Hewlett Packard Enterprise

Technical Documentation

HPE Synergy Image Streamer Microsoft Windows Artifact Bundle Documentation

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1 HPE Synergy Image Streamer Artifact Bundle for Microsoft Windows

1.1 Artifact Bundle: HPE - Windows – 2018-10-26

The HPE Synergy Image Streamer Artifact Bundle for Microsoft Windows includes artifacts which can be used to deploy and personalize Microsoft Windows Server 2016 and 2019 or Microsoft Hyper-V Server 2016 and 2019 Operating Systems.

1.2 Prerequisite:

1.2.1 Filesystem

The Windows image must contain a FAT32 partition which is assigned the drive-letter “S:” It is assumed that the FAT32 partition exists at dev/sda5 device path in guestfish. If the FAT32 partition is not on the mentioned device path, the “HPE - Windows - Mount” Plan Script has to be modified with the appropriate path. If the drive-letter assigned is different, all scripts with reference to paths on S: drive have to be modified.

1.2.2 Golden Image Creation

1. Ensure that you have access to Windows 2016 or 2019 ISO file.
2. Create a server profile with “HPE - Foundation 1.0 - create empty OS Volume” as OS Deployment plan and a server hardware of desired hardware type (see section on Golden Image Compatibility below). Set an appropriate value for volume size in MiB units, say 40000 MiB. 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 the Windows 2016 or 2019 ISO file as virtual CD-ROM/DVD image file. Power on the server.
4. Windows should present an option of installing from CD/DVD. Continue with this option.
5. Install Windows 2016 or 2019.
6. (Optional) To take a backup of this installation at this stage:
    a. Shutdown the server
    b. Perform an as-is capture using "HPE - Windows - Capture - As-Is" build plan to create the "as-is" golden image of the OS.
    c. Deploy another server with the golden image captured in previous step and boot the server.
7. Install any additional software or roles if required.

NOTE: The next six steps can be automated using the “PrepareForImageStreamerOSVolumeCapture.ps1” script in “scripts” directory on the github repository where Windows artifact bundles are available for download.

8. Create a FAT32 partition which will be used by the artifacts for personalization:

FAT 32 partition can be created either from UI using Disk Management utility (8.1) or using CMD Diskpart commands (8.2).

8.1 FAT32 partition creation from UI

a. Open "Computer Management" > "Disk Management"

b. Select C: partition

c. Shrink volume

d. Change amount of space to shrink to 100 MB

e. Select Shrink

f. Select new Unallocated space

g. Select New Simple Volume

h. Leave size

i. Assign drive letter, (Choose S)

j. Format as FAT32 file system type (this requires changing from the default)

k. Give Volume label as "ISDEPLOY"

l. Finish

m. “ISDEPLOY (S:)” should be shown

8.2 FAT32 partition creation using CMD commands

Use list volume command to get volume number for C: partition. Here C: partition resides in Volume 0.

```
C:\Users\Administrator>diskpart
DISKPART>list volume
DISKPART >select volume 0
DISKPART >shrink desired=100
DISKPART >create partition primary size=100
DISKPART >format fs=fat32 quick label=ISDEPLOY
DISKPART >assign letter=S
```

9. Backup drive-letters

```
reg export HKLM\System\MountedDevices C:\driveletters.reg
```

10. Generalize Windows using sysprep

WARNING: This operation is destructive and will remove all configuration. To take backup of the system at this stage, capture an as-is golden image.

Open Command Prompt window and run the following:


```
cd Windows\System32\Sysprep
Sysprep /generalize /oobe /quit
```

This will take a few minutes to complete and will generalize the system. All settings will be lost. This does not remove any additional user accounts that are created. Any user accounts not required in the captured golden image must be manually deleted.

11. Restore drive-letters

```
reg import C:\driveletters.reg
```

12. Set Unattend.xml location to the FAT32 partition

```
reg add HKLM\System\Setup /v UnattendFile /t REG_SZ /d "S:\ISdeploy\Unattend.xml"
```

13. Set SetupComplete.cmd location to the FAT32 partition

```
mkdir C:\Windows\Setup\Scripts
echo S:\ISdeploy\SetupComplete.cmd > C:\Windows\Setup\Scripts\SetupComplete.cmd
```

14. Shutdown the server.

15. Capture a golden image using the "HPE - Windows - Capture - As-Is" build plan. This will be the generalized golden image.

1.2.3 Golden Image Compatibility

The golden image created using the above method will work only when the image is deployed on server hardware of the same model. Specifically, if the number of processors on server where the image is deployed is different from the server where the image was captured, server boot after deployment will fail. Also, if the boot controller is moved from one Mezzanine slot on the server to another, Windows will not boot correctly.

1.2.4 Pagefile Size

Following is recommended for the size and location of the pagefile:

If the pagefile is going to be of small size (< 1 GiB), then it can be located on the OS volume.

If the pagefile is going to be large (> 1 GiB), then it should be located on local disk or SAN and configured appropriately.

If a large pagefile size is required and the above recommendations cannot be followed, then using Windows with Image Streamer may require re-consideration as having a large pagefile on the OS volume may consume significant storage on Image Streamer and limit the number of server profiles that can be deployed.

1.3 Build Plans

1.3.1 Build Plan: HPE - Windows - Capture - As-Is

This build plan can be used to create a golden image from a Windows volume without performing any modifications on the volume contents.

1.3.2 Build Plan: HPE - Windows - Deploy - As-Is

This build plan can be used to deploy a Windows golden image without any personalization. It does not perform any modifications on the volume contents.

1.3.3 Build Plan: HPE - Windows - Deploy - HA

This build plan can be used to deploy a Windows golden image with management NICs teamed for high-availability. It is used for multi-frame environment containing a pair of ImageStreamer appliances.

Steps: Plan Script Names	**Attributes**
HPE - Windows - Mount	
HPE - Windows - Initialize	
HPE - Windows - Hyper - V - Enable	
HPE - Windows - iSCSI Multi-path IO	
HPE - Windows - Locale	DisplayLanguage (Option) Keyboard Layout (Option)
HPE - Windows - Network - Domain	DomainAccount (String) DomainName (FQDN) DomainPassword (Password)
HPE - Windows - Network - HA Configuration	ManagementNIC1 (NIC) ManagementNIC2 (NIC)
HPE - Windows - Network - Proxy	ProxyServerAddress (String) ProxyServerPort (Number) ProxyServerSkipForAddresses (String)
HPE - Windows - Power Plan	PowerPlan (Option)
HPE - Windows - Remote Desktop	RemoteDesktop (Option)
HPE - Windows - Time Zone	TimeZone (Option)
HPE - Windows - User - Add - 1	User1DisplayName (String) User1Name (String) User1Password (Password)
HPE - Windows - User - Administrator	Password (Password)

HPE - Windows - Unattend - Save	
HPE - Windows - Unmount	

1.3.4 Build Plan: HPE - Windows - Deploy - Non HA

This build plan can be used to deploy a Windows golden image with management NIC without high-availability. It is used for single-frame environment.

Steps: Plan Script Names	**Attributes**
HPE - Windows - Mount	
HPE - Windows - Initialize	
HPE - Windows – Hyper - V - Enable	
HPE - Windows - Locale	DisplayLanguage (Option) Keyboard Layout (Option)
HPE - Windows - Network - Domain	DomainAccount (String) DomainName (FQDN) DomainPassword (Password)
HPE - Windows - Network - Non HA Configuration	ManagementNIC
HPE - Windows - Network - Proxy	ProxyServerAddress (String) ProxyServerPort (Number) ProxyServerSkipForAddresses (String)
HPE - Windows - Power Plan	PowerPlan (Option)
HPE - Windows - Remote Desktop	RemoteDesktop (Option)
HPE - Windows - Time Zone	TimeZone (Option)
HPE - Windows - User - Add - 1	User1DisplayName (String) User1Name (String) User1Password (Password)
HPE - Windows - User - Administrator	Password (Password)
HPE - Windows - Unattend - Save	
HPE - Windows - Unmount	

1.3.5 Build Plan: HPE - Windows - Example - Deploy

This build plan uses most all plan scripts from the artifact bundle and demonstrates how to use the example plan scripts for personalization. This can be used as a reference to create custom Windows artifacts.

Steps: Plan Script Names	Attributes
HPE - Windows - Mount	
HPE - Windows - Initialize	
HPE - Windows - Hostname	Hostname (String)
HPE - Windows - Example - Commands in Unattend	
HPE - Windows - Example - First Logon Commands	
HPE - Windows - Example - Logon Commands	
HPE - Windows - Example - PowerShell	
HPE - Windows - Example - Registry Edit	
HPE - Windows - Example - Registry Edit with .reg	
HPE - Windows - Hyper - V - Enable	
HPE - Windows - Locale	DisplayLanguage (Option) Keyboard Layout (Option)
HPE - Windows - Network - Non HA Configuration	ManagementNIC
HPE - Windows - Network - Proxy	ProxyServerAddress (String) ProxyServerPort (Number) ProxyServerSkipForAddresses (String)
HPE - Windows - OEM Information	OEMManufacturerName (String) OEMModelName (String)
HPE - Windows - Owner Info	OrganizationName (String) OwnerName (String)
HPE - Windows - Pagefile - Custom Size	PagefileMaximumSizeMB (Number) PagefileMinimumSizeMB (Number)
HPE - Windows - Power Plan	PowerPlan (Option)
HPE - Windows - Remote Desktop	RemoteDesktop (Option)

HPE - Windows - Time Zone	TimeZone (Option)
HPE - Windows - User - Add - 1	User1DisplayName (String) User1Name (String) User1Password (Password)
HPE - Windows - User - Add - 2	User2DisplayName (String) User2Name (String) User2Password (Password)
HPE - Windows - User - Administrator	Password (Password)
HPE - Windows - User - Auto Logon	AutoLogonUsername AutoLogonPassword
HPE - Windows - Unattend - Save	
HPE - Windows - Unattend - Debug	
HPE - Windows - Unmount	

1.3.6 Build Plan: HPE - Windows - Example - Single Unattend

This build plan is an example of personalizing Windows using a single Unattend.xml file

Steps: Plan Script Names	**Attributes**
HPE - Windows - Mount	
HPE - Windows - Example - Single Unattend	UserDisplayName (String) UserName (String) UserPassword (String)
HPE - Windows - Unmount	

1.4 Plan Scripts

1.4.1 HPE - Windows - Mount

This Plan Script lists all mount partitions and mounts the FAT32 partition (S: drive) of the image. It also creates directories used by other plan scripts for personalization.

1.4.2 HPE - Windows - Initialize

Creates initial (default) configuration for Unattend.xml.

1.4.3 HPE - Windows - Hostname

Sets the Computer Name (Hostname)

Attributes:

Hostname (String)

Computer Name (Hostname) to set. The value must conform to a valid hostname requirement defined for Microsoft Windows Server. It can be maximum 15 characters in length. To automatically generate a computer name, specify * (asterisk).

1.4.4 HPE - Windows - Hyper - V - Enable

Enables Hyper-V if it is not already enabled. Enabling Hyper-V requires reboot.

1.4.5 HPE - Windows - iSCSI Multi-path IO

Enables multi-path I/O for iSCSI

1.4.5 HPE - Windows - Locale

Sets the display language and keyboard layout

Attributes:

DisplayLanguage (Option)

The display language to set

KeyboardLayout (Option)

The keyboard layout to set

1.4.6 HPE - Windows - Network - Domain

Joins the domain with credentials

Attributes:

DomainAccount (String)

Username for joining domain.

DomainName (FQDN)

Domain to join.

DomainPassword (Password)

Password for the specified DomainAccount username for joining domain.

1.4.7 HPE - Windows - Network - HA Configuration

Configures the management network with high-availability

Attributes:

ManagementNIC1 (NIC)

This attribute is of type NIC and has the following four sub-attributes:
ManagementNIC1.dns1
ManagementNIC1.dns2
ManagementNIC1.gateway
ManagementNIC1.ipaddress
ManagementNIC1.mac
ManagementNIC1.netmask

These sub-attributes are used to configure network settings.

ManagementNIC2 (NIC)

This attribute is of type NIC and has the following four sub-attributes:
ManagementNIC2.mac

These sub-attributes are used to configure network settings.

1.4.8 HPE - Windows - Network - Non-HA Configuration

Configures the management network without high-availability.

Attributes:

ManagementNIC (NIC)

This attribute is of type NIC and has the following four sub-attributes:
ManagementNIC.dns1
ManagementNIC.dns2
ManagementNIC.gateway
ManagementNIC.ipaddress
ManagementNIC.mac
ManagementNIC.netmask

These sub-attributes are used to configure network settings.

1.4.9 HPE - Windows - Network - Proxy

Configures the proxy server address and port. Also sets the list of addresses that bypass the proxy server.

Attributes:

ProxyServerAddress (String)

The address of the proxy server, without http(s)://

ProxyServerPort (Number)

The port of the proxy server. For example: 8080

ProxyServerSkipForAddresses (String)

List of hostnames or IP addresses that bypass the proxy server. Multiple addresses must be separated by semicolons (;). Include string <local> to bypass the proxy server for all intranet addresses.

1.4.10 HPE - Windows - OEM Information

Sets the OEM manufacturer name and model of the server

Attributes:

OEMManufacturerName (String)

The OEM manufacturer name. For example: Hewlett Packard Enterprise

OEMModelName (String)

The server model. For example: Synergy 480 Gen9

1.4.11 HPE - Windows - Owner Info

Sets the computer owner's name and organization.

Attributes:

OrganizationName (String)

Computer owner's organization

OwnerName (String)

Computer owner's name

1.4.12 HPE - Windows - Pagefile - Custom Size

Sets the minimum and maximum pagefile size.

Attributes:

PagefileMaximumSizeMB (Number)

Maximum size of the pagefile.

PagefileMinimumSizeMB (Number)

Minimum size of the pagefile.

1.4.13 HPE - Windows - Pagefile - Disable

Disables the pagefile. This script must not be used with "HPE - Windows - Pagefile - Custom Size" plan script.

1.4.14 HPE - Windows - Power Plan

Sets the power plan to "Balanced", "High Performance" or "Power Saver"

Attributes:

PowerPlan (Option)

Power plan to use

1.4.15 HPE - Windows - Product Key

Sets the Windows product key

Attributes:

WindowsProductKey (String)

The Windows product key.

1.4.16 HPE - Windows - Remote Desktop

Enables or disables remote desktop

Attributes:

RemoteDesktop (Option)

Option to allow or disallow remote desktop.

1.4.17 HPE - Windows - Time Zone

Sets the time zone.

Attributes:

TimeZone (Option)

Option to specify time zone.

1.4.18 HPE - Windows - Unattend - Debug

Validates Unattend.xml's XML syntax and logs the contents in deployment log. This script logs the passwords in plain text, so it should be used only for debugging purpose during Windows artifact development.

1.4.19 HPE - Windows - Unattend - Save

Generates a single Unattend.xml file from the fragments created by other plan scripts. Should be placed just above the unmount script in the OS build plan steps.

1.4.20 HPE - Windows - Unmount

Generates the SetupComplete.cmd file which executes scripts created by other plan scripts. Should be the last step in the OS build plan. Unmounts the FAT32 partition.

1.4.21 HPE - Windows - User - Add - 1

Creates an additional administrator user account.

Attributes:

User1DisplayName (String)

User's display name.

User1Name (String)

Username of the account.

User1Password (Password)

Account password.

1.4.22 HPE - Windows - User - Add - 2

Creates an additional administrator user account.

Attributes:

User2DisplayName (String)

User's display name.

User2Name (String)

Username of the account.

User2Password (Password)

Account password.

1.4.23 HPE - Windows - User - Administrator

Configures the "Administrator" user account.

Attributes:

Password (Password)

The "Administrator" user's password.

1.4.24 HPE - Windows - User - Auto Logon

Sets the username and password with which to automatically logon at startup.

Attributes:

AutoLogonPassword (Password)

The password of the user with which to automatically logon.

AutoLogonUsername (String)

Username with which to automatically logon.

1.4.25 HPE - Windows - Example - Commands in Unattend

Example of running commands/scripts from Unattend.xml

1.4.26 HPE - Windows - Example - First Logon Commands

Example of running commands the first time a user logs in

1.4.27 HPE - Windows - Example - Logon Commands

Example of running commands every time a user logs in

1.4.28 HPE - Windows - Example - PowerShell

Example of running a PowerShell script during Windows deployment

1.4.29 HPE - Windows - Example - Registry Edit

Example of modifying the Windows registry during deployment

1.4.30 HPE - Windows - Example - Registry Edit with .reg

Example of modifying the Windows registry during deployment using a .reg file

1.4.31 HPE - Windows - Example - Single Unattend

Example of personalizing windows by directly creating Unattend.xml with a single plan script. It creates a user account as an example.

Attributes:

UserDisplayName (String)

User's display name.

UserName (String)

Username of the account.

UserPassword (Password)

Account password.

1.5 Developing Windows Artifacts

New plan scripts should follow the following method/conventions for personalization that are used by the existing plan scripts.

1.5.1 Personalization method

The plan scripts provided in this artifact bundle use two methods of personalization:

Unattend.xml. This is an answer file that stores the custom settings that are applied during Windows setup.

SetupComplete.cmd script. This is a script where commands can be added to run at the end of Windows setup.

The plan scripts either generate parts of Unattend.xml or generate scripts that are invoked from SetupComplete.cmd.

1.5.2 Directory conventions

/ISdeploy/SetupComplete Scripts created in this directory will be executed through SetupComplete.cmd in alphabetical order (more details below)

/ISdeploy/Unattend Unattend.xml will be generated based on files and directories in this location (more details below)

/ISdeploy/Scripts Scripts executed by Unattend.xml or other scripts are created

here **/ISdeploy/Files** Files used by any scripts are created here

/ISdeploy/Temp Temporary files and scripts created during personalization are stored at this location. These are deleted after personalization is completed

1.5.3 Unattend.xml conventions

Temporary directory (TMPDIR) used by "HPE - Windows - Unattend - Save" is **/ISdeploy/Unattend/**

"HPE - Windows - Unattend - Save" script generates the entire Unattend.xml based on the parts generated by other scripts. This script must be added just before the "HPE - Windows - Unattend - Debug" (if included) and "HPE - Windows - Unmount" steps in OS Build Plan.

If a pass is to be included in Unattend.xml, TMPDIR/*pass* directory should exist. For example: For specialize and oobeSystem passes, "/ISdeploy/Unattend/specialize" and "/ISdeploy/Unattend/oobeSystem" directories must be created by a plan script.

If a component is to be included, TMPDIR/*pass*/*component* directory should exist. For example: /ISdeploy/Unattend/specialize/Microsoft-Windows-Shell-Setup

If TMPDIR/*pass*/*component*.xml file exists, it is considered as the contents of start tag of that component. If it doesn't exist, start tag is automatically generated.

TMPDIR/*pass*/*component* directory can contain directories or files. Directories are used for nested elements inside components. For example: oobeSystem > Microsoft-Windows-Shell-Setup > UserAccounts > LocalAccounts

Contents of all files (preferably created having .xml extension) are added inside the component XML. This is done in alphabetical order of filenames (as listed by the "ls" command in Linux).

If any directories exist in TMPDIR/*pass*/*component*/, the names are considered as element names. An element is added in the XML for each directory name. These directories can have further levels of nesting and directories at all levels can contain .xml files.

The .xml filenames should preferably match the element name whose XML they contain. In case an element has nested elements, then care should be taken to ensure that one plan script does not overwrite the XML file or other files created by another plan script.

"HPE - Windows - Unattend - Save" will recursively traverse this directory structure to generate Unattend.xml.

If "HPE - Windows - Unattend - Debug" script is added, the final generated XML is logged in the deployment log, which can be used for debugging. It also checks the XML for valid XML syntax.

1.5.4 SetupComplete.cmd conventions

Scripts created in **/ISdeploy/SetupComplete/** directory are executed by SetupComplete.cmd in alphabetical order (same as order of files listed by "ls" UNIX/Linux command without any options).

SetupComplete.cmd with commands to execute scripts in the above directory is generated by the unmount plan script.

A reboot script for Windows is also executed at the end of SetupComplete.cmd which restarts Windows if an empty file exists at "S:\ISdeploy\Restart-required" (/ISdeploy/Restart-required" in Guestfish)

1.5.5 Creating new OS Build Plans

If a fresh new OS build plan is created, the type and the settings (constraints) for the custom attributes must be properly assigned for the HPE provided plan scripts. The HPE provided OS build plans can be used as reference for the same. The OS build plan “Copy” operation can be used instead of creating a new OS build plan and steps modified, to retain type/constraints for the custom attributes.

1.5.6 Unattend.xml reference

https://docs.microsoft.com/en-us/windows-hardware/customize/desktop/unattend/components-b-unattend

