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Technical Documentation

# **HPE Synergy Image Streamer RHEL 7.2 Artifact Bundle Documentation**

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# 1 HPE Synergy Image Streamer Artifact Bundle of RHEL 7.2

The HPE Synergy Image Streamer Artifact Bundle of RHEL 7.2 includes artifact which is helpful to personalize the RHEL 7.2 OS.

## 1.1.1 Artifact Bundle: HPE-RHEL-7.2-artifacts

### 1.1.2

This artifact personalizes the RHEL 7.2 OS environment based on user input. It contains 2 Build Plan and 9 Plan Scripts.

## 1.2 Prerequisite:

### 1.2.1 Filesystem:

The filesystem of RHEL 7.2 image should be xfs or ext4.

We assume that root partition (/) is mounted on /dev/sda3 or /dev/rhel/root. If the root partition is not on the mentioned device the user has to edit RHEL-7.2-mount-and-validate Plan Script before proceeding.

### 1.2.2 LogicalVolumeMangement (LVM):

User has to add a local drive for LVM type partitioning, while creating the server profile user should edit "Integrated storage controller mode" option of local storage to add a local drive for the server. There will be only two partitions done. Ensure that the disk is in a clean state before you start using it.

### 1.2.3 NIC Teaming:

For NIC teaming the user should add two network connection with same VLAN ID for teaming in the add network section of server profile. And while selecting the **Team0NIC1** and **Team0NIC2** the network should be of same VLAN ID.

### 1.2.4 Adding Multiple NIC's:

While selecting the **MgmtNIC1**, **MgmtNIC2**, **MgmtNIC3** and **MgmtNIC4** the user should select a different network. User should not use the same network for selecting the MgmtNIC's.

### 1.2.5 Adding the user:

The user can add one or more users. User can add more users either with comma separated or semicolon separated or space separated and the password will be same for all the user. User can change password on their first login, though it is not enforced.

## 1.3 Build Plans

### 1.3.1 Build Plan: RHEL-7.2-personalize-and-configure-NICs-LVM-BP

Build Plan personalizes the RHEL 7.2 server by creating a new users, applying multiple nic configuration, allowing the network to access from outside world, updating the hostname, creating partition on the disk, enabling SELINUX service, server hardening and changing the root password as per user parameters.

Steps: Plan Script Names	Attributes
RHEL-7.2-mount-and-validate	
RHEL-7.2-configure-multiple-NICs	MgmtNIC1(NIC) MgmtNIC2(NIC) MgmtNIC3(NIC) MgmtNIC4(NIC) TotalMgmtNICs(Option)
RHEL-7.2-configure-hostname	DomainName(FQDN)
RHEL-7.2-configure-users	NewRootPassword(Password) NewUserName(String) NewUserPassword(Password)
RHEL-7.2-configure-partition-using-LVM	DiskName(String) FirstPartitionSize(Number) LogicalVolumeGroupName(String) LogicalVolumeName(String) LogicalVolumeSize(Number) SecondPartitionSize(Number)
RHEL-7.2-manage-services	SSH(Option)

RHEL-7.2-unmount	
------------------	--

### 1.3.2 Build Plan: RHEL-7.2-personalize-and-NIC-teamings-LVM-BP

Build Plan personalizes the RHEL 7.2 server by creating a new users, creating multiple nic teaming, allowing the network to access from outside world, updating the hostname, creating partition on the disk, enabling SELINUX service, server hardening and changing the root password as per user parameters.

Steps: Plan Script Names	Attributes
RHEL-7.2-mount-and-validate	
RHEL-7.2-configure-multiple-NIC-teaming	FirstNicTeamName(String) SecondNicTeamName(String) Team0NIC1(NIC) Team0NIC2(NIC) Team1NIC1(NIC) Team1NIC2(NIC) TotalNicTeamings(Option)
RHEL-7.2-configure-hostname	DomainName(FQDN)
RHEL-7.2-configure-users	NewRootPassword(Password) NewUserName(String) NewUserPassword(Password)

RHEL-7.2-configure-partition-using-LVM	DiskName(String) FirstPartitionSize(Number) LogicalVolumeGroupName(String) LogicalVolumeName(String) LogicalVolumeSize(Number) SecondPartitionSize(Number)
RHEL-7.2-manage-services	SSH(Optional)
RHEL-7.2-unmount	

## 1.4 Plan Scripts

### 1.4.1 Plan Script: RHEL-7.2-mount-and-validate

This Plan Script lists all mount partitions and mounts the root partition of the image.

After the mount script validates golden image to check whether it is appropriate image to use. And verifies whether the image was captured by the HPE Synergy Image Streamer or not.

### 1.4.2 Plan Script: RHEL-7.2-configure-multiple-NICs

This script gives the user an option of configuring four NICs and user as to select the total number of NICs to configure as DHCP or Static as per their requirement. User has to add public network while creating server profile.

Attributes:

#### MgmtNIC1 (NIC)

This attribute is of type NIC and has the following four sub-attributes:

- MgmtNIC1.dhcp
- MgmtNIC1.gateway
- MgmtNIC1.ipaddress
- MgmtNIC1.mac
- MgmtNIC1.netmask

These sub-attributes are used to edit the network file of the first NIC in RHEL 7.2.

#### MgmtNIC2 (NIC)

This attribute is of type NIC and has the following four sub-attributes:

- MgmtNIC2.dhcp
- MgmtNIC2.gateway
- MgmtNIC2.ipaddress

- MgmtNIC2.mac
- MgmtNIC2.netmask

These sub-attributes are used to edit the network file of the second NIC in RHEL 7.2.

#### MgmtNIC3 (NIC)

This attribute is of type NIC and has the following four sub-attributes:

- MgmtNIC3.dhcp
- MgmtNIC3.gateway
- MgmtNIC3.ipaddress
- MgmtNIC3.mac
- MgmtNIC3.netmask

These sub-attributes are used to edit the network file of the third NIC in RHEL 7.2.

#### MgmtNIC4 (NIC)

This attribute is of type NIC and has the following four sub-attributes:

- MgmtNIC4.dhcp
- MgmtNIC4.gateway
- MgmtNIC4.ipaddress
- MgmtNIC4.mac
- MgmtNIC4.netmask

These sub-attributes are used to edit the network file of the fourth NIC in RHEL 7.2.

#### TotalMgmtNICs (Option)

This attribute is of type option where user must select the number of NICs to configure the server.

### 1.4.3 Plan Script: RHEL-7.2-configure-multiple-NIC-teaming

#### 1.4.4

This script gives the user an option of configure two NIC teaming and user as to select the total number of NICs for teaming as DHCP or Static as per their requirement. User has to add public network while creating server profile and can also specify the name for teaming the NICs.

Attributes:

#### FirstNicTeamName (String)

User can specify the name for first NIC teaming.

#### SecondNicTeamName (String)

It is of type string and can specify the name for second NIC teaming.

#### Team0NIC1 (NIC)

This attribute is of type NIC which has three sub attribute

- Team0NIC1.gateway,
- Team0NIC1.ipaddress
- Team0NIC1.mac

All these attributes are used for network teaming Team0NIC1 and Team0NIC2 as static or dhcp.



#### Team0NIC2 (NIC)

This attribute is of type NIC which has three sub attribute

- Team0NIC2.gateway,
- Team0NIC2.ipaddress
- Team0NIC2.mac

All these attributes are used for network teaming Team0NIC1 and Team0NIC2 as static or dhcp.

#### Team1NIC1

This attribute is of type NIC which has three sub attribute

- Team1NIC3.gateway,
- Team1NIC3.ipaddress
- Team1NIC3.mac

All these attributes are used for network teaming Team1NIC1 and Team1NIC2 as static or dhcp.

#### Team1NIC2

This attribute is of type NIC which has three sub attribute

- Team1NIC3.gateway,
- Team1NIC3.ipaddress
- Team1NIC3.mac

All these attributes are used for network teaming Team1NIC1 and Team1NIC2 as static or dhcp.

#### TotalNicTeamings (Option)

Gives option to select either one or two NIC teaming for the server.

### 1.4.4.1 Sample test screenshot

(Note: The screenshot has been captured through SSH console)

```
[root@myhost ~]# nmcli connection show
NAME          UUID                                  TYPE      DEVICE
team0         699cce37-da3e-4e53-937f-e89858ea7d81 team       team0
ibft0         72d8c878-e0ad-475a-bace-5b5b968c6460 802-3-ethernet ibft0
iBFT ibft0    c4764f86-d025-3d0e-8ec4-fd2d98246ade 802-3-ethernet --
virbr0-nic    d9080ba0-3e1b-4319-88dd-e0f332bb40a7 generic    virbr0-nic
virbr0        3dbdeed6-099f-4491-b6be-06121a6cae1d bridge     virbr0
team0-port2   a6204f55-4cc4-4309-9dc6-7bb0f827d7da 802-3-ethernet ens3f4
team0-port1   2ce887a5-7b88-479a-aa2c-dae38c1f3180 802-3-ethernet ens3f1
[root@myhost ~]# teamdctl team0 state
setup:
runner: roundrobin
ports:
ens3f1
link watches:
link summary: up
instance[link_watch_0]:
name: ethtool
link: up
down count: 0
ens3f4
link watches:
link summary: up
instance[link_watch_0]:
name: ethtool
link: up
down count: 0
[root@myhost ~]# nmcli connection down team0-port1
Connection 'team0-port1' successfully deactivated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/2)
[root@myhost ~]# teamdctl team0 state
setup:
runner: roundrobin
ports:
ens3f4
link watches:
link summary: up
instance[link_watch_0]:
name: ethtool
link: up
down count: 0
[root@myhost ~]# nmcli connection show
NAME          UUID                                  TYPE      DEVICE
team0         699cce37-da3e-4e53-937f-e89858ea7d81 team       team0
ibft0         72d8c878-e0ad-475a-bace-5b5b968c6460 802-3-ethernet ibft0
iBFT ibft0    c4764f86-d025-3d0e-8ec4-fd2d98246ade 802-3-ethernet --
virbr0-nic    d9080ba0-3e1b-4319-88dd-e0f332bb40a7 generic    virbr0-nic
virbr0        3dbdeed6-099f-4491-b6be-06121a6cae1d bridge     virbr0
team0-port2   a6204f55-4cc4-4309-9dc6-7bb0f827d7da 802-3-ethernet ens3f4
team0-port1   2ce887a5-7b88-479a-aa2c-dae38c1f3180 802-3-ethernet --
```

### 1.4.5 Plan Script: RHEL-7.2-configure-hostname

This script assigns the hostname given by user, adds the alias in /etc/hosts file with respective to the interface name present in the /tmp/interface name file and also delete the default gateway so that the network can be accessible from the outside world.

The hostname assignment is done in HPE Synergy Image Streamer only, but updating /etc/hosts should be done when the host is up. So the script for updating hosts is added in **rc.local** file which is present in /etc/rc.d folder. And this script has to be added next either to the Plan Script RHEL-7.2-configure-multiple-NIC-teaming or RHEL-7.2-configure-multiple-NICs.

Attributes:

DomainName (FQDN)

This attribute is of type FQDN the user must specify the full domain name to which the network should belong.

## 1.4.6 Plan Script: RHEL-7.2-configure-users

Changes the root password and adds new users with data given by the user while creating the server profile. This scripts are executed in the **rc.local** file to do the operations. Script takes new root password and new user details as parameters.

Attributes:

NewRootPassword (Password)

Attribute is used to change the root password of the server based on user input.

NewUserName (String)

String used to create a new users to the server. And multiple user name can also give by either comma separated or semicolon separated.

NewUserPassword (Password)

This attribute is of type Password and used to set for the newly created user. Same password is assigned to the multiple users given by the users.

## 1.4.7 Plan Script: RHEL-7.2-configure-partition-using-LVM

Script partitions the newly added disk (example /dev/sda) into to two partitions (example /dev/sda1 /dev/sda2) of given size. Creates a logical volume group and logical volume and create ext4 file system and mounts the given directory to the new logical volume and adds the entry to /etc/fstab. User have to add local disk while creating server profile.

Attributes:

DiskName (String)

It is a string which takes the name of the disk to partition.

#### FirstPartitionSize (Number)

This attribute take the size of the first partition to be in GiB. This is a special attribute which is recognized by the HPE Synergy Image Streamer.

#### LogicalVolumeGroupName (String)

This attribute is of type string it takes the name of logical volume group to create in the disk.

#### LogicalVolumeName (String)

The new logical volume to be create in the disk. It is of the type string.

#### LogicalVolumeSize (Number)

Size of the logical volume to be create will be in GiB unit.

#### SecondPartitionSize (Number)

This attribute take the size of the second partition to be in GiB. This is a special attribute which is recognized by the HPE Synergy Image Streamer.

### **1.4.7.1 Sample test screenshot:**

(Note: The screenshot has been captured through SSH console)

```

[root@host ~]# lsblk
NAME                                MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sda                                 8:0      0 279.4G 0 disk
├─sda1                             8:1      0   10G 0 part
│ └─new_vol_group-new_vol 253:2    0   15G 0 lvm  /root/LVM-Dat1
├─sda2                             8:2      0   10G 0 part
│ └─new_vol_group-new_vol 253:2    0   15G 0 lvm  /root/LVM-Dat1
└─sdb                               8:16     0   20G 0 disk
    ├─sdb1                         8:17     0 2000M 0 part /boot/efi
    ├─sdb2                         8:18     0 5000M 0 part /boot
    ├─sdb3                         8:19     0  19.3G 0 part
    └─rhel-swap                    253:0    0    2G 0 lvm  [SWAP]
        └─rhel-root                253:1    0  17.3G 0 lvm  /

[root@host ~]# clear
[root@host ~]# lsblk
NAME                                MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sda                                 8:0      0 279.4G 0 disk
├─sda1                             8:1      0   10G 0 part
│ └─new_vol_group-new_vol 253:2    0   15G 0 lvm  /root/LVM-Dat1
├─sda2                             8:2      0   10G 0 part
│ └─new_vol_group-new_vol 253:2    0   15G 0 lvm  /root/LVM-Dat1
└─sdb                               8:16     0   20G 0 disk
    ├─sdb1                         8:17     0 2000M 0 part /boot/efi
    ├─sdb2                         8:18     0 5000M 0 part /boot
    ├─sdb3                         8:19     0  19.3G 0 part
    └─rhel-swap                    253:0    0    2G 0 lvm  [SWAP]
        └─rhel-root                253:1    0  17.3G 0 lvm  /

[root@host ~]# df -h
Filesystem                                Size  Used Avail Use% Mounted on
/dev/mapper/rhel-root                    10G   3.2G   6.8G  33% /
devtmpfs                                16G     0   16G   0% /dev
tmpfs                                    16G   96K   16G   1% /dev/shm
tmpfs                                    16G   9.7M   16G   1% /run
tmpfs                                    16G     0   16G   0% /sys/fs/cgroup
/dev/sdb2                               497M  154M  343M  31% /boot
/dev/sdb1                               200M   9.5M  191M   5% /boot/efi
/dev/mapper/new_vol_group-new_vol        15G   41M   14G   1% /root/LVM-Dat1
tmpfs                                    3.2G   20K   3.2G   1% /run/user/1002
tmpfs                                    3.2G     0   3.2G   0% /run/user/0

[root@host ~]# vgs
VG          #PV #LV #SN Attr   VSize  VFree
new_vol_group 2   1   0 wz--n- 19.99g  4.99g
rhel        1   2   0 wz--n- 19.31g 40.00m

[root@host ~]# lvs
LV          VG          Attr   LSize  Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
new_vol new_vol_group -wi-ao--- 15.00g
root      rhel        -wi-ao--- 17.27g
swap      rhel        -wi-ao---  2.00g

[root@host ~]# pvdisplay
--- Physical volume ---
PV Name           /dev/sda1
VG Name           new_vol_group
PV Size           10.00 GiB / not usable 4.00 MiB
Allocatable       yes (but full)
PE Size           4.00 MiB
Total PE          2559
Free PE           0
Allocated PE      2559
PV UUID           qPpF0y-xQwM-ptbX-2qvj-mwT-GrXI-Cjtwyv

--- Physical volume ---
PV Name           /dev/sda2
VG Name           new_vol_group
PV Size           10.00 GiB / not usable 4.00 MiB
Allocatable       yes
PE Size           4.00 MiB
Total PE          2559
Free PE           1278
Allocated PE      1281
PV UUID           d0ql9u-yrow-iBUL-ceZ6-9lwT-DWxs-6hfrwt

--- Physical volume ---
PV Name           /dev/sdb3
VG Name           rhel
PV Size           19.31 GiB / not usable 2.00 MiB
Allocatable       yes
PE Size           4.00 MiB
Total PE          4944
Free PE           10
Allocated PE      4934
PV UUID           IGTRZY-eGWA-Pidb-TI4K-U0tF-BZ40-42Ahr5

[root@host ~]#

```

### 1.4.8 Plan Script: RHEL-7.2-manage-services

This script enables the SELINUX service which supports access control security policies and also performs server hardening operations such as enabling the SSH service and disabling the firewall service so that the network is accessible through external network. It also gives the user an option to enable or disable the SSH.

Attributes:

SSH (Option)

This attribute is a user option to enable or disable the SSH service of the server.

### 1.4.9 Plan Script: RHEL-7.2-unmount

This Plan Script sets up **rc.local** file, removes the temporary directory created during mount operation and unmounts the root partition.

## 1.5 Procedure for creating a Linux Golden Image

The following process explains how to create an RHEL 7.2 golden image using HPE Synergy Image Streamer.

1. Ensure that you have access to RHEL 7.2 ISO installation file containing iSCSI device drivers.
2. Create a server profile with “HPE - Foundation 1.0 - create empty OS Volume” as OS Deployment plan and any available server hardware. Set an appropriate value for volume size in MiB units. The HPE Synergy Server will be configured for access to this empty OS Volume.
3. Launch iLO Integrated Remote Console of this server and set RHEL 7.2 ISO file as virtual CD-ROM/DVD image file. Power on the server.
4. RHEL installation starts and RHEL installer detects the configured empty OS Volume as an iSCSI disk device. Select this iSCSI disk device as the target for RHEL installation.
5. Follow onscreen instructions and complete the RHEL installation.
6. Power off the server.
7. Navigate to HPE Synergy Image Streamer -> Golden Images and Click ‘Create Golden image’
8. Select the OS volume corresponding to the server profile created for empty OS volume and choose “RHEL-7.2-generalize” as the capture build plan.
9. HPE Synergy Image Streamer generalizes and captures RHEL image and adds it as a golden image.