HPE Reference Architecture for deploying SAP HANA DB with HPE Synergy Image Streamer

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Executive summary

SAP HANA® database (DB) is a modern technology by SAP® and offers an in-memory database, enabling a radically different application architecture and a new philosophy with regards to the data model simplicity. SAP HANA DB offers a new way of solving current and future challenges with enterprise applications. More customers are transitioning to SAP HANA and are accelerating on utilizing it as a mission critical platform.

The demands of SAP HANA DB implementations continue to increase. Faster transaction processing speeds, scalable capacity, and increased flexibility are required to meet the needs of today's business.

HPE Synergy is an ideal platform for SAP HANA DB, offering fluid resource pools which can be customized for specific database needs. SAP HANA DB resources can be deployed repeatedly and fast through the software-defined intelligence embedded in the HPE Synergy Composer and HPE Synergy Image Streamer. An administrator can utilize HPE Synergy Image Streamer to develop a deployment plan to install and configure both the operating system and database software. A server profile defined in the HPE Synergy Composer can use that deployment plan to configure a new or even multiple bare metal server in a matter of minutes, compared to hours or days utilizing traditional infrastructure.

This Reference Architecture (RA) demonstrates how to use the artifact bundle "HPE - SLES12 - SAP HANA DB" created for HPE Synergy Image Streamer to quickly deploy SAP HANA DB. More specifically, it shows the following benefits of utilizing HPE Synergy for SAP HANA DB solutions:

- HPE Synergy Composer with embedded HPE OneView seamlessly manages the entire environment, including configuration of network resources required for SAP HANA DB, creation and management of the required storage, and deploying the OS and database software on the compute nodes.

- Testing shows that HPE Synergy Composer plus HPE Synergy Image Streamer allows administrators to deploy a new system for SAP HANA DB in less than four minutes, which is a significant reduction as compared to traditional deployment times of hours or days.

Target audience: This Hewlett Packard Enterprise white paper is designed for IT professionals who use, program, manage, or administer large databases that require high availability and high performance. Specifically, this information is intended for those who evaluate, recommend, or design new IT high performance architectures.

Document purpose: The purpose of this document is to describe a fully tested Reference Architecture, highlighting the usage of HPE Synergy Image Streamer to deploy SAP HANA DB.

Solution Overview

HPE Synergy enables IT organizations to accelerate application and service delivery through a single interface that composes physical and virtual compute, storage and fabric pools into any configuration for any application. Composable resources are provisioned together with their state (determined by variables such as BIOS settings, firmware, drivers, and protocols) and their OS and application image using repeatable templates. This is ideal for applications such as SAP HANA DB, because it eliminates time-consuming provisioning processes and offers flexibility in the resource usage.

The key components of this solution are the HPE Synergy Composer and HPE Synergy Image Streamer. The combination of these tools allow automating the customization of an OS image and deployment of the SAP HANA DB software, to quickly and repeatedly provision one or several server.

Solution components

The Hardware and Software used for the Reference Architecture for deploying SAP HANA with HPE Image Streamer is described in this section.

Hardware
The hardware components listed in table 1 were used for this Reference Architecture.

Table 1. Hardware list

Qty	Component	Purpose
1	HPE Synergy 1200 Frame	Infrastructure for compute, fabric and management
1	HPE Synergy Composer	Infrastructure management
1	HPE Synergy Image Streamer	Infrastructure deployment
2	HPE Synergy 680 Gen9 Compute nodes	Bare metal hosts
1	HPE 3Par 8400	Storage for SAP HANA DB, version 3.2.2
1	HPE FlexFabric Switch	Top of Rack network connectivity
2	HPE VC SE 16Gb FC Module	Virtual Connect Module
2	HPE VC SE 40Gb F8 Module	Virtual Connect Module

Figure 1 shows the components that were used for this effort.

Note

While a single frame with a single Image Streamer was used for this testing, the recommended production configuration for high availability is a pair of Image Streamer appliances, and a pair of Virtual Connect SE 40 Gb F8 Modules for Synergy, which provides Active-Active HA for volume storage. HPE Synergy Image Streamer use in production environments requires a minimum of three Synergy Frames with two Virtual Connect SE 40 Gb F8 Modules for Synergy, two HPE Synergy Image Streamers, and two HPE Synergy Composers.
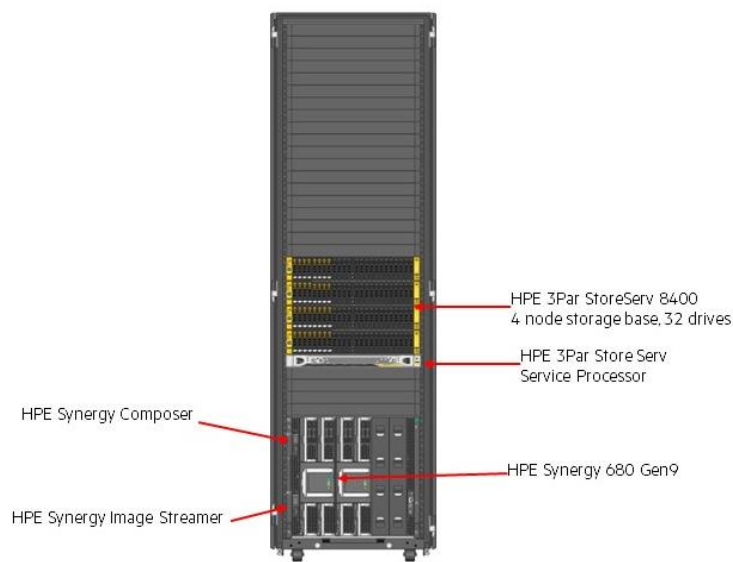

Figure 1. HPE Synergy and HPE 3PAR StoreServ configuration

HPE Synergy Composer

HPE Synergy Composer provides the enterprise-level management to compose and deploy system resources to your application needs. This management appliance uses software-defined intelligence with embedded HPE OneView to aggregate Compute, Storage and Fabric resources in a manner that scales to your application needs, instead of being restricted to the fixed ratios of traditional resource offerings.
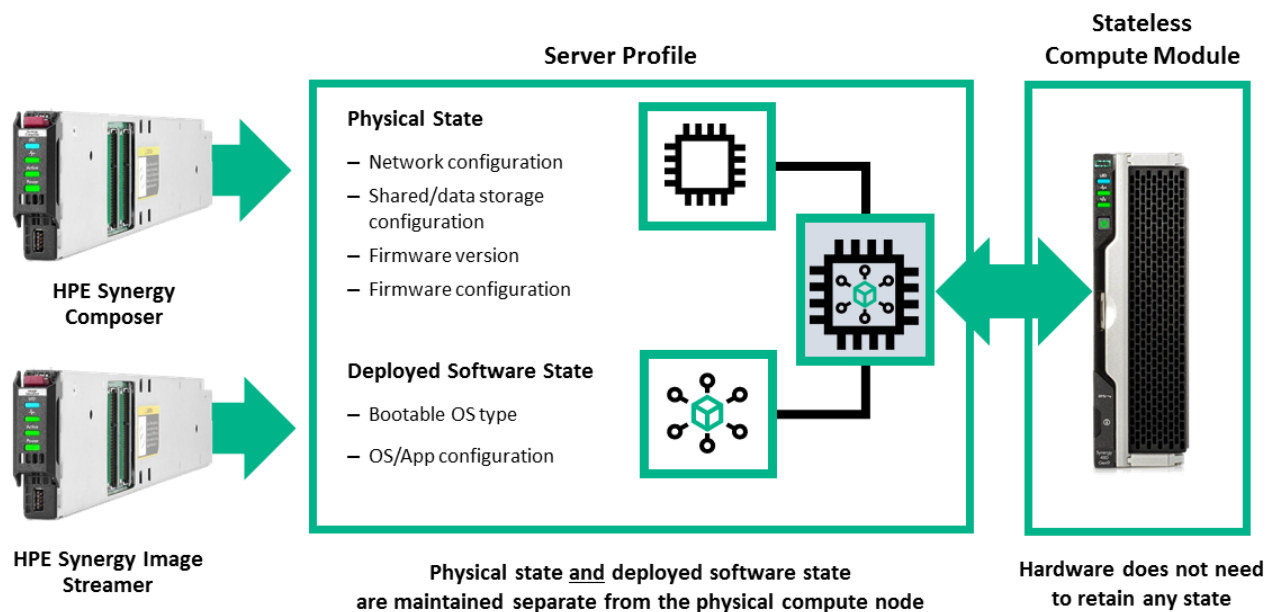
HPE Synergy Image Streamer

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, 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')—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.

Figure 2 shows how HPE Synergy Composer and HPE Synergy Image Streamer manage a compute node via a server profile.

Figure 2. HPE Synergy Composer and HPE Synergy Image Streamer managing compute module with a server profile

HPE Synergy Image Streamer building blocks

HPE Synergy Image Streamer uses the following components for capture and deployment of images:

- **Plan script:** A guestfish[1] script used by OS build plans to personalize OS volumes based upon the values of custom attributes.

- **OS build plan:** A set of plan scripts used to modify the configuration of an OS volume during the deployment or capture process.

- **Golden image:** A generic format of an application and operating system image that can be customized for multiple deployments.

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[1] For more information about the guestfish scripting language, see http://libguestfs.org/guestfish.1.html

- **Deployment plan:** A combination of an OS build plan and golden image that is used by a server profile for the deployment of a server.

The deployment plan "HPE – SLES12 – SAP HANA DB deploy" provisions a physical compute node, using a user-defined golden image for SAP HANA DB and installs after the first boot the SAP HANA DB as shown in figure 3.
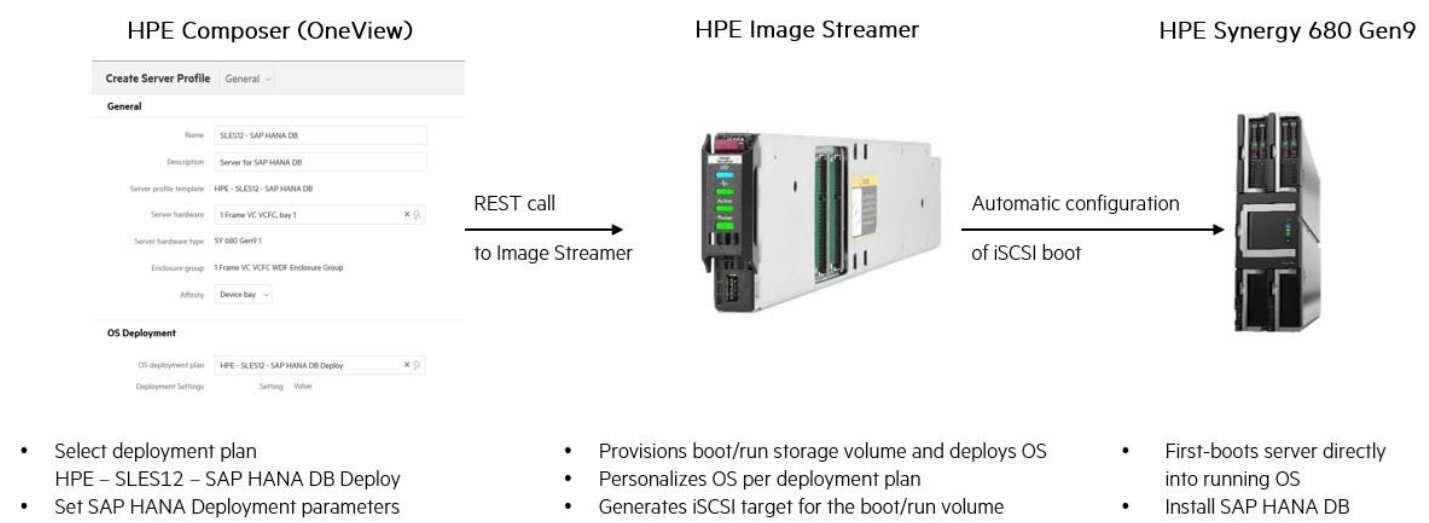

Figure 3. HPE Synergy Image Streamer Flow

HPE Synergy Image Streamer supports a variety of operations for flexibility in how you handle your images. For example, you can capture golden images for your use, import golden images from another location, or modify some of your 'known good' images for re-use. This flexibility allows you to easily establish your desired images for use. A variety of images can be used on HPE Synergy Image Streamer. Reference implementations provide artifacts for recent versions of VMware® ESXi (5.0, 6.0, 6.5), and application images based on Red Hat Enterprise Linux® (RHEL 7.2, 7.3) and SUSE Linux® (SLES 12 SP1) using ext3 and ext4 file systems. You can also enable your own specific images and image types using the tools provided with HPE Synergy Image Streamer.

Software

The software components listed in table 2 were utilized in this Reference Architecture.

Table 2. Software list

Component	Version
HPE Synergy Composer	3.10.04
HPE Synergy Image Streamer	3.10.02
HPE Synergy Image Streamer artifacts for SAP HANA DB	RA-SLES12-SAP-HANA-DB.zip
Operating System	SUSE Linux Enterprise Server for SAP Applications 12 SP2
SAP HANA database	2.0 SPS02

Application software

SAP HANA® Database (DB) is a modern technology by SAP® and is offered as an in-memory database, enabling a radically different application architecture and a new philosophy with regards to the data model simplicity. HANA DB offers a new way of solving current and future challenges with enterprise applications. More customers are transitioning to HANA and are accelerating on utilizing it as a mission critical platform. In response, SAP has planned to convert all existing customers running traditional SAP applications to HANA-based applications by the year 2025.

For the Reference Architecture deploying SAP HANA with HPE Synergy Image Streamer, SAP HANA 2.0 SPS02 was used.

Best practices and configuration guidance for the solution

For being able to use the artifact bundle "HPE - SLES12 - SAP HANA DB" several preparation steps have to be done to create the right environment for the solution:

- Create SAP Software Share

- Create network

- Download and import the artifact bundle

- Create a golden image

- Adapt the deployment plan

- Create server profile template and server profile

The following sections describe the steps in detail.

Create SAP Software Share

To support repeatable, automated SAP installations, it is crucial to store all necessary installation media at a central location – a software depot. Depending on your environment, you can host the software depot on any server that is reachable in your environment.

You can share the software depot on Windows using the Common Internet File System (CIFS) or on Linux using the Network File System (NFS) – both are described below:

1. Option: Software depot on Windows (CIFS)

    a. Create a folder on your Windows server for the software depot, e.g., C:\SWDEPOT

    b. To share the software depot folder, right-click SWDEPOT and select Share with → Specific people…

    c. Ensure that at least one user has full access to the folder by adding an appropriate user and sharing the folder.

Option: Software depot on Linux (NFS)

    a. Create a folder on your Linux server for the software depot:
       `# mkdir /SWDEPOT`

    b. Install the NFS Server package on your Linux host, if not already done.

    c. Modify the exports file:
       `# vi /etc/exports`

    d. Make the following entry for your share:
       `/SWDEPOT *(fsid=0,ro,root_squash,sync)`

    e. Now run exportfs to make the changes effective:
       `# exportfs -a`

Download the SAP media archives

Once the software depot folder has been shared, you can begin storing SAP installation media.

Download the SAP HANA Database media archives from the SAP Software Download Center. On the left menu, click `Installations and Upgrades` → `Software Downloads` → `By Alphabetical Index (A-Z)`→ `H` → `SAP In-Memory (SAP HANA)` → `HANA Platform Edition` → `SAP HANA PLATFORM EDITION` → `SAP HANA PLATFORM EDIT. 2.0` → `Installation.`

From that list you must obtain the following media files:

- SAP HANA Platf. Ed. 2.0 SPS02 Linux x86_64 1/4

- SAP HANA Platf. Ed. 2.0 SPS02 Linux x86_64 2/4

- SAP HANA Platf. Ed. 2.0 SPS02 Linux x86_64 3/4

– SAP HANA Platf. Ed. 2.0 SPS02 Linux x86_64 4/4

Extract the files into a dedicated directory on the software share (DepotSapDirectory) by executing the first media file.

Create network

The following networks are required in the Synergy environment for usage in the server profiles that deploy SAP HANA DB:

- Image Streamer deployment network

- Management Network

- SAN Network

Table 3 summarizes the configuration for each network. All networks were created with a preferred bandwidth of 2.5 Gb/second and a maximum bandwidth of 20 Gb/second since they all share a single Virtual Connect SE 40 Gb F8 Module.

Table 3. Networks for SAP HANA DB deployments

Network name	Type	VLAN	Port	Uplink set
Image Streamer Deploy 99	Ethernet	99	Mezzanine 9:1-a	Image Streamer Deploy Uplink Set
Management 100	Ethernet	100	Mezzanine 3:1-b	Ethernet Uplink Set
Synergy SAN A-Side	Fabric Channel	none	Mezzanine 2:1	SAN A Uplink
Synergy SAN B-Side	Fabric Channel	none	Mezzanine 2:2	SAN B Uplink

Figure 4 shows the Connections section of the server profile for an SAP HANA Server. Note that the Image Streamer deployment network is automatically added to the server profile when an OS deployment plan is selected. The iSCSI boot configuration is also automatically added to the profile.

Figure 4. Network connections

Download and import the artifact bundle

From the HPE github site for image streamer reference architectures download the zip file RA-SLES12-SAP-HANA-DB.zip and add it to your Image Streamer in the artifact bundles.

After adding the zip archive, the artifact bundle has to be extracted.

The artifact bundle includes:

- Deployment plan: HPE - SLES12 - SAP HANA DB - deploy

- OS build plan: HPE - SLES12 - SAP HANA DB - deploy

- OS Build plan: HPE - SLES12 - SAP HANA DB - generalize

- Plan scripts

Create golden image

The following steps are required to create a SLES 12SP2 image for deploying a SAP HANA DB.

Note

An OS deployment plan must be in place to create an empty OS volume for step one below.

1. Create an HPE OneView server profile with an OS deployment plan that creates an empty OS volume of size 10 GB and assign the profile to a compute node.

2. Install SUSE Linux Enterprise Server for SAP Applications 12 SP2 into the empty volume.

3. Configure the OS according to SAP OS recommendations.

Note

The plan script "HPE - SLES12 - SAP HANA DB - manage security services" will disable the firewall.
If the firewall shall be enabled, please refer to SAP note 2477204: FAQ: SAP HANA Services and Ports and open the required ports in the OS for the golden image.
In the plan script "HPE - SLES12 - SAP HANA DB - manage security services" delete the lines that disable the firewall.

Relevant SAP documentation

On the SAP HANA Platform webpage (http://help.sap.com/hana_platform), check the latest SAP HANA Master Guide and SAP HANA Server Installation Guide for important SAP Notes and additional information about the setup.

To meet the SAP HANA KPIs several kernel parameter and OS settings have to be done.
Plan script "HPE - SLES12 - SAP HANA DB - update OS settings" will set the right kernel parameter.

Please take a close look at SAP Note 2382421: Optimizing the Network Configuration on HANA- and OS-Level.
Saptune is part of SLES for SAP Applications 12 SP2. Make sure to use at least saptune version 1.1.6.

Note

You must have access to the SAP support webpages to view and download the necessary SAP Notes.

Relevant SAP notes

- 171356 – SAP software on Linux: General information

- 1788665 – SAP HANA Support for virtualized / partitioned (multi-tenant) environments

- 2205917 – SAP HANA DB: Recommended OS settings for SLES12/SLES for SAP Applications 12

- 2382421 – Optimizing the Network Configuration on HANA- and OS-Level

- 2477204 – FAQ: SAP HANA Services and Ports

- 1984787 – SUSE LINUX ENTERPRISE 12: Installation notes

Relevant SLES documentation

- Suse Linux Enterprise Server for SAP Applications 12 SP2

- Saptune documentation

After the OS has been customized according to the steps listed above, the Image Streamer "Create golden image" interface is used to create an image which is stored on the Image Streamer appliance, as shown in Figure 6. Do the following to create the golden image:

1. Shut down the OS.

2. Find the OS volume number in the HPE OneView server profile created in step one above. It is listed under the OS Deployment section of the profile.

3. On the Image Streamer Golden Images screen, select "Create golden image" and specify a name ("SLES12-SP2-SAP"), description, OS volume, and Capture OS build plan as shown in figure 5. The capture OS Build Plan "HPE – SLES12 – SAP HANA DB – generalize" was used to create the golden image.

Create Golden Image

Name	SLES-12SP2-SAP
Description	SUSE Linux Enterprise Server for SAP Applications 12 SP2
OS volume	OSVolume-158
Capture OS build plan	HPE - SLES12 - SAP HANA DB - generalize

Figure 5. Golden Image creation

Note

For golden image creation, the capture OS build plan "HPE – SLES12 – SAP HANA DB - generalize" may only be used for empty OS systems.

Customize the deployment plan

The imported deployment plan provided by HPE is read only. To be able to customize the deployment plan for your environment it has to be copied. Now the values for the plan attributes can be changed to reflect your environment as shown in figure 6. Please note that for readability reasons not all of the plan attributes are shown here. Details can be found in table 2b.

Some of the attributes, like the Software Depot Host, are always the same in the environment and therefore can be set once and then be hidden for the server deployment.
Use the newly created SLES-12SP2-SAP golden image as the default golden image in the deployment plan.

Figure 6. Deployment plan configuration

Parameter for the SAP HANA DB installation can be changed by configuring a configuration file that has to be located in the software depot. Details about the usage of the configuration file can be found in Appendix C: Customized SAP HANA DB installation options

Create server profile template and server profile

It is a best practice to create a server profile template and use this to create the server profiles. By using the Server Profile Template feature within HPE OneView you can specify and maintain a single configuration for the system firmware, BIOS, and boot-order at time of initial deployment as well as orchestrate updates to that configuration as needed. This provides a location to centrally manage and update configuration settings, such as system firmware, and provides assurance that each server is running with the same configuration and has event and health data being exposed up to the HPE OneView.

The server profile template is created in OneView Server Profile Templates.

For creating a server profile template, the following information is necessary:

- Server hardware type

- Enclosure group

- OS Deployment Plan with custom attributes as listed in table 2b

- Connections

- SAN Storage

For this RA external 3Par storage was used to host the SAP HANA DB application data. For a server deployment a new 3Par volume has to be created.
One storage with minimum 200GB is required and will be partitioned during the server creation using the plan script "HPE - SLES12 - SAP HANA DB - partition SAN disk using LVM".

Figure 7. Storage creation

Using this server profile template, you can deploy your SLES12 SAP HANA DB server profile.

- Create new server profile from the template you created

- Set all visible custom attributes. For a detailed list of attributes see table 2b

Once the server profile is assigned to an available server, the deployment process will begin. A smart clone of the golden image is created as a new volume and presented to the server. The server is powered up and automatically boots the newly created volume.
The build plan and plan scripts that are part of the deployment plan will customize the server with the configured attributes and finally call the installation script for SAP HANA DB. This will install the SAP HANA database into the newly created server.

Capacity and sizing

Traditional OS deployments for SAP HANA DB installation include OS installation, network and kernel configuration and several server reboots. Depending on the requirements this can take hours. These steps have to be done for each new SAP HANA DB installation in the traditional environment.

Deploying a server for a SAP HANA DB installation using HPE OneView server profiles with HPE Synergy Image Streamer deployment plans is very fast and easy. Setting up a golden image with the right settings needs to be done only once. Later on, the server profile is being created in minutes. The deployment of a new SAP HANA DB using Software Defined Infrastructure is fast consistent and repeatable.

Figure 8 shows the creation of the HPE SLES12 SAP HANA DB Server profile. It completed after 3 minutes and 14 seconds. This includes the validation and creation of the SAN storage (6s), creation of the OS volume (11s) and applying the server profile (2m20s).

	Name		Resource	Date	▼	State	Owner
			nnect 2				
▼ ●	**Create**		HPE_SLES12 - SAP HA NA DB Server Profiles	9/20/17 11:56:45 am 3 hours ago		Completed 3m14s	Administrator

Validate configuration.
Reserve 1 Frame VC VCFC, bay 1.
Save server profile definition.
Reserve connections.
Deploy Image Streamer OS volume.
Configure downlink subports for 1 Frame VC VCFC, bay 1.
Configure SAN storage.
Apply settings to 1 Frame VC VCFC, bay 1.

Figure 8. Server creation step

Subsequently the server is powered on and will boot. The boot time will vary depending on the used server. The Synergy 680 Gen9 server used in this RA take approximately 30 minutes to boot.

Following the SAP HANA DB installation is being started. The SAP HANA DB installation will finish after ~6 minutes.

Summing up all the steps to create a new and running SAP HANA DB installation, it takes ~39 minutes.

The benefit of using Software Defined Infrastructure can be seen well when multiple SAP HANA DB installations are required. The deployment of multiple servers can run in parallel, being started by one administrator. A deployment of 10 servers will be done in less than one hour.
In the traditional case of physical deployment this would take days, setting up multiple server can take up to several hours.

Analysis and recommendations

The reference architecture for deploying SAP HANA DB using HPE Synergy Image Streamer was created using Synergy 680 Gen9 server for the hardware provisioning. Other server like Synergy 680 Gen 10, once they are certified for SAP HANA DB, may also be used.

The sizing for SAP HANA DB system may vary depending on the customer needs. Please refer to the SAP sizing tool.

Using this Reference Architecture will help to deploy bare metal server for SAP HANA DB in significantly less time compared to traditional deployment.

Summary

This reference architecture describes how a SAP HANA Database can be deployed in a highly composable environment using the artifact bundle "HPE – SLES12 – SAP HANA DB" for the HPE Synergy Image Streamer.

This document shows the setup required to apply the artifact bundle "HPE – SLES12 - SAP HANA DB" in a HPE Synergy Image Streamer environment. Necessary prerequisites for the golden image creation and customization of attributes for the plan scripts are listed.

The fluid resource pools and software-defined intelligence of HPE Synergy allow administrators to rapidly compose any configuration required, reducing deployment time repeatedly from hours or days to minutes.

The artifact bundle "HPE – SLES12 - SAP HANA DB" shown in this reference architecture configures the network and storage resources required for a SAP HANA DB server. After the first boot, the SAP HANA DB will be installed.

In this document, recommendations are given on how to create a golden image being used by the server profile together with the OS Deployment Plan "HPE – SLES12 – SAP HANA DB – deploy".

Tests show that the server deployment with a new installation of SAP HANA DB using the artifact bundle "HPE – SLES12 – SAP HANA DB" takes roughly 39 minutes, which is significantly less compared to traditional deployment of hours and days. These time savings multiply if several SAP HANA DB systems need to be deployed.

This Reference Architecture describes solution testing performed in October 2017.

Implementing a proof-of-concept

As a matter of best practice for all deployments, HPE recommends implementing a proof-of-concept using a test environment that matches as closely as possible the planned production environment. In this way, appropriate performance and scalability characterizations can be obtained. For help with a proof-of-concept, contact an HPE Services representative (hpe.com/us/en/services/consulting.html) or your HPE partner.

Appendix A: Bill of materials

Note

Part numbers are at time of publication/testing and subject to change. The bill of materials does not include complete support options or other rack and power requirements. If you have questions regarding ordering, please consult with your HPE Reseller or HPE Sales Representative for more details. hpe.com/us/en/services/consulting.html

Table 1a. Bill of materials

Qty	Part Number	Description
		HPE Synergy Frame Components
1	797740-B21	HPE Synergy 12000 Configure-to-order Frame with 1x Frame Link Module 10x Fans
2	804942-B21	HPE Synergy Frame Link Module
6	798095-B21	HPE 6X 2650W AC Titanium Hot Plug FIO Power Supply Kit
1	804353-B21	HPE Synergy Composer
1	804937-B21	HPE Synergy Image Streamer
2	794502-B23	HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy
2	779227-B21	HPE Virtual Connect SE 16Gb FC Module for HPE Synergy
		HPE Synergy Compute Module Components
	861547-B21	HPE Synergy HPE SY 620/680 Gen9 Prem HDD Upgrade Kit
2	834482-B21	HPE SY 680 Gen9 4S Configure-to-Order Compute Module
8	834500-B21	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8880 v4 Processor Kit
8	834500-L21	HPE Synergy 620/680 Gen9 Intel® Xeon® E7-8880 v4 FIO Processor Kit
192	805358-B21	HPE 64GB 4Rx4 PC4-2400T-L Kit
4	777430-B21	HPE Synergy 3820C 10/20Gb Converged Network Adapter
		Storage
1	H6Z01B	HPE 3PAR 8400 4N+SW Storage Base
3	H6Z26A	HPE 3PAR StoreServ 8000 SFF(2,5in) SAS Drive Enclosure
32	K2P94B	HPE 3Par 8000 1.8TB 10K SFF HDD
1	L7F2DA	HPE 3PAR All-in Sgl-sys SW Current Media
1	K2R28A	HPE 3PAR StoreServ SPS Service Processor

Appendix B: Plan scripts and custom attributes for OS build plan

Table 1b lists the plan scripts included in the OS Build Plan "HPE - SLES12 - SAP HANA DB deploy"

Table 1b. Plan script names included in the artifact bundle

Plan script name	Type	Comment
HPE – SLES12 – SAP HANA DB – mount and validate	General	Mounts the root partition and validates the golden image.
HPE – SLES12 – SAP HANA DB – configure multiple NICs	Deploy	Configures the network.
HPE – SLES12 – SAP HANA DB – change root user password	Deploy	Sets the root user password and creates new user accounts if required.
HPE – SLES12 – SAP HANA DB – configure hostname	Deploy	Updates the hostname and configures the gateway.
HPE – SLES12 – SAP HANA DB – update OS settings	Deploy	Customize kernel parameters and block devices for SAP HANA.
HPE – SLES12 – SAP HANA DB – manage security services	Deploy	Activates the firewall and ssh settings.
HPE – SLES12 – SAP HANA DB – partition SAN disk using LVM	Deploy	Partitions the attached SAN storage using LVM using the LVM parameter described in table 2b.
HPE – SLES12 – SAP HANA DB – create local input file	Deploy	Creates the input file required for the SAP HANA DB installation
HPE – SLES12 – SAP HANA DB – create install script	Deploy	Copies the installation script install_SAP.sh for installing SAP HANA DB to the OS. The script will mount the software depot, create the HANA DB config file and start the installation. The script will be executed after the first boot of the OS.
HPE – SLES12 – SAP HANA DB – unmount	General	Unmounts the root partition
HPE – SLES12 – SAP HANA DB – mount generalize	Capture	Mount root partition for generalization
HPE – SLES12 – SAP HANA DB – generalize host	Capture	Remove host specific configuration
HPE – SLES12 – SAP HANA DB – generalize network	Capture	Remove network settings
HPE – SLES12 – SAP HANA DB – unmount generalize	Capture	Unmount root partition after generalization

Table 2b lists the custom attributes and default values of the OS Build Plan "HPE – SLES12 – SAP HANA DB – deploy".

Table 2b. Custom attributes of OS Build Plan "HPE – SLES12 – SAP HANA DB – deploy"

Custom attribute name	Type	Description	Default/example value	Visible on deployment
DepotCifsPassword	Password	Password for the cifs software share administrator. For nfs either delete this attribute in plan script "HPE – SLES12 – SAP HANA DB – create local input file" or enter a dummy value.	password	No
DepotCifsUsername	String	Username for the cifs software share. For nfs either delete this attribute in plan script "HPE – SLES12 – SAP HANA DB – create local input file" or enter a dummy value.	Administrator	No
DepotHost	IPv4 Address	IP-Adress of the software share	e.g. 172.16.12.22	No
DepotLocalMountpoint	String	Local mountpoint on the deployed host for the software share. The directory will be created during deployment.	/swdepot	No
DepotMountType	Option	Network protocol for the software share. Either cifs or nfs are supported	cifs	No
DepotSapDirectory	String	Directory on the software share that contains the SAP HANA DB installation media.	SYNERGY	No
DepotShareName	String	Name of the software share.	SWDEPOT	No

Custom attribute name	Type	Description	Default/example value	Visible on deployment
DomainName	FQDN	Full hostname (FQDN) for the deployed OS.	hostname.domainname	Yes
HanaInstanceNumber	String	The two digit SA HANA Database Instance Number. Rules for SAP Instance Number apply.	e.g. 00	Yes
HanaMasterPassword	Password	The master password of the SAP HANA Database that will be used for all SAP HANA DB users.	password	Yes
HanaSID	String	The SAP System Identification of the SAP HANA Database host. Rules for SAP System ID definition apply.	e.g. HDB	Yes
HanaStartAfterReboot	Option	Sets the autostart option for HANA after a system reboot. Possible values are yes and no.	Yes	Yes
InstallDirectory	String	Local installation directory for the SAP HANA Database. The installation script, local input file and all installation logfi will be stored here.	/root/hpe_ai	No
LvmVolumeGroupName	String	Name of the LVM volume group for the SAP HANA database installation.	sapdata	No
LvmVolumeNameHana	String	Name of the LVM partition for /hana directory.	hana	No
LvmVolumeNameSap	String	Name of the LVM partition used for /usr/sap directory.	sap	No
LvmVolumeNameSwap	String	Name of the LVM partition used for swap space.	swap	No
LvmVolumeSizeHana	Number	Size of the LVM partition required for /hana in GiB.	100	No
LvmVolumeSizeSap	Number	Size of the LVM partition required for /usr/sap in GiB.	5	No
LvmVolumeSizeSwap	Number	Size of the LVM partition required for swap space in GiB.	20	No
ManagementNIC1	NIC	NIC of Management Network1	none	Yes
ManagementNIC2	NIC	NIC of Management Network2	none	No
ManagementNIC3	NIC	NIC of Management Network3	none	No
ManagementNIC4	NIC	NIC of Management Network4	none	No
NewRootPassword	Password	New Password for the root user.	Password	Yes
SSH	Option	Defines if SSH shall be enabled on the deployed OS. Possible values are Enabled or Disabled	Enabled	No
TotalMgmtNICs	Number	Amount of Management NICs. 1 to 4 Management Networks are possible. If the TotalMgmtNICs are set to a value smaller 4, only the N up to this number are defined. E.g. TotalMgmtNICs=2 will create ManagementNIC1 and ManagementNIC2. In this case the other ManagementNICs should be set on inv as they are not required.	1	No

Appendix C: Customized SAP HANA DB installation options

In an installation scenario where the default values for an SAP HANA Database installation do not fit the requirements, a configuration file can be provided to be used for the SAP HANA DB installation. Parameters, e.g., database mode (single_container vs. multi_container), database isolation, system usage, maximum memory allocation and many more, can be edited in the configuration file.

This HANA DB configuration file can be created once, modified and then reused for any following HANA DB deployment by storing it in the media directory (DepotSapDirectory) and naming it hdblcm.conf.

Note

The name of the hdb configfile must be hdblcm.conf and may not be changed.

It must be located in the DepotSapDirectory where the HANA DB installation media is stored.

How to create the SAP HANA Database config file

```
# <DepotSapDirectory>/SAP_HANA_PLATFORM_10_SPS12/DATA_UNITS/HDB_LCM_LINUX_X86_64/hdblcm --
action=install --dump_configfile_template=<DepotSapDirectory>/hdblcm.conf
```

This will create a config file where individual parameters for a HANA DB installation can be set. Save the file in the media directory (DepotSapDirectory) of your SAP HANA Database.

Edit the file and modify the required parameters. A small extract is shown below:

```
# Database Mode ( Default: single_container; Valid values: single_container | multiple_containers )
db_mode=single_container

# Database Isolation ( Default: low; Valid values: low | high )
db_isolation=low

# System Usage ( Default: custom; Valid values: production | test | development | custom )
system_usage=custom
```

Key point

The complete hdblcm.conf file template must be included for an SAP HANA Database installation, even if not all parameters are customized. Providing only one parameter in an otherwise empty file will not work.

Values in the hdblcm.conf file that conflict with values of the local_input.ini will be overwritten, as listed below in the Error! Reference source not found. section.

The configuration file will be detected by the installation script and the values will be used for the SAP HANA DB installation. The default settings are listed in table 1c. Values in < > are taken from the custom attributes.

Table 1c. Configuration variables for SAP HANA DB installation

Configuration variable	Default value	Changeable
components	client,server	Yes, additional values possible
hostname	<DomainName>	No
sid	<HanaSID>	No
number	<HanaInstanceNumber>	No
use_master_password	yes	No
master_password	<HanaMasterPassword>	No
action	install	No
autostart	<HanaStartAfterReboot>	Yes

Glossary

Name	Description
CIFS	Common Internet File System
DB	Database
HPE	Hewlett Packard Enterprise
KPI	Key Performance Indicator
NFS	Network File System
NIC	Network Interface Controller
RA	Reference Architecture
SAP	Systems, Applications & Products in Data Processing
SID	SAP System Identification
SSH	Secure Shell

Resources and additional links

HPE Reference Architectures
hpe.com/info/ra

HPE Synergy
hpe.com/synergy

HPE Synergy Reference Architecture
hpe.com/info/synergy-ra

HPE Servers
hpe.com/servers

HPE Storage
hpe.com/storage

HPE Networking
hpe.com/networking

HPE Technology Consulting Services
hpe.com/us/en/services/consulting.html

HPE Github site for image streamer reference architecture
https://github.com/HewlettPackard/image-streamer-reference-architectures/

SAP HANA Platform (Core),
http://help.sap.com/hana_platform

SAP Notes
http://support.sap.com/notes

SAP Software Download Center
https://support.sap.com/swdc

SAP System sizing Quick sizer tool
http://service.sap.com/sizing

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

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