IBM Software Group

Implementing SSL with HTTP nodes in Websphere Message Broker V6.x

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e business on demand.

WebSphere® Support Technical Exchange

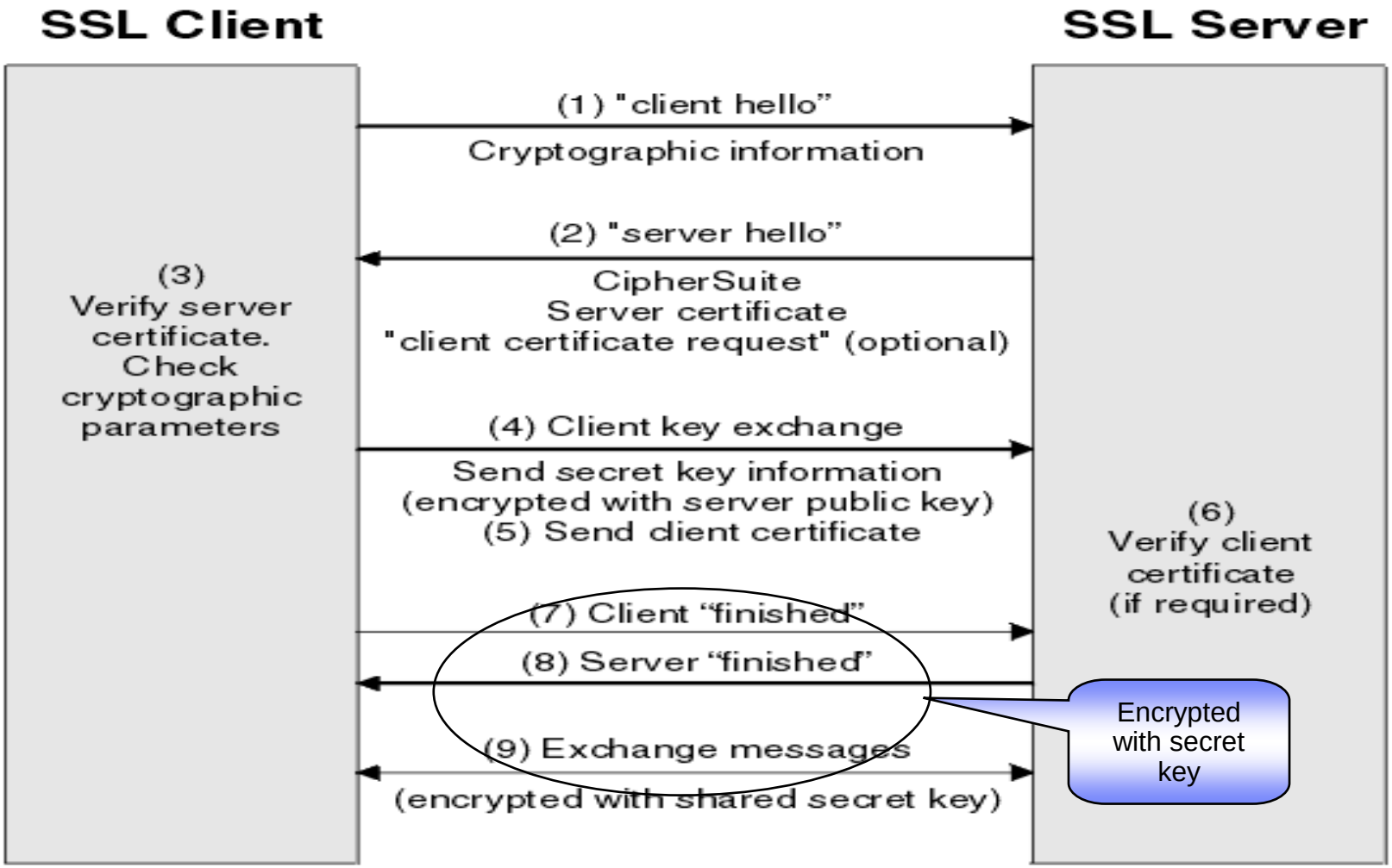
Agenda

- SSL Basics
- HTTP Basics
  - HTTPRequest node
  - HTTPInput node & HTTPReply node
- HTTPS Basics
- Certificate management tools
- Configuration of HTTPRequest nodes
- Configuration of HTTPInput nodes and HTTPReply nodes
- Troubleshooting tips

SSL Basics

- Protocol developed by Netscape to manage the security of message transmission on the Internet
- Creates a secure connection between a client and a server, over which any amount of data can be sent securely
- Useful terms –
  - **KeyStore** – File or Database that stores the keys and digital certificates
    - Example – cacerts file located in - **C:\ProgramFiles\IBM\MQSI\6.0\jre\lib\security**
  - **Digital Certificates** – Provides security against impersonation by binding the key to its owner
    - Contains Public key + Information about the Owner and/or CA
    - Example - verisignserverca
  - **CipherSuites** – Set of algorithms providing means of Encryption, Hash (MAC) and Key exchanges
    - Example – DES_SHA_EXPORT

SSL Basics

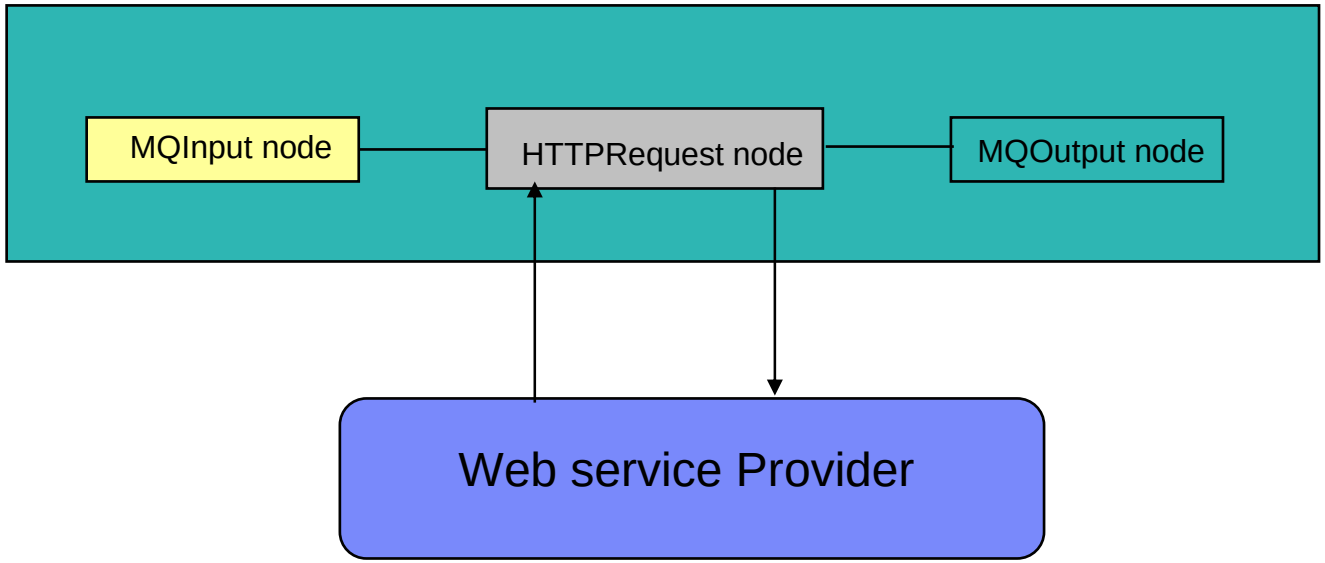

SSL Client
SSL Server
(1) "client hello"
Cryptographic information
(2) "server hello"
CipherSuite
Server certificate
"client certificate request" (optional)
(3)
Verify server certificate.
Check cryptographic parameters
(4) Client key exchange
Send secret key information
(encrypted with server public key)
(5) Send client certificate
(6)
Verify client certificate
(if required)
(7) Client "finished"
(8) Server "finished"
Encrypted with secret key
(9) Exchange messages
(encrypted with shared secret key)

HTTP Basics

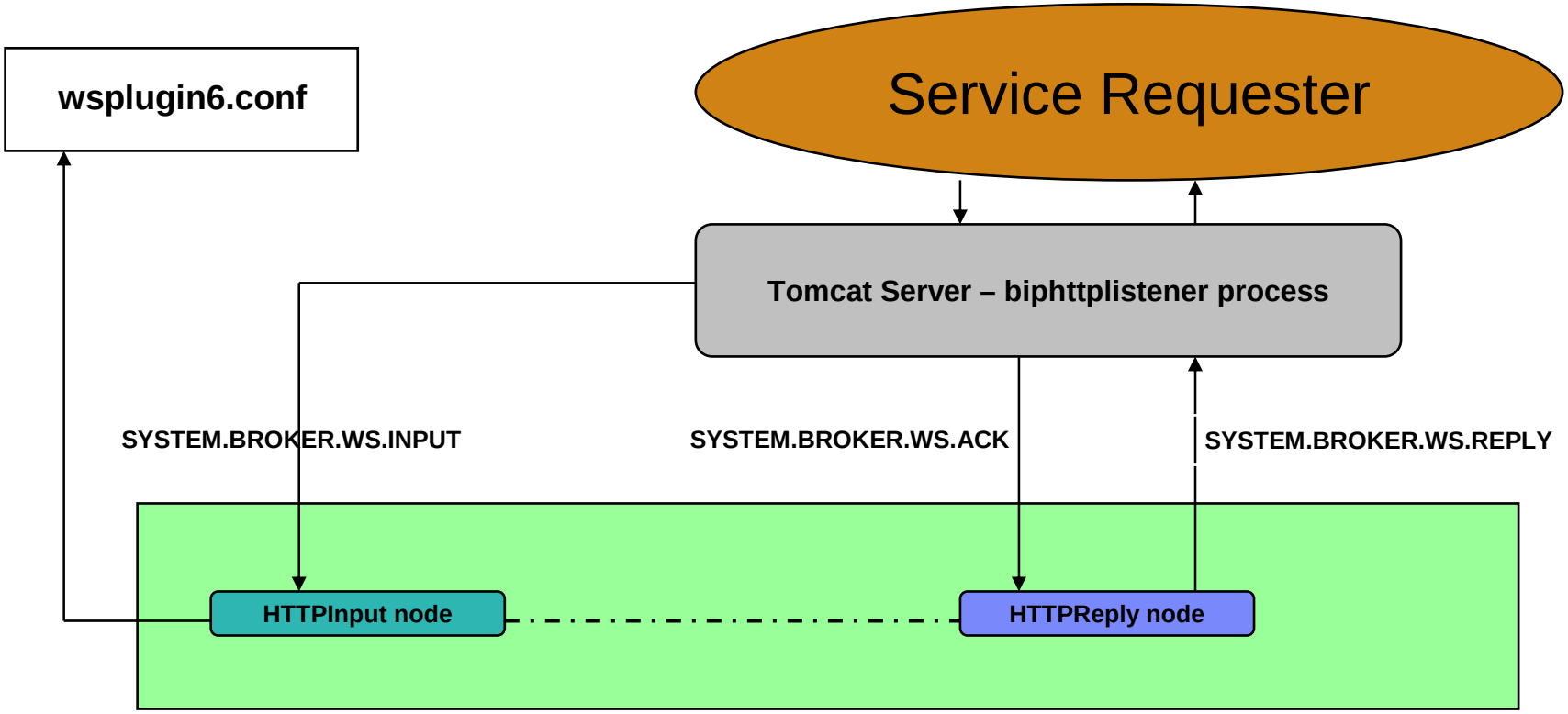
- Communications protocol used to transfer information on the World Wide web
- Useful questions -
- What is a Web service?
  - A standard way to allow functions/methods to be invoked using HTTP
  - Used for program to program interactions
  - Uses the XML, SOAP, WSDL and UDDI open standards over an Internet backbone
- How does WebSphere Message Broker fit in?
  - Convenient central point for Web services brokering – eg. Transform WSDL definitions or act as a SOAP intermediary etc.
  - Message Flow can be a requester (Client) – calls out to a Web Service
  - Message Flow can be a Service provider – lets Web Service clients to invoke it or other flows
  - Uses HTTPInput node, HTTPReply node, HTTPRequest node

Web Service Requester

- HTTPRequest node serves as the gateway from a message flow to the broker network invoking Web services within the network
- Sends requests and receives responses from a Web service provider



Web Service Provider



- Uses HTTPInput node to receive Web service requests from clients at a certain port
- Uses HTTPReply node to send replies back to the clients
- Uses Internal Tomcat servlet engine running as biphttplistener process

HTTP + SSL = HTTPS

- HTTP over SSL or SSL over HTTP
- Secure messaging over HTTP
- Handled by Tomcat Servlet (Internal or External) - when Web service provider
- Relies on Java JSSE code in JVM
- Must use HTTP/1.1 to implement SSL support
- Uses Port#7083 by default for SSL
- Broker uses CACERTS keystore located in - **C:\ProgramFiles\IBM\MQSI\6.0\jre\lib\security**

Certificate Management Tools

- Enables users to administer their public/private key pairs and associated certificates used in SSL
- Different CMTs are available:
  - Keytool – Tested and supported with WMB V6.0
    - Supplied with IBM JRE
    - Default location for WMB V6 on Windows - C:\Program Files\IBM\MQSI\6.0\jre\bin
    - Default location for WMB V6 on UNIXes - /opt/IBM/mqsi/6.0/jre/bin
    - Command line tool
  - Ikeyman – Known to work and is supported with WMB V6.0
    - Supplied with IBM JRE
    - Default location for WMB V6 on Windows - C:\Program Files\IBM\MQSI\6.0\jre\bin
    - Default location for WMB V6 on UNIXes - /opt/IBM/mqsi/6.0/jre/bin
    - GUI-based tool

Configuration of HTTPRequest nodes

- ***Configure the HTTPRequest node for SSL with server authentication –***
  - The receiver of the requests will present certificates to the Broker and the Broker will validate them with the signer's certificates stored in the "cacerts" keystore
  - Add signer's (or trusted) certificates to the existing "cacerts" keystore –

Using "keytool" -

keytool -import -alias mykey -file <name of certificate file> -keystore "C:\Program Files\IBM\MQSI\6.0\jre15\lib\security\cacerts" -storepass changeit

file – Name of the certificate being imported

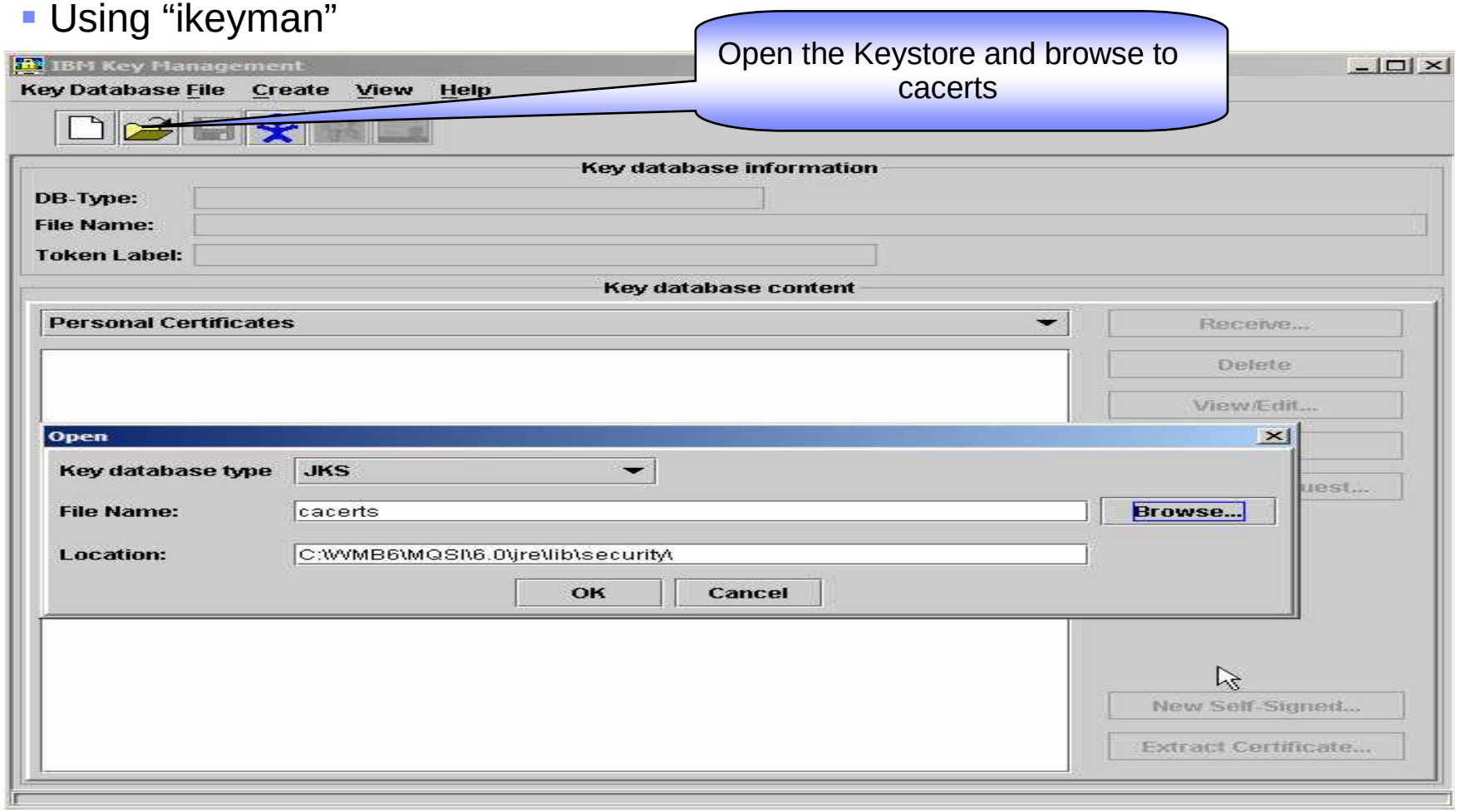
alias – Name it will show in the keystore

keystore – Keystore DB being used

storepass – password for the above keystore

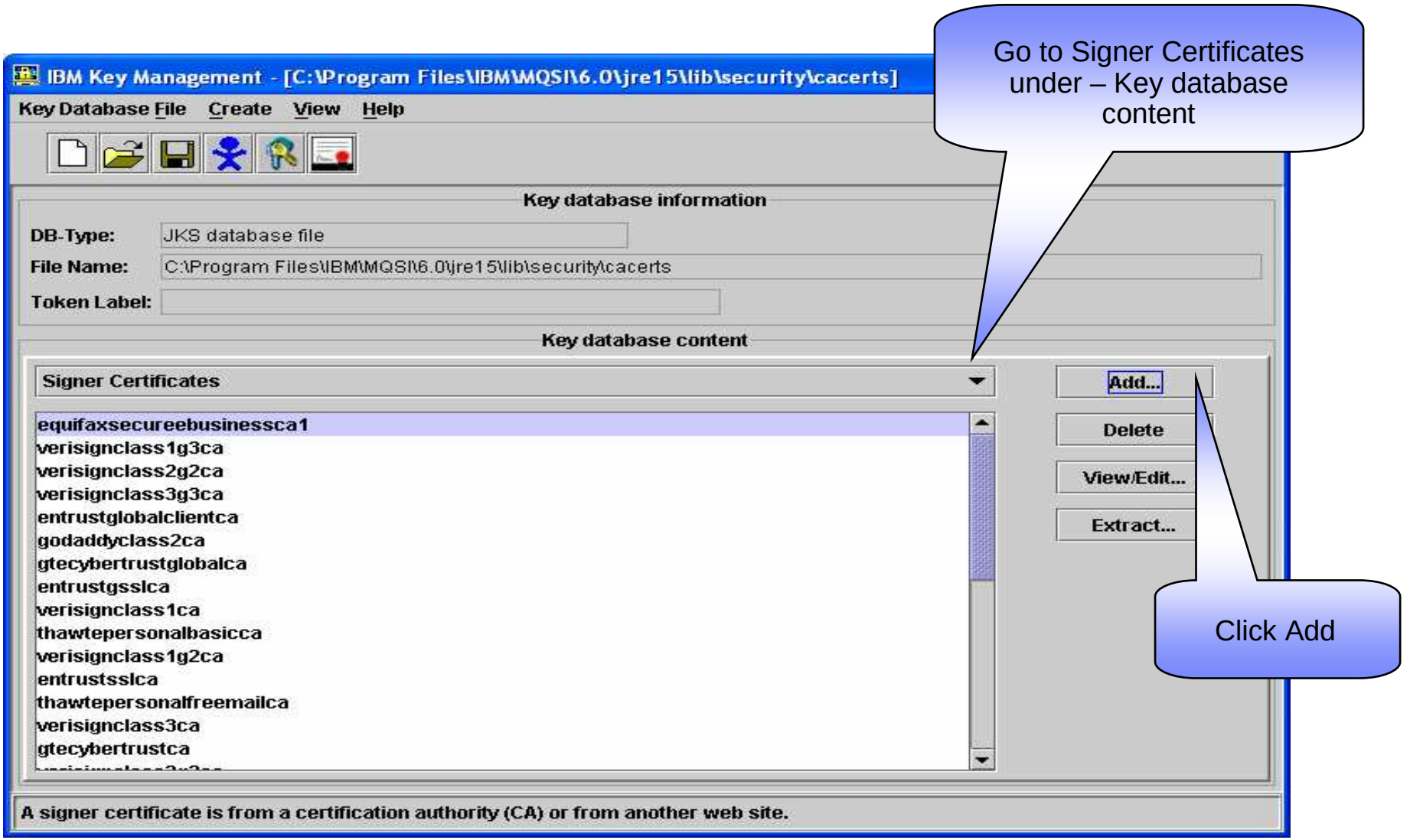
Configuration of HTTPRequest nodes

- Using “ikeyman”

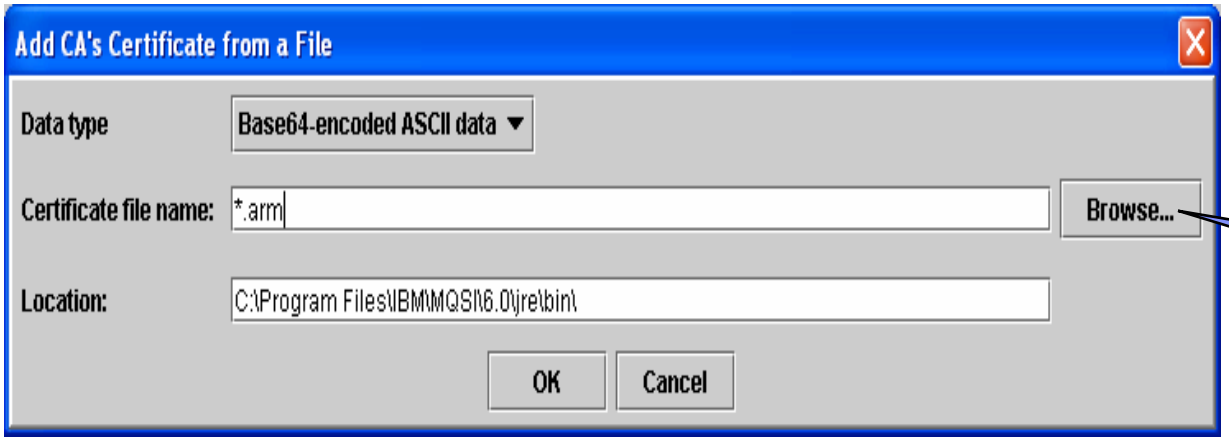


- The password for this file is – “changeit”

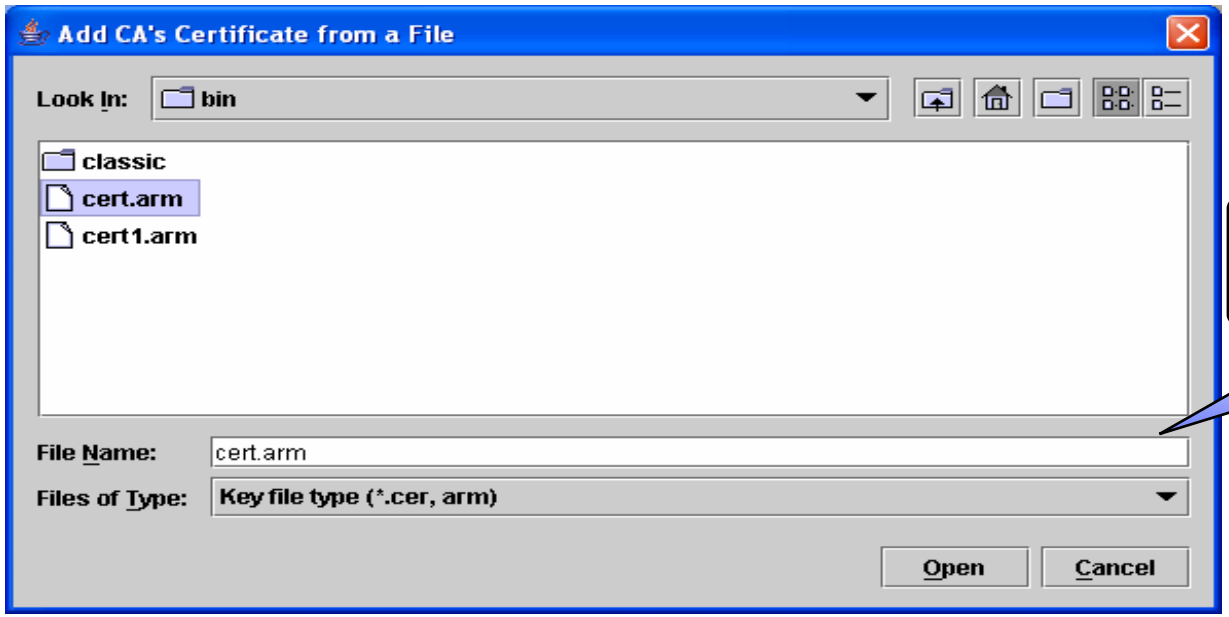
Configuration of HTTPRequest nodes



Configuration of HTTPRequest nodes



Browse to the certificate file



Select the Certificate to be added and click open

Configuration of HTTPRequest nodes

- ***Configure the HTTPRequest node for SSL with mutual authentication***
  - The receiver and the sender of the requests need to present their certificates to each other and each end will validate using the local copies of the signer's certificates
    - Create a keystore file
    - Create a self-signed certificate (or use a CA certificate)

Using keytool -

keytool -genkey -storepass <password > -keystore <keystore file> -alias <self-signed certificate>

Answer the options it asks you while creating the certificate

- Ensure the server keystore contains the above created certificate
- Ensure that the servers signers certificate is imported into cacerts on broker side (extracted as discussed later)

Configuration of HTTPRequest nodes

- For V6.0 - Update the mqsiprofile.cmd to add the following environment variables with the location of the keystore and the password –

IBM_JAVA_OPTIONS=

-Djavax.net.ssl.keyStore=<keystore_path>/<keystore_filename>

-Djavax.net.ssl.keyStorePassword=<keystore_password>

- Stop and start the broker

Configuration of HTTPRequest nodes

- For V6.1 – Run the mqsichangeproperties command to point the broker to the keystore file –

mqsichangeproperties <Broker name> -o BrokerRegistry –
n brokerKeystoreFile -v <Fully qualified name of the new Keystore>

- The password can be changed using mqsisetdbparms command –

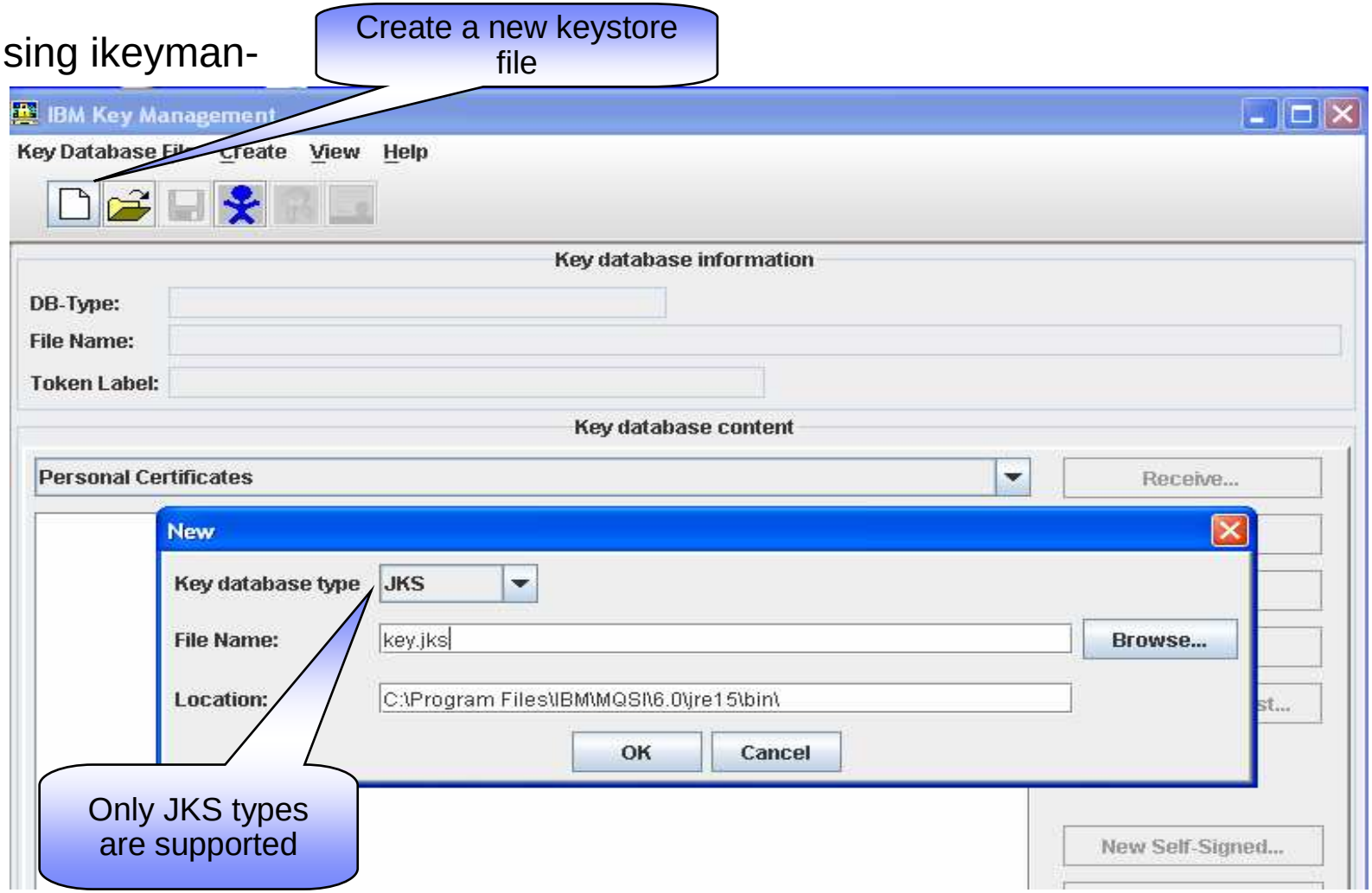
mqsisetdbparms <Broker name> -n brokerkeystore::password -u temp -p <password>

The user ID (-u) can be any value

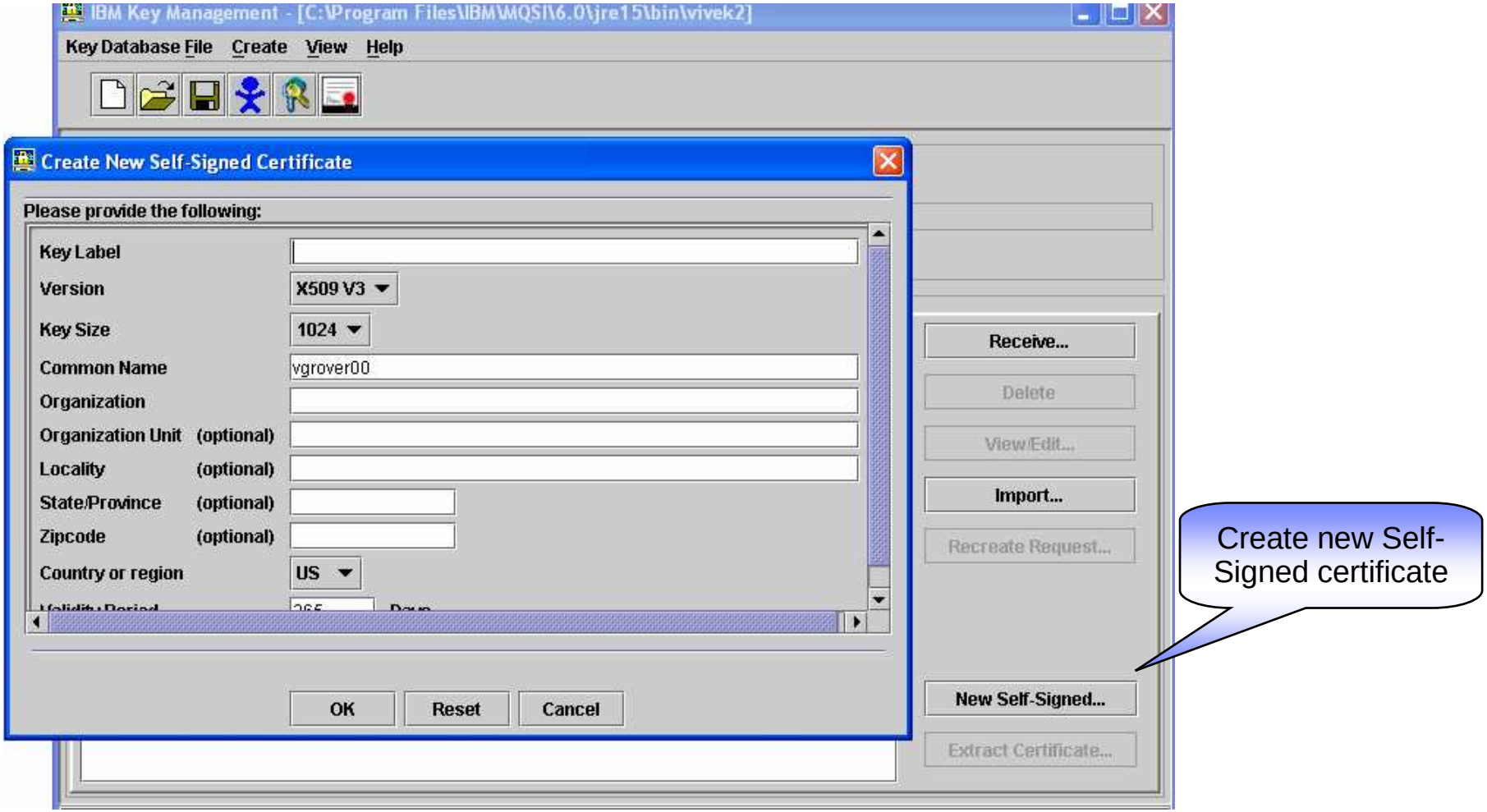
- Stop and Start the broker

Configuration of HTTPRequest nodes

- Using ikeyman-



Configuration of HTTPRequest nodes



Configuration of HTTPRequest nodes

- **Configure the node in the Toolkit**
  - Ensure that the destination URL starts with **https**
  - In the SSL tab (following options) –
    - **Protocol -** SSL – Try SSLv3 first, allows fallback on SSLv2
      - SSLv3 – Try SSLv3 only
      - TLS (Transport Layer Security) – try TLS only
    - **Allowed SSL ciphers**
      - default of empty means all broker JVM supported ciphers
      - Can specify 1 or more ciphers
- **Configure the bar file in the Toolkit**
  - Same above mentioned properties can be configured via bar file
    - Protocol, URL, Ciphers

Configuration of HTTPInput & HTTPReply nodes

- ***Configure the HTTPInput & HTTReply nodes for SSL with server authentication***
  - biphttplistener is used to receive HTTP requests on behalf of any message flow that is using HTTPInput nodes
  - The responses generated by HTTPReply nodes are also handled by the biphttplistener
    - Create a keystore file for the broker
    - Create a self-signed certificate (for testing SSL)

  Using keytool -

keytool -genkey -storepass <password > -keystore <keystore file name> -alias <self-signed certificate>

- Change the broker properties to set the following:

Configuration of HTTPInput & HTTPReply nodes

- Enable the HTTPSConnector:

mqsichangeproperties <broker_name> -b httplistener -o HTTPListener –n enableSSLConnector -v true

- Point the broker to above created keystore

mqsichangeproperties <broker_name> -b httplistener -o HTTPSConnector -n keystoreFile -v <keystore file name>

- Set the keystore password

mqsichangeproperties <broker_name> -b httplistener -o HTTPSConnector -n keystorePass –v <MyKeystorePass>

- Set the Port # (if 7083 is busy)

mqsichangeproperties broker name -b httplistener -o HTTPSConnector -n port -v <Port to listen on for https>

- Use the following commands to verify and display the HTTP Listener properties:

mqsireportproperties <broker_name> -b httplistener -o HTTPListener -a

mqsireportproperties <broker_name> -b httplistener –o HTTPSConnector -a

Configuration of HTTPInput & HTTPReply nodes

- Extract the certificate to be imported onto client's machine

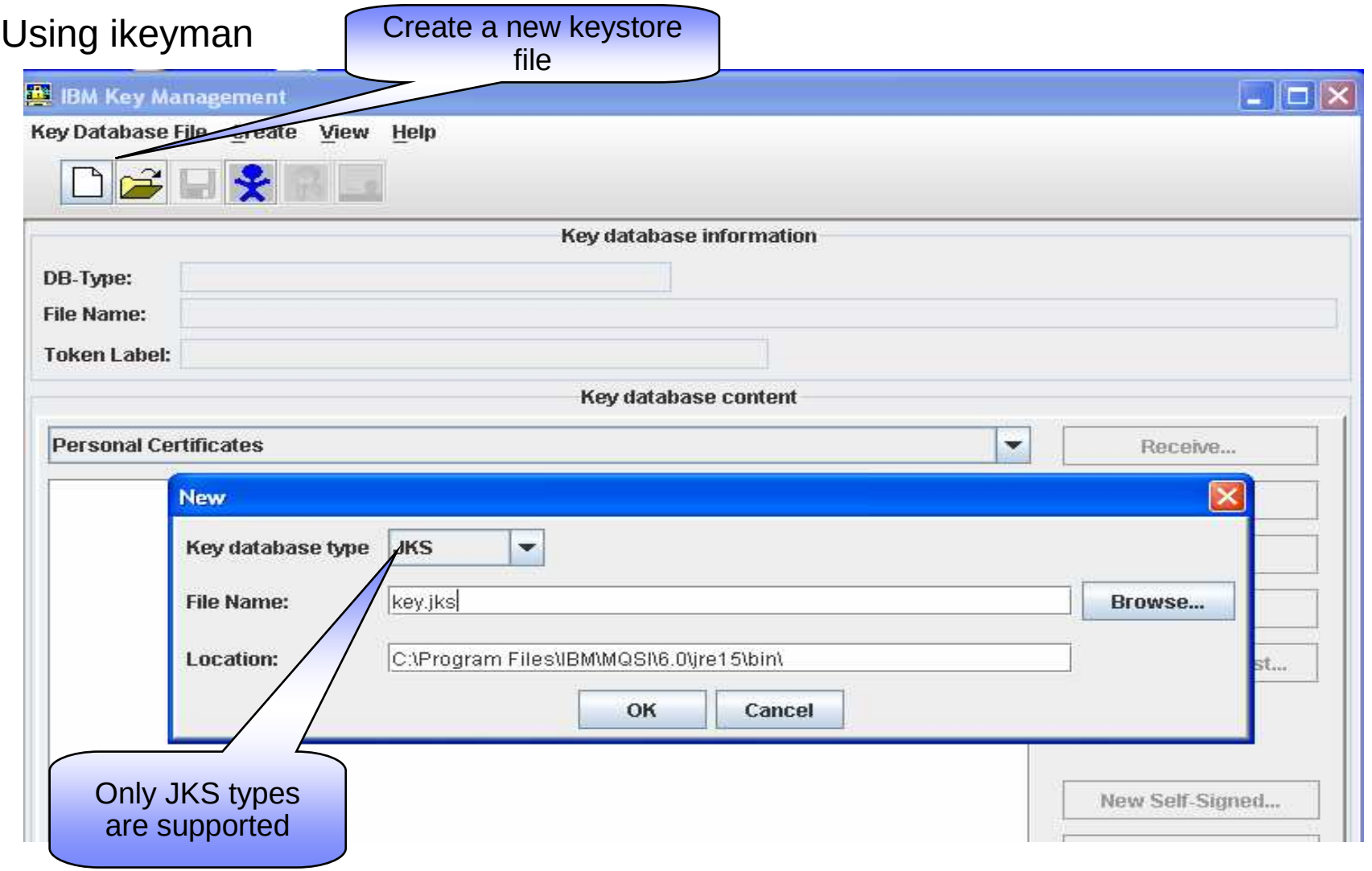
keytool -export -alias tomcat -file <name of certificate file> -keystore <keystore file> -storepass <password>

- alias – whatever alias is specified when creating the certificate in the keystore

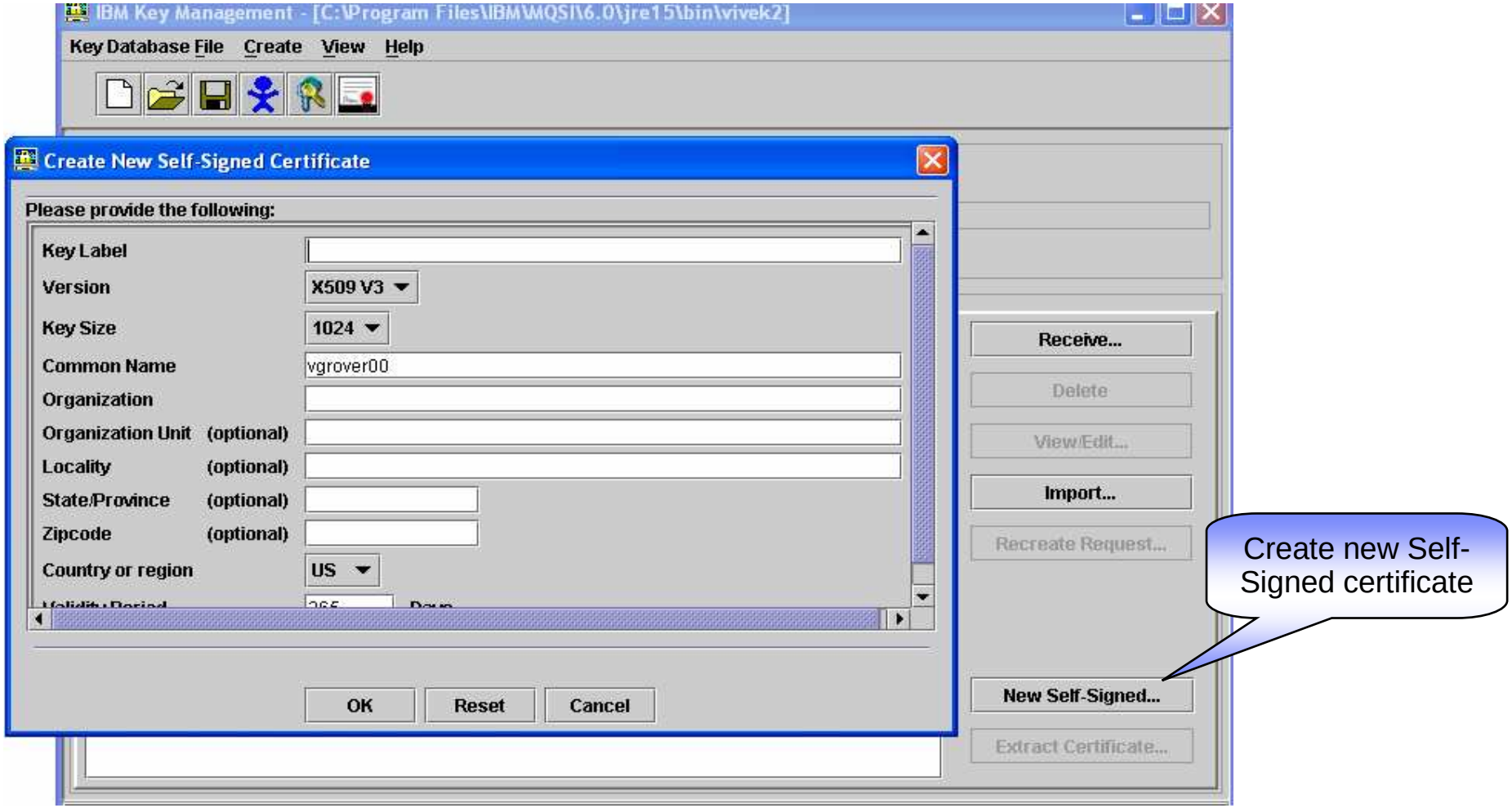
- Send the certificates file to the client machine to be imported into its keystore

Configuration of HTTPInput & HTTPReply nodes

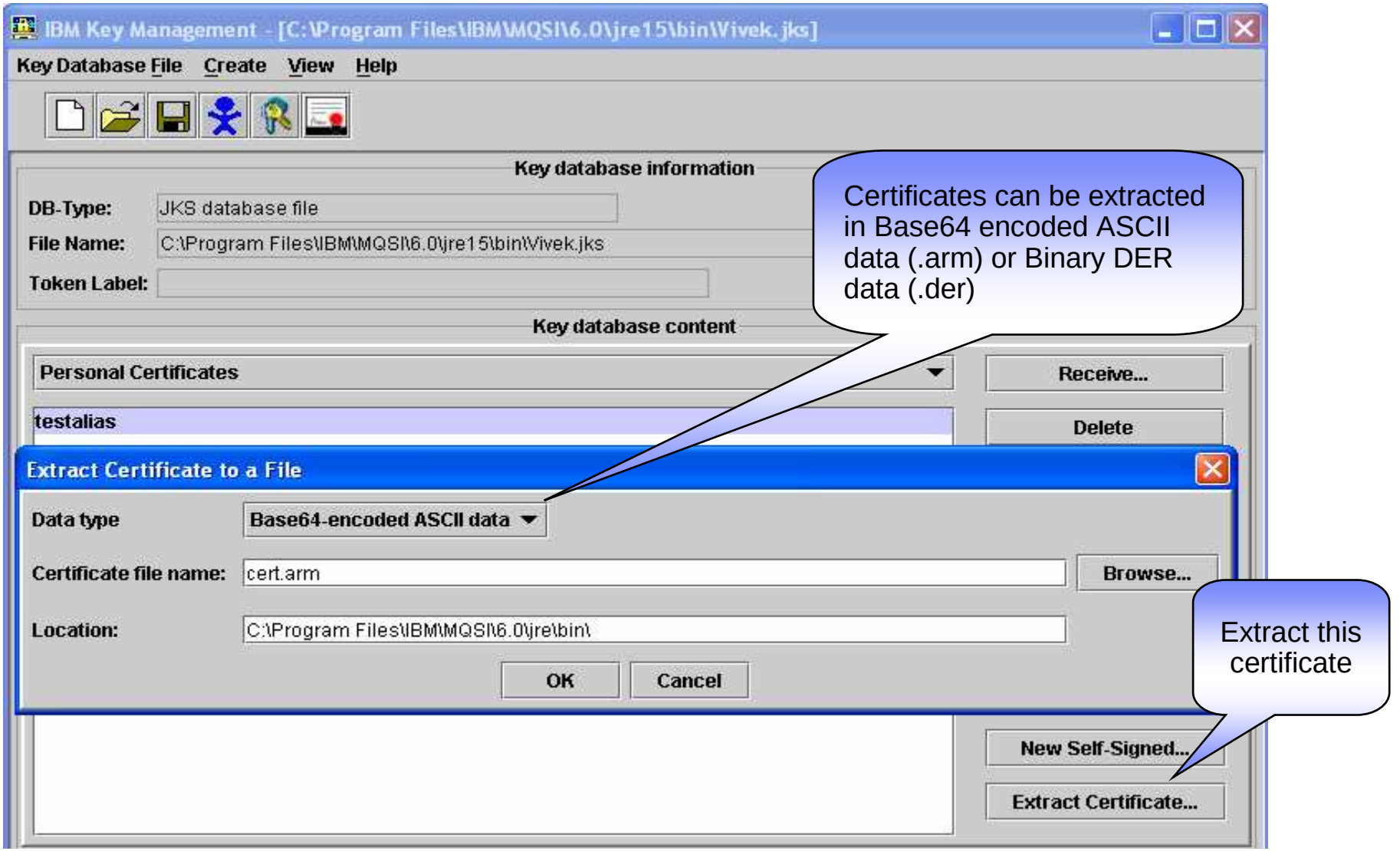
Using ikeyman



Configuration of HTTPInput & HTTPReply nodes



Configuration of HTTPInput & HTTPReply nodes



Configuration of HTTPInput & HTTPReply nodes

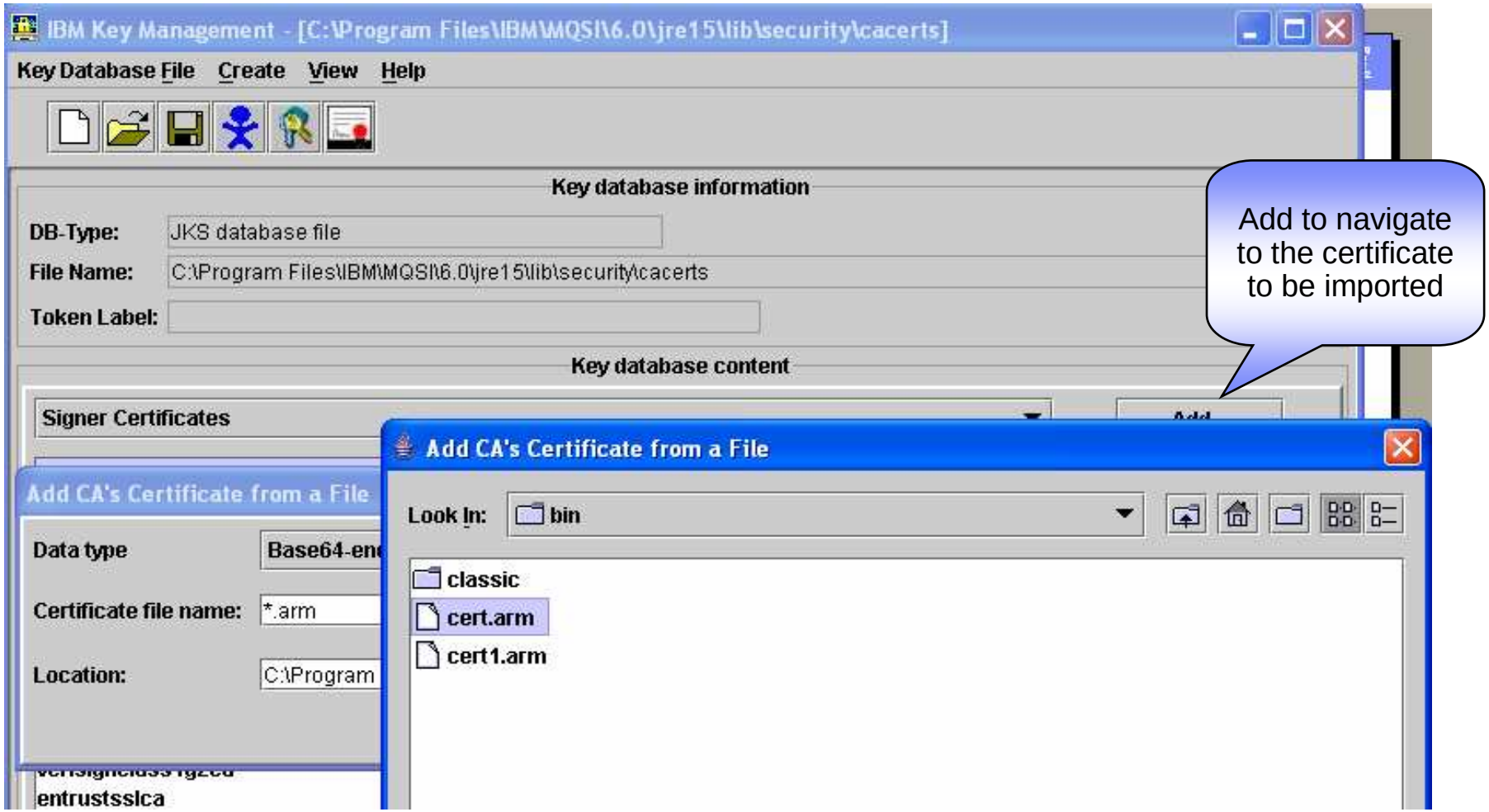
- ***Configure the HTTPInput & HTTPReply nodes for SSL with mutual authentication***
  - Follow the above slides # 20 -25
  - Enable Client Authentication for broker listener
    - **mqsichangeproperties <broker_name> -b httplistener –o HTTPSConnector -n clientAuth –v true**
  - The Trusted (Signer or CA) Certificates from the client must be added to the broker's default keystore – cacerts

  Using keytool -

keytool -import -alias mykey -file <name of certificate file> -keystore cacerts -keypass changeit

Configuration of HTTPInput & HTTPReply nodes

Using ikeyman

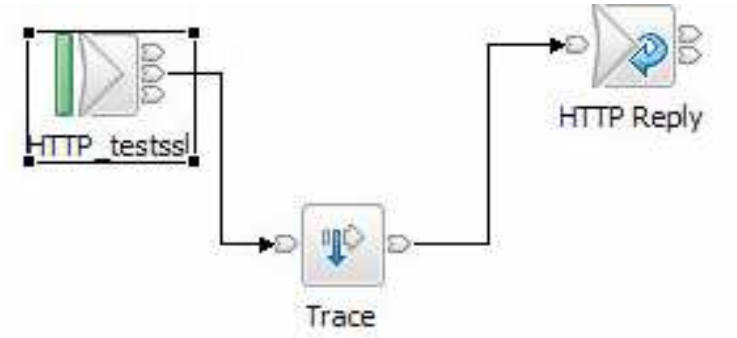


Configuration of HTTPInput & HTTPReply nodes

- Configure the nodes in the Toolkit
  - HTTPInput node Properties
    - Select “Use HTTPS”
    - Path suffix for URL – the path part of the URL from which this node receives Web service requests (Not the full URL).
      - For example, specify /path/to/service, where the full URL is http://server/path/to/service or If the URL is http://server/testHTTPS then “testHTTPS”
  - HTTPReply node Properties
    - There are no parameters to be configured
- Configure the bar file in the Toolkit
  - Ensure that “Use HTTPS” box is checked for the HTTPInput node

- Deploy and Confirm with – BIP3132I message in the logs indicating https listener has been enabled

Configuration of HTTPInput & HTTPReply nodes



- Test the configuration –
  - Start a web browser and type the URL: https://localhost:7083/<Path suffix>
  - Accept the certificate when the pop up Window appears and it shows - "XML document must have a top level element. Error processing resource https://localhost:7083/<Path suffix>"

Troubleshooting configuration issues

- Ensure the message flow works fine with HTTP configured only
- Ensure the certificates have been imported in the correct keystore files located in the correct directories
- Ensure the certificates are X.509
- Ensure the keystore are in .jks format
- Capture the traces (if needed)

Tracing

- When Broker is the Client (with HTTPRequest node) –
  - Collect EG service trace
  - Collect JSSE trace

- When Broker is the server (with HTTPInput node) –
  - Collect the EG service trace
  - Collect the biphttplistener trace

Additional Resources

- http://publib.boulder.ibm.com/infocenter/wmbhelp/v6r0m0/topic/com.ibm.etools.mft.doc/ap12234_.htm
- http://dev2dev.bea.com/pub/a/2006/08/pfx-pem-certificate-formats.html
- http://publib.boulder.ibm.com/infocenter/wmqv6/v6r0/topic/com.ibm.mq.csqzas.doc/sy11560_.htm
- http://www-306.ibm.com/software/integration/wbimessagebroker/support/
- Security Guide - <Install dir>\jre\docs\sdkGuides\securityguide.win32.htm
- How to setup SSL for the HTTP nodes WebSphere Message Broker V6 – Vicente Suarez
- SSL Basics WSTE – Russ Stancliffe
- SSL – Everett Turner

Questions and Answers