Running and Supporting MQ Light Applications

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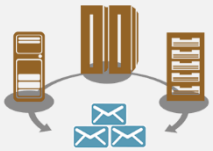
Agenda

- What is MQ Light?
- The MQ Light API
- Running MQ Light apps in Bluemix
- IBM MQ support for MQ Light
- Demos

IBM Messaging



Enterprise
Messaging

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

Application
Messaging

Enable Developers to build more scalable, responsive applications

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

What is MQ Light?

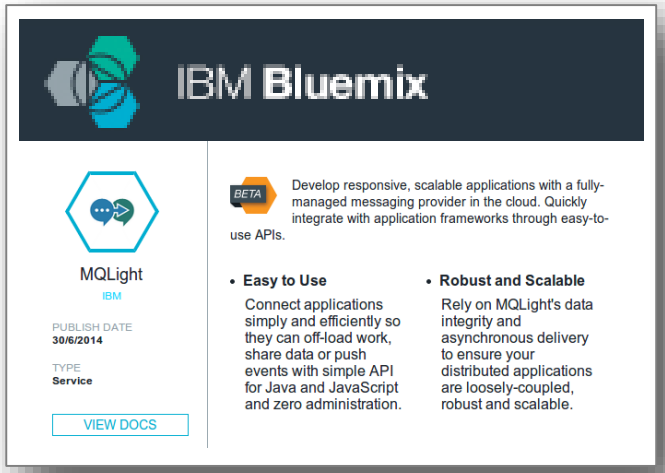
1. A new messaging API

2. A messaging runtime for on-premise development

3. A PaaS messaging runtime for admin-free cloud deployment (the MessageHub Service in Bluemix)

More on all of these throughout the slides...

MQ Light : Software and Cloud



- **Messaging that application developers will love to use, helping them make responsive applications that scale easily**
- **3 ways to run an MQ Light application:**
  - **Bluemix Message Hub service (MQ Light service now deprecated)**
  - **MQ Light software download**
  - **IBM MQ 8.0.0.4**
- **Open APIs crafted to feel natural in a growing range of popular languages**
- **Tooling that makes modular app development easy**

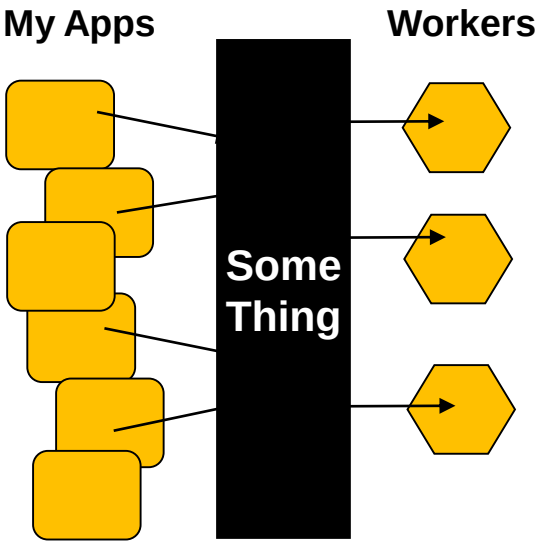
The journey that got us here

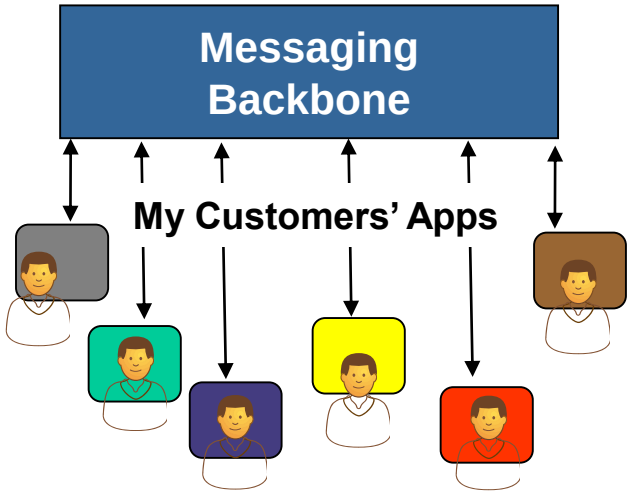
I want to execute code without taxing my Web app processes

Andy
Developer

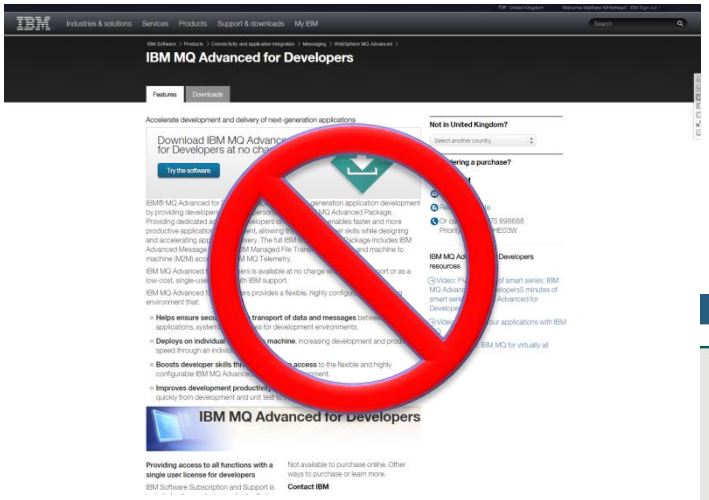
Iain
Infrastructure Guy

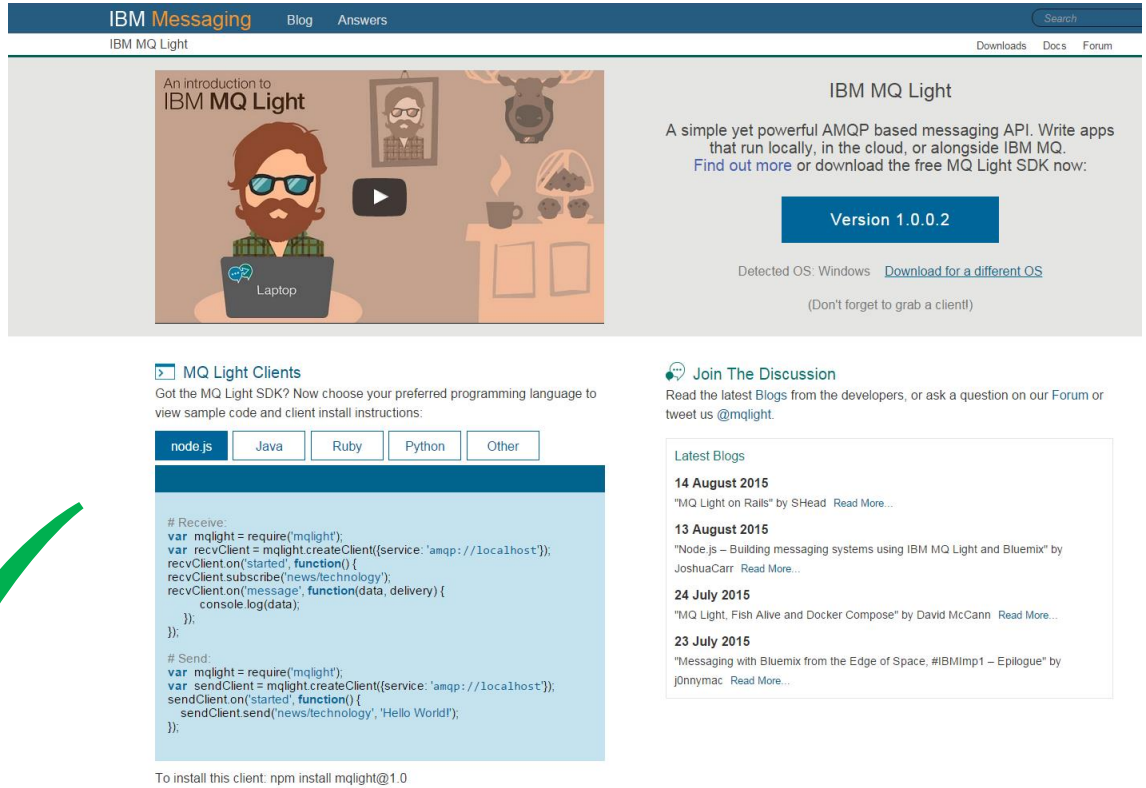
My job is run a communications service for my customers' apps



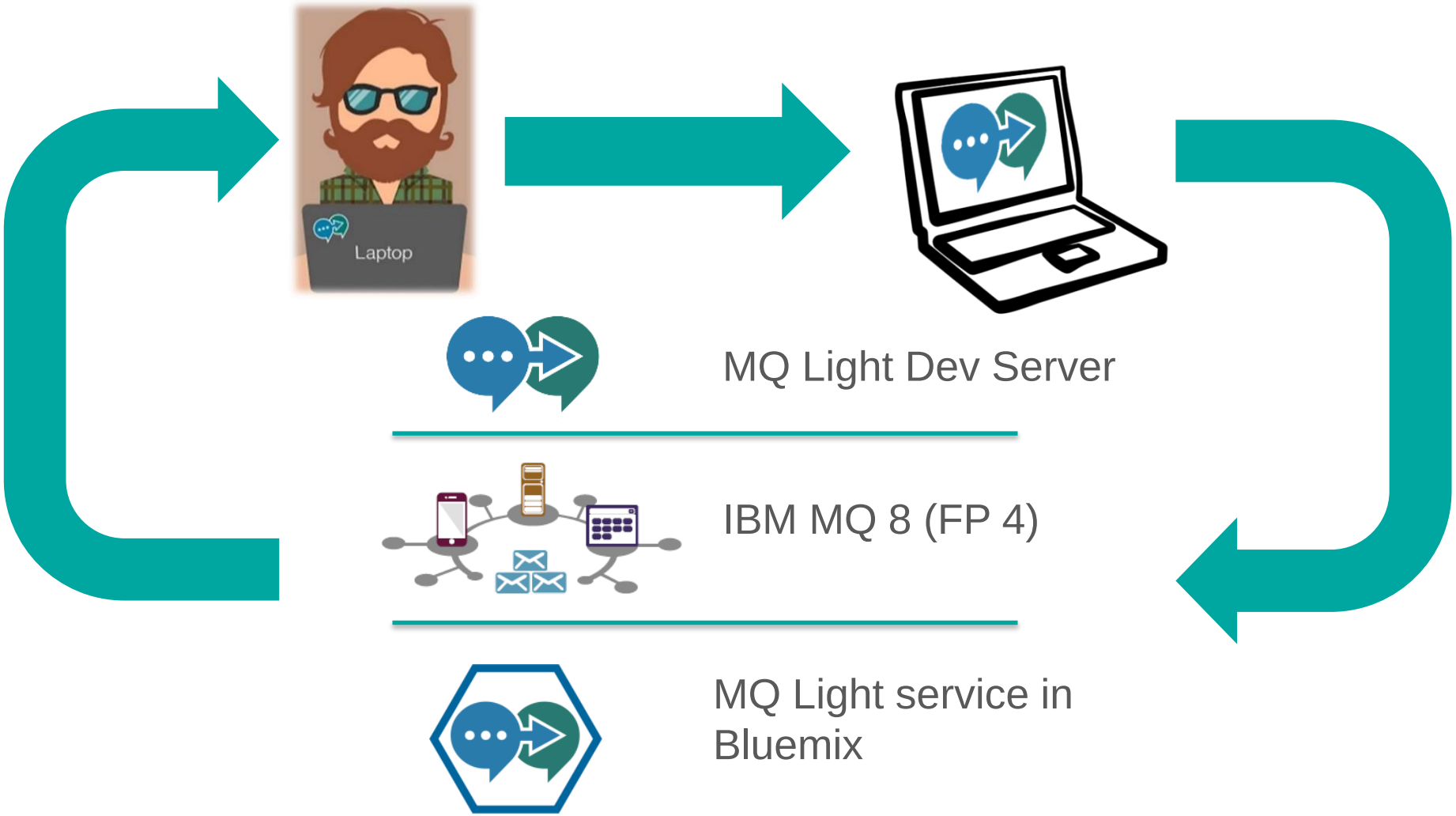


Corporate-free look & feel

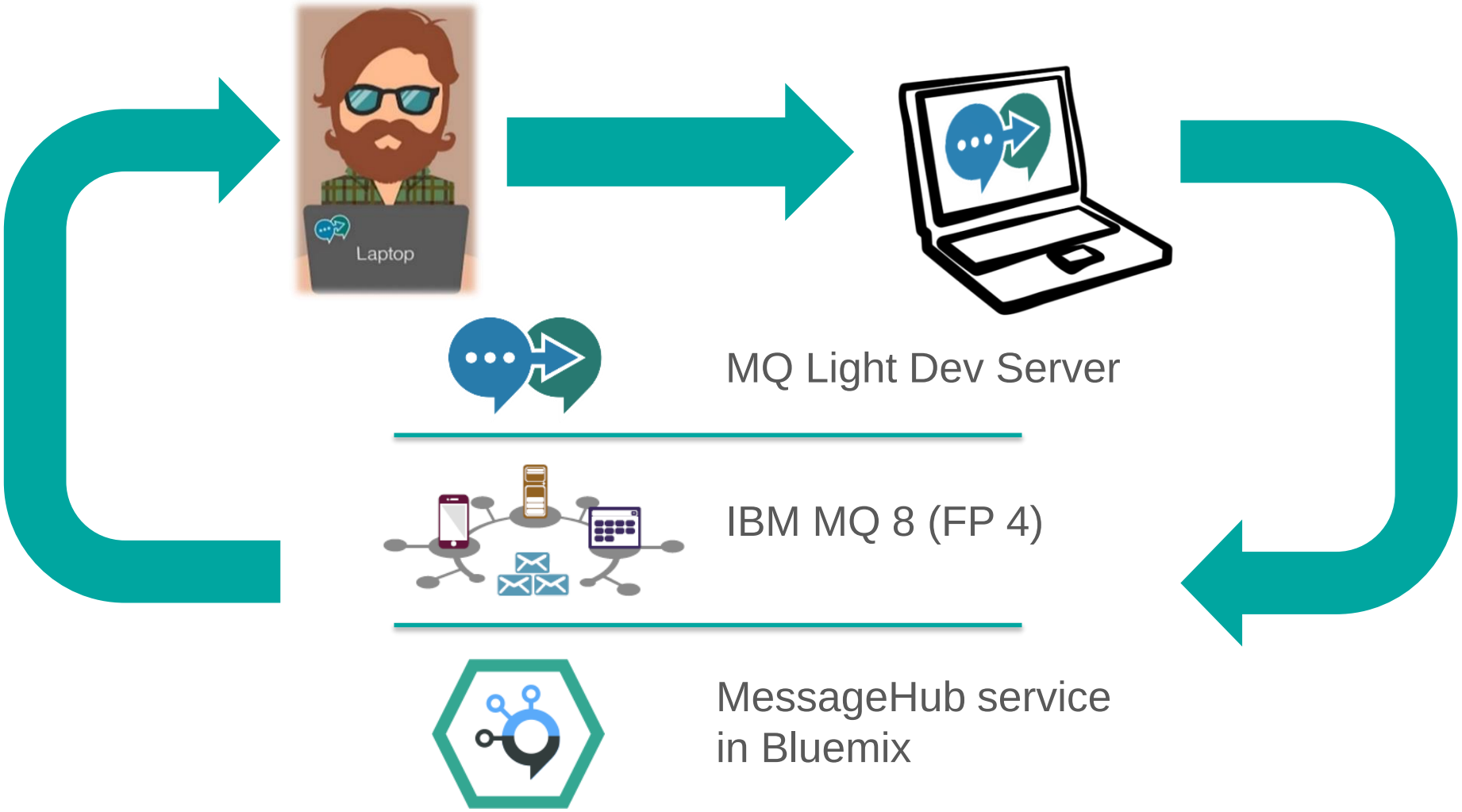




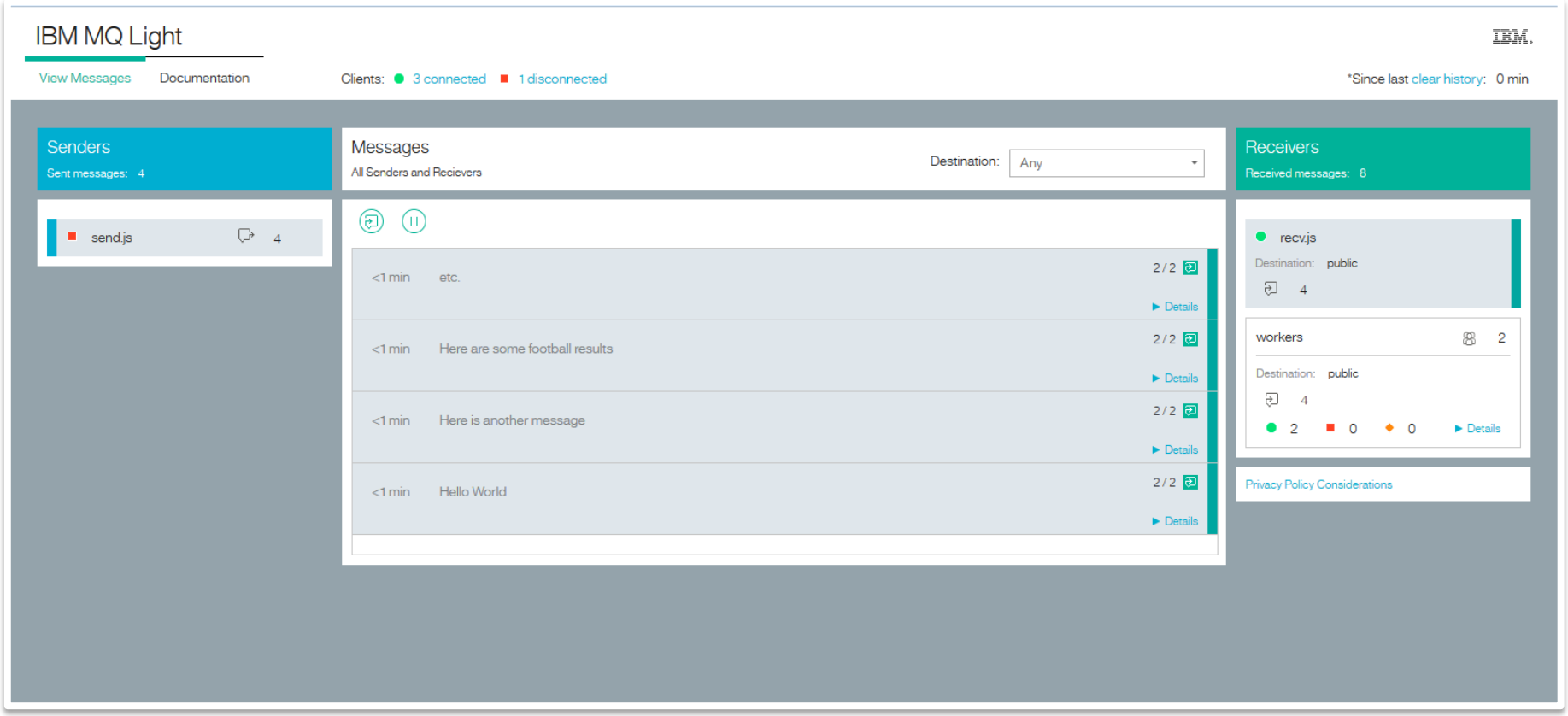
Deployment Options (last year's slide)



Deployment Options



Web Based Tooling



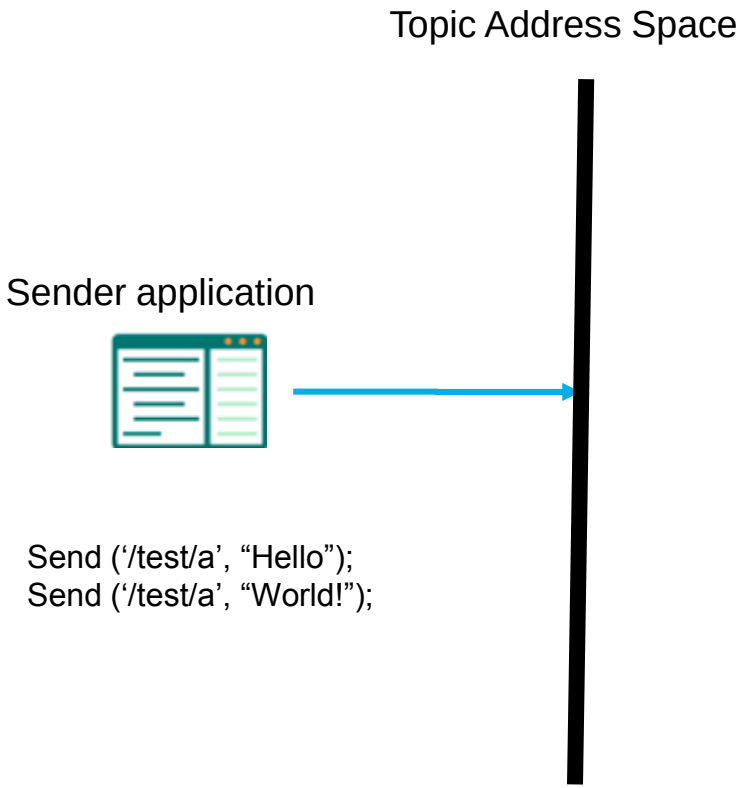
Agenda

- What is MQ Light?
- **The MQ Light API**
- Running MQ Light apps in Bluemix
- IBM MQ support for MQ Light
- Demo

MQ Light API - Language support

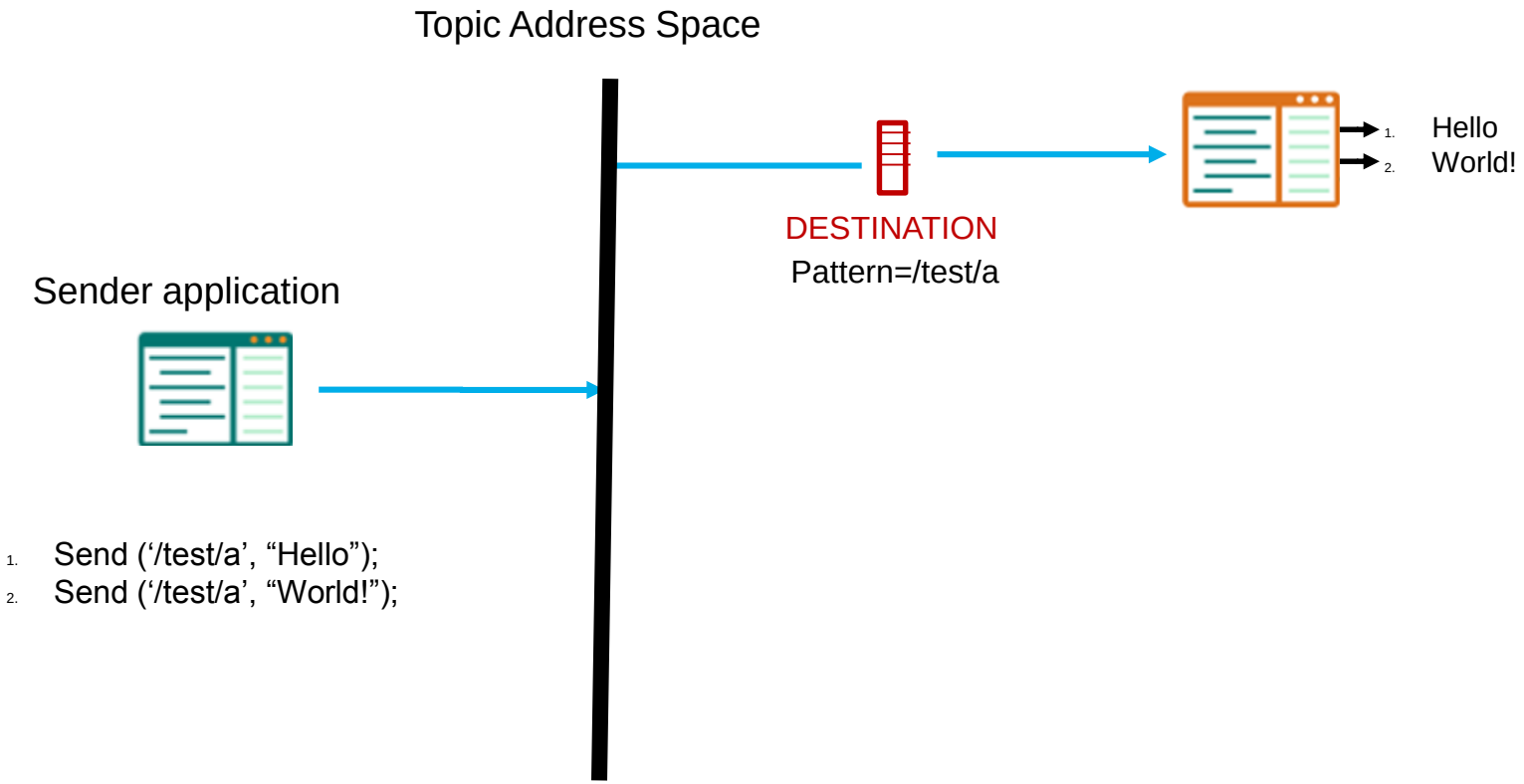
- Simple, programming Language neutral messaging model
- Idiomatic language & framework API Mappings
  - Frictionless development
- Open wire protocol
  - Open Source client libraries
  - Facilitates community drivers for languages & frameworks

MQ Light Messaging Model – Send Messages



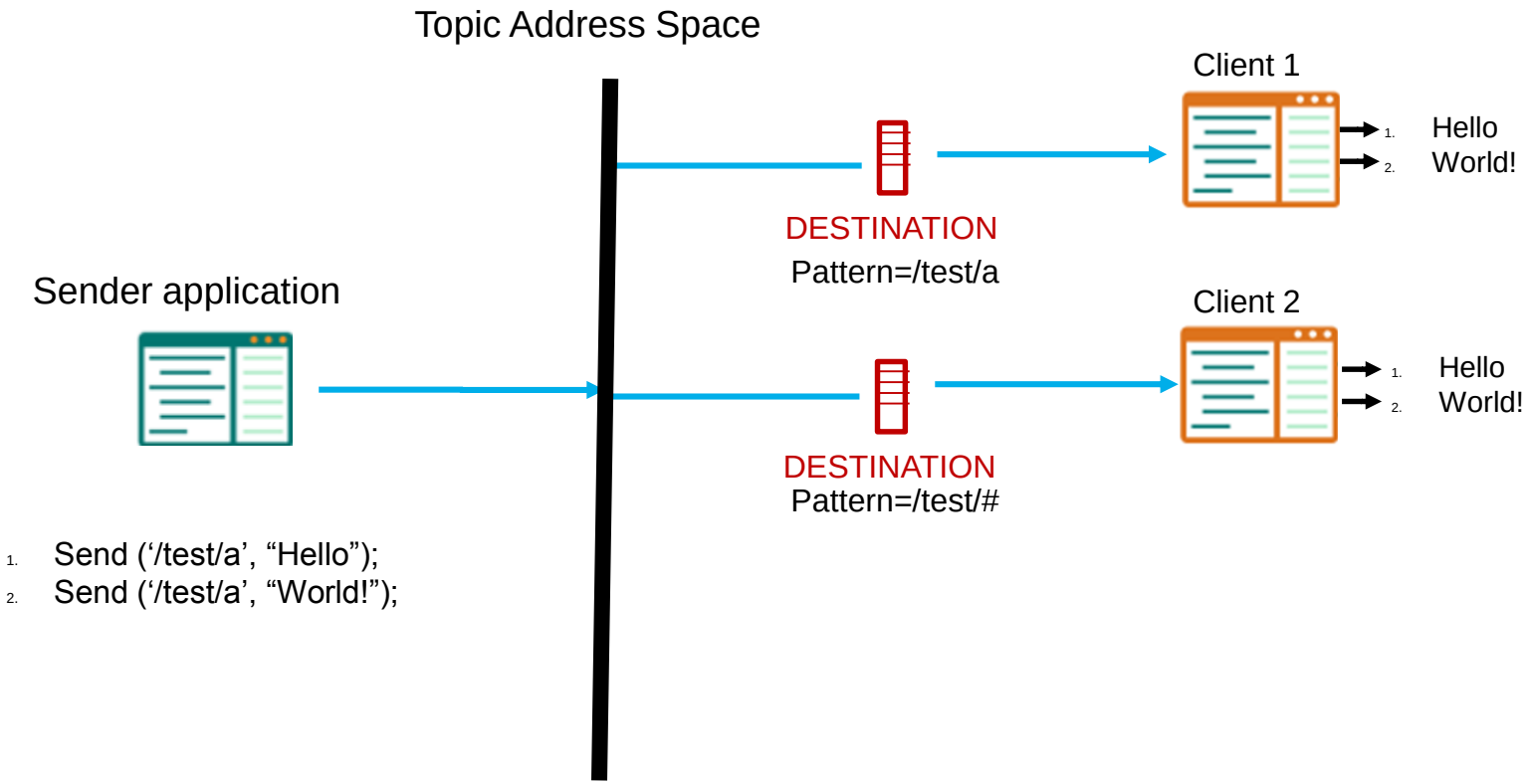
Applications send messages to a ***topic***.
A topic is an address in the topic space either flat or arranged hierarchically.

MQ Light Messaging Model – Simple Receive



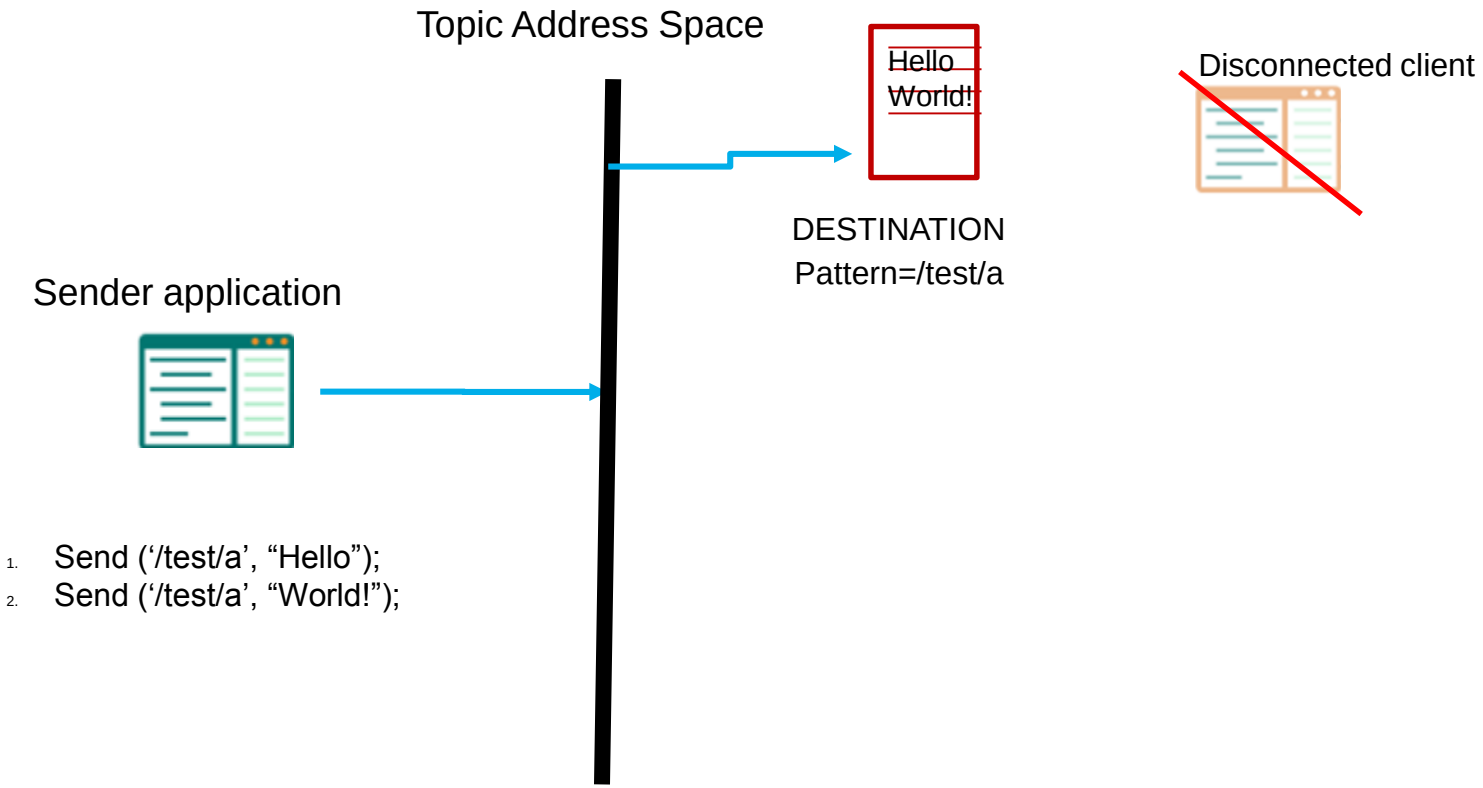
- Applications receive messages by creating a **destination** with a pattern which matches the topics they are interested in.
- Pattern matching scheme based on WMQ.

MQ Light Messaging Model – Pub/Sub



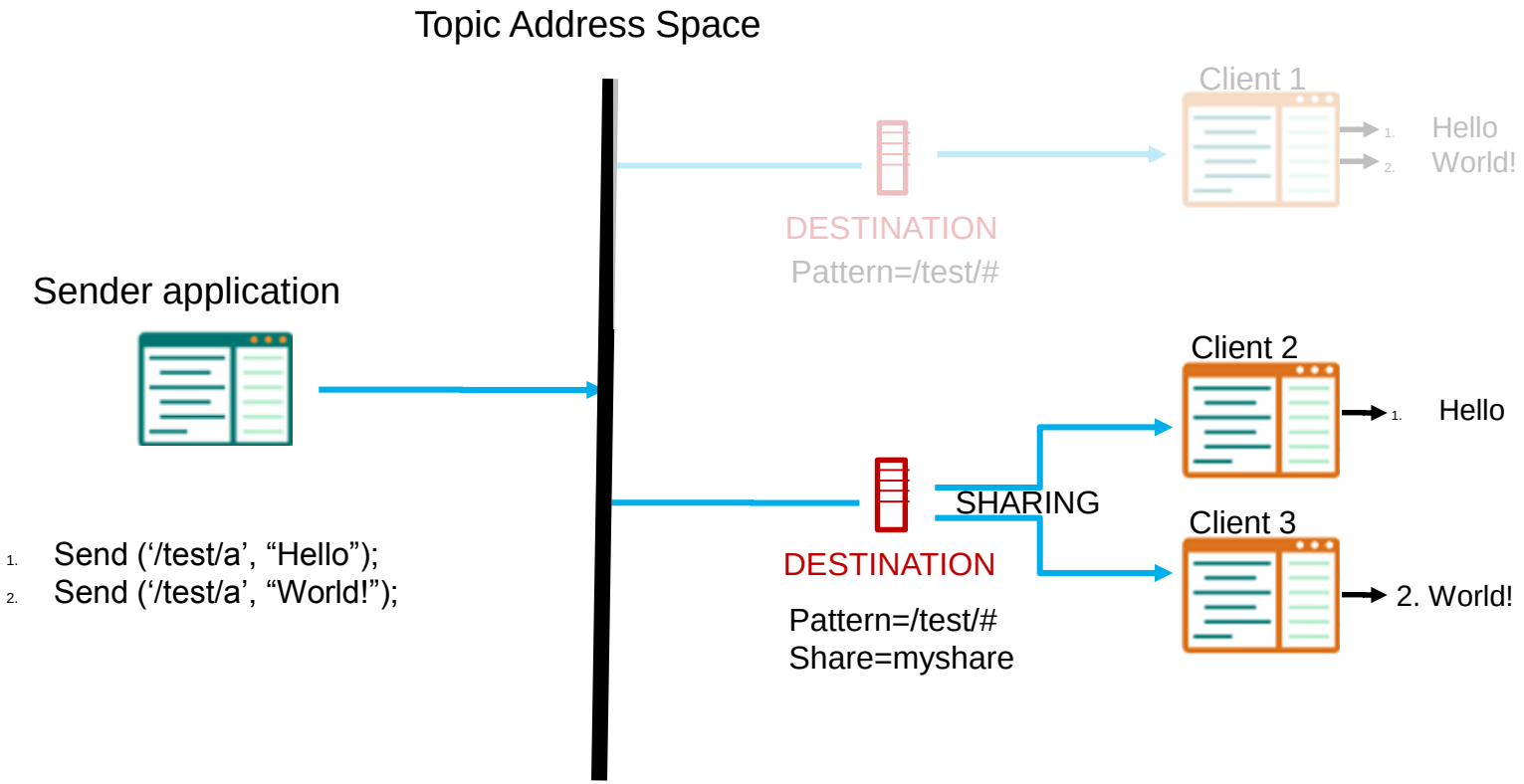
- Multiple destinations can be created which match the same topic
  - Pub/Sub style.

MQ Light Messaging Model – Persistent destinations



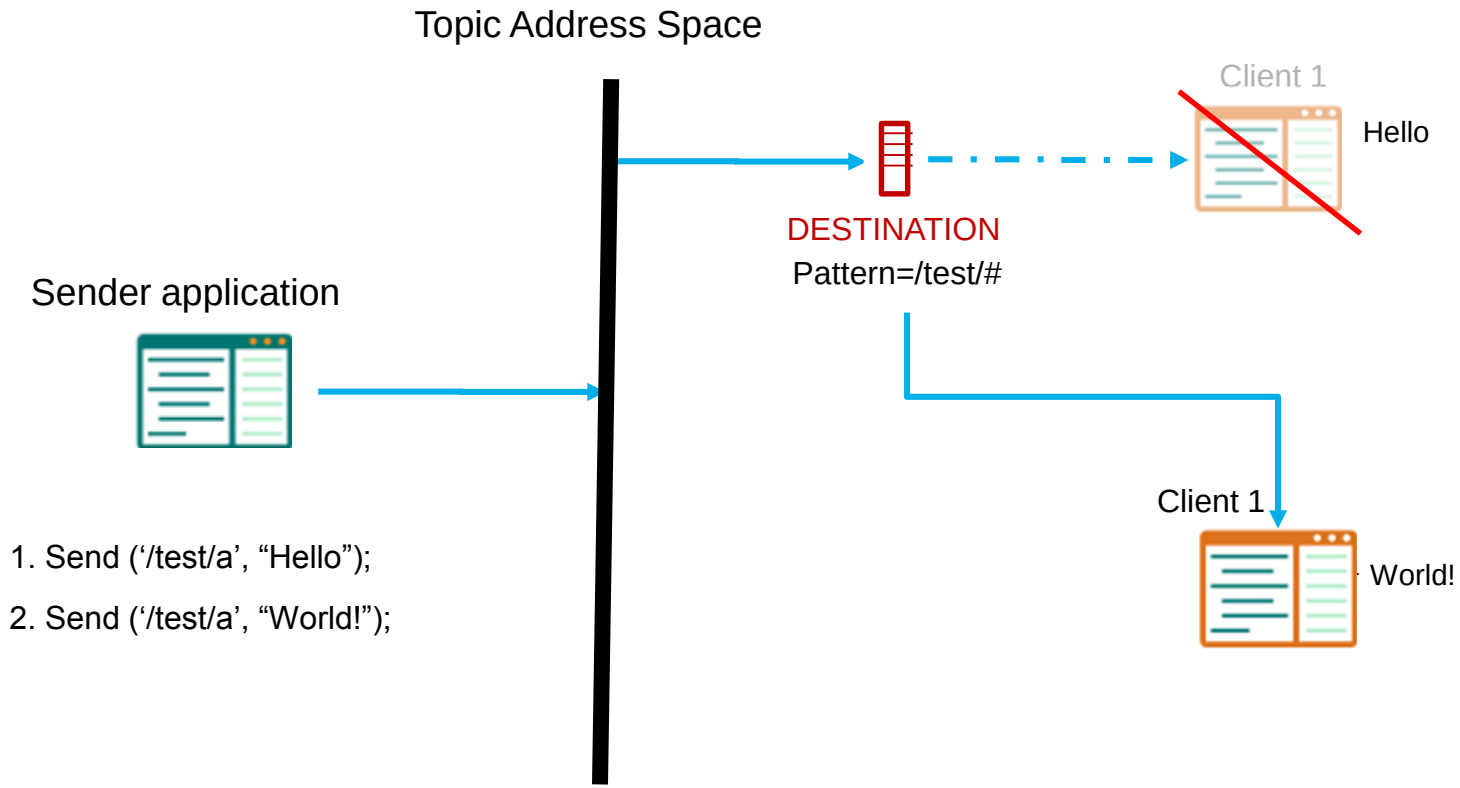
- Destinations persist for a defined "time to live" after receiver detaches.

MQ Light Messaging Model – Sharing



- Clients attaching to the same topic pattern and share name attach to the same shared destination.

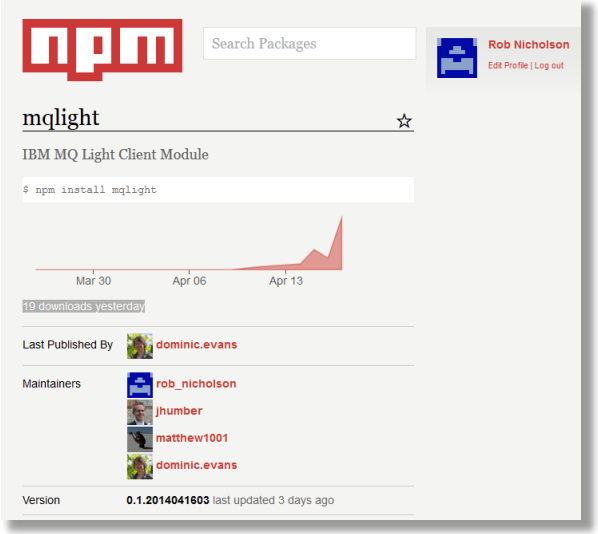
MQ Light Messaging Model – Client takeover



- Applications connect to MQ Light service specify (optional) client ID.
- Re-using the same client ID pre-empts the original connection.
  - Ideal for worker takeover in the cloud.

MQ Light Node.JS API

- Installable from NPM
- Fully non blocking – Node.JS style
- Fluent programming style - wrappable into promises.
- Focussed on code simplicity.
- Client seamlessly retries across cloud endpoints

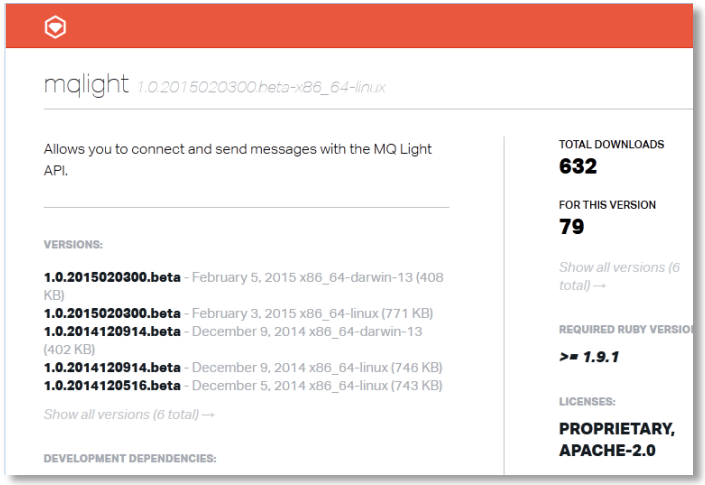



```
# Receive:
var mqlight = require('mqlight');
var recvClient = mqlight.createClient({service: 'amqp://localhost'});
recvClient.on('started', function() {
  recvClient.subscribe('news/technology');
  recvClient.on('message', function(data, delivery) {
        console.log(data);
      });
  });

# Send:
var mqlight = require('mqlight');
var sendClient = mqlight.createClient({service: 'amqp://localhost'});
sendClient.on('started', function() {
   sendClient.send('news/technology', 'Hello World!');
 });
```

MQ Light Ruby API

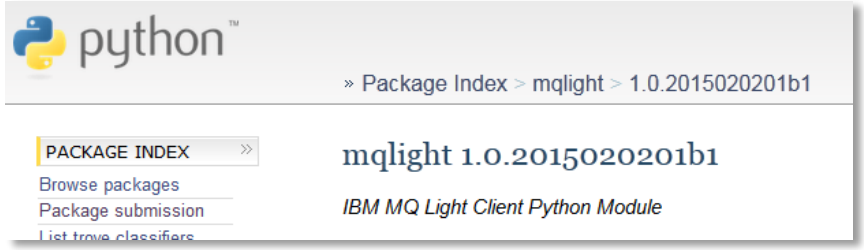
- **Installable from rubygems.org**
- **Synchronous/blocking client.**
- **Bluemix connection support**
- **Backlog**
  - Auto reconnect.
  - Asynchronous non blocking
  - TLS




```
# Receive:
require 'mqlight'
client = Mqlight::BlockingClient.new('amqp://localhost')
client.subscribe('news/technology')
delivery = client.receive('news/technology')
puts delivery.data

# Send:
require 'mqlight'
client = Mqlight::BlockingClient.new('amqp://localhost')
client.send('news/technology', 'Hello World!')
```

MQ Light Python API (Beta)



- **Installable from pypi.python.org**
- **Non blocking**
- **Client seemlessly retries across cloud endpoints**
- **Backlog**
  - TLS

```
# Receive:
require 'mqlight'
client = Mqlight::BlockingClient.new('amqp://localhost')
client.subscribe('news/technology')
delivery = client.receive('news/technology')
puts delivery.data

# Send:
require 'mqlight'
client = Mqlight::BlockingClient.new('amqp://localhost')
client.send('news/technology', 'Hello World!')
```

MQ Light Non Blocking Java API

- Installable using Maven
- Code is opensource on github.
- Non blocking
- Client seemlessly retries across cloud endpoints

```
void send() {
   NonBlockingClient.create("amqp://localhost", new NonBlockingClientAdapter<Void>() {
        public void onStarted(NonBlockingClient client, Void context) {
            client.send("news/technology", "Hello World!", null);
        }
    }, null);
}

void receive() {
   NonBlockingClient.create("amqp://localhost", new NonBlockingClientAdapter<Void>() {

      public void onStarted(NonBlockingClient client, Void context) {
         client.subscribe("news/technology",  new DestinationAdapter<Void>() {
            public void onMessage(NonBlockingClient client, Void context, Delivery delivery) {
               if (delivery.getType() == Delivery.Type.STRING) System.out.println(((StringDelivery)delivery).getData());
            }
         }, null, null);
      }
   }, null);
}
```

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- **Running MQ Light apps in Bluemix**
- IBM MQ support for MQ Light
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IBM Bluemix

Bluemix is an **open-standards**, cloud-based platform for **building**, **running, and managing applications.**

Build your apps, your way

Use the most prominent compute technologies to power your app: Cloud Foundry, Docker, OpenStack.

Scale more than just instances

Development, monitoring, deployment, and logging tools allow the developer to run and manage the entire application.

Extend apps with services

A catalog of IBM, third party, and open source services allow the developer to stitch an application together quickly.

Deploy and manage hybrid apps seamlessly

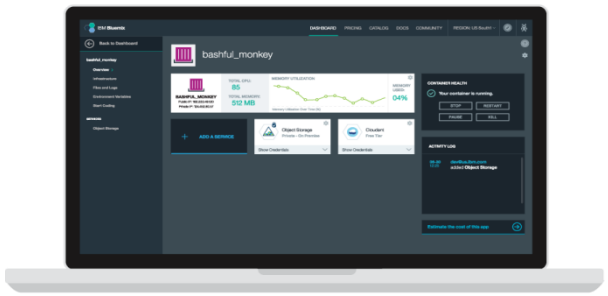
Get a seamless dev and management experience across a number of hybrid implementations options.

Layered Security

IBM secures the platform and infrastructure and provides you with the tools to secure your apps.

Flexible Pricing

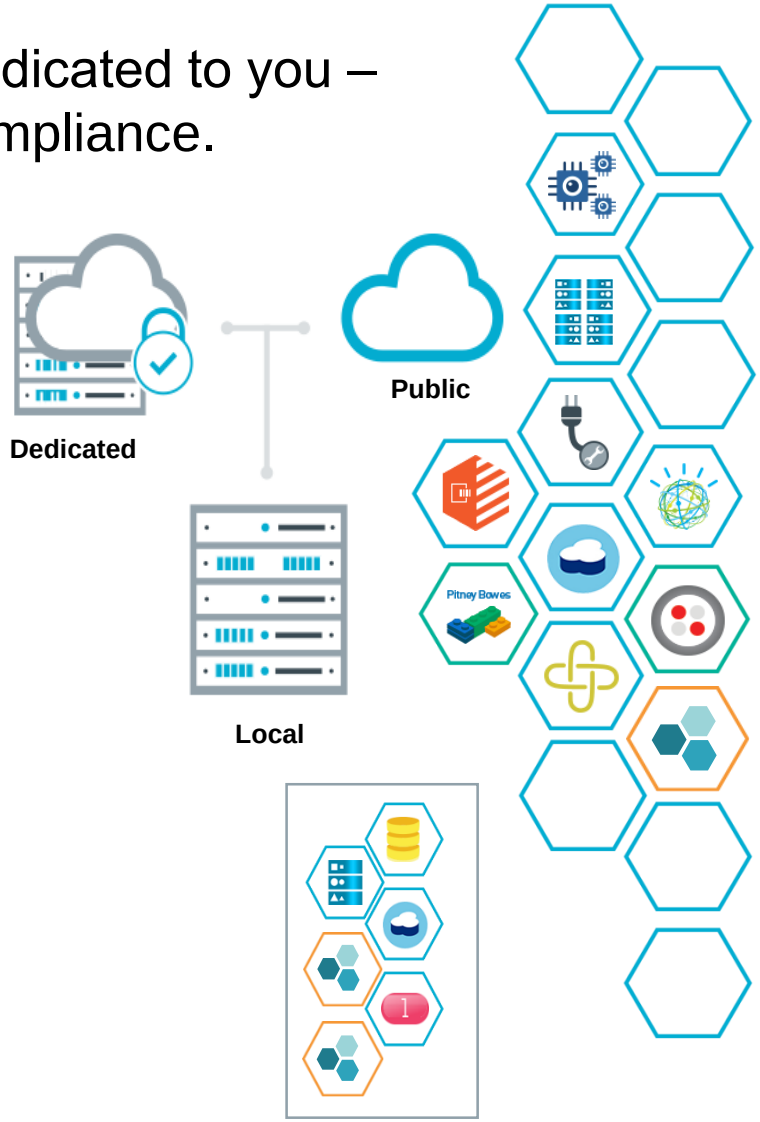
Try compute options and services for free and, when you're ready, pay only for what you use. Pay as you go and subscription models offer choice and flexibility.



Has a “Dedicated to You” option

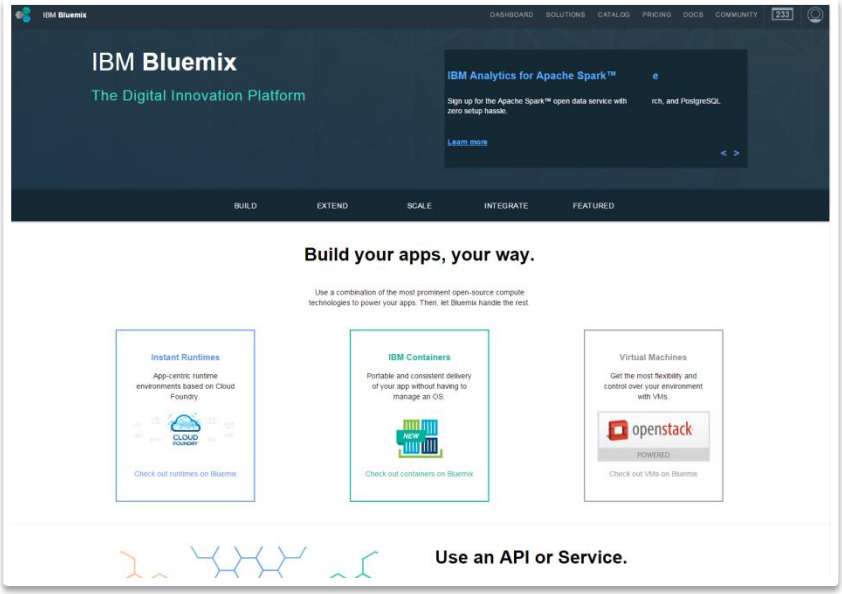
Single tenant hardware that’s completely dedicated to you – allowing you to satisfy regulatory & legal compliance.

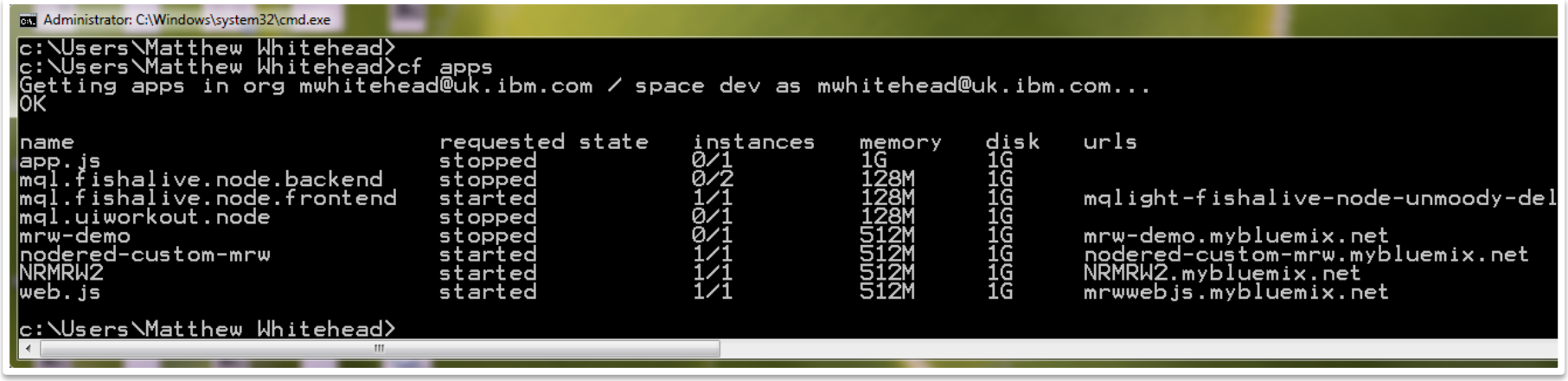
- The Bluemix platform and dedicated runtimes and services sit on SoftLayer hardware that is dedicated to you
- You still have the ability to connect to all multi-tenant services in the “public” catalog
- Integrated to your LDAP for developer authentication
- Elastic capacity based on your demands.



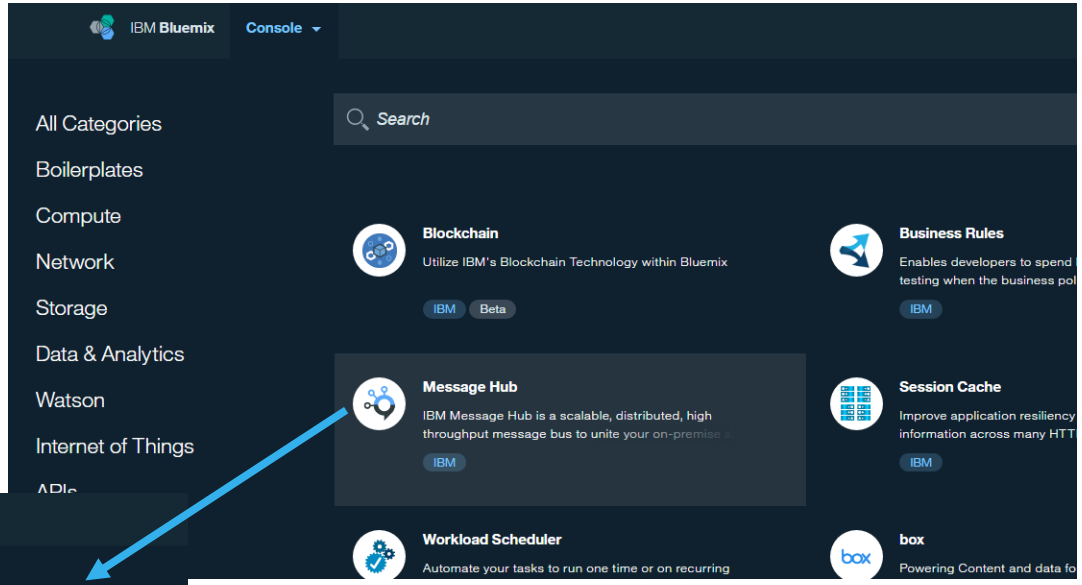
IBM Bluemix Apps

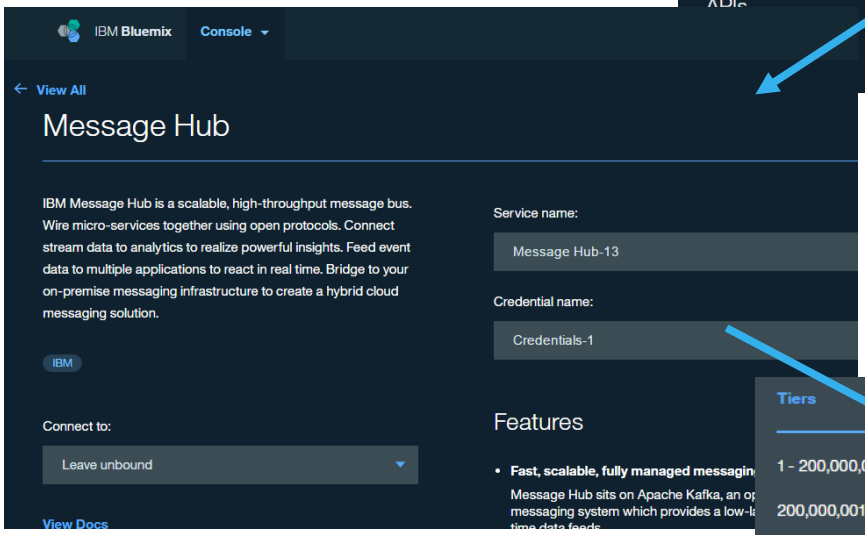
- Based on Pivotal ® Cloud Foundry ®
- Uses standard cf commands, e.g.
    - cf push <myapp>
    - cf start <myapp>
    - cf stop <myapp>
    - cf apps
    - cf create-service …
    - cf bind-service …





IBM Bluemix Services





Tiers	Pricing
1 - 200,000,000	£0.0605 GBP/Million Digital Messages
200,000,001 - 700,000,000	£0.0302 GBP/Million Digital Messages
700,000,001 - 1,700,000,000	£0.0181 GBP/Million Digital Messages
1,700,000,000+	£0.0102 GBP/Million Digital Messages

IBM Bluemix – Binding Apps and Services

Applications are bound to the services they require

This is the dashboard for one of my applications. It's bound to a Message Hub service instance I previously created


```
cf create-service messagehub standard "Message Hub-7u"
cf bind-service mql.uiworkout.node "Message Hub-7u"
```

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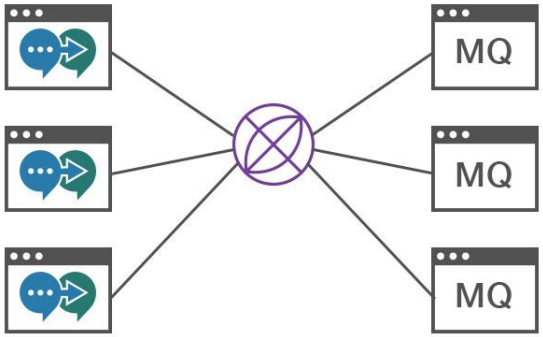
New AMQP channel type

- Introduced in MQ 8.0.0.4
- Supported on distributed platforms (not z/OS/IBM i)
- Adds a channel type of “AMQP”
- Supports a subset of the AMQP 1.0 Oasis specification
- Interoperable with MQ FAP and MQTT applications (see later slides for details)



AMQP channels

- Configuration model
  - MQSC and PCF updates allow you to administer AMQP channels in much the same way as other MQ objects
    - DISPLAY CHANNEL(*) CHLTYPE(**AMQP**)
    - DEFINE CHANNEL(MY.AMQP.CHANNEL) CHLTYPE(**AMQP**) PORT(5673)
    - START CHANNEL(MY.AMQP.CHANNEL)
    - STOP CHANNEL(MY.AMQP.CHANNEL)
    - DISPLAY CHSTATUS(*) CHLTYPE(**AMQP**)
  - PCF command types all valid, using MQIACH_CHANNEL_TYPE=**MQCHT_AMQP**:
    - MQCMD_CREATE_CHANNEL MQCMD_DELETE_CHANNEL,
      MQCMD_CHANGE_CHANNEL MQCMD_START_CHANNEL,
      MQCMD_STOP_CHANNEL MQCMD_COPY_CHANNEL,
      MQCMD_INQUIRE_CHANNEL MQCMD_INQUIRE_CHANNEL_STATUS

AMQP channels

mwhitehead@ubuntu-vm: /opt/mqmAMQP

DIS CONN command

```
      :

      :
dis conn(*) type(conn) where (channel eq myamqp) all
    10 : dis conn(*) type(conn) where (channel eq myamqp) all
AMQ8276: Display Connection details.
   CONN(9658C45405250020)
   EXTCONN(414D5143514D35202020202020202020)
   TYPE(CONN)
   PID(3446)                                TID(8)
   APPLDESC(WebSphere MQ Advanced Message Queuing Protocol)
   APPLTAG(java)                            APPLTYPE(SYSTEMEXT)
   ASTATE(STARTED)                          CHANNEL(MYAMQP)
   CLIENTID(recv_729b7a3)                   CONNAME(192.168.56.1)
   CONNOPTS(MQCNO_HANDLE_SHARE_NO_BLOCK,MQCNO_FASTPATH_BINDING)
   USERID(mqm)                              UOWLOG( )
   UOWSTDA( )                               UOWSTTI( )
   UOWLOGDA( )                              UOWLOGTI( )
   URTYPE(QMGR)
   EXTURID(XA_FORMATID[] XA_GTRID[] XA_BQUAL[])
   QMURID(0.0)                              UOWSTATE(NONE)
```

Note the new client ID attribute set on the MQ connection

AMQP channels

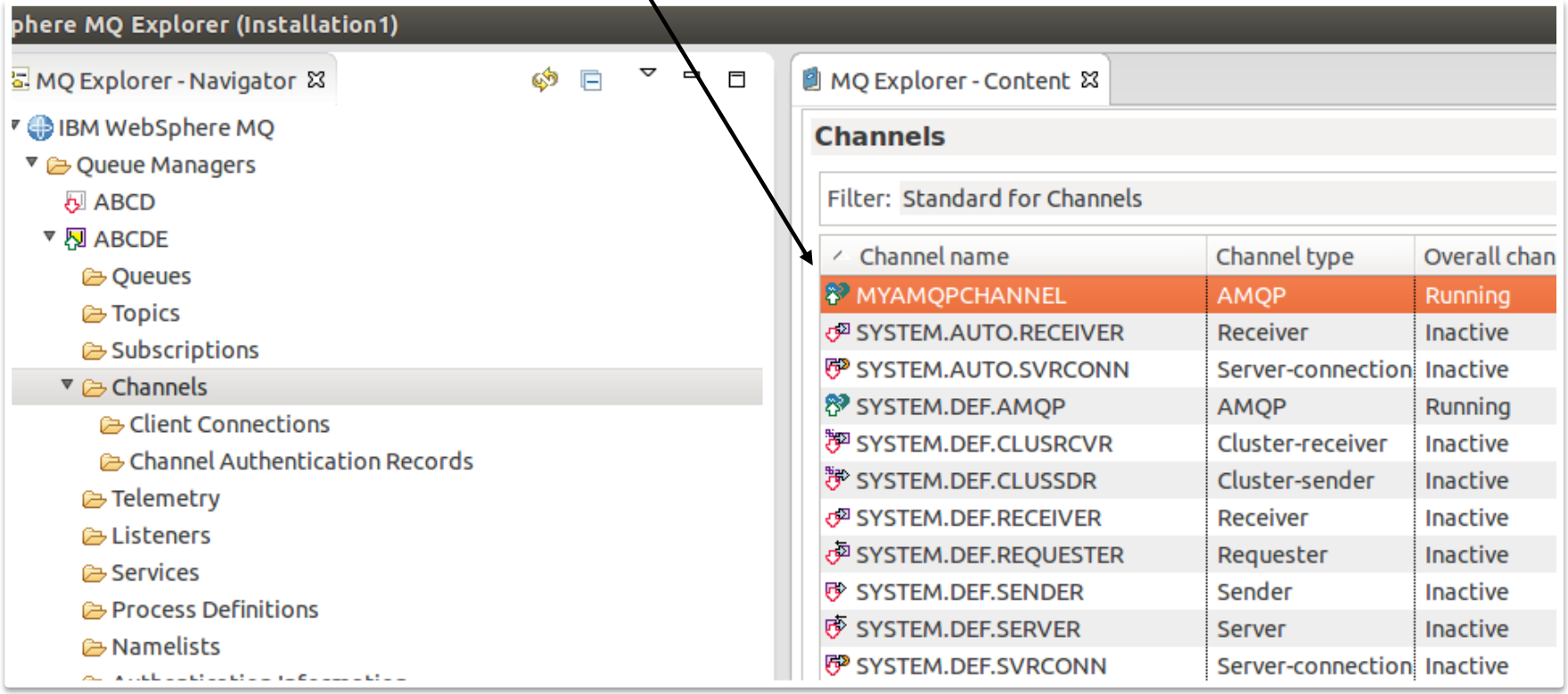
```
mwhitehead@ubuntu-vm: /opt/mqmAMQP

      :

      :
display chstatus(*) chltype(AMQP) clientid(*) all
     2 : display chstatus(*) chltype(AMQP) clientid(*) all
AMQ8417: Display Channel Status details.
   CHANNEL(MYAMQP)                         CLIENTID(recv_fced6d9)
   STATUS(RUNNING)                         CONNAME(192.168.56.1)
   KAINT(0)                                MCAUSER(mwhitehead)
   CLNTUSER( )                             MSGSNT(3)
   MSGRCVD(0)                              INDOUBTIN(0)
   INDOUBTOUT(0)                           PENDING(0)
   LMSGDATE(2015-01-25)                    LMSGTIME(03.29.31)
   CHLSDATE(2015-01-25)                    CHLSTIME(02.46.16)
   PROTOCOL(AMQP)
```

DIS CHSTATUS command

Note, DIS CHSTATUS usage varies slightly from MQ channels

Administration – MQ Explorer

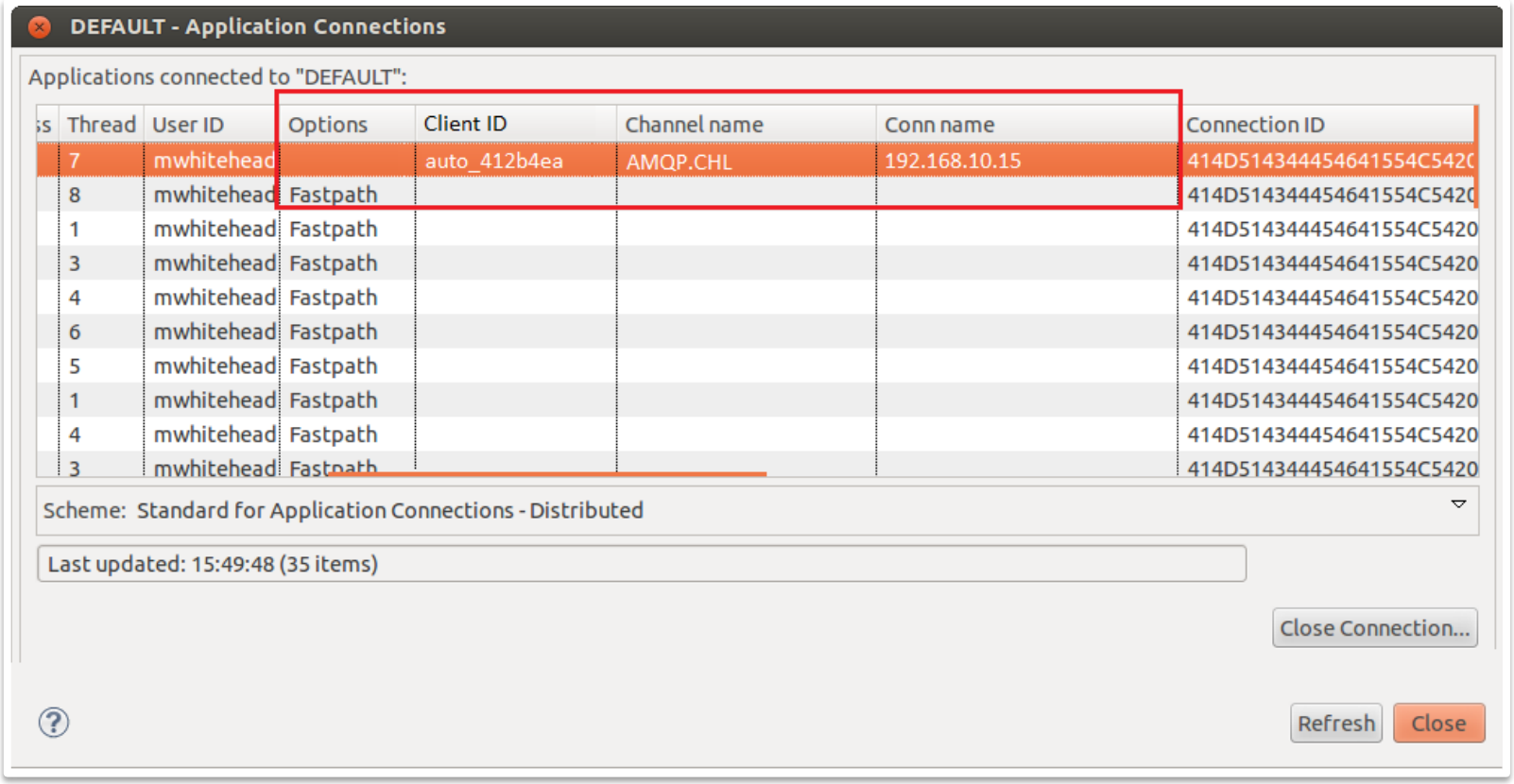
AMQP channels displayed alongside existing channels



Administration – MQ Explorer

Application connections view use to display AMQP clients

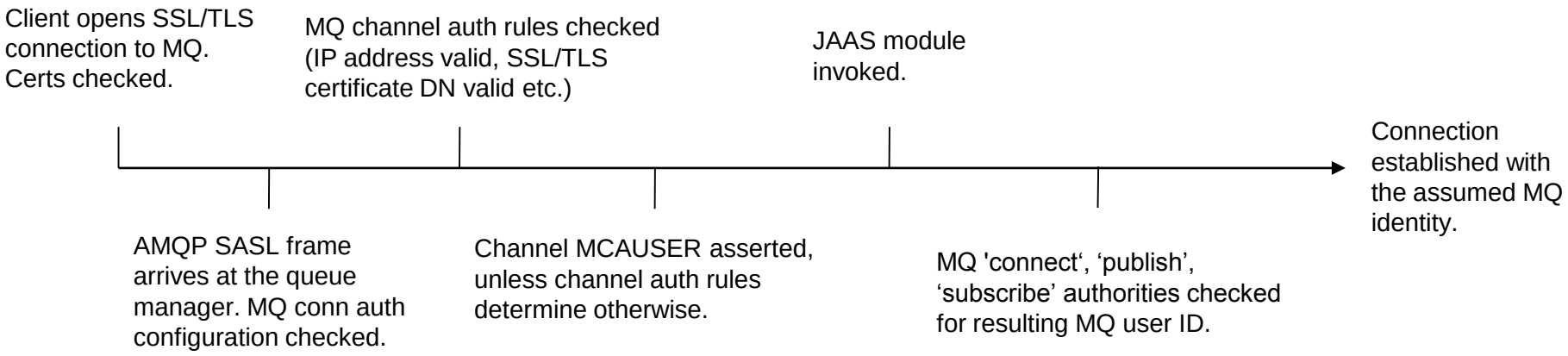
- Connection name and channel name populated to show where the client has connected from
- New **Client ID** attribute in the Application Connections view



Thread	User ID	Options	Client ID	Channel name	Conn name	Connection ID
7	mwhitehead		auto_412b4ea	AMQP.CHL	192.168.10.15	414D514344454641554C5420
8	mwhitehead	Fastpath				414D514344454641554C5420
1	mwhitehead	Fastpath				414D514344454641554C5420
3	mwhitehead	Fastpath				414D514344454641554C5420
4	mwhitehead	Fastpath				414D514344454641554C5420
6	mwhitehead	Fastpath				414D514344454641554C5420
5	mwhitehead	Fastpath				414D514344454641554C5420
1	mwhitehead	Fastpath				414D514344454641554C5420
4	mwhitehead	Fastpath				414D514344454641554C5420
3	mwhitehead	Fastpath				414D514344454641554C5420

Authorities and authentication

- MQ authenticates the client and authorises messaging in a similar way to MQ clients. Similarly administration changes and commands for AMQP channels are authorised in the same was as for other MQ channels. Allows you to specify who has authority to:
  - Start or stop a channel
  - Change a channel's configuration
  - Display a channel's status
  - Delete a channel



Monitoring

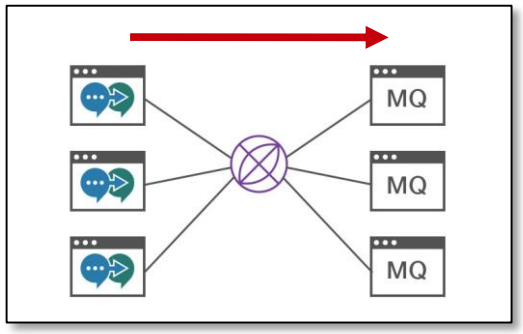
- Events
  - MQ provides events for monitoring different activities
  - Some are available to try in the beta
    - Command events (e.g. request to start a channel)
    - Configuration events (e.g. request to change channel attrs)
  - Some are ones we'd like to do
    - Security events (e.g. an AMQP client failed an authority check)

Administration

- Backup/Restore
  - MQ provides tools to saving and restoring queue manager configuration
    - dmpmqcfg and runmqsc
  - These have been updated to include AMQP channel definitions
  - Service may request that custom tuning/service parameters be set in a .properties file. If so, then this file must be manually backed up similar to qm.ini files today
- Logs
  - Located in MQ data path
    - /var/mqm/qmgrs/QM1/**amqp.stdout** and /var/mqm/qmgrs/QM1/**amqp.stderr**
    - /var/mqm/qmgrs/errors/**amqp_*.log**
    - /var/mqm/trace/**amqp_*.trc** (start/end trace using strmqtrc/endmqtrc)

Interoperability

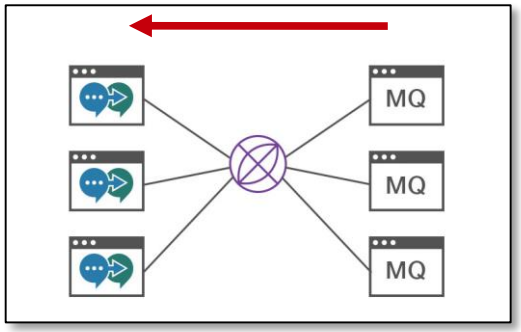
- AMQP publisher to MQ consumer



  - MQMD PutApplType always set to MQAT_AMQP
  - Some AMQP attributes → MQMD
  - Some AMQP attributes → MQ message properties
  - All AMQP application properties → MQ message properties
  - Simple AMQP binary payload → MQFMT_NONE message
  - Simple AMQP string payload → MQFMT_STRING message
  - All other AMQP payloads → MQFMT_AMQP

Interoperability

- MQ publisher to AMQP consumer



  - Some MQMD fields → AMQP headers
  - Some MQMD fields → AMQP properties
  - All MQ message properties → AMQP application properties

  - MQFMT_NONE message → single AMQP binary data payload
  - MQFMT_STRING message → single AMQP string data payload
  - MQFMT_AMQP message → copy to payload section

Note: All MQ messages are got with MQGMO_CONVERT to convert string data to UTF8

Detail (for reading on the plane home) – AMQP to MQ

Some AMQP **headers** are set as MQMD fields:

AMQP header.ttl	set on MQ message as MQMD.expiry (converted to 10ths of a second)
AMQP header.priority	set on MQ message as MQMD.priority (max value of 9)
AMQP properties.correlation-id	set on MQ message as MQMD.correlid

All AMQP **headers** are set as MQ message properties with a mapped name:

header.durable	set on MQ message as MQ propertyAMQPDurable
header.priority	set on MQ message as MQ propertyAMQPPriority
header.ttl	set on MQ message as MQ propertyAMQPTtl
header.first-acquirer	set on MQ message as MQ propertyAMQPFirstAcquirer
header.delivery-count	set on MQ message as MQ propertyAMQPDeliveryCount

All AMQP **properties** are also set as MQ message properties, e.g.

properties.user-id	set on MQ message as MQ propertyAMQPUserId
properties.to	set on MQ message as MQ propertyAMQPTo
properties.subject	set on MQ message as MQ propertyAMQPSubject
properties.reply-to	set on MQ message as MQ propertyAMQPReplyTo
properties.content-type	set on MQ message as MQ propertyAMQPContentType
properties.content-encoding	set on MQ message as MQ propertyAMQPContentEncoding
properties.creation-time	set on MQ message as MQ propertyAMQPCreationTime
properties.group-id	set on MQ message as MQ propertyAMQPGroupId
properties.message-id	set on MQ message as MQ propertyAMQPMessageId
Properties.group-sequence	set on MQ message as MQ propertyAMQPGroupSequence
Properties.absolute-expiry-time	set on MQ message as MQ propertyAMQPAbsoluteExpiryTime
Properties.reply-to-group-id	set on MQ message as MQ propertyAMQPReplyToGroupId

Finally, all AMQP **application-properties** are copied into the MQ message properties in the user space (usr.*) using similar naming conventions with some restrictions on the property length, characters used, and certain keyword restrictions e.g. “JMS”.

Detail (for reading on the plane home) – MQ to AMQP

The following **MQMD fields** are set on the AMQP message as headers, **if and only if** the value in the MQ message is not the same as the AMQP default value for that property.

MQMD.persistence	set on AMQP message as header.durable
MQMD.expiry	set on AMQP message as header.ttl
MQMD.priority	set on AMQP message as header.priority

Some **MQ message properties**, if they exist, are set as AMQP headers:

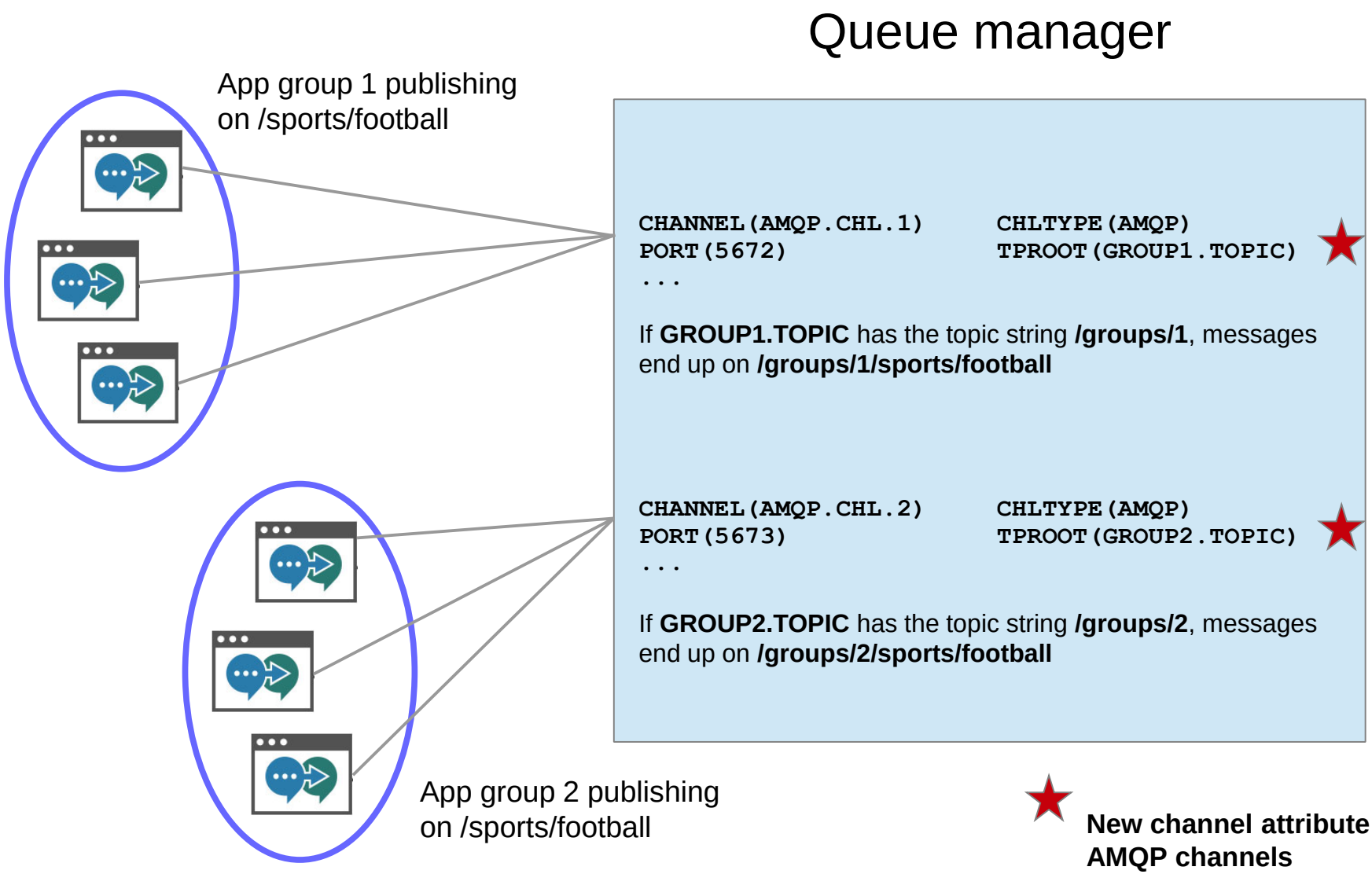
MQ message property AMQPFirstAcquirer	set on AMQP message as header.first-acquirer
MQ message property AMQPDeliveryCount	set on AMQP message as header.delivery-count

Some **MQ message properties** are set as AMQP properties:

AMQPUserId	set on the AMQP message as properties.user-id
AMQPTo	set on the AMQP message as properties.to
AMQPSubject	set on the AMQP message as properties.subject
AMQPReplyTo	set on the AMQP message as properties.reply-to
AMQPContentType	set on the AMQP message as properties.content-type
AMQPContentEncoding	set on the AMQP message as properties.content-encoding
AMQPCreationTime	set on the AMQP message as properties.creation-time
AMQPGroupId	set on the AMQP message as properties.group-id
AMQPMessageId	set on the AMQP message as properties.message-id
AMQPGroupSequence	set on the AMQP message as properties.group-sequence
AMQPAbsoluteExpiryTime	set on the AMQP message as properties.absolute-expiry-time
AMQPReplyToGroupId	set on the AMQP message as properties.reply-to-group-id

Finally, all **MQ message properties in the user space** (i.e. those which start usr.*) are copied into the AMQP message as application properties.

Managing MQ Light in an MQ Environment



Agenda

- What is MQ Light?
- The MQ Light API
- Running MQ Light apps in Bluemix
- IBM MQ support for MQ Light
- **Demo**

Thank You - Questions?

Related session:

- **Hybrid Messaging with IBM Bluemix**
    - **Tuesday 8.30am (this room)**

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