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# MQSeries Everyplace

*Commercial Messaging on the Move*

AIM Partner Enablement Centre  
Hursley Park, Winchester, England

**Tony J Cox**  
**tonyj\_cox@uk.ibm.com**





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# Customer Value Proposition

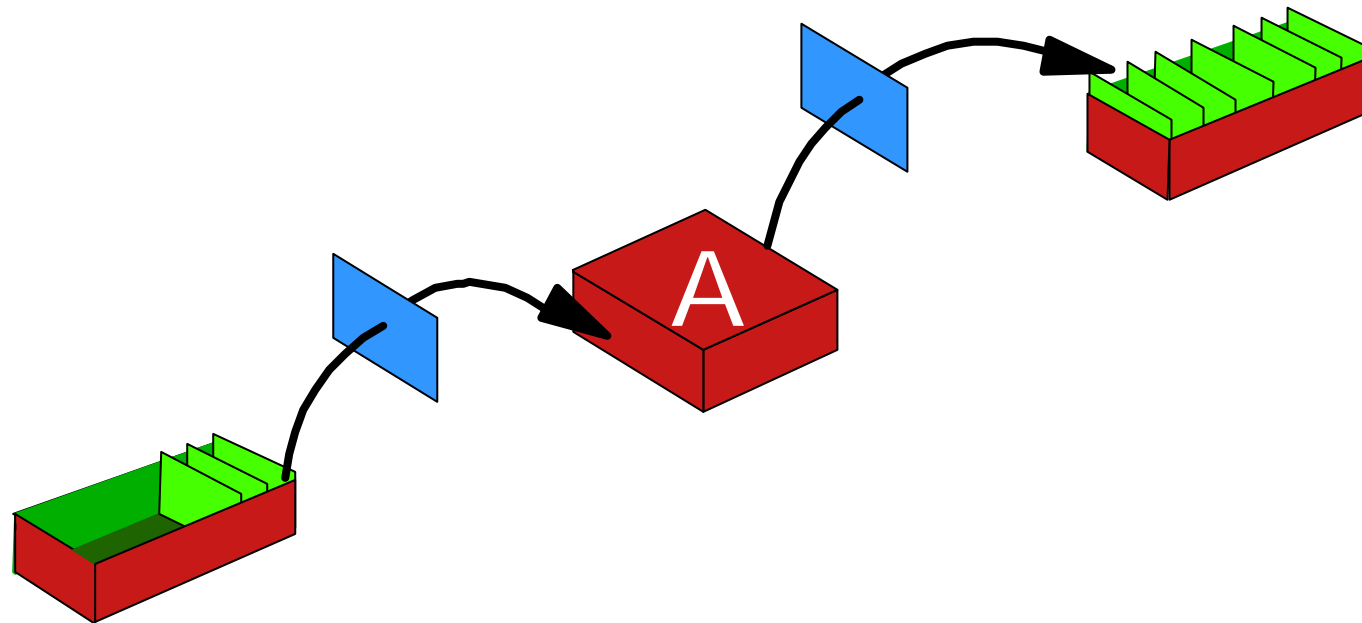
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- ◆ **MQSeries Everyplace brings a reliable connection into an unreliable world**
  - Get the freedom of a mobile handheld device, do your work any place, any time
  - Check your inventory, quote the latest prices, win your order - at a customer location, walking down the street, riding in a cab
  - Keep your work force on the move - give them the location of the next customer to visit, confirm a parcel has been delivered, process a meter reading immediately
  - Collect data automatically and remotely, from sensors on an oil pipeline or daily inventory from a regional department store



# Messaging -- The Route to Business Integration

- Links "nearly everything to almost anything..."
- Loosely-coupled flexibility via queuing
- Faster and safer application development
- Common, easy-to-use, multi-platform API
- Assured message delivery



# Possible users of MQSeries Everyplace

Mobile phone  
connected



Insurance agent with Thinkpad dials into office for latest prices and to enter orders, **but can also enter data if no line is available.**

Mobile device



Executive with netBook receives **high-priority** messages or approves **high-value** transactions

**Gets workforce away from desks and in front of customer**



Mobile workers report progress and receive new jobs. Could also request more information or assistance.

Enables scalability of solution

**Scheduling and business optimisation opportunities**

**Workflow and personal productivity**



Efficient delivery of information to and from vehicles

Delivery driver gets new pick-ups and records deliveries

**True Pervasive Opportunity**



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# Customer requirements

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## ■ Configuration

- ▶ minimal footprint
  - highly customizable
- ▶ communications
  - efficient wire protocol
  - support unreliable comms
  - HTTP, TCP/IP, WAP
- ▶ many operating systems
  - Java VM
  - Windows (CE to NT)
  - PalmOS
- ▶ many devices
  - memory models
  - threading ...
  - display/keyboard ...

## ■ Operation

- ▶ once-only assured delivery
  - synchronous/asynchronous
- ▶ MQSeries compatibility
- ▶ end-to-end
  - authentication
  - encryption
  - non-repudiation
  - compression
- ▶ roaming support
  - server connectivity
- ▶ remote & local queue access
  - mailbox support
  - device delivery
- ▶ high availability
  - minimal administration





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# Roles

## Client

- ▶ Optional local resources
- ▶ Can initiate communications



## Peer

- ▶ Optional local resources
- ▶ Can listen for communication from a single peer



## Gateway

- ▶ Contains local resources
- ▶ Can listen for communication from multiple clients
- ▶ May contain Gateway functions e.g. Bridge to MQSeries

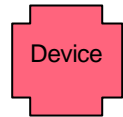


The IBM logo, consisting of the letters 'IBM' in a stylized, blocky font with horizontal lines through them.

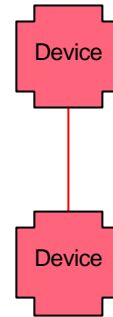


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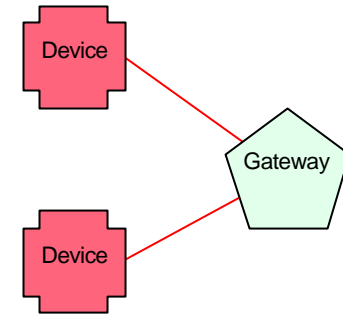
# Relationships



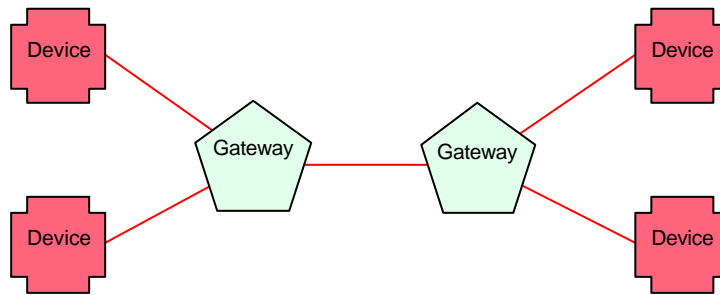
(a) Standalone device



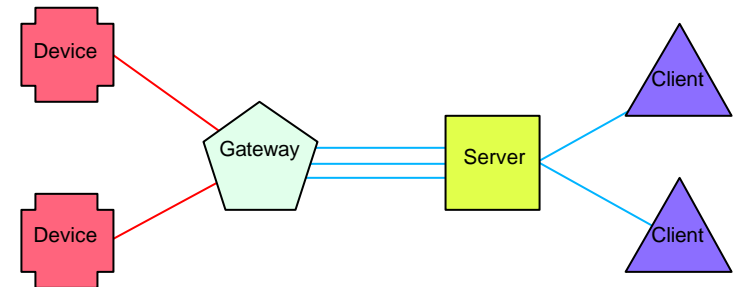
(b) Peer - peer devices



(c) Device cluster



(d) Complex device cluster



(e) An integrated MQSeries family n/w





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# MQSeries Family



**MQSeries  
Workflow**

- Workflow, Process Flow
- Application Services
- Tools

**MQSeries  
Integrator**

- Xform, Rules, Routing
- API Framework
- Templates, Utilities

**MQSeries**

- Messaging Services
- Standard Formats
- Tools

**MQSeries  
Everyplace**

## Family Traits

- Modular Set of Offerings
- MQSeries Foundation
- Common Look and Feel
- Management/Monitoring
- Messaging Tools

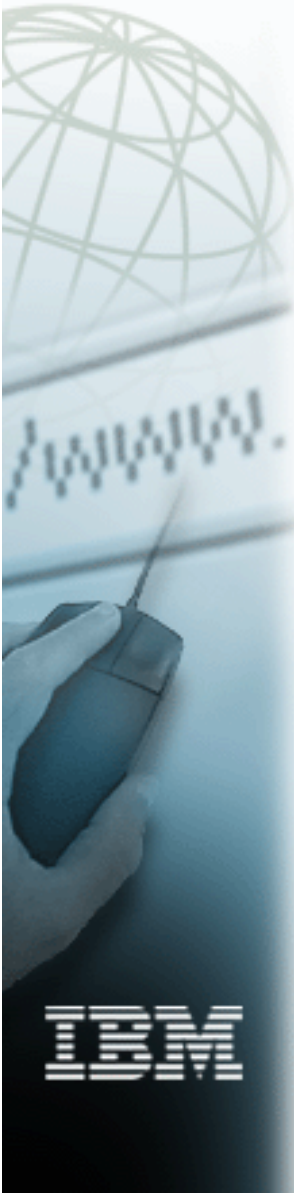
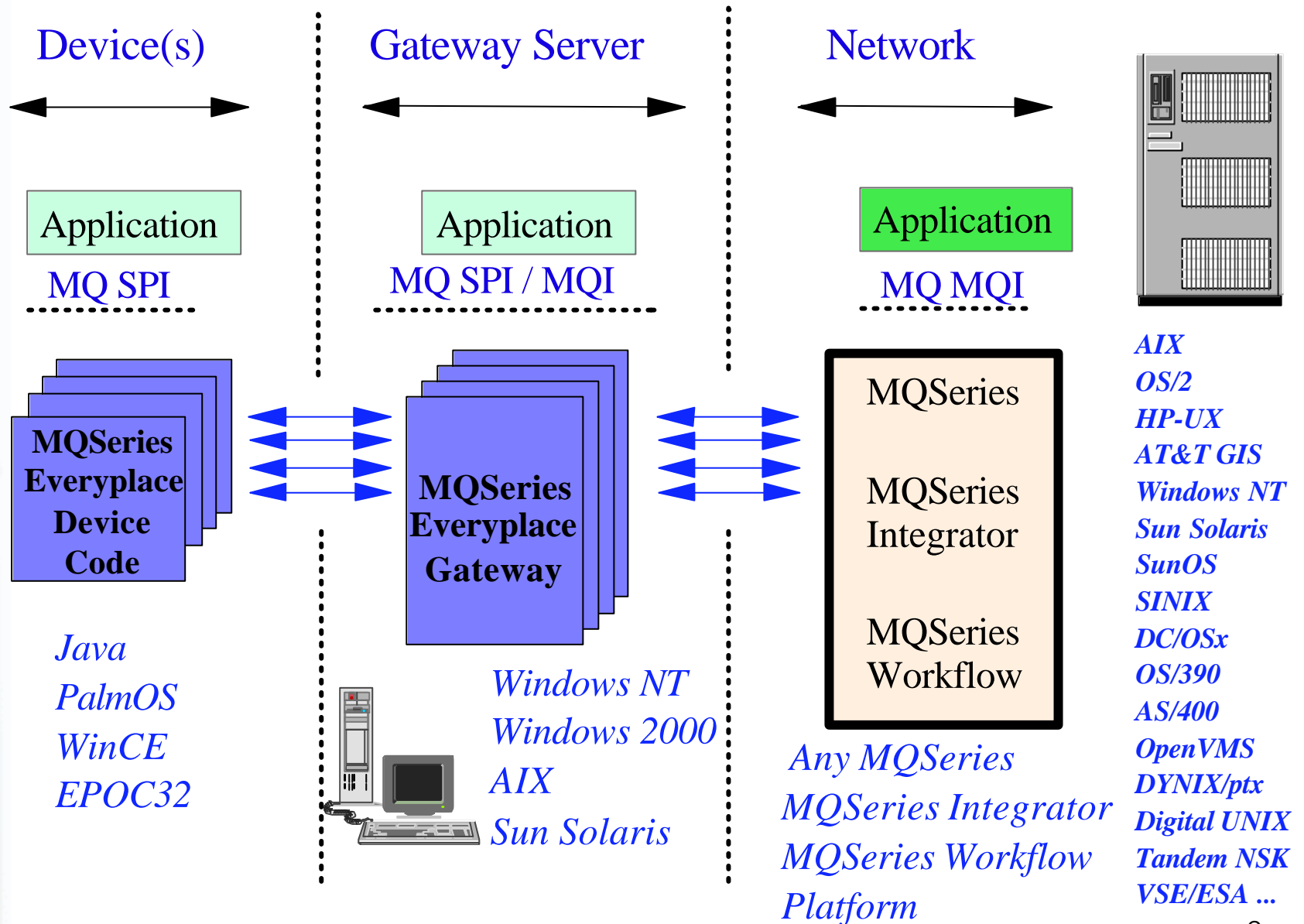






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# MQSeries Everyplace Solution





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# Supported devices

**Thinkpad (etc.)**

**Java Windows  
95/98/NT/2000**

**Asynchronous/synchronous**



**Palm 5/IBM Workpad C3**

**C PalmOS  
Synchronous**



**Servers**

**Java Windows NT/2000,  
AIX, Sun Solaris**

**Asynchronous/synchronous**

**Psion Series 5MX Pro  
and netBook**

**Java EPOC**

**Asynchronous/synchronous**

**HP Jornada 820 and  
Jornada 680**

**Java WinCE**

**Asynchronous/synchronous**





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# Supported environments

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Programming Language	Operating System
Java	EPOC32 Pocket PC Windows CE Windows 95, 98, NT & 2000 AIX, SUN Solaris Any IBM Java platform Any Sun Certified JVM
C	PalmOS





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# Queue Managers

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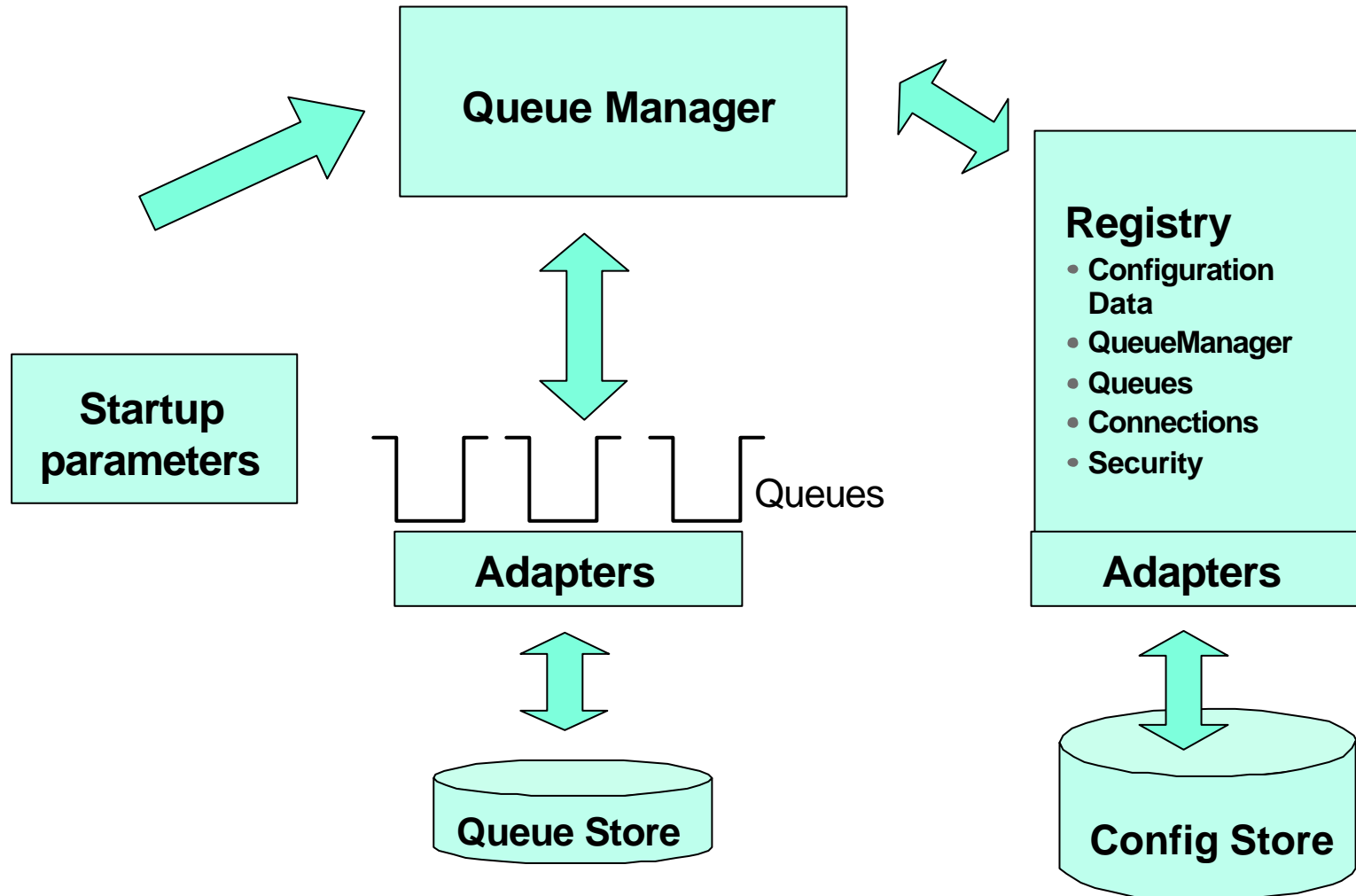
- Queue Managers - control how and where messages are stored or sent
  - ▶ Flexible configuration - every device has a Queue Manager
  - ▶ Adapters
    - defines communications and storage operations
  - ▶ Rules
    - Allows intervention during certain queue manager operations e.g. startup/shutdown, message handling, message transmission





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# Queue Manager





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# Adapters

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- Adapters are used to provide support for different types of communication networks and storage options
  - Communications adapters provided for Tcp/ip and Http
  - Storage adapters provided for disk and memory
- Provide your own java class that extends MQeAdapter
  - override the methods you want to replace/extend
- Define your adapter for use by the Queue Manager



# Queue Manager Rules

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- Queue Manager Rules are called when:
  - Queue Manager is activated/closed
  - Queue is added/removed
  - Queue Manager is 'triggered' to transmit pending messages
  - Get/Put/Delete/Undo message operation is requested
  - Incoming Peer connection is established
- Provide your own java class that extends MQeQueueManagerRule
  - override the methods you want to replace/extend
- Use MQeQueueManagerAdminMsg to activate the new rules

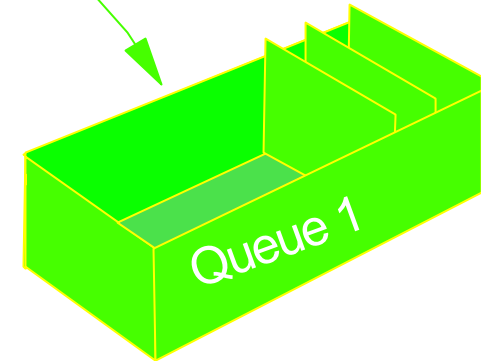


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# Messages

- Messages
  - Messages are objects
  - have unique identifier generated by system
  - remainder of message consists of named fields
  - all fields are optional
- Fields Object ... **MQeFields class**
  - an accumulation of fields
    - fields have **name**, **type** and **value**
    - nested fields object supported

msg







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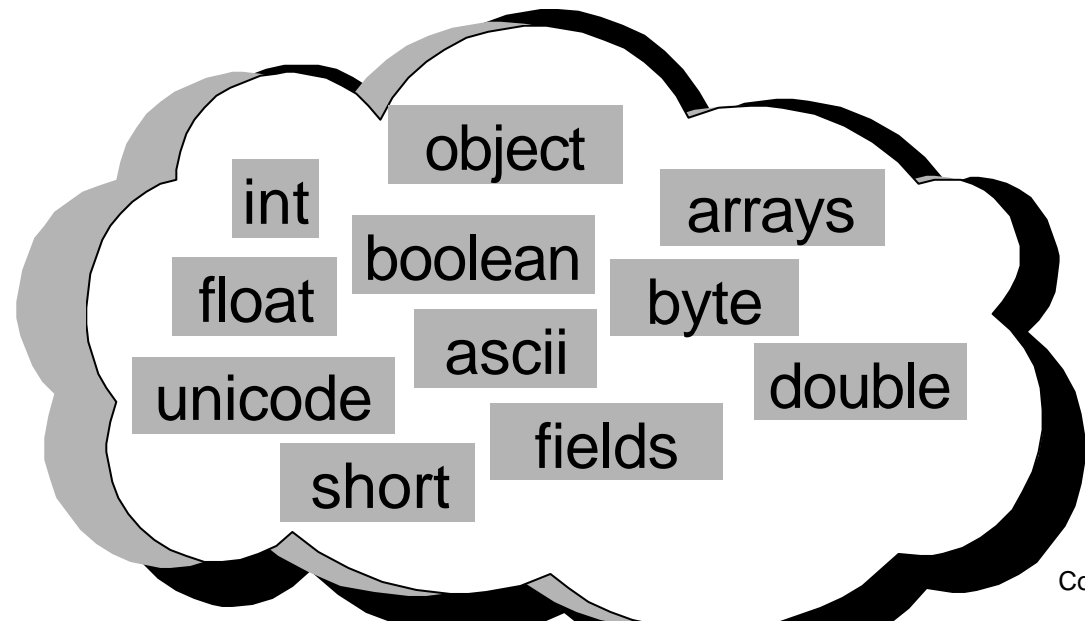
# MQeFields

MQeFields are a core component of MQe

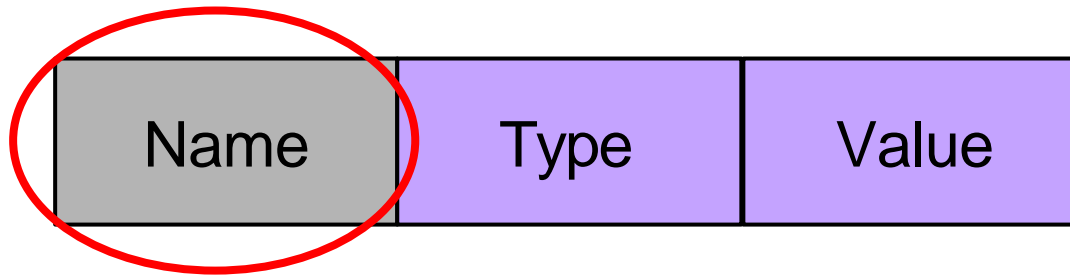
MQeFields provide a container for various data types.

MQeFields can encode the contents of the MQeFields object in a compressed form for efficient network transmission

MQeFields can decode the contents of the MQeFields object from its encoded form.



# MQeFields - field name



Be at least 1 character long.

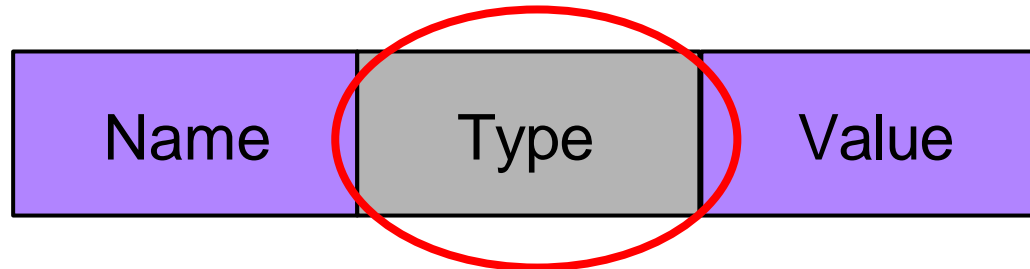
No maximum length

Conform with the ASCII character set, i.e. characters with values  $20 < \text{value} < 128$

Must not include any of the characters `{ } [ ] # ( ) : ; , ' " =`

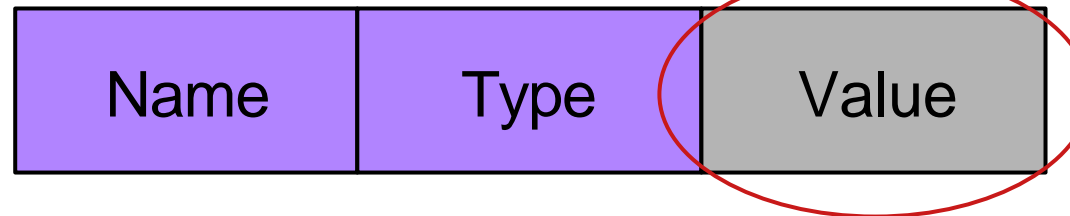
Recommended to keep field name short

# MQeFields - data type



- **ASCII String** or a dynamic array of ASCII strings
- **Boolean** value
- **byte** value, fixed array or dynamic array of byte values
- **double** Floating Point value, fixed array or a dynamic array of double floating point values
- **MQeFields** object or a dynamic array of fields objects (nesting therefore supported)
- **floating Point** value, fixed array or a dynamic array of floating point values
- **integer** (4 byte) value, fixed array or a dynamic array of integers
- **long** Integer (8 byte) value, fixed array or dynamic array of long integers
- **Object** value.
- **short** Integer (2 byte) value, fixed array or dynamic array of short integers
- **UNICODE** String value or a dynamic array of UNICODE strings

# MQeFields - set/get



- There are getter and setter methods:
  - ▶ For all fields:
    - getType( fieldName )
      - e.g. int x = getInt( "quantity" )
    - putType( fieldName, Value )
      - e.g. putInt( "quantity", 10 )
  - ▶ For fixed arrays:
    - putArrayOfType( fieldName, value )
    - getArrayOfType( fieldName )
  - ▶ For dynamic arrays:
    - putTypeArray( fieldName, value )
    - getTypeArray( fieldName )
    - putArrayLength( fieldName, n )
    - getArrayLength( fieldName )



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# MQeMsgObject fields

Field name	Type	Optional	Cached	Description
MQe.Msg_CorrelID	byte[]	yes	yes	correlation identifier
MQe.Msg_ExpireTime	long	yes	no	absolute expiry time in milliseconds (based on UTC time)
MQe.Msg_ExpireTime	int	yes	no	relative time in milliseconds
Msg_LockID	long	yes	no	lock identifier
MQe.Msg_MsgID	byte[]	yes	yes	message identifier
MQe.Msg_OriginQMgr	ASCII	no	yes	origin queue manager ( part of UID )
MQe.Msg_Priority	byte	yes	yes	priority ( 0 to 9 )
MQe.Msg_ReplyToQ	ASCII	yes	no	reply to queue
MQe.Msg_ReplyToQMgr	ASCII	yes	no	reply to queue manager
MQe.Msg_Resend	Boolean	yes	no	resending message
MQe.Msg_Style	int	yes	no	style - request, reply or datagram
MQe.Msg_Time	long	no	yes	time message created (part of UID)





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# Queues

- Queues

- ▶ Types of Queues

- Ordinary Queues
    - Admin queues
    - Remote queues
    - Home server queues
    - Store and Forward Queues

- ▶ Custom Queues

- sub-class queue object

- Queue properties

- ▶ Security

- authenticator class
    - cryptor class
    - compressor class
    - rule

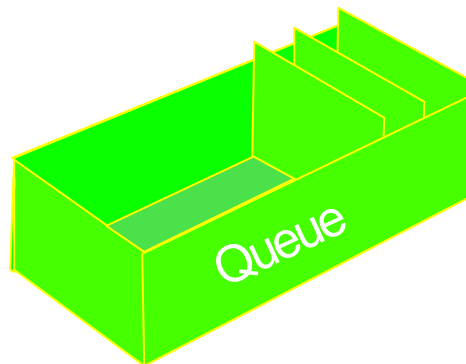
- ▶ adapter descriptor

- file system
    - database
    - memory

- ▶ max message length

- ▶ max queue depth

- ▶ name ... etc



The IBM logo, consisting of the letters 'IBM' in a bold, white, sans-serif font, positioned at the bottom of a vertical sidebar on the left side of the slide.



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# Messaging Operations

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## ■ Messaging Operations

- browse local and remote queues
  - ◆ option of a filter
  - ◆ option of locking messages
- get from a local and remote queues
  - ◆ option of a filter
- put to local and remote queue
- delete messages
- listen locally
  - ◆ option of a filter
- wait on local and remote queue
  - ◆ option of a filter





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# Messaging Operations

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Operation	Local Queues	Remote	Queues
		Synchronous	Asynchronous
browse (& Lock)	yes	yes	
delete	yes	yes	
get	yes	yes	
listen	yes		
put	yes	yes	yes
wait	yes	yes	







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# putMessage and getMessage

- putMessage method adds a message to a queue.
  - void putMessage(
    - String qmgrName , // destination queue manager
    - String queueName, // destination queue
    - MQeMsgObject msgObj, // message
    - MQeAttribute attr, // message level security
    - long confirmId ) // assured delivery

getMessage method retrieves a message from a queue

```
MQeMsgObject getMessage(  
    String qmgrName , // destination queue manager  
    String queueName, // destination queue  
    MQeFields filter, // message filter  
    MQeAttribute attr, // message level security  
    long confirmId ) // assured delivery
```



# Message delivery options

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## ► Synchronous

Communications must be available

Auto discovery of queues

Application knows the message has been delivered

Application is responsible for error handling

## ► Asynchronous

Message passed to MQe for delivery

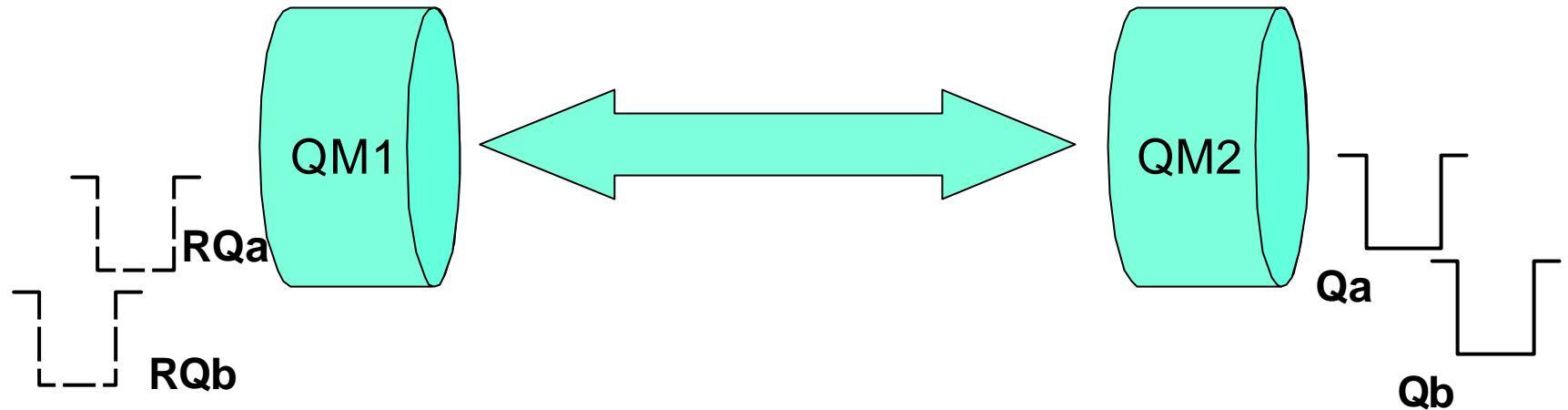
Requires local definition of remote queue

Once-only assured delivery



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# Asynchronous messaging



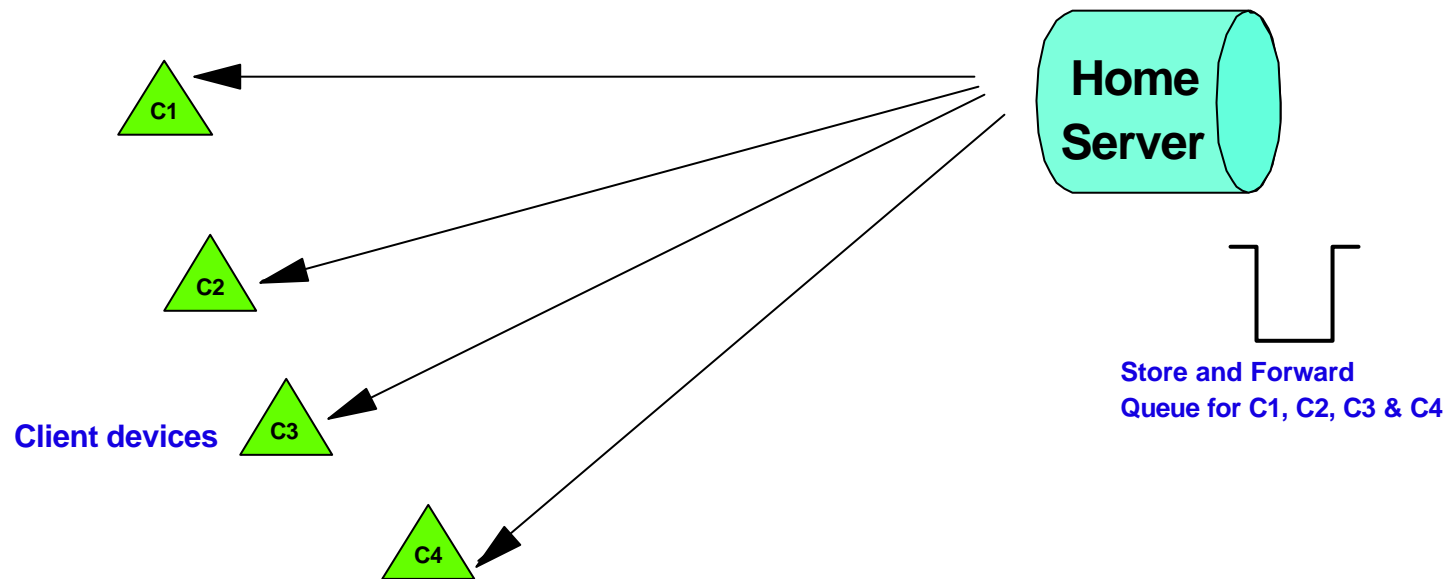
- Logically, there is a 'transmission queue' of messages awaiting delivery.
- However, messages are physically stored in their respective remote queue definitions.
- Queue Manager must be 'triggered' for messages to be transmitted.



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# Home Servers


- Home Server is a Queue Manager that stores messages for its clients to collect.





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# Security




**Queue  
Based**

- Synchronous
  - ▶ uses remote queue definitions
  - ▶ may negotiate dynamically, subject to rules
  - ▶ gives end-to-end authentication
    - may route through intermediates
- Asynchronous
  - ▶ encrypts data on transmitting queue
  - ▶ QM-to-QM authentication



**Message  
Based**

- Application-level
  - use attribute object on field objects
    - exploit cryptors & compressors
    - organization handles symmetric cryptor keys
  - exploits public key infrastructure
    - uses RSA encryption & digital signatures
    - non-repudiation
      - ◆ proof of sender
      - ◆ decrypt by receiver only
      - ◆ message protection



Me1.4  
**IBM**




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# Q Based Security

**This is a Service !!**

Solution designer selects Queue Attribute required (when using admin to define the Queue).



**Q-based  
Security  
features**

- MQeMsgObjects automatically protected according to qualities imbued by Queue Attribute
- Message always protected during transfer on an MQeChannel and in backing storage
- Programmer is freed from other security considerations

The IBM logo, consisting of the letters 'IBM' in a bold, sans-serif font with horizontal stripes through the letters.



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# Message level security

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A light green, star-shaped callout box with a black outline, containing the text 'Message Level Security features'.

**Message  
Level  
Security  
features**

## Application Service

- Initiating application creates and provides Attribute as *putMessage* parameter
- Recipient Application creates mirror Attribute and provides as *getMessage* parameter
- simple mechanism which enables strong message level protection
- MQe supplies two alternate attributes for message level security:
  - MQeMAttribute
  - MQeMTrustAttribute
- Both classes are descendants of MQeAttribute class.

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# Message level security- MQeMAttribute



**Message  
Level  
Security  
features**

## MQeMAttribute

- Well suited for business to business communications where mutual trust tightly managed
- Requires sending and recipient application to use predefined shared secret
- Provides for simple and powerful method for strong cryptographic, message-level protection, enabling Users or Groups with knowledge of shared secret to share private message data
- does not require any PKI



# Message level security - MQeMTrustAttribute

## MQeMTrustAttribute



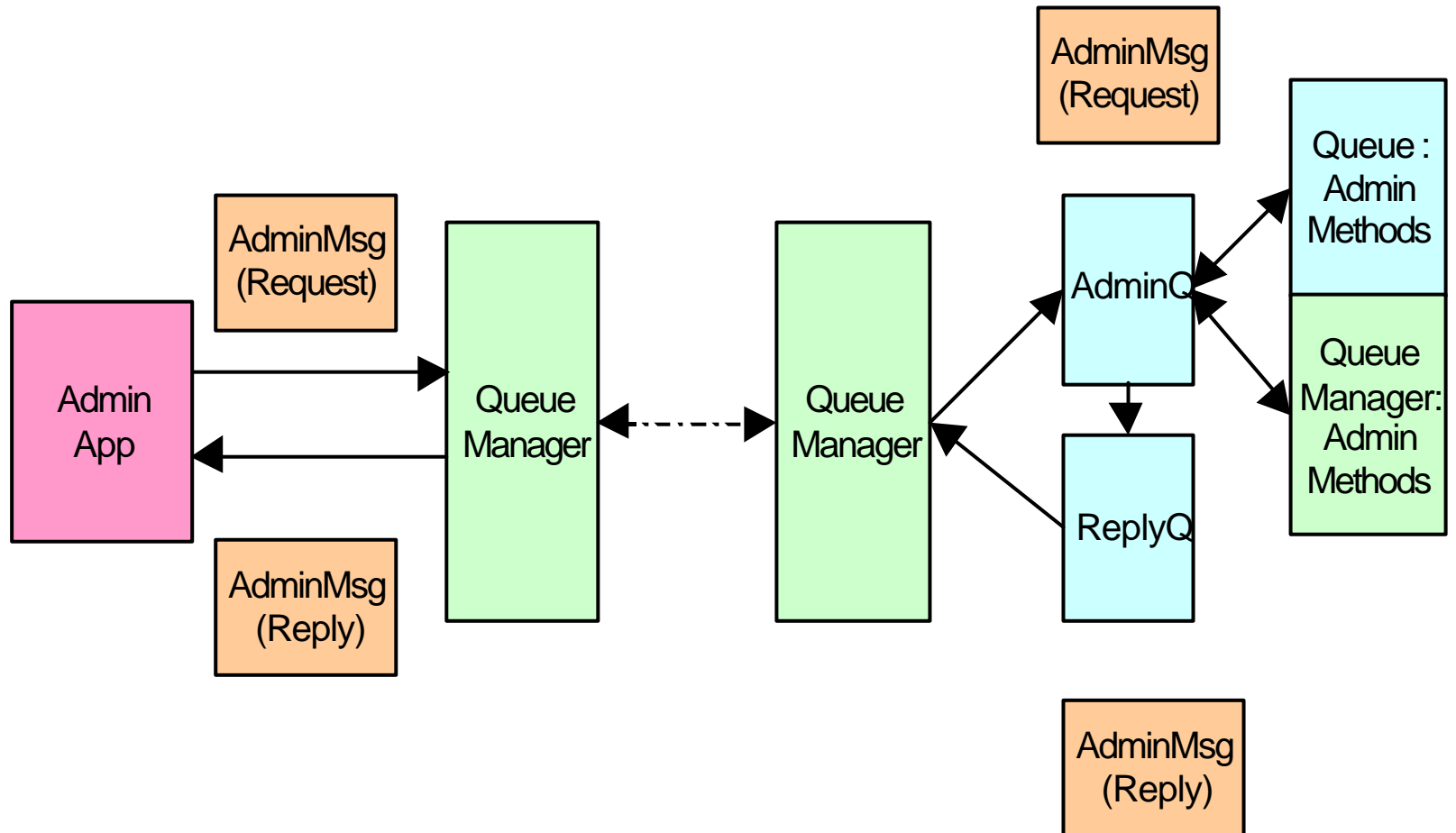
**Message  
Level  
Security  
features**

- uses default PKI
- protects data using digital envelope:
  - so only intended recipient can get access to message
  - ensuring a guaranteed level of cryptographic protection (confidentiality)
  - enabling intended recipient to determine whether message has been tampered with(integrity)
  - enabling recipient to validate signature of initiator (non-repudiation)

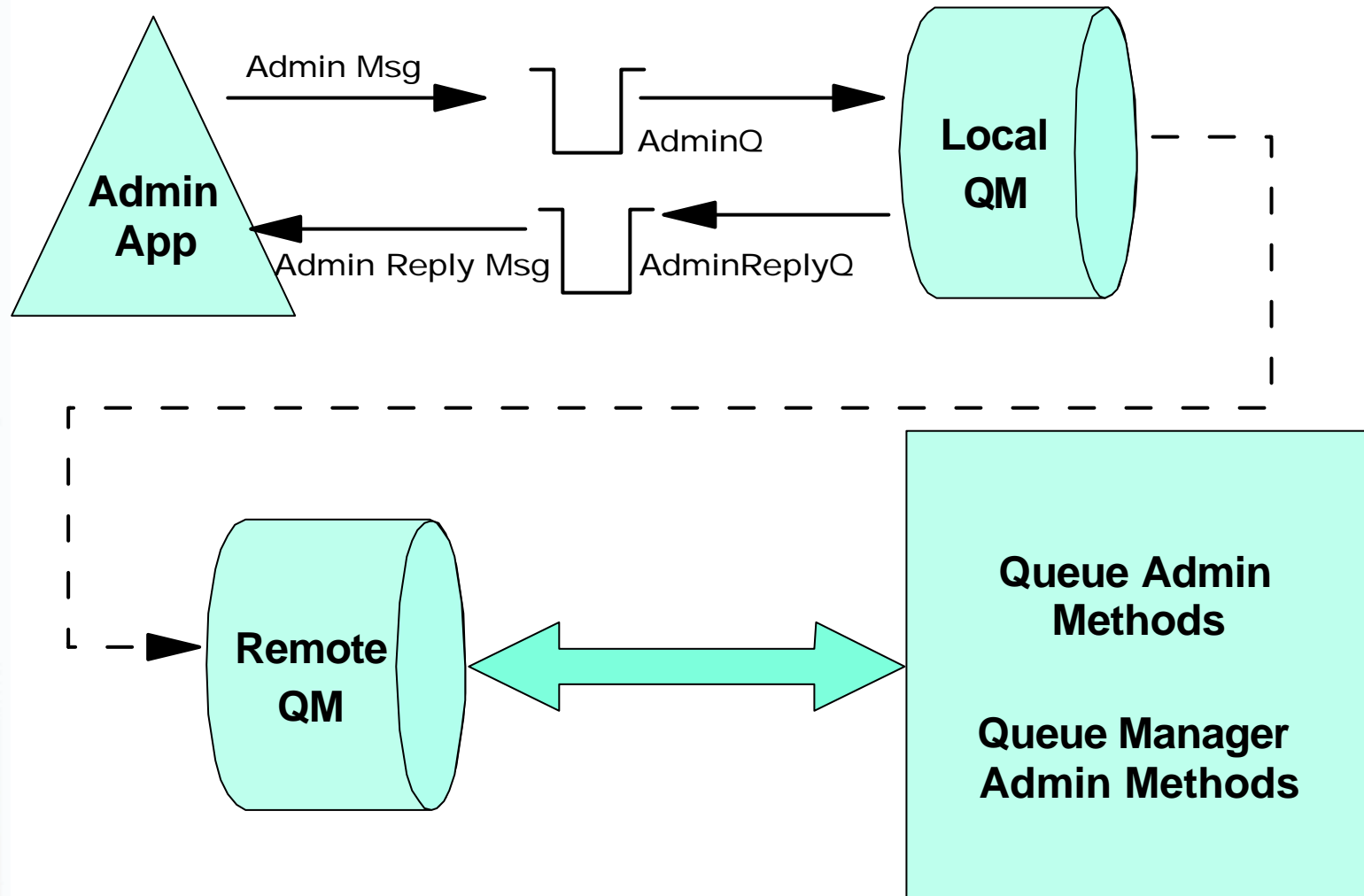


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# Administration



# Administration Overview





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# MQeExplorer

The screenshot shows the MQeExplorer application window. The left pane displays a tree view of the MQe root, with 'Local queues' selected under QM9091. The right pane shows a table of queue details.

Name	Description	Type	Mode	Owning qmgr	Class	Queue store
AdminQ	Admin Queue for QM9091	Local ...	Sync	QM9091	com.ibm.mqe.M...	MsgLog:D:\
AdminReplyQ	Admin Reply Queue for QM9091	Local ...	Sync	QM9091	com.ibm.mqe.M...	MsgLog:D:\
DeadLetterQ	Default Dead Letter Queue for QM9091	Local ...	Unknown	QM9091	com.ibm.mqe.M...	MsgLog:D:\
Drawqueue		Local ...	Unknown	QM9091	com.ibm.mqe.M...	MsgLog:D:\
SFQ		Store ...	Async	QM9091	com.ibm.mqe.M...	MsgLog:D:\
SYSTEM.DEF...	Default Queue for QM9091	Local ...	Unknown	QM9091	com.ibm.mqe.M...	MsgLog:D:\
TargetQueue		Local ...	Unknown	QM9091	com.ibm.mqe.M...	MsgLog:D:\



# Code footprint

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- MQeDevice.jar - 186KB
  - ▶ Base classes used in a device
- MQeGateway.jar - 191KB
  - ▶ Base classes used in a gateway
- MQeMQBridge.jar - 127KB
  - ▶ extends a gateway to interoperate with MQSeries
- MQeHighSecurity.jar - 12KB
  - ▶ provides enhanced security
- MQeMiniCertificateServer.jar - 316KB
  - ▶ provides the mini-certificate server
- MQeExamples.jar - 311KB
  - ▶ all the examples



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# Summary

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- MQSeries Everyplace is part of the MQSeries family
- It is an IBM messaging product for pervasive computing solutions
- New Code Base
- Object Oriented implementation
- Security is built in from the base up
- Current release is a tool kit



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# More Information

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- V1.1 code available from "Developer Toolbox" at IBM PartnerWorld for Developers
  - ▶ [www.developer.ibm.com/devcon](http://www.developer.ibm.com/devcon)
- General Information
  - ▶ [www-4.ibm.com/software/ts/mqseries/everyplace](http://www-4.ibm.com/software/ts/mqseries/everyplace)
- Documentation
  - ▶ [www-4.ibm.com/software/ts/mqseries/library/manualsa/#Everyplace](http://www-4.ibm.com/software/ts/mqseries/library/manualsa/#Everyplace)
- MQExplorer admin tool available as a supportpac
  - ▶ [www-4.ibm.com/software/ts/mqseries/txppacs/es02.html](http://www-4.ibm.com/software/ts/mqseries/txppacs/es02.html)

