Scenarios

Contents

Scenarios

Scenarios demonstrate how to apply technology to accomplish business goals and solve problems. They describe hypothetical business situations to bring the discussions to life.

These scenarios explore some of the first steps and some of the more advanced tasks that you can do by using IBM Security Key Lifecycle Manager. As a prerequisite for these scenarios, install the IBM Security Key Lifecycle Manager server and verify that its components are running.

Note: The user IDs, names, and passwords that are used in these scenarios are examples only.

Scenario: To provide a primary and replica server

To ensure continuous key and certificate availability to encrypting devices, configure a primary and a replica IBM Security Key Lifecycle Manager server for your enterprise. Then, provide repeated backup and restore actions that protect critical data.

On Windows systems and other systems, both systems must have the required memory, speed, and available disk space to meet the workload.

IBM Security Key Lifecycle Manager creates backup files in a manner that is independent of operating systems and directory structure of the application. You can restore the backup files to an operating system that is different from the one it was backed up from.

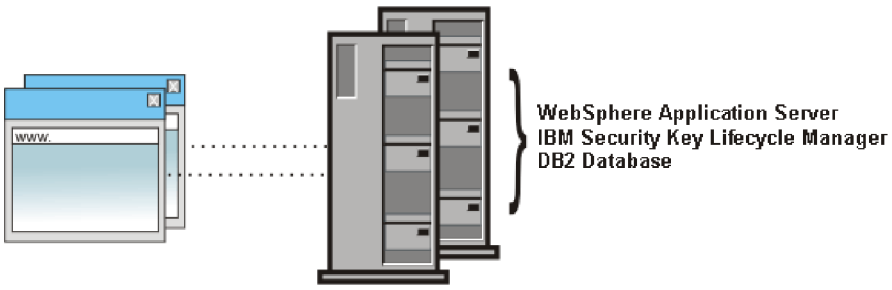

Figure 1. Primary and replica IBM Security Key Lifecycle Manager server

Before you create a replica server, catalog the requirements in your operation, which might include:

- Disaster recovery procedures that are unique to your site. The procedures might require ad hoc or periodic activities to ensure concurrent availability of a primary and replica IBM Security Key Lifecycle Manager server.

  Your site might require periodic exercises to demonstrate that a simulated failure of a primary IBM Security Key Lifecycle Manager server causes an immediate response from a replica.

  The IBM Security Key Lifecycle Manager server does not provide automatic failover. You must separately set up the necessary device controls to ensure that the replica server is available if the primary server fails.

- Initial installation and configuration of IBM Security Key Lifecycle Manager server and the devices in your installation that require keys and certificates.

  You might choose to also install and configure IBM Security Key Lifecycle Manager server and its prerequisites on another server, and set a schedule to back up and restore critical data.
- Cycles of time at which your organization normally changes keys and certificates.

  If your organization replaces keys and certificates on a monthly or quarterly basis, ensure that the key materials and other data are backed up when new keys and certificates begin their usage cycle.
- Events that cause you to create a certificate request and send the request to a certificate authority.

  Use the secure communication process that your site or the certificate authority requires. Run a backup to protect keys and data that are associated with a certificate request until the actual certificate returns.
- Upgrades and related middleware fix packs for the IBM Security Key Lifecycle Manager server.

  Run a backup to ensure that the upgraded IBM Security Key Lifecycle Manager server has the same keys and other critical data that were in use immediately prior to the upgrade.

Backup and restore practices

When a change occurs, such as adding or changing devices, keys, and certificates, you must back up the IBM Security Key Lifecycle Manager critical data. IBM Security Key Lifecycle Manager provides a task that creates a backup file of configuration files, database, and other data. You can restore this backup file to an operating system that is different from the one it was backed up from.

`Failure to back up your critical data properly might result in unrecoverable loss of all access to your encrypted data. Do not encrypt your backup file, or store a backup file on an encrypting device.` Failure to back up data might also result in a later inconsistency of the key manager and potential data loss on the storage device.

You can follow these practices:

- Maintain both a primary IBM Security Key Lifecycle Manager server and at least one replica IBM Security Key Lifecycle Manager server that run concurrently. Ensure that a storage device has access to its keys if the primary server fails.

  The IBM Security Key Lifecycle Manager server does not provide automatic failover. You must separately set up the necessary device controls to ensure that the replica server is available if the primary server fails.
- Run the backup task whenever you add or change devices, keys, or certificates. Restore the IBM Security Key Lifecycle Manager backup file to a replica IBM Security Key Lifecycle Manager server.
- Do not make changes to the IBM Security Key Lifecycle Manager server on the replica computer under normal operating conditions in which a primary server is always available. If failure events cause significant activity on the replica server while the primary server is down, back up the replica server and restore the backup file to the primary server.

- Use only the IBM Security Key Lifecycle Manager backup and restore tasks to create a backup file. Use only IBM Security Key Lifecycle Manager to restore the data that the backup file contains. Do not take other manual steps to back up or to restore files.
- Keep backup files in a safe place, separate from the computer on which the IBM Security Key Lifecycle Manager server runs. Ensure that function can be rebuilt on a replacement server if files on the primary IBM Security Key Lifecycle Manager server are lost. These files might reside at a geographically separate location.

Backup and restore runtime requirements

You must prevent timeout failure by increasing the time interval that is allowed for backup and restore transactions for large key populations. Specify a larger value for the **totalTranLifetimeTimeout** setting in the `server.xml` file.

WAS_HOME`/profiles/KLMProfile/config/cells/SKLMCell/nodes/SKLMNode/servers/server1/server.xml`

Additionally, these conditions must be true:

- Ensure that the task occurs during a time interval that allows a halt to key serving activity.
- For a backup task, the IBM Security Key Lifecycle Manager server must be running in a normal operational state. The IBM Security Key Lifecycle Manager database instance must be available.
- For a restore task, the IBM Security Key Lifecycle Manager database instance must be accessible through the IBM Security Key Lifecycle Manager data source.

  Before you start a restore task, ensure that you have the password that was used when the backup file was created. Restored files must be written to the same IBM Security Key Lifecycle Manager server from which the data was previously backed up. Alternatively, the restored files must be written to a replica computer.
- Ensure that the directories, which are associated with the **tklm.backup.dir** property exist. Also, ensure read and write access to these directories for the system and IBM Security Key Lifecycle Manager administrator accounts under which the IBM Security Key Lifecycle Manager server and the DB2® server run.

Setting up a replica computer

A replica computer for IBM Security Key Lifecycle Manager must have the same or greater storage capacity and free disk space as the primary computer on which IBM Security Key Lifecycle Manager server customarily runs.

About this task

Use the IBM Security Key Lifecycle Manager installation program and repeat the same steps that you took on the primary computer.

Procedure

1. Obtain a computer that has the same or greater storage capacity and free disk space as the computer on which IBM Security Key Lifecycle Manager server customarily runs.
2. Install and configure an operating system and fixes on the replica computer to match the system on the computer on which IBM Security Key Lifecycle Manager server customarily runs.

3. Complete the installation steps and verification steps that are described in the "Installing and configuring" section on IBM Knowledge Center for IBM Security Key Lifecycle Manager.

What to do next

Configure and test the replica computer after you install and verify the primary computer on which IBM Security Key Lifecycle Manager customarily runs.

Verify that a current backup file that you create on the primary IBM Security Key Lifecycle Manager server can be successfully restored on the replica computer.

Responding after significant replica server activity

A replica server might have significant activity while the primary IBM Security Key Lifecycle Manager server is down. Select an announced maintenance interval, when network traffic is stopped, to back up the replica server and restore the backup file to the primary server.

About this task

No alerts are issued if the replica server provides keys to a device. Validate that there is actually a need to back up the replica computer and then restore the backup file to the primary server. For example, you might determine whether a write request caused a key to be served to a device. Use the **tklmServedDataList** command to query the database and to list served data. Less significant information might be available in the audit log for read requests from devices.

Procedure

1. At an announced time when network traffic is stopped, back up the replica computer.
2. Restore the backup file from the replica computer onto the primary computer on which IBM Security Key Lifecycle Manager server customarily runs.

What to do next

Verify that the primary IBM Security Key Lifecycle Manager server is active and that the backup file was successfully restored.

Scenario: Request for a third-party certificate

IBM Security Key Lifecycle Manager can generate a certificate request in PKCS #10 format that you can send to a certificate authority. Use the returned CA certificate to protect data on an encryption-enabled device, or for SSL communication.

1. Before you begin, determine whether the usage of the certificate is for SSL authentication, or for secure communication with 3592 tape drives or DS8000 Turbo drives.
2. For each of the certificates that you anticipate in your next business cycle, create a certificate request.

   The generated certificate request files reside in the SKLM_HOME directory. For example, a generated certificate request might be a file such as SKLM_HOME\080419154137-sslcert001.csr.

   The certificate request file is an encoded, base64 format, which is not readable with an editor.

   The certificate request file contains the base64 format information, including:

- The version number.
- The subject name, which is the X.500 name of the requestor. For example, an X.500 name contains values for a common name (cn), organization, and other values that identify the subject.
- The public key data and the algorithm unique identifier. You can use the algorithm, such as RSA or ECDSA.
- A generated signature for the data that is signed by the private key of the user.

The keystore database contains the private key that was used to generate the signature for the certificate request.

Additionally, information related to the certificate request is stored in the database. The information includes the X.500 subject name, the start, expiration, and retirement date, and other values for other attributes that are normally specified for a certificate, including a pending state for the certificate request. The values are updated when the returned certificate is imported.

3. Protect certificate requests until the certificate returns. It is important to run a backup task for the keystore database after you create and send a certificate request, just as when you change actual keys or certificates in a keystore database.
4. After ensuring that a backup file is in place, manually send a certificate request to your selected certificate authority, by using the secure communication process that your site or the certificate authority requires for e-mail or https transmission.
5. Import a returned certificate that matches an earlier certificate request.

   Upon receipt of a valid request, the certificate authority returns a DER, base64, or PEM encoded certificate to you. The certificate contains the public key that was provided in the certificate request, and a signature from the certificate authority, which specify that the public key is valid, and that your enterprise is the authentic owner. The certificate subject name is the X.500 subject name that you provided in the certificate request.
6. Again back up the keystore database, which contains the new certificate.

Creating a certificate request

Use the Create Certificate dialog, **tklmCertGenRequest** command, or **Certificate Generate Request REST Service** to create certificate requests.

About this task

Before you begin, determine your site policy and process to obtain certificates that are issued by a certificate authority.

Procedure

1. Navigate to the appropriate page or directory:
   - Graphical user interface:
     a. Log on to the graphical user interface.
     b. In the Key and Device Management section on Welcome page, select the **3592** or **DS8000** device group.
     c. Click **Go to** > **Guided key and device creation**.
     d. Alternatively, right-click **3592** or **DS8000** and select **Guided key and device creation**.
   - Command-line interface

a. Go to the <*WAS_HOME*>/bin directory. For example,

Windows

```
cd drive:\Program Files\IBM\WebSphere\AppServer\bin
```

Linux

```
cd /opt/IBM/WebSphere/AppServer/bin
```

b. Start the **wsadmin** interface by using an authorized user ID, such as SKLMAdmin. For example,

Windows

```
wsadmin.bat -username SKLMAdmin -password mypwd -lang jython
```

Linux

```
./wsadmin.sh -username SKLMAdmin -password mypwd -lang jython
```

- REST interface:
  - Open a REST client.

2. Request a certificate:
   - Graphical user interface:
     a. On the Step 1: Create Certificates page, click **Create**.
     b. On the Create Certificate dialog, select a certificate request for a third-party provider.
     c. Specify values for the required and optional parameters.
     d. Click **Create Certificate**.
   - Command-line interface:

     Type tklmCertGenRequest to create a certificate request file. For example:
     - SSL communication

```
print AdminTask.tklmCertGenRequest('[-alias sklmSSLCertificate1
 -cn sklm -ou sales -o myCompanyName -locality myLocation
  -country US -validity 999 -keyStoreName defaultKeyStore
   -fileName mySSLCertRequest1.crt -usage SSLSERVER]')
```

     - 3592 tape drives

```
print AdminTask.tklmCertGenRequest('[-alias sklmCertificate1
 -cn sklm -ou marketing -o CompanyName -locality myLocation
  -country US -validity 999 -keyStoreName defaultKeyStore
   -fileName myCertRequest1.crt -usage 3592]')
```

     - DS8000 Turbo drives

```
print AdminTask.tklmCertGenRequest('[-alias sklmCertificate3
 -cn sklm -ou sales -o myCompanyName -locality myLocation
  -country US -validity 999 -keyStoreName defaultKeyStore
   -fileName myCertRequest3.crt -usage DS8000]')
```

   - REST interface:
     a. Obtain a unique user authentication identifier to access IBM Security Key Lifecycle Manager REST services. For more information about the authentication process, see Authentication process for REST services.
     b. To invoke **Certificate Generate Request REST Service**, send the HTTP POST request. Pass the user authentication identifier that you obtained in Step a along with the request message as shown in the following example.
        - SSL communication

```
POST https://localhost:<port>/SKLM/rest/v1/certificates
Content-Type: application/json
Accept : application/json
Authorization: SKLMAuth authId=139aeh34567m
{"type":"certreq","alias":"sklmSSLCertificate1","cn":"sklm","ou":
"sales","o":
```

```
"myCompanyName","usage":"SSLSERVER","country":"US","validity":"999",
"fileName":
"mySSLCertRequest1.crt","algorithm":"ECDSA"}
```

– 3592 tape drives

```
POST https://localhost:9080/SKLM/rest/v1/certificates
Content-Type: application/json
Accept : application/json
Authorization: SKLMAuth authId=139aeh34567m
{"type":"certreq","alias":"sklmCertificate1","cn":"sklm","ou":
"sales","o":
"myCompanyName","usage":"3592","country":"US","validity":"999",
"fileName":
"myCertRequest1.crt","algorithm":"ECDSA"}
```

– DS8000 Turbo drives

```
POST https://localhost:<port>/SKLM/rest/v1/certificates
Content-Type: application/json
Accept : application/json
Authorization: SKLMAuth authId=139aeh34567m
{"type":"certreq","alias":"sklmCertificate3","cn":"sklm","ou":
"sales","o":
"myCompanyName","usage":"DS8000","country":"US","validity":"999",
"fileName":
"myCertRequest1.crt","algorithm":"ECDSA"}
```

3. A success indicator varies, depending on the interface:
   - Graphical user interface:

     The certificate or certificate request appears as an item in the **Certificates** table. Return to the Welcome page. On the Welcome page, in the **Action Items**, the certificate request appears as an item in the **Pending Certificate** table.
   - Command-line interface:

     A completion message indicates success.
   - REST interface:

     The status code `200 OK` indicates success.

What to do next

Manually send the certificate request to a certificate authority, by using the secure communication process that your organization provides. Additionally, retain the alias value of the certificate request, for use when you import the returned certificate, which must match a certificate request.

Importing a certificate

You can use the pending certificates link on the Welcome page of graphical user interface, the **tklmCertImport** CLI command, or **Certificate Import REST Service** to import a certificate that you earlier requested from a certificate authority.

About this task

Before you begin, ensure that the alias of the incoming certificate matches the alias of a previous certificate request, such as `sklm cert1`. Write the certificate file to a temporary directory.

Retrieve the alias of original certificate request, for use when you import the returned certificate, which must specify the correct alias.

To look up the X.500 subject name of a certificate request, to determine whether it matches the X.500 subject name of the certificate, run the **tklmCertList** command or **Certificate List REST Service**, by specifying the state attribute with a value of pending.

To look at the subject name of the certificate file, you might take these steps:

- Windows systems:

  Open the certificate file directly. A Windows native utility displays the information in the certificate in readable format.
- Other systems:

  Import the certificate into IBM Security Key Lifecycle Manager by using a new alias. Then, run the **tklmCertList** command or the **Certificate List REST Service**, specifying the alias, to view the certificate information.

Procedure

1. Go to the appropriate page or directory:
   - Graphical user interface:

     Log on to the graphical user interface. The Welcome page is displayed.
   - Command-line interface
     a. Go to the <*WAS_HOME*>/bin directory. For example,

        Windows
        ```
        cd drive:\Program Files\IBM\WebSphere\AppServer\bin
        ```

        Linux
        ```
        cd /opt/IBM/WebSphere/AppServer/bin
        ```
     b. Start the **wsadmin** interface by using an authorized user ID, such as SKLMAdmin. For example,

        Windows
        ```
        wsadmin.bat -username SKLMAdmin -password mypwd -lang jython
        ```

        Linux
        ```
        ./wsadmin.sh -username SKLMAdmin -password mypwd -lang jython
        ```
   - REST interface:
     – Open a REST client.
2. Import a certificate.
   - Graphical user interface
     a. In the Action Items section of the Welcome page, in the Key Groups and Certificates area, click **You have pending certificates**.
     b. In the **Pending Certificates** table, select the appropriate pending certificate
     c. Click **Import**.
     d. Click **Browse** to specify the certificate request file location under <*SKLM_DATA*>. For the definition of <SKLM_DATA>, see Definitions for *HOME* and other directory variables.
     e. The **File name and location** field displays the default <*SKLM_DATA*> directory path, where the certificate file is saved, for example, C:\Program Files\IBM\WebSphere\AppServer\products\sklm\data. For the definition of <*SKLM_DATA*>, see Definitions for *HOME* and other directory variables. Click **Browse** to specify a location under <*SKLM_DATA*> directory.
     f. Click **Import**.
   - Command-line interface:

Type `tklmCertImport` to import a certificate. For example:

- SSL communication

```
print AdminTask.tklmCertImport
 ('[-fileName myTempPath\\mySSLCertRequest1.cer
   -alias sklmSSLCertificate1 -format base64
     -keyStoreName defaultKeyStore -usage SSLSERVER]')
```

- 3592 tape drives

```
print AdminTask.tklmCertImport
 ('[-fileName myTempPath\\myCertRequest2.cer
   -alias sklmCertificate2 -format base64
     -keyStoreName defaultKeyStore -usage 3592]')
```

- DS8000 Turbo drives

```
print AdminTask.tklmCertImport
 ('[-fileName myTempPath\\myCertRequest3.cer
   -alias sklmCertificate3 -format base64
     -keyStoreName defaultKeyStore -usage DS8000]')
```

- REST interface

a. Obtain a unique user authentication identifier to access IBM Security Key Lifecycle Manager REST services. For more information about the authentication process, see Authentication process for REST services.

b. To run **Certificate Import REST Service**, send the HTTP POST request. Pass the user authentication identifier that you obtained in `Step a` along with the request message as shown in the following example.

- SSL communication

```
POST https://localhost:<port>/SKLM/rest/v1/certificates/import
Content-Type: application/json
Accept : application/json
Authorization: SKLMAuth authId=139aeh34567m
{"fileName":"/mycertfilenam.base64","alias","sklmSSLCertificate1",
"format":"base64",
"usage":"SSLSERVER"}
```

- 3592 tape drives

```
POST https://localhost:<port>/SKLM/rest/v1/certificates/import
Content-Type: application/json
Accept: application/json
Authorization: SKLMAuth authId=139aeh34567m
{"fileName":"/mycertfilenam.base64","alias","sklmSSLCertificate2",
"format":"base64",
"usage":"3592"}
```

- DS8000 Turbo drives

```
POST https://localhost:<port>/SKLM/rest/v1/certificates/import
Content-Type: application/json
Accept: application/json
Authorization: SKLMAuth authId=139aeh34567m
{"fileName":"/mycertfilenam.base64","alias","sklmSSLCertificate3",
"format":"base64",
"usage":"DS8000"}
```

3. A success indicator varies, depending on the interface:

- Graphical user interface:

  The pending certificate entry is removed from the **Pending Certificates** table on the Welcome page. If there are no more certificates to be imported, the **Pending Certificates** table is removed from the Action Items section of the Welcome page.

- Command-line interface:

  A completion message indicates success.

- REST interface:

The status code `200 OK` indicates success.

What to do next

Ensure that you back up the key materials to protect the certificate. Then, you might associate the certificate with one or more devices.

Certificate request problems

You must solve problems in either creating a certificate request, or enabling a returned certificate for use.

- Before you create a certificate request, solve these problems as administrator:
  - **Problem:** You might not have permission to write to the certificate request file. Alternatively, there might not be sufficient free disk space, or the database might not be available.

    Solution: Ensure that your permissions are correct, that there is sufficient free disk space, and that the database connection is available. If not, make the appropriate corrections. Then, try the operation again.
  - **Problem:** A value is not specified for the common name. The common name (`cn`) is part of the unique identification for the certificate. For example, the value of `cn` is used in the subject name for a certificate, which can identify whether a certificate that is being imported matches an original certificate request.

    Solution: Specify the common name for the certificate. Then, try the operation again.
  - **Problem:** The certificate request file exists.

    Solution: The file name that you specified in the certificate request matches an existing certificate request file name. Specify a different file name for the certificate request. For example, specify `myUniqueRequest.crt`. Then, try the operation again.
- When you import a returned CA certificate, solve these problems:
  - **Problem:** The subject name of the certificate that returned from a certificate authority does not match the subject name in the original certificate request.

    Solution: Correct the file name or alias specification. Then, try the import operation again.
  - **Problem:** An error occurs while verifying the key and certificate. The certificate request that you submitted to a certificate authority and the certificate that returned, do not match.

    Solution: The problem might be an internal processing error. Collect any information that might be in the audit log and then contact IBM Software Support.
  - **Problem:** The key in the certificate to be imported does not match the key in the original certificate request.

    Solution: You attempted to match a returned certificate to an incorrect certificate request. Import the certificate by using an alias that corresponds to this response. Then, try the operation again.
  - **Problem:** When you import a certificate with the expiration year greater than 50 years, you might see these messages:

    Using command-line interface

    ```
    CTGKM0002E Command failed: javax.management.MBeanException:
    RuntimeException thrown in RequiredModelMBean while trying to invoke
    operation importCertificate
    ```

Using graphical user interface

```
Cannot import certificate to the keystore.
javax.management.MBeanException: RuntimeException thrown in
RequiredModelMBean while trying to invoke operation
importCertificate
```

Workaround: The certificate expiration period cannot be greater than 50 years. To modify the expiration period, change the value of the **maximum.keycert.expiration.period.in.years** parameter in the`SKLMConfig.properties` file.

Scenario: Setup for SSL handshake between IBM Security Key Lifecycle Manager server and client device

The SSL handshake enables IBM Security Key Lifecycle Manager server and client devices to establish the connection for secure communication. IBM Security Key Lifecycle Manager provides the Server Configuration Wizard to configure server and the client device for SSL handshake.

You must complete the following steps in the wizard for SSL/TLS handshake:

1. Creating a self-signed SSL/KMIP server certificate.
2. Exporting the SSL/KMIP server certificate that is created in Step 1 to a certificate file in an encoded format for use by the client device. You can also export an existing certificate.
3. Importing client communication certificate to the IBM Security Key Lifecycle Manager server.

Creating a self-signed SSL/KMIP server certificate

As a first activity, you might create an SSL/KMIP server certificate for use with IBM Security Key Lifecycle Manager.

Procedure

1. Log on to the graphical user interface.
2. Click the **Review the configuration parameters and/or create an SSL server certificate** link.

   Immediately after you install IBM Security Key Lifecycle Manager, the **Review the configuration parameters and/or create an SSL server certificate** link is the only available option to configure IBM Security Key Lifecycle Manager for SSL/TLS handshake with the client devices. This link is not visible if you previously created an SSL server certificate.
3. Alternatively, on the Welcome page, click **Configuration** > **SSL/KMIP** > **Launch Server Configuration Wizard**.
4. Click **Create SSL/KMIP Server Certificate**.
5. On the Add SSL/KMIP Certificate dialog, select **Create self-signed certificate**.
6. Specify values for the parameters according to your requirements.
7. Click **Create Certificate**.

What to do next

You might need to export the IBM Security Key Lifecycle Manager SSL/KMIP server certificate that you created to a file in an encoded format for use by the client device. Click the **Export Certificate** link or click the **Export SSL/KMIP Server Certificate** tab. You can also export an existing SSL/KMIP server certificate

by selecting **Use an existing certificate**. See "Exporting a server certificate."

Exporting a server certificate

You must export the IBM Security Key Lifecycle Manager SSL/KMIP server certificate to a file in an encoded format for use by the client device. The client device imports this certificate for secure communication with the server.

Procedure

1. Log on to the graphical user interface.
2. On the Welcome page, click **Configuration** > **SSL/KMIP** > **Launch Server Configuration Wizard**.
3. To create a self-signed certificate, click **Create SSL/KMIP Server Certificate**. See the "Creating a self-signed SSL/KMIP server certificate" on page 11 topic for more information.
4. Click **Export SSL/KMIP Server Certificate**.
5. On the Export Certificate dialog, select the server certificate from the **Certificate name** list.
6. Specify certificate name in the **File name** field.
7. The **File location** field displays the default <*SKLM_DATA*> directory path, where the certificate is exported, for example, `C:\Program Files\IBM\WebSphere\AppServer\products\sklm\data`. For the definition of <*SKLM_DATA*>, see Definitions for *HOME* and other directory variables. Click **Browse** to specify a location under <SKLM_DATA> directory.
8. Specify the certificate type, such as **BASE64** or **DER**.
9. Click **Export Certificate**.

What to do next

You might go the next step to import the client device communication certificate for secure communication between IBM Security Key Lifecycle Manager server and the client device. Click the **Go to Next Step** link or select **Import SSL/KMIP Server Certificate**. See "Importing a client communication certificate."

Importing a client communication certificate

You must import communication certificate to the IBM Security Key Lifecycle Manager server for secure communication with the client device.

Procedure

1. Log on to the graphical user interface.
2. On the Welcome page, click **Configuration** > **SSL/KMIP** > **Launch Server Configuration Wizard**.
3. To create a self-signed certificate, click **Create SSL/KMIP Server Certificate**. See the "Creating a self-signed SSL/KMIP server certificate" on page 11 topic for more information.
4. Click **Export SSL/KMIP Server Certificate** to export the IBM Security Key Lifecycle Manager SSL/KMIP server certificate to a file in an encoded format for use by the client device. See the "Exporting a server certificate" for more information.
5. Click **Import SSL/KMIP Client Certificate**.

6. On the Import Certificate dialog, specify values for the parameters according to your requirements.
7. Click **Import**.

Scenario: To migrate an IBM Security Key Lifecycle Manager Multi-Master cluster in inline mode

To ensure the Multi-Master cluster configuration is replicated after you migrate from IBM Security Key Lifecycle Manager version 3.0.0.*x* (source) to version 3.0.1 (destination), you need to plan the Multi-Master cluster migration, and perform the inline migration in a specific order. You can choose to not migrate the Multi-Master configuration but only migrate the master servers to the newer version.

Migrating an IBM Security Key Lifecycle Manager Multi-Master cluster in inline mode

1. Plan the Multi-Master cluster migration.
2. Migrate the master servers in the Multi-Master cluster.
3. Complete the post-migration tasks.

Planning the Multi-Master cluster migration

- Ensure that the configuration of all the master servers in the Multi-Master cluster is correct. For example, check for any discrepancy in the actual role of the master server and the role that is configured in the `SKLMConfig.properties` file. If a master server is acting primary, ensure its role in the configuration file is `Primary`. Else, the inline migration fails.
- Note down the HTTPS ports that you plan to use for the master servers in the migrated cluster.
- If a master server in the cluster is running the Linux operating system, ensure that the permissions for the `/tmp` directory on the server is set to `777` that is full execute, read, and write permissions.
- Create a properties file on the primary master server to store the configuration details of the Multi-Master cluster.
  - In a temporary directory, create the **`mmsetup.properties`** file. Example of temporary directory:

    ```
    Windows: %temp%
    Linux: $TMPDIR
    ```

  - In the **`mmsetup.properties`** file, include the host names and HTTPS ports that you plan to use for the master servers in the migrated cluster.
  - Ensure that you specify the same host names that are provided in the cluster configuration of the source IBM Security Key Lifecycle Manager master server.
  - Sample **`mmsetup.properties`** file:

    ```
    PRIMARY_HTTP_PORT=9443
    PRIMARY_IP_HOSTNAME=myprimaryhost
    PRIMARY_HADR_PORT=60025 (optional)
    STANDBY_1_HTTP_PORT=9443
    STANDBY_1_IP_HOSTNAME=mystandbyhost1
    STANDBY_2_HTTP_PORT=9443
    STANDBY_2_IP_HOSTNAME=mystandbyhost2
    NODE_1_HTTP_PORT=9443
    NODE_1_IP_HOSTNAME=mynonhadrhost1
    NODE_2_HTTP_PORT=9443
    NODE_2_IP_HOSTNAME=mynonhadrhost2
    ```

Note: If you do not specify the **PRIMARY_HADR_PORT** value in the file, the default port value 60025 is used.

- During the inline migration process, only the master servers that are correctly specified in the **mmsetup.properties** file are added to the migrated Multi-Master cluster.

Migrating the master servers in the Multi-Master cluster in inline mode

1. Migrate all the standby and non-HADR master servers in the IBM Security Key Lifecycle Manager Multi-Master cluster. For instructions, see Migration planning and Migrating IBM Security Key Lifecycle Manager in silent inline mode.
2. Ensure that all the migrated standby and non-HADR master servers are up and running.
3. Migrate the primary master server.

For instructions, see Installing IBM Security Key Lifecycle Manager in silent mode.

Completing the post-migration tasks

- Verify whether all the configuration properties are correctly updated in the *SKLM_HOME*/config/SKLMConfig.properties file on the IBM Security Key Lifecycle Manager destination server.
- Verify whether all the master servers are correctly added in the newly created cluster, and check their DB2 HADR configuration status. For instructions, see Viewing the list of master servers and their configuration status.
- If any master servers of the earlier Multi-Master cluster are not automatically configured in the new cluster, add them by using one of the following methods:
  - Run the createCluster.bat or createCluster.sh script file. The file is located in the following path:

    Windows: *SKLM_HOME*\migration\bin
    Linux: *SKLM_HOME*/migration/bin

    Note: The script file uses the **mmsetup.properties** file as input. Ensure that the **mmsetup.properties** file is correctly updated.

    Run the command as follows:

    Windows

    ```
    createCluster.bat
    ```

    Linux

    ```
    ./createCluster.sh
    ```

  - Add the master servers manually. For instructions, see Adding a master to the cluster.
- Review the logs for the cluster migration. The logs are stored in the temporary directory.

  Windows: %temp%/cluster_migration.log
  Linux: $TMPDIR/cluster_migration.log

Scenario: To cross-migrate an IBM Security Key Lifecycle Manager Multi-Master cluster

To ensure that the Multi-Master cluster configuration is replicated after you cross-migrate from an earlier version of IBM Security Key Lifecycle Manager (source) to version 3.0.1 (destination), complete the procedure given in this topic.

To cross-migrate an IBM Security Key Lifecycle Manager Multi-Master cluster:

1. Identify servers to create the new IBM Security Key Lifecycle Manager Multi-Master cluster. You need the same number of servers that is used in the source cluster.
2. Install IBM Security Key Lifecycle Manager version 3.0.1 on the new servers.
3. Back up the primary master server on the source IBM Security Key Lifecycle Manager cluster by using the cross-migration utility. For instructions, see Backup and restore operations for earlier versions of IBM Security Key Lifecycle Manager and IBM Tivoli Key Lifecycle Manager.
4. Restore the backup files on a new server and use it as the primary master server. For instructions, see Backup and restore operations for earlier versions of IBM Security Key Lifecycle Manager and IBM Tivoli Key Lifecycle Manager.
5. Add master servers to the cluster. For instructions, see Adding a master to the cluster.

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Index