CyberArk Conjur

nShield® HSM Integration Guide

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Contents

1. Introduction

CyberArk Conjur offers secrets management for applications and services. There are four different deployment models. The model tested in this Integration Guide is the Dynamic Access Provider (DAP). For more information, refer to Conjur Secrets Manager Enterprise features in the CyberArk Conjur online documentation.

The base product is provided as a containerized appliance and can be executed in Docker or Kubernetes. The testing in this Integration Guide uses a basic deployment of nSCOP in Docker.

1.1. Container images

Two container images were created for the purpose of this integration: a hardserver container and a CyberArk Conjur application container. These images are stored in an external registry:

- `nshield-hwsp`

  A hardserver container image that controls communication between the HSM(s) and the application containers.

- `conjur-appliance`

  An Application Access Manager (AAM) container image from CyberArk that will host the Master DAP Server.

1.2. Product configurations

Entrust has successfully tested nShield HSM integration with CyberArk Conjur in the following configurations:

Software	Version
nSCOP	1.1.1
Operating System	CentOS 8
CyberArk Conjur Appliance Image	12.3.0, 12.7.0

1.3. Supported nShield hardware and software versions

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

1.3.1. Connect XC

Security World Software	Firmware	Image	OCS	Softcard	Module
12.71.0	12.50.11 (FIPS Certified)	12.60.10	✓	✓	✓
12.80.4	12.50.11 (FIPS Certified)	12.80.4	✓	✓	✓
12.80.4	12.72.1 (FIPS Pending)	12.80.5	✓	✓	✓

1.3.2. Connect +

Security World Software	Firmware	Image	OCS	Softcard	Module
12.71.0	12.50.8 (FIPS Certified)	12.60.10	✓	✓	✓
12.80.4	12.50.8 (FIPS Certified)	12.80.4	✓	✓	✓
12.80.4	12.72.0 (FIPS Pending)	12.80.5	✓	✓	✓

1.4. Supported nShield HSM functionality

Feature	Support
Module-only key	Yes
OCS cards	Yes
Softcards	Yes
nSaaS	Yes
FIPS 140-2 Level 3	Yes

1.5. Requirements

Before installing these products, read the associated documentation:

- For the nShield HSM: *Installation Guide* and *User Guide*.
- If nShield Remote Administration is to be used: *nShield Remote Administration User Guide*.

- *nShield Container Option Pack User Guide*.
- AAM DAP Deployment, refer to Conjur Secrets Manager Enterprise v12.7 in the CyberArk online documentation.
- HSM Master Key Encryption, refer to Encrypt the master key using an HSM in the CyberArk online documentation.

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

- Whether your Security World must comply with FIPS 140-2 Level 3 standards.

  If using FIPS Restricted mode, it is advisable to create an OCS for FIPS authorization. For information about limitations on FIPS authorization, see the *Installation Guide* of the nShield HSM.

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

1.6. More information

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

2. Procedures

2.1. Prerequisites

Before you can use nSCOP and run the container images, complete the following steps:

1. Install Docker. For information, see Get Docker in the Docker online documentation.
2. Gain access to the Conjur appliance image. The following command can be used to load the `conjur-appliance` .tar file into the local Docker repository:

```
% docker load -i conjur-appliance-12.3.0.tar.gz
```

3. Set up the HSM. See the *Installation Guide* for your HSM.
4. Configure the HSM(s) to use the IP address of your container host machine as a client.
5. Load an existing Security World or create a new one on the HSM.
6. Copy the Security World and module files to your container host machine at a directory of your choice.
7. Create or edit the `cknfastrc` file in `/opt/nfast` and add one of the following config settings:
8. OCS or Softcard protection:

```
CKNFAST_LOADSHARING=1
CKNFAST_NO_ACCELERATOR_SLOTS=1
```

9. Module protection:

```
CKNFAST_FAKE_ACCELERATOR_LOGIN=1
```

10. Create a `pkcs11.yml` file with the following content:

```
library: /opt/nfast/toolkits/pkcs11/libcknfast.so
wrapping_key: <wrapping_key name>
pin: <passphrase of ocs/softcard if needed>
```

In the case where soft card protection is used and an OCS is inserted into the module, the following value should be added: "slot: 1", where 1 is the slot number of the soft card. This slot value was optional for module and OCS protection when tested.

For more information on configuring and managing nShield HSMs, Security Worlds, and

Remote File Systems, see the *User Guide* for your HSM(s).

2.2. Create and configure the nshield-hwsp container

The nShield hardserver container has to be configured to enable it to communicate with the CyberArk Conjur Master DAP Server in a later step, see Create and configure the Conjur application container and the Master DAP Server.

To deploy an nSCOP container image for use with CyberArk Conjur:

1. Log in to the container host machine server as **root** and launch a terminal window.
2. Set up the nSCOP working directory:

```
% mkdir -p /opt/nscop

% tar xf nscop-1.1.0.tar -C /opt/nscop
```

3. Mount the Security World:

```
% mkdir SecWorld-12.80.4

% mount -o loop SecWorld_Lin64-12.80.4.iso SecWorld-12.80.4
```

4. Set up the hardserver image:

```
% ./make-nshield-hwsp SecWorld-12.80.4
```

5. Configure `nshield-hwsp`:
   a. Set up the hardserver configuration file and directory:

```
% mkdir -p /opt/nscop/config1

% ./make-nshield-hwsp-config --output /opt/nscop/config1 config <hsm ip address>

% cat /opt/nscop/config1/config
```

   b. Create a new socket so that application containers can use the hardserver:

```
% docker volume create socket1
```

   c. Run the `nshield-hwsp` container:

```
% docker run -d -v /opt/nscop/config1:/opt/nfast/kmdata/config:ro -v socket1:/opt/nfast/sockets nshield-
hwsp:12.80.4
```

   d. Check the status of `nshield-hwsp` using the `enquiry` command:

```
% NFAST_SERVER=/var/lib/docker/volumes/socket1/_data/nserver /opt/nfast/bin/enquiry
```

2.3. Create and configure the Conjur application container and the Master DAP Server

1. Extend the `conjur-appliance` image with the `nfast` utilities:

```
% ./extend-nshield-application --from conjur-appliance:12.3.0 --pkcs11 SecWorld-12.80.4
```

2. Tag the generated application image for convenience:

```
% docker tag <IMAGEID> conjor-appliance-wnfast:12.3.0
```

3. Run the `conjur-appliance` container with the `nfast` container:

```
% docker run --name dap-wnfast -d --restart=always --security-opt seccomp=unconfined -p "443:443" -p "5432:5432" -p
"1999:1999" -v /opt/nfast/kmdata:/opt/nfast/kmdata:rw -v socket1:/opt/nfast/sockets conjur-appliance-wnfast:12.3.0
```

4. Perform the initial configuration of Conjur. The username is **admin**. For password requirements, refer to Configure the Conjur cluster in the CyberArk online documentation.

```
% docker exec dap-wnfast evoke configure master --accept-eula --hostname dap-wnfast.example.com --admin-password
Mypassw0rD1! org1
```

5. Copy the `cknfastrc` and `pkcs11.yml` configuration files into the running container:

```
% docker cp cknfastrc dap-wnfast:/opt/nfast/cknfastrc

% docker cp pkcs11.yml dap-wnfast:/opt/conjur/etc/pkcs11.yml
```

6. Generate a new Key Encryption Key (KEK) for Conjur to be stored on the HSM:

```
% docker exec dap-wnfast evoke pkcs11 generate
```

7. Start the `conjur-appliance` container, which will act as the Master DAP Server, in Interactive mode:

```
% docker exec -i -t dap-wnfast /bin/bash
```

The KEK is now ready for use.

2.4. Example commands used with the KEK

```
% evoke pkcs11 wrap
% evoke keys lock
% evoke keys unlock
```

For more examples, refer to Server Key Encryption Methods in the CyberArk online documentation.