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# Using SUSE Automation to Deploy an SAP HANA Cluster on Google Cloud Platform

SUSE Linux Enterprise Server for SAP Applications  
SUSE Linux Enterprise Server  
Google Cloud Platform

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The document at hand walks you through the deployment of a two-node SAP HANA High Availability Cluster using the SUSE Automation Project into a sandbox environment, operated on Google Cloud Platform.

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# 1 About the guide

This document will walk you through the deployment of a simple two-node SAP HANA HA Cluster using the SUSE Automation Project for SAP Solutions Project and operating on Google Cloud Platform.

This project uses Terraform and Salt to deploy and configure the operating system (SUSE Linux Enterprise Server for SAP Applications), SAP software (SAP HANA), and a SUSE Linux Enterprise High Availability (HA) cluster. If extensive configuration and customization are required, refer to the project documentation at <https://github.com/SUSE/ha-sap-terraform-deployments>.

For simplicity, this guide uses the Cloud Shell to perform the deployment, as it provides easy access to most of the required tooling.

It is possible to use a local Linux or macOS computer, but some commands may need modification or omission.

The architecture for the deployment is similar to the one shown below:

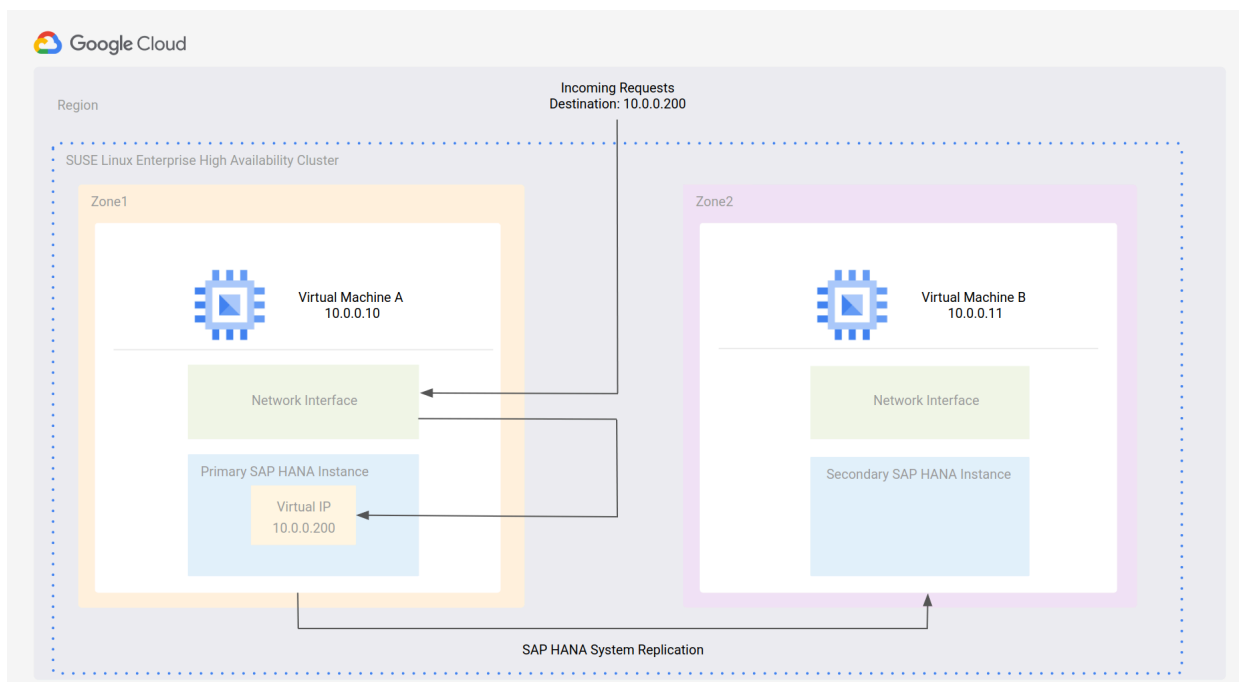


FIGURE 1: SUSE AUTOMATION FOR SAP HANA ON GOOGLE CLOUD PLATFORM ARCHITECTURE

The project will perform the following actions:

- Deploying infrastructure - including Virtual Network, subnet, firewall rules etc.
- Deploying instances - 2x SAP HANA Instances

- Configuring the operating system for SAP workload
- Running the SAP HANA installation
- Configuring SAP HANA System Replication (HSR)
- Configuring SUSE Linux Enterprise High Availability cluster components and resources

## 2 Configuring the Cloud Shell

### Important

The Google Cloud Platform (GCP) user specified in the below-mentioned steps needs certain GCP Project permissions to ensure the deployment is successful. For simplification, the GCP user used in this guide has the *Project Owner* IAM role.

The following procedures show the minimum steps required to prepare the GCP infrastructure to host the SAP HANA environment:

1. Create a new GCP Project to host the SAP HANA environment.
2. Enable the GCP Compute Engine API.
3. Using the newly created GCP project console, start a GCP Cloud Shell.
4. Using the GCP Cloud Shell, create a new GCP Key for the default GCP Service Account. The key will be used by Terraform to access the GCP infrastructure.

### Tip

For more details about creating a GCP Service Account key, refer to <https://cloud.google.com/iam/docs/creating-managing-service-account-keys#iam-service-account-keys-create-gcloud>

### Note

For simplification, the default GCP Service Account will be used in this guide.

### 3 Ensuring Terraform is installed

Terraform is already deployed as part of the GCP Cloud Shell. The following command output shows the Terraform version used at the time of creating this guide:

```
$ terraform -v
Terraform v1.0.0
on linux_amd64
```

### 4 Preparing the SAP HANA media

With the correct entitlement, SAP HANA media can be downloaded from the SAP Web site at <https://support.sap.com/en/my-support/software-downloads.html>. The SAP Media needs to be made available so it can be accessed during the deployment.

The SUSE Automation for SAP Applications project allows for three methods for presenting the SAP media:

1. SAR file and SAPCAR executable (SAP HANA Database only)
2. Multipart exe/RAR files
3. Extracted media

The different formats come with some benefits and drawbacks:

1. The compressed archives (SAR and RAR) provide a simple copy to the cloud but a longer install time because of extracting it during the process.
2. The uncompressed/extracted media are the fastest install, but more files are copied to the cloud share, which also takes time in forehand as preparation.

In this example, we use the extracted archives for the installation as it is the fastest deployment way.



#### Note

This however depends on the method used to download the SAP media. If multiple compressed files are downloaded, the official SAP extract tool SAPCAR tool must be used to extract the SAP media.



## Tip

The extracted SAP Media can contain a lot of files. Depending on your network speed, it can consume time to upload the extracted SAP media files. Google Cloud infrastructure provides a breakneck network speed. Create a Google Cloud compute engine workstation machine to download/upload the SAP media. The other option is to use fast speed internet connection.



## Tip

It is a good practice to have the SAP Media versioned on the cloud share to build a library for automatic installs and (re)deployments. Thus you should think about your SAP media structure first.

As an **example**, see below how a full SAP Application media tree (in a compressed format) for a S/4HANA version 1809 install would look like:

```
<FS>/s4hana1809
  |SWPM_CD
  | |SWPM20SP07_5-80003424.SAR
  | |SAPCAR_721-20010450.EXE
  |
  |EXP_CD
  | |S4CORE104_INST_EXPORT_1.zip
  | |S4CORE104_INST_EXPORT_2.zip
  | |...
  |DBCLIENT_CD
  | |IMDB_CLIENT20_005_111-80002082.SAR
  |BASKET_CD
  | |SAPHOSTAGENT24_24-20009394.SAR
  | |figshelper_4-10010245.sar
  | |figsex_1-80001746.sar
  | |SAPEXEDB_400-80000698.SAR
  | |SAPEXE_400-80000699.SAR
  |HANA
  | |51053061_part1.exe
  | |51053061_part2.rar
  | |51053061_part3.rar
  | |51053061_part4.rar

HANA      : contains the HANA Database install
BASKET_CD : contains SAP kernel, patch + more like hostagent.
DBCLIENT_CD: contains the package corresponding to DB CLIENT, e.g HANA
```

```
EXP_CD      : contains the package corresponding to EXPORT files
SWPM_CD     : must contain the .exe file corresponding to SAPCAR and the
              .sar file corresponding to SWPM.
              The file suffix must be .exe and .sar.
```

In the next steps, we use a simple HANA install download.

A GCP Cloud Storage bucket is used to host the SAP HANA extracted media. Using the GCP Console, perform the following actions:

- Create a new GCP bucket. (The example shows a GCP Cloud Storage bucket called mysapmedia, but a unique name should be used.)
- Upload the SAP HANA media extracted directory to the GCP Cloud Storage bucket. The following figure shows the uploaded SAP HANA media extracted directory:

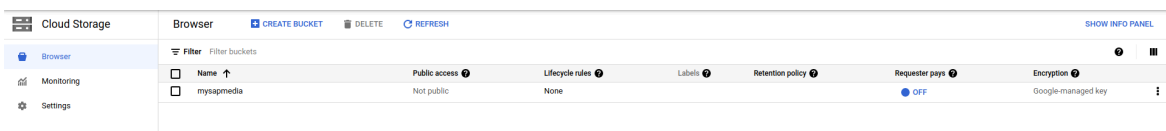


FIGURE 2: SAP HANA GCP STORAGE BUCKET

## 5 Downloading and configuring the SUSE Automation code

The SUSE SAP Automation code is published in GitHub.

The following command will clone the project to the Cloud Shell ready for configuration:

```
$ git clone --depth 1 --branch 7.2.0 https://github.com/SUSE/ha-sap-terraform-deployments.git
```

Next, move the generated GCP Service Account Key to the SUSE SAP Automation GCP directory:

```
$ cd ~
$ cp <GCP Service Account Key> suse-sap-automation/ha-sap-terraform-deployments/gcp
```



### Note

If the following SSH keys already exist, the next step can be skipped.



Then, generate SSH key pairs to allow for accessing the SAP HANA instances:

```
#optional if ssh-keys already exist
$ cd ~
$ ssh-keygen -q -t rsa -N '' -f ~/.ssh/id_rsa
```

## 5.1 Configuring the deployment options and modifying the Terraform variables

The files that need to be configured are contained in a subdirectory of the project. Use that as the working directory:

```
$ cd ~/suse-sap-automation/ha-sap-terraform-deployments/gcp
```

A Terraform example template is provided. For a demo environment consisting of a simple HANA cluster, only a handful of parameters will need changing.

Copy the Terraform example file to `terraform.tfvars`:

```
$ cp terraform.tfvars.example terraform.tfvars
```

Edit the `terraform.tfvars` file and modify it as explained below. If you are duplicating the lines before modification, ensure the original is commented out, or the deployment will fail.

First, choose the GCP Project ID for the deployment:

```
# GCP project id
project = "<PROJECT ID>"
```

Then, choose the GCP Service Account Key file path. With the following parameter, Terraform will use the GCP Service Account Key file created above:

```
# Credentials file for GCP
gcp_credentials_file = "<GCP Service Account Key Path and Name>"
```

Choose the region for the deployment, for example:

```
# Region where to deploy the configuration
region = "europe-west1"
```

The following parameters select the version of SUSE Linux Enterprise Server for SAP Applications to deploy:



## Note

The values shown equal the default values. All defaults point to PAYG images for an easy start. Thus you only need to enable or change the variables if you want to work with different values.

```
#os_image = "suse-sap-cloud/sles-15-sp2-sap"
```

Next, enter the path for the public and private SSH keys that were generated earlier. Below is an example using the default created SSH keys:

```
# SSH Public key location to configure access to the remote instances
public_key = "~/ssh/id_rsa.pub"

# Private SSH Key location
private_key = "~/ssh/id_rsa"
```

To keep the cluster architecture and deployment simple and to provide additional packages needed to deploy, uncomment and set the following parameters:

```
ha_sap_deployment_repo = "https://download.opensuse.org/repositories/network:/ha-
clustering:/sap-deployments:/v7/"
```

Then, enable the `pre_deployment` parameter:

```
pre_deployment = true
```

The Jump host server (Bastion Host Server) is enabled by default, and provide the public IP address to the database. Otherwise the two HANA servers will get a public ip.

Disable the Bastion Host Server creation parameter `bastion_enabled`:

```
bastion_enabled = false
```

Next, set which SAP HANA instance machine type should be selected: The default is set to some standard types, and you only need to enable and change the variable if you want other sizes.

```
#machine_type = "n1-highmem-32"
```

Modify the following parameter to point to SAP media that was uploaded to the storage location:

```
hana_inst_master = "mysapmedia/51054623"
```

To create the cluster, we need to set this parameter to **true**, otherwise only a single system is created.

```
# Enable system replication and HA cluster
hana_ha_enabled = true
```

Finally, to ensure a fully automated deployment, it is possible to set passwords within the `terraform.tfvars` file. Uncomment and set the following parameters to your own value:

```
hana_master_password = "SAP_Pass123"
```



### Note

If the parameters are not set in the `terraform.tfvars` file, they must be entered when running the deployment.



### Important

All passwords must conform to SAP password policies or the deployment will fail.

Optional: If a monitoring instance should be as part of the deployment, find and uncomment the following:

```
monitoring_enabled = true
```

## 6 Finalizing the automation configuration

Ensure that the GCP Project used to host the SAP HANA HA cluster meets the infrastructure quota requirements set by Google Cloud. For more info, refer to <https://cloud.google.com/solutions/sap/docs/sap-hana-planning-guide#quotas>

## 7 Deploying the project

Terraform will create and name resources when running the deployment based on the "workspace" in use. It is highly recommended to create a unique workspace from which to run the deployment.

```
$ terraform init
$ terraform workspace new demo
$ terraform workspace select demo
$ terraform plan
$ terraform apply
```



## Tip

The Cloud Shell has a timeout of around 20 minutes and the shell will close if left unattended, resulting in a failed deployment. It is strongly advised to retain focus on the Cloud Shell window to ensure the timeout does not occur.

If successful, the output lists the public IP addresses for the cluster nodes. This will look similar to the following considering the different Public IP addresses for each deployment:

```
module.hana_node.module.hana_provision.null_resource.provision[1] (remote-exec): Summary
for local
module.hana_node.module.hana_provision.null_resource.provision[1] (remote-exec):
-----
module.hana_node.module.hana_provision.null_resource.provision[1] (remote-exec):
Succeeded: 33 (changed=23)
module.hana_node.module.hana_provision.null_resource.provision[1] (remote-exec): Failed:
0
module.hana_node.module.hana_provision.null_resource.provision[1] (remote-exec):
-----
module.hana_node.module.hana_provision.null_resource.provision[1] (remote-exec): Total
states run:    33
module.hana_node.module.hana_provision.null_resource.provision[1] (remote-exec): Total
run time: 1028.670 s
module.hana_node.module.hana_provision.null_resource.provision[1] (remote-exec): Wed Jun
23 10:14:22 UTC 2021::demo-hana02::[INFO] deployment done
module.hana_node.module.hana_provision.null_resource.provision[1]: Creation complete
after 27m24s [id=3463680564647535989]

Apply complete! Resources: 26 added, 0 changed, 0 destroyed.

Outputs:

bastion_public_ip = ""
cluster_nodes_ip = [
  "10.0.0.10",
  "10.0.0.11",
]
cluster_nodes_name = [
```

```
"demo-hana01",
"demo-hana02",
]
cluster_nodes_public_ip = tolist([
  "34.127.16.75",
  "34.145.94.26",
])
cluster_nodes_public_name = []
drbd_ip = []
drbd_name = []
drbd_public_ip = []
drbd_public_name = []
iscsisrv_ip = ""
iscsisrv_name = ""
iscsisrv_public_ip = ""
iscsisrv_public_name = []
monitoring_ip = ""
monitoring_name = ""
monitoring_public_ip = ""
monitoring_public_name = ""
netweaver_ip = []
netweaver_name = []
netweaver_public_ip = []
netweaver_public_name = []
```

## 8 Tearing down

When finished with the deployment, or even if the deployment has failed, ensure that Terraform is used to tear down the environment.

```
$ terraform destroy
```

This method will ensure all GCP resources, such as instances, disks, VPCs, and roles are cleaned up. You need to delete the following GCP components manually:

- GCP Cloud Storage bucket
- GCP Project

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