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Asynchronous Communication With Message Driven Beans

Objectives

After completing this lesson, you should be able to do the following:

- Identify the features of a messaging system
- Describe the Java Message Service (JMS) architecture
- Configure a Java Message Service
- Create a message-driven bean (MDB)
- Create a JMS/MDB client

Messaging Systems

A messaging system is a system that:

- Uses messages to communicate between components (rather than direct method invocations)
- Enables loosely coupled components
- Is peer-to-peer in nature

Message-Oriented Middleware

- Message-oriented middleware refers to an infrastructure that supports messaging.
- Typical message-oriented middleware architectures define these elements:
  - Message structure
  - The way to send and receive messages
  - Scaling guidelines

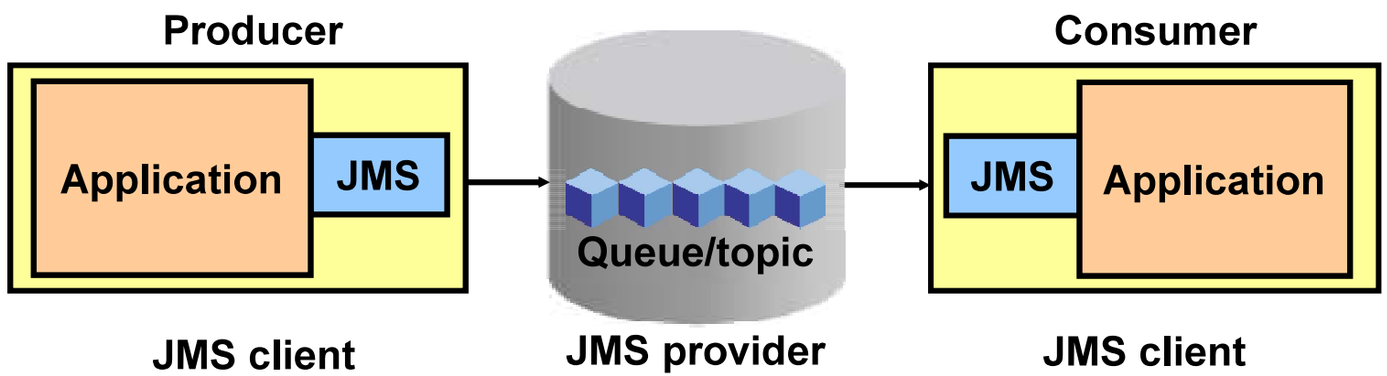
Java Message Service (JMS):

- Is a Java EE standard for developing messaging systems
- Provides an architecture for loosely coupled integration of systems through the use of messages
- Supports both point-to-point and publish/subscribe models for message delivery
- Is asynchronous in nature
- Enables reliable communication

JMS Application Architecture

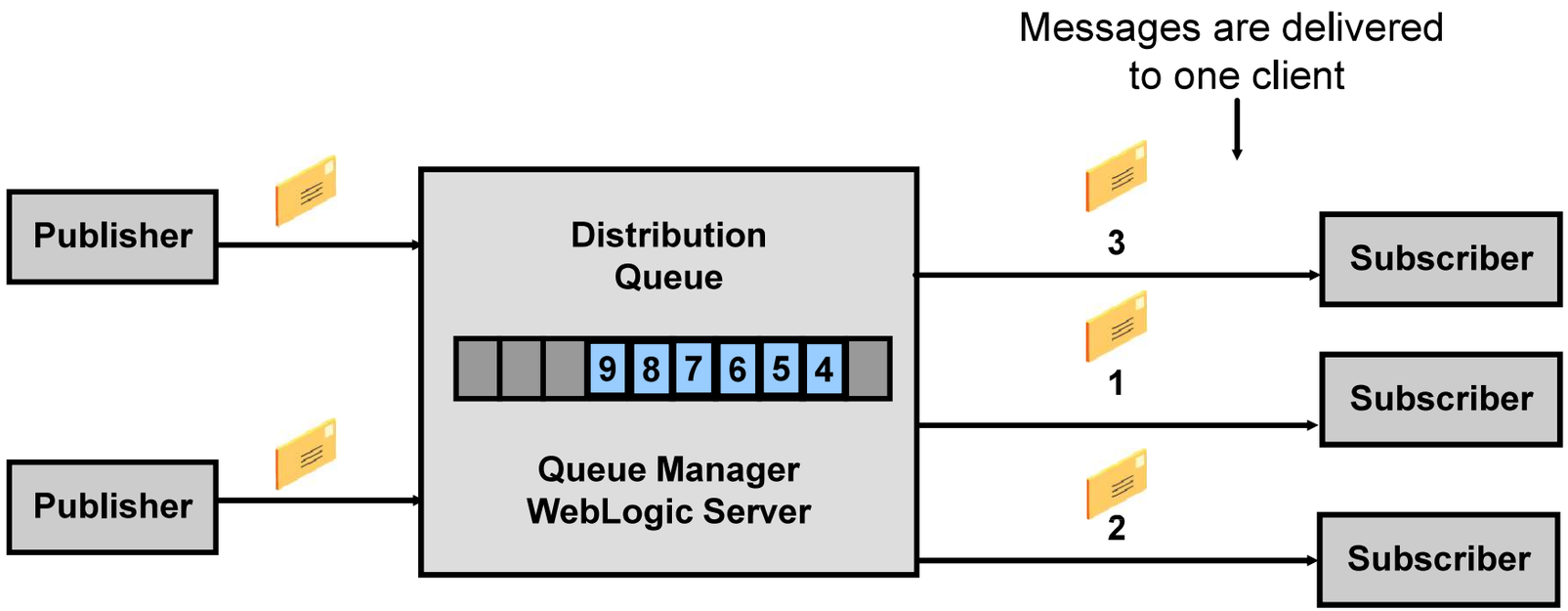
The main components of a JMS application:

- JMS clients (producer and consumer)
- JMS provider
- Administered objects
  - Connection factories
  - Destinations (queues or topics)



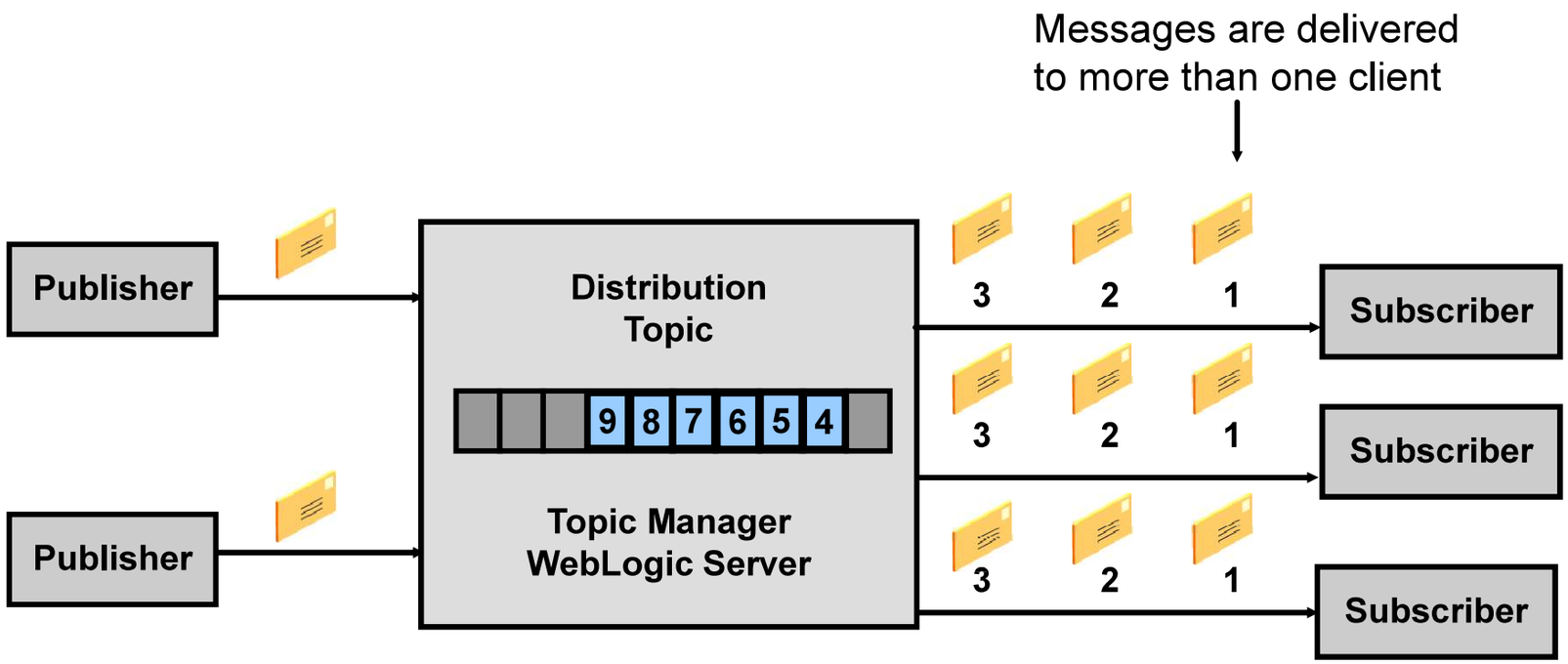
Point-to-Point Queue

Many producers can serialize messages to multiple receivers in a queue.



Publish-Subscribe Topics

Publishing and subscribing to a topic decouples producers from consumers.



Identify the correct statements about the point-to-point or queuing model.

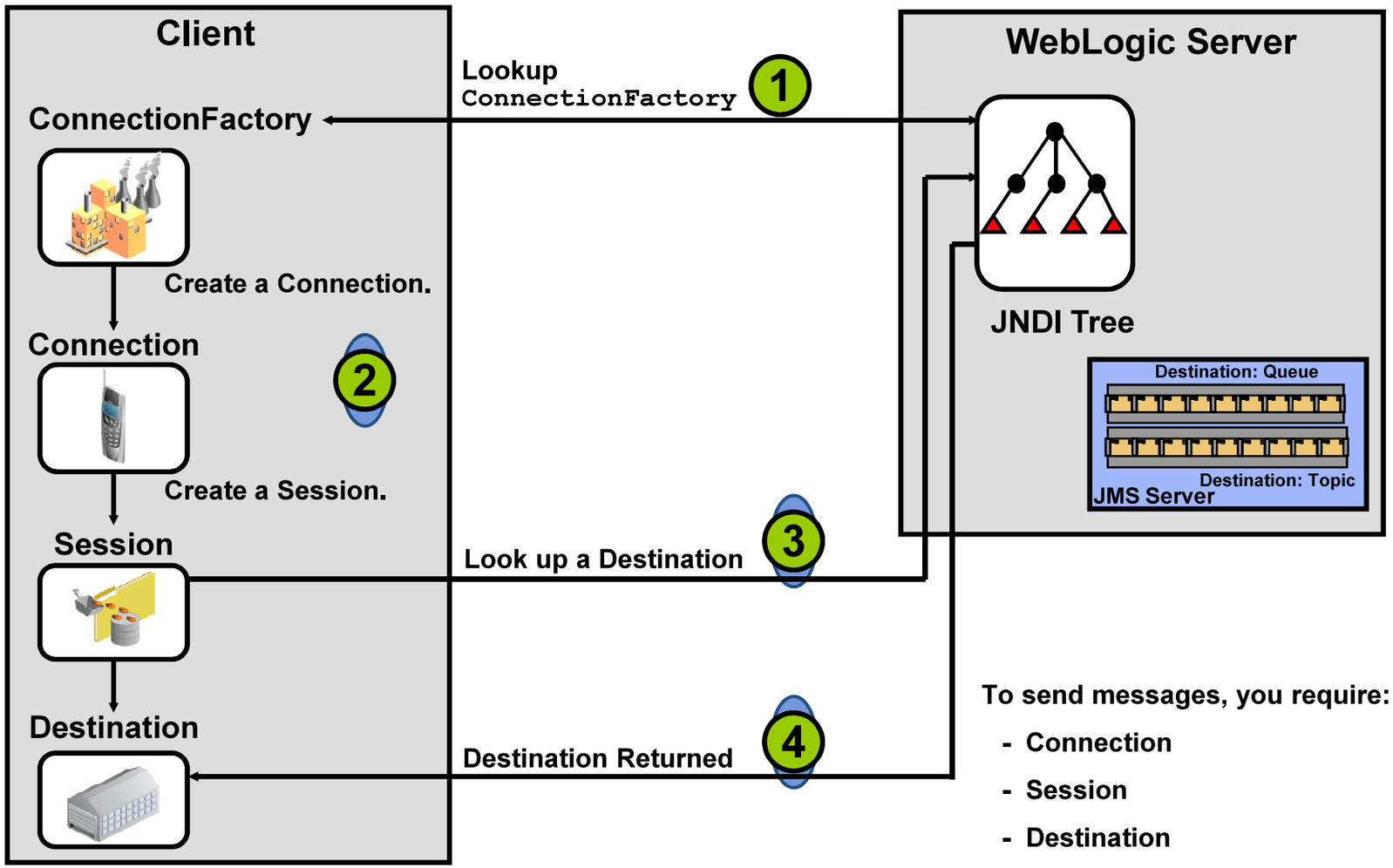
1. Multiple consumers will get the message.
2. The producer does not have to be running at the time the consumer consumes the message, nor does the consumer need to be running at the time the message is sent.
3. Every message successfully processed is acknowledged by the consumer.

WebLogic Server JMS Features

WebLogic Server JMS supports:

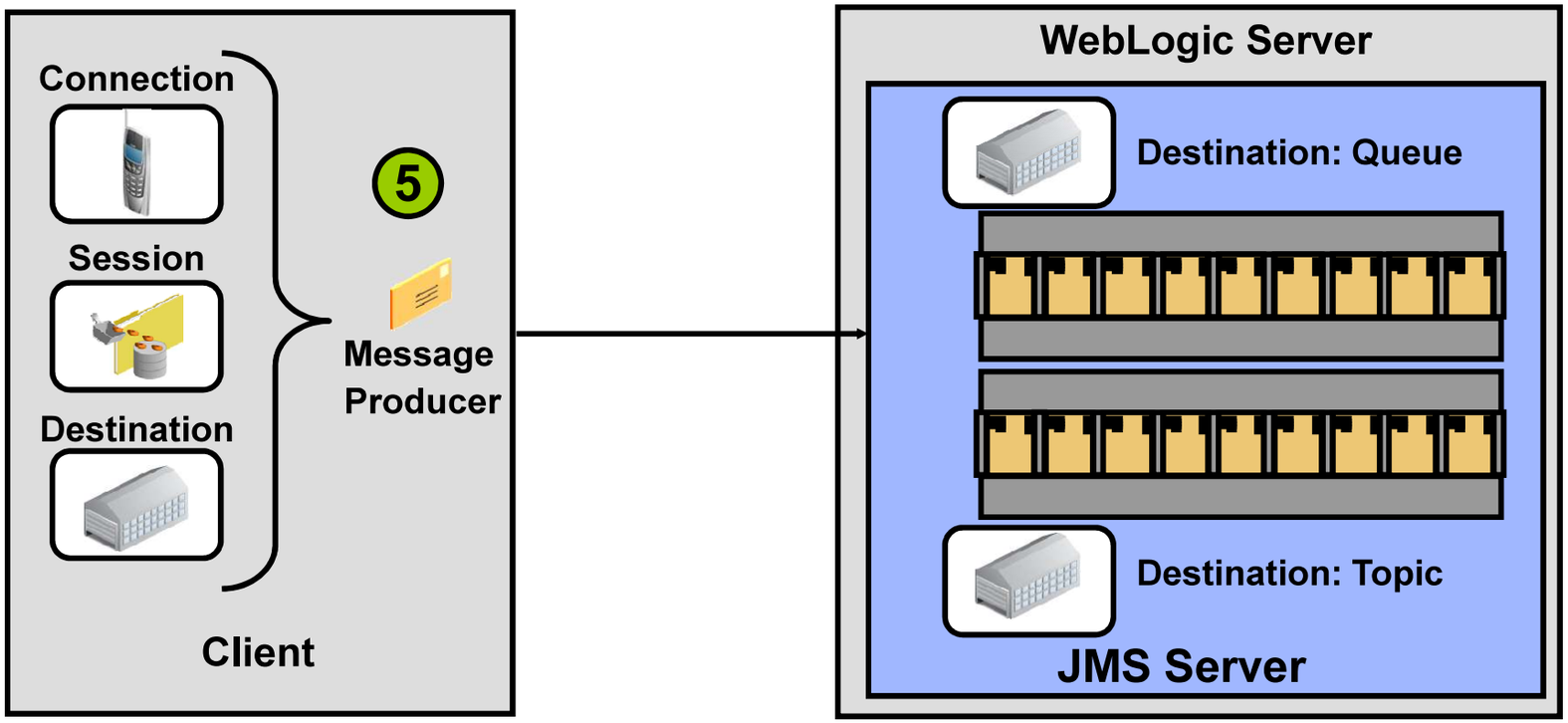
- PTP and pub/sub domains
- Guaranteed and transactional message delivery
- Durable subscribers
- Distributed destinations
- Recovery from failed servers

JMS Architecture: Connecting



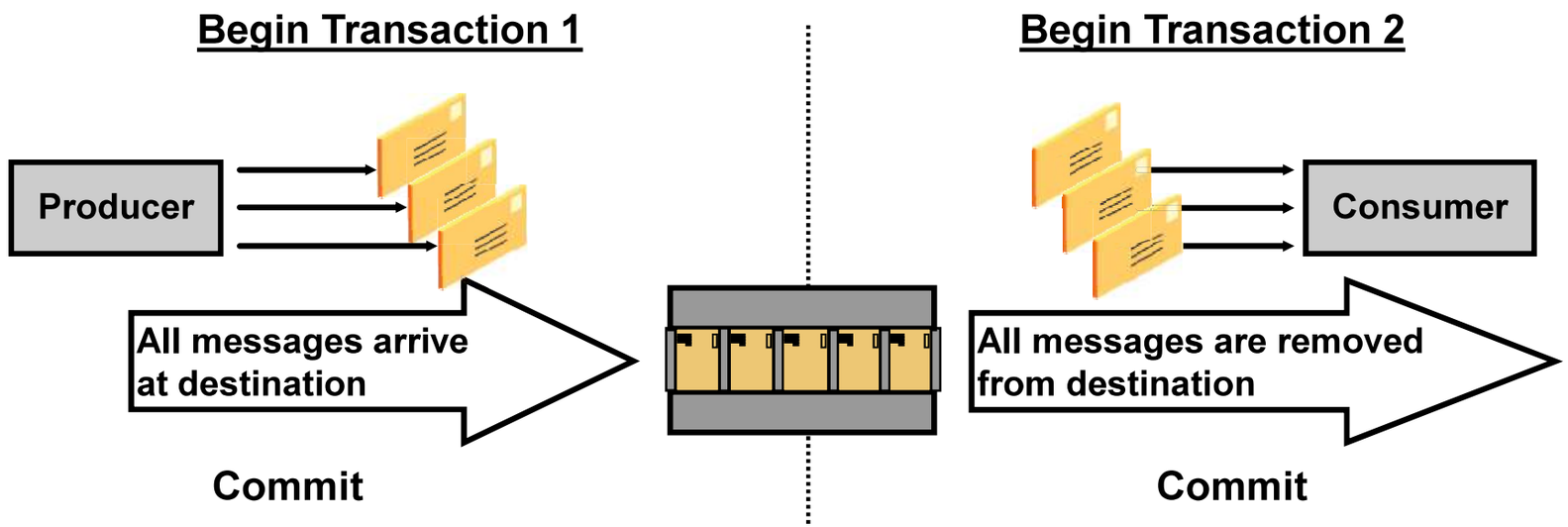
JMS Architecture: Sending Messages

Connection, Session, and Destination are used to send a message.



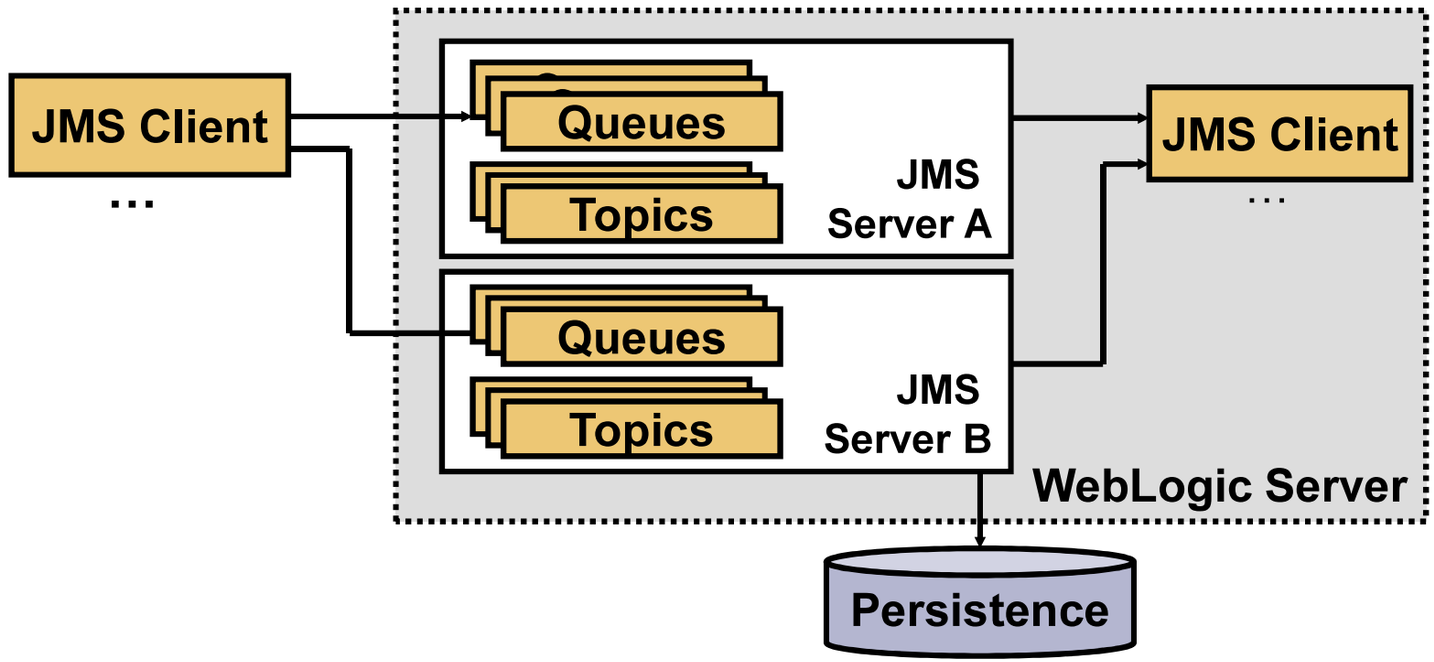
Transacted Messaging

- A JMS client can use JTA to participate in a distributed transaction.
- Alternatively, a JMS client can demarcate transactions local to the JMS Session, through a transacted session.
- Participation in a transaction is optional.

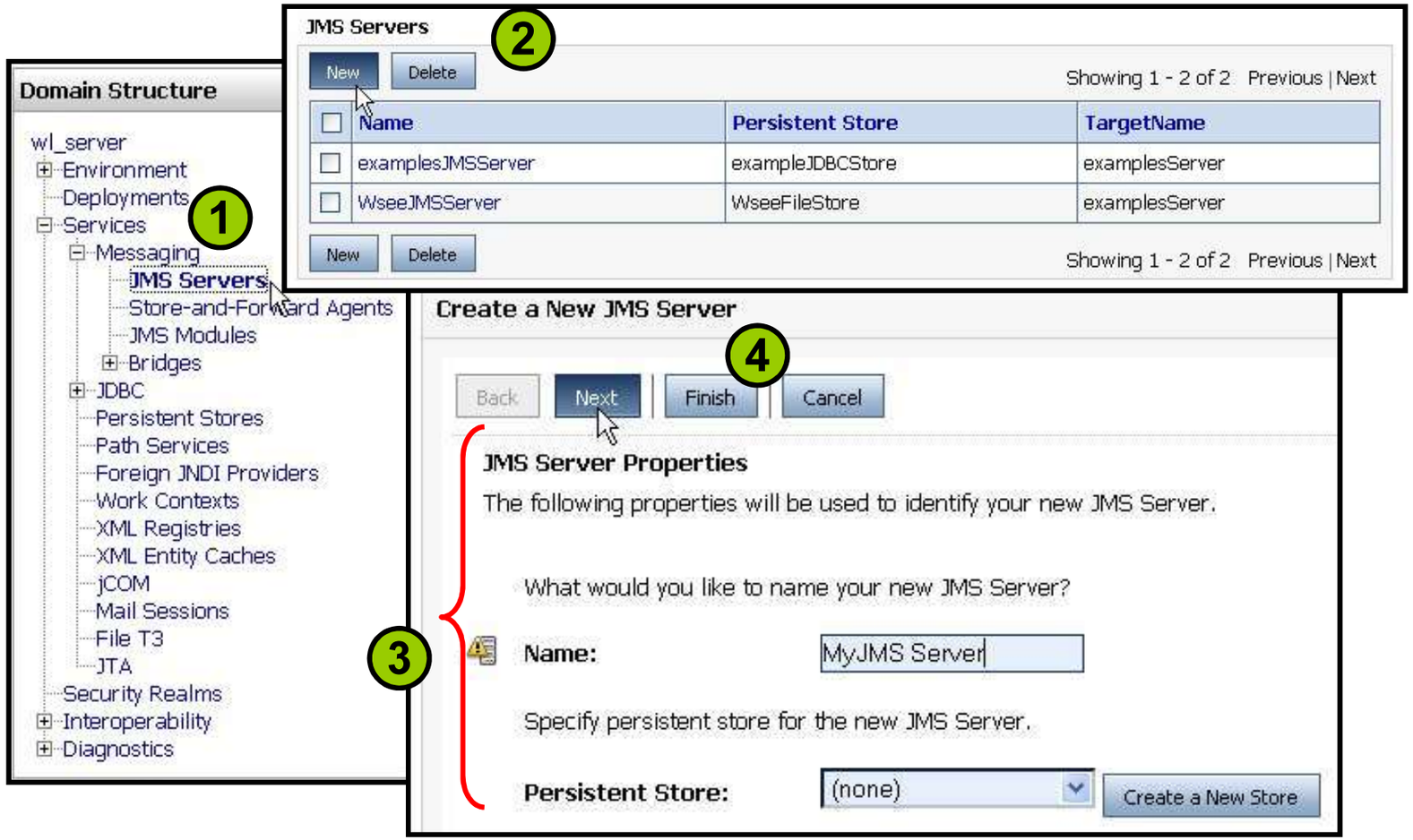


WebLogic Server JMS Server

- In WLS, the messaging service is implemented through a JMS server.
- A JMS server receives and distributes messages.



Creating a JMS Server



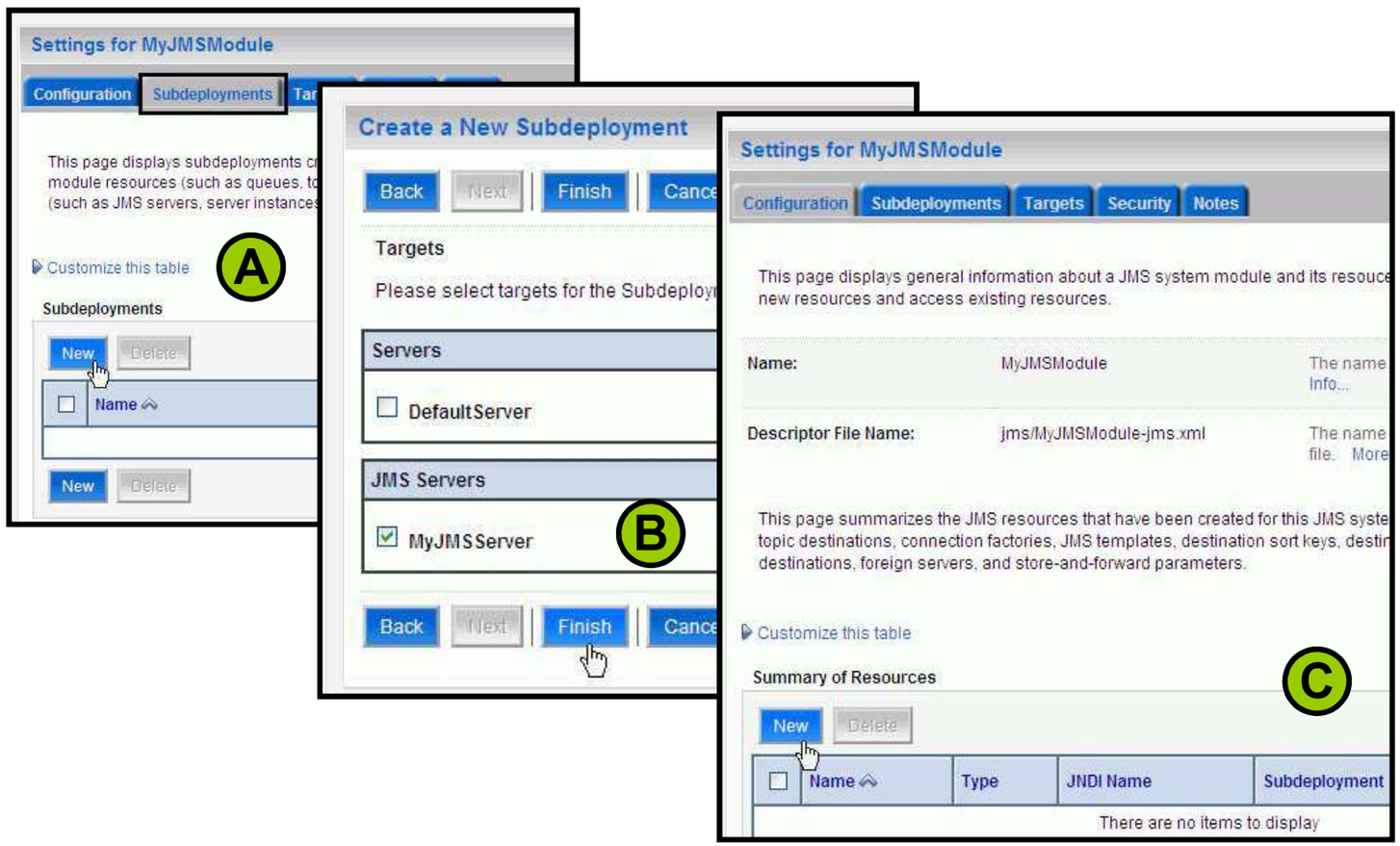
Connection Factory

- A connection factory:
  - Encapsulates connection configuration information
  - Is used to create preconfigured connections
  - Is stored in JNDI
  - Can be targeted to servers or clusters
- WLS provides a default connection factory that is bound in JNDI to `weblogic.jms.ConnectionFactory`.
- When a new configuration is required, a new connection factory can be created.

JMS Destination

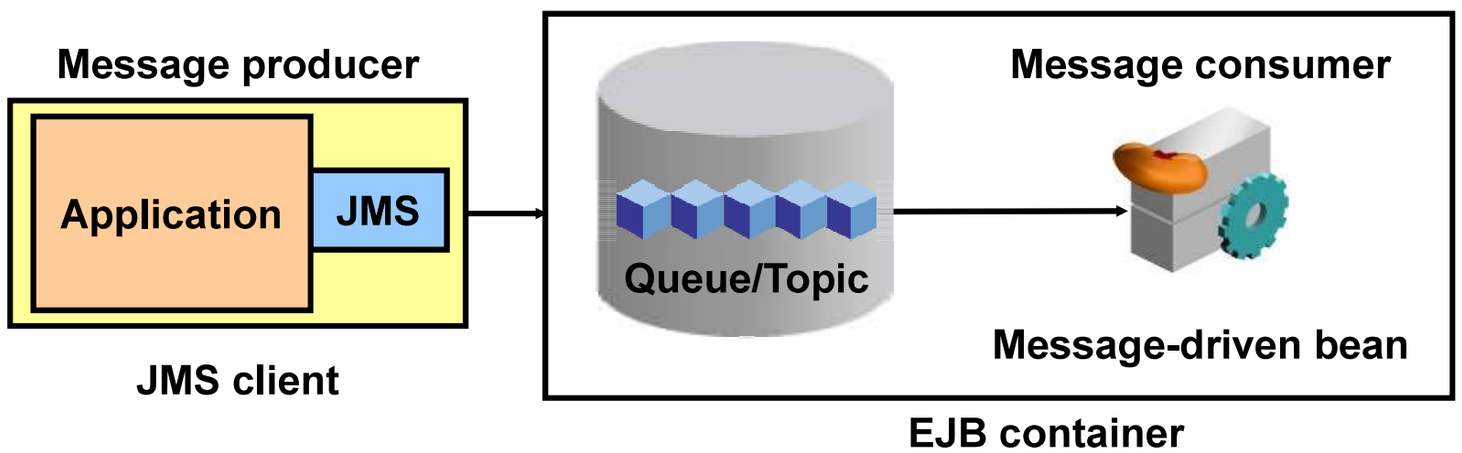
- A JMS destination is a lightweight object stored in JNDI.
- It is the target on a JMS server for sending or receiving messages.
- The JMS destination types are:
  - Queue
  - Topic

Creating a Queue Destination

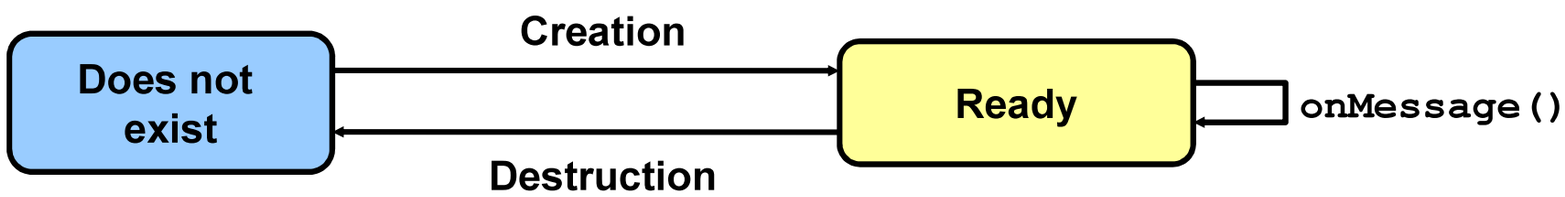


A message-driven bean (MDB):

- Is a stateless EJB that asynchronously consumes JMS messages
- Is never called directly by a client
- Has an `onMessage()` method that is invoked by the EJB container when a message arrives



Life Cycle of a Message-Driven Bean



Creating a Message-Driven Bean

```
@MessageDriven(mappedName = "jms/demoTopic",                    1
   name = "MessageBean",
   activationConfig = { @ActivationConfigProperty(              2
       propertyName="connectionFactoryJndiName",
       propertyValue="jms/TopicConnectionFactory"),
     @ActivationConfigProperty(
       propertyName="destinationName",
       propertyValue="jms/demoTopic"),
     @ActivationConfigProperty(
       propertyName="destinationType",
       propertyValue="javax.jms.Topic"),
     @ActivationConfigProperty(
       propertyName="messageSelector",
       propertyValue="RECIPIENT = 'MDB'") } )
public class MDBBean implements MessageListener {
   @Resource javax.ejb.MessageDrivenContext mc;              3
   public void onMessage(Message message) {                  4
      ... }
}
```

Creating a JMS/MDB Client

```
public class JMSClient {
 public static void main(String [] args) {
  try {
      Context context = new InitialContext();
      ConnectionFactory connectionFactory =
         (ConnectionFactory) new
                  InitialContext().lookup("
                        jms/TopicConnectionFactory");
      Connection connection =
                 connectionFactory.createConnection();
      connection.start();
      Session topicSession =
         connection.createSession(false,
                              Session.AUTO_ACKNOWLEDGE);
      Destination topic = (Topic) new
            InitialContext().lookup("jms/demoTopic");
```

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Creating a JMS/MDB Client

```
        MessageProducer publisher =
                topicSession.createProducer(topic);
        Message message = topicSession.createMessage();
        message.setJMSType("theMessage");
        message.setLongProperty("time",
                           System.currentTimeMillis());
        message.setStringProperty("subject",
                                  "Test EJB 3.0 MDB");
        message.setStringProperty("message",
                    "Test message sent to EJB 3.0 MDB");
        message.setStringProperty("RECIPIENT", "MDB");
        publisher.send(message);
        publisher.close();
        topicSession.close();
        connection.close();
      } catch(Throwable ex) { ex.printStackTrace(); }
    }
}
```

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Summary

In this lesson, you should have learned how to:

- Identify the features of a messaging system
- Describe the Java Message Service (JMS) architecture
- Configure a Java Message Service
- Create a message-driven bean (MDB)
- Create a JMS/MDB client

Practice: Overview

These practices covers the following topics:

- Creating a message-driven bean to send emails
- Modifying the session bean to produce messages for the MDB to send as emails
- Configuring JMS resources in WebLogic Server
- Testing the email functionality using an email client