HID Global Validation Authority

nShield® HSM Integration Guide

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Chapter 1. Introduction

The nShield Hardware Security Module (HSM) is a Root of Trust used by HID Global Validation Authority to protect cryptographic material. A HID Validation Authority integration with an Entrust nShield HSM provides FIPS 140-3 or FIPS 140-2 protection to meet strict compliance requirements.

1.1. Product configurations

This integration guide is intended solely to demonstrate the integration process and does not represent best practices. For guidance on optimal implementation, consult your organization's IT security team or engage Entrust Professional Services.

Entrust has tested nShield HSM integration with HID Validation Authority in the following configurations:

Product	Version
Operating System	Windows Server 2022
HID ActivID VA	7.4
Database	Microsoft SQL Server 2025
Java	jdk-11 or higher (windows-x64)

1.2. Supported nShield hardware and software versions

Entrust has tested the integrations with OCS and with the following nShield hardware and software versions:

Product	Security World Software	Firmware	Image
Connect XC	13.6.11	12.72.1 (FIPS 140-2 certified)	13.6.7
nShield 5c	13.6.11	13.4.5 (FIPS 140-3 certified)	13.6.7

1.3. Supported nShield HSM functionality

Feature	Support
Module-only key	No
OCS cards	Yes
Softcards	No
nSaaS	Yes
FIPS 140 Level 3	Yes

1.4. Requirements

Before installing these products, read the associated documentation:

- For the HSM: *Installation Guide* and *User Guide* at the nShield user documentation site.
- For Remote Administration (if used): *nShield Remote Administration User Guide* at the nShield user documentation site.
- HID Global documentation: *ActivID® Validation Authority Installation and Configuration Guide* at the HID documentation portal.

The integration between nShield HSMs and HID VA requires:

- nCipherKM JCA/JCE CSP support in the HSM.
- A correct quorum for the Administrator Card Set (ACS).
- An Operator Card Set (OCS).
  - A 1-of-N quorum must be used.
- Firewall configuration with usable ports:
  - 9004 for the HSM (hardserver).
  - 3501 for HID VA HTTP Port (default port number).
  - 3601 for HID VA HTTPS Port (default port number).

In addition, the following design decisions have an impact on how the HSM is installed and configured:

- Whether your Security World must comply withFIPS 140-3 or 140-2 standards.

  If you are using FIPS 140-3 or 140-2, it is advisable to create an OCS for FIPS authorization. It will be needed during the Validation Authority Configuration. For information about limitations on FIPS authorization, see the *Installation Guide* for the

HSM.

- Whether to instantiate the Security World as recoverable or not.

Entrust recommends that you allow only unprivileged connections unless you are performing administrative tasks.

1.5. More information

For more information about OS support, contact your HID Global sales representative or Entrust nShield Support, https://nshieldsupport.entrust.com.

Access to the Entrust Support Portal is available to customers under maintenance. To request an account, contact nshield.support@entrust.com.

Chapter 2. Procedures

2.1. Install Java

1. Install the Java Development Kit (JDK).

HID specifically requires the JDK and not the Java Runtime Environment (JRE). Refer to the HID documentation for validated versions of the JDK.

2. Set the **JAVA_HOME** environment variables

```
>export JAVA_HOME=/usr/lib/jvm/java-11-openjdk
>export JRE_HOME=/usr/lib/jvm/java-11-openjdk
>export PATH=$JAVA_HOME/bin:$PATH
```

2.2. Install the HSM

Install the nShield Connect HSM locally, remotely, or remotely via the serial console. See the following nShield Support articles and the *Installation Guide* for the HSM:

- How to locally set up a new or replacement nShield Connect
- How to remotely set up a new or replacement nShield Connect
- How to remotely set up a new or replacement nShield Connect XC Serial Console model

Access to the Entrust nShield Support Portal is available to customers under maintenance. To request an account, contact nshield.support@entrust.com.

2.3. Install the Security World software and create a security world

1. Install the Security World software:
   a. Mount the DVD or .iso/disc image and locate `setup.exe`.
   b. Right-click the `setup.exe` icon and select **Run as Administrator**.
   c. For detailed instructions, see the *Installation Guide* and the *User Guide* for the HSM.
2. Add the Security World utilities path `C:\Program Files\nCipher\nfast\bin` to the

Windows system path.

3. Open the firewall port `9004` for the HSM connections.
4. Inform the HSM of the client's location. In this integration the client is the HID database. For instructions, see in Configuring the nShield HSM to use the client. If it's a high-availability setup, repeat the client configuration for each HSM.
5. Enroll HID as a client of the HSM. See Configuring client computers to use the nShield HSM. If it's a high-availability setup, repeat the enrolment for each HSM.
6. Open a command window and run the following command to confirm that the HSM is `operational`:

```
>enquiry
Server:
 enquiry reply flags  none
 enquiry reply level  Six
 serial number        6308-03E0-D947
 mode                 operational
...
Module #1:
 enquiry reply flags  none
 enquiry reply level  Six
 serial number        6308-03E0-D947
 mode                 operational
...
```

7. Create your security world if one does not already exist, or copy an existing one. Follow your organization's security policy for this.
8. Confirm that the security world is `usable`:

```
>nfkminfo
World
 generation  2
 state       0x3fb7000c Initialised Usable ...
...
 mode        fips1402level3

Module #1
 generation 2
 state      0x2 Usable
```

9. Edit the `C:\ProgramData\nCipher\Key Management Data\config\config` file. Add the following lines in the `[server_startup]` section:

```
[server_startup]
...
priv_port=9001
nonpriv_port=9000
```

2.4. Create the OCS

1. Create the OCS, following your organization's security policy for the value N of K/N. As required, create extra OCS cards, one for each person with access privilege, plus spares.

   Administrator Card Set (ACS) authorization is required to create an OCS in FIPS 140 level 3.

   After an OCS card set has been created, the cards cannot be duplicated.

```
# createocs -m1 -s2 -N HIDValAuth -Q 1/1

FIPS 140-2 level 3 auth obtained.

Creating Cardset:
 Module 1: 0 cards of 1 written
 Module 1 slot 3: Admin Card #1
 Module 1 slot 2: blank card
 Module 1 slot 0: empty
 Module 1 slot 2:- passphrase specified - writing card
Card writing complete.

cardset created; hkltu = 6165632fe011c6475f4d61ac555698d437230cf3
```

2. List the OCS created:

```
>nfkminfo -c
Cardset list - 1 cardsets:  (P)ersistent/(N)ot, (R)emoteable/(L)ocal-only
 Operator logical token hash               k/n timeout  name
 6165632fe011c6475f4d61ac555698d437230cf3  1/1  none-NL HIDValAuth
```

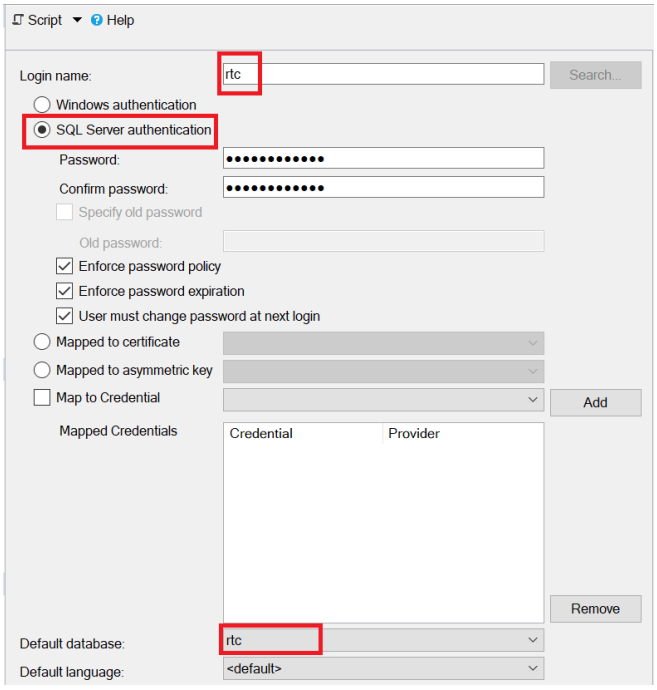
3. Configure Java by copying the `nCipherKM.jar` file from `%NFAST_HOME%\java\classes\` to the extensions folder of the local Java `%JAVA_HOME%\lib`:

```
>copy "C:\Program Files\nCipher\nfast\java\classes\nCipherKM.jar" "C:\Program Files\Java\jdk-
11.0.22\jre\lib\."
        1 file(s) copied.
```

2.5. Install and configure the database

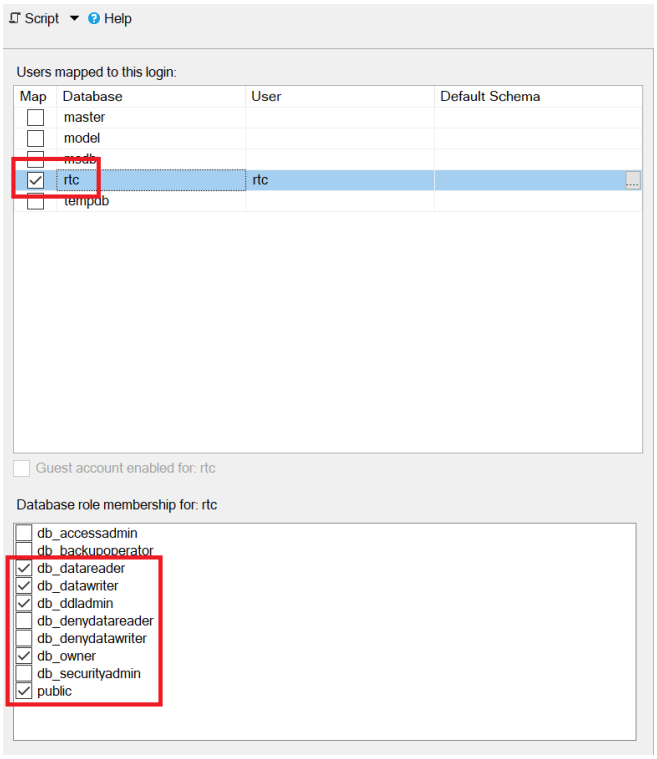
1. Install the database where information about issuers, credentials, and revocation lists will be stored. See the HID documentation for compatible database versions.
2. Create a new database called `rtc`.
3. Create a new login:
   a. For **Login name**, enter **rtc**.
   b. Select **SQL server authentication**.
   c. Enter a **Password** and confirm the password.

d. For **Default database**, select **rtc**. For example:

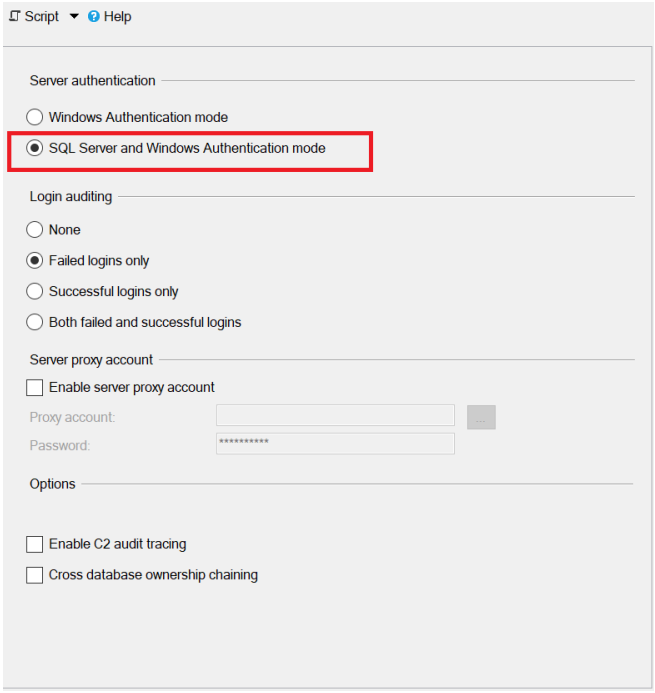


e. For **Users mapped to this login**, select **rtc**.

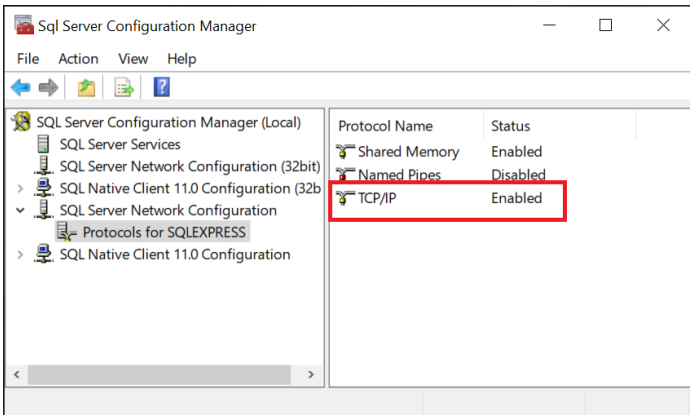
f. For **Access privilege**, select **db_datareader**, **db_datawriter**, **db_ddladmin**, **db_owner**, and **public**. For example:



g. For **Server authentication**, select **SQL Server and Windows Authentication mode**.



4. Enable the TCP/IP network protocol.

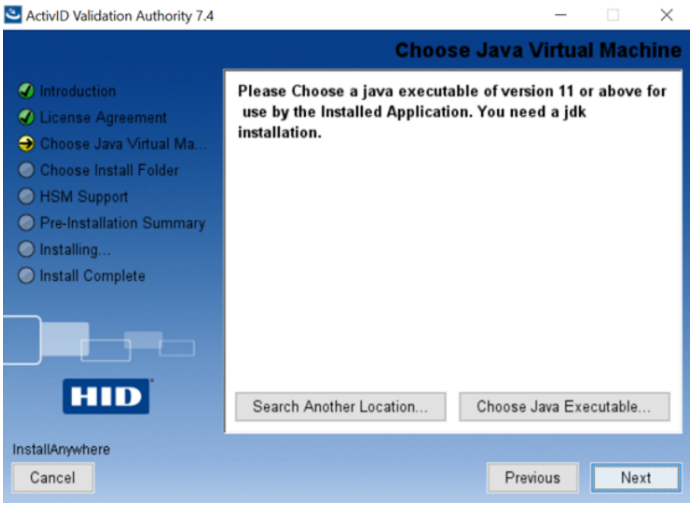


5. Open the firewall port 1433 for the TCP/IP connection to the MS SQL server.

2.6. Install the HID Global Validation Authority

For detailed instructions, see the *ActivID® Validation Authority Installation and Configuration Guide*.

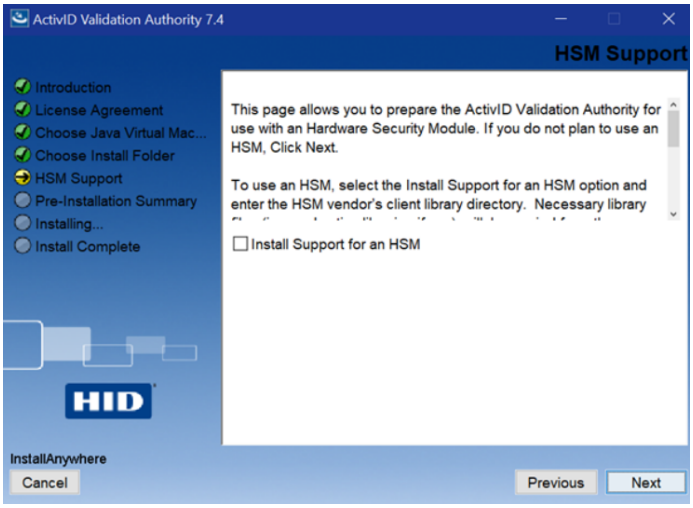
1. Run through the HID VA installer.
2. On the **Choose Java Virtual Machine** page of the installer, choose the Java executable within the JDK folder.



3. On the **HSM Support** page of the installer:

    a. Select **Install Support for an HSM**.

    b. Select **Choose** and find `%NFAST_HOME%\java\classes`.



4. Complete the installation.

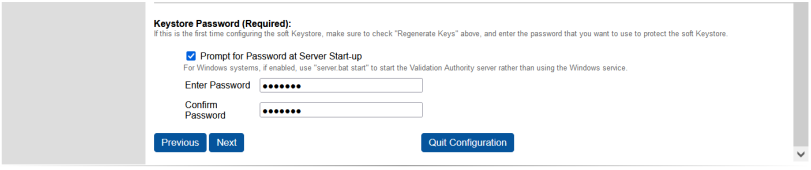
5. Launch the Windows Services and locate **ActivID Validation Authority**.
6. Right-click **ActivID Validation Authority** to select its properties.
7. On the **General** tab, for **Startup type** select **Manual**.
8. On the **Log On** tab, select **Local System account**.
9. Select **Apply** and then select **OK**.

2.7. Configure the HID Global Validation Authority

1. Insert the OCS in the HSM.
2. On the Windows **Start** menu, run **Configure Validation Authority**.
3. Select **Begin**.
4. Select whether you are upgrading or new installation.
5. On the next page, provide your organization name.
6. On the **Keystore** page:
    a. Select **nShield (client software v11 or later)** from the drop-down menu.
    b. Clear the **Oracle SunJCE keystore for SSL Key** check box.
    c. Select **Regenerate Keys** to create a new set of security keys that are protected by the nShield HSM.
    d. Select all four key options if this is a fresh install.

This version of the VA has a known issue. It does not support an ECC key for the **Asymmetric SSL Key** option. If you want to install the VA using ECC keys, contact HID for more information.

    e. Under **Message Digest Algorithms**:
        i. For the **For Signatures** property, select **SHA-256**.
        ii. For the **For OCSP Response Data** property, select **SHA-256**.
    f. Under **Keystore Password (Required)**
        i. Select **Prompt for Password at Server Start**.
        ii. Enter and confirm the enter the OCS passphrase.



g. Select **Next**.

7. In the **Configure Database** page:

   a. For **Vendor**, select **Microsoft SQL Server**.

   b. For **Host**, enter **localhost**.

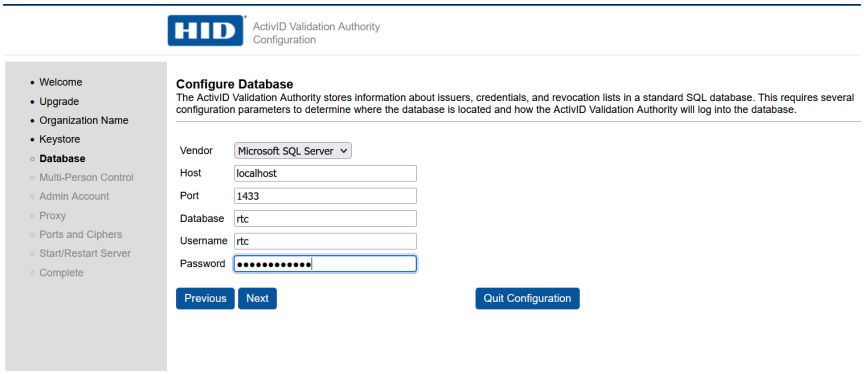
   c. For **Port**, enter **1433**.

   d. For **Database**, enter **rtc**.

   e. For **User**, enter **rtc**.

   f. For **Password**, enter the database password defined in Install and configure the database.

   g. Select **Next**.

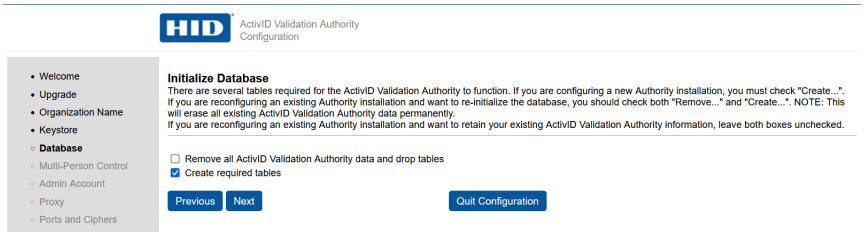


8. In the **Initialize Database** page:

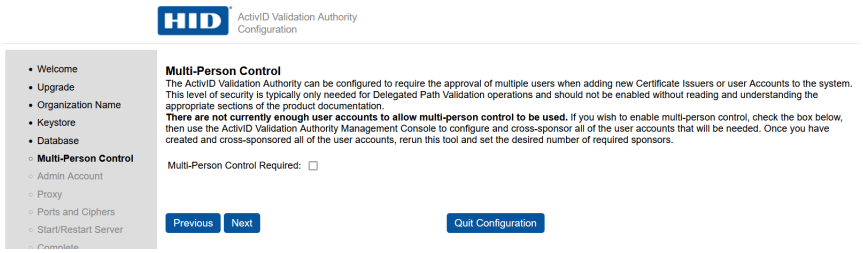
   a. Clear the **Remove all ActivID Validation Authority data and drop tables** check box.

   b. Select **Create required tables**.

   c. Select **Next**.



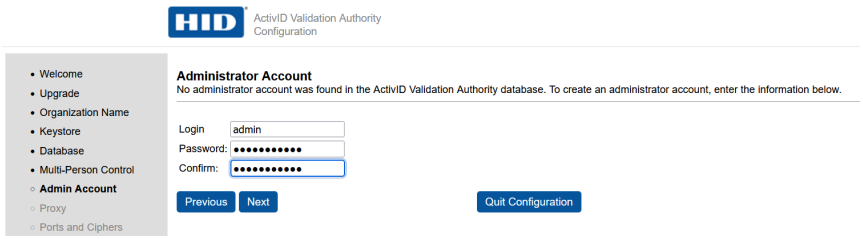
9. In the **Multi-Person Control** page, select **Next**.



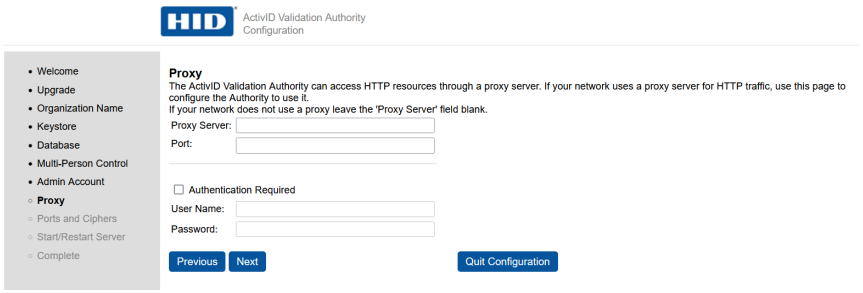
10. In the **Administrator Account** page:

    a. Enter the credentials for the HID Global Validation Authority.

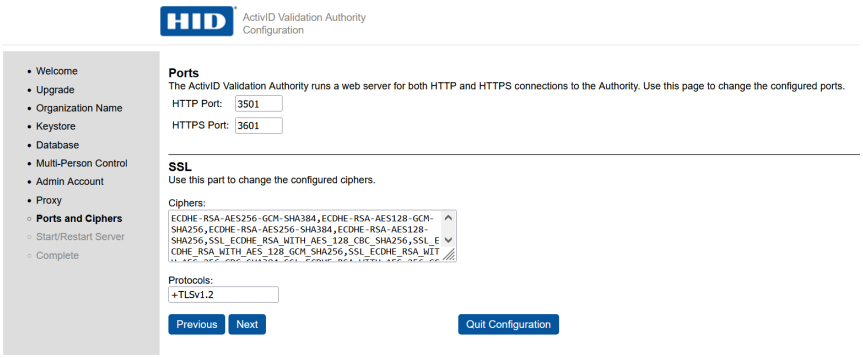
    b. Select **Next**.



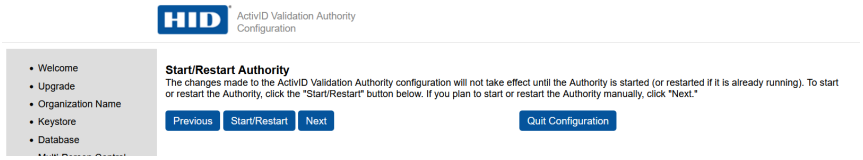
11. In the **Proxy** page, do not update any properties. Then, select **Next**.



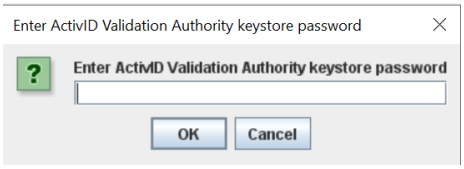
12. In the **Ports** page, do not update any properties. Then, select **Next**.



13. Select **Start/Restart** to finish.

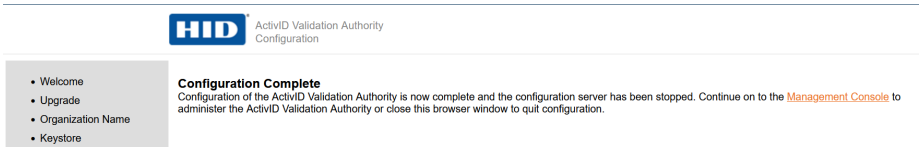


A password dialog appears. Be aware that the dialog may be behind the Browser window.

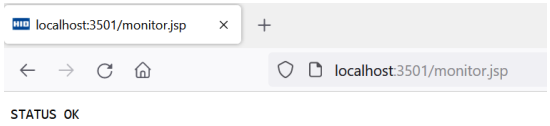


14. Enter the OCS passphrase and select **OK**.

    The installation completes.



15. Verify the installation:
    a. Close your browser.
    b. Open your browser and enter the following URL `+\http://localhost:3501/monitor.jsp`.



    c. Confirm that **STATUS OK** appears.

2.8. Start the HID Global Validation Authority

To start the HID Global Validation Authority:

1. Insert the OCS card into the HSM.
2. Open a command prompt and start HID VA.

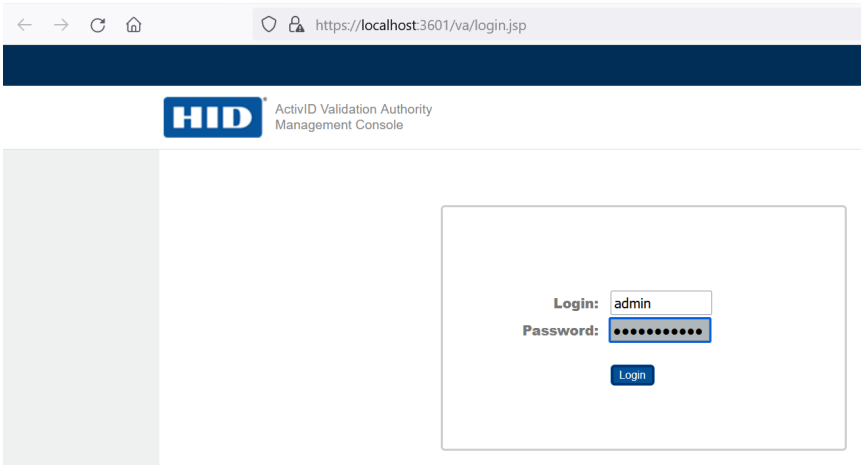
```
C:\Program Files\HID Global\Validation Authority 7.4\authority\bin>server.bat start
Using CATALINA_BASE:   "C:\Program Files\HID Global\Validation Authority 7.4\authority"
Using CATALINA_HOME:   "C:\Program Files\HID Global\Validation Authority 7.4\authority\..\tomcat"
Using CATALINA_TMPDIR: "C:\Program Files\HID Global\Validation Authority 7.4\authority\temp"
Using JRE_HOME:        "C:\Program Files\Java\jdk-11.0.22"
Using CLASSPATH:       "C:\Program Files\HID Global\Validation Authority
7.4\authority\..\tomcat\bin\bootstrap.jar;C:\Program Files\HID Global\Validation Authority
7.3\authority\..\tomcat\bin\tomcat-juli.jar"
Using Security Manager
```

Entrust was unable to start the HID VA service from services as detailed in the HID Global documentation. The `server.bat` file was

> used instead.

A password dialog appears. Be aware that the dialog may be behind the Browser window.

3. Enter the OCS passphrase.
4. Access the HID Validation Authority Management Console from a web browser. To do this, select **Start** > **HID Global** > **Validation Authority Management**.



Chapter 3. Additional resources and related products

3.1. nShield HSMs

3.2. nShield as a Service

3.3. Entrust products

3.4. nShield product documentation