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|   Cisco SAE Core Function PackInstallation Guide |
|  |
|  Version 1.0.0  |
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|    | Total pages: 20 |
| **SAE Core Function Pack Installation Guide**   |  |

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Contents

[1 Preface 5](#_Toc528662707)

[1.1 Abstract 5](#_Toc528662708)

[1.2 Purpose of This Document 5](#_Toc528662709)

[1.3 Using This Document 5](#_Toc528662710)

[1.4 Applicability 5](#_Toc528662711)

[1.5 Related Documentation 5](#_Toc528662712)

[1.6 Terminology 5](#_Toc528662713)

[2 Prerequisites 7](#_Toc528662714)

[3 System Installation 8](#_Toc528662715)

[3.1 System Installation Using NCT 8](#_Toc528662716)

[3.1.1 NCT capability 8](#_Toc528662717)

[3.1.2 Prerequisites 8](#_Toc528662718)

[3.1.3 Installation of SAE CFP 1.0.0 10](#_Toc528662719)

[3.1.4 Uninstallation of SAE CFP 1.0.0 13](#_Toc528662720)

[3.2 Local Installation 15](#_Toc528662721)

[3.2.1 Prerequisites 15](#_Toc528662722)

[3.2.2 Install NSO locally 15](#_Toc528662723)

[3.2.3 Verify the packages status and versions 16](#_Toc528662724)

[3.3 Docker Container Installation 16](#_Toc528662725)

[3.3.1 Docker image for the cisco-sae-core-fp Milestone release 17](#_Toc528662726)

[3.3.2 Netsim only Setup Installation (Supported on both MAC and Ubuntu) 17](#_Toc528662727)

[3.3.3 Without Netsim Setup Installation (Supported on both MAC and Ubuntu) 17](#_Toc528662728)

[3.3.4 Real Devices Setup Installation (tested and supported with Ubuntu) 18](#_Toc528662729)

[3.3.5 NSO UI login 18](#_Toc528662730)

[Operational Commands 18](#_Toc528662731)

[3.3.6 Known Issues 19](#_Toc528662732)

[4 Installation Validation Checks 21](#_Toc528662733)

[4.1 Pre Install Verification 21](#_Toc528662734)

[4.1.1 Verify NSO 21](#_Toc528662735)

[4.1.2 Verify Java 21](#_Toc528662736)

[4.1.3 Verify Python 21](#_Toc528662737)

[4.2 Post Install Verification 21](#_Toc528662738)

[4.2.1 Verify SAE Release 21](#_Toc528662739)

[4.2.2 Verify Packages 22](#_Toc528662740)

[4.2.3 Verify Package Version 24](#_Toc528662741)

[5 Backup and Restore 26](#_Toc528662742)

[5.1 How to take a backup of an NSO environment 26](#_Toc528662743)

[5.2 How to restore an NSO environment from a backup file 26](#_Toc528662744)

[5.3 Automatic backup using Installer 27](#_Toc528662745)

List of Tables

Table 1.5-1 – References 5

Table 1.6-1 – Terminology 6

# Preface

## Abstract

This document serves as the SAE Core Function Pack (CFP) Installation Guide.

## Purpose of This Document

This document shows how to install and configure SAE CFP for Cisco customers. The target audience is advanced developers, network and system engineers who need to deliver SAE CFP functionalities for Cisco customers.

## Using This Document

This document assumes that the reader has a good understanding of NSO and its usage as described in the NSO User Guide, Version 4.7.1.

This document is intended for the users who needed to install the SAE CFP.

## Applicability

This document is applicable to the SAE CFP.

## Related Documentation

Table 1.5-1 –lists documents and other reference sources containing information that may be essential to your understanding of topics in this document.

Table 1.5-1 – References

|  |  |
| --- | --- |
| No. | Title |
| 1 | SAE Core Function Pack User Guide 1.0.0 |
| 2 | NSO 4.7.1 Installation Guide |
| 3 | NSO 4.7.1 User Guide |

## Terminology

Table 1.6-1 – Terminology provides a short glossary of any terms crucial to the understanding of this document, and lists the acronyms and abbreviations used in the document.

Table 1.6-1 – Terminology

|  |  |
| --- | --- |
| Term | Definition |
| API | Application Programming Interface |
| ASA | Adaptive Security Appliances |
| CDB | Configuration Database |
| CFP | Core Function Pack |
| CLI | Command Line Interface |
| CPE | Customer Premise Equipment |
| ENCS | Enterprise Network Compute System |
| FP | Function Pack |
| IOS | Internetwork Operating System (CISCO) |
| IOSv | Internetwork Operating System virtual (CISCO) |
| ISR | Integrated Services Router |
| NCS | Network Control System |
| NCT  | NSO cluster Tools |
| NED | Network Element Driver |
| NETCONF | Network Configuration Protocol |
| NFVIS | Network Function Virtual Infrastructure Software |
| NIC | Network Interface Controller |
| NSO | Network Services Orchestrator |
| PnP | Plug-n-Play |
| REST | Representational State Transfer |
| SAE | Secure Agile Exchange |
| SR-IOV | Single-Root I/O Virtualization |
| VDU | Virtual Deployment Unit |
| VM | Virtual Machine |
| VNF | Virtualized Network Function |
| VNFD | Virtualized Network Function Descriptor |
| vNIC | Virtualized Network Interface Controller |
| WAAS | Wide Area Application Services |
| XML | Extensible Markup Language |
| YANG | Modeling language per RFC6020 |

NSO Overview

# Prerequisites

Operating Systems Supported:

* Ubuntu
	+ v17.10                 Artful
	+ v16.04.4 LTS      Xenial
	+ v18.04 LTS         Bionic
	+ v14.04.5 LTS      Trusty
* CentOS v7.4
* Mac OSX
* Python 2.7+
* Paramiko - "pip install paramiko"
* Future package – "pip install future"
* Requests package - "pip install requests"

If previous NSO platform exists, uninstall previous NSO platform first.

1. Become 'root' user and then run the uninstallation command below:

|  |
| --- |
|  # ncs-uninstall --all |

1. Do a fresh installation of NSO 4.7.1.

$ sudo sh nso-NEWVERSION.OS.ARCH.installer.bin --system-install

Example:

|  |
| --- |
| $ sudo sh  nso-4.7.1.linux.x86\_64.installer.bin --system-install |

  Please refer to NSO documentation for detailed information.

# System Installation

Please choose one of the following methods to install the SAE Core Function Pack.

## System Installation Using NCT

### NCT capability

NCT is a package fetching and install tool for NSO platform. It comes with NSO which means as soon as you install the NSO platform, then you have the NCT command available.

There are three ways to install NCT:

A. Using NSO controller server to install SAE CFP on the same/controller server

B. Using NSO controller server to install SAE CFP on remote/different server

C. Using NSO controller server to install SAE CFP on multiple servers

This installation guide only shows you installation scenario A.

NCT documentation can be found by running "man nct" on a system with NSO 4.1 and above installed.

### Prerequisites

The following prerequisites for NCT (NCS Cluster Tools) installation should be met before starting to install the SAE Core Function Pack.

In this case, both Controller and Remote nodes will be on the same system, which is referred to as the "target host".

1. Install the Oracle Java Development Kit 1.8 or above.
2. Install Python 2.7 or above.

NOTE: NSO servers with Python 3+ installed will also need to have at least Python 2.7 installed as well.

The following Python packages must be installed:

* paramiko
* requests
* future

Install these packages preferably using pip install method for Python 2.7 environment. Make sure you install using sudo or root. Pay attention to what "location" the package is being installed.

**Example:**

## Switch to user 'root'

$ pip install requests

## OR

##use SUDO

$ sudo pip install requests

$ sudo pip show requests

$ sudo pip show requests

---

Metadata-Version: 2.0

Name: requests

Version: 2.18.4

Summary: Python HTTP for Humans.

Home-page: http://python-requests.org

Author: Kenneth Reitz

Author-email: me@kennethreitz.org

Installer: pip

License: Apache 2.0

Location: /usr/local/lib/python2.7/dist-packages

Requires: certifi, chardet, idna, urllib3

Classifiers:

  Development Status :: 5 - Production/Stable

  Intended Audience :: Developers

  Natural Language :: English

  License :: OSI Approved :: Apache Software License

  Programming Language :: Python

  Programming Language :: Python :: 2.6

  Programming Language :: Python :: 2.7

  Programming Language :: Python :: 3

  Programming Language :: Python :: 3.4

  Programming Language :: Python :: 3.5

  Programming Language :: Python :: 3.6

  Programming Language :: Python :: Implementation :: CPython

  Programming Language :: Python :: Implementation :: PyPy

1. Uninstall the previous NSO platform.

## Switch to user 'root'

$ ncs-uninstall --all

1. Install the NSO 4.7.1 platform.

The NSO platform 4.7.1 is installed on target host as a**System Install**.  Refer to NSO 4.7.1 platform installation documentation and the topic,  [How to verify NSO platform.](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/SAE%2BM0.3.0%2BInstall%2BValidation%2BChecks)

The user on the target host must have sudo rights, but passwords are not required for the sudo commands.
To disable password, please follow steps below:

|  |
| --- |
| $sudo vi /etc/sudoers...#includedir /etc/sudoers.dadmin ALL = NOPASSWD: ALLubuntu ALL = NOPASSWD: ALL |

### Installation of SAE CFP 1.0.0

The steps below are for NCT installation with Controller node and Remote node on the same system, which is referred to as the "target host".

     NOTE:   The installation example below is done with user = admin.

1. Download and untar the SAE Core Function Pack tar file onto the target host as shown below.

|  |
| --- |
| # Download and untar SAE CFP installer tar file# NOTE:  Only download and untar file with the same user that will be used to install SAE CFP.  Don't use root to download and untar the file $wget http://engci-maven-master.cisco.com/artifactory/nso-release/function-pack-releases/corefp/sae/1.0.0/nso-4.7.1-cisco-sae-core-fp-1.0.0.tar.gz$tar -xvf nso-4.7.1-cisco-sae-core-fp-1.0.0.tar.gz # Change to installer directory$cd nso-4.7.1-cisco-sae-core-fp-1.0.0/installer/core-FP-installer |

1. Modify the nct-host file by providing correct information:

In this example, both Controller node and Remote node reside on the target host with an IP of 172.23.80.245.

|  |
| --- |
| $ vi nct.config============================================================================={ "ip\_value": {               "name": "host1",              "groups" :["master","service"],              "ssh\_user": "ssh\_user\_name",              "rest\_user": "rest\_user\_name",              "netconf\_user": "netconf\_user\_name",              "rest\_pass": "rest\_pass\_value",              "ssh\_pass": "ssh\_pass\_value",              "netconf\_pass": "netconf\_pass\_value",              "sudo\_pass": "sudo\_pass\_value",              "rest\_ssl": "false",              "rest\_port": "8080",              "install\_dir":"/opt/ncs",              "run\_dir": "/var/opt/ncs",              "config\_dir" : "/etc/ncs",              "log\_dir": "/var/log/ncs",              "user\_defined\_vars":    {                                          "ncs\_user\_name":"ncs\_user\_name\_value",                                          "PYTHON2PATH":"/usr/bin/python2",                                          "PYTHON3PATH":"/usr/local/bin/python3.6",                                          "MULTIPYTHON" :"false"                                      }               }}=============================================================================Fill the XX\_user\_name and XX\_pass\_value and ip\_value with user's own settings, also remember to change ncs\_user\_name to your own username if it is not adminFor example: if your username is cisco and your password is Cisco123#,then============================================================================={ "127.0.0.1": {               "name": "host1",              "groups" :["master","service"],              "ssh\_user": "admin",              "rest\_user": "admin",              "netconf\_user": "admin",              "rest\_pass": "Cisco123#",              "ssh\_pass": "Cisco123#",              "netconf\_pass": "Cisco123#",              "sudo\_pass": "Cisco123#",              "rest\_ssl": "false",              "rest\_port": "8080",              "install\_dir":"/opt/ncs",              "run\_dir": "/var/opt/ncs",              "config\_dir" : "/etc/ncs",              "log\_dir": "/var/log/ncs",              "user\_defined\_vars":    {                                          "ncs\_user\_name":"admin",                                          "PYTHON2PATH":"/usr/bin/python2",                                          "PYTHON3PATH":"/usr/local/bin/python3.6",                                          "MULTIPYTHON" :"false"                                      }               }} |

1. Run installation script on target host.
As a preparatory step please make sure to remove docroot element from target hosts's ncs.conf's webui configuration (if it exists).

$python install.py

1. Post Validation

Follow the steps from [Install Validation Checks](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/SAE%2BM0.3.0%2BInstall%2BValidation%2BChecks)

Please create a link day0, day1, images from webui docroot to /opt/cisco/nso/

ln -s /opt/cisco/nso/day0/ ${NCS\_DIR}/var/ncs/webui/docroot/day0

ln -s /opt/cisco/nso/day1/ ${NCS\_DIR}/var/ncs/webui/docroot/day1

ln -s /opt/cisco/nso/images/ ${NCS\_DIR}/var/ncs/webui/docroot/images

1. Follow [Quick Start Guide](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/SAE%2BM0.3.0%2B-%2BQuick%2BStart%2BGuide) in Documentation link to get started.

### Uninstallation of SAE CFP 1.0.0

Before uninstall, please make sure you've deleted all services and devices from NSO.

1. Go to the nct-installer folder.

|  |
| --- |
| $cd ~/nso-4.7.1-cisco-sae-core-fp-1.0.0/installer/core-FP-installer |

1. Modify the nct-host's file as shown in the following example.

$ vi nct.config

=============================================================================

{

"ip\_value": {

              "name": "host1",

              "groups" :["master","service"],

              "ssh\_user": "ssh\_user\_name",

              "rest\_user": "rest\_user\_name",

              "netconf\_user": "netconf\_user\_name",

              "rest\_pass": "rest\_pass\_value",

              "ssh\_pass": "ssh\_pass\_value",

              "netconf\_pass": "netconf\_pass\_value",

              "sudo\_pass": "sudo\_pass\_value",

              "rest\_ssl": "false",

              "rest\_port": "8080",

              "install\_dir":"/opt/ncs",

              "run\_dir": "/var/opt/ncs",

              "config\_dir" : "/etc/ncs",

              "log\_dir": "/var/log/ncs",

              "user\_defined\_vars":    {

                                          "ncs\_user\_name":"admin"

                                      }

              }

}

=============================================================================

Fill the XX\_user\_name and XX\_pass\_value and ip\_value with user's own settings, also remember to change ncs\_user\_name to your own username if it is not admin

For example: if your username is cisco and your password is Cisco123#,then

=============================================================================

{

"172.23.80.245": {

              "name": "host1",

              "groups" :["master","service"],

              "ssh\_user": "cisco",

              "rest\_user": "cisco",

              "netconf\_user": "cisco",

              "rest\_pass": "Cisco123#",

              "ssh\_pass": "Cisco123#",

              "netconf\_pass": "Cisco123#",

              "sudo\_pass": "Cisco123#",

              "rest\_ssl": "false",

              "rest\_port": "8080",

              "install\_dir":"/opt/ncs",

              "run\_dir": "/var/opt/ncs",

              "config\_dir" : "/etc/ncs",

              "log\_dir": "/var/log/ncs",

              "user\_defined\_vars":    {

                                          "ncs\_user\_name":"cisco"

                                      }

              }

}

1. Run the uninstallation script

|  |
| --- |
| $python uninstall.py |

                       Uninstallation will remove packages being used by SAE CFP.

## Local Installation

### Prerequisites

* Python 2.7.x
* Oracle Java 1.8
* Paramiko
* **No** instances of NSO running
* Uninstall previous NSO platform prior to installing NSO 4.7.1 (Refer to NSO Installation guide)

### Install NSO locally

Download the NSO installer bin from the URL below and install NSO using "local install" method:

**Linux**

[https://earth.tail-f.com:8443/ncs/nso-4.7.1.linux.x86\_64.installer.bin](https://earth.tail-f.com:8443/ncs/nso-4.6.1.3.linux.x86_64.installer.bin)

**Mac**

<https://earth.tail-f.com:8443/ncs/nso-4.7.1.darwin.x86_64.installer.bin>

## The following example is for user = admin

## On Linux server, assuming HOME=/home/admin, please put installer bin file to HOME dir

cd ~

export HOME=/home/admin

sh nso-4.7.1.linux.x86\_64.installer.bin $HOME/nso-4.7.1 --local-install

## On Mac, assuming HOME=/Users/macUser1, please put installer bin file to HOME dir

cd ~

export HOME=/Users/macUser1

sh nso-4.7.1.darwin.x86\_64.installer.bin $HOME/nso-4.7.1 --local-install

## Source the ncsrc file

source $HOME/nso-4.7.1/ncsrc

#### Download SAE installer tar file

|  |
| --- |
| # Download and untar SAE CFP installer tar file# NOTE:  Only download and untar file with the same user that will be used to install SAE CFP.  Don't use root to download and untar the filecd ~$wget http://engci-maven-master.cisco.com/artifactory/nso-release/function-pack-releases/corefp/sae/1.0.0/nso-4.7.1-cisco-sae-core-fp-1.0.0.tar.gz$tar -xvf nso-4.7.1-cisco-sae-core-fp-1.0.0.tar.gz  |

#### Run the script to install SAE

cd ~/nso-4.7.1-cisco-sae-core-fp-1.0.0/local-install/

./local-install.sh <DIRECTORY> <NSO\_IP>

## DIRECTORY: directory where SAE CFP will be installed. If it does not exist, installation will create the directory.

   NSO\_IP: Optional option.  If IP address is provided here, it will be used in the SAE CFP installation.  If not, installation will automatically detect IP address in the system.

Example:-

   ./local-install.sh /home/admin/sae-1.0.0 192.168.66.126

Make sure read-write permissions are given to the DIRECTORY the user created.

### Verify the packages status and versions

Follow the Post Installation steps from [Post Installation](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/SAE%2BM0.3.0%2B-%2BPost%2BInstallation)

## Docker Container Installation

Docker Repository - <https://containers.cisco.com/repository/>

For login details refer to this document - [How to login into Docker container](https://confluence-eng-sjc1.cisco.com/conf/display/NSOUS/How%2Bto%2Blogin%2Binto%2BDocker%2Bcontainer)

### Docker image for the cisco-sae-core-fp Milestone release

Netsim -  <https://containers.cisco.com/repository/nso-core-function-pack/nso-4.7.1-sae-1.0.0-withnetsim>

Without Netsim -  <https://containers.cisco.com/repository/nso-core-function-pack/nso-4.7.1-sae-1.0.0>

* NSO version: 4.7.1
	+ Please Uninstall previous NSO platform prior to installing NSO 4.7.1
* SAE CoreFP release: 1.0.0
* Installation type: Local install
	+ Python 2.7 and above
	+ Paramiko
* Install Path: /usr/shared/sae. Please use this dir to perform start/stop of NCS.
* Logs Location:  /usr/shared/sae/logs

### Netsim only Setup Installation (Supported on both MAC and Ubuntu)

* Run the command "*docker run -it*[*containers.cisco.com/nso-core-function-pack/nso-4.7.1-sae-1.0.0-withnetsim*](http://containers.cisco.com/nso-core-function-pack/nso-4.6.1-sae-m0.3.0-withnetsim)"
* Wait a couple of minutes for docker to finish installation. You should see the ncs\_cli prompt after installation is completed.
* All the prerequisites are installed, NSO server is installed, the SAE core function pack respective release is installed and all the required catalogs and data are loaded.
* NET-SIM are also started, and you are now ready to use/demo the SAE Core Function Pack.

### Without Netsim Setup Installation (Supported on both MAC and Ubuntu)

* Run the command "*docker run -it*[*containers.cisco.com/nso-core-function-pack/nso-4.7.1-sae-1.0.0*](http://containers.cisco.com/nso-core-function-pack/nso-4.6.1-sae-m0.3.0)"
* Wait a couple of minutes for docker to finish installation. You should see the ncs\_cli prompt after installation is completed.
* All the prerequisites are installed, NSO server is installed, the SAE core function pack respective release is installed and all the required catalogs and data are loaded.

### Real Devices Setup Installation (tested and supported with Ubuntu)

Use the IP address of your docker client.

**You will need to open ports 8080, 830, 4000, 2024, 9191, 9090**

On your docker client please run the CLI below:

**Linux OS:**
*sudo docker run --network host -p* *80:80* *-p* *8080:8080* *-p* *830:830* *-p* *4000:4000* *-p* *2024:2024* *-p* *9191:9191* *-p 9090:9090* *-it* [*containers.cisco.com*](http://containers.cisco.com/nso-core-function-pack/nso-4.6.1.3-sae-m4.0.1)/[*nso-core-function-pack/nso-4.7.1-sae-1.0.0*](https://containers.cisco.com/repository/nso-core-function-pack/nso-4.7-sae-m0.5.0)

**Mac OS:**

sudo docker run -p 80:80 -p 8080:8080 -p 830:830 -p 4000:4000 -p 2024:2024 -p 9191:9191 -p 9090:9090 -it --privileged [*containers.cisco.com*](http://containers.cisco.com/nso-core-function-pack/nso-4.6.1.3-sae-m4.0.1)/[*nso-core-function-pack/nso-4.7.1-sae-1.0.0*](https://containers.cisco.com/repository/nso-core-function-pack/nso-4.7-sae-m0.5.0)

Note: A container running on Mac OS does not work with external devices; use a Netsim device instead. Enter "man ncs-netsim" for detailed usage of Netsim.

### NSO UI login

* Open a browser and type *http://<docker-ip>:8080/login.html*
* Login as admin/admin.

### Operational Commands

* To logout of container user - *Ctrl+p+q*. This will keep the container in a running state.
* To logout and stop container use - *exit* command.
* To execute all below commands, then you may need sudo access.
* To get container id - *docker ps -a*
* Stop container - *docker stop <id>*.  This will stop ncs.
* Start container  - *docker start <id>*.  This will start ncs.
* Exec Login to running container  - *docker exec -it <id> /bin/bash* after login connect to ncs\_cli -u admin.
* Start container with -a option - *docker start -a -i <id>* . Ncs will start along with container and will connect to CLI once you logged in.

### Known Issues

* Smart Licensing issues.

after connecting to ncs\_cli, there are notifications about Smart Licensing.

|  |
| --- |
| ncs[93]: - Smart Licensing Entitlement Notification: type = "notifyEnforcementMode", agentID = "sa1", notificationTime = "Jan 23 22:49:11 2018", version = "1.0", requestedDate = "Jan 23 22:49:09 2018", tag = "regid.2015-10.com.cisco.NSO-platform-production,1.0\_d1445dab-9d96-4593-99f2-6f633b8a759c", enforceMode = "eval", daysLeft = 90, expiryDate = "Apr 23 22:48:04 2018", requestedCount = 1ncs[93]: - Smart Licensing Entitlement Notification: type = "notifyEnforcementMode", agentID = "sa1", notificationTime = "Jan 23 22:49:13 2018", version = "1.0", requestedDate = "Jan 23 22:49:11 2018", tag = "regid.2015-10.com.cisco.NSO-network-element,1.0\_5d641fa0-757d-43b0-a926-166cb6e3cfdd", enforceMode = "eval", daysLeft = 90, expiryDate = "Apr 23 22:47:38 2018", requestedCount = 1 |

* Netsim warnings at the start (Applicable for container with netsim only)

Calling function /usr/shared/sae/packages

ncs-4.6.1-csp-1.0.0.tar.gz

ncs-4.6.1-esc-3.1.0.0.tar.gz

ncs-4.6.1-cisco-nx-4.5.13.tar.gz

DEVICE csp0 CREATED

DEVICE csp1 CREATED

awk: not an option: --field-separator=-

awk: not an option: --field-separator=-

awk: not an option: --field-separator=-

awk: not an option: --field-separator=-

../package.mk:461: warning: overriding recipe for target '../src/java/src/com/cisco/escned/namespaces/'

../package.mk:461: warning: ignoring old recipe for target '../src/java/src/com/cisco/escned/namespaces/'

awk: not an option: --field-separator=-

awk: not an option: --field-separator=-

../package.mk:461: warning: overriding recipe for target '../src/java/src/com/cisco/escned/namespaces/'

../package.mk:461: warning: ignoring old recipe for target '../src/java/src/com/cisco/escned/namespaces/'

awk: not an option: --field-separator=-

awk: not an option: --field-separator=-

../package.mk:461: warning: overriding recipe for target '../src/java/src/com/cisco/escned/namespaces/'

../package.mk:461: warning: ignoring old recipe for target '../src/java/src/com/cisco/escned/namespaces/'

awk: not an option: --field-separator=-

awk: not an option: --field-separator=-

../package.mk:461: warning: overriding recipe for target '../src/java/src/com/cisco/escned/namespaces/'

../package.mk:461: warning: ignoring old recipe for target '../src/java/src/com/cisco/escned/namespaces/'

awk: not an option: --field-separator=-

awk: not an option: --field-separator=-

# Installation Validation Checks

Perform the following checks.

## Pre Install Verification

### Verify NSO

Installed NSO version should be 4.7.1.

ncs --version

4.7.1

### Verify Java

Use Oracle JDK 1.8.

**NOTE:   Only Oracle JDK is supported.**

**Not Open JDK**

java -version

java version "1.8.0\_121"

Java(TM) SE Runtime Environment (build 1.8.0\_121-b13)

Java HotSpot(TM) 64-Bit Server VM (build 25.121-b13, mixed mode)

### Verify Python

Use Python 2.7.x

python --version

Python 2.7.10

## Post Install Verification

### Verify SAE Release

Verify the build number and SAE release information.

admin@ncs> show cisco-sae-core-fp-release

cisco-sae-core-fp-release sae-version CoreFP[-sae-1.0.0](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/-sae-1.0.0)

cisco-sae-core-fp-release sae-function-packs saeCoreFP

cisco-sae-core-fp-release build-date 2018-10-19-11-40

cisco-sae-core-fp-release build-number 12

cisco-sae-core-fp-release nso-build-version [4.7.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/4.7.1)

cisco-sae-core-fp-release git-revision d4ff8f6

cisco-sae-core-fp-release git-branch HEAD

cisco-sae-core-fp-release build-user nsobuild

cisco-sae-core-fp-release build-host nso-sjc12-lnx

cisco-sae-core-fp-release build-host-uname Linux

cisco-sae-core-fp-release build-host-java-version [1.8.0\_121-](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/1.8.0_121-)Java(TM)

[ok][2018-10-23 20:07:25]

### Verify Packages

Verify all the packages are installed and status is UP.

admin@ncs> show packages package oper-status

                                                                                              PACKAGE

                               PROGRAM                                                        META     FILE

                               CODE     JAVA           BAD NCS  PACKAGE  PACKAGE  CIRCULAR    DATA     LOAD   ERROR

NAME                       UP  ERROR    UNINITIALIZED  VERSION  NAME     VERSION  DEPENDENCY  ERROR    ERROR  INFO

---------------------------------------------------------------------------------------------------------------------

cisco-extension-framework  X   -        -              -        -        -        -           -        -      -

cisco-nx                   X   -        -              -        -        -        -           -        -      -

cisco-sae-asav-extension   X   -        -              -        -        -        -           -        -      -

cisco-sae-avi-extension    X   -        -              -        -        -        -           -        -      -

cisco-sae-core-fp          X   -        -              -        -        -        -           -        -      -

cisco-sae-core-fp-cfs      X   -        -              -        -        -        -           -        -      -

cisco-sae-core-fp-common   X   -        -              -        -        -        -           -        -      -

cisco-sae-core-fp-release  X   -        -              -        -        -        -           -        -      -

cisco-sae-core-fp-status   X   -        -              -        -        -        -           -        -      -

cisco-sae-diagnosis        X   -        -              -        -        -        -           -        -      -

cisco-sae-ftdv-extension   X   -        -              -        -        -        -           -        -      -

cisco-sae-itd-service      X   -        -              -        -        -        -           -        -      -

core-fp-common             X   -        -              -        -        -        -           -        -      -

csp                        X   -        -              -        -        -        -           -        -      -

csp-vim                    X   -        -              -        -        -        -           -        -      -

custom-template-utils      X   -        -              -        -        -        -           -        -      -

day1-templates             X   -        -              -        -        -        -           -        -      -

diagnosis                  X   -        -              -        -        -        -           -        -      -

esc                        X   -        -              -        -        -        -           -        -      -

infra-discovery            X   -        -              -        -        -        -           -        -      -

resource-manager           X   -        -              -        -        -        -           -        -      -

tailf-etsi-rel2-nfvo       X   -        -              -        -        -        -           -        -      -

tailf-etsi-rel2-nfvo-csp   X   -        -              -        -        -        -           -        -      -

[ok][2018-10-23 20:47:14]

admin@ncs>

### Verify Package Version

Verify package version for all packages.

admin@ncs> show packages package package-version

                           PACKAGE

NAME                       VERSION

------------------------------------

cisco-extension-framework  1.0.0

cisco-nx                   5.7.2

cisco-sae-asav-extension   1.0.0

cisco-sae-avi-extension    1.0.0

cisco-sae-core-fp          1.0.0

cisco-sae-core-fp-cfs      1.0.0

cisco-sae-core-fp-common   1.0.0

cisco-sae-core-fp-release  1.0.0

cisco-sae-core-fp-status   1.0.0

cisco-sae-diagnosis        1.0.0

cisco-sae-ftdv-extension   1.0.0

cisco-sae-itd-service      1.0.0

core-fp-common             1.5.0

csp                        1.0.0

csp-vim                    1.0.0

custom-template-utils      0.1.0

day1-templates             1.1.0

diagnosis                  0.1.0

esc                        4.1.1.6

infra-discovery            1.0.0

resource-manager           3.3.1

tailf-etsi-rel2-nfvo       3.2.0

tailf-etsi-rel2-nfvo-csp   1.0.0

[ok][2018-10-23 20:47:32]

admin@ncs>

# Backup and Restore

Using NCT commands you can take a backup of the NSO environment (NCS CDB, state data, and config files) from the CDB of a NSO instance.

* How to take backup of NSO environment
* How to restore NSO environment from a backup file
* Automatic backup using Installer

## How to take a backup of an NSO environment

To take a backup of an NSO environment, use the NCT command below:

nct backup --hostsfile <nct hosts file>

This creates a backup in /var/opt/ncs/backups directory

Bash Shell:

[admin@nso-1728-73 installer]$ nct backup --hostsfile ~/nct-hosts

172.28.112.73

>> OK : INFO  Backup /var/opt/ncs/backups/ncs-4.7.1@2018-07-02T07:28:21.backup.gz created successfull

## How to restore an NSO environment from a backup file

To take a backup of a NSO environment:

1. Stop NCS.
2. Using below NCT command restore the backup : nct backup -c restore --file <backup file path and name> --hostsfile <nct hosts file>
3. Start NCS.

Bash Shell:

[admin@nso-1728-73 installer]$ nct stop --hostsfile ~/nct-hosts

SSH command to 172.28.112.73:22

SSH OK : 'ssh cd /;sudo -S -p "NCT-sudo-prompt:" /etc/init.d/ncs stop' returned: Stopping ncs (via systemctl):  [  OK  ]

[admin@nso-1728-73 installer]$ nct backup -c restore --file /var/opt/ncs/backups/ncs-4.7.1@2018-07-02T07:28:21.backup.gz --hostsfile ~/nct-hosts

Restore of NCS backup 172.28.112.73

>> OK : tar: packages/day1-templates/README: time stamp 2018-07-02 11:22:14 is 13883.478175576 s in the future

tar: packages/day1-templates/package-meta-data.xml: time stamp 2018-07-02 11:22:14 is 13883.477884693 s in the future

tar: packages/day1-templates/src: time stamp 2018-07-02 11:22:14 is 13883.477767567 s in the future

tar: packages/day1-templates/CHANGES.txt: time stamp 2018-07-02 11:22:14 is 13883.477696421 s in the future

tar: packages/day1-templates/build-meta-data.xml: time stamp 2018-07-02 11:30:32 is 14381.477634912 s in the future

INFO  Restore completed successfully

## Automatic backup using Installer

The SAE installer creates a backup of a running system in the "/var/opt/ncs/backups" directory.

You can see the backup being taken on the screen below:

/var/opt/ncs/backups/ncs-4.7.1@2018-07-02T07:15:06.backup.gz

Bash Shell:

[admin@nso-1728-73 installer]$ ./install.py

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - Generating backup of NCS ...

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - /var/opt/ncs/backups/ncs-4.7@2018-08-31T12:11:[26.backup.gz](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/26.backup.gz)

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - Copying packages, configurations, and scripts to host ...

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - Restarting NCS to ensure NCS is running ...

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - Checking if function pack cisco-sae-core-fp can be installed ...

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - Running pre-installation hook script ...

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - Applying function pack changes to [ncs.conf](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/ncs.conf) ...

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - Setting up packages ...

[127.0.0.1](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/127.0.0.1) - Packages to install: {

    "cisco-asa": {

        "file\_name": "[ncs-4.7-cisco-asa-6.0.9.tar.gz](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/ncs-4.7-cisco-asa-6.0.9.tar.gz)",

        "ncs\_ver": "4.7",

        "pkg\_ver": "[6.0.9](https://confluence-eng-sjc1.cisco.com/conf/display/NSOCoreFP/6.0.9)"

This information is for managing through NCT setup.