

Developing applications for IBM MQ V9.2 with JMS

WM514 (Classroom)

WM515 (Self-paced)

Course description

This course teaches the skills that are needed to create a JMS 2.0 application to interface with IBM MQ queue managers. The course presumes no knowledge of IBM MQ or JMS. Students learn through lecture and hands-on labs to use JMS 2.0, and configure a development environment for IBM MQ. Students connect to an IBM MQ queue manager, put a message on a queue, and retrieve a message from the queue. Students also perform transactions, send asynchronous messages, publish messages to a topic, receive message through a subscription to a topic, create and use an allowlist, and handle all five JMS message types. Students are introduced to the REST API, Transport Layer Security with JMS, and IBM MQ development patterns.

For information about other related courses, see the IBM Training website:

**ibm.com**/training

General information

Delivery method

Classroom or self-paced virtual classroom (SPVC)

Course level

ERC 1.0

Product and version

IBM MQ version 9.2.0

Audience

This course is intended for application developers of IBM MQ 9.2.0 using JMS.

Learning objectives

After completing this course, you should be able to:

* Describe and identify IBM MQ features and components
* Configure IBM MQ for a development environment
* Test IBM MQ using sample programs
* Understand development options in IBM MQ
* Implement the JMS 2.0 API for IBM MQ
* Use JMS to connect to a queue manager
* Send and receive a message in JMS
* Publish and subscribe to a topic
* Understand all JMS message types
* Explain the purpose of allowlisting
* Increase security with allowlist in enforcement mode
* Explore data in the message body
* Use a transaction in JMS to IBM MQ
* Send messages asynchronously
* Describe Transport Layer Security in IBM MQ
* Explore the IBM MQ development patterns
* Understand REST API calls to IBM MQ

Prerequisites

* Basic Java programming skills

Duration

3 days

Skill level

Intermediate

Notes

The following unit and exercise durations are estimates, and might not reflect every class experience. If the course is customized or abbreviated, the duration of unchanged units will probably increase.

This course is not an update of the older course:

* WM513: IBM MQ V9 Application Development (Windows Labs) ERC1.0 is a C programming course working with MQI on IBM MQ 9.0.
* This course, WM514, is application development using JMS 2.0 API on IBM MQ 9.2.

Those needing to work with older existing applications written with the MQI in C should take WM513. WM514 is appropriate for those writing new applications.

Course agenda

|  |
| --- |
| Course introduction  Duration: 30 minutes |

|  |  |
| --- | --- |
| Unit 1. IBM MQ introduction  Duration: 1 hour and 30 minutes | |
| Overview | This unit provides an understanding of IBM MQ. |
| Learning objectives | After completing this unit, you should be able to:   * Describe IBM MQ features * Identify IBM MQ components * Describe IBM MQ objects |

|  |  |
| --- | --- |
| Unit 2. IBM MQ configuration  Duration: 2 hours and 15 minutes | |
| Overview | In this unit, a simple MQ server will be configured to teach the MQ developer how to establish their own environment. Command line tools are shown. |
| Learning objectives | After completing this unit, you should be able to:   * Configure IBM MQ using script * Configure IBM MQ basic security * Test IBM MQ using sample programs |

|  |  |
| --- | --- |
| Exercise 1. Configure IBM MQ for a development environment  Duration: 1 hour and 15 minutes | |
| Overview | This exercise covers the configuration of an IBM MQ server to create the queue manager, queues, and other items required for the operation of an MQ system. Messages are created and retrieved through a created queue. |
| Learning objectives | After completing this exercise, you should be able to:   * Login to the lab environment * Create a queue manager * Create queues, channels, security, and a listener * Setup users and groups with access to IBM MQ * Use a provided sample program to test IBM MQ |

|  |  |
| --- | --- |
| Unit 3. Developing in IBM MQ  Duration: 1 hour | |
| Overview | This unit describes the development environment for IBM MQ. |
| Learning objectives | After completing this unit, you should be able to:   * Describe IBM MQ development options * Understand how to setup a JMS development environment * Find and use the JMS sample programs |

|  |  |
| --- | --- |
| Exercise 2. Setting up a development environment for IBM MQ  Duration: 45 minutes | |
| Overview | This exercise creates an environment for Java JMS development. You modify a sample program, then compile and execute the program. |
| Learning objectives | After completing this exercise, you should be able to:   * Prepare a development environment * Locate the sample programs for Java JMS * Modify, compile, and execute a sample program |

|  |  |
| --- | --- |
| Unit 4. Connecting to IBM MQ  Duration: 1 hour | |
| Overview | This unit describes the making the connection to IBM MQ in JMS 2.0 and the sending and receiving of a message. |
| Learning objectives | After completing this unit, you should be able to:   * Connect to MQ * Send a message * Receive a message |

|  |  |
| --- | --- |
| Exercise 3. Connect to IBM MQ, send, and receive a message  Duration: 1 hour and 30 minutes | |
| Overview | In this exercise, you write a Java JMS 2.0 program to connect to an IBM MQ queue manager. You then send a message and retrieve a message. |
| Learning objectives | After completing this exercise, you should be able to:   * Connect to an IBM MQ queue manager * Put a message in a queue * Get a message from a queue |

|  |  |
| --- | --- |
| Unit 5. Publish and subscribe in JMS  Duration: 1 hour | |
| Overview | This unit introduces publishing and subscribing in IBM MQ. It reviews the code in JMS 2.0 to publish a message to a topic, and how to subscribe to receive messages published to a topic. |
| Learning objectives | After completing this unit, you should be able to:   * Describe publishing and subscribing * Publish a message * Subscribe to a topic |

|  |  |
| --- | --- |
| Exercise 4. Publish and subscribe to a topic  Duration: 1 hour | |
| Overview | With IBM MQ, you can publish and subscribe to a topic. A topic is all the messages that are related to a subject. IBM MQ can stream a topic to all the users, the subscribers, who are interested in all the posts on a subject. This is different from a use case where only one recipient retrieves and discards a message. |
| Learning objectives | After completing this exercise, you should be able to:   * Publish messages to a topic * Subscribe to a topic * Display messages received from a subscription |

|  |  |
| --- | --- |
| Unit 6. IBM MQ message types  Duration: 1 hour and 15 minutes | |
| Overview | This unit explores all the message data types used in IBM MQ and instructs on how to send each type of message. |
| Learning objectives | After completing this unit, you should be able to:   * Understand the JMS message types * Create and send a message in all JMS message types |

|  |  |
| --- | --- |
| Exercise 5. Sending message types  Duration: 1 hour and 30 minutes | |
| Overview | In messaging, the basic type of message is text. You sent a text message in exercise 3. However, other message types are sometimes needed. In this exercise, you explore the five types of messages in JMS, and learn how to send each type to a queue on the MQ server. |
| Learning objectives | After completing this exercise, you should be able to:   * Send messages in all five JMS message types |

|  |  |
| --- | --- |
| Unit 7. Allowlisting in IBM MQ  Duration: 45 minutes | |
| Overview | This unit describes the IBM MQ feature of allowlisting that helps to protect systems against attack by restricting which objects can be passed into the system in messages. |
| Learning objectives | After completing this unit, you should be able to:   * Describe allowlisting and purpose * Use an allowlist * Understand allowlist modes |

|  |  |
| --- | --- |
| Exercise 6. Use an allowlist  Duration: 1 hour | |
| Overview | An allowlist can be utilized to restrict which objects can be sent to the MQ in messages by creating a list of allowed objects. |
| Learning objectives | After completing this exercise, you should be able to:   * Create an allowlist * Demonstrate a program that uses an allowlist |

|  |  |
| --- | --- |
| Unit 8. Message data  Duration: 45 minutes | |
| Overview | This unit explores how data is represented in the body of a message. |
| Learning objectives | After completing this unit, you should be able to:   * Using data types in a message body * Using message properties |

|  |  |
| --- | --- |
| Exercise 7. Data type assignment in messages  Duration: 45 minutes | |
| Overview | Data conversion in MQ is often completed automatically. Using JMS your data can be assigned a type with methods on the message type objects, or by using message properties to declare the character set or other characteristics of the data sent. In this exercise, you explore both. |
| Learning objectives | After completing this exercise, you should be able to:   * Use data types * Use message properties |

|  |  |
| --- | --- |
| Unit 9. Performing transactions  Duration: 45 minutes | |
| Overview | This unit demonstrates performing a transaction in JMS for IBM MQ. |
| Learning objectives | After completing this unit, you should be able to:   * Understand transactions * Implement a transaction |

|  |  |
| --- | --- |
| Exercise 8. Performing transactions  Duration: 45 minutes | |
| Overview | This exercise shows how to have a transactional MQ context and sends a set of messages as a transaction. |
| Learning objectives | After completing this exercise, you should be able to:   * Set the session as a transaction * Commit a transaction |

|  |  |
| --- | --- |
| Unit 10. Asynchronous messaging using JMS  Duration: 30 minutes | |
| Overview | This unit describes how to implement asynchronous messaging in JMS. |
| Learning objectives | After completing this unit, you should be able to:   * Review asynchronous messaging * Understand how to implement a CompletionListener * Understand how to send an asynchronous message |

|  |  |
| --- | --- |
| Exercise 9. Asynchronous messaging using JMS  Duration: 45 minutes | |
| Overview | Sending an ascynchronous message in JMS requires the use of the javax.jms.CompletionListener. In this exercise, you create a listener object that implements the CompletionListener. You then write a program to send messages asynchronously. |
| Learning objectives | After completing this exercise, you should be able to:   * Create a listener that implements the CompletionListener * Use the CompletionListener to see the response to sent messages. |

|  |  |
| --- | --- |
| Unit 11. Transport Layer Security in JMS  Duration: 45 minutes | |
| Overview | In this unit, you review Transport Layer Security in the IBM MQ environment. TLS is then implemented from a JMS client to a IBM MQ server. |
| Learning objectives | After completing this unit, you should be able to:   * Describe Transport Layer Security (TLS) in IBM MQ * Implement TLS from a JMS client |

|  |  |
| --- | --- |
| Unit 12. Development patterns for IBM MQ  Duration: 30 minutes | |
| Overview | This unit surveys the development patterns published by IBM for IBM MQ. The patterns for JMS are examined in detail. |
| Learning objectives | After completing this unit, you should be able to:   * Explore the IBM MQ development patterns * Understand the patterns provided for JMS |

|  |  |
| --- | --- |
| Exercise 10. Exploring IBM MQ development patterns  Duration: 30 minutes | |
| Overview | This unit explores the IBM MQ development patterns that are published on the repository GitHub. |
| Learning objectives | After completing this exercise, you should be able to:   * Access the IBM MQ development patterns published on the repository GitHub. |

|  |  |
| --- | --- |
| Unit 13. REST API in IBM MQ  Duration: 45 minutes | |
| Overview | This unit explores the REST API in IBM MQ. It reviews the IBM MQ configuration needed to support REST and working with the IBM MQ web server. |
| Learning objectives | After completing this unit, you should be able to:   * Explore the REST configuration for IBM MQ * Understand REST API calls to IBM MQ |

|  |  |
| --- | --- |
| Exercise 11. Using the REST API for IBM MQ  Duration: 45 minutes | |
| Overview | This exercise introduces IBM MQ REST API to access an IBM MQ server. |
| Learning objectives | After completing this exercise, you should be able to:   * IBM MQ configuration to support REST * Starting and stopping the IBM MQ web server * Making REST API calls to IBM MQ |

|  |  |
| --- | --- |
| Unit 14. Course summary, badge, and other learning resources  Duration: 30 minutes | |
| Overview | This unit summarizes the course and provides information for future study. |
| Learning objectives | After completing this unit, you should be able to:   * Describe the course objectives and what you learned * Earn a badge for this course * Identify and describe product certifications that are related to this course * Identify resources that can help you learn more |

For more information

To learn more about this course and other related offerings, and to schedule training, see **ibm.com**/training

To learn more about validating your technical skills with IBM certification, see **ibm.com**/certify

To stay informed about IBM training, see the following sites:

IBM Training News: ibm.com/blogs/ibm-training/

YouTube: youtube.com/IBMTraining

Facebook: facebook.com/ibmtraining

Twitter: twitter.com/IBMTraining