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HPE Cray EX with CSM System Diagnostic Utility (SDU) Installation Guide

Contents

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2 Introduction

2.1 Overview

The following procedure details how to install, configure and mange the installation of the System Diagnostic Utility (SDU) product stream onto an HPE Cray EX with Cray System Management (CSM) asset. The SDU release distribution is a gzipped tar file that includes SDU, product specific SDU plugins and installation support code.

2.2 Document Notes

- <release_version> can be substituted with the version of this document.
- SDU may be installed on any non-compute management node. Throughout this document, “ncn-m001” will be referenced, indicating non-compute management node number one. SDU is not strictly limited to this management node. This node was selected to reduce abstraction for readability.
- Throughout this document, there are references to a `<nexus>` command. This is a command line interface to a Nexus repository instance that is globally available to the system. There are two concrete implementations of this command that must be chosen by use case. See the Resolve Nexus CLI Implementation prerequisite for the artifact management section.

2.3 Publication

This installation guide is intended to be published along with an administration guide on a per revision basis. These guides are published to the following locations. This is not necessarily a complete list of publication sites.

- Online via the HPE Customer Support Center.
- The root directory of an SDU distribution tar file in PDF form.
- This HPE internal site. Cray credentials are required for login.

2.4 Versioning

SDU and SDU related components are released adhering to Semantic Versioning 2.0.0.

2.4.1 Major Version Transitions

- Major version 1 to major version 2
  - Backwards compatibility is not supported
  - Forwards compatibility is supported by executing:
    1. Pre-install procedure
    2. Install the new version
    3. Post-install procedure

2.4.1.1 Prerequisites

SDU must be installed.

2.4.1.2 Pre-install Procedure

Save and optionally delete the contents (recursively) of the following directories:

1. `/var/opt/cray/sdu`
2. `/etc/opt/cray/sdu`

2.4.1.3 Post-install Procedure

Restore the saved content from the pre-install source directories to the post-install destination directories at the same path.

NOTE: Be careful to merge any existing content at the destination with the source content as needed.

3 Install

3.1 Tar File Install

The following procedure details how to install the System Diagnostic Utility (SDU) from a distribution tar file.

3.1.1 Prerequisites

1. Follow the Major Version Transitions procedure if switching major versions.
2. An SDU distribution tarfile.

3.1.2 Procedure

1. Start a typescript to capture the commands and output from this installation.

   SDU is intended to be started on only one non-compute management node (ncn-m00x). However, it is staged and ready to be started on all management nodes. If a management node is unavailable, SDU can be started and used on another management node. Typically, ncn-m001 is chosen as the node to run SDU and will be used in the following examples.

   ```
   ncn-m001# script -af product-sdu.$(date +%Y-%m-%d).txt
   ncn-m001# export PS1='\u@\H \D{%Y-%m-%d} \t \w # '
   ```

2. Copy the release distribution tar file (e.g cray-sdu-rda-<release_version>.tar.gz) to ncn-m001.

3. Unzip and extract the release distribution.

   ```
   ncn-m001# tar xzf cray-sdu-rda-<release_version>.tar.gz
   ```

4. Change to the extracted release distribution directory.

   ```
   ncn-m001# cd cray-sdu-rda-<release_version>
   ```

5. Run the installation script:

   ```
   ncn-m001# ./install.sh
   ```

6. Configure SDU.

7. Configure RDA.

8. Clean up installation artifacts.

   ```
   # Change directories to the one containing the release distribution tar file.
   ncn-m001# cd <path to distribution tar file>
   ncn-m001# rm cray-sdu-rda-<release_version>.tar.gz
   ncn-m001# rm -rf cray-sdu-rda-<release_version>
   ```

9. Finish the typescript file started at the beginning of this procedure.

   ```
   ncn-m001# exit
   ```

4 Configure

4.1 SDU

Configure SDU for use on the system. This procedure will populate `/etc/opt/cray/sdu/sdu.conf` with the required information provided.

There are a few ways to configure SDU, they are detailed in this section.

4.1.1 Prerequisites

The following information is needed to properly identify the system:

- Top-level system serial number. An HPE service team member can help to obtain this.
- System product number. Here is a (non-exhaustive) list of possibilities:
  - Shasta air-cooled: R6G08A
  - Shasta liquid-cooled: R4K98A

Additionally, the `sdu setup` command will ask for information, such as system name, system type, system description, company name, company site, and country code. See `sdu setup --help` for an exhaustive list of what will be requested.

4.1.2 Interactively

1. Start an interactive SDU configuration session with the following command:

   ```
   ncn-m001# sdu setup
   ```

2. Follow the on-screen prompts, answering each question posed.

4.1.3 Directly

The SDU configuration is saved to `/etc/opt/cray/sdu/sdu.conf`. This file may be edited directly as long as SDU is not currently executing.

4.1.4 Programmatically

A non-blocking `sdu setup` command is provided by passing the `--batch` parameter to the command. Each sdu.conf section and field can then be set using the following form:

```
ncn-m001# sdu setup --batch --[<section>][<field key>] <value>
```

where

<section> is the sdu.conf section of interest <field key> is the field within the sdu.conf section of interest <value> is the value to set the field to

4.2 RDA

Enable and configure the HPE Remote Device Access (RDA), which provides integrated remote connectivity for support automation, device telemetry, and remote service delivery. HPE RDA requires HTTPS outbound. This is a one-time setup that only needs to be run once on the NCN manager node running SDU.

Configuring and enabling RDA is optional. This is only required if network connectivity to HPE is required for either of the following:

1. Transport of SDU collections over the network to HPE
2. Interactive Device Access Refer to the resources below for more information on RDA:

- RDA Documentation: https://midway.ext.hpe.com/home
- Security white paper: https://support.hpe.com/hpesc/public/docDisplay?docId=a00006791en_us

4.2.1 Prerequisites

SDU must be installed. See “Install System Diagnostic Utility (SDU) Product Stream” in the ***HPE Cray EX System with CSM Diagnostic Utility (SDU) Installation Guide*** for more information.

Typically, RDA is configured at SDU installation time, but this is not strictly required.

4.2.2 Procedure

1. Enter the SDU container.

   ```
   ncn-m001# sdu bash
   ```

2. Run `cray-rda-setup enable` to configure and enable RDA.

```
ncn-m001-sdu# cray-rda-setup enable
```

When prompted, use the serial number and product number specified during `sdu setup`. The serial number is a system serial number. Contact an HPE representative to obtain the system serial number and product number.

For example:

```
Enter serial number (required) []: 77340000
Enter product number (required) []: R4K98A
```

Output similar to the following is expected:

```
=== RDA Setup Utility ===
Loading current configuration...
Checking known environments...
Current environment is pro

Environment not changed

Applying changes for product-mode: CAS-Agent

Create run-time directories... Done

Configure services
Done
Protecting config... Done
Updating configuration... Done
Adding midway-selector to cron... Done
Checking device certificate...
Certificate issued
Certificate created OK
Using device ID f1aa025b-a810-4625-b4eb-6d84ff699147
Adding cas-getcert to cron... Done
Checking web certificate.... Done
[Re]Apply file ownership and permissions... Done
Starting rda-cas service... Done
Starting rda-cas-jobs service... Done
Adding watchdog to cron... Done
Done!
```

3. Verify RDA operation.

   There will be an active tunnel listed if RDA is configured and enabled properly.

   NOTE: There is a delay from the completion of setup to tunnel readiness. Allow up to one minute for the following command to display properly configured tunnels.

   ```
   ncn-m001-sdu# rda-control show tunnel -v
   ```

   Output similar to the following is expected:

   ```
   Operating Values
   ----------------
           Command: show tunnel
      Station Role: cas
          Use WAPI: https://127.0.0.1:8082
           Midways: midway.ext.hpe.com:443
        Start Time          Tunnel       Remote Endpoint
   ====================  ==============  ===============
   2021-03-01T21:29:16Z  g4t9667g        tcp:15.241.136.220:443
   ```

5 Installation Management

5.1 Artifacts

The HPE Cray EX with CSM product has a globally available instance of a Nexus Repository. SDU keeps two artifacts within Nexus for use in SDU installation.

1. An Open Container Initiative (OCI) container by the name of `cray-sdu-rda`.
2. An RPM Package Manager (RPM) file, also by the name of `cray-sdu-rda`.

This section provides information and instructions needed to manage the SDU artifacts within Nexus.

5.1.1 Prerequisites

5.1.1.1 Resolve Installation Node

SDU is intended to run on any non-compute management node (ncn-m). The examples in this section will only show "ncn-m001", but in practice, this may be "ncn-m002", "ncn-m003", etc.

5.1.1.2 Resolve Nexus CLI Implementation

There are two command line implementations to Nexus. This document references a `<nexus>` command that resolves to one of the two command line implementations, depending on use case.

1. `nexus.sh` - provided within an SDU distribution tar file. This is useful at SDU installation time. This file is found in the root directory of an SDU distribution tar file. This is the preferred interface when performing `install` or `update` sub-commands.

2. `sdu nexus` - provided via SDU. This is useful at SDU runtime when managing SDU versions within Nexus post installation and configuration. It can be used with `install` and `update` sub-commands; keep in mind that the path to the distribution tar file/directory to be installed must be accessible from within the `cray-sdu-rda` container.

Unless one of the two commands are explicitly stated, `<nexus>` will be used throughout this document so that the appropriate CLI implementation can be chosen as needed.

Notes:

- Issue `ncn-m001# <nexus> -h` for more information, in particular a listing of the available sub-commands.
- Issue `ncn-m001# <nexus> <cmd> -h` for more information on each command, where `<cmd>` is a sub-command from the list provided by `ncn-m001# <neuxs> -h`.

5.1.1.3 Tar File

An SDU distribution tar file is required for `install` and `update` sub-commands. A tar file is optional for all other sub-commands.

5.1.2 Activate

To "activate" an SDU version in Nexus is to cause a given version to be the default for the `zypper` RPM front end.

1. Query the state of `cray-sdu-rda` with the following command:

   ```
   ncn-m001# <nexus> query
   ```

   The following is example output:

   ```
   Docker Image State of cray-sdu-rda
   ----------------------------------
   repo: cray-sdu-rda/cray-sdu-rda
       tags:
           1.1.4
           1.1.3
   RPM State of cray-sdu-rda
   -------------------------
   path: cray-sdu-rda
       blobstore: cray-sdu-rda
           group: cray-sdu-rda
   ```

```
        members:
            cray-sdu-rda-1.1.3 (activated)
            cray-sdu-rda-1.1.4
```

Note the current "activated" version.

2. Activate a specific cray-sdu-rda version, replacing with the desired `cray-sdu-rda` RPM version.

   ```
   ncn-m001# <nexus> activate cray-sdu-rda-<version>
   ```

5.1.3 Install

This will upload and activate the SDU artifacts found within a distribution tar file into Nexus. See the update sub-command for upload only.

1. Copy the release distribution tar file (e.g cray-sdu-rda-<release_version>.tar.gz) to the non-compute management node that SDU is to be installed into.
2. Unzip and extract the release distribution.

   ```
   ncn-m001# tar xzf cray-sdu-rda-<release_version>.tar.gz
   ```

3. Change to the extracted release distribution directory.

   ```
   ncn-m001# cd cray-sdu-rda-<release_version>
   ```

4. Run the installation script:

   ```
   ncn-m001# ./nexus.sh install
   ```

5.1.4 Query

To query the state of SDU:

```
ncn-m001# <nexus> query
```

Here is an example output from this command:

```
Docker Image State of cray-sdu-rda
----------------------------------
repo: cray-sdu-rda/cray-sdu-rda
    tags:
        1.1.4
        1.1.3
RPM State of cray-sdu-rda
-------------------------
path: cray-sdu-rda
    blobstore: cray-sdu-rda
        group: cray-sdu-rda
            members:
                cray-sdu-rda-1.1.3 (activated)
                cray-sdu-rda-1.1.4
```

There are two artifact types, as mentioned in the overview of this section.

The first is an OCI image. In the above example, there are two OCI image tags found in the `cray-sdu-rda/cray-sdu-rda` repository, `1.1.4` and `1.1.3`

The second is an RPM. In the above example, there are two RPMs found in the `cray-sdu-rda` group in the `cray-sdu-rda` blobstore in the `cray-sdu-rda` path, `cray-sdu-rda-1.1.3` and `cray-sdu-rda-1.1.4`.

The "activated" SDU version is indicated by the "(activated)" text next to the `cray-sdu-rda-1.2.3` RPM. Here "activated" means the default version that will be used by the `zypper` RPM front end. There is a one to one mapping of the `cray-sdu-rda` RPM version and the `cray-sdu-rda` OCI image tag. Therefore, there must be a matching OCI image found within Nexus for each RPM.

5.1.5 Remove

1. Query the state of cray-sdu-rda.

   ```
   ncn-m001# <nexus> query
   ```

   The following is example output from the above command:

   ```
   Docker Image State of cray-sdu-rda
   ----------------------------------
   repo: cray-sdu-rda/cray-sdu-rda
       tags:
           1.1.4
           1.1.3

   RPM State of cray-sdu-rda
   -------------------------
   path: cray-sdu-rda
       blobstore: cray-sdu-rda
           group: cray-sdu-rda
               members:
                   cray-sdu-rda-1.1.3 (activated)
                   cray-sdu-rda-1.1.4
   ```

2. Select an entry from the RPM "members" list output from the `query` command to remove a specific version of the cray-sdu-rda product stream. For example:

   ```
   ncn-m001# <nexus> remove --name cray-sdu-rda-1.1.3
   ```

   NOTE: If the activated version is removed, the next version in the repository group member list will be set to active.

   Alternatively, all versions of cray-sdu-rda can be removed:

   ```
   ncn-m001# <nexus> remove --all
   ```

Note, because there is a one to one mapping of the `cray-sdu-rda` RPM to a `cray-sdu-rda` OCI image, the associated OCI image(s) will be removed when specifying the `cray-sdu-rda` RPM(s) to remove.

5.1.6 Update

This will upload SDU artifacts found within a distribution tar file into Nexus. The tar file that is being used to update Nexus with will not be set active within Nexus unless there is no other versions of `cray-sdu-rda` available or if the currently active version matches the version that is being Nexus is being updated with. See the install sub-command to upload and activate with one command.

1. Copy the release distribution tar file (e.g cray-sdu-rda-<release_version>.tar.gz) to ncn-m001.
2. Unzip and extract the release distribution.

   ```
   ncn-m001# tar xzf cray-sdu-rda-<release_version>.tar.gz
   ```

3. Change to the extracted release distribution directory.

   ```
   ncn-m001# cd cray-sdu-rda-<release_version>
   ```

4. Run the installation script:

   ```
   ncn-m001# ./nexus.sh update
   ```

5.1.7 Upgrade

`ncn-m001# <nexus> upgrade` will set the latest version active for SDU within Nexus.

5.2 RPM Installation

SDU may be installed onto any HPE Cray EX system with Cray System Management (CSM) non-compute management node (ncn-m). The `zypper` RPM front end system is used for this task. This section provides information and instructions needed to manage the SDU installation onto the system via `zypper`.

5.2.1 Prerequisites

1. Follow the Major Version Transitions procedure if switching major versions.

5.2.1.1 Artifacts Loaded Into Nexus

See the artifact management section. There must be at least one version of `cray-sdu-rda` loaded into Nexus. In particular, see the nexus query section within.

5.2.2 Installation

This procedure will install the currently activated `cray-sdu-rda` version found within Nexus.

1. Add the `cray-sdu-rda` repository found in Nexus to the `zypper` index:

   ```
   ncn-m001# zypper addrepo --gpgcheck-allow-unsigned-repo --refresh \
             https://packages.local/repository/cray-sdu-rda cray-sdu-rda
   ```

2. Refresh the zypper cache

   ```
   ncn-m001# zypper refresh --force cray-sdu-rda
   ```

3. Install the currently activated `cray-sdu-rda` version found in Nexus. SDU may be installed on any non-compute management node. Shown below is ncn-m001 as an example only.

   ```
   ncn-m001# zypper install \
             --no-confirm \
             --oldpackage \
             --no-recommends \
             --force-resolution \
             --force cray-sdu-rda
   ```

4. Start the `cray-sdu-rda` systemd service with:

   ```
   ncn-m001# systemctl restart cray-sdu-rda
   ```

5. Wait for the systemd service to become ready with:

   ```
   ncn-m001# sdu wait_for_service
   ```

   See the systemd service section for more detailed information about the `crya-sdu-rda` systemd service.

6. Configure SDU.
7. Configure RDA.

5.2.3 Removal

This procedure will remove `cray-sdu-rda` installation from a non-compute management node. Note, it does not remove the related artifacts from Nexus. See the artifact management section if the supporting artifacts need to be removed from Nexus as well.

```
ncn-m001# zypper remove cray-sdu-rda
ncn-m001# zypper removerepo cray-sdu-rda
```

5.2.4 Query

The installed version of SDU can be queried with the command:

```
ncn-m001# rpm -q cray-sdu-rda
```

5.3 Systemd Service

SDU implements a systemd service by the name `cray-sdu-rda` to manage the lifetime of the `cray-sdu-rda` OCI container. The `cray-sdu-rda` service must be running for SDU to be functional.

NOTE: The `cray-sdu-rda` service is not started as part of installation.

5.3.1 Prerequisites

SDU must be installed. See one of the following for installation instructions:

- via tar file installation
- via artifact management and installation management

5.3.2 Start

To start the `cray-sdu-rda` service with:

```
ncn-m001# systemctl start cray-sdu-rda
```

5.3.3 Query

The status of the service can be queried with the following command:

```
ncn-m001# systemctl status cray-sdu-rda
```

5.3.4 Wait

The following command will block until the `cray-sdu-rda` service becomes ready or fails to become ready:

```
ncn-m001# sdu wait_for_service
```

The above command has a default timeout of 120 seconds. The first positional argument will override the default timeout in seconds.

NOTE: It may take a few minutes for the `cray-sdu-rda` service to become ready.

5.3.5 Stop

The `cray-sdu-rda` container will be stopped as part of stopping the `cray-sdu-rda` service. Do this by issuing:

```
ncn-m001# systemctl stop cray-sdu-rda
```

5.3.6 Restart

The `cray-sdu-rda` service can be restarted with the following command. This will cause the `cray-sdu-rda` container to restart as well.

```
ncn-m001# systemctl restart cray-sdu-rda
```

6 Support

6.1 Known Issues

6.1.1 Piping SDU Command Output

Piping SDU command output to the less or more commands causes formatting problems. This is a known issue when using podman exec with the `--tty` option. Refreshing the less or more will work around this issue. Less and more have the following commands to refresh the screen using `CTRL-r`, `CTRL-l`, or `r`.

6.2 Troubleshooting

6.2.1 Service Start Failure

Problem: The Docker container version is not what is expected or the Docker container fails to start.

Gather Information:

Check the output of the following command for indication of what went wrong:

```
ncn-m001# systemctl status cray-sdu-rda
```

Gather journctl entries for the cray-sdu-rda service, saving the results to `cray-sdu-rda-startup-failure.txt`. This file is helpful in debugging.

```
ncn-m001# journalctl -u cray-sdu-rda > cray-sdu-rda-startup-failure.txt 2>&1
```

Solution #1:

Check for existence of a /etc/sysconfig/cray-sdu-rda.rpmnew file. If it exists, merge it with /etc/sysconfig/cray-sdu-rda. A difference can be viewed with the following command:

```
ncn-m001# diff -u --color /etc/sysconfig/cray-sdu-rda*
```

The /etc/sysconfig/cray-sdu-rda file will not be updated with Zypper installations if it was modified from its original form. This can cause an out of sync problem with the state of Nexus/Zypper and this file. In particular, pay special attention to the SDU_IMAGE variable, ensuring that the image tag matches what is expected.

Solution #2:

Contact a member of the High Performance Computing Call Home Platform team at chp-team@hpe.com. Please include the gathered information.