IBM

Simplified JMS Messaging Support for Liberty Profile

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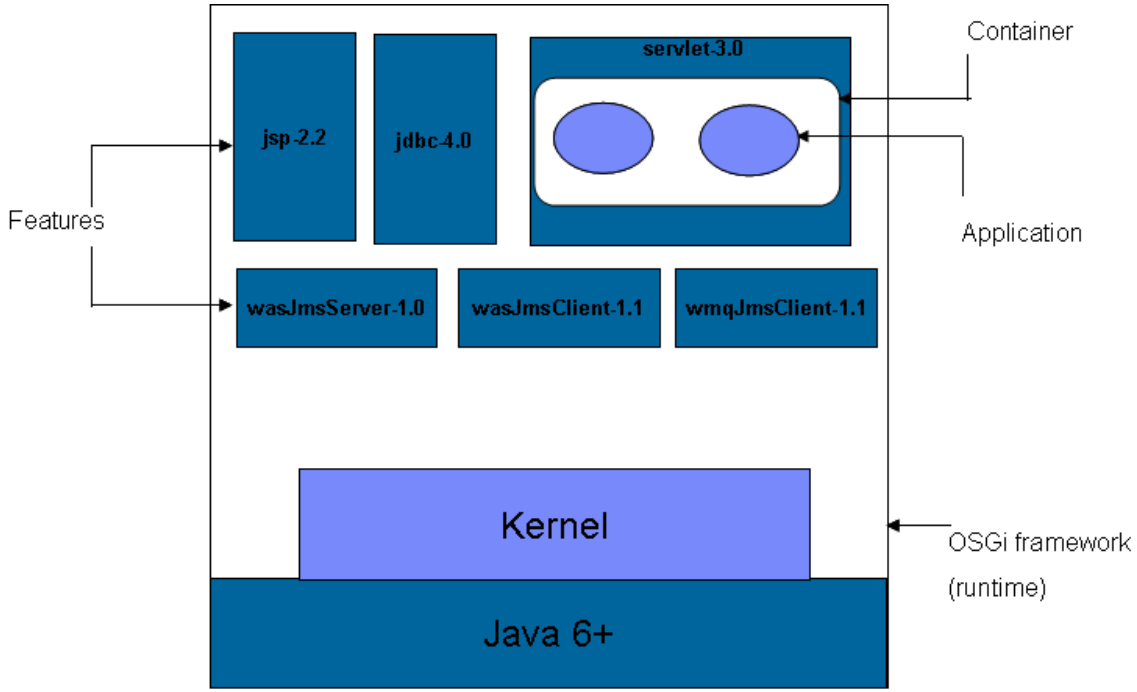
Overview of Liberty messaging

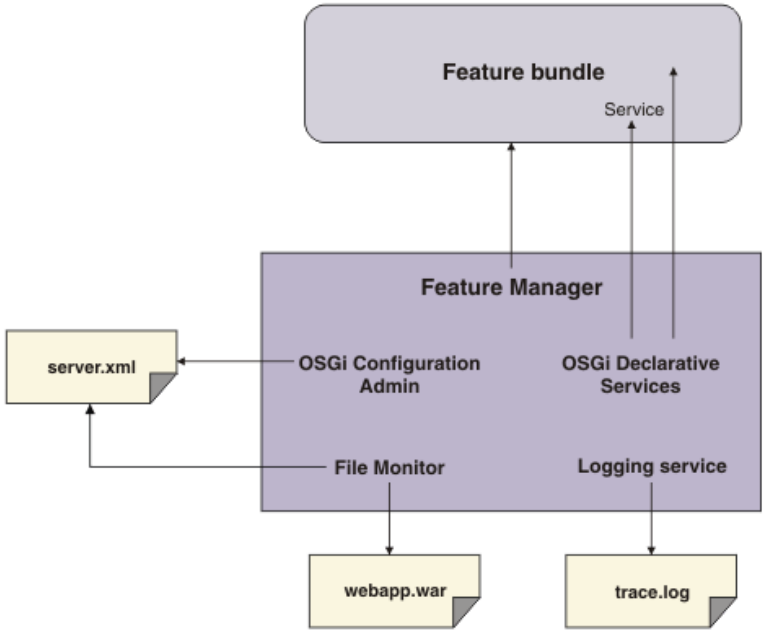
- Provides light weight JMS server
- JMS 1.1 compliant
- Composable, flexible and dynamic messaging service
- Supports WebSphere MQ as the messaging provider
- Supports Message Driven Bean (MDB) deployment
- Interoperability with full profile WebSphere Application Server
- Supports transactions, security and persistence

Liberty profile : Architecture



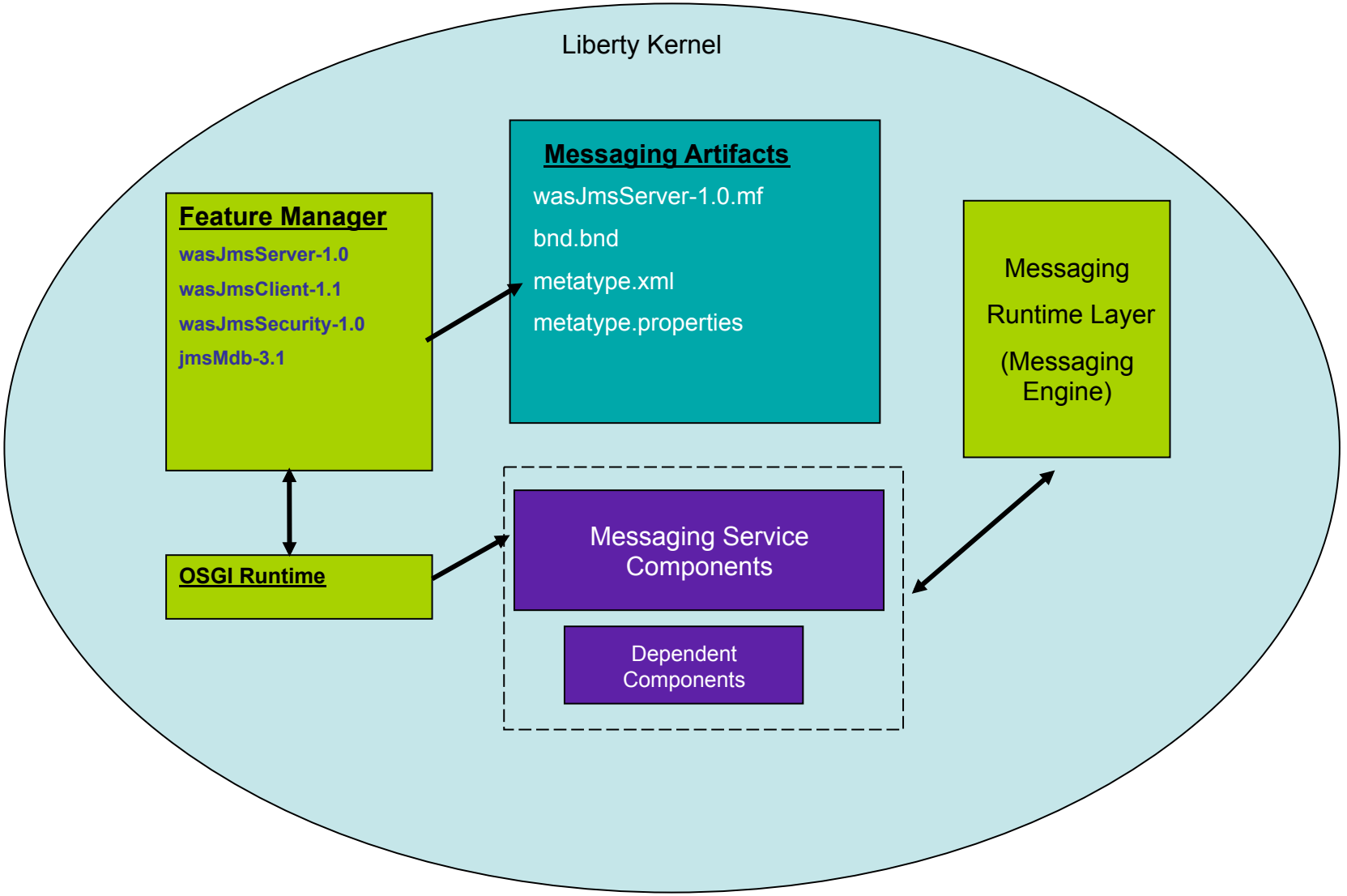
- The Liberty profile is a highly composable and dynamic runtime environment
- OSGi services are used to manage component lifecycles, and the injection of dependencies and configuration
- The server process comprises a single JVM, the Liberty kernel, and any number of optional features.
- The feature code and most of the kernel code runs as OSGi bundles within an OSGi framework.

Liberty profile : Kernel

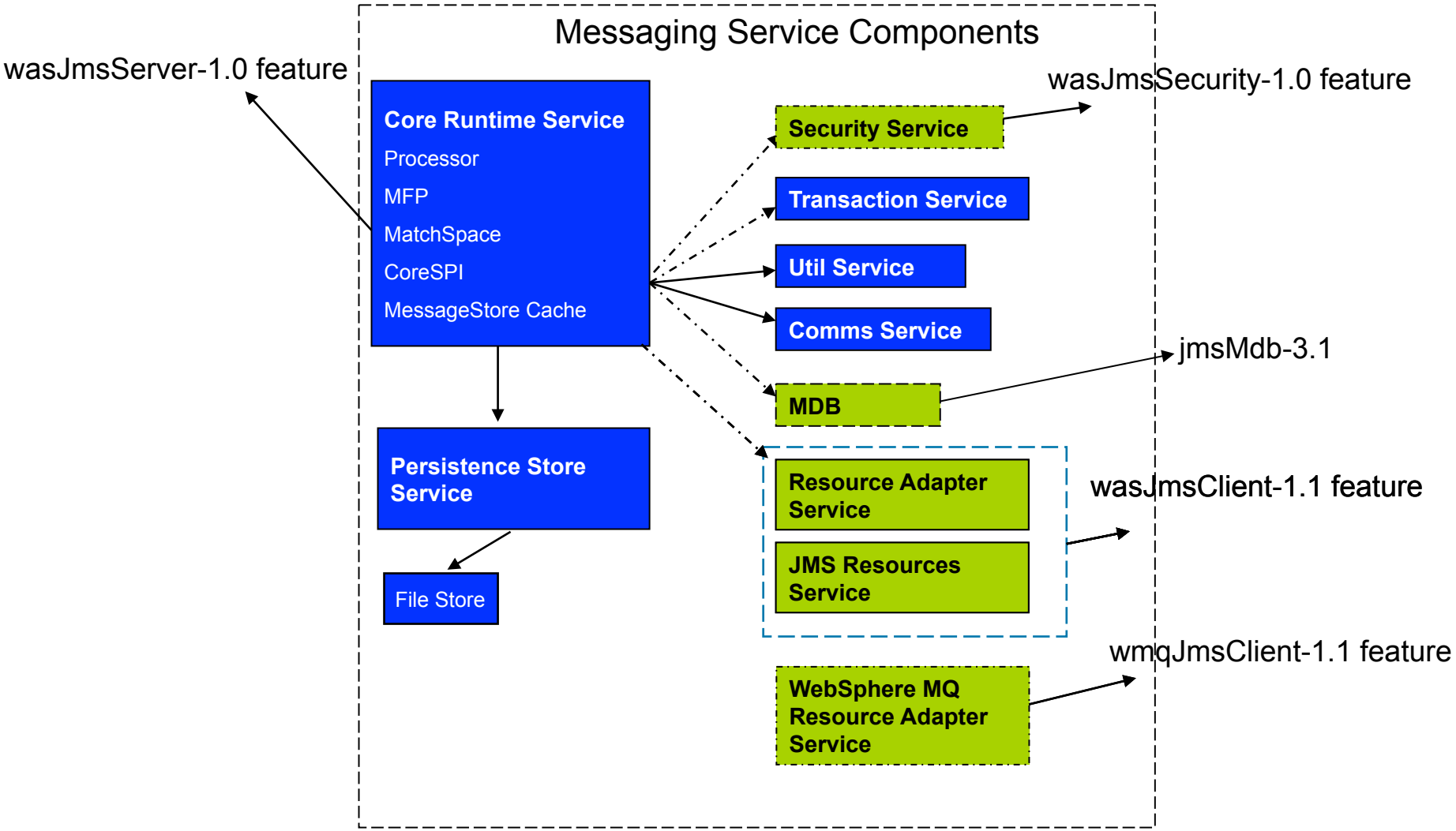


- Features are specified in the system configuration files that are the server.xml file and any other included files
- The server configuration files populate the OSGi Configuration Admin service, which injects the feature configuration into the feature manager service
- The feature manager maps each feature name to a list of bundles that provide the feature. The bundles are installed into the OSGi framework and started
- The feature manager responds to configuration changes by dynamically adding and removing features while the server is running

Liberty embedded JMS Server



Liberty messaging - Architecture

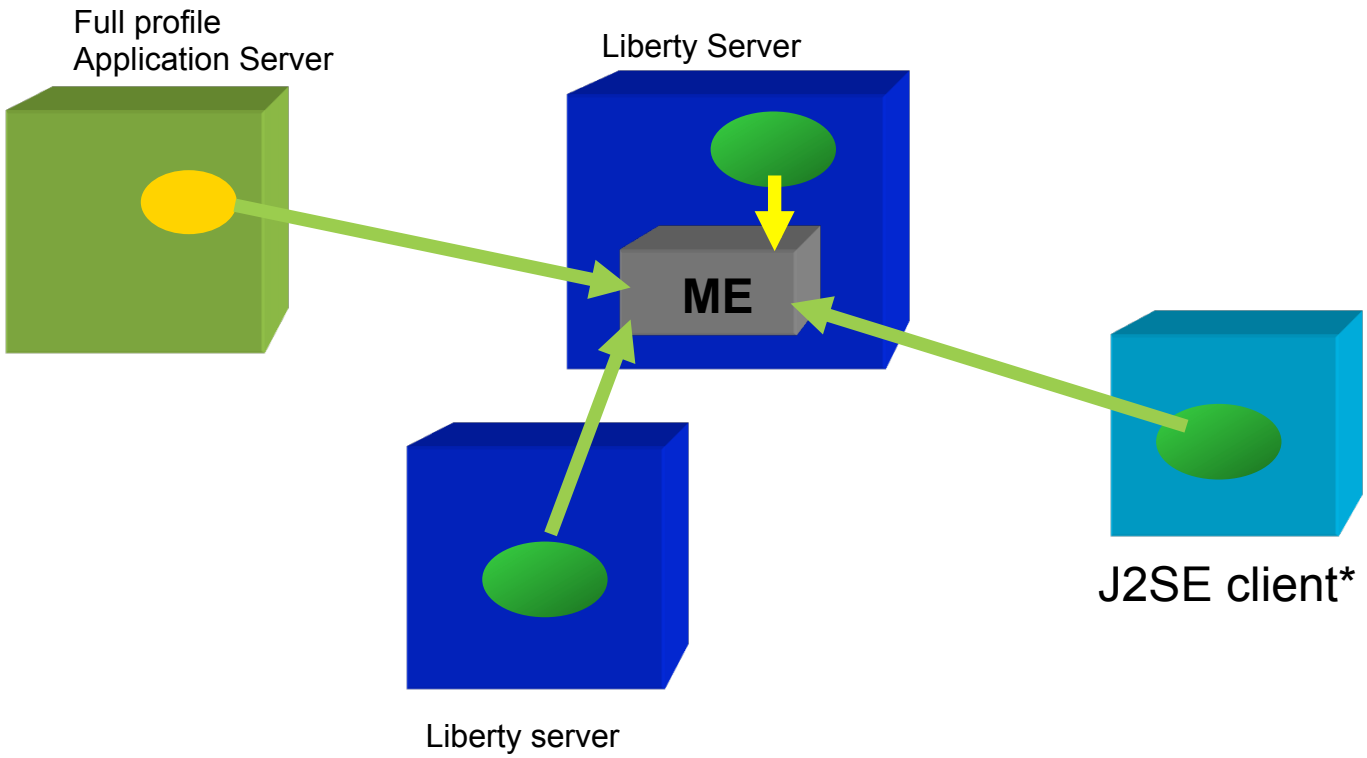


SIBus v/s Liberty Messaging footprint

SIBus	Liberty Messaging
Single Jar - com.ibm.ws.sib.server.jar	Multiple Bundles & Service
SIBus jar size – 12.8 MB	Core runtime size < **5MB**
Resource Adapter size sibc.jmsra.rar – 3.8 MB WebSphere MQ RA – 8.3 MB	Liberty Messaging Resource Adapter Bundle size – 1.5 MB
Tightly coupled	Loosely coupled

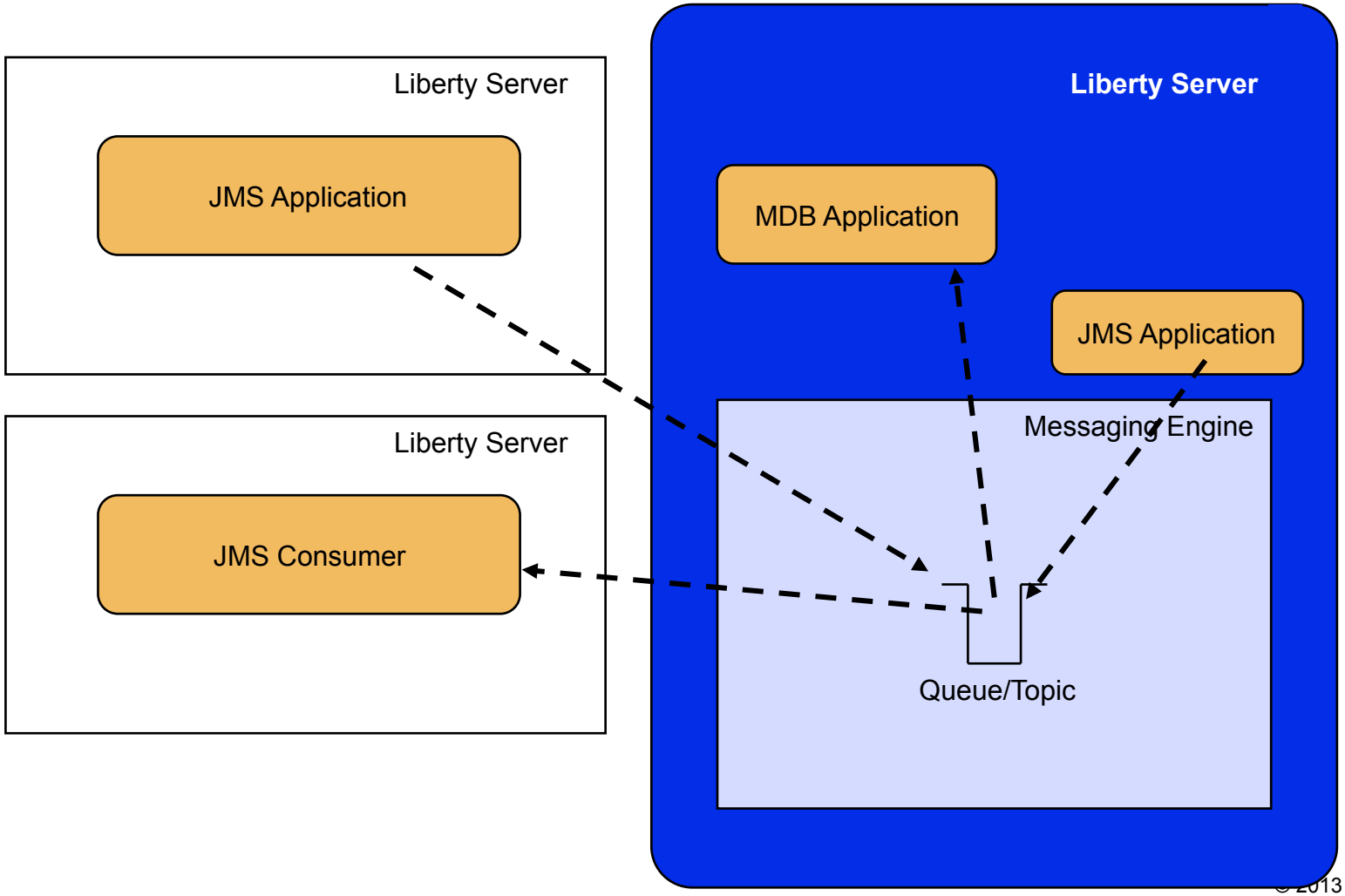
Application Deployment

- An application can run:
  - in a liberty profile that is hosting the messaging engine
  - in a liberty profile that is not hosting the messaging engine
  - in a full profile application server
  - in a J2SE client
- An application always connects directly to the messaging engine



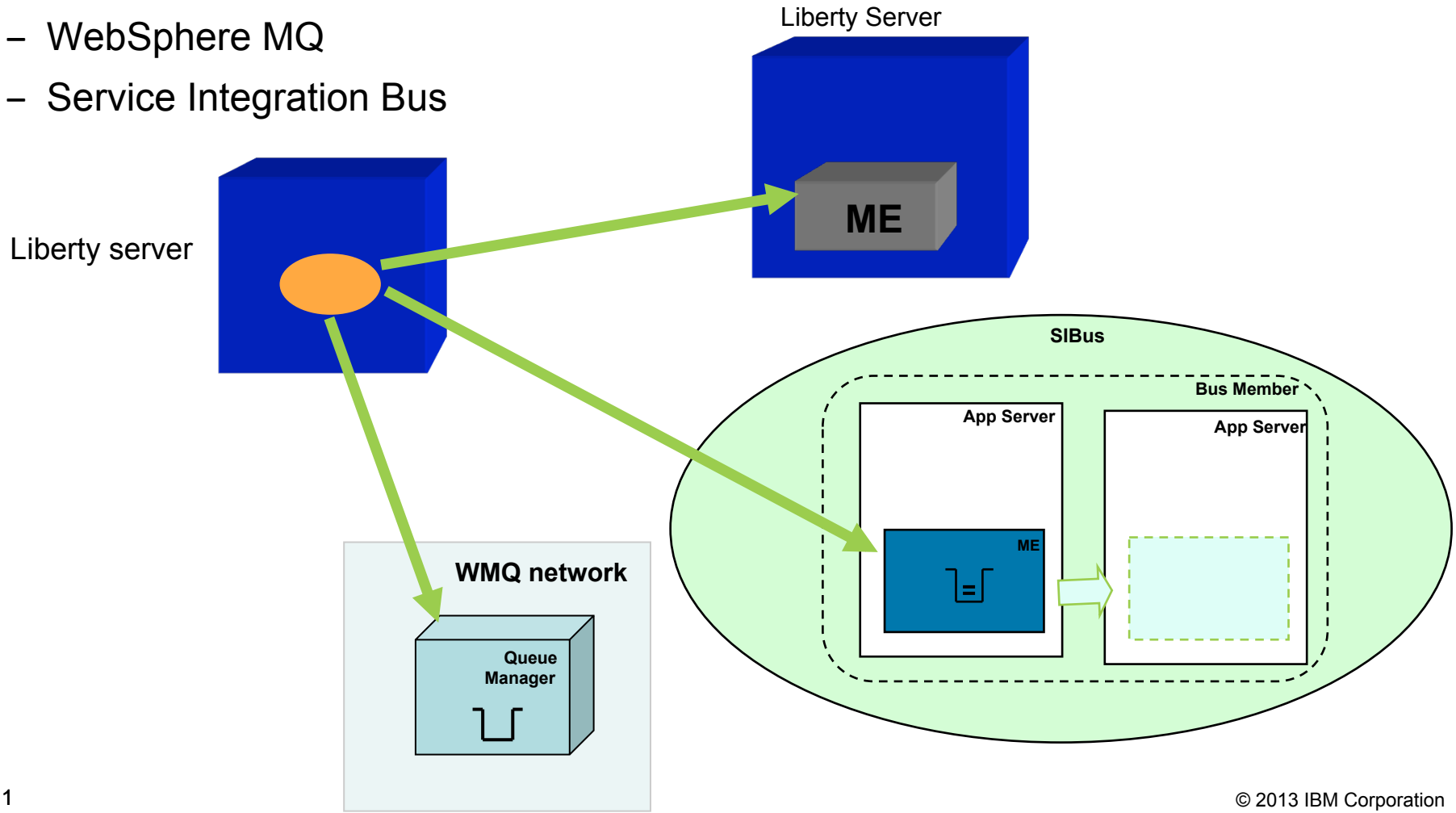
Message Handling

•In liberty messaging, all messages are sent and received from a messaging engine that localizes the destination



Liberty JMS provider support

- Liberty provides first class support for the following JMS providers
  - Liberty embedded JMS server
  - WebSphere MQ
  - Service Integration Bus



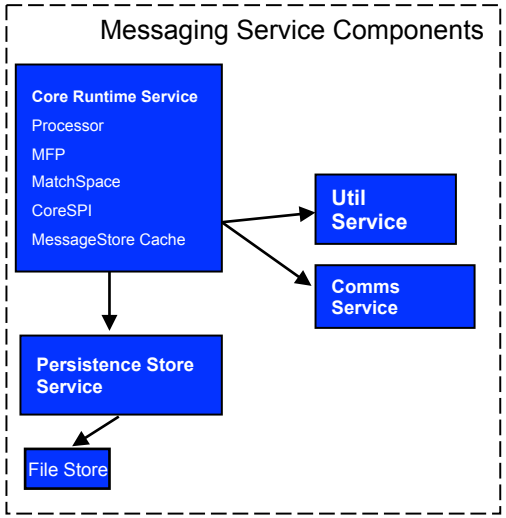
Liberty messaging features

- **wasJmsServer-1.0**
  - Instantiates the messaging engine runtime
- **wasJmsClient-1.1**
  - Provides client libraries and defining the JMS resources
- **wasSecurity-1.0**
  - Enables messaging engine to be secured
- **wmqJmsClient-1.1**
  - Enables connectivity to WebSphere MQ
- **jmsMdb-3.1**
  - Provides capabilities to configure and deploy MDB within Liberty

JMS Server (wasJmsServer-1.0)

- Provides the runtime capabilities for messaging server
  - Manages connections, persistence, transactions, security
- Flexible, Dynamic and Light weight
- Allows creation of destinations and managing authorization for messaging resources

```
<server description="Server with JMS">
    <featureManager>
        <feature>servlet-3.0</feature>
        <feature>wasJmsServer-1.0</feature>
    </featureManager>
</server>
```



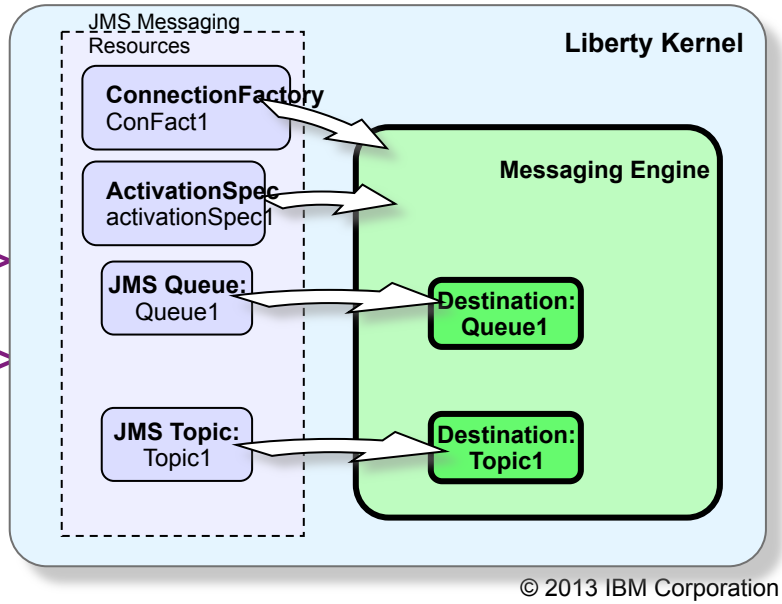
JMS Server (wasJmsServer-1.0) – Contd..


```
<server description="Server with JMS">
    <featureManager>
        <feature>servlet-3.0</feature>
        <feature>wasJmsServer-1.0</feature>
    </featureManager>
    <messagingEngine id="defaultME">
        <queue id="CreditQ" receivedAllowed="false"
                maxMessageDepth="1000"/>
        <topicSpace id="Sports.Topic.Space"/>
        <fileStore id="fileStore" logFileSize="20" fileStoreSize="100"/>
    </messagingEngine>
</server>
```

JMS Client (wasJmsClient-1.1)

- Provides the definition of the JMS Resources and registers the objects in the repository
  - Connection Factory (jmsConnectionFactory)
  - Queue Connection Factory (jmsQueueConnectionFactory)
  - Topic Connection Factory (jmsTopicConnectionFactory)
  - Activation Spec (jmsActivationSpec)
  - JMS Queue (jmsQueue)
  - JMS Topic (jmsTopic)

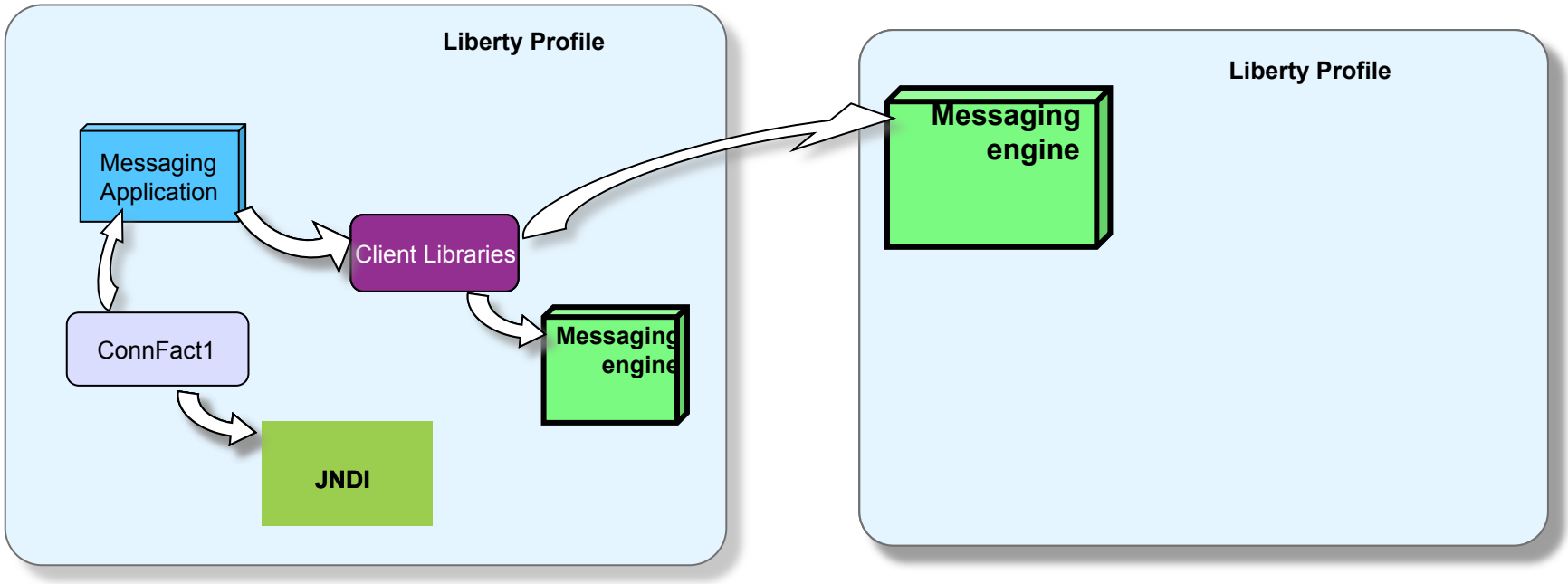
```
<featureManager>
        <feature>servlet-3.0</feature>
        <feature>wasJmsServer-1.0</feature>
        <feature>wasJmsClient-1.1</feature>
        <feature>jndi-1.0</feature>
</featureManager>
```



JMS Client (wasJmsClient-1.1)

- Provides the client libraries required for the JMS application to interact with the messaging engine

- Liberty supports two ways of application connectivity
  - IN-MEMORY
  - TCP/IP



JMS Client remote connectivity

•JMS applications can either connect on a secured or non-secured port

• By default JMS server listens for incoming data on 7276 (unsecured) and 7286 (secured). Default ports can be over-ridden by using the ***wasJmsEndPoint*** option in server.xml

```
<featureManager>
        <feature>wasJmsServer-1.0</feature>
</featureManager>
<wasJmsEndpoint id="InboundJmsEndpoint" host="*"
                wasJmsPort="9011"
                wasJmsSSLPort="9100" />
<messagingEngine id="defaultME">
        <queue id="libertyQ"/>
</messagingEngine>
```

JMS Client remote connectivity

- By default a JMS client application tries to connect to port 7276 (unsecured) and 7286 (secured)
- Use **remoteServerAddress** option in the connection factory to make JMS application connect to a remote messaging engine

```
<jmsQueueConnectionFactory jndiName="myQCF"
connectionManagerRef="ConMgr4">

      <properties.wasJms

       remoteServerAddress="lserver.ibm.com:9011: BootstrapBasicMessaging"/
>

</jmsQueueConnectionFactory>
```

Securing the JMS connections

- JMS client connections can be made secured by using custom chains and using SSL
- Use the **wasJmsOutbound** option to specify custom outgoing connection properties

```
<wasJmsOutbound id="jmsSecureCustomChain" useSSL="true">
        <sslOptions sslRef="CustomSslOptions" />
 </wasJmsOutbound>
<jmsQueueConnectionFactory jndiName="jms/QCF"
connectionManagerRef="ConMgr6">
<properties.wasJms remoteServerAddress="localhost:
7286:jmsSecureCustomChain" />
</jmsQueueConnectionFactory>
```

Securing the JMS connections (Contd..)

Server side

```
<ssl id="CustomSslOptions" keyStoreRef="defaultKeyStore"/>

<keyStore location="serverKey.jks" id="defaultKeyStore"
password="key123" />

<wasJmsEndpoint id="InboundJmsEndpoint" host="*"
        wasJmsPort="7276"
        wasJmsSSLPort="7286" >
        <sslOptions sslRef="CustomSslOptions"/>
</wasJmsEndpoint>
```

Securing the JMS connections (Contd..)

Client side

```
<ssl id="CustomSslOptions" keyStoreRef="defaultKeystore"/>

<keyStore id="defaultKeystore" location="clientKey.jks" type="JKS"
password="key123"/>

<wasJmsOutbound id="jmsSecureCustomChain" useSSL="true">

        <sslOptions sslRef="CustomSslOptions" />

 </wasJmsOutbound>


 <jmsQueueConnectionFactory jndiName="jms/QCF"
connectionManagerRef="ConMgr6">

    <properties.wasJms userName="persona99" password="ppersona99"
remoteServerAddress="localhost:7286:jmsSecureCustomChain" />

   </jmsQueueConnectionFactory>
```

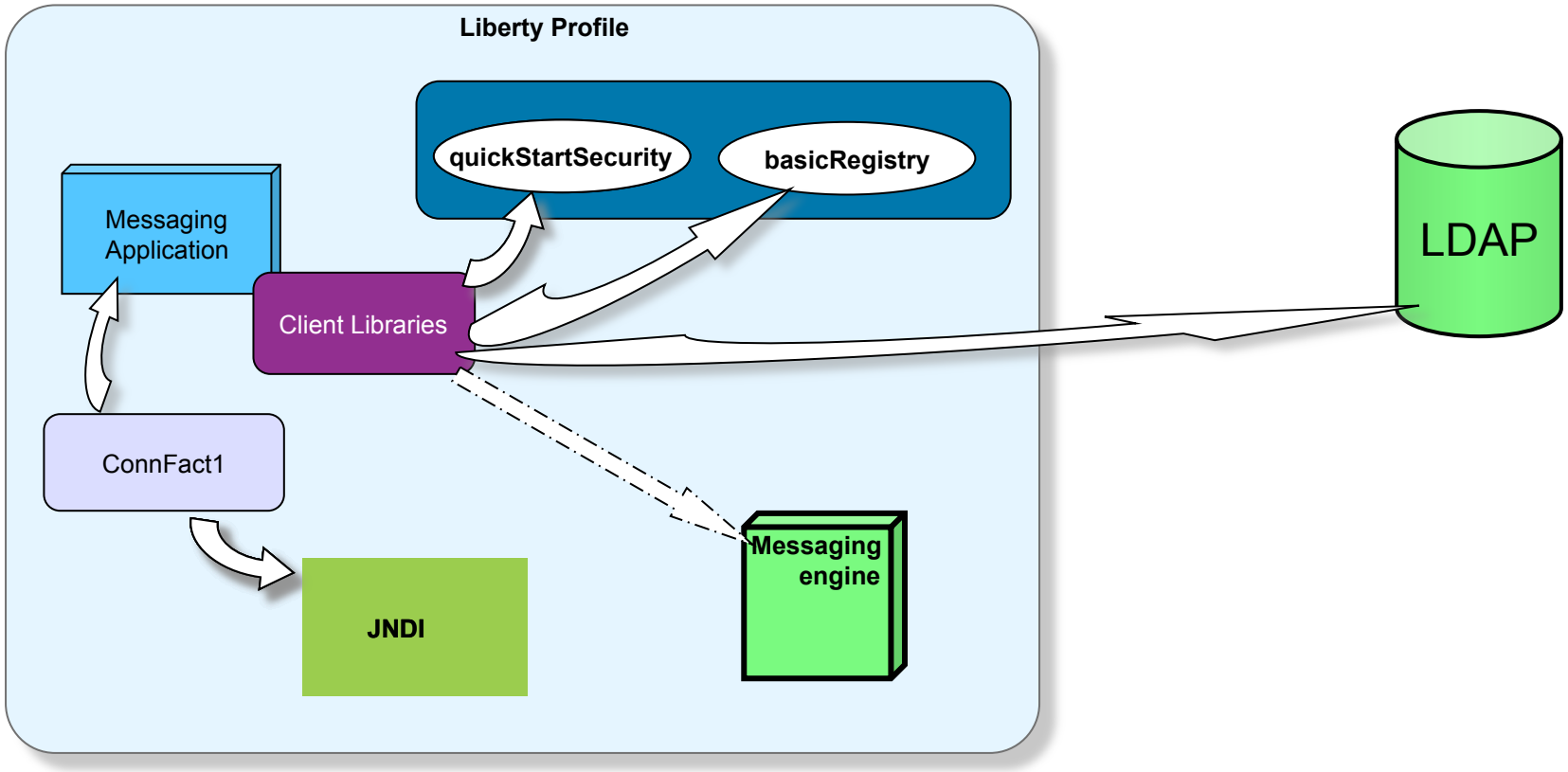
Securing Liberty Messaging (wasJmsSecurity-1.0)

- Enables the messaging engine to be secured
- Authentication
  - Validates if user has permission to *connect* to the messaging engine
- Authorization
  - Validates if user has sufficient *roles/permissions* to access the messaging resources (queues/topics)

```
<featureManager>
        <feature>servlet-3.0</feature>
        <feature>wasJmsServer-1.0</feature>
        <feature>wasJmsClient-1.1</feature>
        <feature>wasJmsSecurity-1.0</feature>
    </featureManager>
```

JMS Security - Authentication

- Liberty supports 3 types of user registries
  - quickStartSecurity : Simplest and easiest to configure
  - basicRegistry : Provides groups and member creations
  - ldapRegistry : Connectivity to external ldap registries



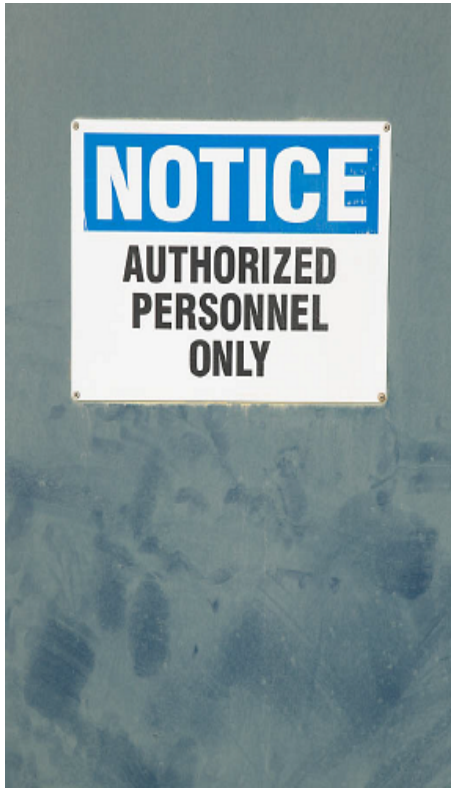
JMS Security - Authentication

- Different way of defining authentication information
  - Application
  - Connection Factory (Component)
  - AuthDat

JMS Security - Authorization

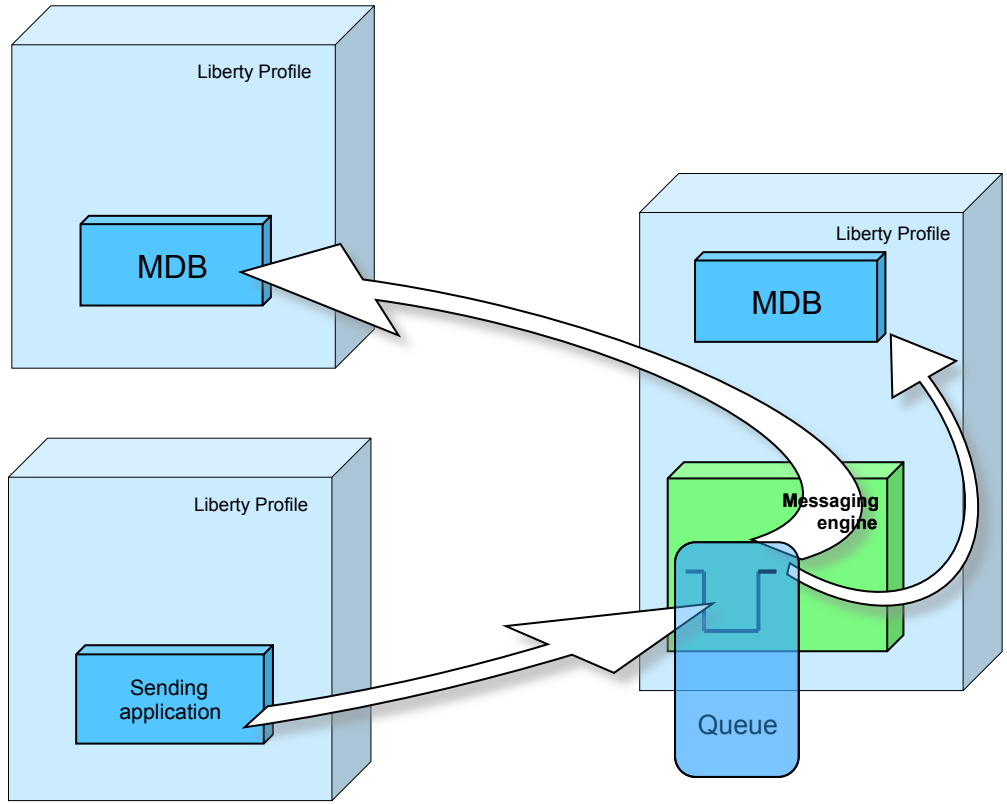
- Access to messaging resources is limited based on roles and credentials
- Only authenticated users will be authorized to access the resources
- Unless specified default access can be “allow all” or “deny all”

```
<messagingSecurity>
    <role name="developer">
        <queuePermission name="Q1">
            <action>ALL</action>
        </queuePermission>
        <user name="libertyUser"/>
    </role>
</messagingSecurity>
```



Message Driven Beans (jmsMdb-3.1)

- Liberty supports deployment of MDB's to asynchronously consume messages from messaging engine
- Supports both *Point to Point* and *Publish/Subscribe*
- Does not require EJB container to deploy MDB



Message Driven Beans (jmsMdb-3.1)

- MDB can be configured within the web project itself
- MDB utilizes Activation specifications to communicate with the messaging engine

```
<server description="Server with JMS">
    <featureManager>
        <feature>wasJmsServer-1.0</feature>
        <feature>wasJmsClient-1.1</feature>
        <feature>jmsMdb-3.1</feature>
    </featureManager>
</server>

<jmsActivationSpec id="jms/ActSpec" jndiName="jms/ActSpec" >
        <properties.wasJms destinationRef="jms/Q"/>
 </jmsActivationSpec>

<jmsQueue id="jms/Q" jndiName="jms/Q" >
        <properties.wasJms queueName="Q1"/>
 </jmsQueue>
```

Message Driven Beans (jmsMdb-3.1)

Liberty provides flexibility in the way MDB's can be configured and deployed

- Direct activation specification usage
- Annotation
-

server.xml

```
<jmsActivationSpec id="JMSSample/JMSSampleMDB">
```

```
@MessageDriven(
        name = "JMSSampleMDB", activationConfig = {
```

server.xml

```
<jmsActivationSpec id="PriceChangeAS">
      <properties.wasJms destinationRef="jms/TriggerQ" /> </jmsActivationSpec>
<jmsQueue id="jms/TriggerQ" jndiName="jms/TriggerQ">
      <properties.wasJms queueName="Q1"/>
</jmsQueue>
```

ibm-ejb-jar-bnd.xml

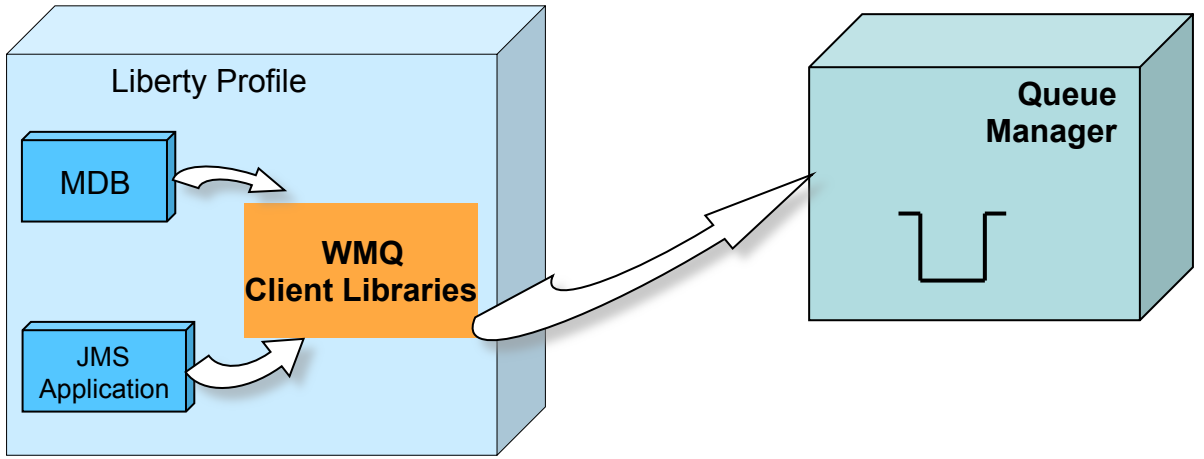
```
<message-driven name="PriceChangeMDBBean">
       <jca-adapter activation-spec-binding-name="PriceChangeAS" destination-
                    binding-name="jms/TriggerQ" />
</message-driven>
```

WebSphere MQ Support (wmqJmsClient-1.1)

- Liberty supports configuring WebSphere MQ as the external JMS messaging provider

- JMS Applications running within Liberty profile can communicate with WMQ to perform both
  - Point to Point
  - Publish/Subscribe

- Supports both type of connectivity
  - BINDING mode
  - CLIENT mode



WebSphere MQ Support (wmqJmsClient-1.1)

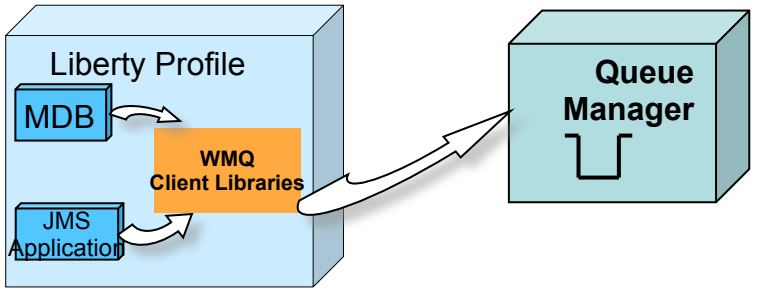
- WMQ client libraries are available to applications using the wmqJmsClient-1.1 feature

```
<featureManager>
   <feature>wmqJmsClient-1.1</feature>
<featureManager>
```

- Configuration very similar to liberty messaging configuration

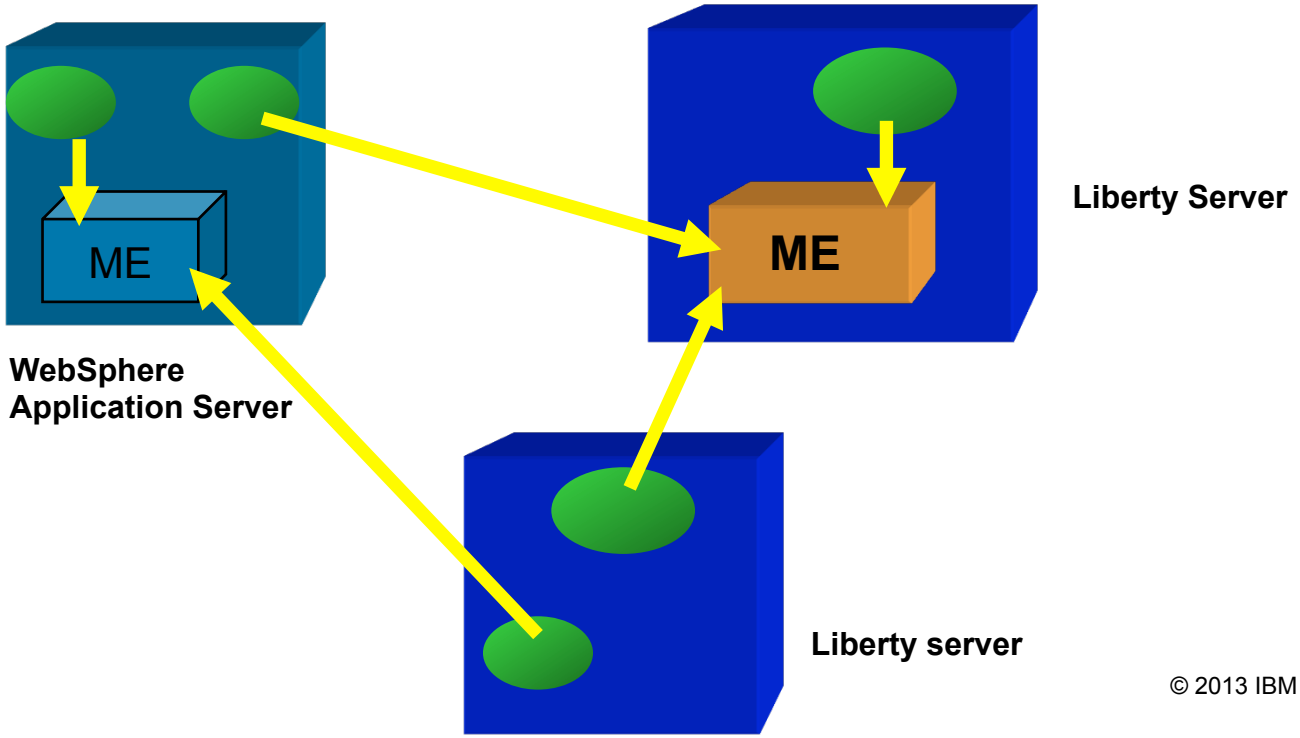
```
<jmsConnectionFactory id="jms/conFac connectionManagerRef="ConMgr1">
  <properties.wmqJms host="wmqserver.in.ibm.com port="1414"/>
</jmsConnectionFactory>

<jmsQueue id="eis/queue1" jndiName="eis/queue1">
   <properties.wmqJms   baseQueueName="Q1"
      baseQueueManagerName="qm1"/>
</jmsQueue>
```

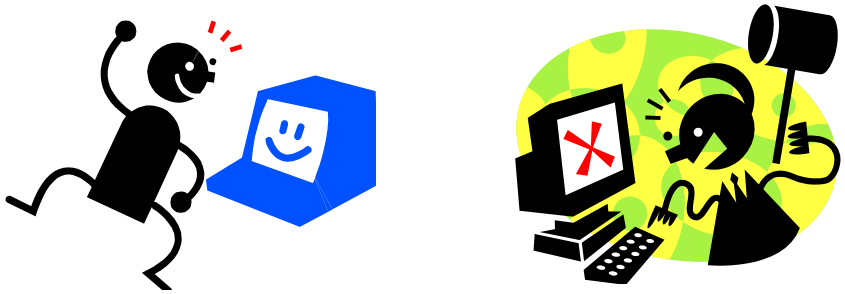


Interoperability between Liberty and Full Profile Application Server

- Application deployed in Liberty profile can connect to SIBus
- Application deployed in full profile WAS can connect to Liberty messaging
- Does not support ME to ME communication between Liberty and SIBus



And now the demo….



Summary

- Provides light weight single stand alone JMS server
- Composable, flexible and dynamic messaging service
- Supports WebSphere MQ as the messaging provider
- Supports Message Driven Bean (MDB) deployment
- Interoperability with full profile WebSphere Application Server

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