

Installation and Setup of Synopsys® Containers

Version P-2019.06, June 2019 and Later Releases

SYNOPSYS®

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Container Installation

Starting with Synopsys Installer 5.x, you can optionally set up a Synopsys container based on Singularity container technology. The Synopsys container provides all the OS libraries and other dependencies necessary to run container-enabled tools. This is especially useful for cloud installations.

Caution:

Synopsys recommends that you set up the Synopsys Container on a recent, supported OS such as CentOS or RedHat 7.3. If you wish to enable a Synopsys Container on CentOS and RHEL 6.x, see [CentOS and RHEL 6.x Support](#).

For more information on Synopsys containers, including a list of container-enabled tools, supported OS information, and troubleshooting information, see <https://www.synopsys.com/containers>.

The following sections are included:

- [Container Download](#)
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- [Starting Container-Enabled Tools](#)
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Container Download

Container-enabled tools are installed like any other tool, following the procedure in Chapters 2 and 3. You can install the container-enabled tools either before or after downloading and setting up the Synopsys Container.

Note:

Container-enabled and non-container-enabled product files can be installed together.

To enable containerization for container-enabled tools, follow these steps.

1. From the Synopsys EFT download directory for Installer, download the following files to a temporary directory:

- `SynopsysInstaller_vversion.run` # If not already downloaded
- `snps_container_vversion.bin.csh`
- `snps_container_vversion.bin.part01`
- `snps_container_vversion.bin.part02`

2. Install the Synopsys Installer with the following command:

```
% ./SynopsysInstaller_vlatest_version.run
```

3. Make the *.csh file executable. For example,

```
% chmod 755 snps_container_v1.1.bin.csh
```

4. Execute the *.csh file to join the .part files and create the installable `snps_container_vversion.bin` file. For example,

```
% ./snps_container_v1.1.bin.csh
```

Singularity Installation

Before you set up a Synopsys Container, Singularity 3.1.0 or later must be installed on your machine or network. Singularity is included with Synopsys Installer version 5.x. If Singularity 3.1.0 or later is not already installed on your machine or network, a network administrator should install Singularity from a root user account. For example,

```
% cd /usr/synopsys/installer/version/container_setup/singularity
% sudo ./singularity_install \
  --prefix=/opt/singularity-3.1.0 # local installation
```

Or

```
% sudo ./singularity_install \
  --prefix=/path/to/nfs/share/singularity-3.1.0 # For a network
  installation
```

For the Singularity installation procedure, see the Singularity README file in this directory: *installer_root/container_setup/singularity/README.install*

Container Setup and Verification

To set up a Synopsys Container, perform the following steps. These steps should be performed by an administrator with permissions to login or su as the owner of the Synopsys Installer and Synopsys tool installation tree.

1. Install the `snps_container_v1.1.bin` file by entering the following commands:

```
% cd installer_root/container_setup
% ./container_setup.sh install \
  -source EFT_download_dir \
  -target container_destination_dir \
  -exe singularity_binary_path
```

For example,

```
% cd /usr/synopsys/installer/5.0.1/container_setup
% ./container_setup.sh install -source \
  -source /usr/synopsys/downloads \
  -target /usr/synopsys/tools \
  -exe /opt/singularity-3.1.0/bin/singularity
```

This set of commands,

- installs the Synopsys Container into the `/usr/synopsys/tools/snps_container_v1.1` directory
- creates the default `.synopsys_container` configuration file at *installer_root/container_setup/config/snps_container*

- uses the default container image file, `centos7.simg`
 - enables automounting by default
2. (Optional) Update the Synopsys Container configuration file.

- a. Add necessary paths that are not automounted.

```
% pwd
installer_root/container_setup

% ./container_setup.sh config -bind path1,path2,...
```

This updates the default configuration file, `installer_root/container_setup/config.snps_container`, to add any specified “bind paths” that are not automounted by default. Specify multiple bind paths in a comma-separated list. For example,

```
% ./container_setup.sh config -bind /remote/src1,/remote/src2
```

- b. Change the container image to CentOS 6 if you are using the Synopsys Container on CentOS or RHEL 6.x (the default image is CentOS 7):

```
% pwd
installer_root/container_setup

% ./container_setup.sh config -image centos6.simg
```

Note:

Symbolic links in the host's root directory need to be replicated with the `-bind` option if access is required within the container.

For configuration options and usage examples, enter the following at the command line:

```
% ./container_setup.sh config -help
```

3. Verify that the Synopsys Container configuration file will start Singularity and create a container environment that provides access to the desired mount points.
- a. Log in or `su` to a regular, non-root user account.
 - b. Change the directory (`cd`) to the root directory to prevent your current directory from being automatically bound into the container. For example,

```
% pwd
/usr/synopsys/installer/5.0.1/container_setup

% cd /
```

- c. Execute `snps_container` to start a shell inside the container environment. For example,

```
% pwd
/  
% /usr/synopsys/installer/5.0.1/container_setup/config/snps_container sh
```

If the container is properly configured, you will see the Singularity prompt:

```
Singularity>
```

- d. At the Singularity prompt, `cd` to your home directory:

```
Singularity> cd $HOME
```
- e. Type the following command to make sure other home directories are present. This indicates the home directories have been mounted inside the container.

```
% ls ..
```
- f. Type the following command to see all the mount points available within the container. By default, all the automount points should be available.

```
% df
```
- g. (Optional) Open another terminal and compare the available mount points outside of the container to the mount points available inside the container.

If there are missing paths or mount points,

- i. Repeat Step 2 using the `-bind` option followed by a comma-separated list of paths to add.

Note:

The full set of `-bind` paths must be passed each time `container_setup.sh` is executed.

- ii. Open a new terminal and repeat Step 3 to verify the container matches the host. Make sure you perform this step from the root directory (`/`).

Note:

An alternative configuration file with different values can be used with the `config` and `deploy` commands. You can use the `-target -source /path/to/.snps_container` option with the `config` command and the `-source /path/to/.snps_container` option with the `deploy` command.

Deploying the Container

Deploy the Synopsys Container configuration file to the Synopsys tools:

```
% cd installer_root/container_setup
% ./container_setup.sh deploy -target synopsis_tools_path
```

For example,

```
% ./container_setup.sh deploy -target /usr/synopsys/tools
```

This copies, or deploys, the `.snps_container` configuration file to the container-enabled tools installed in the path to the Synopsys tools. If a tool already contains a configuration file in its root directory, the existing file will be updated:

```
INFO: Update /slowfs/scna_li/tools/pwr/P-2019.03-SP2/.snps_container
INFO: Update /slowfs/scna_li/tools/pts/P-2019.03-SP2/.snps_container
```

For later tool installations, Synopsys Installer automatically copies the default `.snps_container` configuration file from the configuration (config) directory to the tools' root directories. If additional container-enabled tools are installed later, the Synopsys Container will not need to be configured or deployed again unless you wish to change some parameter, such as the bind paths or the Singularity path.

Starting Container-Enabled Tools

To invoke a container-enabled tool and load (access) the Synopsys container, do one of the following:

- Enter the command

```
% tool_invocation_script -container
```

For example,

```
% /usr/synopsys/tools/pts/P-2019.03-SP2/bin/pt_shell -container
```

Note:

If you omit the `-container` option, the tool starts normally, without loading the container.

- Set the environment variable `SNPS_CONTAINER=1` to enable the container-enabled tools to automatically access the container on startup.

For more information on Synopsys containers, including a list of container-enabled tools, supported OS information, and troubleshooting information, see <https://www.synopsys.com/containers>.

CentOS and RHEL 6.x Support

CentOS and RHEL 7.1 or later are recommended. For CentOS and RHEL 6.x (only 6.6 and later are supported), automount points bound into the container need to be marked shared. Otherwise, accessing new mounts from within the container will fail with an ELOOP error (too many levels of symbolic links). To achieve this on older systems, mark the root mount point recursive-shared at startup. For example,

```
% cat /etc/rc.d/rc3.d/S99shared
#!/bin/sh
# Mark automount points shared for containers
mount --make-rshared /
```