#ibminterconnect

1484: Flexible MQ Topologies in IBM Integration Bus

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IBM

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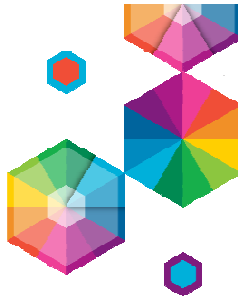
IBM Integration Bus – Session Highlights



- Monday
  - 11.00am: What's New in IIB (Mandalay Ballroom B)
  - 12.15pm: WESB Conversion (Surf C)
  - 2.00pm: Meet The IIB Experts (Forum 1)
  - 2.00pm: Intro - The Business Value of IIB (Surf C)
  - 3.30pm: Technical Introduction to IIB (Surf C)
  - 5.00pm: Integration in Healthcare (Surf C)
- Tuesday
  - 8.00am: IIB and Cast Iron (Surf C)
  - 9.30am: IIB in the Cloud (Surf C)
  - 9.30am: IIB Customer Feedback Roundtable (Tropics A)
  - 11.00am: Effective Administration in IIB (Surf C)
  - 12.30pm: IIB Designing for Performance (Mandalay Ballroom B)
  - 2.00pm: Integration Keynote
  - 3.30pm: Effective Application Development (Surf D)
  - **5.30pm: Flexible MQ Topologies (Surf C)**
  - 5.30pm: IIB Customer Feedback Roundtable (Tropics A)
- Wednesday
  - 8.00am: IIB APIs, Services, Applications and Libraries (Surf C)
  - 9.30am: Connecting to Software-as-a-Service (Surf C)
  - 11.00am: Integration in Manufacturing (Surf C)
  - 12.30pm: Integration Your Way (Surf C)
  - 2.00pm: IBM Integration Bus Lab (South Seas G)
- Thursday
  - 10.30am: IIB Customer Feedback Roundtable (Tropics A)

Agenda

- Flexibility for MQ
- MQ Environments
  - Cloud, Clients and Connectivity
- Administration
- Migration
- Installation changes
- MQ Node changes
- Changes to other MQ dependent function
  - Nodes: Collector, Aggregate, Sequence, Timeout
  - Pub-sub changes
- High availability
- Administration Security
- Transactionality
- CMP, Web Admin Ports and the Toolkit

Simplify relationship

Remove limitations

Platforms

Platform Support

MQ Flexibility

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MQ Flexibility

Simplify relationship

Remove limitations

- Message Broker and Integration Bus have always required a local queue manager
- Local Queue Manager provided:
  - Persistence for resources (Aggregate nodes, SAP, etc)
  - Publish-subscribe capability (Statistics, Business Activity Monitoring / Record-Replay)
  - Global Transaction Management
  - Inter-process communication (IPC) between IIB Components and CMP-based applications
  - Administration Security Management
  - High-availability
- MQ Nodes only work with local queue manager, therefore the messages “have to come to us!”.
- Actual business requirement: “I want to be able to get/put MQ messages to my queue managers”!

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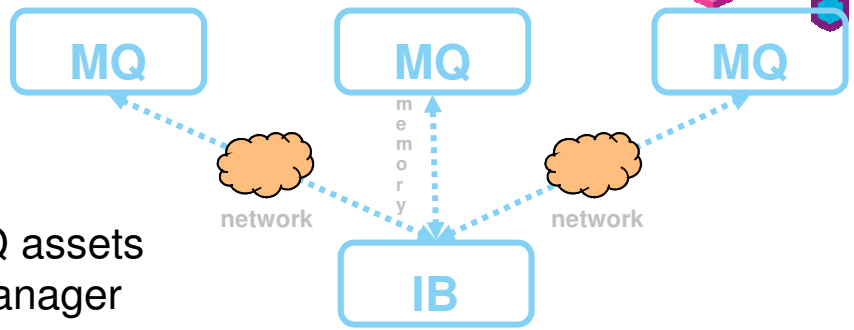
MQ Environments & Topologies



- Existing MQ infrastructure, new Integration Node
  - Requirement to be able to tap into existing MQ assets
  - Multiple IB Nodes can use the same queue manager
- V9 Migration Environment – existing Queue Manager assigned to IB
- Cloud Environment
  - MQ assets separate from IB nodes, and dynamically discoverable via cloud services
- Ability to “go where the messages are!”
  - IB node can access messages in multiple queue managers – also enables Active-Active HA scenarios.
- No MQ Requirement?
  - Some customers don’t use MQ!
  - Provides a lighter footprint
  - Still require full administrative control
  - Not available on zOS (MQ still required).

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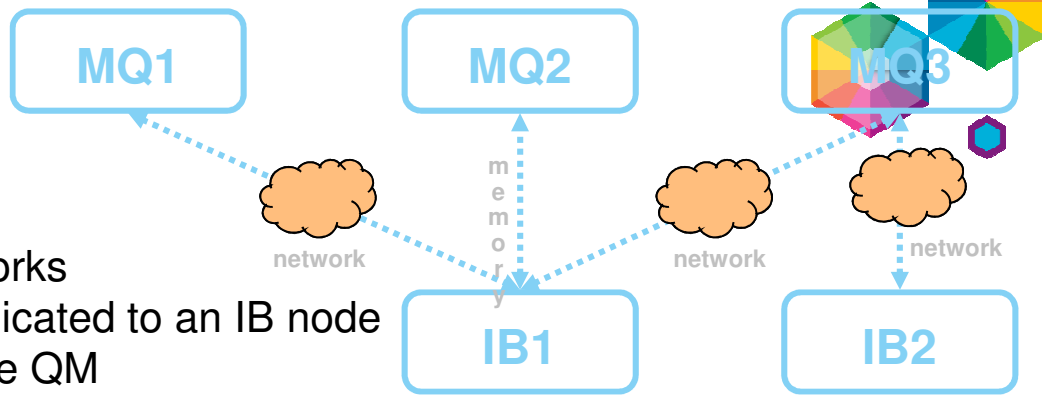
MQ connectivity options in v10



- Developers can access existing MQ networks
  - No longer require queue manager dedicated to an IB node
  - Multiple IB nodes can access the same QM
- MQ Input/Output/Get/Reply nodes can now use any form of MQ connectivity
  - Local, remote (client), or both in same flow
- Reconnection supported
  - Both local and remote connections will reconnect if link is broken
  - Node and Servers stay up, allowing flows to continue running against available MQ systems and other unaffected transports and resources (databases, Web Services, etc)
- MQ Input Nodes can receive messages from multiple queues on multiple queue managers
  - Transactional behavior will require MQ Input and MQ Output nodes to use same Local Queue Manager if globally coordinated.
  - Only QM associated with Integration Node can be globally coordinated, other QMs are 1PC (except on zOS where all QMs are global).
- MQ support for v7.1, v7.5 and v8
- Enabled for MQ Policy changes!

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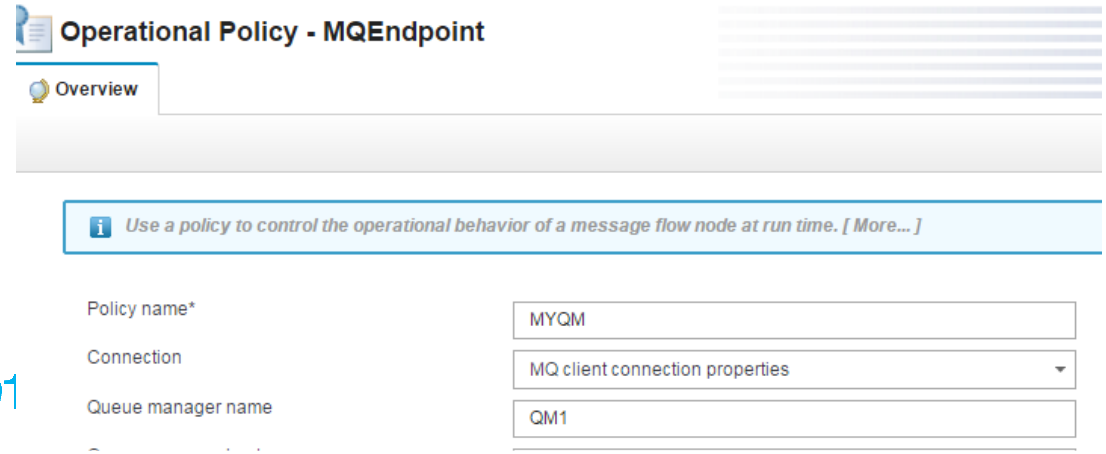
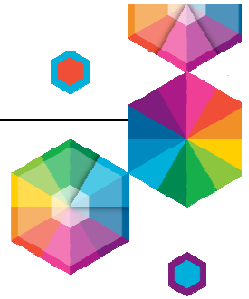
Integration Bus and MQ Administration

- IB nodes no longer tied to a local Queue Manager
  - Reduces complexity in local administration
  - No MQ admin knowledge needed for IB administration
- QM links defined by policy/configurable services
  - Allows for easy management of IB to MQ interactions
- Internal queues replaced by other technologies
  - IB can be administered without requiring MQ for internal processes.
- IBX superseded by enhanced Web Admin UI
  - Capabilities merged
- MQ nodes fully support v10 Policy to allow management of QM connections



Installation changes



- IB V10 will no longer require MQ to be installed as a prerequisite (except on zOS)
  - No requirement to have MQ on the box at any point
  - Similar to database connectivity, where there is no requirement (since WMB 7.0) to have a database installed.
  - IIB License still provides full MQ entitlement
- IB will pick up MQ libraries for automatic use
  - If MQ (Client or Server) is installed, then IB will configure the environment appropriately
    - Will pick up MQ install added after IB itself has been installed
- Some IB functionality requires MQ
  - Product will install without MQ and leave the functionality unavailable
  - Similar to database connectivity.
- Automated installation simplified
  - MQ resources not installed at the same time
  - Reduces dependency management
  - Simplifies cloud-based installs

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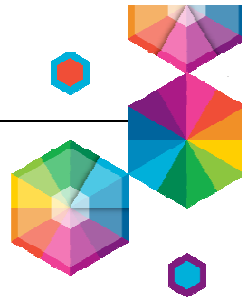
Queue Manager associated with the Integration Node



- mqsicreatebroker BrokerName -q [qmgr]
  - Creates an Integration Node, with a default queue manager
  - No queues created now
  - Queue Manager is not started when “mqsistart” is run.

- mqsichangebroker BrokerName -q [qmgr]
  - Queue Manager definition can now be changed

- IIB Default Queue Manager is used for MQ nodes (MQInput, MQOutput…) whenever WMQ is being used, and no explicit queue manager has been defined.
  - E.g. For migrated MQ nodes

- Associating the queue manager will default a number of distinct things:-
  - Queue Manager to use for MQ nodes
  - Queue Manager to use for internal use (EDA nodes, etc)
  - Queue Manager to act as Transaction Manager for global coordination (distributed)
  - IIB will forward pub-sub messages to queue manager

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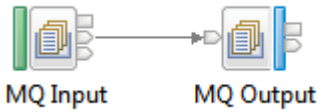
MQ-specific nodes



- More flexible options, enabling simpler interactions with existing MQ networks
  - Administratively define MQ links
  - No need to put client parameters on nodes!
- Defaults for migrated Integration Nodes will be to use existing local QM
- All MQ nodes support
  - Client and CCDT-based links (Apart from z/OS)
  - Server connections to default QM for the Integration Node (as per v9)
  - Server connections other local QMs
  - Automatic reconnect to queue managers
- MQInput and MQGet will be able to receive message from multiple queue managers using MQ failover (CCDT or multiple hostnames)
  - Specified via policy/configurable services, avoiding need for redeploy when MQ network changes
  - Transactionality limitations depending on configuration
    - Not all configurations will support XA initially
- MQOutput/MQReply will be able to put to remote queues directly (as well as local)

Connection*	MQ client connection properties
Destination queue manager name	REMOTEQM
Queue manager host name	localhost,lobbers
Listener port number	1414
Channel name	SYSTEM.BKR.CONFIG

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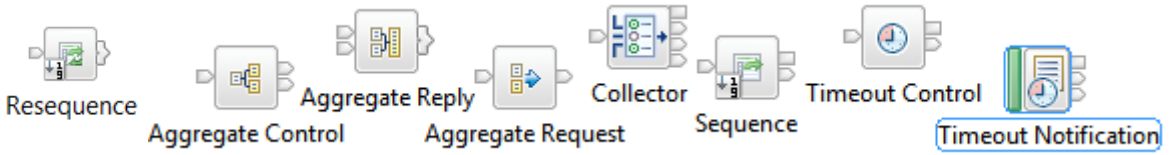
IIB MQ usage



- Some message flow nodes require a persistent store for messaging-related data and use local QM for this
  - Collector, Aggregate, Sequence, etc

- These message flow nodes will require local QM to store data
  - QM connections specified via policy/configurable services as with MQ nodes

- HTTP and SOAP nodes can use a MQ-based proxy servlet
  - Will continue to be able to do so for compatibility

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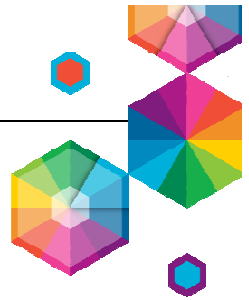
IIB MQ Usage



- Certain function requires MQ resource definition ('SYSTEM.BROKER.xx' queues):
  - Collector / Aggregate / Sequence / Timeout nodes ("EDA" Nodes)
  - Broker-wide HTTP Listener
  - SAP Input node (if transactional)
  - Record-Replay
- This functions still rely on the presence QM associated with the Integration Node.
- Necessary resources can be defined via scripts [install\server\sample\wmq\iib_createqueues.sh/.cmd]

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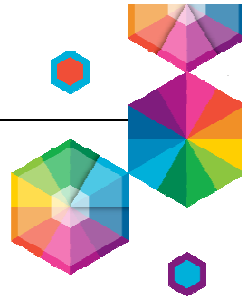
SSL Connectivity



- HTTPS based auth for remote administration and toolkit connections using web administration port.

- MQ Nodes can be configured using broker wide Keystore for SSL (‘mqsireportproperties <Node> -o BrokerRegistry –r’ now has a ‘mqKeyRepository’ and ‘mqCCDT’ property)

- SSL Peer name and SSL CipherSpec can be set in policy or MQ node properties

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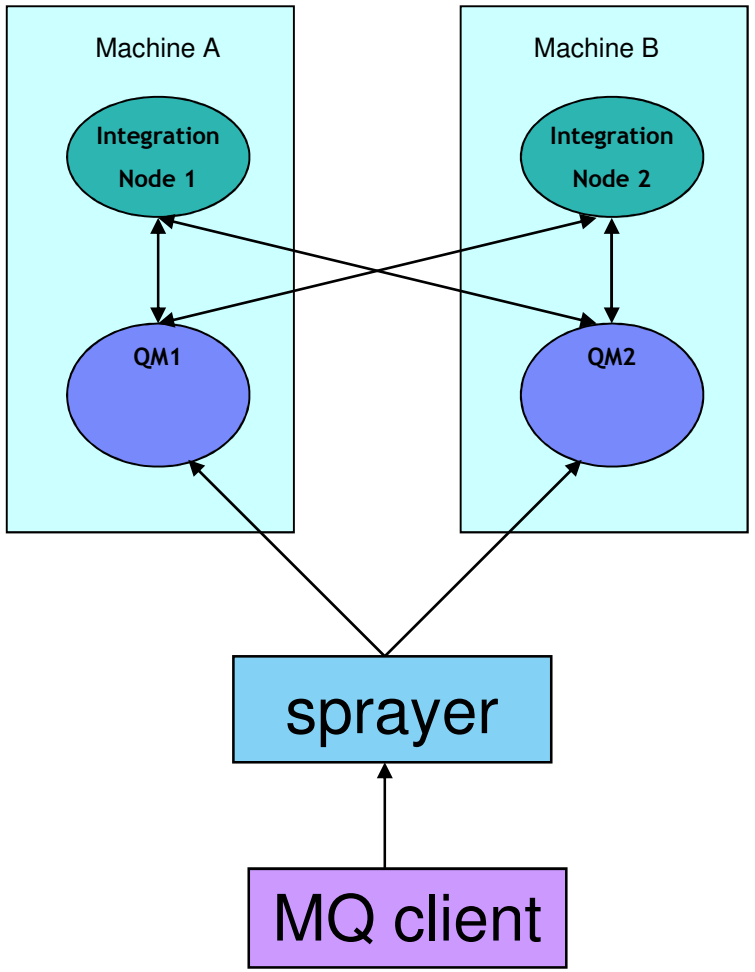
High Availability



- MQ CCDT Definition allows multiple target QM endpoints and will failover
- Comma-separated hostnames in MQ nodes.
- Creates possibility of an active-active model.
- IB nodes no longer tied to a QM, and can access messages on QM using either local or remote connections
- Failure of one QM or one node still allows messages to flow through the system
- QM1 and QM2 could be multi-instance queue managers, with multiple systems providing active/passive configuration
  - IB would access messages from which ever instance is up, reconnecting as needed.
- Multi-QM access also enables easier cloud integration
  - Cloud-based MQ services accessible from any IB node

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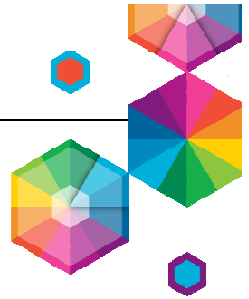
Multi-instance QMs



- 2 Patterns: Client connections, and local connections.
- If local, then broker instance must failover with the queue manager (QM assoc. with integration node).
- If client, then failover can be achieved using either CCDT or comma-separated hostname on the node properties or policy.

Connection*	MQ client connection properties
Destination queue manager name	REMOTEQM
Queue manager host name	localhost,lobbers
Listener port number	1414
Channel name	SYSTEM.BKR.CONFIG

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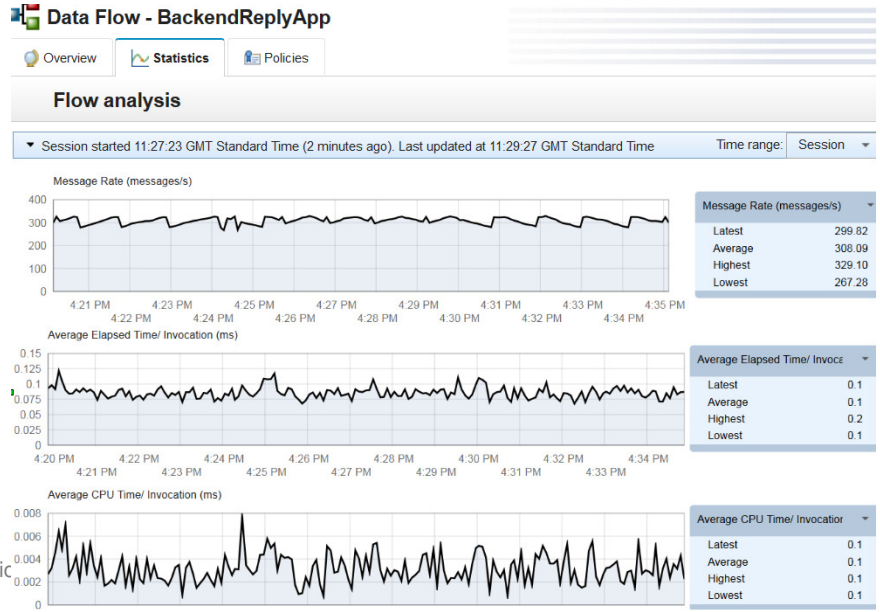
Publish Subscribe

- MQTT Broker embedded in the product provides OOTB pub-sub for events emitted by integration servers.
  - Enabled by default (can be disabled)
  - MQTT publications can be routed to an external MQTT broker such as MessageSight.
- Publication emitted by the Integration node classified as :-
  - Accounting and Flow Statistics
  - Resource Statistics
  - Business Activity Monitoring
- Events can be routed to MQ (QM associated with integration node) or MQTT broker
- Events also published to QM associated with Integration Node for backward compatibility

```
mqsireportproperties TESTNDE_xyz -b pubsub -o ...

OperationalEvents
  MQ
    policyUrl=''
    enabled='true'
    format=''
  MQTT
    policyUrl=''
    enabled='true'
AdminEvents
  MQ
    policyUrl=''
    enabled='true'
    format=''
MQTT
    policyUrl=''
    enabled='true'
BusinessEvents
  MQ
    policyUrl=''
    enabled='true'
    format=''
  MQTT
    policyUrl=''
    enabled='false'
MQTTServer
  enabled='true'
  port='11884'
```



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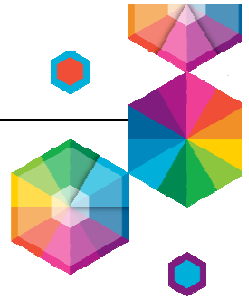
Transactionality



- IB can manage local (1PC) transactions, or use MQ to provide two-phase (XA) coordination
  - IB-managed transactions will continue to support all resource managers
- Global Two-phase Commit (2PC) support provided by MQ will also continue to be supported (distributed platforms)
  - Only queue manager associated with Integration Node is global resource.
  - Other MQ QMs involved will be 1PC resources.
- Global Two-phase Commit (2PC) support provided by RRS will also continue to be supported (z/OS)
  - All QMs are global resources on zOS

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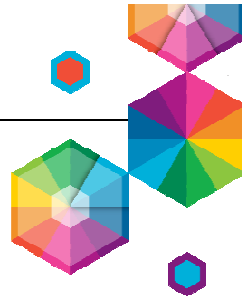

Administration Security

- 2 Methods of connection: Remote (Websocket) and local connections.
- Administrative security currently relies on access control lists held as permissions on MQ queue objects
  - Dependent on local QM to check group memberships, etc
- Will retain MQ authorization, but add a new broker registry-based authorization

MQ Flow (“Runtime”) Security

- MQ nodes can use SSL for Client connections
- Security identity propagation fully supported in new environments.
- Should continue to support MQ AMS for message security

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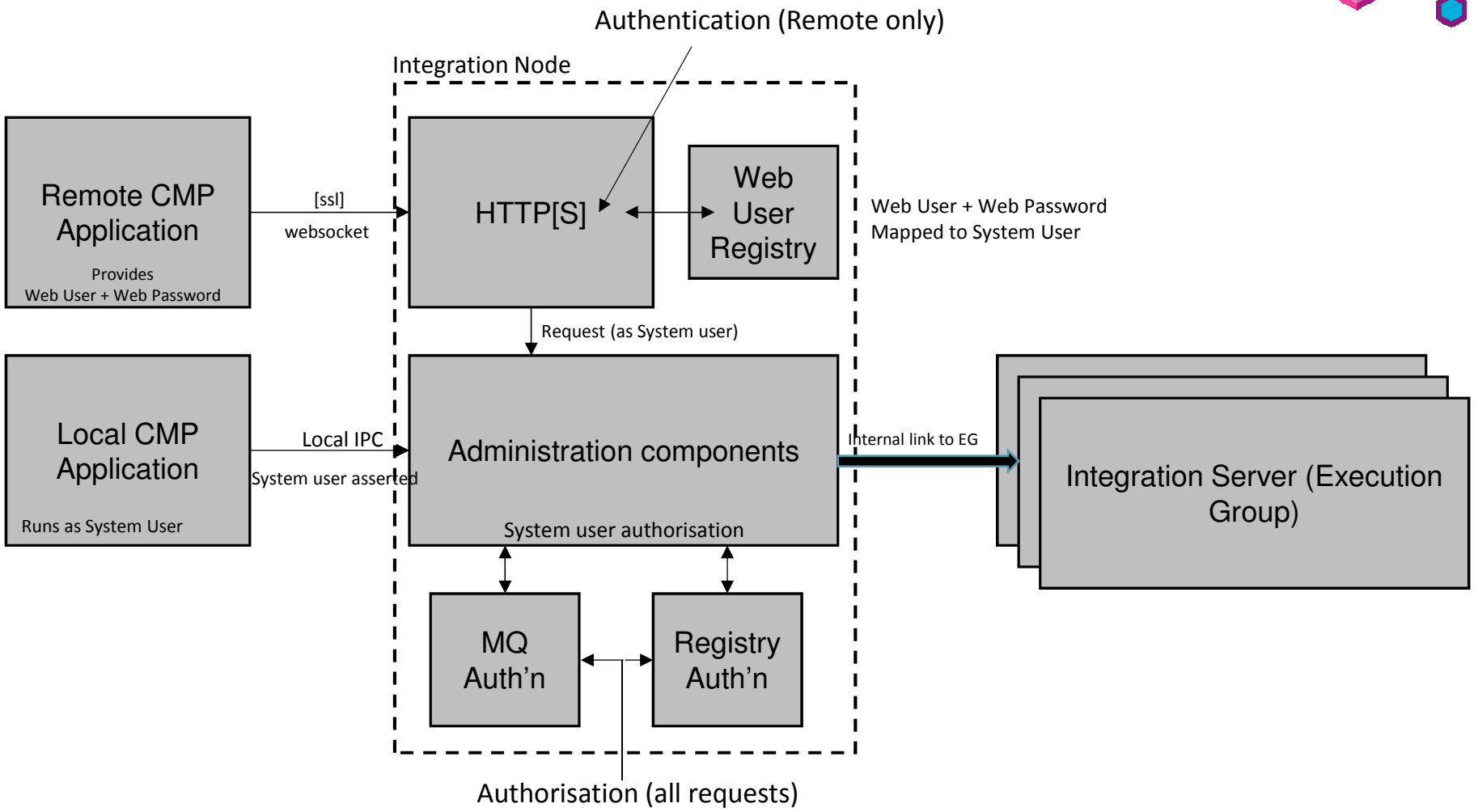
System Diagram



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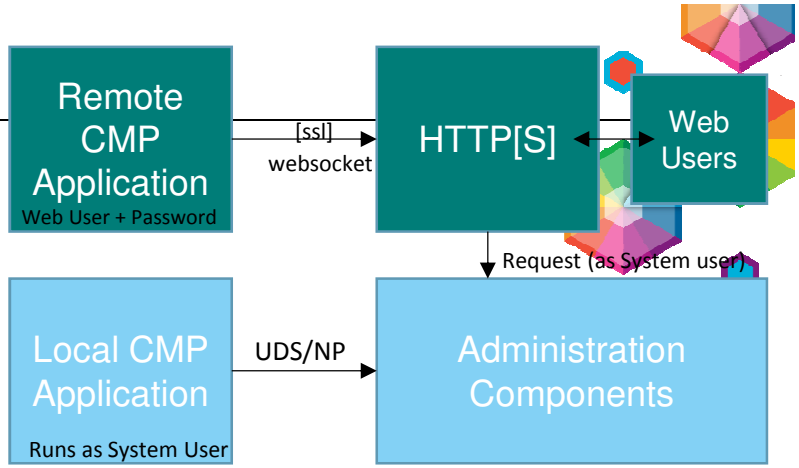
Types of connection:



- Remote connections will use Web Admin Port
  - Note: Web Admin port can be disabled
  - Can be secured using user:password (Web Users)
  - Can be secured using SSL (all traffic on port 4414 will share this setting)
  - Client certificate can be used to map identity
- Local connections will use new local transport (via Named Pipes or Unix Domain Sockets)
  - Local clients cannot specify a userid. Userid is taken to mean the system account running the source process attempting to connect to the integration node.
  - Local transport will not rely on websocket/http and so will work when port is disabled.
  - System accounts in the IIB node's primary group (mqbrkrs) will be treated as "superuser" to prevent self-lockout (authorisation).

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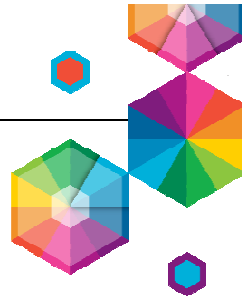
Remote client authentication



- Enabling admin security (“mqsichangebroker <iibnode> -s active”) causes user/password security to be required for:
  - REST
  - Web UI
  - Integration API (remote mode)
- In all cases, CMP-provided user+password are webuser accounts, and map to a system account. (‘mqsiwebuseradmin’).
- Commands which can connect to a remote integration node can now take a URI format:-
  - tcp://user:password@hostname:port (user and password optional).
  - If user specified without password, user is prompted.

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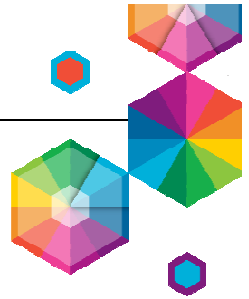
Authorisation



- Retaining MQ authorisation
  - SYSTEM.BROKER.AUTH queue, etc
  - IIB will need ALTERNATE_USER_AUTHORITY for this to work
  - Provides simple migration and retains RACF commands for zOS users
- New file registry-based authorisation
  - New command to administer access for single integration node.
- Object structure in both cases unchanged – i.e. READ/WRITE/EXECUTE on a Integration Node / Integration Server / DataCapture resource type.

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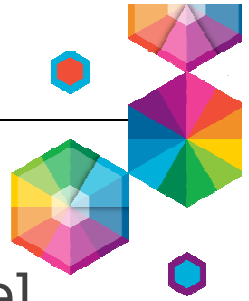
Registry Authorisation



- System Resource [Broker / Execution Group / Data Capture]
  - System User
    - Read Access
    - Write Access
    - Execute Access

mqsichangefileauth <broker>
-r <role/systemUser>
-o <object>
-e <server name>
-p [read+/-] [write+/-] [execute+/-] [all+/-]

- Examples:
  - mqsichangeauth IB10NODE –r pmasters –e default +read
  - mqsichangeauth IB10NODE –r pmasters –o datacapture +all

mqsireportfileauth <broker> [-r <role>] [-e <server name>]

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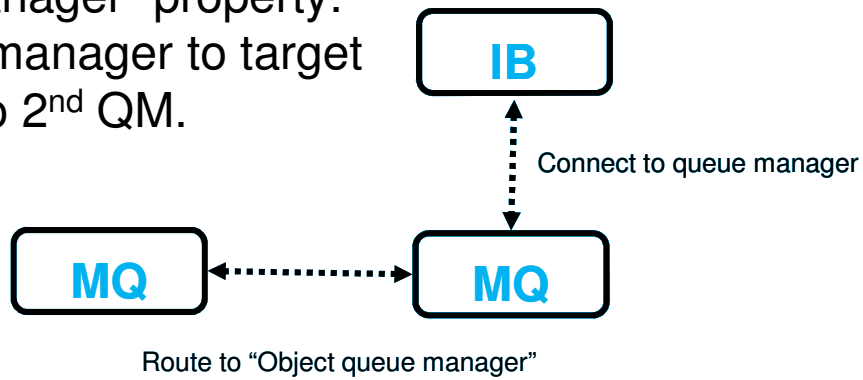
Other considerations

- Default codepage for message parsing currently set to the QM CCSID
  - Will be independent in v10
  - Migrated Integration Nodes will carry the QM CCSID forward into the new configuration

- MQ Output node already has a “queue manager” property:
  - In v9, acts as a routing from IB queue manager to target
  - In v10, will route from connected QM to 2nd QM.



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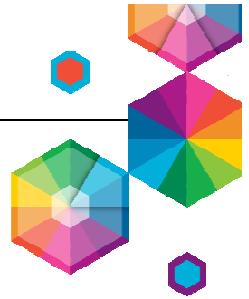
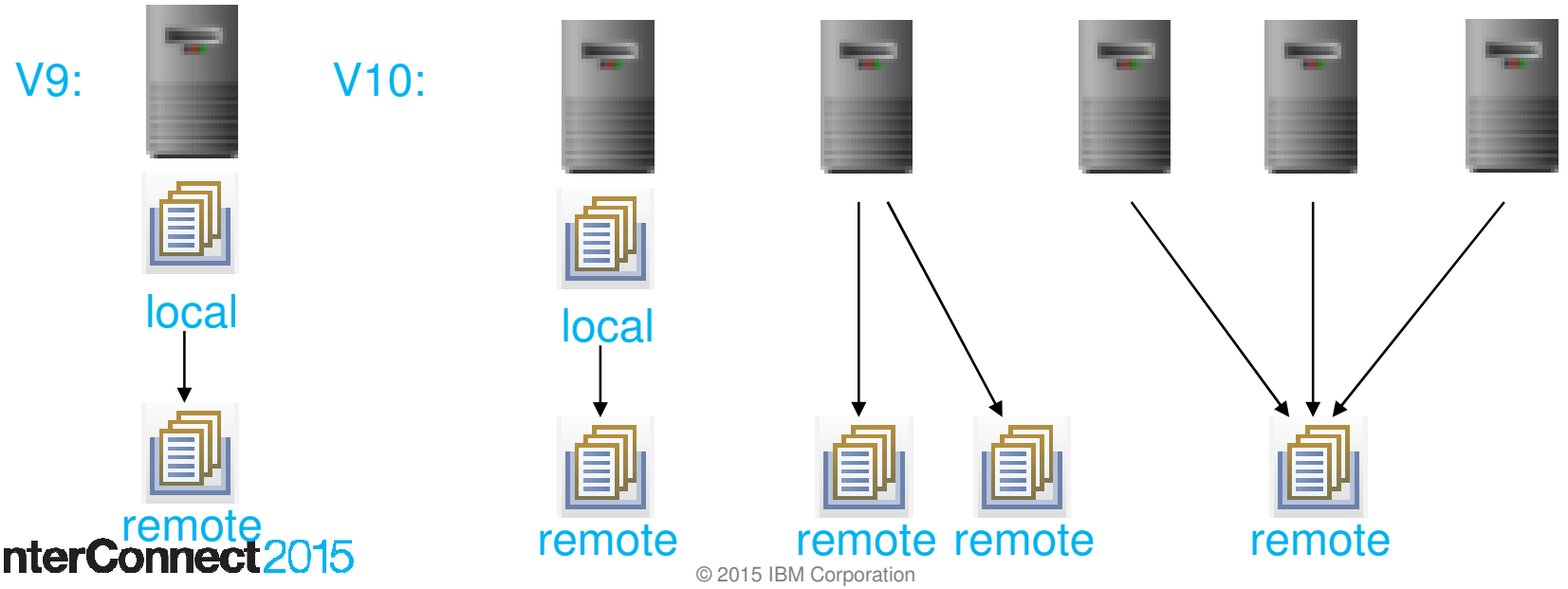
Recap: Flexible MQ Topologies



- V10 introduces flexibility in relationship between Integration Nodes and Queue Managers
  - Connect to multiple remote QMs
  - Connect to local QM
  - Connect to no QMs

- This requires a flexible, dynamic definition of these relationships
  - For this we use policy



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IIB Policies

- Policies define a common approach to performing some action
  - E.g. health and safety policies, WS-SecurityPolicy
  - A shared, managed definition
  - Policy for **reuse**

- Policies separate the description of how something is done from where it is used
  - Extract properties from code and runtime into objects with their own lifecycle
  - Allow updates to the policy independent of where its used
  - Policy for **visibility** and **dynamicity**

- IIB Policies aim to provide these capabilities
  - For Developer: reuse configuration data held in policies in multiple places
  - For Administrator: define key configuration data for each environment in policies
  - For Operator, view and dynamically modify configuration data in policies

- IIB v9 has Workload Management Policy, applies to a flow

- For V10 we are designing the general use of policies for nodes, flows and connectors, in particular MQ and MQTT

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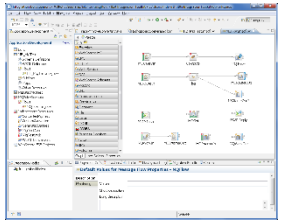
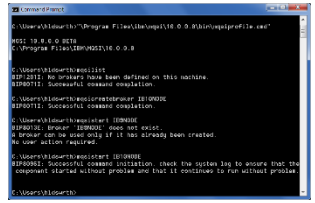
IIB Roles for Policy





Developer

creates

BAR file

Runtime environments

integration nodes

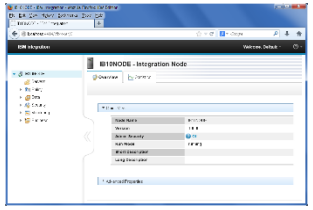
QMs queues

registries policies

Administrator

installs configures

monitors modifies



Operator

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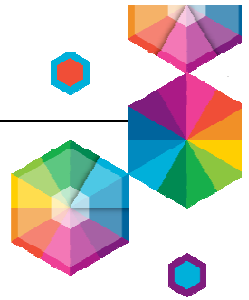
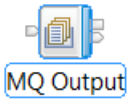
Defining a policy





Properties | Problems | Outline | Tasks | Deployment Log | Search

MQ Output Node Properties - MQ Output

- Description
- Basic
- MQ Connection
- Advanced
- Request
- Validation
- **Policy**
- Monitoring

Use a policy to control the operational behavior of the node at run time. By default, the properties defined on the node in the Integration Toolkit are used to determine the deployment settings at run time. More...

Policy URL [ ] Generate new policy

WLM_1.msgflow | *Policy Editor

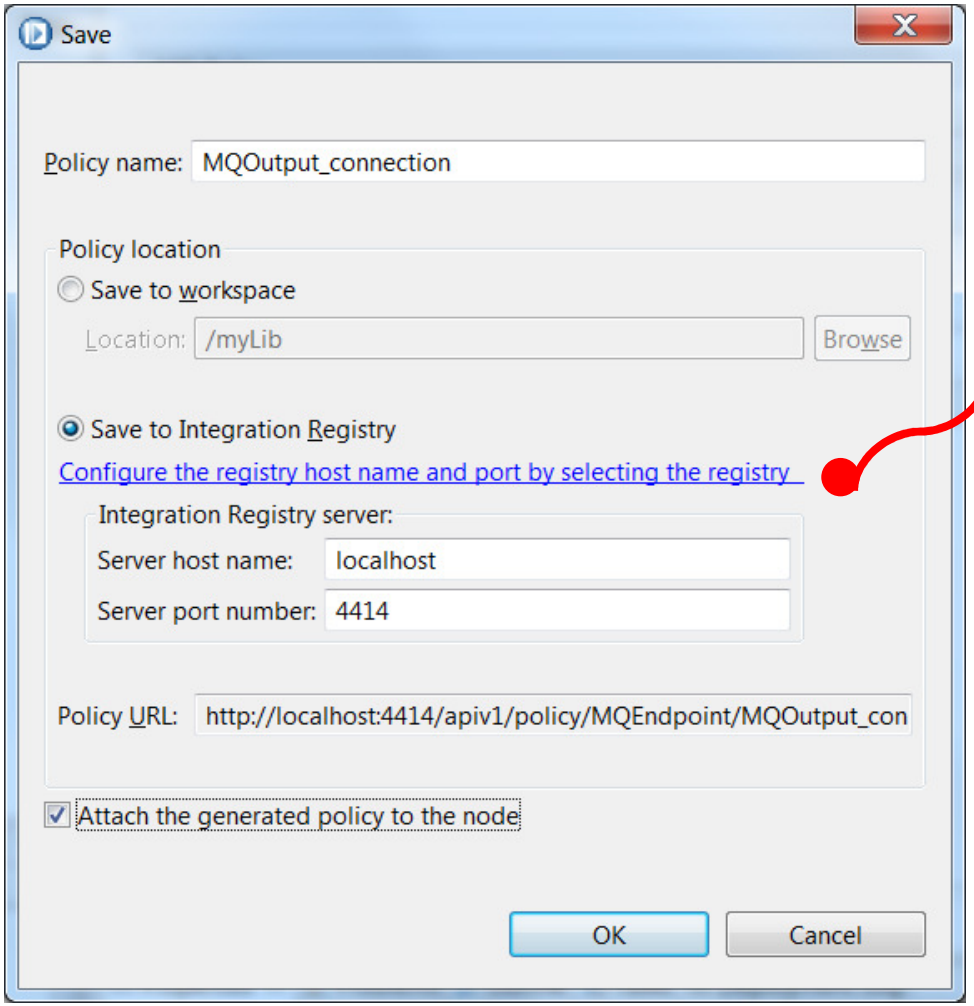
MQ Policy

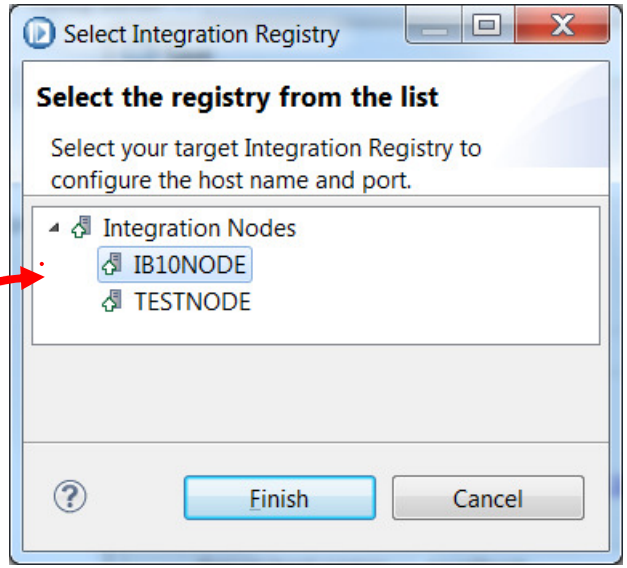
Connection*:	Queue manager specified on the integration node
Queue Manager Name:	
Queue Manager Host Name:	localhost
Listener Port Number:	1414
Channel Name:	SYSTEM.DEF.SVRCONN
Security Identity:	SYSTEM.DEF.SVRCONN
Use SSL:	☐
SSL Peer Name:	
SSL Cipher Specification:	

Save

Toolkit: Policy generation wizard

- By default a policy is saved to the workspace with the option to publish to an Integration Node's registry





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Integration Bus V10 MQ Enhancements – Benefits Summary

Development

- Simplicity
  - Single Install for all Integration Tools
    - Fully functional for design & test
  - Administer Integration component only
    - Align with appropriate skills base
  - Maintain Integration component only
    - No extra upgrade dependencies
  - MQTT Publish-Subscribe capability
- Flexibility
  - Exploit existing MQ network as-is
  - Direct connect via MQ client libraries
  - Many-to-1 and 1-to-many topologies
    - Maintain existing 1:1 if desired
  - System or MQ based security
  - SSL and CCDT Connections

Operations

- Availability
  - Single component for higher reliability
  - Client connection failover
  - Higher availability via multiple MQs
    - Simultaneous MQ connections
    - Single instance has many MQs!
- MQ for when you need
  - XA transactions
  - Persistence for state-based features
    - Aggregations, Collections, Sequencing, Timer…

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Questions?

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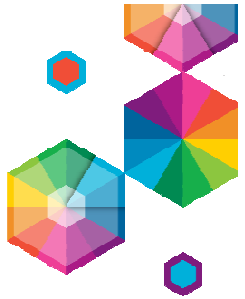

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