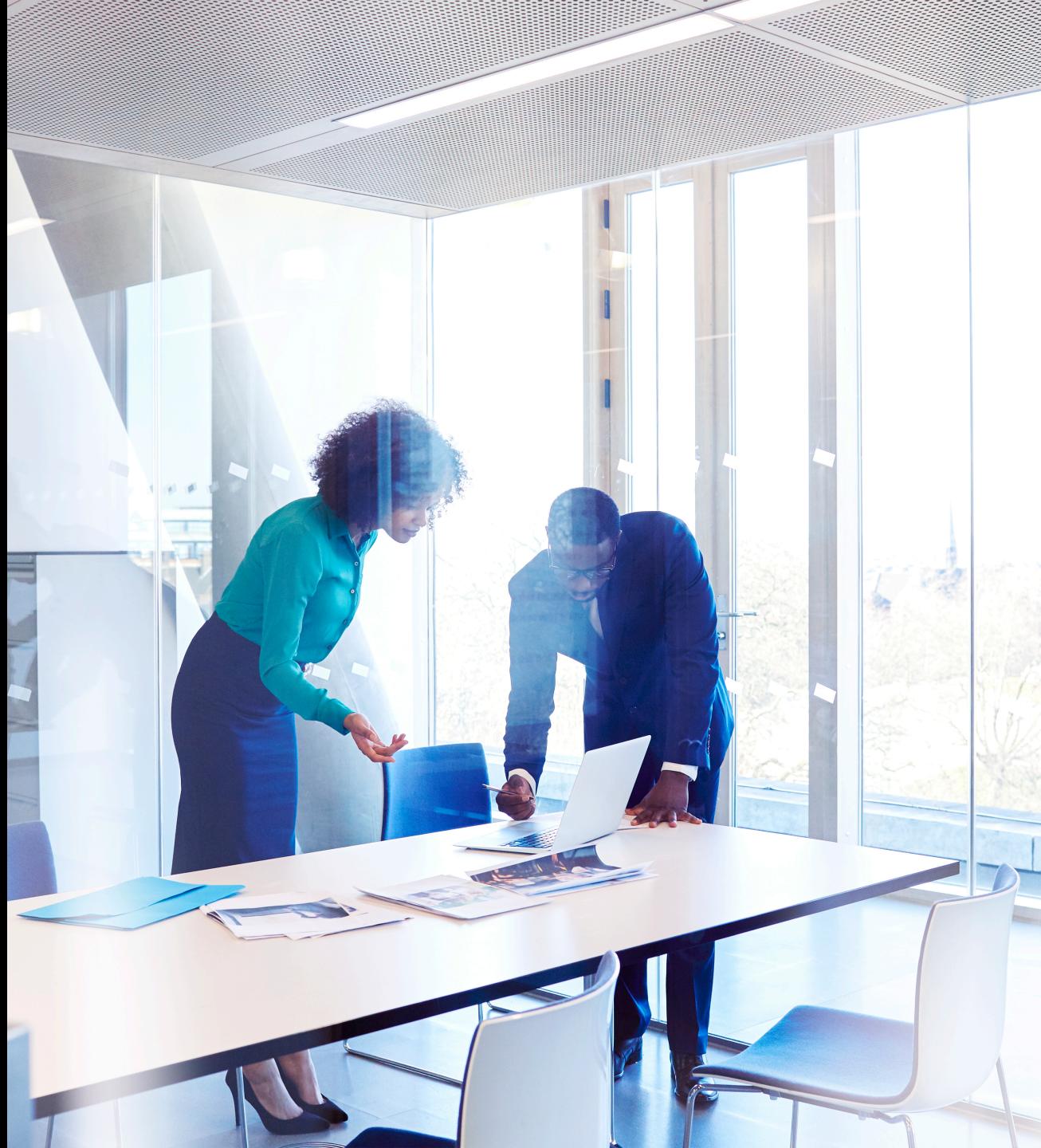
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Interactions between security features

- Every security feature of MQ interacts with each other (except AMS and TLS)
- Channel authentication rules, Connection authentication & Security exits can change the userid used for authorization checks
- Connection authentication can change the userid which is tested during channel authentication rules.
- To effectively design your security you must consider all security features.



Security options for REST/MQ Console



REST/MQ Console Security



- Role based access control. Need to be a member of at least one role
 - MQWebAdmin
 - MQWebAdminRO
 - MQWebUser
 - MFTWebAdmin
 - MFTWebAdminRO
- User and groups defined in a registry
 - Basic
 - LDAP
 - SAF (on z/OS)
 - OS (on distributed)
- REST is locked down by default, need to do some configuring
 - Samples provided to make this simpler

```
<!--  
Roles for the MQ REST API  
-->  
<enterpriseApplication id="com.ibm.mq.rest">  
  <application-bnd>  
    <security-role name="MQWebAdmin">  
      <group name="MQWebAdminGroup" realm="defaultRealm"/>  
    </security-role>  
    <security-role name="MQWebAdminRO">  
      <user name="mqreader" realm="defaultRealm"/>  
    </security-role>  
    <security-role name="MQWebUser">  
      <special-subject type="ALL_AUTHENTICATED_USERS"/>  
    </security-role>  
    <security-role name="MFTWebAdmin">  
      <user name="mftadmin" realm="defaultRealm"/>  
    </security-role>  
    <security-role name="MFTWebAdminRO">  
      <user name="mftreader" realm="defaultRealm"/>  
    </security-role>  
  </application-bnd>  
</enterpriseApplication>
```

```
<!-- Sample Basic Registry -->  
<basicRegistry id="basic" realm="defaultRealm">  
  <!-- This sample defines two users with unencoded passwords -->  
  <!-- and a group, these are used by the role mappings above -->  
  <user name="mqadmin" password="mqadmin"/>  
  <user name="mqreader" password="mqreader"/>  
  <group name="MQWebUI">  
    <member name="mqadmin"/>  
  </group>  
</basicRegistry>
```

```
<!-- Example LDAP Registry -->  
<ldapRegistry id="ldap"  
  realm="MyOrganizationRealm"  
  host="sso.example.com"  
  port="389"  
  ignoreCase="true"  
  baseDN="o=example.com"  
  certificateMapMode="EXACT_DN"  
  ldapType="IBM Tivoli Directory Server"  
  idsFilters="ibm_dir_server">  
</ldapRegistry>
```

Security options for REST/MQ Console



- Token based
 - User logs in once with user id and password and then gets a cookie which is used for subsequent requests

```
curl -k -X POST -H "Content-Type: application/json"
```

```
-d "{\"username\":\"mqadmin\",\"password\":\"mqadmin\"}"  
https://localhost:9443/ibmmq/rest/v1/login -c c:\temp\cookiejar.txt
```

User id and password provided as JSON payload

Cookie stored for use on next request

- DELETE to the login URL logs out

- Or HTTP basic authentication

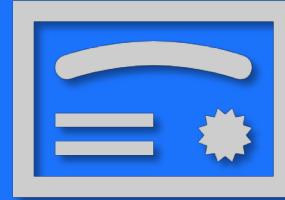
- User id and password provided as an encoded header, must be set for each request

```
C:\>curl -k https://localhost:9443/ibmmq/rest/v1/admin/installation -u mqadmin:mqadmin  
{"installation": [  
    {"name": "MQ905",  
     "platform": "windows",  
     "version": "9.0.5.0"  
}]]
```

Security options for REST/MQ Console

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- Or use a client certificate
 - Must be provided with each call to the REST API
 - Distinguished name from certificate is mapped to user in configured user registry

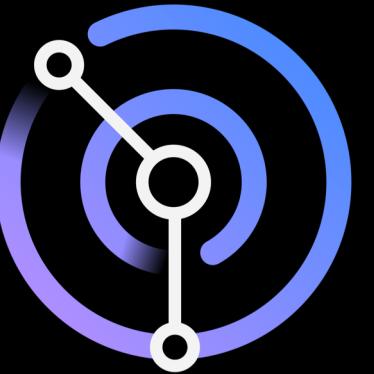


More information?

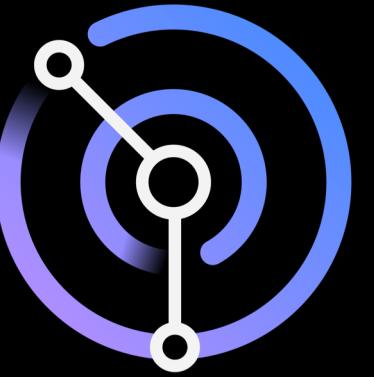
IBM Messaging developerWorks
developer.ibm.com/messaging

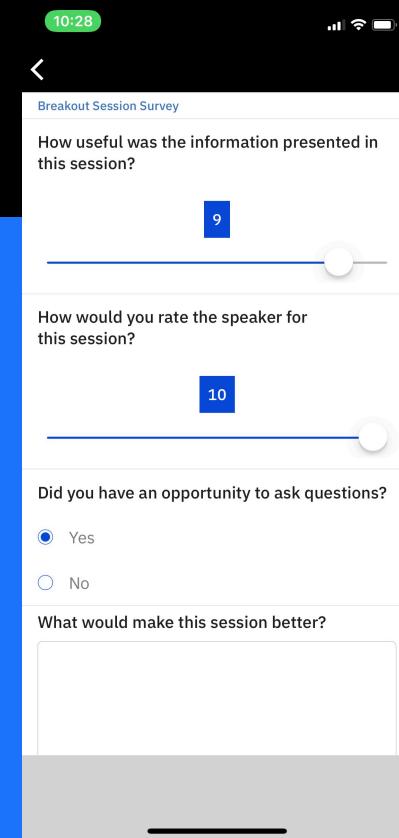
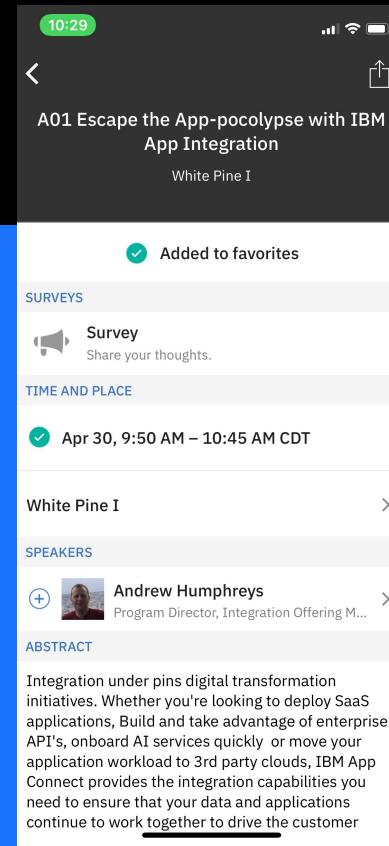
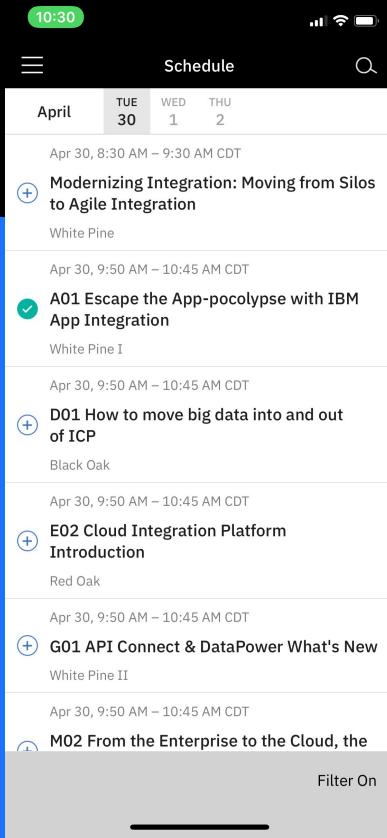
IBM Messaging Youtube
<https://ibm.biz/MQplaylist>

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Thank You



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