HP Business Service Management

For the Windows, Linux operating systems

Software Version: 9.21

Data Flow Probe Installation Guide

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Software Release Date: November 2012

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Chapter 1

Licensing Model for Run-time Service Model

This chapter includes:

Licensing Model – Overview

HP Universal CMDB's licensing model is based on three complementary types of license, or licensing levels. The first one, known as the UCMDB Foundation License, is granted free of charge to eligible customers. The other two levels (the UCMDB Integration Only License and the DDM Advanced Edition License) are fee based.

This section includes the following topics:

- "Licensing Levels" below
- "Units of Measure" on the next page

Licensing Levels

- **UCMDB Foundation License.** This license grants the rights to use UCMDB as the backbone component of select BTO products.
- **UCMDB Integration Only License.** This license grants the right to integrate third-party (non-HP) products with UCMDB using various types of integrations.
- **DDM Advanced Edition License.** This license grants the rights to:
  - Integrate BTO and third-party (non-HP) products with UCMDB, using any type of integration
  - Use all Discovery and Dependency Mapping (DDM) capabilities to populate UCMDB

The following table provides an overview of what is permitted with the various licenses:

License/Integration	Integrations with other BTO products	Integrations with third-party products	Custom Discovery-like integrations	All Discovery capabilities
UCMDB Foundation	Permitted	No	No	No
UCMDB Integration Only	Permitted	Permitted	No	No
DDM Advanced Edition	Permitted	Permitted	Permitted	Permitted

Units of Measure

- **OS Instance.** Each implementation of the bootable program that can be installed onto a physical system or a partition within the physical system. A physical system can contain multiple Operating System instances.
- **Managed Server.** A computer system or computer system partition where a bootable program is installed, but not including personal computers or computers primarily serving a single individual.

  Note: Printers and network devices are not counted as Managed Servers.

UCMDB Foundation License

This is a no charge entitlement license for the UCMDB product, which is automatically granted to any HP customer who purchases HP Discovery and Dependency Mapping (DDMA), HP Service Manager (SM), or HP Asset Manager (AM).

License	Description
Standard BTO Integrations	With this license, you are entitled to integrate the following BTO products with UCMDB: • HP Business Service Management • HP Universal CMDB • HP Asset Manager • HP Service Manager • HP DDM Inventory • HP Network Node Manager • HP Storage Essentials • HP Systems Insight Manager Data flows between these products are implemented by means of adapters provided out-of-the-box with HP Universal CMDB or bundled under the SACM solution. Most adapters can leverage the Data Flow Probe infrastructure of HP Universal CMDB - except those supporting a federation data flow or the push data flow from UCMDB to SM, due to a technical restriction. **Note:** The data flow from UCMDB to Asset Manager relies on a Connect-It connector, which is licensed free of charge to AM customers. The right granted by the UCMDB Foundation license to integrate BTO products with UCMDB does not remove the need for customers to properly license these products in the first place.
Other Integrations	With this license, you are also entitled to integrate BTO products with UCMDB using: • Standard integrations provided by HP partners (additional charges may apply) • Custom data exchange integrations (that is, the Generic DB Adapter, the Generic Push Adapter and customer-developed Java adapters) • The HP Universal CMDB Web Service API and the HP Universal CMDB API (Java)
Number of CIs and Relationships	The UCMDB Foundation License does not restrict the number of CIs and relationships that can be stored in UCMDB or exchanged between UCMDB and other BTO products. The only limitation is physical capacity and performance.

License	Description
Number of UCMDB Instances	The UCMDB Foundation License does not restrict the number of UCMDB instances that can be deployed in a customer environment for the purpose of implementing development, test, production, HA and/or DR platforms. However, technical limitations may apply regarding how data can be managed and exchanged in a multi-instance installation. Servers that are discovered with DDM or sourced from a third-party product only need to be counted once under the DDM Advanced Edition license or the UCMDB Integration Only license, even if they appear in several UCMDB instances for the purpose of operational management.
Number of Data Flow Probe instances	The UCMDB Foundation License does not restrict the number of Data Flow Probe instances that can be deployed in a customer environment for the purpose of hosting discovery or integration adapters. However, technical limitations may apply regarding the maximum number of probes that can be used with UCMDB. Also, as mentioned above, some adapters cannot be hosted by a probe.
Particular Case of BSM	Customers who purchase HP Application Performance Manager (APM) version 9.0x or later are automatically granted a no-charge license to use the embedded UCMDB component labeled as Run-time Service Model (RTSM) and to integrate BTO products with RTSM. As a result, APM customers do not have and do not need a UCMDB Foundation license. **Note:** APM was formerly known as HP Business Availability Center version 8.0x (BAC) and RTSM as the Operational Database (ODB).

UCMDB Integration Only License

This license is based on the Managed Server unit of measure (for details, see "Units of Measure" on page 10). An appropriate quantity of that license must be acquired by customers who need to integrate third-party products with UCMDB.

License	Description
Licensing Rule	One License To Use (LTU) must be purchased for each Managed Server that is defined in a third-party product and whose definition then gets copied to UCMDB to be recorded in the form of CIs. The UCMDB Integration Only license requires an initial minimum purchase of 100 LTUs.

License	Description
Valid Types of Integrations	With this license, you can integrate third-party products with UCMDB using: • Standard integrations provided by HP • Standard integrations provided by HP partners (additional charges may apply) • Custom data exchange integrations (that is, the Generic DB Adapter, the Generic Push Adapter and customer-developed Java adapters) • The HP Universal CMDB Web Service API and the HP Universal CMDB API (Java) • But not Discovery-like integrations (that is, those created using Jython adapters) **Note:** HP Universal CMDB provides out-of-the-box adapters for third-party products such as Microsoft SCCM and BMC Atrium CMDB.

DDM Advanced Edition License

This license is based on the OS Instance unit of measure (for details, see "Units of Measure" on page 10). An appropriate quantity of that license must be acquired by customers who need access to all the Discovery and Dependency Mapping capabilities of DDM.

License	Description
Licensing Rule	One License To Use (LTU) must be purchased for each OS Instance that is discovered by DDM and gets recorded in UCMDB in the form of CIs. The DDM Advanced Edition license requires an initial minimum purchase of 100 LTUs. For example: A VMware ESX Server hosting one virtual machine requires two licenses to use (LTUs). Servers that are both discovered by DDM and sourced from a third-party product (to collect additional data) do not need to be counted under the UCMDB Integration Only license. The DDM Advanced Edition license covers that usage scenario.
Discovery and Dependency Mapping	With this license, you can use the Discovery Control Panel and other related functions to take advantage of all the discovery content available out of the box. In addition, you can create new Jython adapters to discover other resources.
Integrations	With this license, you can use the Integration Studio to create integration points with BTO and third-party products using Discovery-like integrations (custom Jython adapters).
DDM Inventory No Charge Entitlement with DDM Advanced Edition	For each LTU purchased under the DDM Advanced Edition license for a given server, you are granted a free DDM Inventory license to collect inventory data on the same server.

Upgrade to the Integration Only or DDM Advanced Edition License

When you install Business Service Management, you receive the Universal CMDB Foundation license. To obtain the file needed to upgrade to the Integration Only or DDM Advanced Edition license, contact HP Software Support, then perform the following procedure:

To upgrade your license:

1. Obtain the appropriate file from HP Software Support.
2. Replace the **ucmdb_license.xml** file in the **<Business Service Management root directory>\odb\conf** folder on the Data Processing server machine.

   If Business Service Management is installed in a distributed deployment, replace the file on the Gateway Server machine.
3. Use the JMX console to force a license change:
   a. Launch the Web browser and enter the server address, as follows: **http://<BSM Server Host Name or IP>:21212/jmx-console**.
   b. When prompted, enter the JMX Console authentication credentials (if you do not have these credentials, contact your system administrator). The default user name and password are **admin**/**admin**.
   c. Under **UCMDB**, click **service=Server Services** to open the Operations page.
   d. Locate **getLicense** and enter the following information:

      In the Value box for the **customerID** parameter, enter 1.
   e. Click **Invoke**.

   Information about the license type, customer name, permitted packages, and whether any applications are blocked is displayed.

Chapter 2

Data Flow Probe Installation and Configuration

This chapter includes:

Before You Install the Data Flow Probe

Consider the following before installing the Data Flow Probe:

- Review the Data Flow Probe system requirements in the BSM 9.20 System Requirements and Support Matrixes Guide.
- The Probe can be installed before or after you install the Business Service Management Gateway server. However, during Probe installation, you must provide the BSM Gateway Server name, so it is preferable to install the BSM Gateway Server before installing the Probe.
- Verify that you have enough hard disk space available before beginning installation. For details see the section about Data Flow Probe requirements in the BSM 9.20 System Requirements and Support Matrixes Guide.
- It is recommended to install the Probe on a separate server from the BSM servers, to distribute the overall system load.
- **Data Flow Probe on Windows:**
  - Before installing the Probe on a Windows 2008 machine, a user must have full control permissions on the file system. In addition, after installing the Probe, verify that the user who will run the Probe has full administration permissions on the file system where the Probe is installed.
- **Data Flow Probe on Linux:**
  - This Probe on Linux is intended for integration use only, and cannot be used for discovery. That is, this Probe does not appear in the Data Flow Setup window.

- Only integration with BSM version 9.01 and later is supported on the Probe on Linux.
- An instance of Microsoft MySQL database must not be running on the machine on which you are installing the Data Flow Probe. If an instance exists, you must disable it.
- To install the Data Flow Probe on Linux, you must have root permissions to the Linux machine.

Installing the Data Flow Probe on Windows

The following procedure explains how to install the Data Flow Probe on a Windows platform.

Note: For important notes and considerations before you install the Data Flow Probe, see "Before You Install the Data Flow Probe" on the previous page.

To install the Data Flow Probe:

1. Select **Admin > Platform > Setup and Maintenance > Downloads**.

   Note: The **Data Flow Probe** link in the Downloads page is displayed only if you have purchased a license for Data Flow Management, and if the administrator has added the Probe link to the Downloads page. For details, see the section describing installing component setup files in the *BSM Installation Guide*.

2. Click the **HPUCMDB_DataFlowProbe_905.exe** link. You can open the Setup file or save it to your computer:

   - If you choose to open the file, it is not saved to your computer, and the setup program starts immediately. In this case, depending on your browser security settings, a security warning dialog box may open. Confirm that you want to proceed.
   - If you choose to save the file to your computer, double-click the downloaded file to begin installation.

   Choose the locale language and click **OK** to open the Introduction dialog box. Click **Next** to continue.

3. The License Agreement page opens.

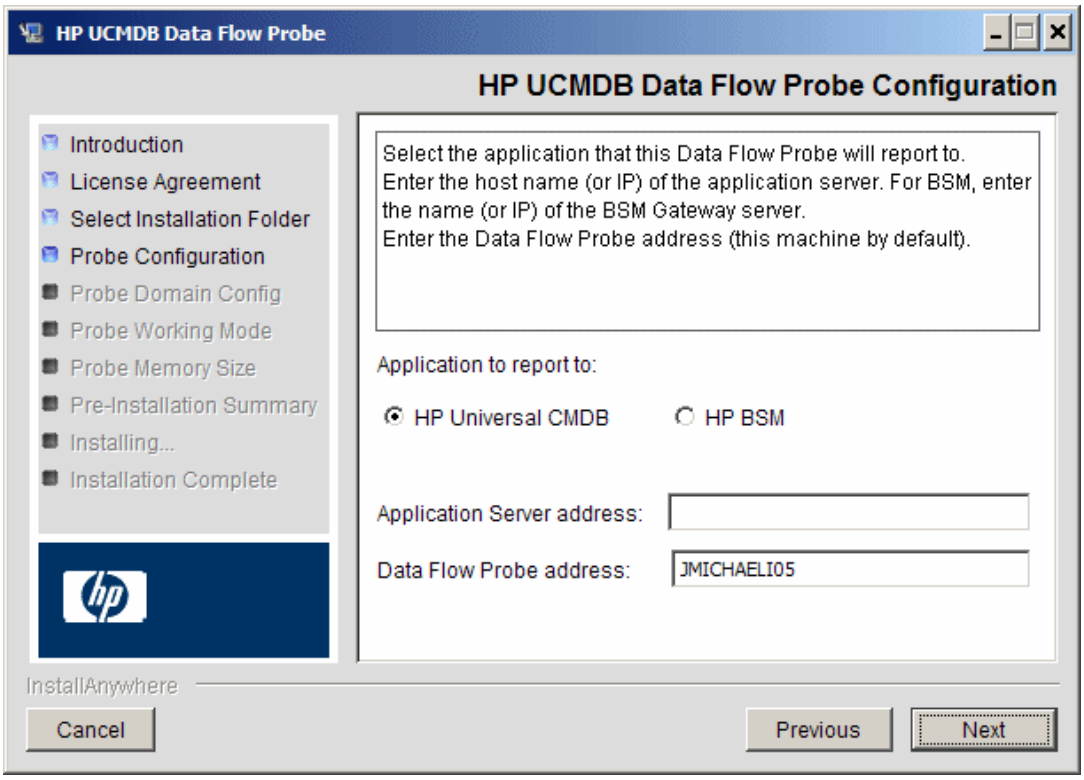
   Accept the terms of the agreement and click **Next**.

4. The Select Installation Folder page opens.

   Accept the default installation folder, **c:\hp\UCMDB\DataFlowProbe**, or click **Choose** to browse to and select a different installation folder.

   Note: The installation folder that you select must be empty. To restore the default installation folder, after selecting a folder in the Browse dialog box, click **Restore Default Folder**.

5. The Data Flow Probe Configuration page opens,enabling you to configure the details of the application server to which the Data Flow Probe will report.

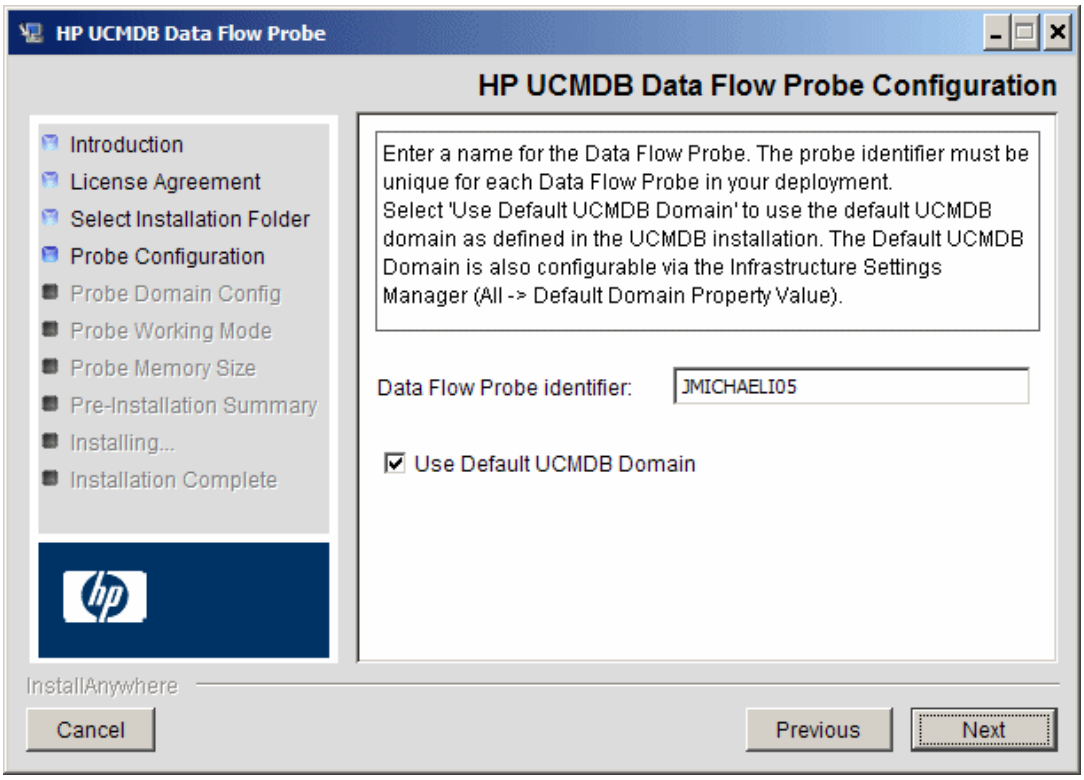


- **Application to report to.** Select the application server with which you are working:
  - If you select **HP Universal CMDB**, in the **Application Server address** box, enter the name or the IP address of the HP Universal CMDB server to which the Probe is to be connected.
  - If you select **HP BSM**, in the **Application Server address** box, enter the IP address or DNS name of the Gateway Server.
- In the **Data Flow Probe address** box, enter the IP address or DNS name of the machine on which you are currently installing the Probe, or accept the default.

  Note: If the machine has more than one IP address, enter a specific IP address, and not the DNS name.

  If you do not enter the address of the application server, a message is displayed. You can choose to continue to install the Probe without entering the address, or to return to the previous page and add the address. Click **Next**.

6. A second configuration page opens, enabling you to configure an identifier for the Probe.



- In the **Data Flow Probe Identifier** box, enter a name for the Probe that is used to identify it in your environment.

  Note: The Probe identifier is case sensitive, must be unique for each Probe in your deployment.

  When installing the Probe in separate mode, that is, the Probe Gateway and Probe Manager are installed on separate machines, you must give the same name (case-sensitive) to the Probe Gateway and all its Managers. This name appears in RTSM as a single Probe node. Failure to give the same name may prevent jobs from running.

- Select **Use Default CMDB Domain** to use the default BSM IP address or machine name, as defined in the BSM Server installation.

  The Default UCMDB Domain is also configurable via Infrastructure Settings, available after installing Business Service Management (**Admin > Platform > Setup and Maintenance > Infrastructure Settings > Foundations > RTSM > Class Model Settings > Default Domain Property Value**).

Click **Next**.

7. If you cleared the **Use Default CMDB Domain** box in the previous step, the HP UCMDB Data Flow Probe Domain Configuration page opens.

- **Data Flow Probe domain type.** Select the type of domain on which the Probe is to run:
  - **Customer.** Select if you are installing one or more Probes in your deployment.

    Note: Always use this option for new installations.
  - **External.** Select if you are upgrading from version 6.x systems.
- **Data Flow Probe domain.** If you are not using the default domain defined in RTSM enter the name of the domain here.

Click **Next**.

8. The HP UCMDB Data Flow Probe Working Mode page opens.

   You can run the Probe Gateway and Manager as one Java process or as separate processes. You would probably run them as separate processes in deployments that need better load balancing and to overcome network issues.

   Click **No** to run Probe Gateway and Probe Manager as one process.

   Click **Yes** to run Probe Gateway and Probe Manager as two processes. For details on the procedure, see "Running Probe Manager and Probe Gateway on Separate Machines" on page 24.

   Click **Next**.

9. The HP UCMDB Data Flow Probe Memory Size page opens.

   Define the minimum and maximum memory to be allocated to the Probe. The values are measured in megabytes.

   Note: To change the maximum heap size value at a later point in time, update the following parameters in the **WrapperEnv.conf** file, located in **C:\hp\UCMDB\DataFlowProbe\bin**:

   - **set.GATEWAY_MAX_MEM**
   - **set.MANAGER_MAX_MEM**

   The maximum heap size allowed on a 32-bit JVM is 1536 MB. If the Data Flow Probe is installed in separate mode, each parameter affects the corresponding process.

   Click **Next**.

10. The Pre-Installation Summary page opens. Review the selections you have made.
11. Click **Install** to complete the installation of the Probe.

    When the installation is complete the Install Complete page opens.

    Note: Any errors occurring during installation are written to the following file: **C:\hp\UCMDB\DataFlowProbe\HP_UCMDB_Data_Flow_Probe_InstallLog.log**

12. Click **Done**.

Note: If you installed the Probe on a Windows 2008 machine:

a. Locate the **wrapper.exe** file in the **c:\hp\UCMDB\DataFlowProbe\bin** folder.

b. Right-click the **wrapper.exe** file and select **Properties**.

c. In the **Compatibility** tab:

   i. Select **Compatibility mode**.

   ii. Select **Run this program in compatibility for**: **Windows XP (Service Pack 2)**.

   iii. Select **Run this program as administrator**.

13. Start the Probe: Select **Start > All Programs > HP UCMDB > Start Data Flow Probe**.

Note: For details about launching the Probe in a Console, refer to the *Data Flow Management Guide*.

The Probe is displayed in Business Service Management: access **Admin > RTSM Administration > Data Flow Management > Data Flow Probe Setup**.

Note: We recommend disabling virus scanning on the main directory that is used to store your MySQL table data. The default directory is **C:\hp\UCMDB\DataFlowProbe\MySQL**.

Installing the Data Flow Probe on Linux

The following procedure explains how to install the Data Flow Probe on a Linux platform.

Note: For important notes and considerations before you install the Data Flow Probe, see "Before You Install the Data Flow Probe" on page 15.

The Probe can be installed before or after you install the Business Service Management Gateway server. However, during Probe installation you must provide the Server name, so it is preferable to install the Server before installing the Probe.

Verify that you have enough hard disk space available before beginning installation. For details, see the section about Data Flow Probe requirements in the BSM 9.20 System Requirements and Support Matrixes Guide.

It is recommended to install the Probe on a separate server from the BSM servers to distribute the overall system load.

To install the Data Flow Probe:

1. Select **Admin > Platform > Setup and Maintenance > Downloads**.

Note: The **Data Flow Probe** link in the Downloads page is displayed only if you have

purchased a license for Data Flow Management, and if the administrator has added the Probe link to the Downloads page. For details, see the section about installing component setup files in the *BSM Installation Guide*.

Choose the locale language and click **OK** to open the Introduction dialog box. Click **Next** to continue.

2. The License Agreement page opens.

   Accept the terms of the agreement and click **Next**.

3. The Select Installation Folder page opens.

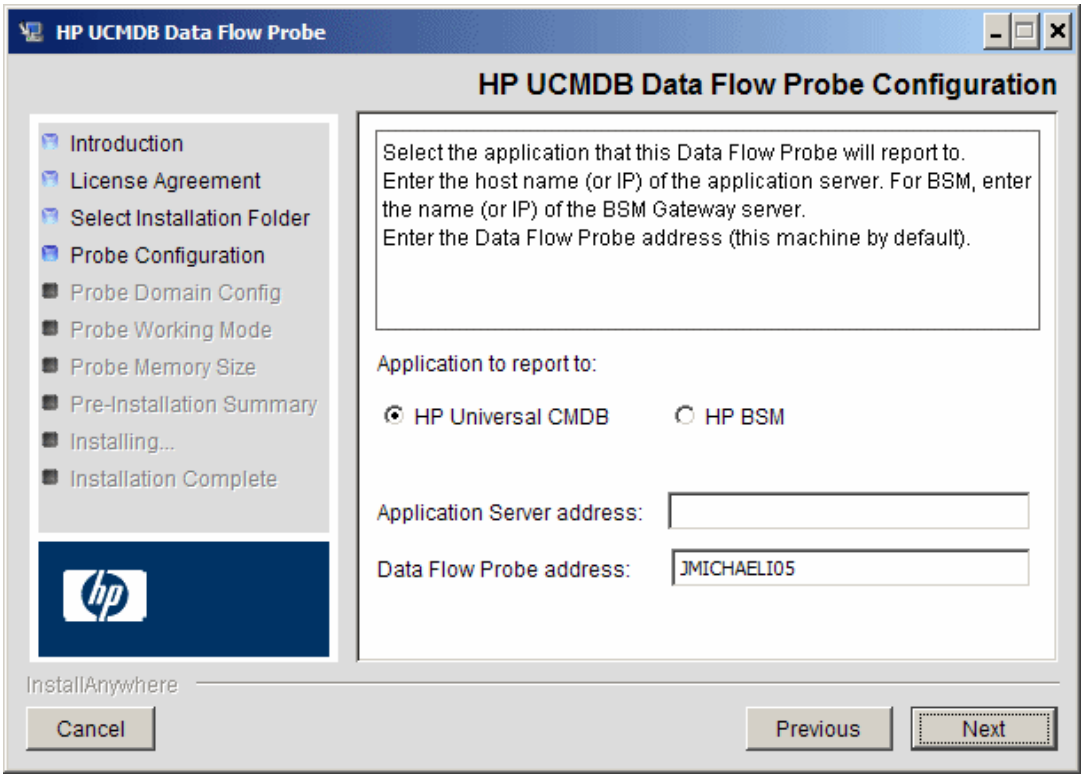
   Accept the default installation folder, **opt/hp/UCMDB/DataFlowProbe**, or click **Choose** to browse to and select a different installation folder.

   Note:

   - You can change the location of the installation, but the folder must be located under **/opt/**.
   - If you selected a different folder and you want to restore the default installation folder, click **Restore Default Folder**.

   Click **Next**.

4. The Data Flow Probe Configuration page opens,enabling you to configure the details of the application server to which the Data Flow Probe will report.

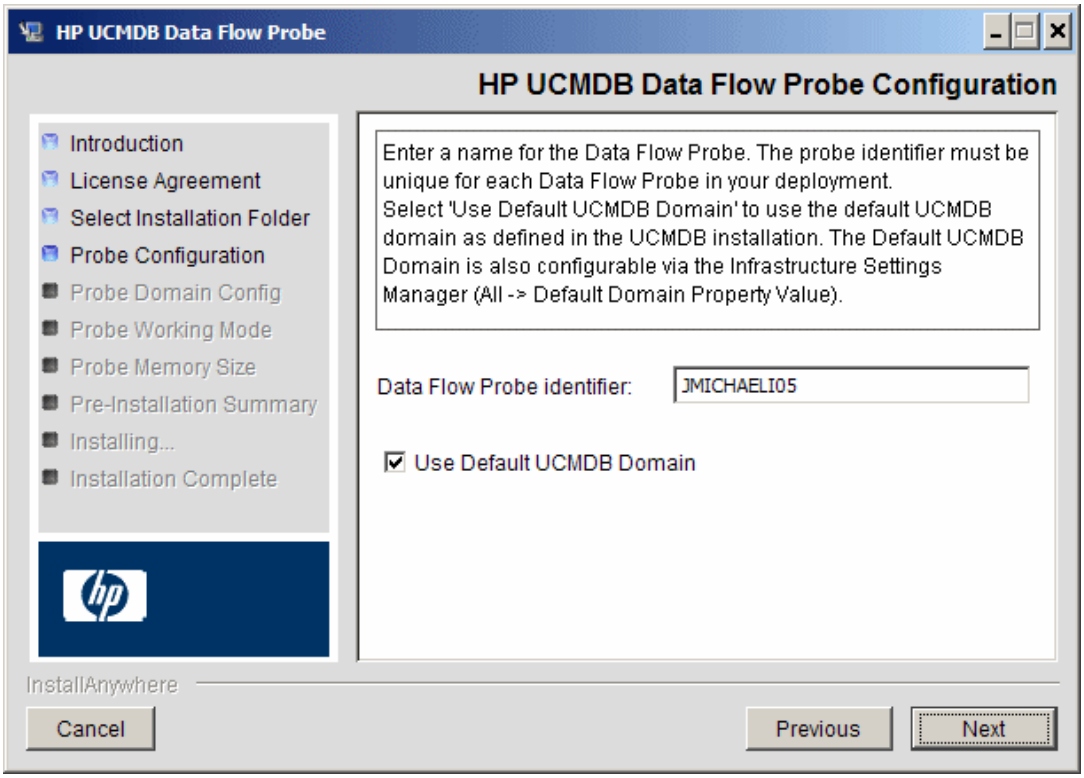


- **Application to report to.** Select the application server with which you are working:
  - **HP Universal CMDB**: In the **Application Server address** box, enter the name or the IP address of the HP Universal CMDB server to which the Probe is to be connected.
  - **HP BSM**: In the **Application Server address** box, enter the IP address or DNS name of the Gateway Server.
- In the **Data Flow Probe address** box, enter the IP address or DNS name of the machine on which you are currently installing the Probe, or accept the default.

  Note: If the machine has more than one IP address, enter a specific IP address, and not the DNS name.

  If you do not enter the address of the application server, a message is displayed. You can choose to continue to install the Probe without entering the address, or to return to the previous page and add the address. Click **Next**.

5. A second configuration page opens, enabling you to configure an identifier for the Probe.



- In the **Data Flow Probe Identifier** box, enter a name for the Probe that is used to identify it in your environment.

  Note: The Probe identifier is case sensitive, must be unique for each Probe in your deployment.

- Select **Use Default CMDB Domain** to use the default BSM IP address or machine name,

as defined in the BSM Server installation.

The Default UCMDB Domain is also configurable via Infrastructure Settings, available after installing Business Service Management (**Admin > Platform > Setup and Maintenance > Infrastructure Settings > Foundations > RTSM > Class Model Settings > Default Domain Property Value**).

Click **Next**.

6. If you cleared the **Use Default CMDB Domain** box in the previous step, the HP UCMDB Data Flow Probe Domain Configuration page opens.
   - **Data Flow Probe domain type.** Select the type of domain on which the Probe is to run:
     - **Customer.** Select if you are installing one or more Probes in your deployment.

       Note: Always use this option for new installations.

     - **External.** Select if you are upgrading from version 6.x systems.
   - **Data Flow Probe domain.** If you are not using the default domain defined in RTSM enter the name of the domain here.

   Click **Next**.

   Note: The installation procedure skips the HP UCMDB Data Flow Probe Working Mode dialog box. This is because the Probe Gateway and Probe Manager must be run as one Java process.

7. The HP UCMDB Data Flow Probe Memory Size page opens.

   Define the minimum and maximum memory to be allocated to the Probe. The values are measured in megabytes.

   Note: To change the maximum heap size value at a later point in time, update the following parameters in the **WrapperEnv.conf**file (located in **/opt/hp/UCMDB/DataFlowProbe/bin/**):
   - **set.GATEWAY_MAX_MEM**
   - **set.MANAGER_MAX_MEM**

   The maximum heap size allowed in 32-bit JVM is 1536 MB. If the Data Flow probe is installed in separate mode, each parameter will affect the corresponding process.

   Click **Next**.

8. The Pre-Installation Summary dialog box opens. Review the selections you have made.
9. Click **Install** to complete the installation of the Probe. When installation is complete the Install Complete page opens.

   Any errors occurring during installation are written to the following file:

   /opt/hp/UCMDB/DataFlowProbe/HP_UCMDB_Data_Flow_Probe_InstallLog.log.

   If you installed the Probe to another directory under **/opt/**, the log file is located there.

10. Click **Done**.

> **Note:** After installing the Probe, it is recommended that you disable virus scanning on the main directory that is used to store your MySQL table data. The default directory is **/opt/hp/UCMDB/DataFlowProbe/MySQL/**.

11. Activate the Probe by executing the following command:

```
/opt/hp/UCMDB/DataFlowProbe/bin/ProbeGateway.sh start
```

To activate the Probe in a console, execute the following command:

```
/opt/hp/UCMDB/DataFlowProbe/bin/ProbeGateway.sh console
```

The installed Probe is displayed in the New Integration Point dialog box, in the list of Probes. For details, see the section describing creating integration points in the *Data Flow Management Guide*.

> **Note:** The user running the Probe service must be a member of the Administrators group.

Probe Version Detection

> **Note:** This is relevant for Windows only.

The Probe reports its version when connecting to the server. The Probe version is displayed in Data Flow Management, in the **Details** pane of the Data Flow Probe Setup module. If the Probe version is not compatible with the server version (and there is no supported upgrade), an error is generated and the Probe is forced to shut down.

When you apply a new Cumulative Update Patch (CUP) to the UCMDB 9.05 server, the Probes do not shut down automatically, and are able to report new data to the server. However, this is not recommended. Therefore, when you apply a CUP to the server, you must also apply it to the Probes—either manually or automatically.

Running Probe Manager and Probe Gateway on Separate Machines

During installation, you can choose to separate the Probe Manager and Probe Gateway processes so that they run on separate machines. You must:

1. Install the Probe on both machines according to the procedure in "Installing the Data Flow Probe on Windows" on page 16. In the step that asks if you want to install the Probe Manager and Probe Gateway in separate mode, select **Yes**.
2. Perform the configuration in "Configuring the Probe Manager and Probe Gateway Components" on the next page.

> **Note:**

- At least one Probe Gateway component must be installed. Gateway is connected to the UCMDB Server, receives tasks from the Server, and communicates with the collectors (Probe Manager).
- Several Probe Managers can be installed. Managers run jobs and gather information from networks.
- The Probe Gateway should contain a list of attached Managers.
- The Probe Managers must know to which Gateway they are attached.

Configuring the Probe Manager and Probe Gateway Components

This section explains how to set up the Data Flow Probe when the Probe Manager and Probe Gateway run as separate processes on two machines.

Note: The Probe Manager name in both the probeMgrList.xml and DiscoveryProbe.properties files must be identical. The name is case sensitive.

1. Set up the Probe Gateway machine.
   a. Open the following file:

      C:\hp\UCMDB\DataFlowProbe\conf\probeMgrList.xml

   b. Locate the line beginning `<probeMgr ip=` and add the Manager machine name or IP address, for example:

      ```
      <probeMgr ip="OLYMPICS08">
      ```

   c. Open the following file:

      C:\hp\UCMDB\DataFlowProbe\conf\DiscoveryProbe.properties

   d. Locate the lines beginning `appilog.collectors.local.ip =` and `appilog.collectors.probe.ip =` and enter the Gateway machine name or IP address, for example:

      ```
      appilog.collectors.local.ip = STARS01
      appilog.collectors.probe.ip = STARS01
      ```

2. Set up the Probe Manager machine.

   In **C:\hp\UCMDB\DataFlowProbe\conf\DiscoveryProbe.properties**:

   a. Locate the line beginning `appilog.collectors.local.ip =` and enter the Manager machine name or IP address, for example:

      ```
      appilog.collectors.local.ip = OLYMPICS08
      ```

   b. Locate the line beginning `appilog.collectors.probe.ip =` and enter the Gateway machine name in uppercase, for example:

      ```
      appilog.collectors.probe.ip = STARS01
      ```

3. Start the services.
   a. On the Probe Manager machine, start the Manager service:

      Start > All Programs > UCMDB > Start Data Flow Probe Manager

   b. On the Probe Gateway machine, start the Gateway service:

      Start > All Programs > HP UCMDB > Start Data Flow Probe Gateway

Connecting a Data Flow Probe to a Non-Default Customer

You can connect a Data Flow Probe to a customer that is not the default customer. The default customer ID is 1.

1. Open the following file in a text editor:
   - **Windows: C:\hp\UCMDB\DataFlowProbe\conf\DiscoveryProbe.properties**
   - **Linux: ../DataFlowProbe/conf/DiscoveryProbe.properties**
2. Locate the `customerID` entry.
3. Update the value with the customer ID, for example, `customerId = 2`.
4. Restart the Probe so that it is updated with your changes.

Data Flow Probe Installation - Troubleshooting and Limitations

Repairing Corrupted Databases

The Data Flow Probe MySQL database may become corrupt without the possibility of recovery, for example, because the machine was shut down but the MySQL service was not stopped.

To repair the corruption:

1. Stop the Probe.
2. Run the repair tool:
   - Windows: Run the **repair_mysql.bat** tool from the following folder:

     C:\hp\UCMDB\DataFlowProbe\tools.
   - Linux: Run the **repair_mysql.sh** tool from the following folder:

     /opt/hp/UCMDB/DataFlowProbe/tools
3. Start the Probe.

If this procedure does not fix the corruption, contact HP Software Support.

Probe Downgrade or Rollback

Automatic downgrade or rollback of the probe version is not supported. To perform downgrade or to rollback a version upgrade, uninstall the probe and then install the required version.

Probe Restart

There are several situations where the Probe automatically restarts itself. For example, when deploying a new Content Pack or applying a CUP. In these cases, the Probe waits for 15 minutes to allow the running jobs to finish, and only then shuts down. Jobs that did not finish in that time (for example, long integrations) start running again when the Probe restarts.

Probe Terminated with OutOfMemoryError Error

If the Probe is terminated and the following error appears in probe-error.log file: **java.lang.OutOfMemoryError: PermGen space**, do the following:

1. Stop the probe.
2. Modify the PermSize parameters in the **WrapperGateway.conf** file:
   - **Windows:** Open **c:\HP\UCMDB\DataFlowProbe\bin\WrapperGateway.conf**
   - **Linux:** Open **/opt/hp/UCMDB/DataFlowProbe/bin/WrapperGateway.conf**

   and add the following lines to line 65:
   - `wrapper.java.additional.19=-XX:PermSize=128m`
   - `wrapper.java.additional.20=-XX:MaxPermSize=256m`
3. Save the file.
4. Modify the PermSize parameters in the **WrapperGateway.conf** file:
   - **Windows:** Open **c:\HP\UCMDB\DataFlowProbe\bin\WrapperManager.conf**
   - **Linux:** Open **/opt/hp/UCMDB/DataFlowProbe/bin/WrapperManager.conf**

   and add the following lines to line 65:
   - `wrapper.java.additional.19=-XX:PermSize=128m`
   - `wrapper.java.additional.20=-XX:MaxPermSize=256m`
5. Save the file.
6. Start the Probe.

Chapter 3

Data Flow Credentials Management

This chapter includes:

Data Flow Credentials Management Overview

To perform discovery or run integration, you must set up the credentials to access the remote system. Credentials are configured in the Data Flow Probe Setup window and saved in the RTSM Server. For details, see the section describing the Data Flow Probe setup in the Data Flow Management Guide.

Credentials storage is managed by the Confidential Manager (CM) component.

The Data Flow Probe can access the credentials using the CM client. The CM client resides on the Data Flow Probe and communicates with the CM server, which resides on the RTSM Server. Communication between the CM client and the CM server is encrypted, and authentication is required by the CM client when it connects to the CM server.

The CM client's authentication on the CM server is based on a LW-SSO component. Before connecting to the CM server, the CM client first sends an LW-SSO cookie. The CM server verifies the cookie and upon successful verification, communication with the CM client begins. For details about LW-SSO, see "Configure LW-SSO Settings" on page 33.

The communication between the CM client and the CM server is encrypted. For details about updating the encryption configuration, see "Configure CM Communication Encryption " on page 33.

Caution: The CM authentication uses the universal time defined on the computer (UTC). In order for the authentication to succeed, ensure that the universal time on the Data Flow probe and the UCMDB Server are the same. The server and probe may be located in different time zones, as UTC is independent of time zone or daylight savings time.

The CM client maintains a local cache of the credentials. The CM client is configured to download all credentials from the CM server and store them in a cache. The credentials changes are automatically synchronized from CM server on a continuous basis. The cache can be a file-system or in-memory cache, depending on the preconfigured settings. In addition, the cache is encrypted and cannot be accessed externally. For details about updating the cache settings, see "Configure the CM Client's Cache Mode on the Probe" on page 37. For details about updating the cache encryption, see "Configure the CM Client's Cache Encryption Settings on the Probe" on page 37.

For details on troubleshooting, see "Change Confidential Manager (CM) Client Log File Message Level" on page 40.

You can copy credentials information from one RTSM server to another. For details, see "Export and Import Credential and Range Information in Encrypted Format" on page 38.

Note: The **DomainScopeDocument** (DSD) that was used for credentials storage on the Probe (in UCMDB version 9.01 or earlier) no longer contains any credentials-sensitive

information. The file now contains a list of Probes and network range information. It also contains a list of credential entries for each domain, where each entry includes the credential ID and a network range (defined for this credential entry) only.

This section includes the following topics:

Basic Security Assumptions

You have secured the Gateway Server and Probe JMX console to enable access to BSM system administrators only, preferably through localhost access only.

Data Flow Probe Running in Separate Mode

When the Probe Gateway and Manager run as separate processes, the Confidential Manager (CM) client component becomes part of the Manager process. Credentials information is cached and used by the Probe Manager only. To access the CM server on the RTSM system, the CM client request is handled by the Gateway process and from there is forwarded to the RTSM system.

This configuration is automatic when the Probe is configured in separate mode.

Keeping the Credentials Cache Updated

On its first successful connection to the CM server, the CM client downloads all relevant credentials (all credentials that are configured in the probe's domain). After the first successful communication, the CM client retains continuous synchronization with the CM server. Differential synchronization is performed at one-minute intervals, during which only differences between the CM server and the CM client are synchronized. If the credentials are changed on the RTSM server side (such as new credentials being added, or existing credentials being updated or deleted), the CM client receives immediate notification from the RTSM server and performs additional synchronization.

Synchronizing All Probes with Configuration Changes

For successful communication, the CM client must be updated with the CM server authentication configuration (LW-SSO init string) and encryption configuration (CM communication encryption). For example, when the init string is changed on the server, the probe must know the new init string in order to authenticate.

The RTSM server constantly monitors for changes in the CM communication encryption configuration and CM authentication configuration. This monitoring is done every 15 seconds; in

case a change has occurred, the updated configuration is sent to the probes. The configuration is passed to the probes in encrypted form and stored on the probe side in secured storage. The encryption of configuration being sent is done using a symmetric encryption key. By default, the RTSM server and Data Flow Probe are installed with same default symmetric encryption key. For optimal security, it is highly recommended to change this key before adding credentials to the system. For details, see "Generate or Update the Encryption Key" on page 41.

Note: Due to the 15 second monitoring interval, it is possible that the CM client, on the Probe side, may not be updated with the latest configuration for a period of 15 seconds.

If you choose to disable the automatic synchronization of CM communication and authentication configuration between the RTSM server and the Data Flow Probe, each time you update the CM communication and authentication configuration on the RTSM server side, you should update all Probes with the new configuration as well. For details, see "Disable Automatic Synchronization of the CM Client Authentication and Encryption Settings Between the Server and Probes" on page 34.

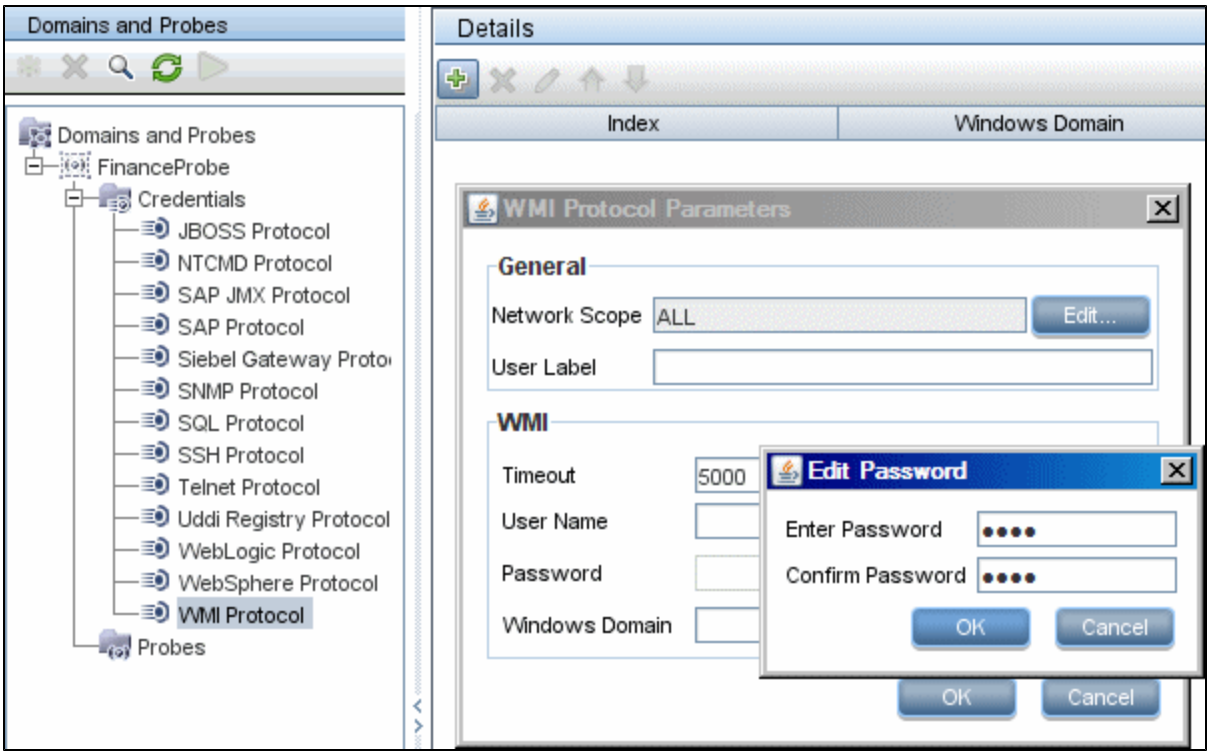
Secured Storage on the Probe

All sensitive information (such as the CM communication and authentication configuration and the encryption key) is stored on the Probe in secure storage in the **secured_storage.bin** file, located in **C:\hp\UCMDB\DataFlowProbe\conf\security**. This secured storage is encrypted using DPAPI, which relies on the Windows user password in the encryption process. DPAPI is a standard method used to protect confidential data—such as certificates and private keys—on Windows systems. The Probe should always run under the same Windows user, so that even if the password is changed, the Probe can still read the information stored in secure storage.

Viewing Credentials Information

Note: This section deals with viewing credential information when the data direction is from the RTSM to Business Service Management.

Passwords are not sent from the RTSM database to the application. That is, Business Service Management displays asterisks (*) in the password field, regardless of content:



Updating Credentials

Note: This section deals with updating credentials when the data direction is from Business Service Management to the RTSM.

- The communication in this direction is not encrypted, therefore you should connect to the BSM Gateway Server using https\SSL, or ensure connection through a trusted network.

  Although the communication is not encrypted, passwords are not being sent as clear text on the network. They are encrypted using a default key and, therefore, it is highly recommended to use SSL for effective confidentiality in transit.

- You can use special characters and non-English characters as passwords.

Configure CM Client Authentication and Encryption Settings

This task describes configuring the CM Client Authentication and Encryption Settings on the RTSM Server, and includes the following steps:

- "Configure LW-SSO Settings" on the next page
- "Configure CM Communication Encryption " on the next page

Configure LW-SSO Settings

This procedure describes how to change the LW-SSO init string on the RTSM server. This change is automatically sent to Probes (as an encrypted string), unless the RTSM server is configured to not automatically do this. For details, see "Disable Automatic Synchronization of the CM Client Authentication and Encryption Settings Between the Server and Probes" on the next page.

1. On the RTSM server, launch the Web browser and enter the following address: **http://localhost:8080/jmx-console**.
2. Click **UCMDB-UI:name=LW-SSO Configuration** to open the JMX MBEAN View page.
3. Locate the **setInitString** method.
4. Enter a new LW-SSO init string.
5. Click Invoke.

Configure CM Communication Encryption

This procedure describes how to change the CM communication encryption settings on the RTSM Server. These settings specify how the communication between the CM client and the CM server is encrypted. This change is automatically sent to Probes (as an encrypted string), unless the RTSM server is configured to not automatically do this. For details, see "Disable Automatic Synchronization of the CM Client Authentication and Encryption Settings Between the Server and Probes" on the next page.

1. On the RTSM server, launch the Web browser and enter the following address: **http://localhost:8080/jmx-console.**
2. Click **UCMDB:service=Security Services** to open the JMX MBEAN View page.
3. Click the **CMGetConfiguration** method.
4. Click **Invoke**.

   The XML of the current CM configuration is displayed.
5. Copy the contents of the displayed XML.
6. Navigate back to the **Security Services** JMX MBean View page.
7. Click the **CMSetConfiguration** method.
8. Paste the copied XML into the **Value** field.
9. Update the relevant transport-related settings.

   For details about the values that can be updated, see "CM Encryption Settings" on page 45.

   Example:

```
<transport>
        <encryptTransportMode>true</encryptTransportMode>
        <CMEncryptionDecryption>
                <encryptDecryptInitString>radiohead</encryptDecryptInitString>
```

```
                    <cryptoSource>lw</cryptoSource>
                    <lwJCEPBECompatibilityMode>true</lwJCEPBECompatibilityMode>
                    <cipherType>symmetricBlockCipher</cipherType>
                    <engineName>AES</engineName>
                    <algorithmModeName>CBC</algorithmModeName>
                    <algorithmPaddingName>PKCS7Padding</algorithmPaddingName>
                    <keySize>256</keySize>
                    <pbeCount>20</pbeCount>
                    <pbeDigestAlgorithm>SHA1</pbeDigestAlgorithm>
                    <encodingMode>Base64Url</encodingMode>
                    <useMacWithCrypto>false</useMacWithCrypto>
                    <macType>hmac</macType>
                    <macKeySize>256</macKeySize>
                    <macHashName>SHA256</macHashName>
            </CMEncryptionDecryption>
    </transport>
```

10. Click **Invoke**.

Configure CM Client Authentication and Encryption Settings Manually on the Probe

This task includes the following steps:

- "Disable Automatic Synchronization of the CM Client Authentication and Encryption Settings Between the Server and Probes" below
- "Configure CM Client Authentication and Encryption Settings on the Probe" on the next page
- "Configure CM Communication Encryption on the Probe" on the next page

Disable Automatic Synchronization of the CM Client Authentication and Encryption Settings Between the Server and Probes

By default, the UCMDB Server is configured to automatically send the CM/LW-SSO settings to all Probes. This information is sent as an encrypted string to the Probes, which decrypt the information upon retrieval. You can configure the UCMDB Server to not send the CM/LW-SSO configuration files automatically to all Probes. In this case, it is your responsibility to manually update all Probes with the new CM/LW-SSO settings.

To disable automatic synchronization of CM/LW-SSO settings:

1. In RTSM, click **Admin > RTSM Administration > Administration > Infrastructure Settings Manager > General Settings**.
2. Select **Enable automatic synchronization of CM/LW-SSO configuration and init string with probe.**
3. Click the **Value** field and change **True** to **False**.
4. Click the **Save** button.
5. Restart the RTSM server.

Configure CM Client Authentication and Encryption Settings on the Probe

This procedure is relevant if the RTSM Server has been configured to not send LW-SSO/CM configuration and settings automatically to Probes. For details, see "Disable Automatic Synchronization of the CM Client Authentication and Encryption Settings Between the Server and Probes" on the previous page.

1. On the Probe machine, launch the Web browser and enter the following address: **http://localhost:1977**.

   Note: If the Probe Manager and the Probe Gateway are running as separate processes, the address should be entered on the machine that is running the Probe Manager as follows: **http://localhost:1978**.

2. Click **type=CMClient** to open the JMX MBEAN View page.
3. Locate the **setLWSSOInitString** method and provide the same init string that was provided for RTSM's LW-SSO configuration.
4. Click the **setLWSSOInitString** button.

Configure CM Communication Encryption on the Probe

This procedure is relevant if the RTSM Server has been configured to not send LW-SSO/CM configuration and settings automatically to Probes. For details, see "Disable Automatic Synchronization of the CM Client Authentication and Encryption Settings Between the Server and Probes" on the previous page.

1. On the Probe machine, launch the Web browser and enter the following address: **http://localhost:1977**.

   Note: If the Probe Manager and the Probe Gateway are running as separate processes, the address should be entered on the machine that is running the Probe Manager as follows: **http://localhost:1978**.

2. Click **type=CMClient** to open the JMX MBEAN View page.

3. Update the following transport-related settings:

   Note: You must update the same settings that you updated on the RTSM server. To do this, some of the methods that you update on the Probe may require more than one parameter. To see the current probe configuration, click **displayTransportConfiguration** in the JMX MBEAN View page. For details, see "Configure CM Communication Encryption " on page 33. For details about the values that can be updated, see "CM Encryption Settings" on page 45.

   a. **setTransportInitString** changes the **encryptDecryptInitString** setting.

   b. **setTransportEncryptionAlgorithm** changes CM settings on the Probe according to the following map:

      - **Engine name** refers to the <engineName> entry
      - **Key size** refers to the <keySize> entry
      - **Algorithm padding name** refers to the <algorithmPaddingName> entry
      - **PBE count** refers to the <pbeCount> entry
      - **PBE digest algorithm** refers to the <pbeDigestAlgorithm> entry

   c. **setTransportEncryptionLibrary** changes CM settings on the Probe according to the following map:

      - **Encryption Library name** refers to the <cryptoSource> entry
      - **Support previous lightweight cryptography versions** refers to the <lwJCEPBECompatibilityMode> entry

   d. **setTransportMacDetails** change CM settings on the Probe according to the following map:

      - **Use MAC with cryptography** refers to the <useMacWithCrypto> entry
      - **MAC key size** refers to the <macKeySize> entry

4. Click the **reloadTransportConfiguration** button to make the changes effective on the Probe.

For details about the different settings and their possible values, see "CM Encryption Settings" on page 45.

Configure the Confidential Manager (CM) Client Cache

This task includes the following steps:

- "Configure the CM Client's Cache Mode on the Probe" on the next page
- "Configure the CM Client's Cache Encryption Settings on the Probe" on the next page

Configure the CM Client's Cache Mode on the Probe

The CM client stores credentials information in the cache and updates it when the information changes on the Server. The cache can be stored on the file system or in memory:

- **When stored on the file system**, even if the Probe is restarted and cannot connect to the Server, the credentials information is still available.
- **When stored in memory**, if the Probe is restarted, the cache is cleared and all information is retrieved again from the Server. If the Server is not available, the Probe does not include any credentials, so no discovery or integration can run.

To change this setting:

1. Open the **DiscoveryProbe.properties** file in a text editor. This file is located in the **c:\hp\UCMDB\DataFlowProbe\conf** folder.
2. Locate the following attribute:
   com.hp.ucmdb.discovery.common.security.storeCMData=true
   - To store the information on the file system, leave the default (**true**).
   - To store the information in memory, enter **false**.
3. Save the **DiscoveryProbe.properties** file.
4. Restart the Probe.

Configure the CM Client's Cache Encryption Settings on the Probe

This procedure describes how to change the encryption settings of the CM client's file system cache file. Note that changing the encryption settings for the CM client's file system cache causes the file system cache file to be recreated. This recreation process requires restarting the Probe and full synchronization with the RTSM Server.

1. On the Probe machine, launch the Web browser and enter the following address:
   http://localhost:1977.

   Note: If the Probe Manager and the Probe Gateway are running as separate processes, the address should be entered on the machine that is running the Probe Manager as follows: **http://localhost:1978**.
2. Click **type=CMClient** to open the JMX MBEAN View page.
3. Update the following cache-related settings:

   Note: Some of the methods that you update on the Probe may require more than one parameter. To see the current probe configuration, click **displayCacheConfiguration** in

the JMX MBEAN View page.

a. **setCacheInitString** changes the file system cache <encryptDecryptInitString> setting.

b. **setCacheEncryptionAlgorithm** changes the file system cache settings according to the following map:

- **Engine name** refers to the <engineName> entry
- **Key size** refers to the <keySize> entry
- **Algorithm padding name** refers to the <algorithmPaddingName> entry
- **PBE count** refers to the <pbeCount> entry
- **PBE digest algorithm** refers to the <pbeDigestAlgorithm> entry

c. **setCacheEncryptionLibrary** changes the cache file system settings according to the following map:

- **Encryption Library name** refers to the <cryptoSource> entry
- **Support previous lightweight cryptography versions** refers to the <lwJCEPBECompatibilityMode> entry

d. **setCacheMacDetails** changes the cache file system settings according to the following map:

- **Use MAC with cryptography** refers to the <useMacWithCrypto> entry
- **MAC key size** refers to the <macKeySize> entry

4. Click the **reloadCacheConfiguration** button to make the changes effective on the Probe. This causes the Probe to restart.

Note: Make sure that no job is running on the Probe during this action.

For details about the different settings and their possible values, see "CM Encryption Settings" on page 45.

Export and Import Credential and Range Information in Encrypted Format

You can export and import credentials and network range information in encrypted format in order to copy the credentials information from one RTSM Server to another. For example, you might perform this operation during recovery following a system crash or during upgrade.

- **When exporting credentials information,** you must enter a password (of your choosing). The information is encrypted with this password.
- **When importing credentials information,** you must use the same password that was defined when the DSD file was exported.

Note: The exported credentials document also contains ranges information that is defined on the system from which the document was exported. During the import of the credentials document, ranges information is imported as well.

Caution: To import credentials information from a UCMDB version 8.02 domainScopeDocument, you must use the key.bin file located on the version 8.02 system.

To export credentials information from the RTSM Server:

1. On the RTSM Server, launch the Web browser and enter the following address: **http://localhost:8080/jmx-console**. You may have to log in with a user name and password.
2. Click **UCMDB:service=DiscoveryManager** to open the JMX MBEAN View page.
3. Locate the **exportCredentialsAndRangesInformation** operation. Do the following:
   - Enter your customer ID (the default is 1).
   - Enter a name for the exported file.
   - Enter your password.
   - Set **isEncrypted=True** if you want the exported file to be encrypted with the provided password, or **isEncrypted=False** if you want the exported file to not be encrypted (in which case passwords and other sensitive information are not exported).
4. Click **Invoke** to export.

   When the export process completes successfully, the file is saved to the following location: **c:\hp\UCMDB\UCMDBServer\conf\discovery\<customer_dir>**.

To import credentials information from the RTSM Server:

1. On the RTSM Server, launch the Web browser and enter the following address: **http://localhost:8080/jmx-console**.

   You may have to log in with a user name and password.
2. Click **UCMDB:service=DiscoveryManager** to open the JMX MBEAN View page.
3. Locate one of the following operations:
   - Locate the **importCredentialsAndRangesInformation** operation if the file that you are importing was exported from a RTSM Server that is later than version 8.02.
   - Locate the **importCredentialsAndRangesWithKey** operation if the file that you are importing was exported from a RTSM version 8.02 Server.
4. Enter your customer ID (the default is 1).
5. Enter the name of the file to import. This file must be located in **c:\hp\UCMDB\UCMDBServer\conf\discovery\<customer_dir>**.
6. Enter the password. This must be the same password that was used when the file was exported.

7. If the file was exported from a RTSM version 8.02 system, enter the **key.bin** file name. This file must be located in **c:\hp\UCMDB\UCMDBServer\conf\discovery\<customer_dir>**, together with the file to be imported.
8. Click **Invoke** to import the credentials.

Change Confidential Manager (CM) Client Log File Message Level

The Probe provides two log files that contain information regarding CM-related communication between the CM server and the CM client. The files are:

- "CM Client Log File" below
- "LW-SSO Log File" below

CM Client Log File

The **security.cm.log** file is located in the **c:\hp\UCMDB\DataFlowProbe\runtime\log** folder.

The log contains information messages exchanged between the CM server and the CM client. By default, the log level of these messages is set to INFO.

To change the log level of the messages to DEBUG level:

1. On the Data Flow Probe Manager server, navigate to **c:\hp\UCMDB\DataFlowProbe\conf\log**.
2. Open the **security.properties** file in a text editor.
3. Change the line:

   ```
   loglevel.cm=INFO
   ```

   to:

   ```
   loglevel.cm=DEBUG
   ```

4. Save the file.

LW-SSO Log File

The **security.lwsso.log** file is located in the **c:\hp\UCMDB\DataFlowProbe\runtime\log** folder.

The log contains information messages related to LW-SSO. By default, the log level of these messages is set to INFO.

To change the log level of the messages to DEBUG level:

1. On the Data Flow Probe Manager server, navigate to **c:\hp\UCMDB\DataFlowProbe\conf\log**.
2. Open the security.properties file in a text editor.
3. Change the line:

```
loglevel.lwsso=INFO
```

to:

```
loglevel.lwsso=DEBUG
```

4. Save the file.

Generate or Update the Encryption Key

You can generate or update an encryption key to be used for encryption or decryption of CM communication and authentication configurations exchanged between the RTSM Server and the Data Flow Probe. In each case (generate or update), the RTSM Server creates a new encryption key based on parameters that you supply (for example, key length, extra PBE cycles, JCE provider) and distributes it to the Probes.

The result of running the **generateEncryptionKey** method is a new generated encryption key. This key is stored only in secured storage and its name and details are not known. If you reinstall an existing Data Flow Probe, or connect a new Probe to the RTSM Server, this new generated key is not recognized by the new Probe. In these cases, it is preferable to use the **changeEncryptionKey** method to change encryption keys. This way, when you reinstall a Probe or install a new Probe, you can import the existing key (whose name and location you know) by running the **importEncryptionKey** method on the Probe JMX console.

Note:

- The difference between the methods used to create a key (**generateEncryptionKey**) and update a key (**changeEncryptionKey**) is that **generateEncryptionKey** creates a new, random encryption key, while **changeEncryptionKey** imports an encryption key whose name you provide.
- Only one encryption key can exist on a system, no matter how many Probes are installed.

This task includes the following steps:

- "Generate a New Encryption Key" below
- "Update an Encryption Key on a RTSM Server" on the next page
- "Update an Encryption Key on a Probe" on page 43
- "Manually Change the Encryption Key when the Probe Manager and Probe Gateway are Installed on Separate Machines" on page 44
- "Define Several JCE Providers" on page 44

Generate a New Encryption Key

You can generate a new key to be used by the RTSM Server and Data Flow Probe for encryption or decryption. The RTSM Server replaces the old key with the new generated key, and distributes this key among the Probes.

To generate a new encryption key through the JMX console:

1. On the RTSM server, launch the Web browser and enter the following address: **http://localhost:8080/jmx-console**.

   You may have to log in with a user name and password.

2. Click **UCMDB:service=DiscoveryManager** to open the JMX MBEAN View page.

3. Locate the generateEncryptionKey operation.

   a. In the **customerId** parameter box, enter 1 (the default).

   b. For **keySize**, specify the length of the encryption key. Valid values are 128, 192, or 256.

   c. For **usePBE**, specify **True** or **False**:

      - **True:** use additional PBE hash cycles.
      - **False:** do not use additional PBE hash cycles.

   d. For **jceVendor**, you can choose to use a non-default JCE provider. If the box is empty, the default provider is used.

   e. For **autoUpdateProbe**, specify **True** or **False**:

      - **True:** the server distributes the new key to the Probes automatically.
      - **False:** the new key should be placed on the Probes manually.

   f. For **exportEncryptionKey**, specify **True** or **False**.

      - **True:** In addition to creating the new password and storing it in secured storage, the Server exports the new password to the file system (**c:\hp\UCMDB\UCMDBServer\conf\discovery\key.bin**). This option enables you to update Probes manually with the new password.
      - **False:** The new password is not exported to the file system. To update Probes manually, set **autoUpdateProbe** to False and **exportEncryptionKey** to True.

   > **Note:** Make sure that the Probe is up and connected to the server. If the Probe goes down, the key cannot reach the Probe. If you change the key before the Probe goes down, once the Probe is up again, the key is sent again to the Probe. However, if you have changed the key more than once before the Probe goes down, you must change the key manually through the JMX console. (Select **False** for **exportEncryptionKey**).

4. Click **Invoke** to generate the encryption key.

Update an Encryption Key on a RTSM Server

You use the **changeEncryptionKey** method to import your own encryption key to the RTSM server and distribute it among all Probes.

To update an encryption key through the JMX Console:

1. On the RTSM Server, launch the Web browser and enter the following address: **http://localhost:8080/jmx-console.**

   You may have to log in with a user name and password.

2. Click **UCMDB:service=DiscoveryManager** to open the JMX MBEAN View page.

3. Locate the **changeEncryptionKey** operation.

   a. In the **customerId** parameter box, enter **1** (the default).

   b. For **newKeyFileName**, enter the name of the new key.

   c. For **keySizeInBits**, specify the length of the encryption key. Valid values are 128, 192, or 256.

   d. For **usePBE**, specify **True** or **False**:

      - **True:** use additional PBE hash cycles.
      - **False:** do not use additional PBE hash cycles.

   e. For **jceVendor**, you can choose to use a non-default JCE provider. If the box is empty, the default provider is used.

   f. For **autoUpdateProbe**, specify **True** or **False**:

      - **True:** the server distributes the new key to the Probes automatically.
      - **False:** the new key should be distributed manually using the Probe JMX console.

   > **Note:** Make sure that the Probe is up and connected to the server. If the Probe goes down, the key cannot reach the Probe. If you change the key before the Probe goes down, once the Probe is up again, the key is sent again to the Probe. However, if you have changed the key more than once before the Probe goes down, you must change the key manually through the JMX console. (Select **False** for **autoUpdateProbe**).

4. Click **Invoke** to generate and update the encryption key.

Update an Encryption Key on a Probe

If you choose not to distribute an encryption key from the RTSM Server to all Probes automatically (because of security concerns), you should download the new encryption key to all Probes and run the **importEncryptionKey** method on the Probe:

1. Place the encryption key file in **C:\hp\UCMDB\DataFlowProbe\conf\security**.

2. On the Probe machine, launch the Web browser and enter the following address: **http://localhost:1977**.

   You may have to log in with a user name and password.

   > **Note:** If the Probe Manager and the Probe Gateway are running as separate processes,

> the address should be entered on the machine that is running the Probe Manager as follows: **http://localhost:1978**.

3. On the Probe domain, click **type=SecurityManagerService**.
4. Locate the **importEncryptionKey** method.
5. Enter the name of the encryption key file that resides in **C:\hp\UCMDB\DataFlowProbe\conf\security**. This file contains the key to be imported.
6. Click the **importEncryptionKey** button.
7. Perform a restart of the probe.

Manually Change the Encryption Key when the Probe Manager and Probe Gateway are Installed on Separate Machines

1. On the Probe Manager machine, start the Probe Manager service (**Start > Programs > HP UCMDB > Probe Manager**).
2. Import the key from the server, using the Probe Manager JMX. For details, see "Generate a New Encryption Key" on page 41.
3. After the encryption key is imported successfully, restart the Probe Manager and Probe Gateway services.

Define Several JCE Providers

When you generate an encryption key through the JMX Console, you can define several JCE providers, using the **changeEncryptionKey** and **generateEncryptionKey** methods.

To change the default JCE provider:

1. Register the JCE provider jar files in **$JRE_HOME/lib/ext**.
2. Copy the jar files to the $JRE_HOME folder:
   - For the RTSM Server: $JRE_HOME resides at: **c:\hp\UCMDB\UCMDBServer\bin\jre**
   - For the Data Flow Probe: $JRE_HOME resides at: **c:\hp\UCMDB\DataFlowProbe\bin\jre**
3. Add the provider class at the end of the provider list in the **$JRE_HOME\lib\security\java.security** file.
4. Update the **local_policy.jar** and **US_export_policy.jar** files to include unlimited JCE policies. You can download these jar files from the Sun Web site.
5. Restart the RTSM Server and the Data Flow Probe.
6. Locate the JCE vendor field for the **changeEncryptionKey** or **generateEncryptionKey** method, and add the name of the JCE provider.

CM Encryption Settings

This table lists the encryption settings that can be changed using various JMX methods. These encryption settings are relevant for encryption of communications between the CM client and the CM server, as well as for encryption of the CM client's cache.

CM Setting Name	Probe CM Setting Name	Setting Description	Possible Values	Default Value
cryp-toSource	Encryption Library name	This setting defines which encryption library to use.	lw, jce, windowsDPAPI, lwJCE-Compatible	lw
lwJCEPBE Compatibility Mode	Support previous lightweight cryp-tography versions	This setting defines whether to support previous lightweight cryptography or not.	true, false	true
engineName	Engine name	Encryption mechanism name	AES, DES, 3DES, Blowfish	AES
keySize	Key size	encryption key length in bits	For AES - 128, 192 or 256; For DES - 64; For 3DES - 192; For Blowfish - any number between 32 and 448	256
algorithm Padding Name	Algorithm padding name	Padding standards	PKCS7Padding, PKCS5Padding	PKCS7Pa-dding
pbeCount	PBE count	The number of times to run the hash to create the key from password (init string)	Any positive number	20
pbeDigest Algorithm	PBE digest algorithm	Hashing type	SHA1, SHA256, MD5	SHA1
useMacWith Crypto	Use MAC with cryp-tography	Indication if to use MAC with the cryptography	true, false	false
macKeySize	MAC key size	Depends on MAC algorithm	256	256

Troubleshooting and Limitations

If you change the default domain name on the UCMDB server, you must first verify that the Data Flow Probe is not running. After the default domain name is applied, you must execute the **DataFlowProbe\tools\clearProbeData.bat** script on the Data Flow Probe side.

Note: Execution of the clearProbeData.bat script will cause a discovery cycle on the Probe side once the Probe is up.

Chapter 4

Data Flow Probe Hardening

This chapter includes:

Set the MySQL Database Encrypted Password

This section explains how to encrypt the password for the MySQL database user.

1. **Create the Encrypted Form of a Password (AES, 192-bit key)**

   a. Access the Data Flow Probe JMX console. Launch a Web browser and enter the following address: **http://<Data Flow Probe machine name or IP address>:1977**. If you are running the Data Flow Probe locally, enter **http://localhost:1977**.

   You may have to log in with a user name and password.

   > **Note:** If you have not created a user, use the default user name admin and the password admin to log in.

   b. Locate the **Type=MainProbe** service and click the link to open the Operations page.

c. Locate the **getEncryptedDBPassword** operation.

d. In the **DB Password** field, enter the password to be encrypted.

e. Invoke the operation by clicking the **getEncryptedDBPassword** button.

The result of the invocation is an encrypted password string, for example:

```
66,85,54,78,69,117,56,65,99,90,86,117,97,75,50,112,65,53,67,114,
112,65,61,61
```

2. **Stop the Data Flow Probe**

Start > All Programs > HP UCMDB > Stop Data Flow Probe

3. **Run the set_dbuser_password.cmd Script**

This script is located in the following folder:
C:\hp\UCMDB\DataFlowProbe\tools\dbscripts\set_dbuser_password.cmd

Run the **set_dbuser_password.cmd** script with the new password as an argument, for example, **set_dbuser_password <my_password>**.

The password must be entered in its unencrypted form (as plain text).

4. **Update the Password in the Data Flow Probe Configuration Files**

a. The password must reside encrypted in the configuration files. To retrieve the password's encrypted form, use the **getEncryptedDBPassword** JMX method, as explained in step 1.

b. Add the encrypted password to the following properties in the **C:\hp\UCMDB\DataFlowProbe\conf\DiscoveryProbe.properties** file.

- **appilog.agent.probe.jdbc.pwd**

  For example:

  ```
  appilog.agent.probe.jdbc.user = mamprobe
  appilog.agent.probe.jdbc.pwd =
  66,85,54,78,69,117,56,65,99,90,86,117,97,75,50,112,65,53,67,
  114,112,65,61,61
  ```

- **appilog.agent.local.jdbc.pwd**

5. **Start the Data Flow Probe**

Start > All Programs > HP UCMDB > Start Data Flow Probe

Using the clearProbeData.bat Script

The **clearProbeData.bat** script recreates the database user with a password that is provided as an argument to the script.

After you set a password, each time you execute the **clearProbeData.bat** script, it retrieves the database password as an argument.

After running the script:

- Review the following file for errors:
  C:\hp\UCMDB\DataFlowProbe\runtime\log\probe_setup.log

- Delete the following file, as it contains the database password:
  C:\hp\UCMDB\DataFlowProbe\runtime\log\probe_setup.log

Set the JMX Console Encrypted Password

This section explains how to encrypt the password for the JMX user. The encrypted password is stored in the DiscoveryProbe.properties file. Users must log in to access the JMX console.

1. **Create the Encrypted Form of a Password (AES, 192-bit key)**

   a. Access the Data Flow Probe JMX console. Launch a Web browser and enter the following address: **http://<Data Flow Probe machine name or IP address>:1977**. If you are running the Data Flow Probe locally, enter **http://localhost:1977**.

   You may have to log in with a user name and password.

   > **Note:** If you have not created a user, use the default user name admin and the password admin to log in.

   b. Locate the **Type=MainProbe** service and click the link to open the Operations page.

   c. Locate the **getEncryptedKeyPassword** operation.

   d. In the **Key Password** field, enter the password to be encrypted.

   e. Invoke the operation by clicking the **getEncryptedKeyPassword** button.

   The result of the invocation is an encrypted password string, for example:

   ```
   85,-9,-61,11,105,-93,-81,118
   ```

2. **Stop the Data Flow Probe**

   Start > All Programs > HP UCMDB > Stop Data Flow Probe

3. **Add the Encrypted Password**

   Add the encrypted password to the following property in the **C:\hp\UCMDB\DataFlowProbe\conf\DiscoveryProbe.properties** file.

   appilog.agent.Probe.JMX.BasicAuth.Pwd

   For example:

   ```
   appilog.agent.Probe.JMX.BasicAuth.User=admin
   appilog.agent.Probe.JMX.BasicAuth.Pwd=-85,-9,-61,11,105,-93,-81,118
   ```

   > **Note:** To disable authentication, leaves these fields empty. If you do so, users can open the main page of the Probe's JMX console without entering authentication.

4. **Start the Data Flow Probe**

   Start > All Programs > HP UCMDB > Start Data Flow Probe

   Test the result in a Web browser.

Restrict the Data Flow Probe's Access to the MySQL Server

This section explains how to permit access to the Data Flow Probe's MySQL database from the local machine only.

To restrict MySQL access:

Run the following script in a command prompt window or by double-clicking it: **C:\hp\UCMDB\DataFlowProbe\tools\dbscripts\remove_remote_user_access.cmd.**

Any user (other than the root user) trying to connect from a remote computer will now be denied access.

Note: Users who have root credentials to the MySQL database will still be able to access the database from the remote machine.

Enable Authentication on the Data Flow Probe with Basic HTTP Authentication

Important: The basic authentication method of enabling authentication on the Data Flow Probe is the least preferred method. It is recommended to use mutual authentication security, as it is a much more effective method of security (it combines data encryption and certificate authentication). For details, see "Enable SSL between BSM and Data Flow Probe with Mutual Authentication" below.

If SSL is not enabled, credentials are transmitted to UCMDB as plain-text.

To set basic authentication:

1. Locate the following file: **C:\hp\UCMDB\DataFlowProbe\conf\DiscoveryProbe.properties**.
2. Remove the comment markers (#) from the following properties, and enter the relevant credentials:

   ```
   appilog.agent.Probe.BasicAuth.Realm=

   appilog.agent.Probe.BasicAuth.User=

   appilog.agent.Probe.BasicAuth.Pwd=
   ```

The credentials should match those defined on the BSM server.

Enable SSL between BSM and Data Flow Probe with Mutual Authentication

You can set up authentication for both the Data Flow Probe and BSM (running an RTSM), with certificates. The certificate for each side is sent and authenticated before the connection is established.

Note: The following method of enabling SSL on the Data Flow Probe replaces the procedure for basic authentication, which is not recommended.

Prerequisites

Set up the BSM server with an RTSM, running in SSL. Client certificates are required.

Enable Mutual Certificate Authentication

If the certificate used by the Run-time Service Model Web server is issued by a trusted Certificate Authority (CA), it is most likely that you do not have to perform the following procedure.

During authentication, BSM running an RTSM sends its certificate to the Data Flow Probe client machine, and the Data Flow Probe sends its certificate to BSM running an RTSM.

1. Download CA root certificate, encoded in base-64, and save it with the following name: **c:\cacert.cer**.
2. Import the Certificate Authority certificate into the DFM Java truststore by running the following command:

   ```
   C:\hp\UCMDB\DataFlowProbe\jre\bin>keytool -import -trustcacerts -
   alias ddmTrustedCA -keystore ..\lib\security\cacerts -file
   c:\cacert.cer
   ```

   a. Type the following keystore password: **changeit**

   b. When asked **Trust this certificate?**, enter **yes**.
3. Create a keystore by running the following command:

   ```
   C:\hp\UCMDB\DataFlowProbe\jre\bin>keytool -genkey -keyalg RSA -
   alias ddmkey -keystore

   C:\hp\UCMDB\DataFlowProbe\root\lib\security\client.keystore
   ```

   a. Choose your password and enter your details. **Important:** Enter the full hostname for **first and last name**.

   b. When asked, Is **CN=... correct?** type **yes**.

   c. Press Enter to set the same password for the key.
4. Create a certificate request for CA to sign by running the following command:

   ```
   C:\hp\UCMDB\DataFlowProbe\jre\bin>keytool -certreq -alias ddmkey -
   file c:\ddm.csr  -keystore

   C:\hp\UCMDB\DataFlowProbe\root\lib\security\client.keystore
   ```

   Enter the keystore password.
5. Submit the **c:\ddm.csr** file to your Certificate Authority and acquire a signed client certificate in base-64 encoding.
6. Import the CA certificate into the keystore by running the following command:

   ```
   C:\hp\UCMDB\DataFlowProbe\jre\bin>keytool -import -alias
   ddmTrustedCA -file c:\cacert.cer -keystore
   ```

```
C:\hp\UCMDB\DataFlowProbe\root\lib\security\client.keystore
```

Enter the keystore password and when asked **Trust this certificate?**, enter **yes**.

7. Import the client certificate into the keystore by running the following command:

```
C:\hp\UCMDB\DataFlowProbe\jre\bin>keytool -import -alias ddmkey -
file c:\<SIGNED_CERT> -keystore

C:\hp\UCMDB\DataFlowProbe\root\lib\security\client.keystore
```

<SIGNED_CERT> is the full path to the certificate acquired in step 5 above.

Make sure that the output message is **Certificate reply was installed in keystore**.

8. List the contents of the keystore by running the following command:

```
C:\hp\UCMDB\DataFlowProbe\jre\bin>keytool -list -keystore

C:\hp\UCMDB\DataFlowProbe\root\lib\security\client.keystore
```

Enter the keystore password.

Verify that the output includes both **keyEntry** and **trustedCertEntry**.

9. Change the **ssl.properties** file, located in the **C:\hp\UCMDB\DataFlowProbe\root\lib\security** folder. Update the keystore and truststore file names to point to the files you created previously:

```
# Path to Keystore and Truststore files

javax.net.ssl.-
key-
Store=C:\hp\UCMDB\DataFlowProbe\\root\\lib\\security\\client.keystore

javax.net.ssl.tr-
ustStore=C:\hp\UCMDB\DataFlowProbe\\jre\\lib\\security\\cacerts
```

(Note the double backslashes.)

10. Update the keystore and truststore passwords:

    a. You encrypt the password through the Probe's JMX console: Launch a Web browser and enter the following address: **http://<Data Flow Probe machine name or IP address>:1977**. If you are running the Data Flow Probe locally, enter **http://localhost:1977**.

       You may have to log in with a user name and password.

    b. Locate the **Type=MainProbe** service and click the link to open the JMX MBEAN View page.

    c. Locate the **getEncryptedKeyPassword** operation.

    d. Enter your keystore or truststore password in the **Key Password** field and click **getEncryptedKeyPassword**.

    e. Open the **ssl.properties** file in the following folder: **C:\hp\UCMDB\DataFlowProbe\root\lib\security**.

    f. Copy and paste the encrypted password (numbers separated by commas, for example, 1,

2,3,4,5) into the relevant keystore or truststore line of the **ssl.properties** file.

g. Save the file.

11. Update the C:\hp\UCMDB\DataFlowProbe\root\lib\collectors\DiscoveryProbe.properties file:
    a. Change the **appilog.agent.probe.protocol** parameter to **HTTPS**.
    b. Make sure the **serverPortHttps** value is **443**.
12. Restart the Data Flow Probe.

Configure SSL from the Data Flow Probe to the Gateway Server

When a session is started between the Data Flow Probe and the Gateway Server, the Gateway Server sends the Probe a server-side certificate that was issued by a Certification Authority (CA) recognized by the Gateway Server. The Data Flow Probe engine should be configured to trust the certificate or the CA that issued it, and to communicate via SSL.

1. Prerequisite: Configure HP Universal CMDB to use SSL.
2. Prerequisite: Install the Data Flow Probe. During installation, enter the name of the HP Universal CMDB Gateway server to which the Probe must report results.
3. If you are working with the Certificate Authority, download the current Certificate Authority certificate to your Data Flow Probe server. Save it to a file, for example, **C:\ca.cer**.
4. Import this certificate into the Data Flow Probe JVM: **C:\hp\UCMDB\DataFlowProbe\jre\bin** with the following values:

   ```
   keytool -import -trustcacerts -alias <your alias> -keystore
   ..\lib\security\cacerts -file <file path and name>
   ```

5. Enter the password and click **Yes** to confirm.
6. Set the connection parameters in the Data Flow Probe.
   a. Open the file **%discovery root%\root\lib\collectors\DiscoveryProbe.properties**.
   b. Configure the URL of the HP Universal CMDB server:

      ```
      serverName = <HP Universal CMDB Gateway server domain name>
      ```

      Note: The SSL connection may fail if an IP address is used instead of domain name.
   c. Configure the port number to use for HTTPS:

      ```
      # Ports used for HTTP/s traffic

      #serverPort = 80

      serverPortHttps = 443
      ```

   d. Set the schema to be used by the Agent to HTTPS:

      ```
      # Can be either HTTP or HTTPS

      appilog.agent.probe.protocol = HTTPS
      ```

e. Set the name of the HP Universal CMDB server:

```
# Name of the Server machine to which this probe reports

serverName = <server name either of the reverse proxy or the
Gateway server>
```

7. Restart the Data Flow Probe.

Connect the Data Flow Probe by Reverse Proxy

Perform the following procedure to connect the Data Flow Probe by reverse proxy.

Note: Enabling mutual authentication when using SSL between the BSM Server and the Data Flow Probe is not supported when the connection is made by reverse proxy.

To configure the Data Flow Probe to work against a reverse proxy:

1. Edit the **discoveryProbe.properties** file (located in **C:\hp\UCMDB\DataFlowProbe\conf**).
2. Set the **serverName** property to the reverse proxy server's IP or DNS name.
3. Set the **serverPort** and **serverPortHttps** properties to the reverse proxy server's ports.
4. Save the file.

The following proxy server configuration is required if Data Flow Probes only are connected via a reverse proxy to BSM:

Requests for... on the Reverse Proxy Server	Proxy Request to be Served by:
/mam-collectors	http://[BSM server]/mam-collectors

The following configuration is required if a SOAP adapter is used for replication via a reverse proxy to a secure (hardened) BSM:

Requests for... on the Reverse Proxy Server	Proxy Request to be Served by:
/axis2	http://[BSM server]/axis2

Connecting the Data Flow Probe and Web Clients by Reverse Proxy

The following configuration is required if both Data Flow Probes and application users are connected via a reverse proxy to BSM:

Requests for... on the Reverse Proxy Server	Proxy Request to be Served by:
/mam	[BSM server]/mam

Requests for... on the Reverse Proxy Server	Proxy Request to be Served by:
/mam_images	[BSM server]/mam_images
/mam-collectors	[BSM server]/mam-collectors
/ucmdb	[BSM server]/ucmdb
/site	[BSM server]/site

Control the Location of the domainScopeDocument File

The Probe's file system holds (by default) both the encryption key and the **domainScopeDocument** file. Each time the Probe is started, the Probe retrieves the **domainScopeDocument** file from the server and stores it on its file system. To prevent unauthorized users from obtaining these credentials, you can configure the Probe so that the **domainScopeDocument** file is held in the Probe's memory and is not stored on the Probe file system.

To control the location of the domainScopeDocument file:

1. Open **C:\hp\UCMDB\DataFlowProbe\conf\DiscoveryProbe.properties** and change:

   ```
   appilog.collectors.storeDomainScopeDocument=true
   ```

   to:

   ```
   appilog.collectors.storeDomainScopeDocument=false
   ```

   The Probe Gateway and Probe Manager serverData folders no longer contain the **domainScopeDocument** file.

   For details on using the **domainScopeDocument** file to harden DFM, see "Data Flow Credentials Management" on page 28.

2. Restart the Probe.

Create a Keystore for the Data Flow Probe

1. On the Probe machine, run the following command:

   ```
   C:\HP\UCMDB\DataFlowProbe\bin\jre\bin\keytool -genkey -alias
   probekey -keyalg
   RSA -keystore
   C:\HP\UCMDB\DataFlowProbe\conf\security\client.keystore
   ```

2. Enter a password for the new keystore.
3. Enter your information when asked.
4. When asked **Is CN=… C=… Correct?** enter **yes**, and press **Enter**.
5. Press **Enter** again to accept the keystore password as the key password.

6. Verify that **client.keystore** is created in the following directory: **C:\HP\UCMDB\DataFlowProbe\conf\security**.

Encrypt the Probe Keystore and Truststore Passwords

The Probe keystore and truststore passwords are stored encrypted in **C:\HP\UCMDB\DataFlowProbe\conf\security\ssl.properties**. This procedure explains how to encrypt the password.

1. Start Data Flow Probe (or verify that it is already running).
2. Access the Data Flow Probe JMX console: Launch a Web browser and enter the following address: http://<Data Flow Probe machine name or IP address>:1977. If you are running the Data Flow Probe locally, enter http://localhost:1977.

   Note: You may have to log in with a user name and password. If you have not created a user, use the default user name admin and the password admin to log in.
3. Locate the **Type=MainProbe** service and click the link to open the Operations page.
4. Locate the **getEncryptedKeyPassword** operation.
5. Enter your keystore or truststore password in the **Key Password** field and invoke the operation by clicking **getEncryptedKeyPassword**.
6. The result of the invocation is an encrypted password string, for example:

   ```
   66,85,54,78,69,117,56,65,99,90,86,117,97,75,50,112,65,53,67,114,
   112,65,61,61
   ```
7. Copy and paste the encrypted password into the line relevant to either the keystore or the truststore in the following file: **C:\HP\UCMDB\DataFlowProbe\conf\security\ssl.properties.**

Server and Data Flow Probe Default Keystore and Truststore

This section includes the following topics:

RTSM Server

The files are located in the following directory: **C:\HP\UCMDB\UCMDBServer\conf\security.**

Entity	File Name/Term	Password/Term	Alias
Server keystore	server.keystore (sKeyStoreFile)	hppass (sKeyStorePass)	hpcert
Server truststore	server.truststore (sTrustStoreFile)	hppass (sTrustStorePass)	clientcert (default trusted entry)
Client keystore	client.keystore (cKeyStoreFile)	clientpass (cKeyStorePass)	clientcert

Data Flow Probe

The files are located in the following directory: **C:\HP\UCMDB\DataFlowProbe\conf\security.**

Entity	File Name/Term	Password/Term	Alias
Probe keystore	MAMKeyStoreExp.jks (pKeyStoreFile)	logomania (pKeyStorePass)	mam
Data Flow Probe uses the **cKeyStoreFile** keystore as the default keystore during the mutual authentication procedure. This is a client keystore that is part of the UCMDB installation.			
Probe truststore	MAMTrustStoreExp.jks (pTrustStoreFile)	logomania (pTrustStorePass)	mam (default trusted entry)
The **cKeyStorePass** password is the default password of **cKeyStoreFile**.			