Hewlett Packard Enterprise

HPE Reference Architecture for SAP HANA lifecycle activity with HPE Synergy Image Streamer

Reference Architecture

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Executive summary

SAP HANA® is a modern technology that offers an in-memory database, enables a radically different application architecture, and provides a new philosophy with regards to data model simplicity. SAP HANA offers a new way of solving current and future challenges with enterprise applications, such as real time data analysis of large amounts of data. More customers are transitioning to SAP HANA and are accelerating its use as a mission-critical platform.

The demands of SAP HANA implementations continue to increase. Faster transaction processing speeds, scalable capacity, increased flexibility, and rapid SAP HANA deployment are required to meet the needs of today's business. During the lifetime of a system the operating system or the software needs to be updated, or resource requirements may change to address new business needs. These lifecycle activities have to be performed with minimum system downtime.

HPE Synergy is the first infrastructure that allows composability, the ability to manipulate hardware in the same manner as we manipulate software today. HPE Synergy is a certified platform for SAP HANA, offering resource pools which can be customized at provisioning time for specific database needs and showing industry leading benchmark results. One or multiple servers with predefined resources for SAP HANA can be provisioned quickly, repeatedly, and simultaneously through the software-defined intelligence embedded in 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 HPE Synergy Composer can use that deployment plan to configure a new or multiple bare-metal servers in a matter of minutes, compared to hours or days utilizing traditional infrastructure. As a result, infrastructure can be deployed faster, allowing for a quicker return on investment.

During the lifetime of SAP HANA, several lifecycle activities may occur. In traditional environments these activities can get time consuming for single systems, and even more complex in large SAP HANA landscapes. Using the advantages of HPE Synergy Composable Infrastructure these tasks can be automated and executed faster, in just minutes compared to hours in traditional environments. Utilizing the power of HPE Synergy Composer and HPE Synergy Image Streamer it is possible to standardize and automate lifecycle activities and react to changing workload requirements. For instance, an administrator can switch workloads to another compute module using a deployment plan for HPE Synergy Image streamer. Additionally, operating system and SAP HANA updates can be automated in a standardized way and run in parallel for single systems or large environments by using the best practices described in this Reference Architecture.

This Reference Architecture (RA) demonstrates the following benefits of utilizing HPE Synergy for SAP HANA solutions:

- Seamlessly manage the entire HANA environment, including configuration of network resources required for SAP HANA, creation and management of the required storage.
- Automate the lifecycle management of HANA environments, including deployment and updating of the operating system and SAP HANA on the compute nodes by using HPE Synergy Image Streamer technology in just minutes.
- Automate switching workloads for SAP HANA systems leveraging composable infrastructure to meet changing workload requirements.

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

This Reference Architecture describes solution testing performed in May 2018.

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 and perform lifecycle activities of SAP HANA servers.

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 useful for applications such as SAP HANA because it eliminates time-consuming provisioning processes and offers flexibility in resource usage.

The key components of this solution are HPE Synergy Composer and HPE Synergy Image Streamer. The combination of these tools allows for automating the customization of an OS image and deployment of the SAP HANA software to quickly and repeatedly provision one or several servers. After the deployment, lifecycle activities like updating the operating system, the SAP HANA revision, and switching workload to another compute module, can be executed in a standardized way for one or several servers.

This Reference Architecture is built upon the following composability concepts and capabilities of the HPE Synergy platform.

Fluid resource pools

HPE Synergy allows for the transformation of traditionally rigid physical systems into flexible virtual resource pools. HPE Synergy creates resource pools of "stateless" compute, storage, and fabric capacity that can be configured almost instantly to rapidly provision infrastructure for a broad range of applications.

Software-defined intelligence

The software-defined intelligence in HPE Synergy reduces operational complexity and enables IT organizations to make needed programmatic changes quickly and confidently, with minimal human intervention. HPE Synergy abstracts operational details and replaces them with high-level, automated operations. HPE Synergy uses templates to automatically implement change operations such as updating firmware, adding additional storage to a service, or modifying a network.

Unified API

HPE Synergy delivers automation through a unified API that provides a single interface to discover, inventory, configure, provision, update, and diagnose the composable infrastructure in a heterogeneous environment. This fully programmable interface integrates into dozens of popular management tools such as Microsoft® System Center, VMware® vCenter, and open source automation and DevOps tools such as Chef, Docker, and OpenStack.

Solution components

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

Hardware

Table 1 shows the hardware components used for this Reference Architecture.

Table 1. Hardware components

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 660 Gen10 Compute Modules	Bare-metal hosts
1	HPE Synergy 480 Gen10 Compute Module	Bare-metal host
1	HPE 3PAR StoreServ 8400	Storage for SAP HANA, 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 HPE Synergy Image Streamer was used for this testing, the recommended production configuration for high availability is a pair of HPE Synergy Image Streamer appliances, and a pair of Virtual Connect SE 40Gb F8 Modules for Synergy, which provides Active-Active HA for volume storage. HPE Synergy Image Streamer used in production environments requires a minimum of three HPE Synergy Frames with two Virtual Connect SE 40Gb F8 Modules for Synergy, two HPE Synergy Image Streamers, and two HPE Synergy Composers.

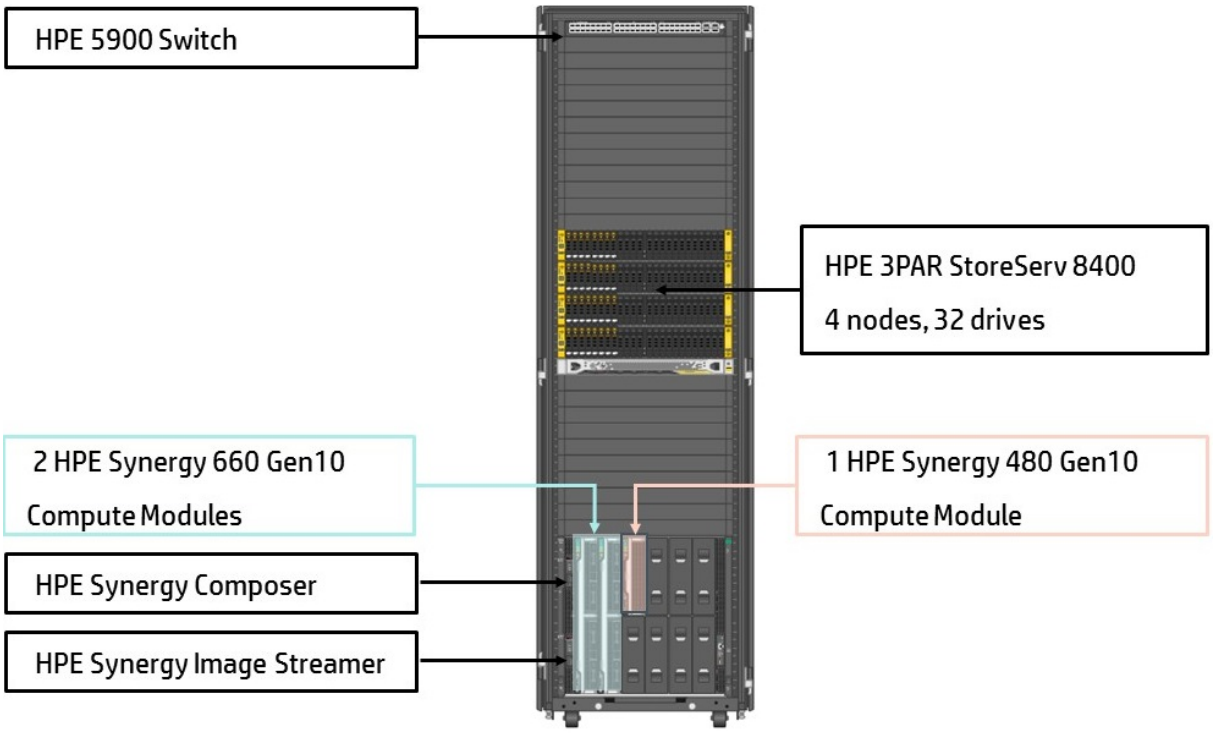

Figure 1. HPE Synergy and HPE 3PAR StoreServ configuration

HPE Synergy Composer

HPE Synergy Composer provides 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 for provisioning and updating composable infrastructure. This management appliance works with HPE Synergy Composer for fast software-defined control over physical compute modules with operating system and application deployment. 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 is time-consuming because it requires building or copying the software image onto individual servers sequentially, 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 offering the possibility to provision several servers simultaneously.

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 allows 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.

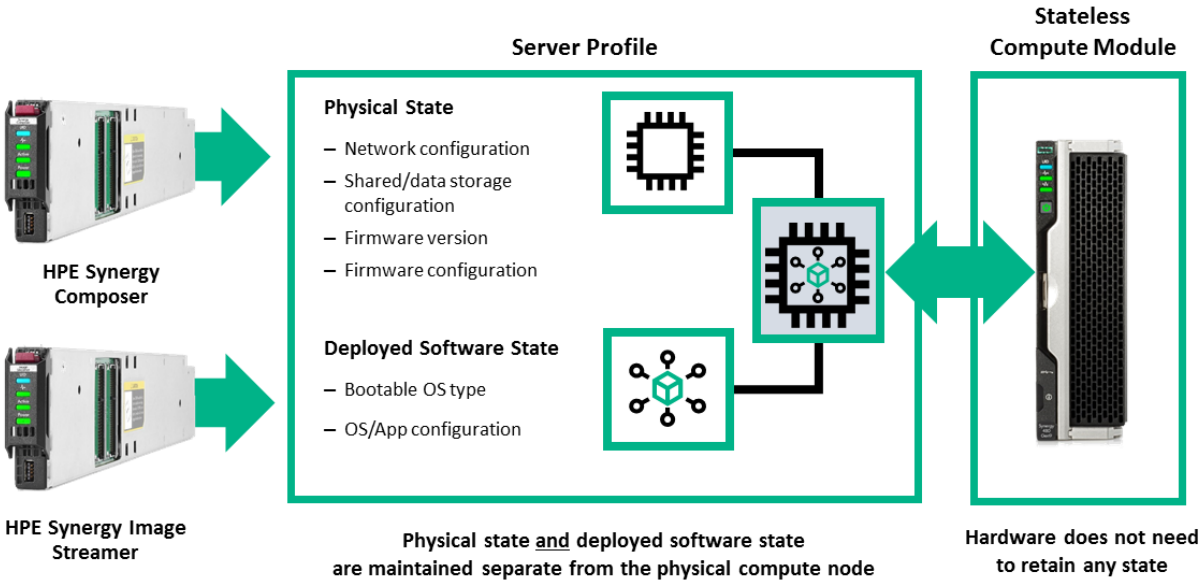

Figure 2. HPE Synergy Composer and HPE Synergy Image Streamer managing compute module with a server profile

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. Custom attributes may be set to default values that are not visible in the server deployment process.
- **Golden image:** OS and application software and including common OS and application configuration in the form of an already installed bootable OS volume. This is rapidly cloned during deployment and the per-server copy personalized to produce a ready-to-run OS volume specific to the server.
- **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.

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

The deployment plans “HPE - SLES12 - SAP HANA DB - deploy” and “HPE - RHEL7.x - SAP HANA DB - deploy” provided with this Reference Architecture offer different lifecycle activity tasks for SAP HANA using HPE Synergy Image Streamer.

Initial SAP HANA provisioning

The deployment plans provision a physical compute node, using a user-defined golden image for SAP HANA and install the database after the first boot as shown in Figure 3. To keep the OS image located on the HPE Synergy Image Streamer as lightweight as possible, the complete database is located on HPE 3PAR storage. Local storage is neither required nor recommended. The server profile has the entire state of the server, including the access to shared storage which enables switching of workloads. Local storage may be used for temporary space but not for data that needs to be retained.

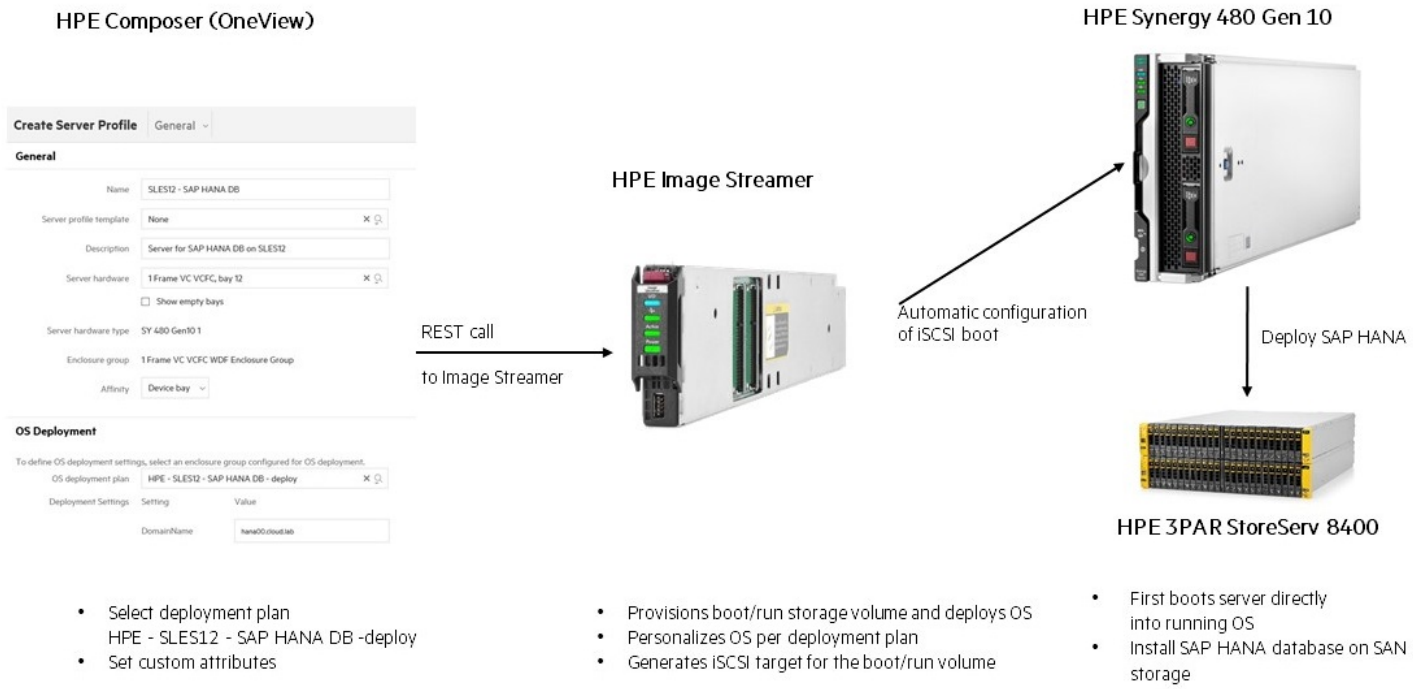

Figure 3. HPE Synergy Image Streamer deployment flow

Switching workloads to meet changing HANA requirements

HPE Synergy allows for the transformation of traditionally rigid physical systems into flexible fluid resource pools. HPE Synergy creates resource pools that can be configured almost instantly to rapidly provision infrastructure for a broad range of applications or workloads. In this reference architecture a specific use case is shown, in which additional resources are needed to meet evolving HANA requirements. A HANA system was deployed on an HPE Synergy 480 Gen10 compute module and it turns out, that more physical resources are required. As the complete database is located on a persistent storage, it is possible to support some lifecycle management tasks to add flexibility and meet HANA compute requirements. Thanks to the HPE Synergy Composable Infrastructure was possible to switch workload to a new HPE Synergy 660 Gen10 compute module in just minutes. Higher resource needs can be satisfied, while keeping the data of the existing SAP HANA database, as shown in Figure 4.

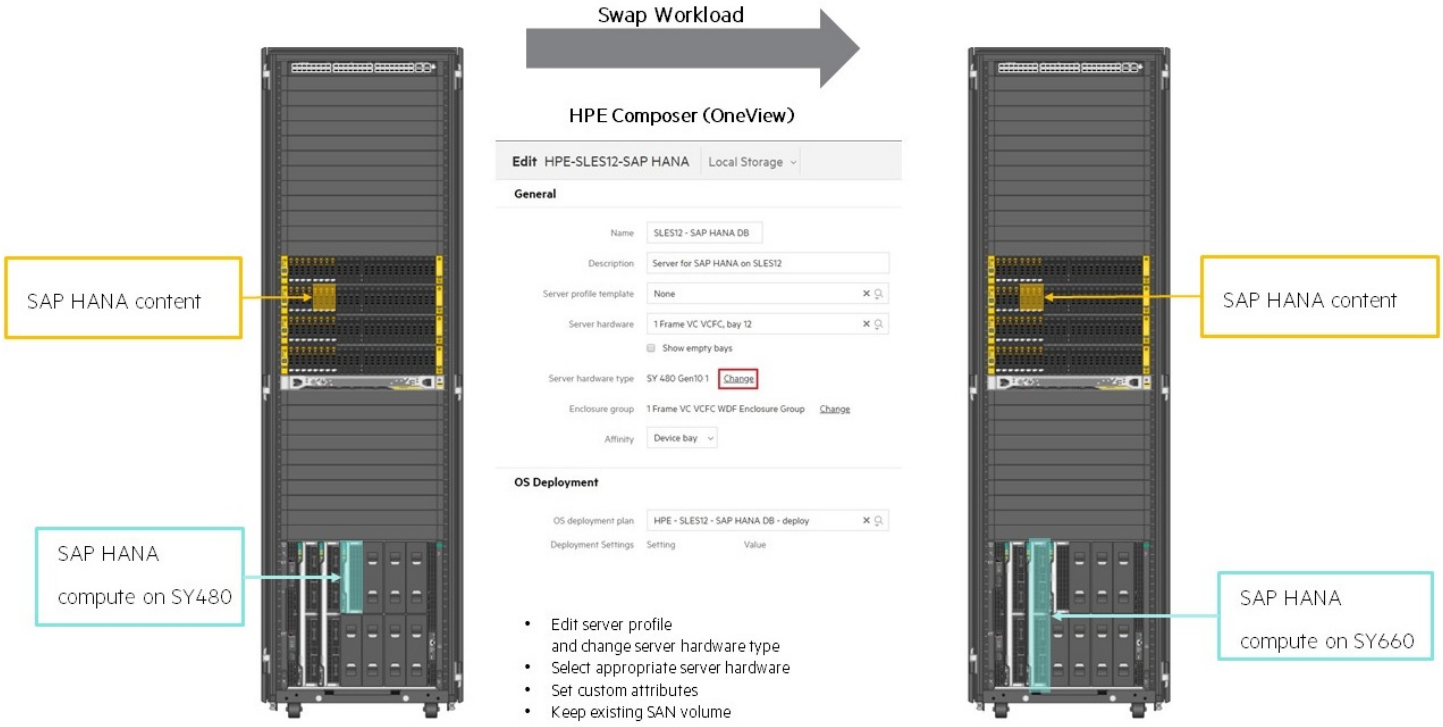

Figure 4. HPE Synergy Image Streamer switching workload flow

OS and SAP HANA update

Updating an SAP HANA system often requires an OS update. Keeping several HANA systems in a landscape in a consistent state can get very complex and time intensive. This process can be automated and done faster for all systems that are part of an HPE Composable Infrastructure. First, a new golden image that fulfills all OS requirements for a new SAP HANA version, has to be created. This can be included in a new deployment plan and can then be deployed on every compute node. The SAP HANA database can be updated to a new version, immediately after the new OS is deployed. During this process, all of the existing SAP HANA data is sustained, as shown in Figure 5.
With this approach, the impact of the disk size usage on the Image Streamer is kept to a minimum. Directly upgrading each server to a new operating system version would lead to higher disk consumption on the Image Streamer side.

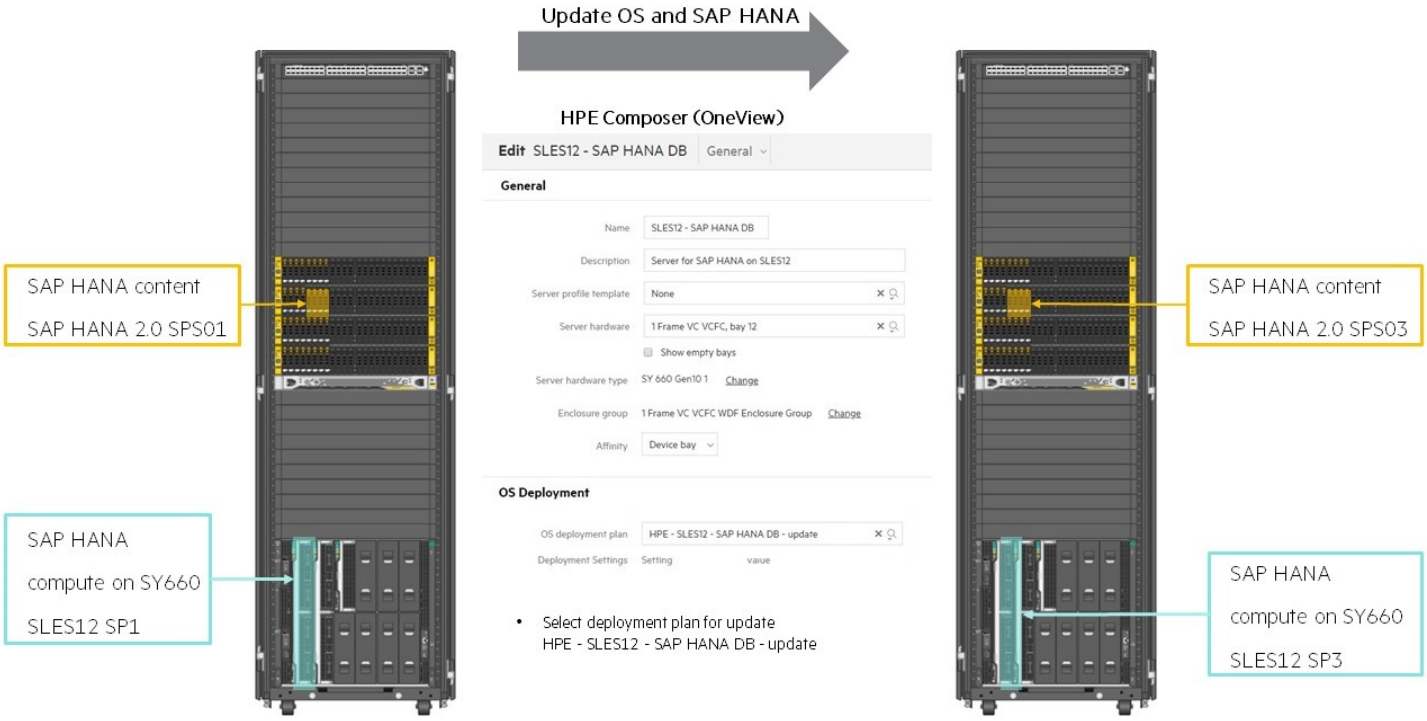

Figure 5. HPE Synergy Image Streamer OS update flow

Even a combination of the previously shown lifecycle tasks is possible. So maintenance activity for switching workloads, updating the SAP HANA version and OS version can be done in one maintenance task, reducing the system downtime noticeably.

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. 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.x) and SUSE Linux Enterprise Server (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	4.00.05
HPE Synergy Image Streamer	4.00.02
HPE Synergy Image Streamer artifacts for SAP HANA	HPE-SLES12-SAP-HANA-DB-RA-2018-06-01-v4.0.zip HPE-RHEL7.x-SAP-HANA-DB-RA-2018-06-01-v4.0.zip
Operating System	SUSE Linux Enterprise Server for SAP Applications 12 SP2 Red Hat Enterprise Linux Server 7.4
SAP HANA	2.0 SPS03

Application software

SAP HANA 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. SAP HANA 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 this Reference Architecture deploying SAP HANA with HPE Synergy Image Streamer, SAP HANA 2.0 SPS03 was used.

Best practices and configuration guidance for the solution

This Reference Architecture can be used for two Linux operating systems: SUSE Linux Enterprise Server and Red Hat Enterprise Linux. For both operating systems the same procedures are implemented in plan scripts. For readability reasons, this document will describe the deployment and update of SUSE Linux Enterprise Server and only highlight Red Hat specific differences.

To use the artifact bundle, several initial steps have to be taken to create the right environment for provisioning SAP HANA databases. An artifact bundle is a zip file that contains artifacts such as deployment plans, OS build plans and plan scripts to configure the server creation using HPE Synergy Image Streamer.

At first an empty OS volume has to be created. The operating system will be installed on to this volume. Then the OS volume will need to be captured as a golden image, which will be the basis for the OS deployment plan. The plan scripts will configure the networks and storage necessary for SAP HANA during the deployment.

After the first boot, some OS kernel parameters required for SAP HANA will be set, the external HPE 3PAR storage will be mounted and the installation of the database will start. Please note that the complete installation is done on 3PAR volumes, not on the local OS storage to avoid large and rapidly-growing smart clones.

For the lifecycle activity tasks updating the OS or the SAP HANA database or switching workloads to a new server, the same deployment plans described in this Reference Architecture can be used and modified with changes of the golden image and custom attributes.

The concrete steps on how to do this are the following:

1. Create an SAP software media share
2. Create the network
3. Download and import the artifact bundle
4. Create a golden image
5. Customize the deployment plan
6. Create a server profile
7. Perform lifecycle activity

Steps 1-5 have to be executed only once, for the initial provisioning in the environment. Provisioning a server with SAP HANA using this environment is described in Step 6. Step 7 describes how an OS update, workload switching, and SAP HANA update are executed. The following sections describe all of the steps in detail.

Create an SAP software media share

To support repeatable, automated SAP HANA installations with individual database settings for each server profile, it is crucial to store the SAP HANA 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.
2. 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. 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.

1. Download the SAP HANA media archives from the SAP Software Download Center.
2. 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.
3. From that list you must obtain the following media files:
   – SAP HANA Platf. Ed. 2.0 SPS03 Linux x86_64 1/4
   – SAP HANA Platf. Ed. 2.0 SPS03 Linux x86_64 2/4

- SAP HANA Platf. Ed. 2.0 SPS03 Linux x86_64 3/4
- SAP HANA Platf. Ed. 2.0 SPS03 Linux x86_64 4/4

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

Create the network

HPE Synergy helps to define and configure networking and allows management of the network connections as part of the profile hardware state. It also assures that network connectivity changes are correctly handled as part of a workload switch.

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

- Image Streamer deployment network
- Management network
- SAN network

Table 3 summarizes the configuration for each network used in this RA. 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 40Gb F8 Module.

Table 3. Networks for SAP HANA deployments

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

Figure 6 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.

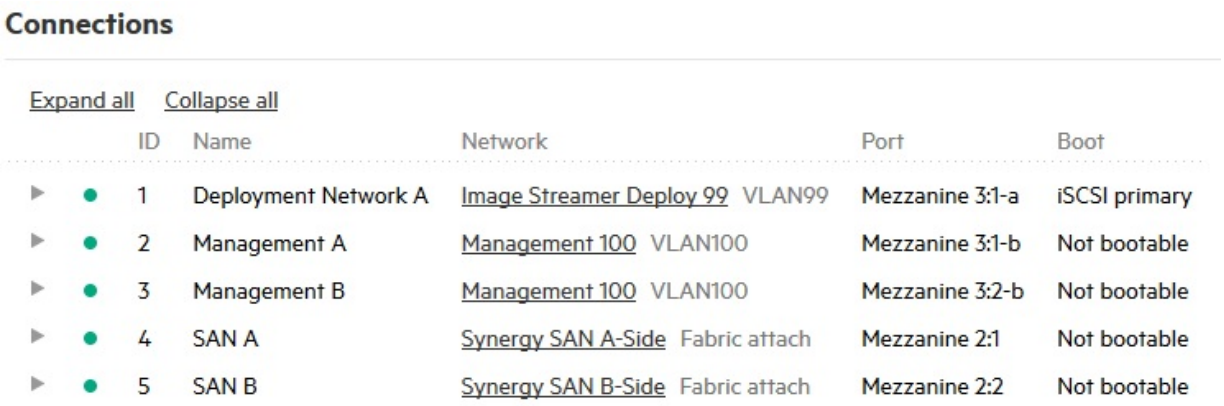

Figure 6. Network connections

Download and import the artifact bundle

1. From the HPE GitHub site for Image Streamer reference architectures, in the folder RA-SAP-HANA-DB, download the zip file for your OS. For SLES this will be HPE-SLES12-SAP-HANA-DB-RA-2018-06-01-v4.0.zip, for Red Hat this will be HPE-RHEL7.x-SAP-HANA-DB-RA-2018-

06-01-v4.0.zip and add it to your Image Streamer in the artifact bundles. Make sure to use the correct GitHub branch for the firmware version in the Image Streamer.

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

- The artifact bundle for SUSE includes:
  - Deployment plan: HPE - SLES12 - SAP HANA DB - deploy - 2018-06-01
  - OS build plan: HPE - SLES12 - SAP HANA DB - deploy - 2018-06-01
  - OS Build plan: HPE - SLES12 - SAP HANA DB - generalize - 2018-06-01
  - Plan scripts
- The artifact bundle for Red Hat includes:
  - Deployment plan: HPE - RHEL7.x - SAP HANA DB - deploy - 2018-06-01
  - OS build plan: HPE - RHEL7.x - SAP HANA DB - deploy - 2018-06-01
  - OS Build plan: HPE - RHEL7.x - SAP HANA DB - generalize - 2018-06-01
  - Plan scripts

Create a golden image

The following steps are required to create an OS image for deploying SAP HANA. See also the description of the HPE Synergy Image Streamer Foundation Artifacts Documentation.

Note

An OS deployment plan must be in place to create an empty OS volume for Step 1 below.

---

1. Create an HPE OneView server profile with the latest HPE Foundation OS deployment plan from the Foundation artifact bundle. Set the volume size to at least 10 GB and assign the profile to a compute node. An empty OS volume will be created.
2. Install the desired operating system, SUSE Linux Enterprise Server for SAP Applications 12 SP2 or Red Hat Enterprise Linux Server 7.4, on the empty volume.
3. The root filesystem should be ext3 or ext4 and it is assumed that the root partition / is located on /dev/sda3. If the root partition is not on that device, then the plan scripts “HPE - SLES12 - SAP HANA DB - mount generalize” and “HPE - SLES12 - SAP HANA DB - mount and validate” or “HPE - RHEL7.x - SAP HANA DB - mount generalize” and “HPE - RHEL7.x - SAP HANA DB - mount and validate” need to be adjusted.
4. Configure the OS according to SAP OS recommendations.

Note

The plan script “HPE - Linux - SAP HANA DB - manage security services” will disable the firewall.

If the firewall needs to be enabled, 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 - Linux - 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 and Update Guide for important SAP Notes and additional information about the setup.

To meet the SAP HANA KPIs, several kernel parameters and OS settings need to be modified. Plan script "HPE - Linux - SAP HANA DB - update OS settings" will set the correct kernel parameters[2].

Be sure to take a close look at SAP Note 2382421: Optimizing the Network Configuration on HANA- and OS-Level. For SAP HANA storage calculation and requirements, check the latest SAP document: SAP HANA TDI-Storage Requirements.

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

Relevant SAP notes

- 2369910 – SAP software on Linux: General information
- 1788665 – SAP HANA Support for virtualized / partitioned (multi-tenant) environments
- 2382421 – Optimizing the Network Configuration on HANA- and OS-Level
- 2477204 – FAQ: SAP HANA Services and Ports

Relevant SLES documentation

- 1984787 – SUSE Linux Enterprise 12: Installation notes
- 1944799 – SAP HANA Guidelines for SLES Operating System Installation
- 2205917 – SAP HANA DB: Recommended OS settings for SLES12/SLES for SAP Applications 12
- SUSE Linux Enterprise Server for SAP Applications 12 SP2
- Saptune documentation - Saptune is part of SLES for SAP applications 12 SP2. Make sure to use at least saptune version 1.1.6

Relevant RHEL documentation

- 2002167 – Red Hat Enterprise Linux 7.x – Installation and Upgrade
- 2009879 – SAP HANA Guidelines for Red Hat Enterprise Linux (RHEL) Operating System
- 2292690 – SAP HANA DB: Recommended OS settings for RHEL 7
- 2526952 – Red Hat Enterprise Linux for SAP Solutions

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 5. Use the following steps 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 1 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 ("SLES-12SP2-SAP"), description, OS volume, and Capture OS build plan as shown in Figure 7. The Capture OS build plans "HPE - SLES12 - SAP HANA DB - generalize" and "HPE - RHEL7.x - SAP HANA DB - generalize" create the golden image. Make sure to use one of these build plans when capturing the OS; using "as is" will not remove the server specific settings and will interfere with later deployment personalization.

[2] Make sure to check the OS specific SAP notes regularly and adapt the plan script if OS recommendations have been changed.

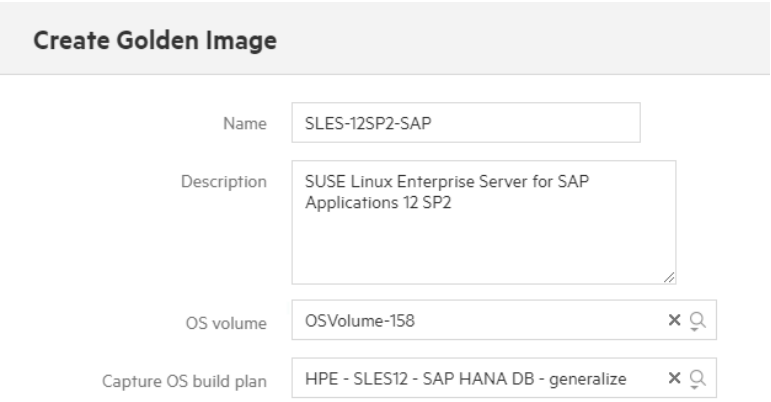

Figure 7. Golden Image creation

Note

For golden image creation, the capture OS build plans "HPE - SLES12 - SAP HANA DB - generalize" and "HPE - RHEL7.x - 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. Once copied, the values for the plan attributes can be changed to reflect your environment as shown in Figure 8. Make sure to check that all attributes have the correct values. Please note that for readability reasons not all of the plan attributes are shown here. Details can be found in Table B-3 in Appendix B.

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 golden image as the default golden image in the deployment plan.

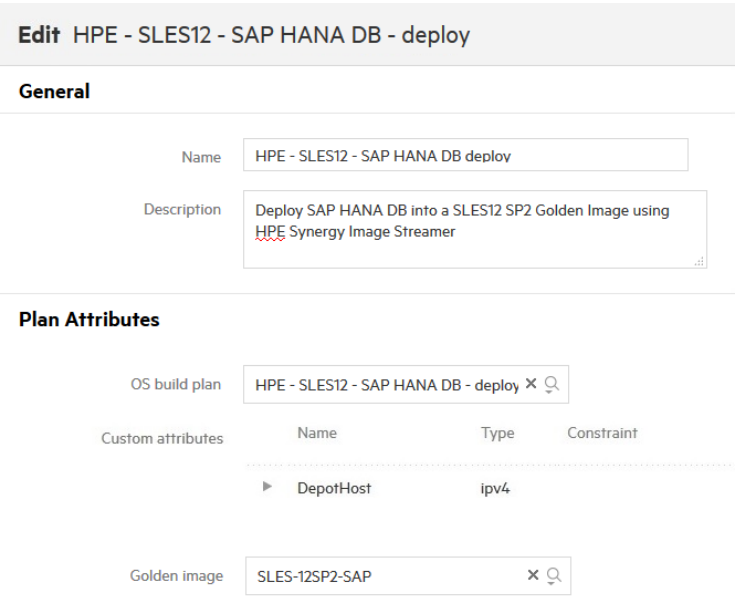

Figure 8. Deployment plan configuration

Parameters for the SAP HANA installation can be changed by using a configuration file that is located in the software depot. Details about the usage of the configuration file can be found in Appendix C: Customized SAP HANA installation options.

Create a server profile

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

- Server hardware type
- Enclosure group
- OS Deployment Plan with custom attributes as listed in Table B-3
- Connections
- SAN Storage

For this RA, external 3PAR storage was used to host the SAP HANA application data. Using external storage instead of local storage will help to reduce costs and will reduce disk consumption on the Image Streamer.

The server profile has the entire state of the server, including the access to shared storage which enables switching of workloads. Local storage may be used for temporary space but not for data that needs to be retained.

SAP HANA storage calculation

The following calculations are based on the SAP document: SAP HANA Storage Requirements. For more information, check the latest version.

Capacity-based storage sizing for SAP HANA systems greater than 1 TB:

- Data (/hana/data): 1.2 x RAM
- Log (/hana/log): 0.5 TB
- Shared (/hana/shared): 1 TB

Example formula for a HANA system with 1 TB of RAM = 1.2 x 1 TB + 0.5 TB + 1.0 TB = 2.7 TB. In this example the system needs 2.7 TB persistent storage capacity for the /hana directory.

Note

This Reference Architecture is configured to work with one data volume. If another data storage layout is chosen, the deployment plan and plan scripts have to be adapted.

For a server profile creation, a new permanent 3PAR volume has to be created.

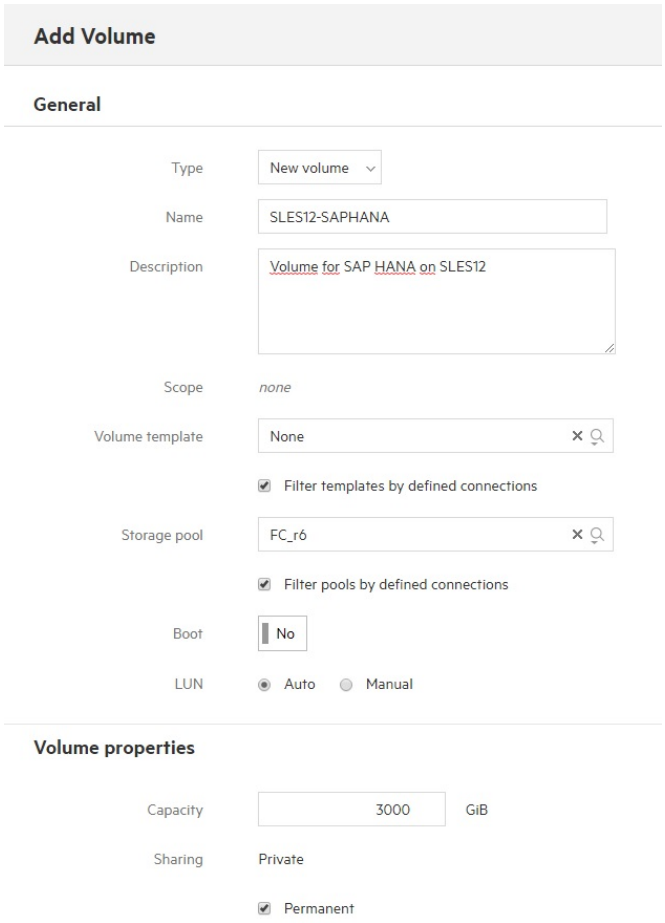

Figure 9. Storage creation in HPE OneView Server Profile template

Figure 10 shows an extract of the Create Server Profile Screen in HPE OneView. Several more customization options are available for server profile creation, but are not shown here for readability reasons. Set all visible custom attributes here. For a detailed list of attributes see Table B-3.

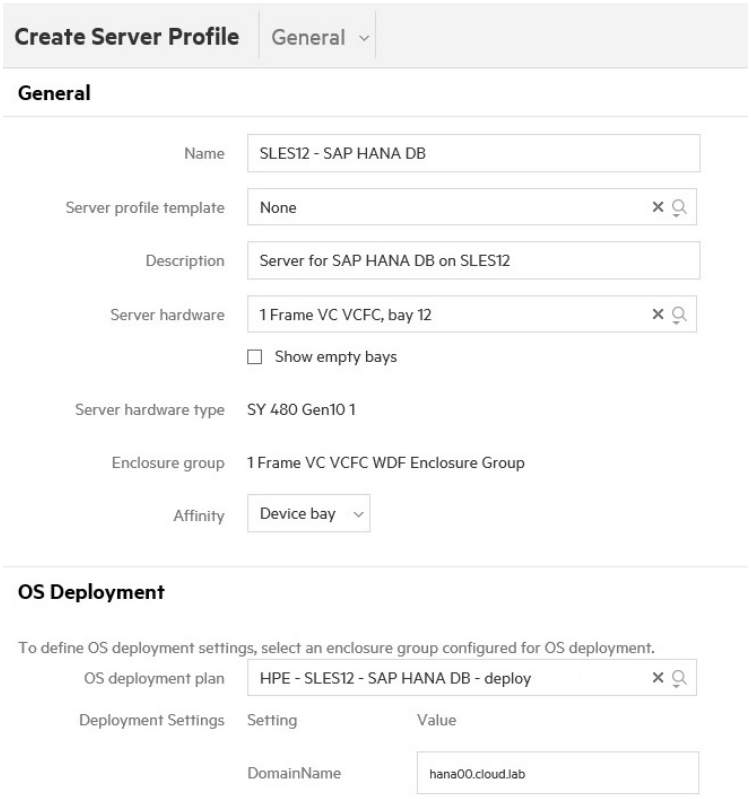

Figure 10. Create Server Profile

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. This will install the database into the newly created server. After the installation is complete, relevant OS settings are stored to a directory on the 3PAR storage and a systemd service is created to save any SAP HANA relevant OS changes at every OS shutdown. This will enable the lifecycle activities.

Perform lifecycle activity

Once an SAP HANA server is up and running, lifecycle management tasks will occur, such as updating the OS, the SAP HANA database version, or switching workloads. They can be handled now easily and automated using HPE Composable Infrastructure, reducing downtime and administration time. The same deployment plans that have been used to create the systems, can be used in a modified way to perform lifecycle activity.

Note

It is required to store the data of the SAP HANA database on persistent data storage, for this Reference Architecture an HPE 3PAR has been used. If the data is NOT stored on persistent storage, the data will be lost and the system can't be used any more.

For any maintenance activity, do NOT change the following custom attributes. Changing these attributes will lead to an inconsistent system - HostName, DomainName, HanaSID, LvmVolumeGroupName and all LvmVolumeNames.

OS update

Updating the OS using HPE Synergy Image Streamer is done by creating a new deployment plan with a new golden image. Create the new golden image as described in chapter Create a golden image. Make sure the golden image complies with the SAP OS recommendations for the desired SAP HANA version. Include the new golden image in the new deployment plan as shown in Figure 11.

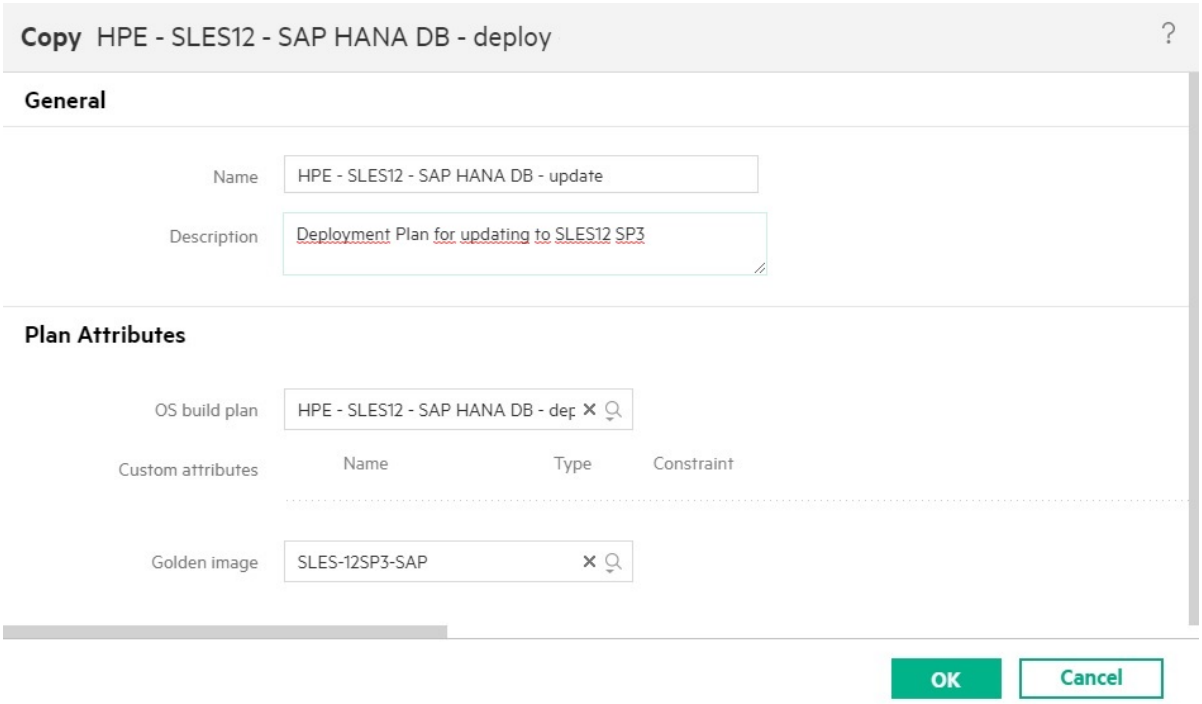

Figure 11. Copy Deployment Plan

The existing server has to be powered off, then the server profile can be edited by choosing the new OS deployment plan as shown in Figure 12. Make sure to keep the already existing data volume and keep the important custom attributes (see note above).

The server will be recreated with the new golden image. This reduces the impact of the disk usage on the image streamer.

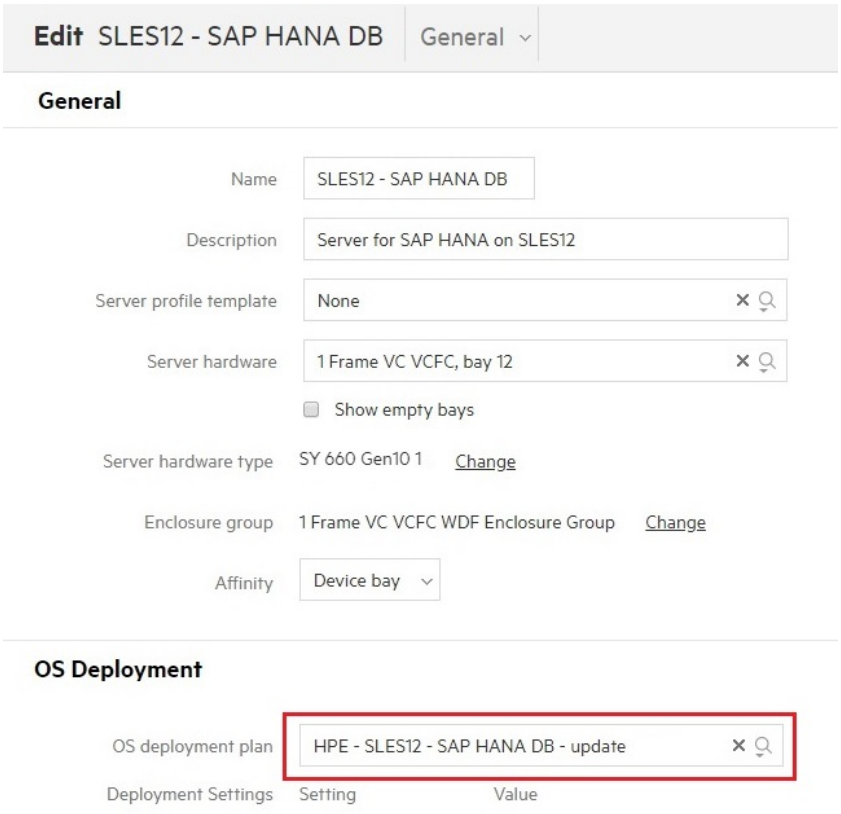

Figure 12. Edit Server Profile

The server update will be finished in less than 2 minutes. After less than 5 minutes the server will be up and running and the SAP HANA database will be started on the new OS version. Startup times of the SAP HANA database depend on the database size.

Note

Manual adaptation of the deployment plans “HPE - SLES12 - SAP HANA DB deploy” and “HPE - RHEL7.x - SAP HANA DB deploy” are required in case of additional installed applications or modified OS settings.

The deployment plans “HPE - SLES12 - SAP HANA - deploy” and “HPE - RHEL7.x - SAP HANA - deploy” will only restore the standard SAP HANA environment, additional data will get lost if not stored on persistent data.

Changing the major OS version, e.g. from SLES11 to SLES12 is not recommended using this approach.

Switching workloads

During the lifetime of an SAP HANA database, different hardware requirements might be necessary.

Switching workloads from one server to another can be done without creating a special deployment plan. Combining switching the servers with an SAP HANA update or an OS update can be executed by creating a new deployment plan.

To move the workload from one server to another the current server has to be powered off. Keep in mind that the SAP HANA data is stored on a persistent data storage and does not get deleted. The time needed for powering off a server depends on the time to shut down the HANA database.

Note

Manual adaptation of the deployment plans “HPE - SLES12 - SAP HANA DB - deploy” and “HPE - RHEL7.x - SAP HANA DB - deploy” are required in case of additional installed applications or modified OS settings.

These deployment plans will only restore the standard SAP HANA environment, additional data will get lost if not stored on persistent data.

Now the server profile can be edited. Change the server hardware type to the desired one as shown in Figure 13. Thoroughly read the notification and confirm it, then select the new server hardware.

If a new operating system shall be provisioned in addition or the SAP HANA database shall be updated, a new deployment plan can be chosen in addition.

Recheck the server profile settings e.g. for the network connections and update the server profile.

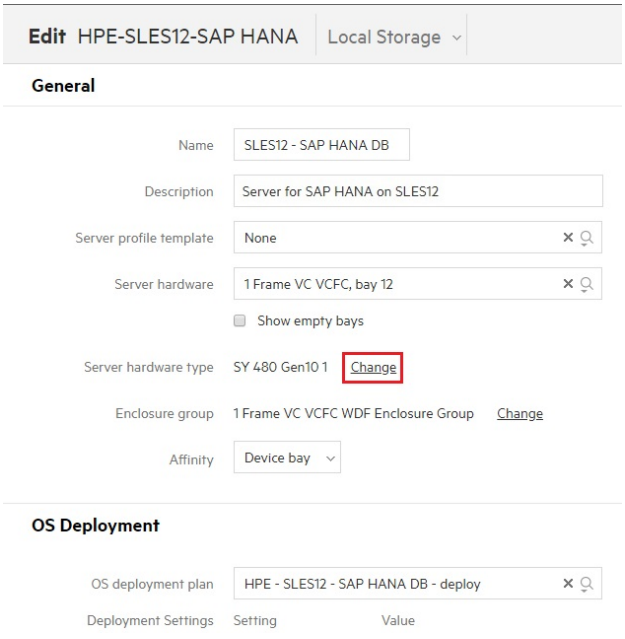

Figure 13. Change hardware type

The server profile will be reassigned to the new server hardware. After the server reassignment and first boot the OS specific parameters for SAP HANA will be restored and the database will be started.

After powering off the server, the whole process, for changing the hardware type from an HPE Synergy 480 Gen10 server to a Synergy 660 Gen10 server will take 8 minutes, followed by 5 minutes boot time. The SAP HANA database was down for only 13 minutes plus manual configuration time of the server profile and now is started automatically on the new server hardware. Startup times of the SAP HANA database depend on the database size.

SAP HANA update

Updating the SAP HANA database can be done by editing the server profile, when the server is powered off and changing two custom attributes. “HanaUpdate” has to be changed to “true” and “DepotSapDirectory” has to point to the directory containing the new SAP HANA installation media.

Alternatively a new deployment plan with the changed values for the custom attributes mentioned above could be created. An existing server profile then can be edited, using the new deployment plan. This action can be combined with any other maintenance task of the server. The relevant custom attributes can also be configured during the OS update task or switching workloads to a new server.

After the boot process of the server, the SAP HANA database is being started. Then the database is getting updated to the version provided in the installation directory.

The process of updating a test database without data takes ~ 6 minutes. SAP HANA startup and update times depend on the database size.

Capacity and sizing

Traditional OS provisioning for SAP HANA includes OS installation, network and kernel configuration, and several server reboots. Depending on the requirements this can take 4-6 hours. These steps have to be done for each new SAP HANA installation in the traditional environment.

Deploying a server for an SAP HANA 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 can be created in minutes. The deployment of a new SAP HANA database using Software Defined Infrastructure is fast, consistent, and repeatable.

Figure 14 shows the creation of the HPE - SLES12 - SAP HANA DB server profile. It completed after 3 minutes and 21 seconds. This includes the validation and creation of the SAN storage (21 seconds), update of the network (1 minute and 29 seconds), creation of the OS volume (15 seconds), and applying the server profile (1 minutes and 15 seconds).

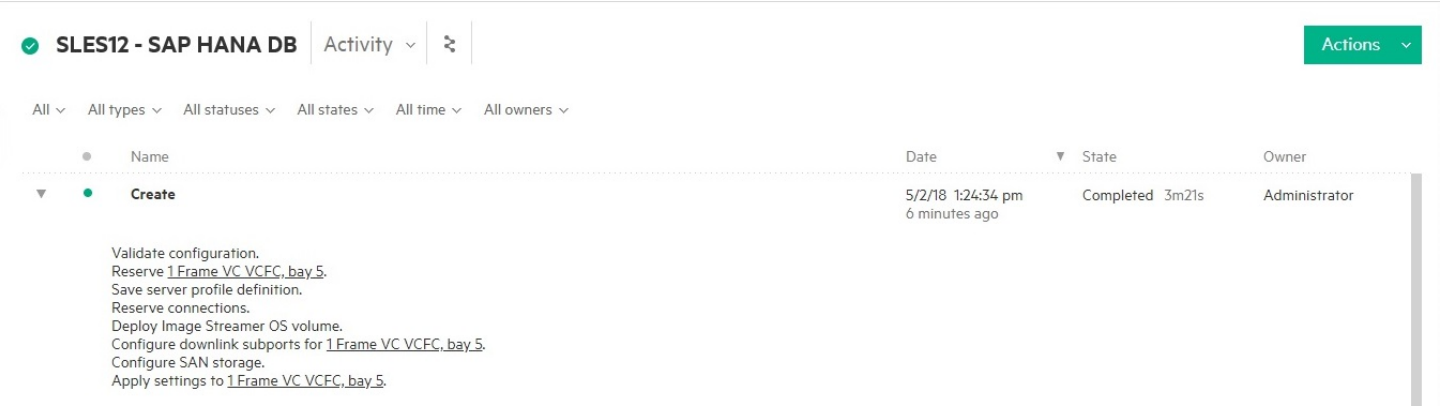

Figure 14. Server creation step

Subsequently the server is powered on and will boot. The boot time will vary depending on the server used. The HPE Synergy 660 Gen10 compute module used in this Reference Architecture took approximately 5 minutes to boot.

Following the boot time, database installation will start. The installation takes approximately 6 minutes.

Summing up all the steps to create a new server with a running SAP HANA database takes approximately 15 minutes.

The work of an IT service provider or administrator does not generally end after the provisioning of a system. Maintenance activities like SAP HANA updates that require an OS update will need to occur over time. In a traditional environment this has to be done on each single system.

Using HPE Synergy Image Streamer capabilities, only one golden image with the required Operating System version has to be created and all server profiles can be updated with this new golden image, offering the possibility to update the SAP HANA database during the same maintenance activity task.

Over the time, resource requirements may change, the SAP HANA database may grow, requiring more CPU power or physical memory. Using the capabilities of HPE's Composable Infrastructure and the deployment plans described in this Reference Architecture, switching workloads to another server with the right hardware resources can be done very fast and smooth.

A combination of the described maintenance tasks will result in a combination of the previously described deployment times.

The deployment and update times shown in Table 4 do not contain SAP HANA database startup or update times as they depend on the actual size of data stored in the database.

Table 4. Deployment and update times until SAP HANA start

Task	Profile creation	Server boot	Comment
Initial SAP HANA provisioning	3 min 21	3 min on SY480 5 min on SY660	SAP HANA installation takes ~6 minutes in addition
OS update	3 min 10	3 min on SY480 5 min on SY660	SAP HANA startup and update time depends on database size
Switching workload	7min 48s	5 min on SY660	SAP HANA startup and update time depends on database size
OS update + switching workload	8 min 01	5 min on SY660	SAP HANA startup and update time depends on database size

The benefit of using Software Defined Infrastructure is even better when multiple SAP HANA databases are required. The provisioning or maintenance of multiple servers can run in parallel, being started by one administrator. A provisioning or maintenance of 10 servers may be done in less than one hour showing the big benefit that each server and database has in a standardized environment.

In traditional data centers, setting up 1 server and installing the OS and SAP HANA would take between 4-6 hours; provisioning 10 servers could easily take several days. This process can hardly be parallelized.

Analysis and recommendations

This Reference Architecture for SAP HANA lifecycle activity using HPE Synergy Image Streamer was created using HPE Synergy 660 Gen10 and HPE Synergy 480 Gen10 compute modules for the hardware provisioning.

HPE 3PAR storage was used for storing the SAP HANA application data therefore local storage is not needed for this solution. This saves costs, because no additional storage is required. The server profile has the entire state of the server, including the access to shared storage which enables switching of workloads. Local storage may be used for temporary space but not for data that needs to be retained. Using 3PAR storage helps makes it possible to switch workloads and update the operating system of existing SAP HANA systems.

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

Using this Reference Architecture will help to provision and maintain bare-metal servers for SAP HANA in significantly less time compared to traditional provisioning. More specifically, it shows the following benefits of utilizing HPE Synergy for SAP HANA solutions:

- Manage the entire environment seamlessly, including configuration of network resources required for SAP HANA, creation and management of the required storage, and deploying the OS and database software on the compute nodes, by using HPE Synergy Composer with embedded HPE OneView.
- Automate deployment of SAP HANA by using HPE Synergy Image Streamer technology. Testing shows that HPE Synergy Composer plus HPE Synergy Image Streamer allows administrators to deploy a new system for SAP HANA in less than four minutes, which is a significant reduction as compared to traditional deployment times of hours or days.
- Automate switching of workloads for SAP HANA servers by using HPE Synergy Image Streamer technology. Testing shows that switching workloads from an HPE Synergy 480 Gen10 compute module to an HPE Synergy 660 Gen10 compute module finished in ~ 8 minutes. Reducing administrator activities and system downtime.
- Automate operating system version changes using HPE Synergy Image Streamer technology. Updating the OS in a landscape with several servers, in a traditional environment, can take several hours to days, whereas it will only take minutes using HPE Synergy Image Streamer. Testing shows that changing the OS version to a newer one, by using a deployment plan with a golden image takes less than four minutes.

- Automate SAP HANA version or revision update using HPE Synergy Image Streamer technology. Testing shows that updating the SAP HANA database version or revision during any other server maintenance tasks will add in an empty test system five minutes to the maintenance task. This makes an SAP HANA update very smooth and easy. Actual SAP HANA startup and update times depend on the database size.

Summary

This Reference Architecture described how an SAP HANA database can be deployed and lifecycle activities can be performed in a highly composable environment using the artifact bundles "HPE - SLES12 - SAP HANA DB" and "HPE - RHEL7.x - SAP HANA DB" for the HPE Synergy Image Streamer.

This document showed the setup required to apply the artifact bundles in an HPE Synergy Image Streamer environment. Necessary prerequisites for the golden image creation and customization of attributes for the plan scripts were listed. Adaptations of the deployment plan to perform lifecycle activity tasks were described.

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 bundles shown in this Reference Architecture configured the network and storage resources required for an SAP HANA server. After the first boot, the SAP HANA database was installed.

In this document, recommendations were given on how to create a golden image being used by the server profile together with the OS deployment plans "HPE - SLES12 - SAP HANA DB - deploy" and "HPE - RHEL7.x - SAP HANA DB - deploy".

Strategies are described how the lifecycle management tasks for existing SAP HANA database servers can be simplified using HPE Synergy Composable Infrastructure. Updating the operating system and the SAP HANA database version or revision, as well as switching workloads to another server can be done separately or combined using the deployment plans "HPE - SLES12 - SAP HANA DB - deploy" and "HPE - RHEL7.x - SAP HANA DB - deploy".

Tests showed that the server provisioning, including a new installation of SAP HANA using the artifact bundle "HPE - SLES12 - SAP HANA DB", took approximately 15 minutes. Traditional provisioning of a server in a TDI scenario and following SAP HANA TDI installation will take hours for one server.

Tests of maintenance activities showed similar timelines: less than four minutes for switching workloads and for updating the OS and SAP HANA database.

Provisioning using the HPE Synergy Composer and HPE Synergy Image Streamer capability reduce this time significantly.

Setting up a complete landscape with the requirement of several SAP HANA databases would consume several days in the traditional environment. Thanks to the repeatability of the HPE Synergy deployment this can be run in parallel, and, depending on the amount of required systems, would take roughly one hour.

Maintaining a large landscape of SAP HANA databases can get very complex. Each server and system has to be maintained manually, consuming up to days in traditional environments. Adapting the hardware to new resource needs can get very time consuming.

Using the capabilities of HPE Composable Infrastructure these activities can be done in a smooth, standardized, repeatable and fast way.

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 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 A-1. 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
1	804942-B21	HPE Synergy Frame Link Module
6	798095-B21	HPE Synergy 12000F 2650W AC Ti PS
1	804353-B21	HPE Synergy Composer
1	804937-B21	HPE Synergy Image Streamer
1	JG838A	HPE 5900CP 48XG 4QSFP+ Switch
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 660 Compute Module components
2	871931-B21	HPE SY 660 Gen10 4S Configure-to-Order Compute Module
8	872138-B21	HPE Synergy 480/660 Gen10 Intel® Xeon-Gold 6142 Processor Kit
2	872138-L21	HPE Synergy 480/660 Gen10 Intel® Xeon-Gold 6142 FIO Processor Kit
4	785067-B21	HPE 300GB 12G SAS 10K 2.5in SC ENT HDD
32	815101-B21	HPE 64GB 4Rx4 PC4-2666V-L Smart Kit
2	759557-B21	HPE Smart Array P542D Controller/21GB FIO Ctrlr
2	777452-B21	HPE Synergy 3830C 16G FC HBA
2	777430-B21	HPE Synergy 3820C 10/20Gb Converged Network Adapter
		HPE Synergy 480 Compute Module components
1	871940-B21	HPE SY 480 Gen10 Configure-to-Order Compute Module
2	873381-B21	HPE Synergy 480/660 Gen10 Intel® Xeon-Gold 6130 Processor Kit
1	873381-L21	HPE Synergy 480/660 Gen10 Intel® Xeon-Gold 6130 FIO Processor Kit
2	872475-B21	HPE 300GB SAS 10K SFF SC DS HDD
8	815100-B21	HPE 32GB 2Rx4 PC4-2666V-R Smart Kit
1	759557-B21	HPE Smart Array P542D Controller/21GB FIO Ctrlr
1	777452-B21	HPE Synergy 3830C 16G FC HBA
1	777430-B21	HPE Synergy 3820C 10/20Gb Converged Network Adapter
		Storage
1	H6Z01B	HPE 3PAR 8400 4N+SW Storage Base
2	H6Z26A	HPE 3PAR StoreServ 8000 SFF(2,5in) SAS Drive Enclosure
32	K2P94B	HPE 3Par 8000 1.8TB 10K SFF HDD
1	L7F20A	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 B-1 lists the plan scripts included in the OS Build Plan "HPE - SLES12 - SAP HANA DB deploy".

Table B-1. Plan script names included in the artifact bundle SLES12

Plan script name	Type	Comment
HPE - SLES12 - SAP HANA DB - mount and validate	General	Mounts the root partition and validates the golden image for SUSE.
HPE - Linux - SAP HANA DB - configure multiple NICs	Deploy	Configures the network and sets gateway.
HPE - Linux - SAP HANA DB - change root password	Deploy	Sets the root user password.
HPE - Linux - SAP HANA DB - configure hostname	Deploy	Updates the hostname.
HPE - Linux - SAP HANA DB - manage security services	Deploy	Enables or disables security services.
HPE - Linux - SAP HANA DB - partition SAN disk using LVM	Deploy	Partitions the attached SAN storage using the LVM parameters described in Table B-3.
HPE - SLES12 - SAP HANA DB - update OS settings	Deploy	Customize kernel parameters and block devices for SAP HANA.
HPE - Linux - SAP HANA DB - create local input file	Deploy	Creates the input file required for the SAP HANA installation
HPE - Linux - SAP HANA DB - create install script	Deploy	Creates the installation script install_SAP.sh. The script will mount the software depot, create the SAP HANA config file, start the installation or database update and create backup services for SAP HANA specific OS settings. The script will be executed after the first boot of the OS.
HPE - SLES12 - SAP HANA DB - unmount	General	Cleans up the temporary directory created during mount and unmounts the root partition.
HPE – SLES12 - SAP HANA DB - mount generalize	Capture	Mount root partition for generalization.
HPE - Linux - SAP HANA DB - generalize host	Capture	Remove host specific configuration.
HPE - SLES12 - SAP HANA DB - generalize network	Capture	Remove network settings.
HPE - Linux - SAP HANA DB - unmount generalize	Capture	Unmount root partition after generalization.

Table B-2 lists the plan scripts included in the OS Build Plan "HPE - RHEL7.x - SAP HANA DB - deploy".

Table B-2. Plan script names included in the artifact bundle RHEL 7.x

Plan script name	Type	Comment
HPE - RHEL7.x - SAP HANA DB - mount and validate	General	Mounts the root partition and validates the golden image for Red Hat.
HPE - Linux - SAP HANA DB - configure multiple NICs	Deploy	Configures the network and sets gateway.
HPE - Linux - SAP HANA DB - change root password	Deploy	Sets the root user password.
HPE - Linux - SAP HANA DB - configure hostname	Deploy	Updates the hostname.
HPE - Linux - SAP HANA DB - manage security services	Deploy	Enables or disables security services.
HPE - Linux - SAP HANA DB - partition SAN disk using LVM	Deploy	Partitions the attached SAN storage using the LVM parameters described in Table B-3.
HPE - RHEL7.x - SAP HANA DB - update OS settings	Deploy	Customize kernel parameters.
HPE - Linux - SAP HANA DB - create local input file	Deploy	Creates the input file required for the SAP HANA installation
HPE - Linux - SAP HANA DB - create install script	Deploy	Creates the installation script install_SAP.sh. The script will mount the software depot, create the SAP HANA config file, start the installation or database update and create backup services for SAP HANA specific OS settings. The script will be executed after the first boot of the OS.
HPE - RHEL7.x - SAP HANA DB - unmount	General	Cleans up the temporary directory created during mount and unmounts the root partition.
HPE – RHEL7.x - SAP HANA DB - mount generalize	Capture	Mount root partition for generalization.
HPE - Linux - SAP HANA DB - generalize host	Capture	Remove host specific configuration.
HPE - RHEL7.x - SAP HANA DB - generalize network	Capture	Remove network settings.
HPE - Linux - SAP HANA DB - unmount generalize	Capture	Unmount root partition after generalization.

Table B-3 lists the custom attributes and default values of the OS Build Plan "HPE - SLES12 - SAP HANA DB - deploy" and "HPE - RHEL7.x - SAP HANA DB - deploy".

Table B-3. Custom attributes of OS Build Plan "HPE - SLES12 - SAP HANA DB - deploy" and "HPE - RHEL7.x - SAP HANA DB - deploy"

Custom attribute name	Type	Description	Default/ example value	Visible on deployment
DepotCifsPassword	Password	Password for the CIFS software share. For NFS, either delete this attribute in plan script "HPE - RHEL7.x - SAP HANA DB - create local input file" or "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 - RHEL7.x - SAP HANA DB - create local input file" or "HPE - SLES12 - SAP HANA DB - create local input file" or enter a dummy value.	Administrator	No
DepotHost	IPv4 Address	IP-Address of the software share	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 is supported	cifs	No
DepotSapDirectory	String	Directory on the software share that contains the SAP HANA installation media	SAP_HANA_PLATFORM_20_SP 03	No
DepotShareName	String	Name of the software share	SWDEPOT	No
DomainName	String	Domain name of the host	hpe.com	Yes
HanaInstanceNumber	String	The two-digit SAP HANA Database Instance Number. Rules for SAP Instance Number apply.	00	Yes
HanaMasterPassword	Password	The master password of the SAP HANA database that will be used for all SAP HANA users.	password	Yes
HanaSID	String	The SAP System Identification of the SAP HANA database host. Rules for SAP System ID definition apply.	HDB	Yes
HanaStartAfterReboot	Option	Sets the autostart option for HANA after a system reboot. Possible values are yes and no.	Yes	Yes
HanaUpdate	Option	Defines if the SAP HANA database shall be updated. Possible values are true and false.	False	No
HostName	Hostname	The hostname of the system	host01	Yes
InstallDirectory	String	Local installation directory for the SAP HANA database. The installation script, local input file, and all installation logfiles 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	NIC1 on the management network	none	Yes
ManagementNIC2	NIC	NIC2 on the management network	none	Yes
NewRootPassword	Password	New Password for the root user	password	Yes
SSH	Option	Defines if SSH will be enabled on the deployed OS. Possible values are Enabled or Disabled	Enabled	No

Appendix C: Customized SAP HANA installation options

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

This configuration file for SAP HANA can be created once, modified, and then reused for any following SAP HANA deployments by storing it in the media directory (DepotSapDirectory).

Note

The name of the hdb configfile may not be changed and must be hdblcm.conf for installation and hdblcm_update.conf for update. It must be located in the DepotSapDirectory where the SAP HANA installation media is stored.

How to create the SAP HANA database installation 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 an SAP HANA 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 Table C-1.

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

Table C-1. Configuration variables for SAP HANA 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>	Yes
action	install	No
autostart	<HanaStartAfterReboot>	Yes

How to create the SAP HANA database update config file

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

This will create a config file where individual parameters for an SAP HANA 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_update.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 Table C-2.

The configuration file will be detected by the installation script and the values will be used for the SAP HANA installation. The default settings are listed in Table C-2. Values in <> are taken from the custom attributes.

Table C-2. Configuration variables for SAP HANA installation

Configuration variable	Default value	Changeable
components	client,server	Yes, additional values possible
hostname	<DomainName>	No
sid	<HanaSID>	No
use_master_password	yes	No
master_password	<HanaMasterPassword>	No
password	<HanaMasterPassword>	Yes
system_user_password	<HanaMasterPassword>	Yes
action	update	No

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 Card
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 Foundation artifact bundle https://github.hpe.com/ImageStreamer/image-streamer-tools/tree/master/foundation/artifact-bundles

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

SAP HANA Storage Requirements, sap.com/documents/2015/03/74cdb554-5a7c-0010-82c7-eda71af511fa.html

SAP Benchmark Certification for HPE Synergy 660 Gen10, https://www.sap.com/dmc/benchmark/2018/Cert18019.pdf

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

Sign up for updates

a00049665enw, June 2018

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