IBM WebSphere MQ (MQ Series) in a Nutshell

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Introduction

- MQ Series is a Middleware for Commercial Messaging and Queuing
- MQ Series API – also called Message Queue Interface (MQI) used to communicate with a Message Queue Manager (MQM), the runtime program of MQSeries.
- MQI consists of 13 calls.

Messages

- Consists of 2 parts: Message Descriptor and Message Data
- Message descriptor identifies message id and contains control information such as message type, expiry time, correlation ID, priority, reply queue name.
- MQ Series Version 5 supports maximum message length of 100 MB
- Messages can be segmented or grouped. If permitted queue manager segments a large message when it does not fit in a queue. Application has the option to receive entire message in piece or each segment separately. Application can also control the logical boundaries or buffer size of the segment of a message. Queue Manager ensures that the order of the segment is maintained.
- Several small messages can be grouped to build one larger physical message.
- Using a Distribution List, you can send a message to more than one destination. Distribution List is a file contains a list of queue names and queue managers that own them. Receiving Queue Manager replicates the messages and puts them into destination queues (This function is called *late fan-out*).
- MQ Series knows 4 types of massages: Datagram (unsolicited message), Request (a message for which response is expected), Reply and Report (an event such as occurrence of an error or confirmation on arrival or delivery)
- MQ Series messages can be *persistent* and *non-persistent*.
- Message Descriptor contains: Version, Message ID/Correlation ID, Persistent/ Non-Persistent, Priority, Date &m Time, Lifetime of a message, Return Address, Format, Sender Application and Type, Report options/ Feedback (COA, COD), Back out counter, Segmenting/ Grouping Information.

Queue Manager (MQM)

- Manages queues and messages for applications
- Transfers messages to other Queue Managers via channels using existing network facilities.
- It refers to objects that are defined by the administrator.
- Coordinates updates to databases and queues using two-phase commit.
- Gets and puts from/to queues are committed together with SQL updates, or backed out if necessary.
- Segments messages, if necessary, and assembles them.
- Can group messages and send them as one physical message to their destination, where they are automatically disassembled.
- Can send one message to more than one destination using a user-defined dynamic destination list.
- Allow administrators to create and delete queues, alter properties of existing queues, control the operation of queue manager.
- MQ Series for Windows NT version 5.1 provides GUI to administer.
- MQ Series for Windows (different from NT) is a single-user queue manager and is not intended to function as a queue manager for other MQ Series clients.

Queue Manager Clusters

- MQSeries for MVS/ESA and Version 5.1 for distributed platforms, provides clustering features
- Queue Managers that form a cluster can run in the same machine or in different machines on different platforms.
- Two of Queue Managers maintain a repository that contains information about all queue managers and queues in the cluster (full repository). Other Queue Managers maintain only a repository of the objects they are interested in (partial repository).
- Queue Managers use special cluster channels to exchange information.
- Client application may specify a queue manager and direct the message to a specific queue in a cluster or it may let a queue manager to determine where the queue is and to which one to send the message.
- Client uses a Transmission Queue on its machine and destination queue is called “Target Queue”.
- Administrator must define the name of the cluster, when a queue is defined.
- MQSeries distributes the messages round robin.

Queue Manager Objects

- A Queue Manager uses 3 types of objects, namely, Queues, Process Definitions and Channels.
- Queues are used to store messages.
- Process Definition object defines an application to a queue manager. It contains a name of a program (and its path) to be triggered when a message arrives for it.
- Channel is a communication link. There are 2 kinds of channels, namely, Message Channels and MQI channels.
- **Message Channel** connects 2 queue managers via Message Channel Agents (MCA). Message Channel is unidirectional.
- MCA is a program (also called mover) that transfers messages from a transmission queue to a communication link and from communication link to a target queue.
- **MQI channel** connects MQSeries client to a queue manager and is bi-directional.
- Message Channel can run at 2 speeds: fast and normal. Fast Channels improve performance but messages can be lost in case of channel failure.

Message Queues

- Message Queues belong to Queue Manager.
- Types of Messages Queues are:
    - Local Queue – is a real queue!
    - Cluster Queue – is a local queue that is known throughout a cluster of queue managers.
    - Remote Queue – structure describing a queue hosted by a different queue manager.
    - Transmission Queue – a local queue used for messages to be sent to a remote queue.
    - Initiation Queue – local queue with a special purpose
    - Dynamic Queue – local queue created on the fly
    - Alias Queue - - if you do not like the queue name
    - Dead-Letter Queue – one for each queue manager
    - Reply-to Queue – specified in request message
    - Model Queue – model for local queues
    - Repository Queue – hold cluster information
- Create a queue manager using the command: **`crtmqm.`** Example:
    - `Crtmqm /q /u system.dead.letter.queue MYQMGR`
- To start a queue manager issue command: **`strmqm`**

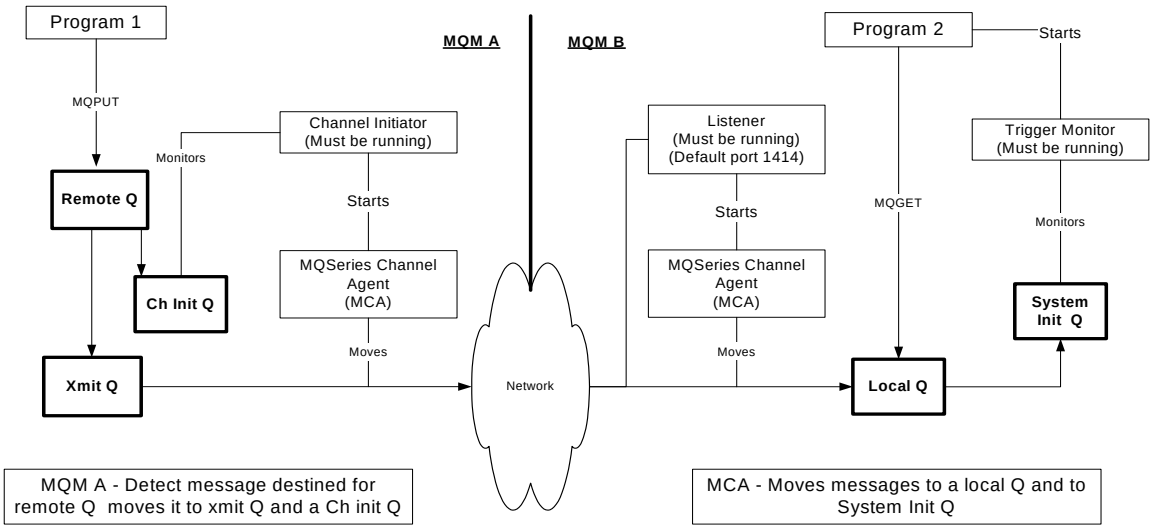
Manipulating Queue manager Objects

- Use the utility RUNMQSC to manipulate queue manager objects. Ensure queue manager is started prior using the runmqsc utility. Example:
    - C:\strmqm
    - runmqsc
        - define qlocal('QUEUE1') replace descry ('test queue')
        - alter qmgr deadq(system.dead.letter.queue)
        - end

How MQSeries Works

Following diagram depicts how MQSeries works:

Figure: How MQSeries Works



Communication between Queue managers

How to Trigger Applications

Message Queuing Interface

MQCONN	Connect to a Queue Manager
MQDISC	Disconnect from a Queue Manager
MQOPEN	Open a specific queue
MQCLOSE	Close a queue
MQPUT	Put message on a queue
MQPUT1	Get message from a queue
MQGET	MQOPEN + MQPUT + MQCLOSE
MQINQ	Inquire properties of an object

MQSET	Set properties of an object
MQCONNX	Standard or fast path bindings
MQBEGIN	Begin a unit of work (database coordination)
MQCMIT	Commit a unit of work
MQBACK	Back out