Hewlett Packard Enterprise

Technical white paper

HPE Synergy Image Streamer 4.0 artifact bundle for Red Hat Enterpise Linux 7.5

Contents

Introduction 3
HPE Synergy Image Streamer 3
HPE Synergy Composer 3
Solution overview 3
HPE Synergy Image Streamer OS Volume deployment overview 4
Install RHEL 7.5 to the empty OS Volume 7
Capture the Golden Image from the Installed Volume 9
Deploy the generalized RHEL Golden Image 10
Resources and additional links 11

Introduction

This document describes the HPE Synergy Image Streamer 4.0 artifact bundle for Red Hat® Enterpise Linux 7.5 for Red Hat Openshift Platform Red Hat Enterprise Linux 7.5 brings you enhanced interoperability, storage efficiency on-premise and in the cloud, and multiplatform support for building network-intensive applications, massively scalable data repositories, or a build-once-deploy-often solution that performs well in physical, virtual, and cloud environments

HPE Synergy, the first platform built from the ground up for composable infrastructure, empowers IT to create and deliver new value instantly and continuously. This single infrastructure reduces operational complexity for traditional workloads and increases operational velocity for the new breed of applications and services. Through a single interface, HPE Synergy composes compute, storage and fabric pools into any configuration for any application. It also enables a broad range of applications from bare metal to virtual machines to containers, and operational models like hybrid cloud and DevOps. HPE Synergy enables IT to rapidly react to new business demands.

Target audience: This document is intended for systems engineers, systems administrators, architects, and installers responsible for installing and maintaining Red Hat Enterpise Linux (RHEL) on a large scale running on Hewlett Packard Enterprise Synergy Composable Infrastructure. The reader of this document should be familiar with RHEL, HPE ImageStreamer, HPE OneView, and HPE Synergy Composable Infrastructure.

Document purpose: The purpose of this document is to describe HPE Synergy Image Streamer artifact bundle for Red Hat Enterpise Linux 7.5 and how to use it.

HPE Synergy Image Streamer

HPE Synergy Image Streamer is a new approach to deployment and updates for composable infrastructure. This management appliance works with HPE Synergy Composer for fast software-defined control over physical compute modules with operating system and application provisioning. HPE Synergy Image Streamer enables true stateless computing combined with the capability for image lifecycle management. This management appliance rapidly deploys and updates infrastructure.

HPE Synergy Image Streamer adds a powerful dimension to 'infrastructure as code'—the ability to manage physical servers like virtual machines. In traditional environments, deploying an OS and applications or hypervisor is time consuming because it requires building or copying the software image onto individual servers, possibly requiring multiple reboot cycles. In HPE Synergy, the tight integration of HPE Synergy Image Streamer with HPE Synergy Composer enhances server profiles with images and personalities for true stateless operation.

HPE Synergy Composer

HPE Synergy Composer, powered by HPE OneView, captures the physical state of the server in the server profile. HPE Synergy Image Streamer enhances this server profile (and its desired configuration) by capturing your golden image as the 'deployed software state' in the form of bootable image volumes. These enhanced server profiles and bootable OS, plus application images, are software structures ('infrastructure as code') and no compute module hardware is required for these operations. The bootable images are stored on redundant HPE Synergy Image Streamer appliances, and they are available for fast implementation onto multiple compute nodes at any time. This enables bare metal compute modules to boot directly into a running OS with applications and multiple compute nodes to be quickly updated.

Solution overview

The solution recommends a three (3) frame HPE Synergy solution with two (2) HPE Synergy Image Streamer appliances set up. The solution is tested for Red Hat Enterpise Linux 7.5 as a base operating system. The Hewlett Packard Enterprise solution management software versions used are as follow:

Table 1. HPE Synergy Software Compnenets.

Component	Version
HPE Synergy Image Streamer	4.00.00
HPE Synergy Composer	4010.07-0330056
HPE Synergy Image Streamer artifacts for RHEL75	V1

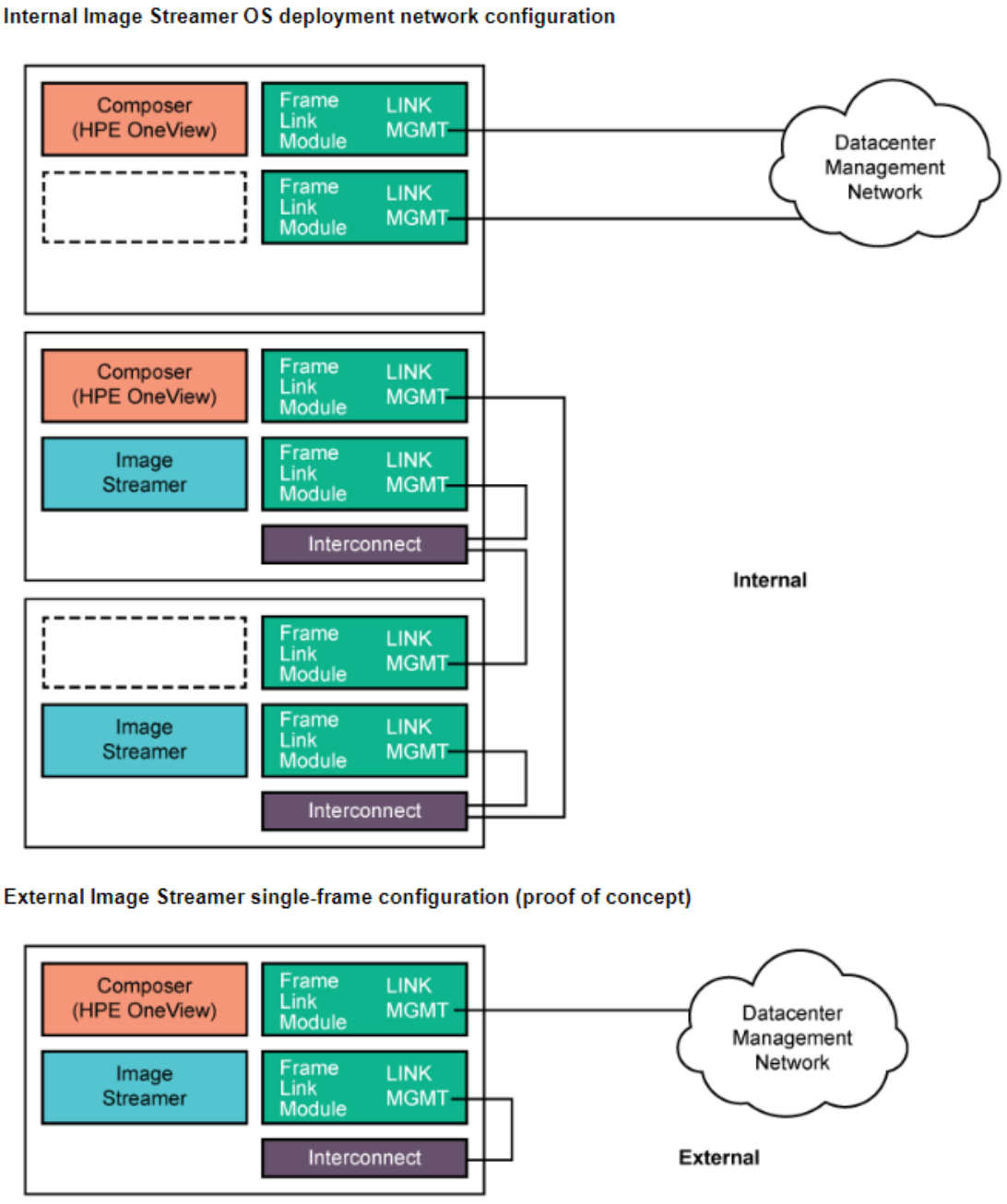


Figure 1. HPE Synergy Image Streamer configuration within HPE Synergy Frame Layout.

HPE Synergy Image Streamer OS Volume deployment overview

Creating and deploying an HPE Synergy Image Streamer OS Volume requires first installing the base operating system on an empty OS Volume, in this case RHEL 7.5, then using the ISO along with base HPE SPP bundle for the firmware. Once the base OS Volume is created, create a golden image using the **Capture Build Plan**, which is part of the RHEL sample artifacts bundle that can be downloaded from the public GitHub.

Using the golden image, deploy OS volumes for multiple computes using the **Deploy Build Plan**, which is also a part of the RHEL sample artifacts bundle, which can be downloaded from the public GitHub. The flow diagram shown below explains the overall process in brief.

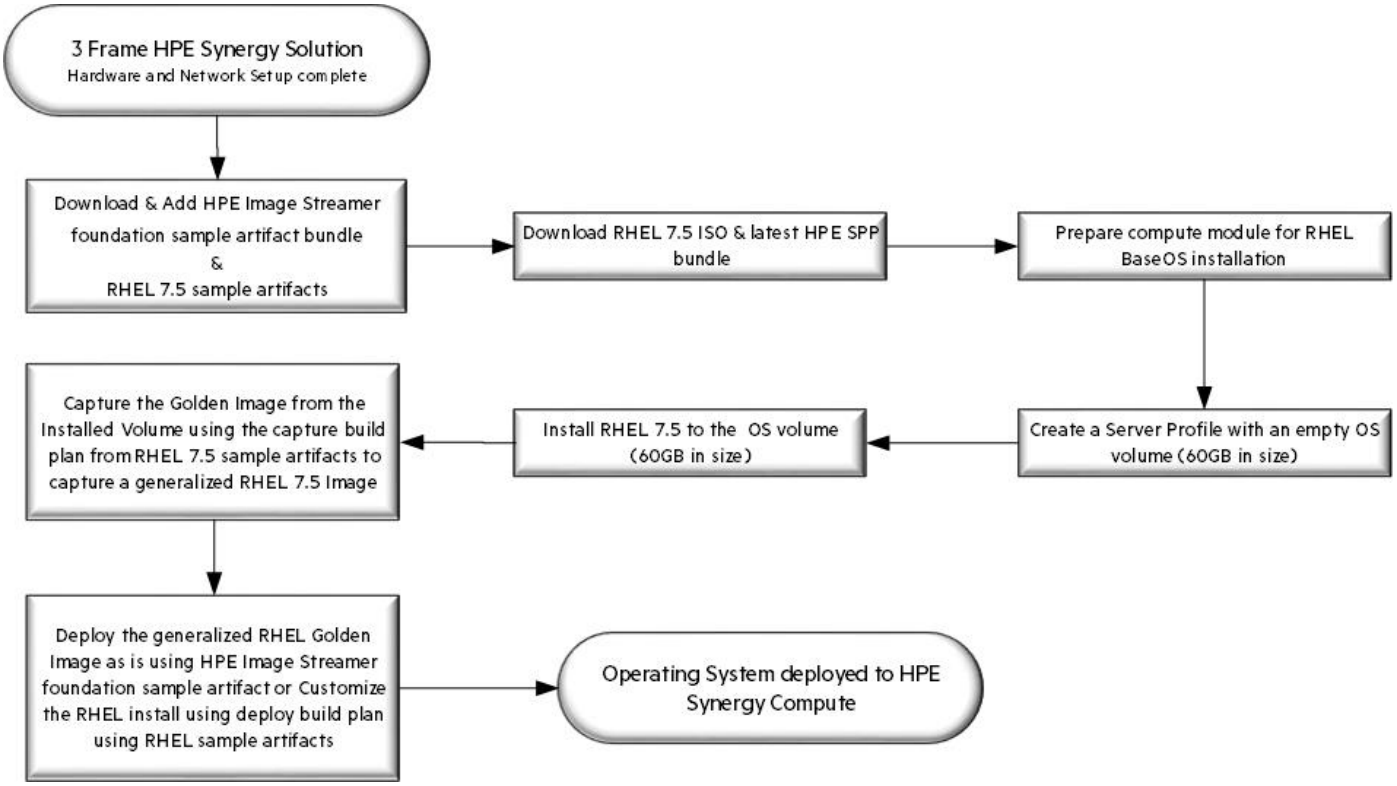


Figure 2. HPE Synergy Image Streamer OS Volume deployment overview

HPE-RHEL-75-2018-08-01-v40.zip

This artifact bundle contains the following:

- **HPE-Capture-RHEL75-Image Build Plan** - to capture RHEL 7.5 golden image by removing personalization settings
- **HPE-Deploy-RHEL75 Build Plan** - to deploy RHEL 7.5 OS volumes by personalizing host, network, and users' settings

Note

The artifact bundle recommendation is to use 60GB volumes for RHEL deployments

Table 2. HPE RHEL 7.5 artifact bundle details

Artifact Bundle	OS Build Plan	Plan Script	Plan Script Description
	HPE-Capture-RHEL75-Image-x.x.x	HPE_RHEL_Mount	Mounts the current RHEL partition for generalization
		HPE_RHEL_Generalize_Network	Network parameter are generalized
		HPE_RHEL_Host_Generalize	Generalize the host specific parameters such as host name, machine-id, udev rules & SSH host keys.
		HPE_RHEL_Generalize_User	Generalizes custom user, groups.

Artifact Bundle	OS Build Plan	Plan Script	Plan Script Description
HPE-RHEL75-v4.0		HPE_RHEL_Unmount_General	Unmounts the current RHEL partition post generalization
	HPE-Deploy-RHEL75 Build Plan	HPE_RHEL_MOUNT_DEPLOY	Mounts the current partition of the server and validates image against invalid image captures
		HPE_RHEL_USER_DEPLOY	Sets root password and creates user accounts
		HPE-RHEL_NETWORK_DEPLOY	Configures Network Interface card settings
		HPE_RHEL_HOSTNAME-DEPLOY	Configure hostname and domain FQDN
		HPE_RHEL_SECURITY_DEPLOY	Enables or Disables the services for security
		HPE_RHEL_UNMOUNT_DEPLOY	Cleans up the temporary directory created during mount and unmounts the current partition.

Key point

The user is free to add or remove scripts from the **Deploy Build Plans** however it is recommended to use the capture script as-is.

1. Download and add the HPE Image Streamer foundation sample artifact bundle and the RHEL sample artifacts:
   a. Download the image-streamer-tools-foundation V4.0 sample artifact bundle, if it is not already added to HPE Image Streamer, from https://github.com/HewlettPackard/image-streamer-tools/tree/v4.0/foundation
   b. Download the image-streamer-RHEL RHEL-7.5 sample artifact bundle from https://github.com/HewlettPackard/image-streamer-reference-architectures/tree/master/RC-RHEL-OpenShift-Synergy
   c. Download RHEL ISO and the latest HPE SPP bundle:
   a. Download the latest RHEL ISO from the Red Hat Website – this requires Red Hat subscription, https://access.redhat.com/downloads/content/150/ver=4.1/rhel---7/4.1/x86_64/product-software
   b. Download the latest SPP from the HPE website, https://spp.hpe.com
2. Prepare the compute module for RHEL installation using the following steps::
   a. Select the compute module to be used to create the RHEL golden image.
   b. Select **Launch console** from the Actions menu to launch the iLO Remote Console.
   c. On the iLO Integrated Remote Console menu select **Virtual Drives**. Use the "**Image File CD-ROM/DVD**" option to locate and open the RHEL 7.5 .iso image that was previously downloaded.
3. Create a Server Profile with an empty OS volume, following the steps below:
   a. Create a copy of HPE – Foundation – create empty OS volume –copy and modify the copy to allow for a 60 GB OS volume.
   b. Select **Create profile** in the Hardware section of the page.
   c. Give the Server Profile a name
   d. Specify an OS Deployment plan (copy HPE – Foundation – create empty OS volume)
   e. Modify deployment settings, Enter a volume size for the golden image at least 60 GB

f. Complete Creation of Server Profile

Install RHEL 7.5 to the empty OS Volume

This involves the following steps:

1. Power on the server.
2. On the install screen press "**e**" key to edit.
3. Modify the install kernel parameters by adding `rd.iscsi.ibft=1` to the install kernel boot parameter.
4. Continue the install kernel boot process - Press **Ctrl-x** to start.
5. Set your language and timezone and insure that there is an NTP server present in the environment.
6. Under Installation Destination click on **Add a disk...**
7. Select the volume with lefthandnetworks in its WWID that matches the 60 GB volume you created.
8. Select "**I will configure partitioning**" and then select **Done**.
9. On the manual partitioning screen select "**Click here to create them automatically**".
10. Adjust the partitions as follows:
    a. Change the /boot partition to ext4
    b. Decrease the / partition by appropriately and change it to ext4
    c. Raise the swap partition to 8192 MiB
    d. Create a separate mount point for /var and make it 20 GiB and ext4

Once done, the screen should appear as in Figure 3.

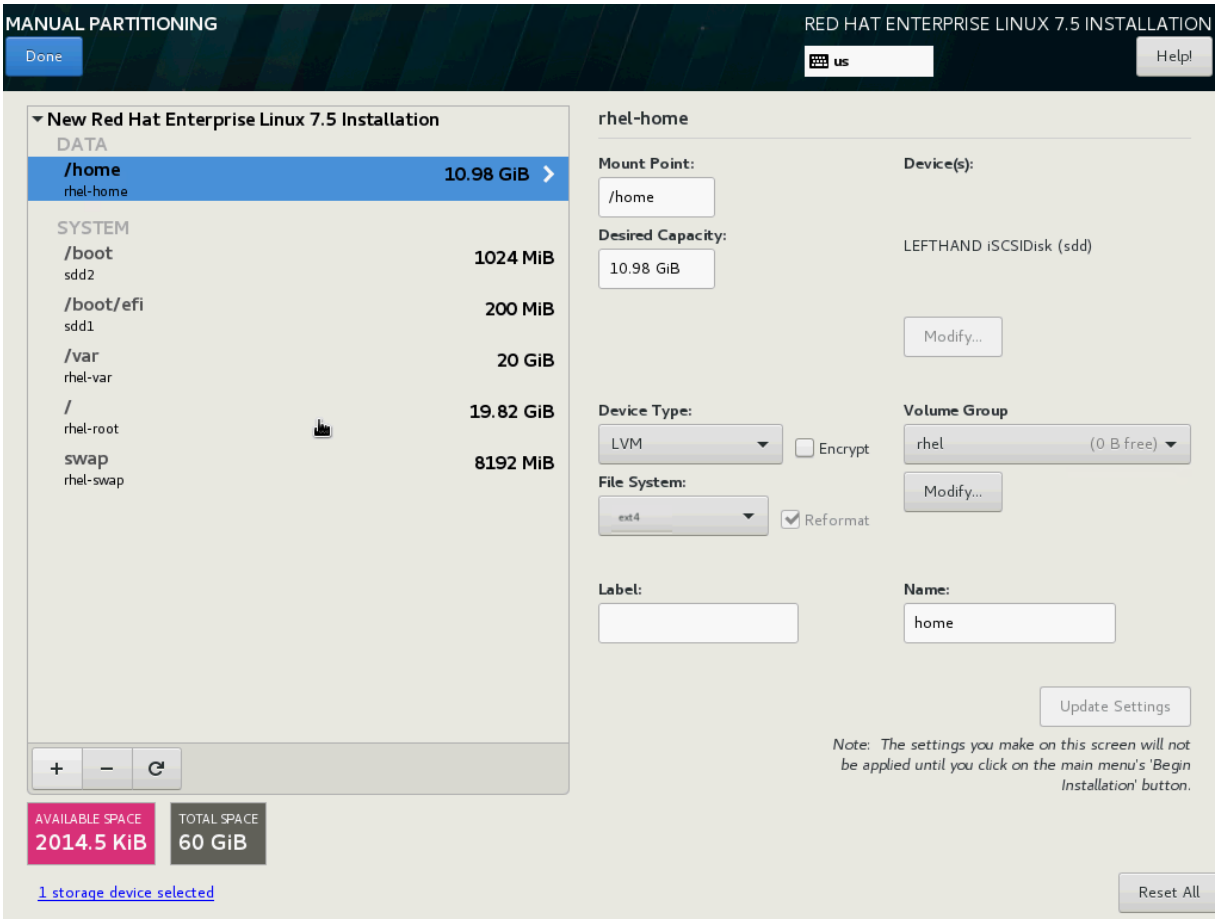


Figure 3. RHEL 7.5 Manual partitioning

11. Select **Modify** and then save the changes. Select **Done** and then **Accept Changes**.
12. Under Network & Host Name activate the management NIC via DHCP by highlighting the NIC and setting the switch to "**On**". Accept the default hostname and select **Done**.
13. Register the host by logging on to the host as root and running the following commands.

```
# subscription-manager register
# subscription-manager list
# subscription-manager attach --pool=8a85f98b6267cf4b01628b910afc466e
# subscription-manager attach --pool=8a85f98b628cd42d016290d1126f211c
# subscription-manager repos --disable=*
# subscription-manager repos \
    rhel-7-server-ansible-2-rpms
    rhel-7-server-extras-rpms
    rhel-7-server-optional-rpms
    rhel-7-server-rpms
    rhel-7-server-rt-rpms
```

14. Enable bonding if needed and open the necessary firewall ports.

```
# modprobe bonding
# firewall-cmd –add-port 22/tcp --permanent
# firewall-cmd --add-port 9090/tcp --permanent
# firewall-cmd --add-port 2223/tcp --permanent
# firewall-cmd --add-port 161/udp --permanent
# firewall-cmd --add-port 111/tcp --permanent
# firewall-cmd --add-port 5900-6923/tcp --permanent
# firewall-cmd --add-port 5989/tcp --permanent
# firewall-cmd --add-port 5989/udp --permanent
# firewall-cmd --add-port 16514/tcp --permanent
# firewall-cmd --add-port 49152-49216/tcp --permanent
# firewall-cmd --add-port 54321/tcp --permanent
# firewall-cmd --add-port 54322/tcp --permanent
# firewall-cmd --add-port 6081/udp –permanent
# firewall-cmd –add-port 3260/tcp --permanent
# firewall-cmd –reload
```

15. Install and enable multipath.

```
#yum –y install device-mapper-multipath
```

16. Open /etc/multipath.conf in a text editor such as VIM or Nano and edit it as follows.

```
defaults {
user_friendly_names yes
}
blacklist {
devnode “sda”
}
```

17. Save the changes to the multipath.conf and run the following commands to enable and start the service.

```
#systemctl start multipathd
#systemctl enable multipathd
#systemctl status multipathd
# multipath –ll
# yum update –y
```

18. Shut down the host by typing the following.

```
# shutdown –h now
```

Capture the Golden Image from the Installed Volume

Using the capture HPE-Capture-RHEL75-Image Build Plan from the RHEL sample artifacts, capture a generalized RHEL Image.

For more information refer to the HPE Synergy Image Streamer 4.0 User Guide http://h20628.www2.hp.com/km-ext/kmcsdirect/emr_na-a00025491en_us-3.pdf. Once this step is completed it will create a golden image for deployment.

Deploy the generalized RHEL Golden Image

Use the HPE Image Streamer foundation sample artifact as-is, or customize the RHEL install by using the HPE-Deploy-RHEL75 Build Plan using the RHEL sample artifacts, by following the steps below:

1. Create s Build plan pointing to the Golden Image
2. Connect the Build plan to an OS Deployment Plan
3. Connect the OS Deployment Plan to the required Server Profile or Server Profile templates.

NOTE

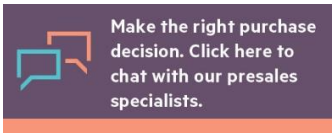
It is recommended to have at least one Ethernet NIC connected to the Server profile when configuring HPE Synergy compute.

Resources and additional links

HPE Reference Architectures, hpe.com/info/ra

HPE Synergy, hpe.com/info/synergy

To help us improve our documents, please provide feedback at hpe.com/contact/feedback.



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