



CLOUD ALLIANCE PARTNERS

# HANA SCALE-OUT ARCHITECTURE



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# SAP on Azure Leader Guide

## Before the hands-on lab

Duration: 10 minutes

To complete this lab, you must verify your account has sufficient permissions to the Azure subscription that you intend to use to deploy Azure VMs. You also need to identify the availability of the SUSE Linux Enterprise Server image that you will use to deploy Azure VMs.

Microsoft Azure Portal URL : <https://portal.azure.com>

Azure user ID : Your azure ID

Password : Your Password

## Important

In order to be able to use the Azure Subscription and create Resources, please make sure you have received the email invitation with credentials required for Azure.

## Exercise 1: Connect to CAP Labs Portal

1. Follow the link embedded in the invitation to register yourself for the lab session.
2. In the Register now screen, enter all the required information and click to SUBMIT the form

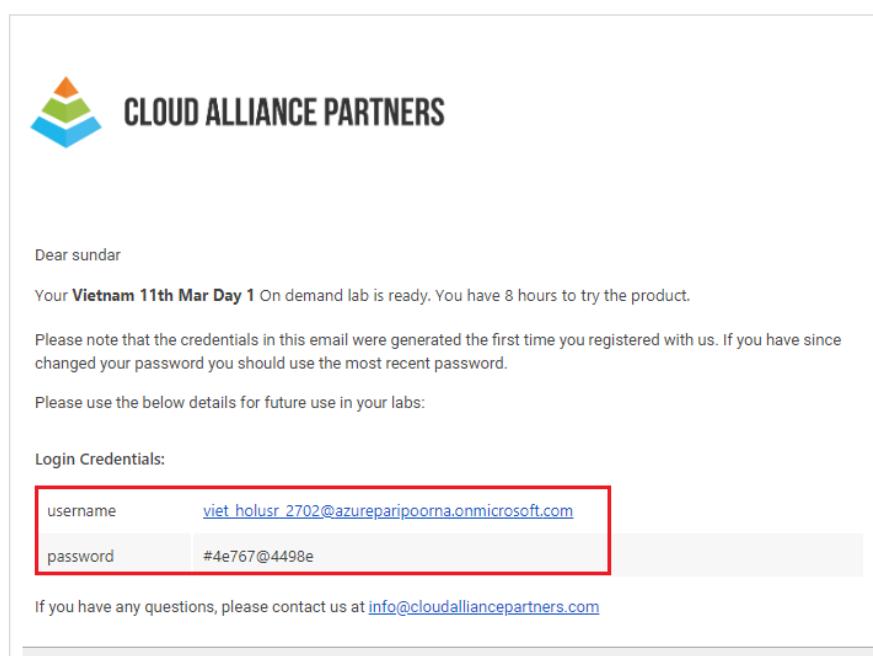


### Register Now

Your Full Name	<input type="text" value="Your Full Name"/>
Your Email ID	<input type="text" value="Your Email ID"/>
Your Org. Name	<input type="text" value="Your Org. Name"/>
Lab Code	<input type="text" value="86BF93FF6617D281495A24FF5A6DE"/>

Microsoft or training providers may use your contact information to provide updates and special offers about Microsoft Azure and other Microsoft products and services. You can unsubscribe at any time. To learn more you can read the [Privacy Policy](#).

3. Once registration is accepted, you will get credentials through Email.



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Dear sundar

Your **Vietnam 11th Mar Day 1** On demand lab is ready. You have 8 hours to try the product.

Please note that the credentials in this email were generated the first time you registered with us. If you have since changed your password you should use the most recent password.

Please use the below details for future use in your labs:

Login Credentials:

username	viet_holusr_2702@azureparipoorna.onmicrosoft.com
password	#4e767@4498e

If you have any questions, please contact us at [info@cloudalliancepartners.com](mailto:info@cloudalliancepartners.com)

4. Download the Required Software from the below URL

PuTTY: <http://bit.ly/2O8Kdya>

Azure Storage Explorer: <http://bit.ly/32DWNum>

## Exercise 2: HANA Scale-Out

### Task 1: Create HANA Master VM (ARM Template)

- 1.1. Click into the below link.

URL: <https://github.com/sathish-cap/labs-arm>

Lab ARM Scripts

11 commits		1 branch	0 packages	0 releases	1 contributor
Branch: master ▾		New pull request	Find file Clone or download ▾		
sathish-cap Demo automation scripts added 1					
 demo	Demo automation scripts added 1				9 hours ago
 dynamictiering	Dynamic Tiering Script Added				6 days ago
 scaleout	scaleout automation scripts added				12 hours ago
 stonith	Initial version 0.1				7 days ago
 README.md	Update README.md				12 hours ago
 README.md					

- 1.2. Click to Scaleout → 01\_CreateLinuxHANAVMs.json → Copy the json script (Click Raw)



324 lines (324 sloc) 13.1 KB

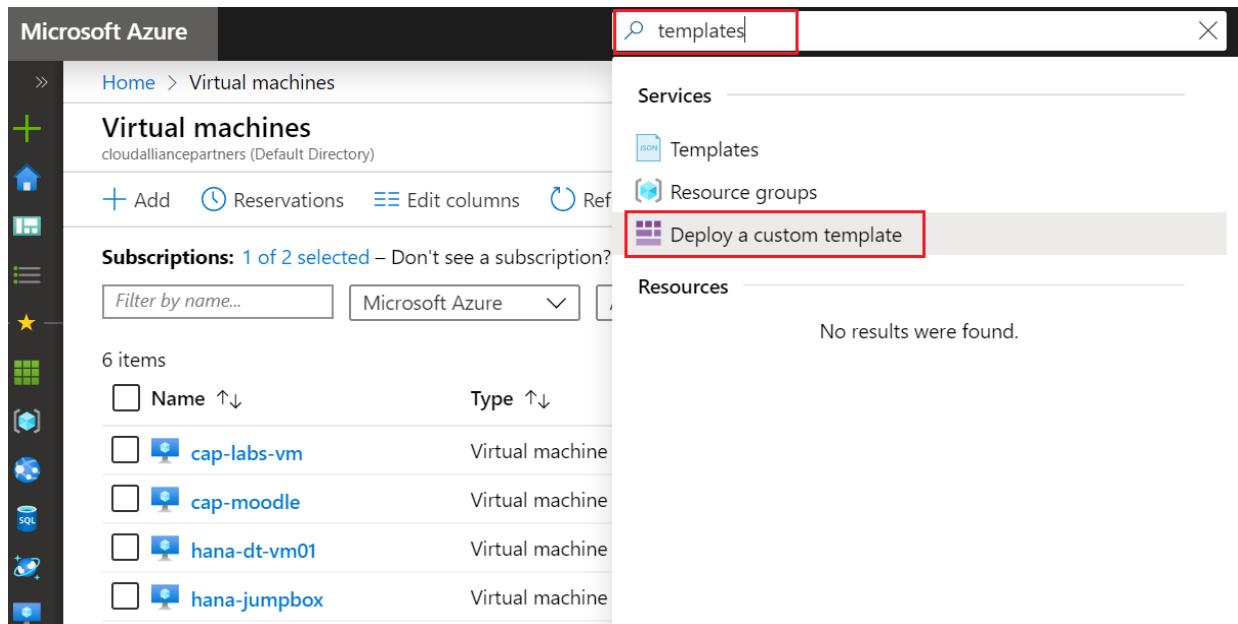
Raw Blame History

```
1  {
2      "$schema": "http://schema.management.azure.com/schemas/2015-01-01/deploymentTemplate.json#",
3      "contentVersion": "1.0.0.0",
4      "parameters": {},
5      "variables": {
6          "vNetName": "[concat(resourceGroup().name, '-vnet')]",
7          "location": "[resourceGroup().location]",
8          "addressPrefix": "10.0.0.0/16",
9          "subnetName": "[concat(resourceGroup().name, '-subnet')]",
10         "subnetAddressPrefix": "10.0.0.0/24",
11         "avSetName": "hana-avset",
12         "vmNamePrefixHANAMaster": "hana-master-vm",
13         "vmNamePrefixHANAWorker": "hana-worker-vm",
14         "vmNamePrefixHANASTandBy": "hana-standby-vm",
15         "subNetRef": "[resourceId('Microsoft.Network/virtualNetworks/subnets',variables('vNetName'),variables('subnetName'))]",
16         "adminUsername": "dbadmin",
17         "adminPassword": "demoPassword1!",
18         "publicIPAddressType": "Dynamic",
19         "publisher": "SUSE",
20         "offer": "SLES-SAP-BYOS",
21         "sku": "12-SP3",
22         "version": "latest",
23         "vmSize": "Standard_D8_v3"
24     },
25 }
```

← → ⏪ https://raw.githubusercontent.com/sathish-cap/labs-arm/master/scaleout/01\_CreateLinuxHANAVMs.json

```
{
    "$schema": "http://schema.management.azure.com/schemas/2015-01-01/deploymentTemplate.json#",
    "contentVersion": "1.0.0.0",
    "parameters": {},
    "variables": {
        "vNetName": "[concat(resourceGroup().name, '-vnet')]",
        "location": "[resourceGroup().location]",
        "addressPrefix": "10.0.0.0/16",
        "subnetName": "[concat(resourceGroup().name, '-subnet')]",
        "subnetAddressPrefix": "10.0.0.0/24",
        "avSetName": "hana-avset",
        "vmNamePrefixHANAMaster": "hana-master-vm",
        "vmNamePrefixHANAWorker": "hana-worker-vm",
        "vmNamePrefixHANASTandBy": "hana-standby-vm",
        "subNetRef": "[resourceId('Microsoft.Network/virtualNetworks/subnets',variables('vNetName'),variables('subnetName'))]",
        "adminUsername": "dbadmin",
        "adminPassword": "demoPassword1!",
        "publicIPAddressType": "Dynamic",
        "publisher": "SUSE",
        "offer": "SLES-SAP-BYOS",
        "sku": "12-SP3",
        "version": "latest",
        "vmSize": "Standard_D8_v3"
    },
    "resources": [
        {
            "apiVersion": "2019-04-01",
            "name": "[variables('vNetName')]",
            "type": "Microsoft.Network/virtualNetworks",
```

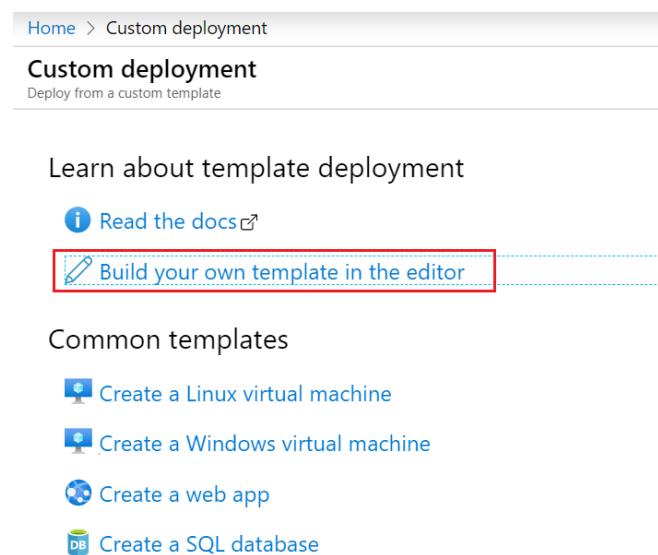
### 1.3. Switch into Portal → Search as “templates” → Deploy a custom template.



The screenshot shows the Microsoft Azure portal interface. In the top navigation bar, there is a search bar with the text "templates" entered. Below the search bar, under the "Services" section, the "Deploy a custom template" option is highlighted with a red box. On the left side, there is a sidebar with various icons representing different Azure services. The main content area shows a list of "Virtual machines" with the following details:

Name	Type
cap-labs-vm	Virtual machine
cap-moodle	Virtual machine
hana-dt-vm01	Virtual machine
hana-jumpbox	Virtual machine

**1.4. Select Build your own template in the editor.**



The screenshot shows the "Custom deployment" page in the Microsoft Azure portal. At the top, there is a breadcrumb navigation: "Home > Custom deployment". The main heading is "Custom deployment" with the sub-instruction "Deploy from a custom template". Below this, there is a section titled "Learn about template deployment" with two links: "Read the docs" and "Build your own template in the editor". The "Build your own template in the editor" link is highlighted with a red box. Further down, there is a section titled "Common templates" with four items:

- Create a Linux virtual machine
- Create a Windows virtual machine
- Create a web app
- Create a SQL database

**1.5. Remove the existing code & paste the copied script → Save**



Home > Custom deployment > Edit template

Edit template  
Edit your Azure Resource Manager template

+ Add resource ↑ Quickstart template ⌂ Load file ⌂ Download

Parameters (0)  
Variables (17)  
Resources (5)

```
1  {
2      "$schema": "http://schema.management.azure.com/schemas/2015-01-01/deploymentTemplate.json#",
3      "contentVersion": "1.0.0.0",
4      "parameters": {},
5      "variables": {
6          "vNetName": "[concat(resourceGroup().name, '-vnet')]",
7          "location": "[resourceGroup().location]",
8          "addressPrefix": "10.0.0.0/16",
9          "subnetName": "[concat(resourceGroup().name, '-subnet')]",
10         "subnetAddressPrefix": "10.0.0.0/24",
11         "avSetName": "s03-avset",
12         "vmNamePrefix": "s03-db-",
13         "numberOfInstances": 2,
14         "subnetRef": "[resourceId('Microsoft.Network/virtualNetworks/subnets', variables('vNetName'), variables('subnetName'))]",
15         "adminUsername": "dbadmin",
16         "adminPassword": "demoPassword1!",
17         "publicIPAddressType": "Dynamic",
18         "publisher": "SUSE"
19     }
}
```

Save Discard

## 1.6. Select the resource group & location. Accept the Terms and conditions → Purchase.

Home > Custom deployment

Custom deployment  
Deploy from a custom template

**BASICS**

Subscription \* Microsoft Azure

Resource group \* caplabs2019

Location \* (Asia Pacific) South India

**TERMS AND CONDITIONS**

Azure Marketplace Terms | Azure Marketplace

By clicking "Purchase," I (a) agree to the applicable legal terms associated with the offering; (b) authorize Microsoft to charge or bill my current payment method for the fees associated with the offering(s), including applicable taxes, with the same billing frequency as my Azure subscription, until I discontinue use of the offering(s); and (c) agree that, if the deployment involves 3rd party offerings, Microsoft may share my contact information and other details of such deployment with the publisher of that offering.

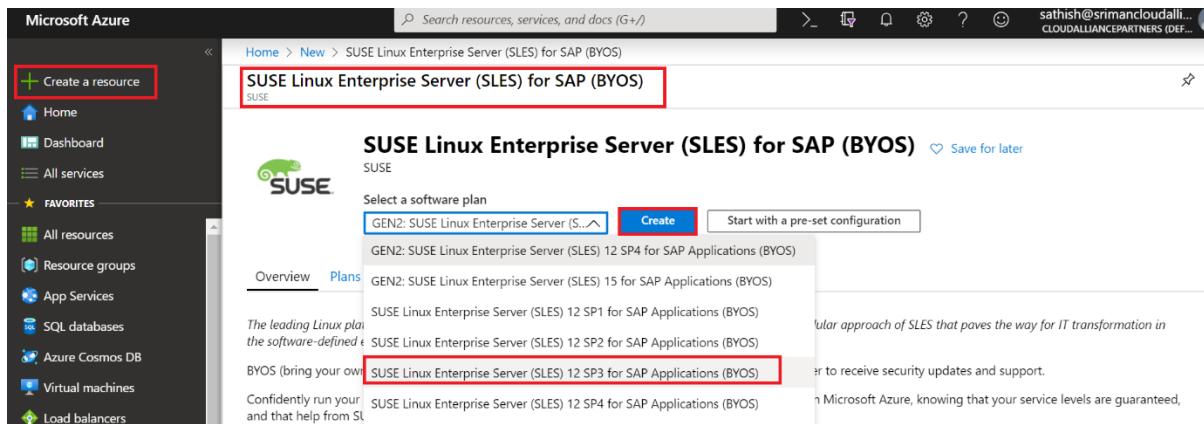
I agree to the terms and conditions stated above

Purchase

## 1.7. Similarly, execute the file “02\_CreateWindowsJumpboxVM.json” file. (Windows jumpbox creation).

## Task 2: Create HANA Master VM (Manual)

2.1. Create New “SLES 12 SP3 for SAP (BYOS)” VM. In Portal Create Resource → Search “SLES for SAP” & choose “SUSE Linux Enterprise Server (SLES) for SAP (BYOS)”.



2.2. Enter the below details.

<b>Resource Group:</b>	<b>default value</b>
<b>Virtual Machine Name:</b>	<b>hana-master-vm</b>
<b>Region:</b>	<b>Refer RG's location</b>
<b>Availability Option:</b>	<b>Availability Set</b>
<b>Availability Set:</b>	<b>Create-New</b>
<b>Name:</b>	<b>hana-scaleout-avset&lt;&lt;unique user id&gt;&gt;</b>

Home > New > SUSE Linux Enterprise Server (SLES) for SAP (BYOS) > Create a virtual machine

### Create a virtual machine

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize your resources.

Subscription *	Microsoft Azure
Resource group *	hol_sea_usr_2729
	<a href="#">Create new</a>
<b>Instance details</b>	
Virtual machine name *	hana-master-vm
Region *	(Europe) UK South
Availability options	Availability set
Availability set *	No existing availability sets in current resource group and location <a href="#">Create new</a>
Image *	SUSE Linux Enterprise Server (SLES) 12 SP3 for SAP Application Server
<a href="#">Review + create</a> < Previous <a href="#">Next : Disks &gt;</a>	
<a href="#">OK</a>	

### 2.3. Size: Change Size → Select “D8\_v3” (If Filter applied, Clear Filter)

**Select a VM size**  
Browse available virtual machine sizes and their features

VM SIZE	OFFERING	FAMILY	VCPUS	RAM (GB)	DATA DISKS	MAX IOPS	TEMPORARY STOR...	PREMIUM DISK SUP...
D8_v3	Standard	General purpose	8	32	16	16x500	200 GB	No
D8s_v3	Standard	General purpose	8	32	16	12800	64 GB	Yes

**Select**    Prices presented are estimates in your local currency that include only Azure infrastructure costs and any discounts for the subscription and location. To applicable software costs. Final charges will appear in your local currency in cost analysis and billing views. [View Azure pricing calculator](#). Activate Windows Go to PC settings to activate Windows

<b>Authentication Type:</b>	<b>Password</b>
<b>Username:</b>	<b>dbadmin</b>
<b>Password:</b>	<b>demoPassword1!</b>

## Administrator account

Authentication type  Password  SSH public key

Username \* 
✓

Password \* 
✓

Confirm password \* 
✓




## 2.4. Click → Disks → Standard SSD → Networking

[Basics](#) [Disks](#) [Networking](#) [Management](#) [Guest config](#) [Tags](#) [Review + create](#)

Azure VMs have one operating system disk and a temporary disk for short-term storage. You can attach additional data disks. The size of the VM determines the type of storage you can use and the number of data disks allowed. [Learn more](#)

**DISK OPTIONS**

\* OS disk type 
Standard SSD
▼
**DATA DISKS**

You can add and configure additional data disks for your virtual machine or attach existing disks. This VM also comes with a temporary disk.

LUN	NAME	SIZE (GiB)	DISK TYPE	HOST CACHING
-----	------	------------	-----------	--------------

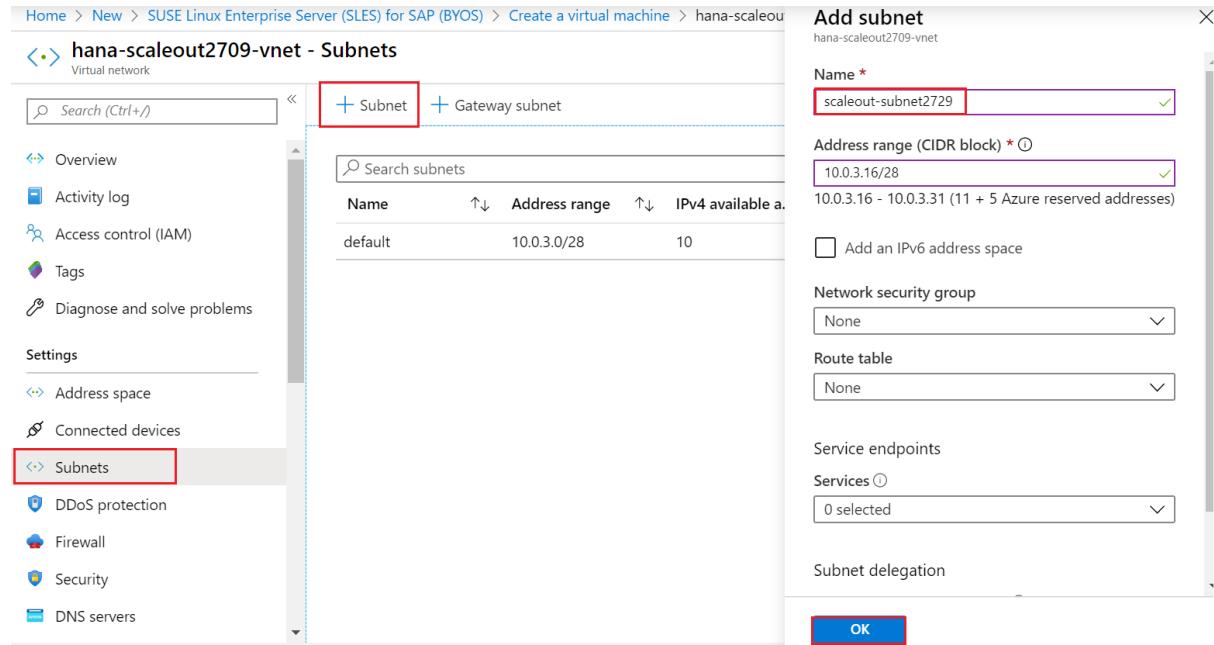
[Create and attach a new disk](#)    [Attach an existing disk](#)

▼ ADVANCED




## 2.5. Accept the Vnet, Subnet, Public IP, Security Group as “Advanced”

**VNet:** Accept the default Value
**Subnet:** Manage Subnet → Add Subnet → Enter the Value for Subnet (scaleout-subnet <<unique user id>>)



**Add subnet**

hana-scaleout2709-vnet

Name \*

Address range (CIDR block) \*  10.0.3.16 - 10.0.3.31 (11 + 5 Azure reserved addresses)

Add an IPv6 address space

Network security group

Route table

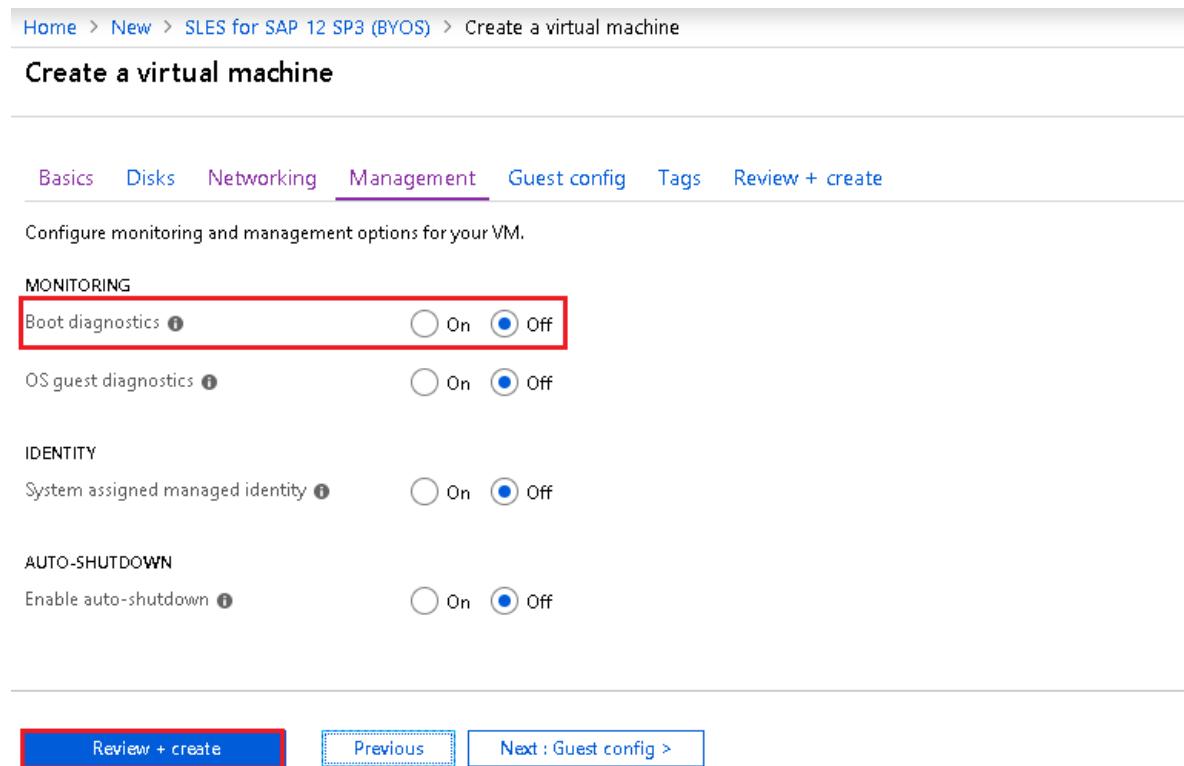
Service endpoints

Services

Subnet delegation

**OK**

2.6. Click Management → Boot diagnostics → off → Click “Review+Create”.



**Create a virtual machine**

**Management**

Configure monitoring and management options for your VM.

**MONITORING**

Boot diagnostics  Off

OS guest diagnostics  Off

**IDENTITY**

System assigned managed identity  Off

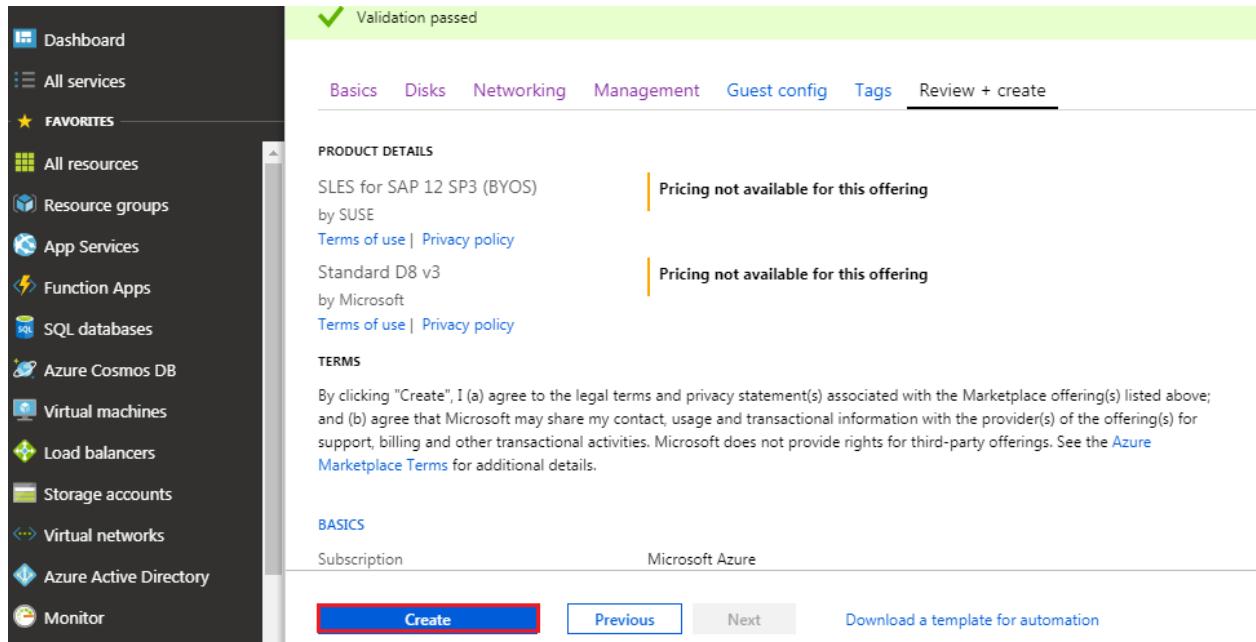
**AUTO-SHUTDOWN**

Enable auto-shutdown  Off

**Review + create**

**Previous**

**Next : Guest config >**



**2.7.** Similarly Create the “hana-worker-vm”, “hana-standby-vm”, VM’s with the following values.

<b>Vnet:</b>	<b>default Value</b>
<b>Subnet:</b>	<b>scaleout-subnet&lt;&lt;unique userid&gt;&gt;</b>
<b>Avset:</b>	<b>hana-scaleout-avset &lt;&lt;unique user id&gt;&gt;</b>

**2.8.** Create “hana-jumpbox” with (windows 2016 datacenter edition) the following values.

**Note:** **Don't include the “hana-jumpbox’ into availability set.**

<b>Vnet:</b>	<b>default Value</b>
<b>Subnet:</b>	<b>scaleout-subnet&lt;&lt;unique userid&gt;&gt;</b>
<b>Size:</b>	<b>D2 V3</b>
<b>Username:</b>	<b>dbadmin</b>
<b>Password:</b>	<b>demoPassword1!</b>
<b>Public Inbound Ports:</b>	<b>Select allowed ports</b>
<b>Select Inbound Ports:</b>	<b>RDP</b>

**Instance details**

Virtual machine name \* ⓘ

 ✓

Region \* ⓘ

 ✓

Availability options ⓘ

 ✓

Image \* ⓘ

 ✓
[Browse all public and private images](#)

Size \* ⓘ

**Standard D2 v3**

2 vcpus, 8 GiB memory

[Change size](#)
**Administrator account**

Username \* ⓘ

 ✓
**ADMINISTRATOR ACCOUNT**

\* Username ⓘ

 ✓

\* Password ⓘ

 ✓

\* Confirm password ⓘ

 ✓
**INBOUND PORT RULES**

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

\* Public inbound ports ⓘ

 None  Allow selected ports

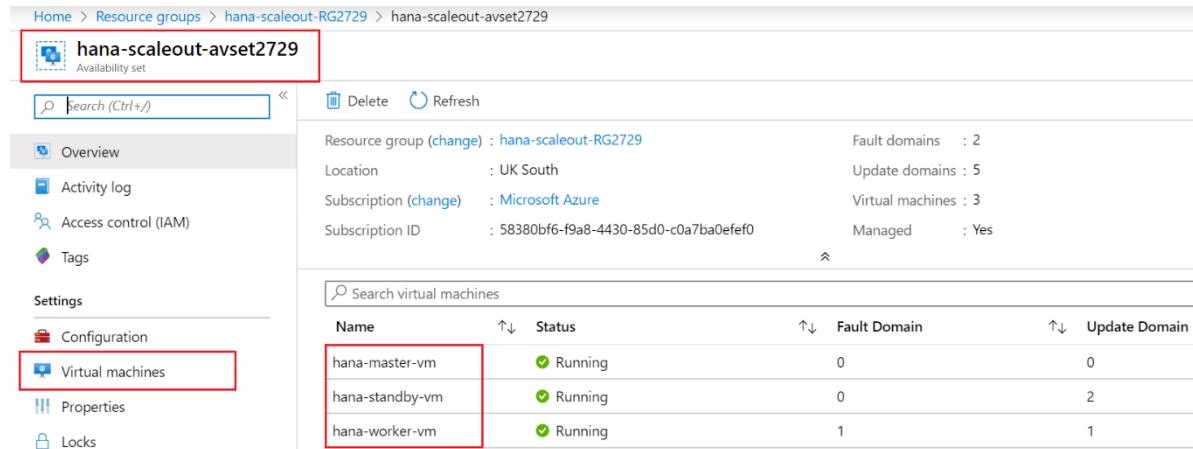
\* Select inbound ports

RDP	<input type="checkbox"/>
HTTP (80)	<input type="checkbox"/>
HTTPS (443)	<input type="checkbox"/>
SSH (22)	<input type="checkbox"/>
<b>RDP (3389)</b>	<input checked="" type="checkbox"/>

**SAVE MONEY**

Save up to 49% with a license you already own using Azure Hybrid Benefit. [Learn more](#)
[Review + create](#)
[Previous](#)
[Next : Disks >](#)
**Checkpoint:**

**Go to the Resource Group → Select the avset ( hana-scaleout-avset<<Unique User ID>>) → Virtual Machines.**



Home > Resource groups > hana-scaleout-RG2729 > hana-scaleout-avset2729

**hana-scaleout-avset2729**  
Availability set

Search (Ctrl+F)

Overview

- Activity log
- Access control (IAM)
- Tags

Settings

- Configuration
- Virtual machines**
- Properties
- Locks

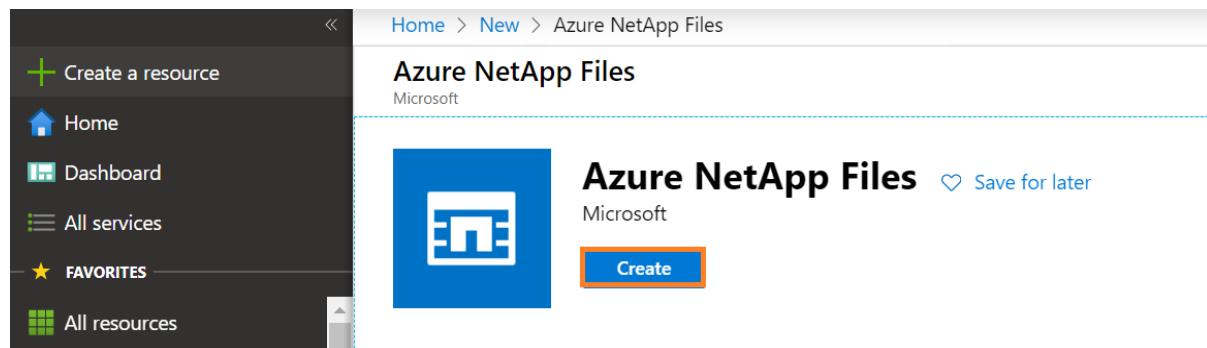
Resource group (change) : hana-scaleout-RG2729  
Location : UK South  
Subscription (change) : Microsoft Azure  
Subscription ID : 58380bf6-f9a8-4430-85d0-c0a7ba0efef0  
Fault domains : 2  
Update domains : 5  
Virtual machines : 3  
Managed : Yes

Search virtual machines

Name	Status	Fault Domain	Update Domain
hana-master-vm	Running	0	0
hana-standby-vm	Running	0	2
hana-worker-vm	Running	1	1

## Task 3: Create Azure NetApp Files.

- 1.1. Create New Create Resource → Azure NetApp Files → Create.



Home > New > Azure NetApp Files

**Azure NetApp Files**  
Microsoft

**Azure NetApp Files** Save for later

Microsoft

Create

+ Create a resource

- Home
- Dashboard
- All services
- FAVORITES
- All resources

- 1.2. Enter the below values & create.

<b>Name:</b>	<b>Azure_Netapp_Account &lt;&lt;unique user id&gt;&gt;</b>
<b>Subscription:</b>	<b>Microsoft Azure</b>
<b>Resource Group:</b>	<b>Accept default value</b>



New NetApp account

Name \*

 ✓

Subscription \*

Microsoft Azure

Resource group \*

hol\_sea\_usr\_2729  

Create new

Location \*

UK South

Create Automation options

### 1.3. Create Capacity Pools.

Resource Group → <>Default RG>> → Azure\_Netapp\_Account <<unique user id>> → Capacity Pools → Add Pool.

<b>Name:</b>	Azure_NetApp_CP <<unique user id>>
<b>Service Level:</b>	Premium
<b>Size:</b>	4 TiB



The screenshot shows the Azure NetApp Account Capacity pools page. On the left, there's a sidebar with options like Tags, Settings, Properties, Locks, Export template, Azure NetApp Files, Active Directory connections, Storage service (with Capacity pools selected), Volumes, Support + troubleshooting, and New support request. The main area shows a table with columns Name and Capacity, and a message: "You don't have any capacity pools. Click Add pool to get started." A red box highlights the "Capacity pools" link in the sidebar and the "Add pool" button. To the right, a "New capacity pool" dialog box is open, containing fields for Name (Azure\_NetApp\_CP2729), Service level (Premium), and Size (TiB) (4 TiB). An "OK" button is at the bottom right of the dialog.

1.4. Create Volumes. Select the Capacity Pool → Select Volumes → Add Volume.

<b>Volume Name:</b>	AzureNetappVolume<<unique user id>>
<b>Quota:</b>	100 GB
<b>Vnet:</b>	Accept Default Value
<b>Subnet:</b>	Accept Default Value

#### Create a volume

Basics Protocol Tags Review + create

This page will help you create an Azure NetApp Files volume in your subscription and enable you to access the volume from within your virtual network. [Learn more about Azure NetApp Files](#)

##### Volume details

Volume name \*  (highlighted by a red box)

Available quota (GiB) ⓘ 4096 (highlighted by a red box)  
4 TiB

Quota (GiB) \* ⓘ  (highlighted by a red box)  
100 GiB

Virtual network \* ⓘ  (highlighted by a red box)  
[Create new](#)

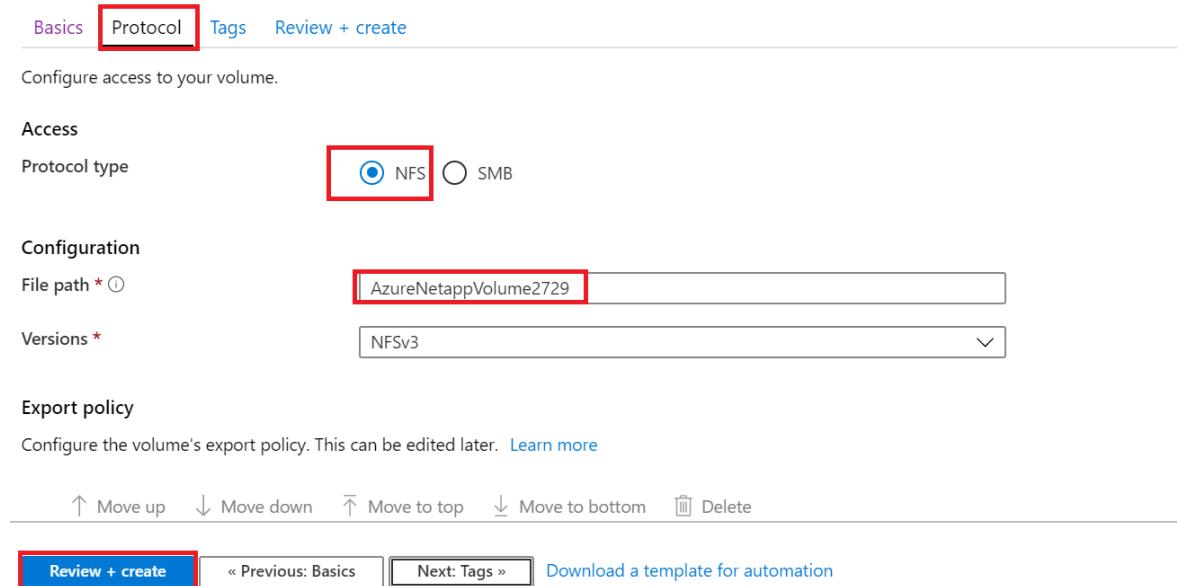
Subnet \* ⓘ

[Review + create](#)

[Next: Protocol »](#)

[Download a template for automation](#)

1.5. Select Protocol → NFS & File path AzureNetappVolume<<unique user id>>→Review & Create.



**Protocol** (highlighted)

Configure access to your volume.

**Access**

Protocol type  **NFS**  SMB

**Configuration**

File path \* **AzureNetappVolume2729**

Versions \* NFSv3

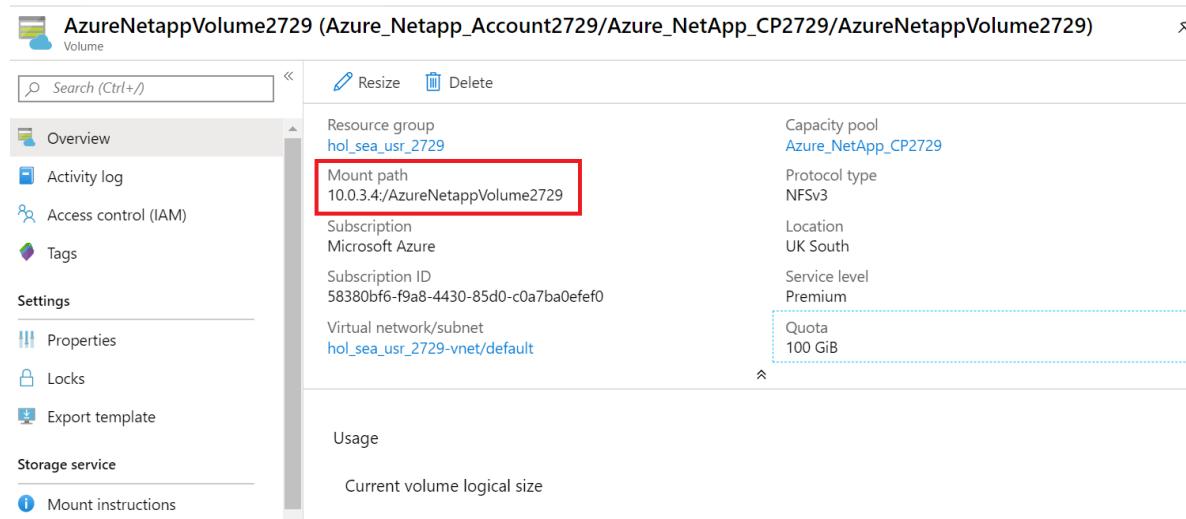
**Export policy**

Configure the volume's export policy. This can be edited later. [Learn more](#)

↑ Move up ↓ Move down ⌈ Move to top ⌋ Move to bottom ⚡ Delete

**Review + create** (highlighted) | « Previous: Basics | Next: Tags » | Download a template for automation

1.6. Check the mount path & note the same into Notepad.



**Overview**

Resource group **hol\_sea\_usr\_2729**

Mount path **10.0.3.4:/AzureNetappVolume2729**

Capacity pool **Azure\_NetApp\_CP2729**

Protocol type **NFSv3**

Location **UK South**

Service level **Premium**

Quota **100 GiB**

Search (Ctrl+ /) | Resize | Delete

Activity log | Access control (IAM) | Tags

Properties | Locks | Export template

Storage service

Mount instructions

Usage

Current volume logical size

#### Task 4: Mount Azure Netapp Files in Master Node:

4.1. Login to the VM “hana-jumpbox” with the below credentials. Go to the Portal → Select the VM “hana-jumpbox” → Networking → Public IP address.



Resource group (change)  
hol\_sea\_usr\_2729

Status  
Running

Location  
UK South

Subscription (change)  
Microsoft Azure

Subscription ID  
58380bf6-f9a8-4430-85d0-c0a7ba0fef0

Computer name  
(not available)

Operating system  
Windows

Size  
Standard D8 v3 (8 vcpus, 32 GiB memory)

Ephemeral OS disk  
N/A

Public IP address  
**51.145.25.251**

Private IP address  
10.0.3.23

Virtual network/subnet  
hol\_sea\_usr\_2729-vnet/azure-netapp2729

#### 4.2. Run → MSTSC → Public IP address <Windows Jumpbox>

Computer: **104.211.229.28**

User name: None specified

You will be asked for credentials when you connect.

Show Options Connect Help

Enter your credentials  
These credentials will be used to connect to 104.211.229.28.

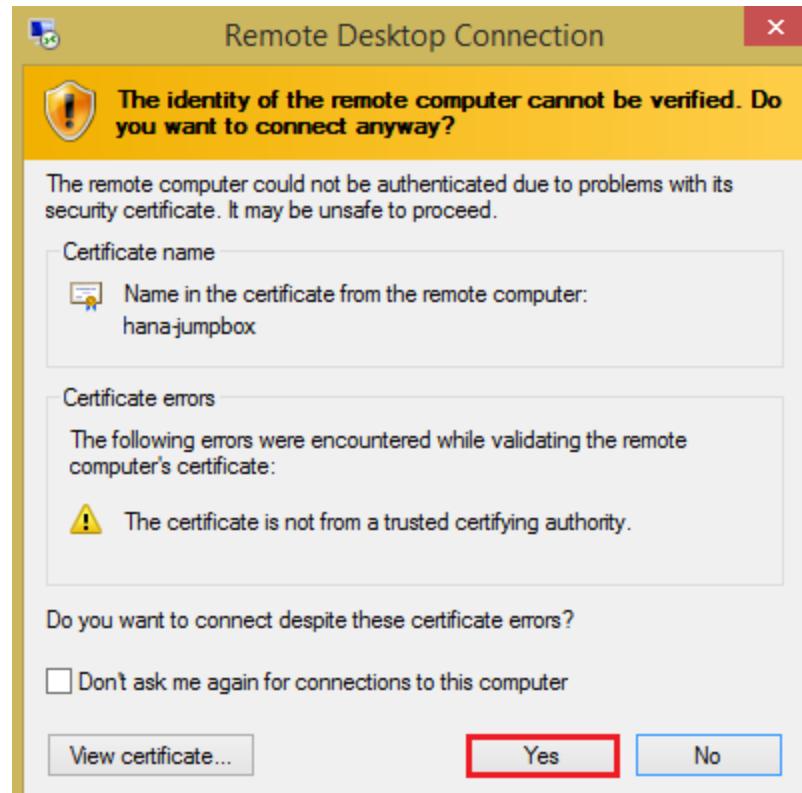
dbadmin  
.....|

Domain: PARIPORNA

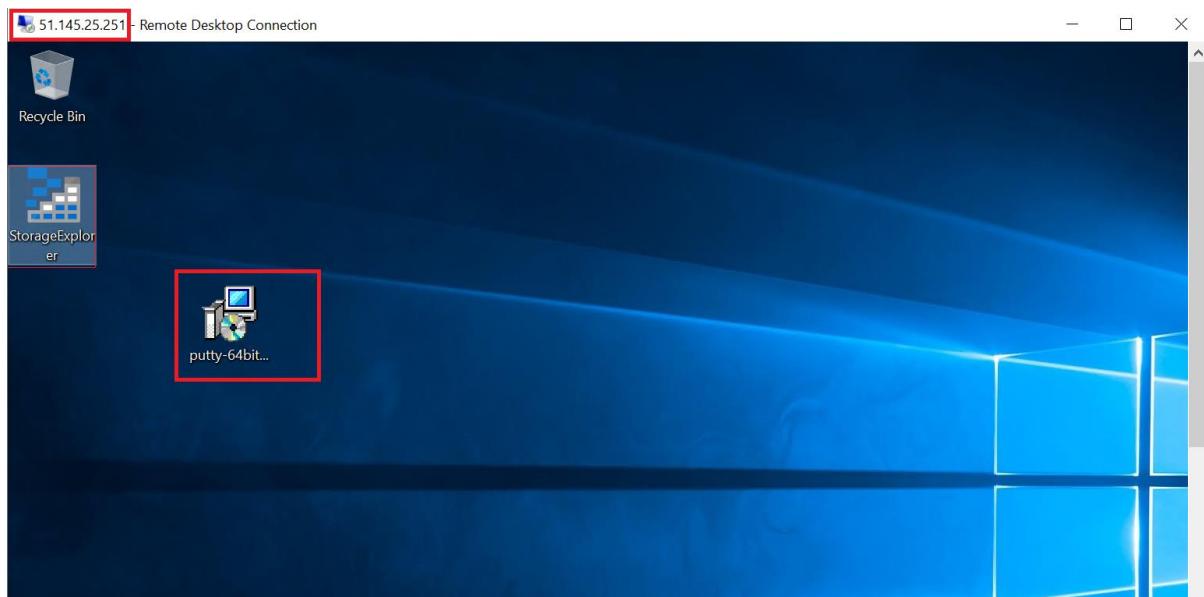
Remember my credentials

**Username: dbadmin**  
**Password: demoPassword1!**

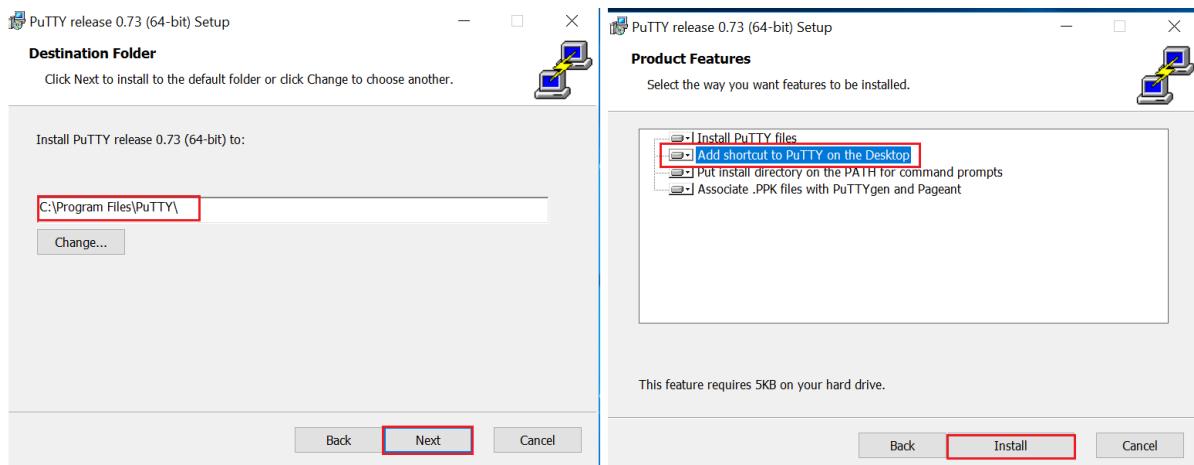
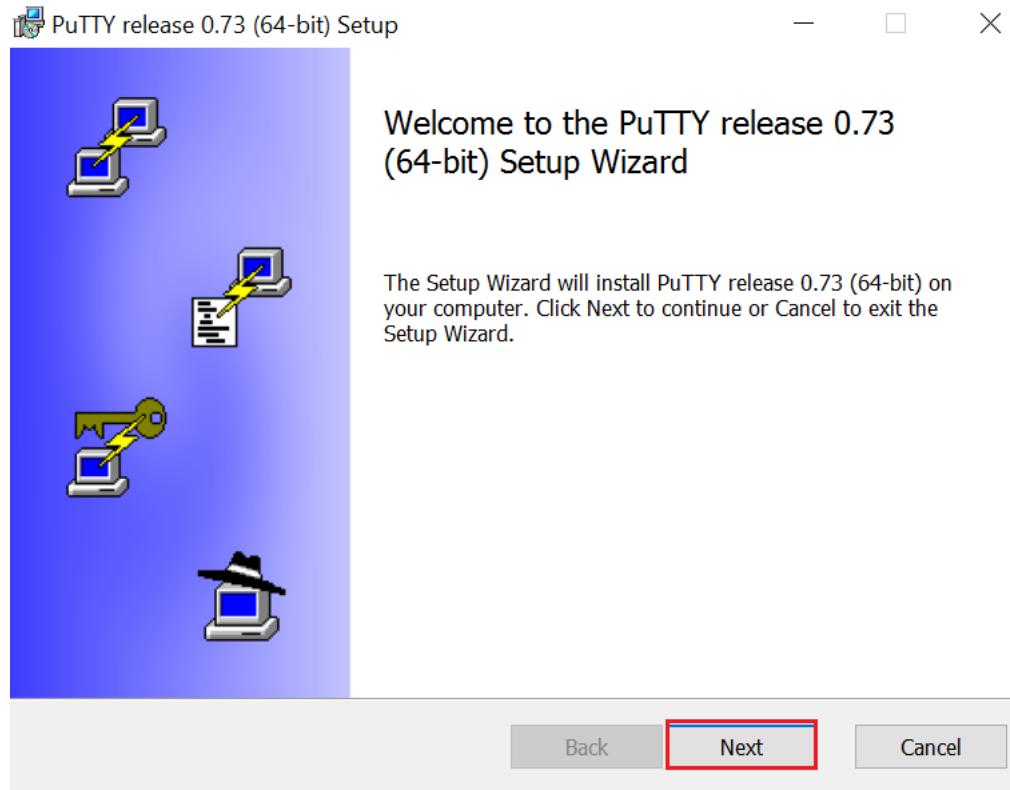
#### 3.3. Accept the Security Alert



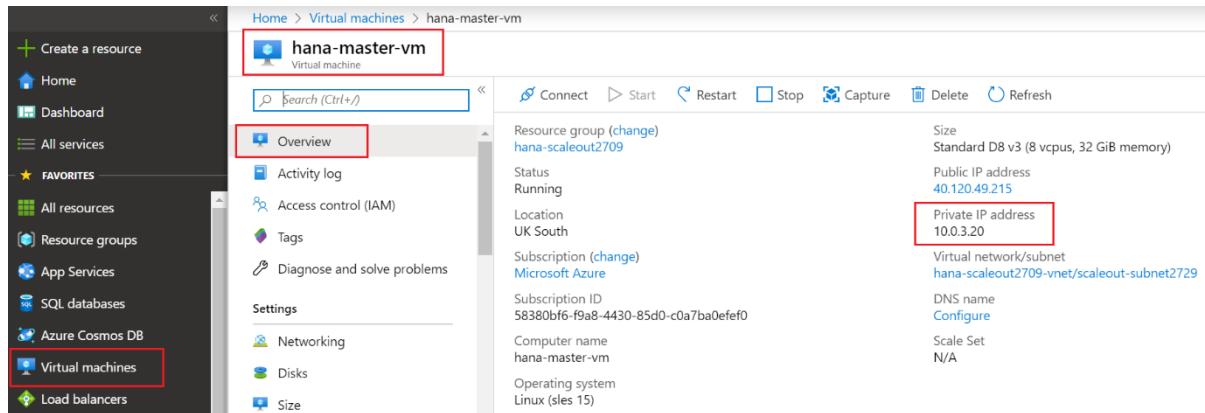
### 3.4. Copy the PuTTY & Storage Explorer from LAB computer into "hana-jumpbox".



### 3.5. Install the PuTTY in "hana-jumpbox". Double click the PuTTY exe → Click "Next" & Install.



3.6. Login to the VM “hana-master-vm” with the below credentials. Go to the Portal → Select the VM “hana-master-vm” → Overview → Private IP address.



Resource group (change)  
hana-scaleout2709

Status  
Running

Location  
UK South

Subscription (change)  
Microsoft Azure

Subscription ID  
58380bf6-f9a8-4430-85d0-c0a7ba0befef0

Computer name  
hana-master-vm

Operating system  
Linux (sles 15)

Size  
Standard D8 v3 (8 vcpus, 32 GiB memory)

Public IP address  
40.120.49.215

Private IP address  
10.0.3.20

Virtual network/subnet  
hana-scaleout2709-vnet/scaleout-subnet2729

DNS name  
[Configure](#)

Scale Set  
N/A

### 3.7. Launch PuTTY & login to the VM & accept the Security Alert.

<b>Username:</b>	<b>dbadmin</b>
<b>Password:</b>	<b>demoPassword1!</b>

### 3.8. Switch into “root” user.

<b>sudo -i</b>
----------------

```
dbadmin@hana-master-vm:~>sudo -i
```

We trust you have received the usual lecture from the local System Administrator. It usually boils down to these three things:

- #1) Respect the privacy of others.
- #2) Think before you type.
- #3) With great power comes great responsibility.

```
[sudo] password for dbadmin:  
hana-master-vm:~ #
```

### 3.9. Activate the SUSE Linux with the below command.

<b>SUSEConnect -r 4FFDCC436AEF3C -e naarayanaa.lk@paripoorna.in</b>
---

```
52.247.127.150 - PuTTY
hana-master-vm:~ # SUSEConnect -r 4FFDCC436AEF3C -e naarayanaa.lk@paripoorna.in
Registering system to SUSE Customer Center
Using E-Mail: naarayanaa.lk@paripoorna.in

Announcing system to https://scc.suse.com ...

Activating SLES_SAP 12.3 x86_64 ...
-> Adding service to system ...

Successfully registered system
```

### 3.10. Update the missing Libraries by executing the below commands. Accept the

Package installation. (Click (Y)).

**zypper update**

```
hana-master-vm:~ # zypper update
Refreshing service 'SUSE_Linux_Enterprise_Server_for_SAP_Applications_12_SP3_x86_64'.
Loading repository data...
Reading installed packages...

The following 51 NEW packages are going to be installed:
bash-completion btrfsmaintenance btrfsprogs btrfsprogs-udev-rules cantarell-fonts
cluster-md-kmp-default-4.4.180-94.103.1 crash-kmp-default crda dconf
d1m-kmp-default-4.4.180-94.103.1 dmraid
drbd-kmp-default-9.0.11+git.1e2bccdc_k4.4.180_94.103-3.14.1 gfs2-kmp-default-4.4.180-94.103.1
glib-networking glib-networking-lang glib2-lang glib2-tools graphviz-gnome grub2-snapper-plugin
grub2-systemd-sleep-plugin gsettings-backend-dconf gsettings-desktop-schemas
gsettings-desktop-schemas-lang kernel-default-4.4.180-94.103.1 kernel-firmware
libboost_system1_54_0 libboost_thread1_54_0 libbtrfs0 libburn4 libburnia-tools libdconf1 libelf0
```

```
160 packages to upgrade, 198 new, 1 to remove.
Overall download size: 255.0 MiB. Already cached: 0 B. After the operation, additional 629.4 MiB will be used.
Continue? [y/n/...? shows all options] (y): y|
```

3.11. Create directory “hana” in root directory.

**cd /**  
**mkdir hana**

3.12. Verify the directory creation by executing the below command.

**ls -l**

```
hana-master-vm:~ # cd /
hana-master-vm:/ # mkdir hana
hana-master-vm:/ # ls -l
total 104
drwxr-xr-x  2 root    root    4096 Nov 12 13:11 bin
drwxr-xr-x  5 root    root    4096 Nov 12 13:13 boot
-rw-r--r--  1 root    root     30 Jun 17 19:18 bootincluded_archives.filelist
drwxr-xr-x 19 root    root    4080 Nov 12 13:13 dev
drwxr-xr-x 110 root   root   12288 Nov 12 13:12 etc
drwxr-xr-x  2 root    root    4096 Nov 12 13:13 hana
drwxr-xr-x  3 root    root    4096 Nov 12 12:45 home
drwxr-xr-x  2 dbadmin users   4096 Feb  6 2017 kiwi-hooks
```

3.13. Enter the values in “/etc/fstab” file.

**vim /etc/fstab**  
**press “i” for the insert mode**  
**<<Azure Netapp Mount Volume>> /hana nfs rw,sync,hard,intr 0 0**  
**Press “escape” key to exit insert mode**  
**:wq <save and exit the file>**

```
51.145.3.69 - PuTTY
/dev/disk/by-uuid/4b16dd17-f545-4076-b941-953f04089a7a / ext4 defaults 1 1
/dev/disk/by-uuid/66dc9b76-c2f2-47dc-8e46-a1047399d09b /boot ext3 defaults 1 2
/dev/disk/by-uuid/824D-9996 /boot/efi vfat defaults 0 0

10.0.3.4:/AzureNetappVolume2729          /hana    nfs      rw, sync, hard, intr   0 [green]
~
```

### 3.14. Mount all devices.

**mount -a**

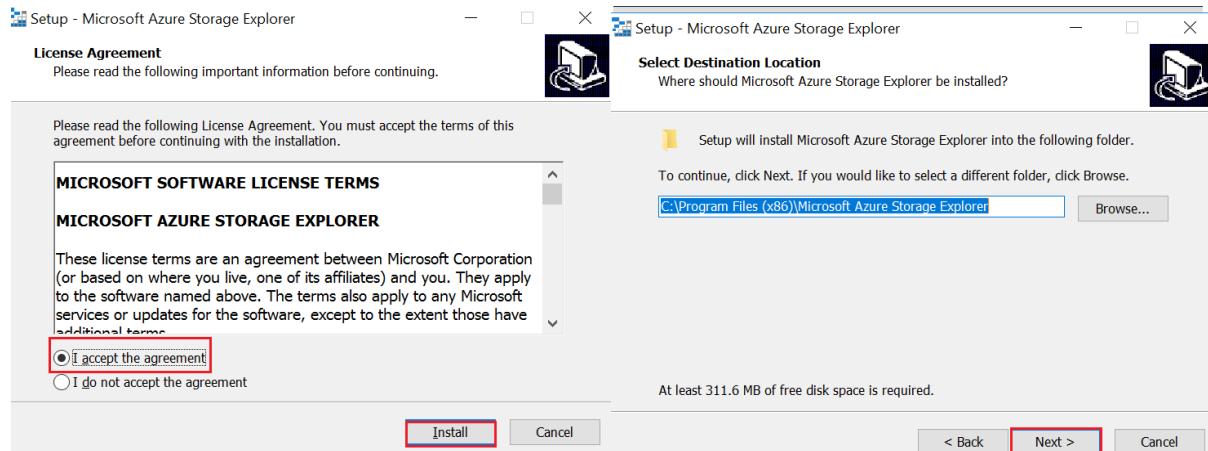
### 3.15. Verify the shared Directory mount in “hana-master-vm”

```
51.145.3.69 - PuTTY
hana-master-vm:/ # df -hT
Filesystem           Type      Size  Used Avail Use% Mounted on
devtmpfs             devtmpfs  16G   8.0K  16G   1% /dev
tmpfs                tmpfs     24G    0    24G   0% /dev/shm
tmpfs                tmpfs     16G   10M   16G   1% /run
/dev/sda4             ext4     29G   2.2G  25G   8% /
/dev/sda3             ext3     976M  102M  823M  12% /boot
tmpfs                tmpfs     16G    0    16G   0% /sys/fs/cgroup
/dev/sda2             vfat     200M  140K  200M  1% /boot/efi
/dev/sdb1             ext4     197G   60M   187G  1% /mnt/resource
tmpfs                tmpfs     3.2G    0   3.2G   0% /run/user/1000
10.0.3.4:/AzureNetappVolume2729 nfs    100T  256K  100T  1% /hana
hana-master-vm:/ # [green]
```

### 3.16. Similar way, mount the NetApp File Volume in “hana-worker-vm” & “hana-standby-vm”.

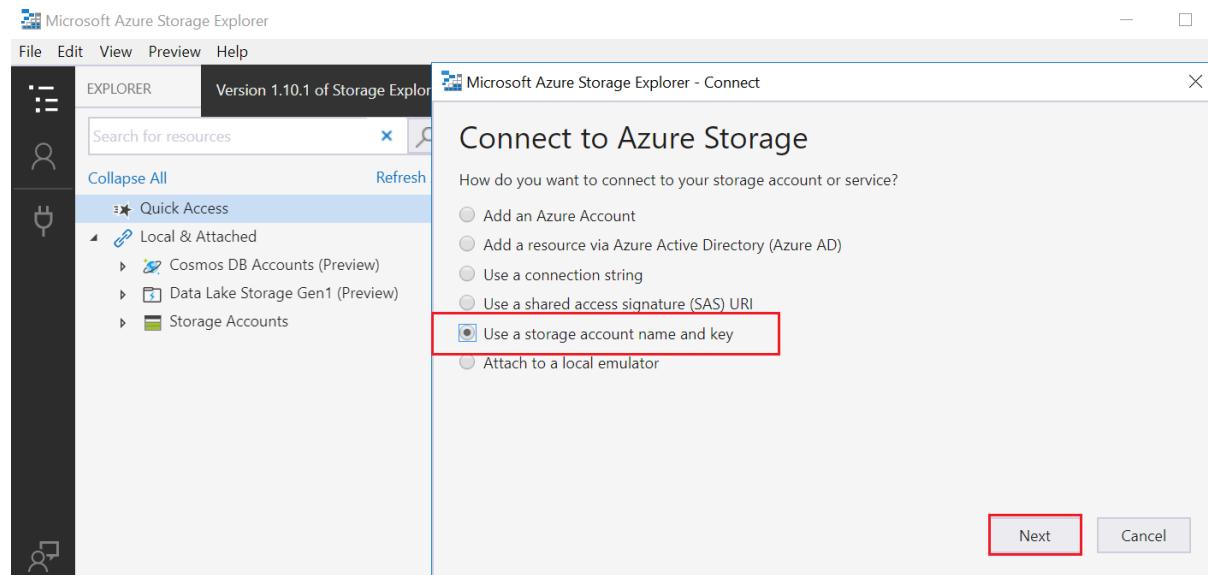
## Task 5: Install HANA Studio in Windows JumpBox

4.1. Install the Storage Explorer into Windows Jumpbox. Select the software with “run As Administrator” → Accept the License Agreement → Install → Choose the Software installation location as default, click → Next & Complete the installation.

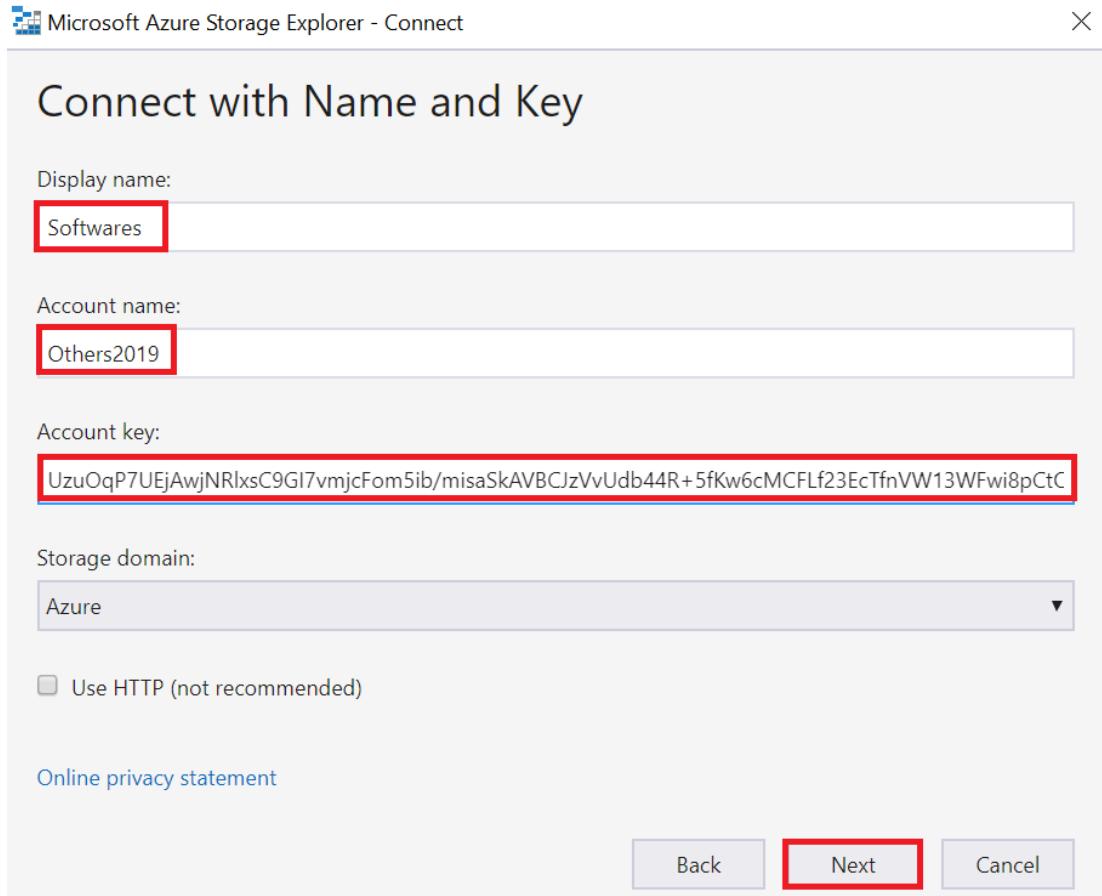


**4.2. Launch the Storage Explorer & Connect to azure Storage by using the Storage account name & key.**

**<<Please refer the attached file “Commands-HANA-Scaleout.txt” file for azure storage location>>**

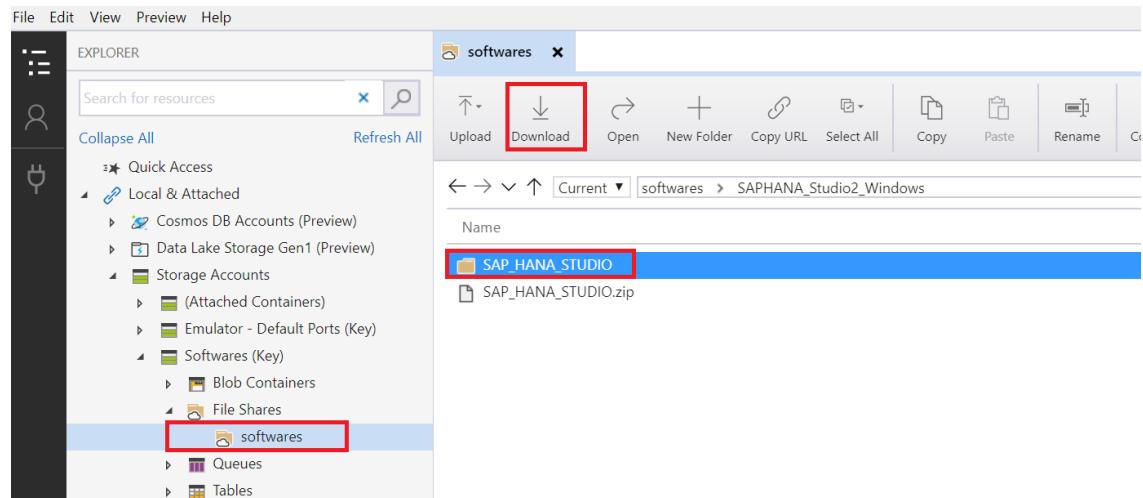


**4.3. Enter the Display Name, Storage Account Name & key values.**

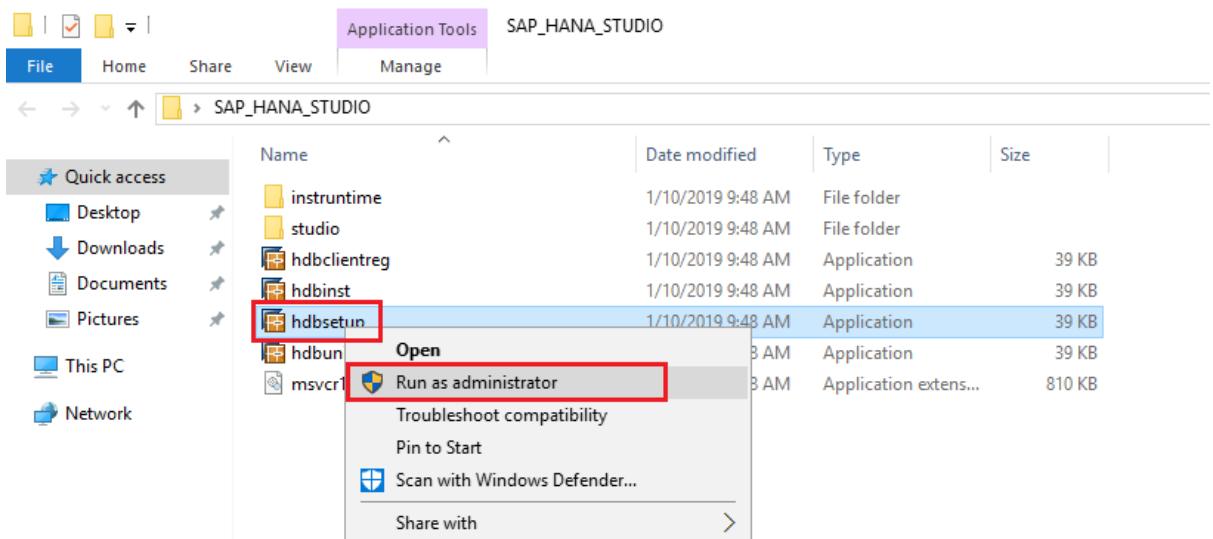


#### 4.4. Connect the Azure Storage & Download the SAP\_HANA\_Studio.

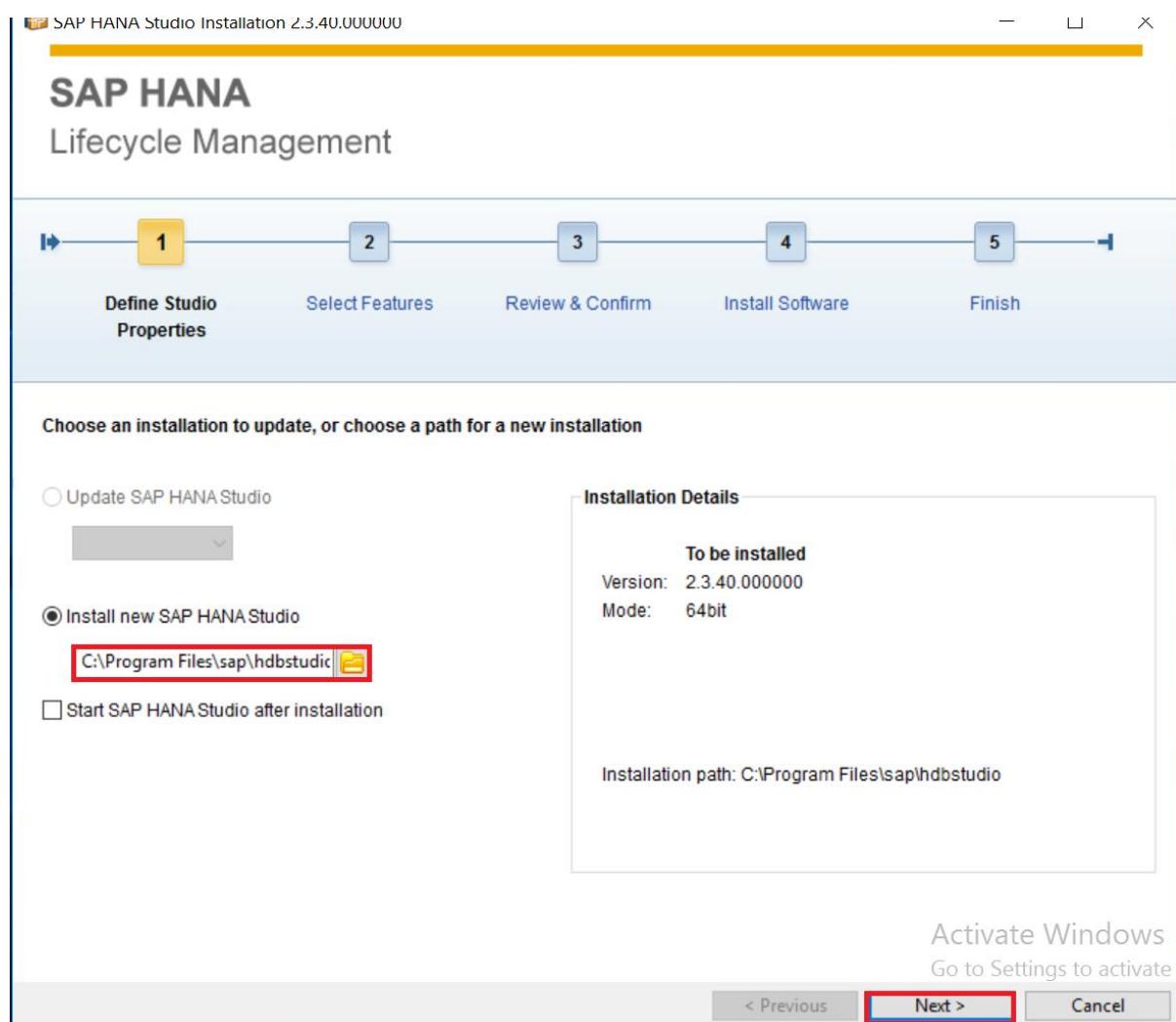
File Shares → softwares → SAPHANA\_Studio2\_Windows → SAP\_HANA\_STUDIO → Click Download.



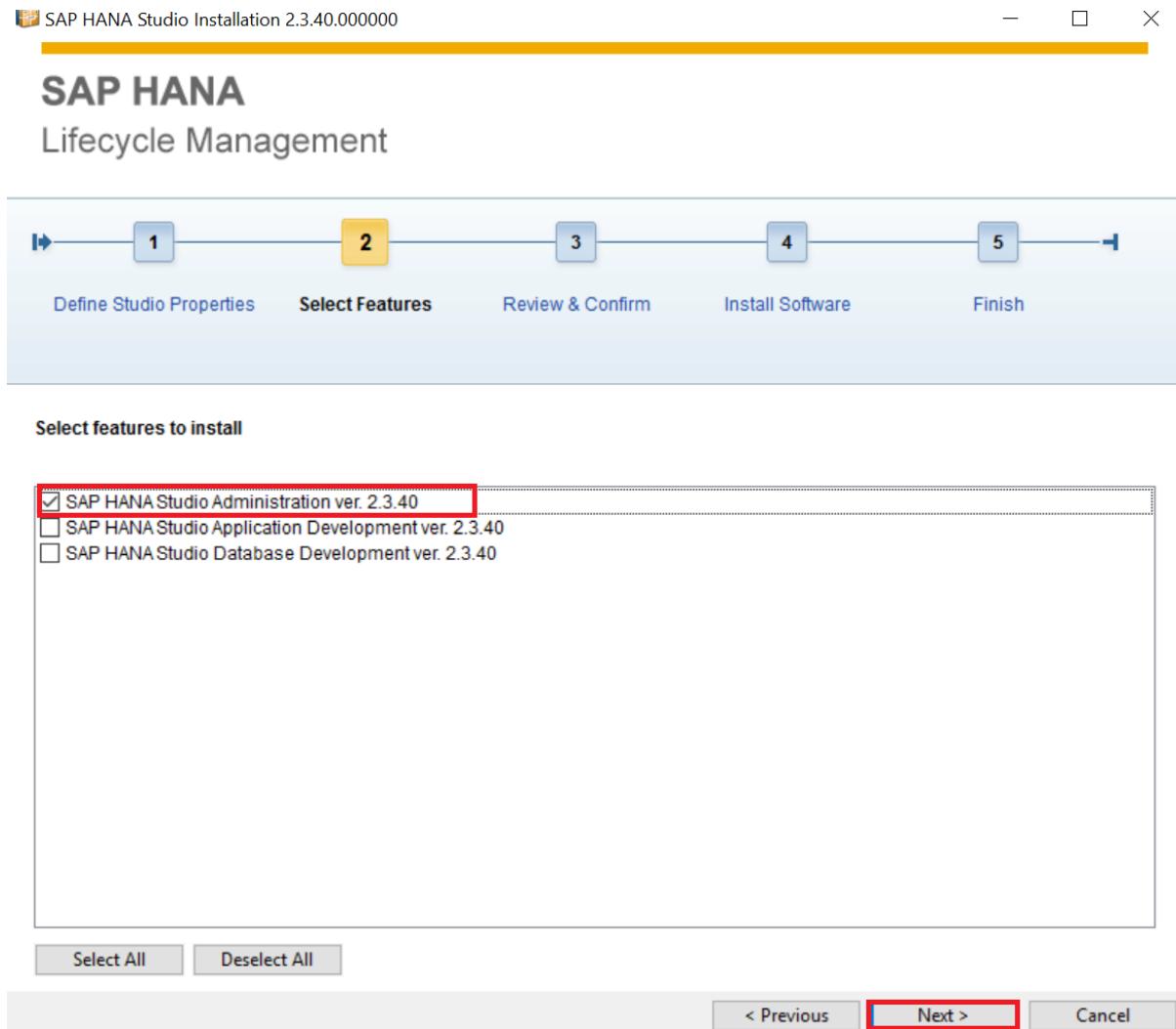
#### 4.5. Open the Downloaded Folder & Run the “hdbsetup” exe file with administrator rights,



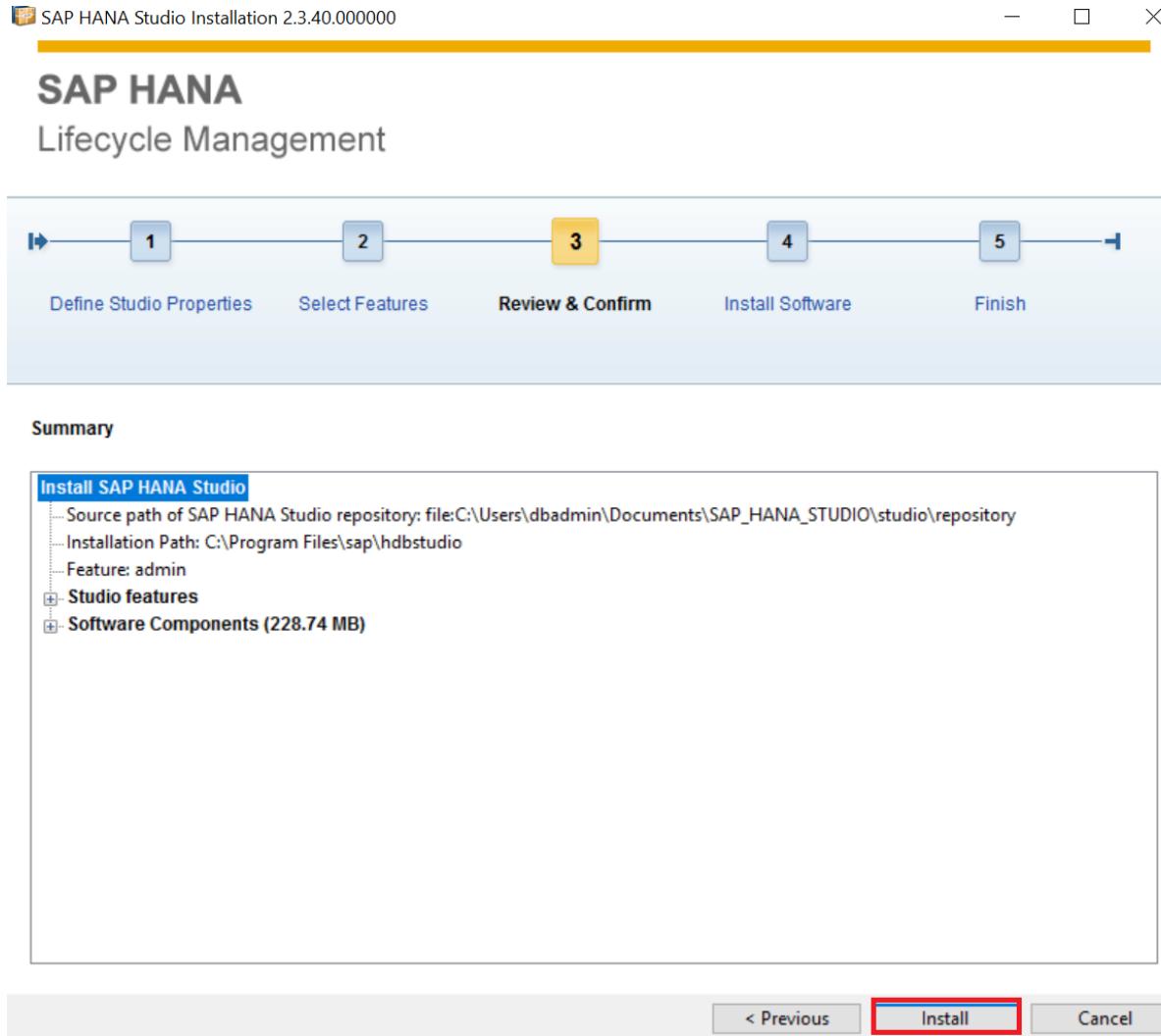
#### 4.6. On the Define Studio installation directory, click Next:



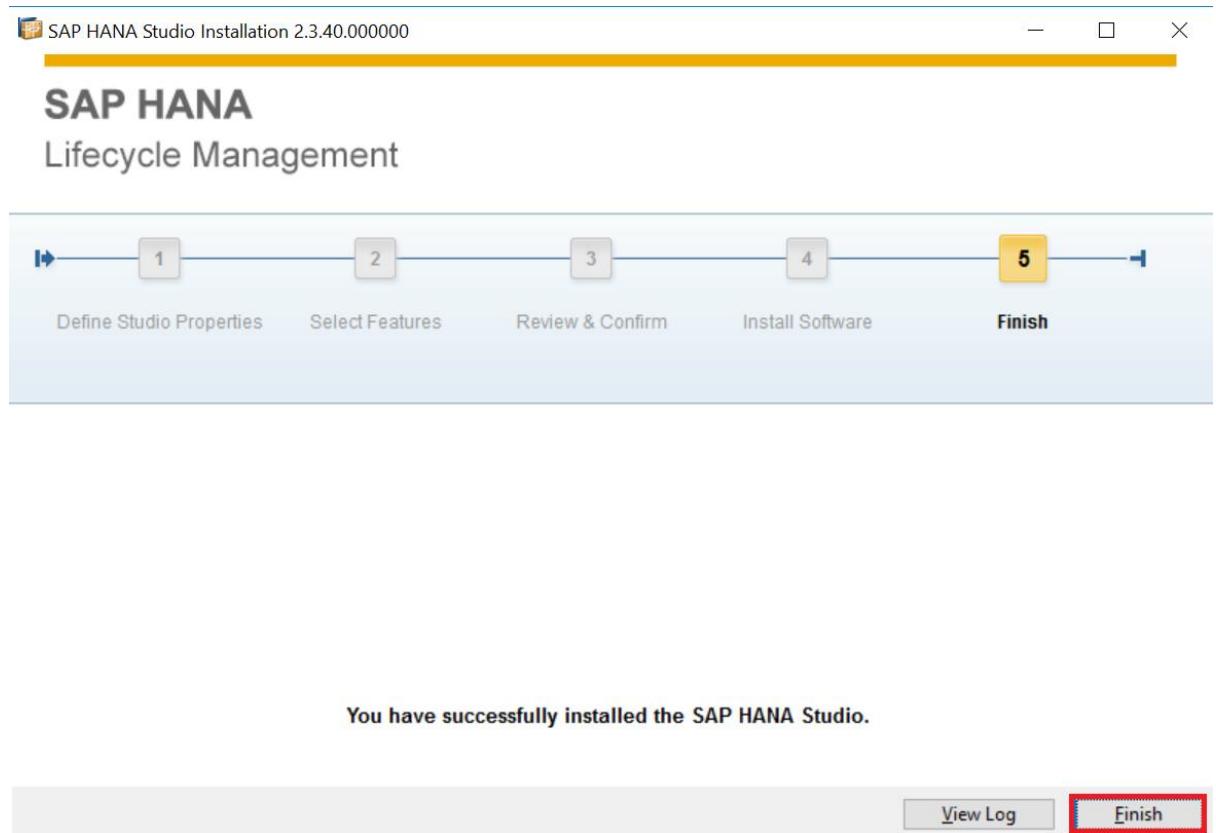
4.7. On the **Select Features** page, ensure that only **SAP HANA Studio Administration** is selected, and click **Next**



4.8. On the **Review & Confirm** page, click **Install**



4.9. On the Finish page, click Finish



### Task 6: Install HANA Database in Master Node:

- 5.1. Switch into “hana-master-vm” VM.
- 5.2. Create directory /software to mount the software packages

```
cd /
mkdir software
```

- 5.3. Verify the directory creation.

```
ls -l
```



```
hana-master-vm:/ # mkdir software
hana-master-vm:/ # ls -l
total 108
drwxr-xr-x  2 root    root    4096 Nov 12 13:11 bin
drwxr-xr-x  5 root    root    4096 Nov 12 13:13 boot
-rw-r--r--  1 root    root     30 Jun 17 19:18 bootincluded_archives fileList
drwxr-xr-x 19 root    root    4080 Nov 12 13:13 dev
drwxr-xr-x 110 root   root  12288 Nov 12 13:18 etc
drwxrwx---  2 root    root    4096 Nov 12 12:02 hana
drwxr-xr-x  3 root    root    4096 Nov 12 12:45 home
drwxr-xr-x  2 dbadmin users  4096 Feb  6 2017 kiwi-hooks
drwxr-xr-x 10 root    root    4096 Jun 17 19:18 lib
drwxr-xr-x  8 root    root    4096 Nov 12 13:12 lib64
drwxr----- 2 root    root  16384 Jun 17 19:20 lost+found
drwxr-xr-x  4 root    root    4096 Nov 12 12:45 mnt
drwxr-xr-x  2 root    root    4096 Jun 27 2017 opt
dr-xr-xr-x 206 root   root      0 Nov 12 12:44 proc
drwxr----- 4 root    root    4096 Nov 12 13:18 root
drwxr-xr-x 31 root   root    880 Nov 12 14:23 run
drwxr-xr-x  2 root    root  12288 Nov 12 13:12 sbin
drwxr-xr-x  2 root    root    4096 Jun 27 2017 selinux
drwxr-xr-x  2 root    root    4096 Nov 12 14:24 software
drwxr-xr-x  4 root    root    4096 Jun 17 19:16 srv
```

5.4. Mount the Storage account into “hana-master-vm” machine by using the below command.

<<Please refer the attached file “Commands-Day2-HOL.txt” file for azure storage location>>

5.5. Verify the Storage Account mount status

```
df -hT
```

```
hana-master-vm:/ # df -hT
Filesystem          Type  Size  Used Avail Use% Mounted on
devtmpfs            tmpfs  16G   8.0K  16G  1% /dev
tmpfs               tmpfs  24G     0   24G  0% /dev/shm
tmpfs               tmpfs  16G   18M  16G  1% /run
/dev/sda4            ext4   29G   2.2G  25G  8% /
/dev/sda3            ext3  976M  102M  823M 12% /boot
tmpfs               tmpfs  16G     0   16G  0% /sys/fs/cgroup
/dev/sda2            vfat  200M  140K  200M  1% /boot/efi
/dev/sdb1            ext4  197G   60M  187G  1% /mnt/resource
tmpfs               tmpfs   3.2G     0   3.2G  0% /run/user/1000
10.0.0.4:/AzureNetappVolume  nfs  100T  320K  100T  1% /hana
//softwareeess.file.core.windows.net/softwares cifs  100G   15G   86G  15% /software
hana-master-vm:/ #
```

5.6. Go to the directory “/software/DATA\_UNITS/HDB\_SERVER\_LINUX\_X86\_64”.

```
cd /software/DATA_UNITS/HDB_SERVER_LINUX_X86_64
```

5.7. Run the command

```
./hdblcm
```

Select option (1) → install

```

10/XSACUI5FESV344_18.zip
  XSAC XMLA Interface For Hana 1 (1.000.2) in /software/SAPHANA2SPS2/51052325/DATA_UNITS/XSA_CONTENT_10/
CXMLAINT00_2.zip
  Xsa Cockpit 1 (1.000.7) in /software/SAPHANA2SPS2/51052325/DATA_UNITS/XSA_CONTENT_10/XSACXSACOCKPIT00_
ip

Choose an action
Index | Action | Description
1 | install | Install new system
2 | extract_components | Extract components
3 | Exit (do nothing) |

Enter selected action index [3]: 1

```

Select the option (2) → Server

```

SAP HANA Database version '2.00.020.00.1500920972' will be installed.

Select additional components for installation:

Index | Components | Description
1 | all | All components
2 | server | No additional components
3 | client | Install SAP HANA Database Client version 2.2.23.1499440855
4 | studio | Install SAP HANA Studio version 2.3.27.000000
5 | smartda | Install SAP HANA Smart Data Access version 2.00.0.000.0
6 | xs | Install SAP HANA XS Advanced Runtime version 1.0.63.292045
7 | afl | Install SAP HANA AFL (incl.PAL,BFL,OFL,HIE) version 2.00.020.0000.1500932993
8 | eml | Install SAP HANA EML AFL version 2.00.020.0000.1500932993
9 | epmmds | Install SAP HANA EPM-MDS version 2.00.020.0000.1500932993

Enter comma-separated list of the selected indices [3]: 2

```

- Enter installation Path [/hana/shared]: <Enter> Accept the default Value
- Enter the Local Host Name[hana-poc-master]: <Enter> Accept the default.
- Do you want to add hosts to the system [y/n] [n]: <Enter>
- Enter SAP HANA System ID: **S03**
- Enter Instance Number [00]: accept the default
- Enter Local Host Worker Group [default]: accept the default
- Select System Usage / Enter Index [4]: 4
- Enter Location of Data Volumes [/hana/data/S03]: accept the default
- Enter Location of Log Volumes [/hana/log/S03]: accept the default
- Restrict maximum memory allocation? [n]: accept the default
- Enter Certificate Host Name for Host 'hana-master-vm' [hana-master-vm]: accept the default
- Enter SAP Host Agent User (sapadm) Password: demoPassword1!
- Confirm SAP Host Agent User (sapadm) Password: demoPassword1!
- Enter System Administrator (s03adm) Password: demoPassword1!
- Confirm System Administrator (s03adm) Password: demoPassword1!
- Enter System Administrator Home Directory [/usr/sap/S03/home]: accept the default
- Enter System Administrator Login Shell [/bin/sh]: accept the default
- Enter System Administrator User ID [1001]: accept the default
- Enter ID of User Group (sapsys) [79]: accept the default
- Enter Database User (SYSTEM) Password: demoPassword1!

- Confirm Database User (SYSTEM) Password: demoPassword1!
- Restart system after machine reboot? [n]: accept the default
- Do you want to continue: <Y>

```

ls -l /opt/sapinst/sapinst_1117/
Software Components
SAP HANA Database
  Install version 2.00.020.00.1500920972
  Location: /software/SAPHANA2SPS2/51052325/DATA_UNITS/HDB_SERVER_LINUX_X86_64/server
SAP HANA AFL (incl.PAL,BFL,OFL,HIE)
  Do not install
SAP HANA EML AFL
  Do not install
SAP HANA EPM-MDS
  Do not install
SAP HANA Database Client
  Do not install
SAP HANA Studio
  Do not install
SAP HANA Smart Data Access
  Do not install
SAP HANA XS Advanced Runtime
  Do not install

Do you want to continue? (y/n): y

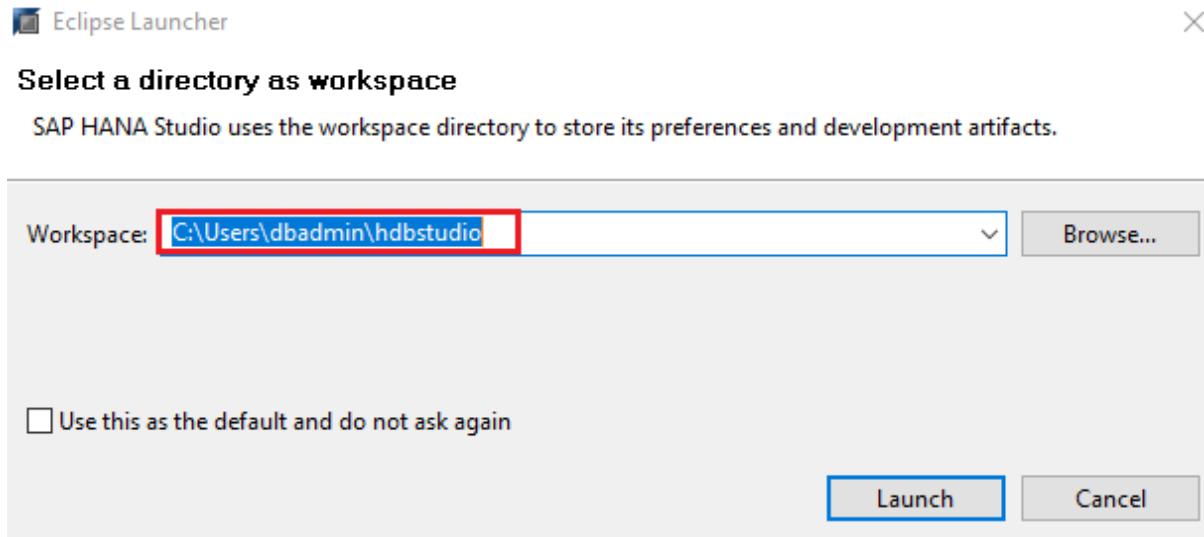
```

```

Importing delivery unit HANA_UI_INTEGRATION_SVC
Importing delivery unit HANA_UI_INTEGRATION_CONTENT
Importing delivery unit HANA_XS_BASE
Importing delivery unit HANA_XS_DBUTILS
Importing delivery unit HANA_XS_EDITOR
Importing delivery unit HANA_XS_IDE
Importing delivery unit HANA_XS_IM
Importing delivery unit HDC_ADMIN
Importing delivery unit HDC_BACKUP
Importing delivery unit HDC_IDE_CORE
Importing delivery unit HDC_SEC_CP
Importing delivery unit HDC_SYS_ADMIN
Importing delivery unit HDC_XS_BASE
Importing delivery unit HDC_XS_IM
Importing delivery unit SAPUI5_1
Importing delivery unit SAP_WATT
Importing delivery unit HANA_SEC_CP
Importing delivery unit HANA_BACKUP
Importing delivery unit HANA_HDBLCM
Importing delivery unit HANA_SEC_BASE
Importing delivery unit HANA_SYS_ADMIN
Importing delivery unit HANA_ADMIN
Importing delivery unit HANA_WKLD_ANLZ
Installing Resident hdblcm...
Updating SAP HANA Database Instance Integration on Local Host...
  Regenerating SSL certificates...
  Deploying SAP Host Agent configurations...
Creating Component List...
SAP HANA Database System installed
you can send feedback to SAP with this form: https://hana-poc-master:1129/lms1/HDBLCM.tml
Log file written to '/var/tmp/hdb_S03_hdblcm_install_2019-02-07_10.11.25/hdblcm.log'
.
hana-poc-master:/software/SAPHANA2SPS2/51052325/DATA_UNITS/HDB_SERVER_LINUX_X86_64 #

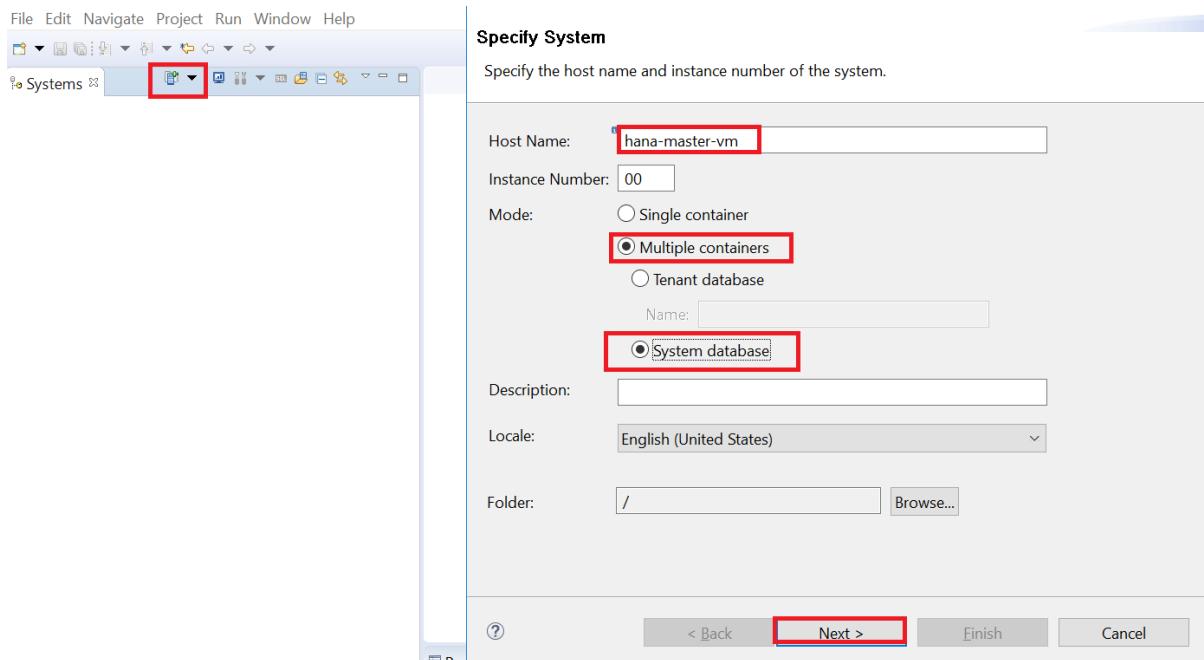
```

5.8. Checkpoint: Open the HANA Studio from the start menu. Accept the default Workspace.



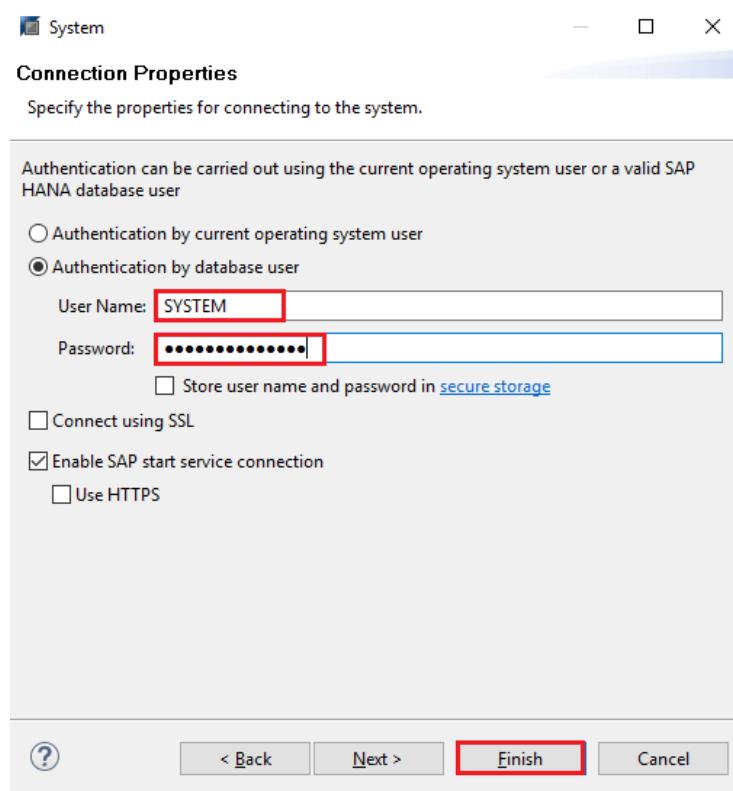
5.9. System → Add System → Enter the below Values & Click “Next”

Hostname: hana-master-vm  
 Instance: 00  
 Mode: Multi Containers → System Database

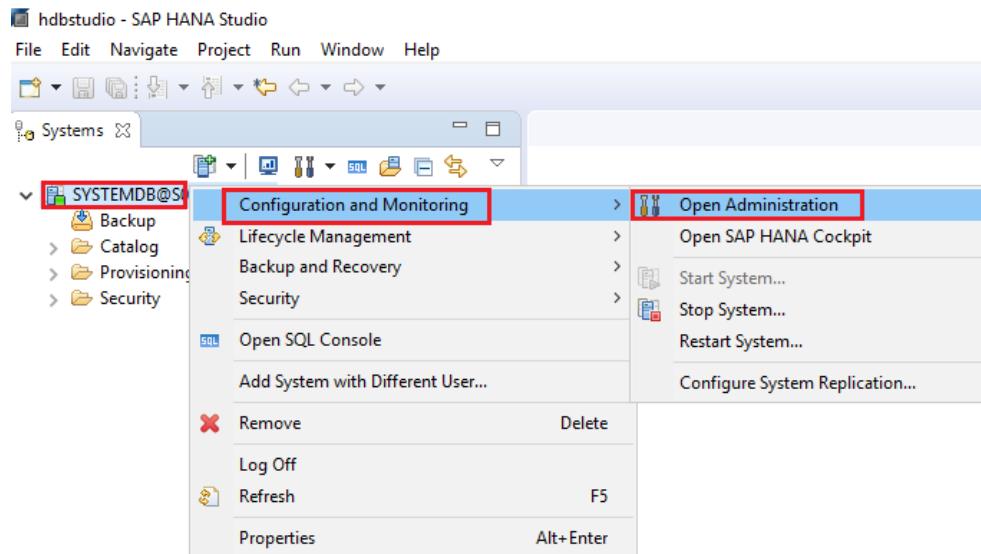


5.10. Enter the Username & Password

User:	<b>SYSTEM</b>
Password:	<b>demoPassword1!</b>

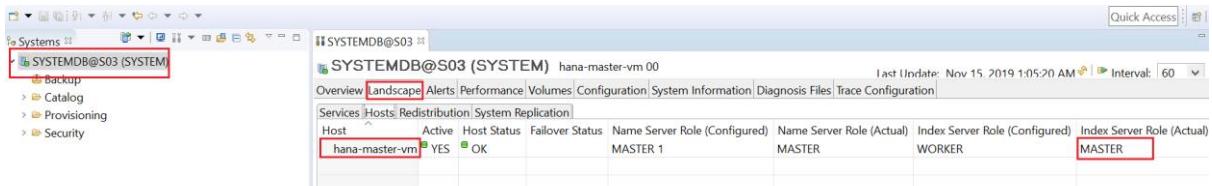


### 5.11. Right Click SystemDB → Configuration & Monitoring → Open Administration



**5.12. Click Landscape → Hosts → Check the Index Server Roles.**

Hana-master-vm:      MASTER

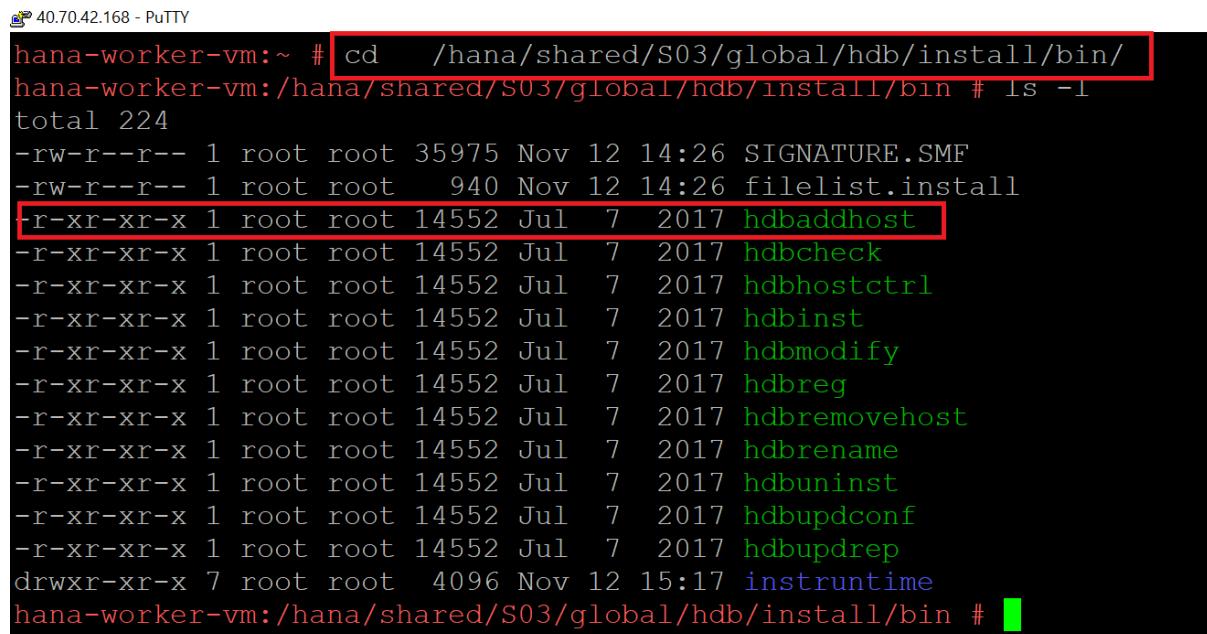


Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	YES	OK	MASTER 1	MASTER	MASTER	WORKER	MASTER

**Task 7: Add the Worker Node in Hana database:**

**6.1. Go to the Hana installed directory (Azure NetApp Volume)**

```
cd /hana/shared/S03/global/hdb/install/bin/
ls -l <list the files>
```



```
40.70.42.168 - PuTTY
hana-worker-vm:~ # cd /hana/shared/S03/global/hdb/install/bin/
hana-worker-vm:/hana/shared/S03/global/hdb/install/bin # ls -l
total 224
-rw-r--r-- 1 root root 35975 Nov 12 14:26 SIGNATURE.SMF
-rw-r--r-- 1 root root 940 Nov 12 14:26 filelist.install
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbaddhost
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbcheck
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbhostctrl
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbinst
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbmodify
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbreg
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbremovehost
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbrename
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbuninst
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbupdconf
-rwxr-xr-x 1 root root 14552 Jul 7 2017 hdbupdrep
drwxr-xr-x 7 root root 4096 Nov 12 15:17 instruntime
hana-worker-vm:/hana/shared/S03/global/hdb/install/bin #
```

**6.2.**

```
./hdbaddhost
```

Enter the Local Hostname [hana-worker-vm]:      Enter

**6.3. Add Host is Failed Error “Parameter 'listeninterface' is set to '.local'.”**

```
40.70.42.168 - PuTTY
hana-worker-vm:/hana/shared/S03/global/hdb/install/bin # ./hdbaddhost
#####
Warning: Direct usage of hdbaddhost is not supported. Use /hana/shared/S03/hdblcm/hdblcm instead
#####

SAP HANA Lifecycle Management - Database Addhost 2.2.18
*****
```

Enter Local Host Name [hana-worker-vm]:  
Add host failed  
Parameter 'listeninterface' is set to '.local'.  
Please reconfigure your master node:  
Perform 'hdbsnutil -reconfig --hostnameResolution=global' as sidadm on master node.

**6.4. Run the Following command in “hana-master-vm” node as root user.**

**su – s03adm**  
**hdbsnutil -reconfig --hostnameResolution=global**

```
52.247.127.150 - PuTTY
hana-master-vm:/software/DATA_UNITS/HDB SERVER LINUX X86 64 # su – s03adm
s03adm@hana-master-vm:/usr/sap/S03/HDB00> hdbsnutil -reconfig --hostnameResolution=global
done.
s03adm@hana-master-vm:/usr/sap/S03/HDB00>
```

**6.5. Now, add the Worker Node to Master. (Repeat the Step 6.2)**

- Enter the Local Hostname [hana-worker-vm]: Enter
- Enter System Administrator (s03adm) password: demoPassword1!
- Confirm System Administrator (s03adm) password: demoPassword1!
- Select Host Role / Enter Index [1]: Enter (accept default value)
- Enter the Host Failover Group [default]: Enter (accept default value)
- Enter Work Group [default]: Enter (accept default value)

```
hana-worker-vm:/hana/shared/S03/global/hdb/install/bin # ./hdbaddhost
#####
Warning: Direct usage of hdbaddhost is not supported. Use /hana/shared/S03/hdblcm/hdblcm instead.
#####

SAP HANA Lifecycle Management - Database Addhost 2.2.18
*****
```

Enter Local Host Name [hana-worker-vm]:  
Enter System Administrator (s03adm) Password:  
Confirm System Administrator (s03adm) Password:

Index	Host Role	Description
1	worker	Host is used for database processing
2	standby	Host is idle and available for failover of database processing



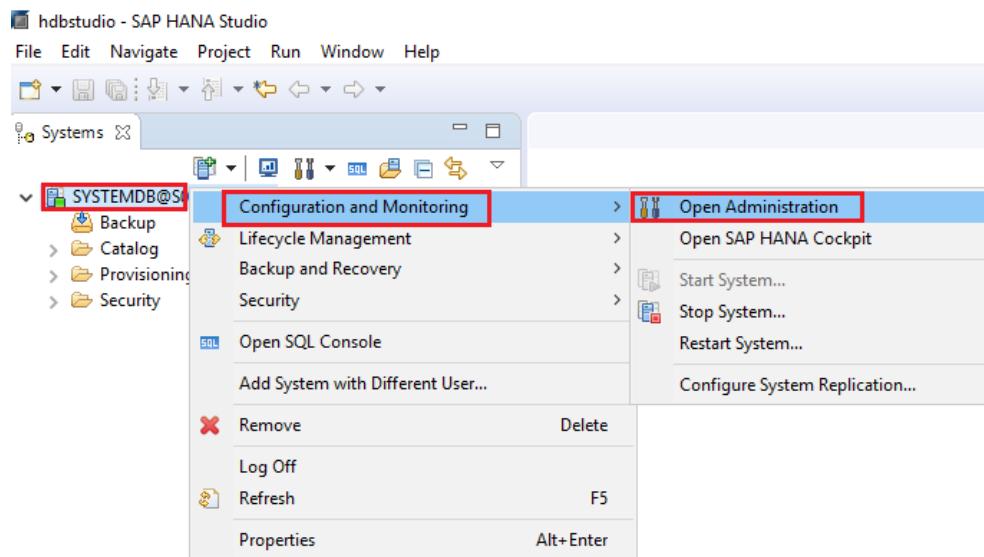
```
Select Host Role / Enter Index [1]: 1
Additional input for parameter 'Host Role'? (y/n):
Invalid input "". Please type "y" or "n": n

Enter Host Failover Group [default]:
Enter Worker Group [default]:

Summary before execution:
  Installation Path: /hana/shared
  SAP HANA System ID: S03
  Local Host Name: hana-worker-vm
  Host Role: worker
  Host Failover Group: default
  Worker Group: default

Do you want to continue? (y/n) : y
```

6.6. After the Master, Worker host addition, Check the Node status in HANA Studio. Right Click SystemDB → Configuration & Monitoring → Open Administration



6.7. Click Landscape → Hosts → Check the Index Server Roles.

Hana-master-vm: MASTER

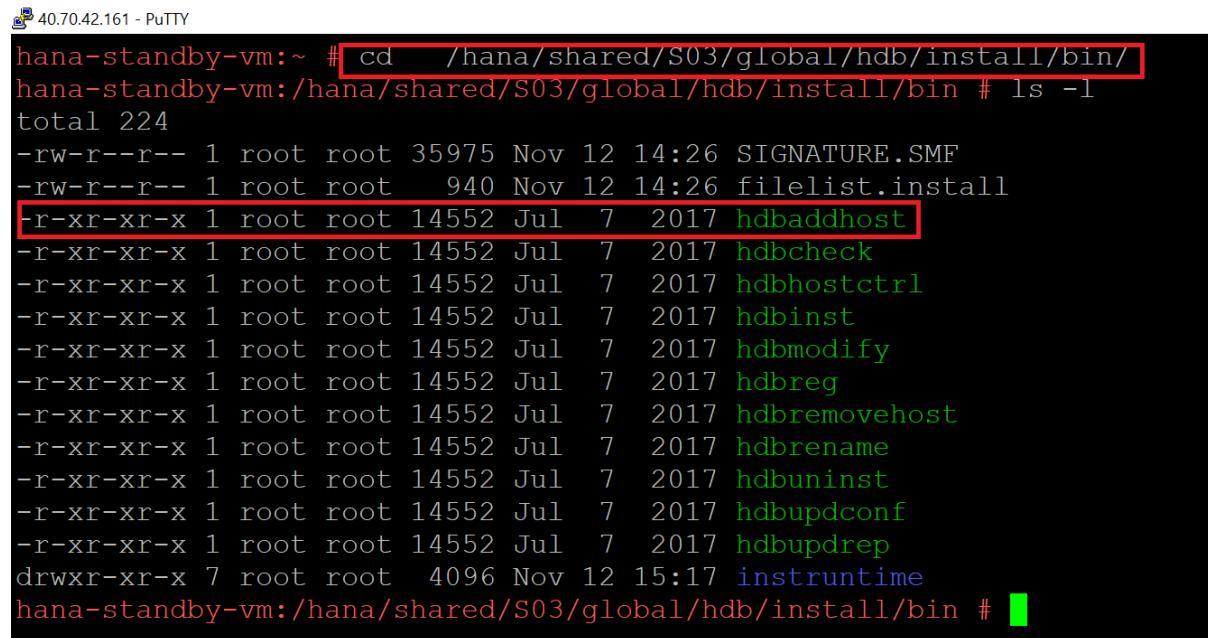
Hana-worker-vm: SLAVE

SYSTEMDB@S03 (SYSTEM) hana-master-vm 00						
Last Update: Nov 12, 2019 4:51:53 PM   Interval: 60						
Overview   Landscape   Alerts   Performance   Volumes   Configuration   System Information   Diagnosis Files   Trace Configuration						
Service   Hosts   Redistribution   System Replication						
Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)
hana-master-vm	YES	OK		MASTER 1	MASTER	MASTER
hana-worker-vm	YES	OK		MASTER 2	SLAVE	SLAVE

## Task 8: Add the Standby Node in Hana database:

### 7.1. Go to the Hana installed directory (Azure NetApp Volume)

```
cd /hana/shared/S03/global/hdb/install/bin/  
ls -l
```



```
40.70.42.161 - PuTTY  
hana-standby-vm:~ # cd /hana/shared/S03/global/hdb/install/bin/  
hana-standby-vm:/hana/shared/S03/global/hdb/install/bin # ls -l  
total 224  
-rw-r--r-- 1 root root 35975 Nov 12 14:26 SIGNATURE.SMF  
-rw-r--r-- 1 root root 940 Nov 12 14:26 filelist.install  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbaddhost  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbcheck  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbhostctrl  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbinst  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbmodify  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbreg  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbremovehost  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbrename  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbuninst  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbupdconf  
-r-xr-xr-x 1 root root 14552 Jul 7 2017 hdbupdrep  
drwxr-xr-x 7 root root 4096 Nov 12 15:17 instruntime  
hana-standby-vm:/hana/shared/S03/global/hdb/install/bin #
```

### 7.7.

```
./hdbaddhost
```

- Enter the Local Hostname [hana-standby-vm]: Enter
- Enter System Administrator (s03adm) password: demoPassword1!
- Confirm System Administrator (s03adm) password: demoPassword1!
- Select Host Role / Enter Index [1]: **Enter 2**
- Additional input for parameter 'Host Role'(y/n): "**n**"
- Enter the Host Failover Group [default]: Enter (accept default value)
- Enter Work Group [default]: Enter (accept default value)
- Do you want to continue? (y/n): **"y"**



```
hana-standby-vm:/hana/shared/S03/global/hdb/install/bin # ./hdbaddhost
#####
Warning: Direct usage of hdbaddhost is not supported. Use /hana/shared/S03/hdblcm/hdblcm instead.
#####

SAP HANA Lifecycle Management - Database Addhost 2.2.18
*****
```

Enter Local Host Name [hana-standby-vm]:  
Enter System Administrator (s03adm) Password:  
Confirm System Administrator (s03adm) Password:

Index	Host Role	Description
1	worker	Host is used for database processing
2	standby	Host is idle and available for failover of database processing
3	extended_storage_worker	Host is used for Dynamic Tiering
4	extended_storage_standby	Host is idle and available for failover of Dynamic Tiering
5	ets_worker	Host is used for the Accelerator for SAP ASE

```
Select Host Role / Enter Index [1]: 2
Additional input for parameter 'Host Role'? (y/n): n
```

```
Enter Host Failover Group [default]:
Enter Worker Group [default]:
```

```
Summary before execution:
```

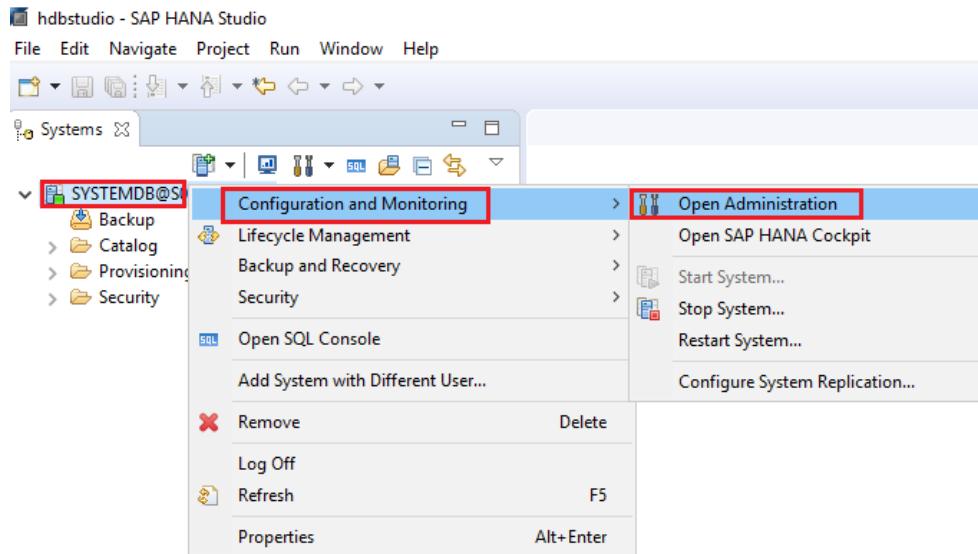
```
Installation Path: /hana/shared
SAP HANA System ID: S03
Local Host Name: hana-standby-vm
Host Role: standby
Host Failover Group: default
Worker Group: default
```

```
Do you want to continue? (y/n): y
```

```
Do you want to continue? (y/n): y
Checking master nameserver
Add new host 'hana-standby-vm' to SAP HANA Database system 'S03'
Adding host 'hana-standby-vm' to instance '00'...
    hdbnsutil: adding host hana-standby-vm to distributed landscape with role=standby, group=default
...
Starting SAP HANA Database...
Starting 1 process on host 'hana-standby-vm' (standby):
    Starting on 'hana-standby-vm': hdbdaemon
Starting 4 processes on host 'hana-standby-vm' (standby):
    Starting on 'hana-standby-vm': hdbcopieserver, hdbnameserver, hdbpreprocessor
    Starting on 'hana-standby-vm': hdbdaemon, hdbwebdispatcher
    All server processes started on host 'hana-standby-vm' (standby).
Starting services...
    All server processes started on host 'hana-standby-vm'.
hdbaddhost done
Log file written to '/var/tmp/hdb_S03_addhost_2019-11-12_17.42.09/hdbaddhost.log' on host 'hana-standby-vm'.
```

7.8. Now, Check in HANA Studio in Windows JumpBox.

SystemDB → Configuration & Monitoring → Open Administration

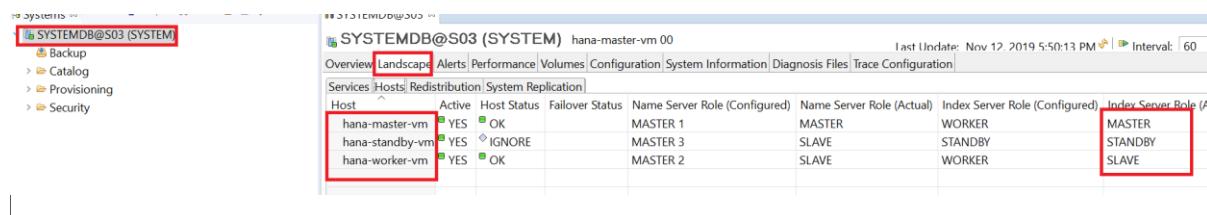


7.9. Click Landscape → Hosts → Check the Index Server Roles.

hana-master-vm: MASTER

hana-worker-vm: SLAVE

hana-standby-vm: STANDBY



Host	Active	Host Status	Failover Status	Name	Server Role (Configured)	Name	Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	YES	OK		MASTER 1	MASTER	WORKER		MASTER	MASTER
hana-standby-vm	YES	IGNORE		MASTER 3	SLAVE	STANDBY		STANDBY	STANDBY
hana-worker-vm	YES	OK		MASTER 2	SLAVE	WORKER		SLAVE	SLAVE

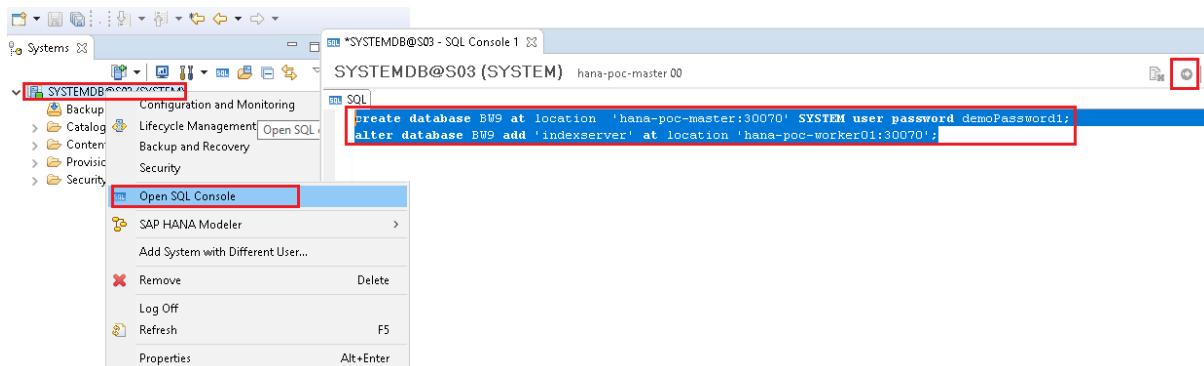
### Exercise 3: Tenant Distribution

Task 1: Create Tenant database “BW9” in Distribution mode:

1.1. Open the SQL console. (Right click → SYSTEMDB → Open SQL Console) & Execute the given script (which is in text document).

```
create database BW9 at location 'hana-master-vm:30070' SYSTEM user password demoPassword1;
alter database BW9 add 'indexserver' at location 'hana-worker-vm:30070';
```

## 1.2. Creating the Tenant database “BW9” with the username “SYSTEM” with the password “demoPassword1”



The screenshot shows the SAP HANA Studio interface. In the left sidebar, under the 'Systems' section, 'SYSTEMDB@S03' is selected. A context menu is open over this entry, with 'Open SQL Console' highlighted. The main window displays an SQL console titled 'SYSTEMDB@S03 (SYSTEM)'. The SQL command entered is:

```
create database BW9 at location 'hana-poc-master:30070' SYSTEM user password demoPassword1;
alter database BW9 add 'indexserver' at location 'hana-poc-worker01:30070';
```

Below the SQL window, the execution results are shown:

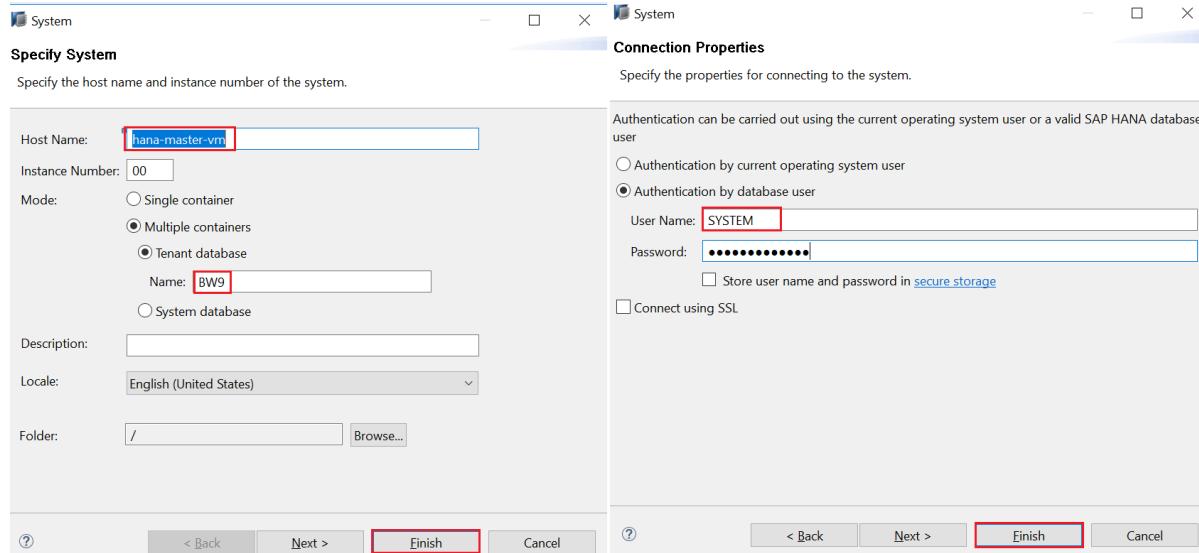
```
Statement [create database BW9 at location 'hana-poc-master:30070' SYSTEM user password demoPassword1] successfully executed in 2:07.987 minutes (server processing time: 2:07.986 minutes) - Rows Affected: 0

Statement [alter database BW9 add 'indexserver' at location 'hana-poc-worker01:30070'] successfully executed in 53.585 seconds (server processing time: 53.584 seconds) - Rows Affected: 0
Duration of 2 statements: 3:01.573 minutes
```

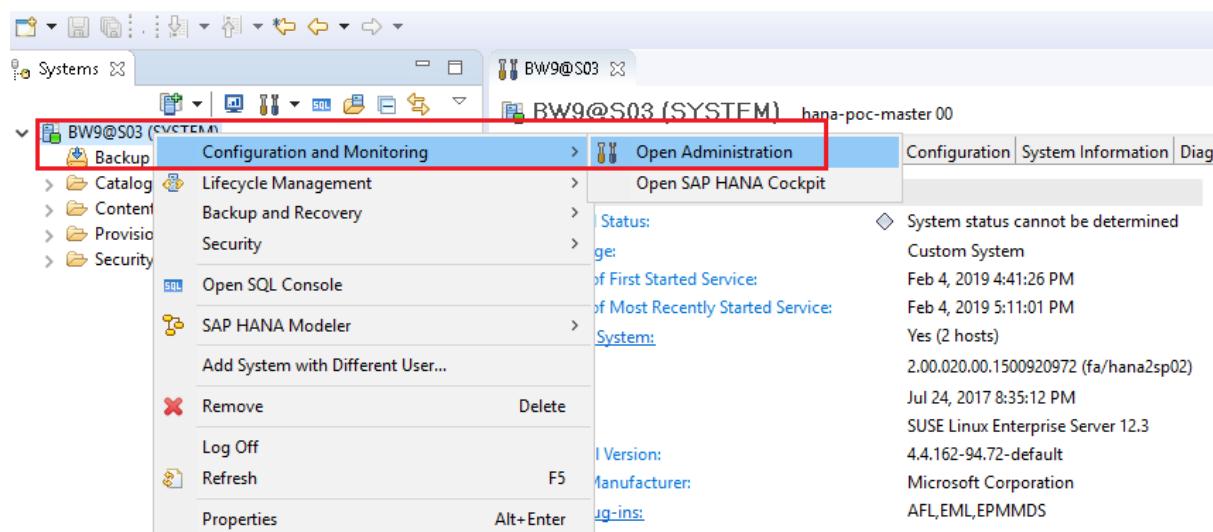
## Task 2: Verify the Tenant Distribution “BW9”

### 2.1. Connect the BW9 Tenant database with the below details.

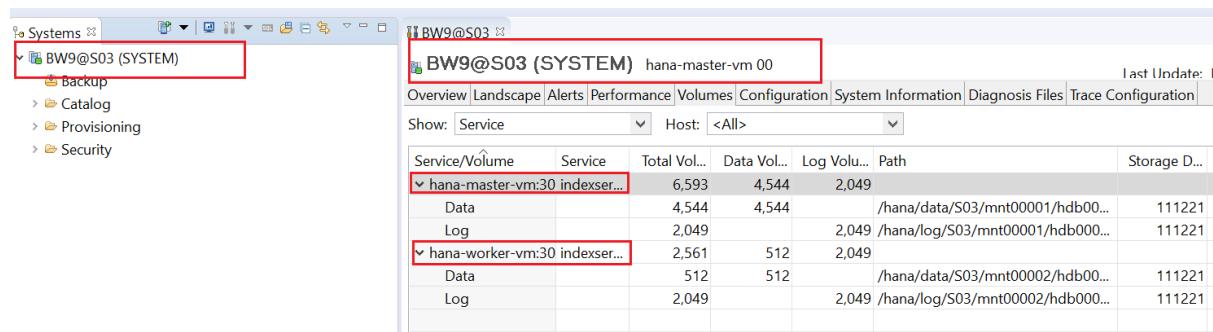
<b>Hostname:</b>	<b>hana-master-vm</b>
<b>Tenant DB:</b>	<b>BW9</b>
<b>Username:</b>	<b>SYSTEM</b>
<b>Password:</b>	<b>demoPassword1</b>



## 2.2. Right click database “BW9” → Configuring & Monitoring → Open Administration



## 2.3. Click Volumes → we can see the distributed database “BW9”.

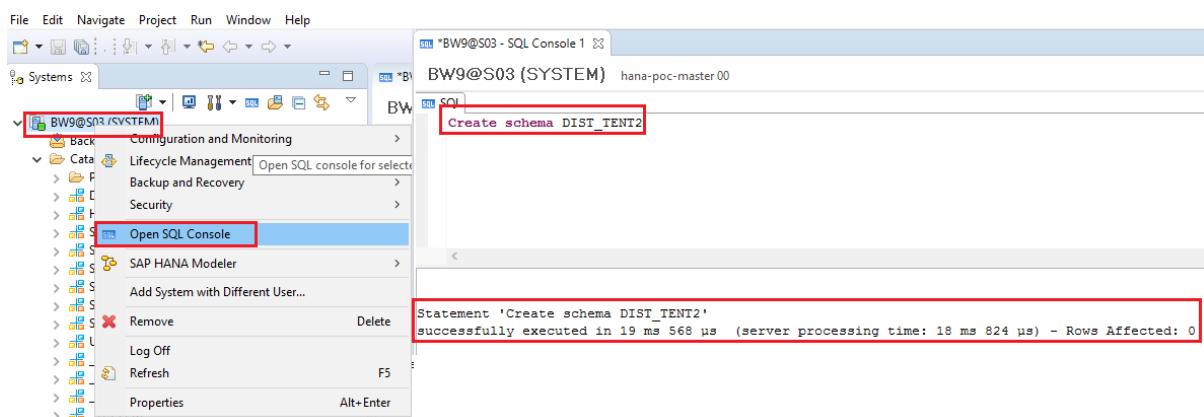


## Exercise 4: Table Distribution & Partition

### Task 1: Table Distribution by Range

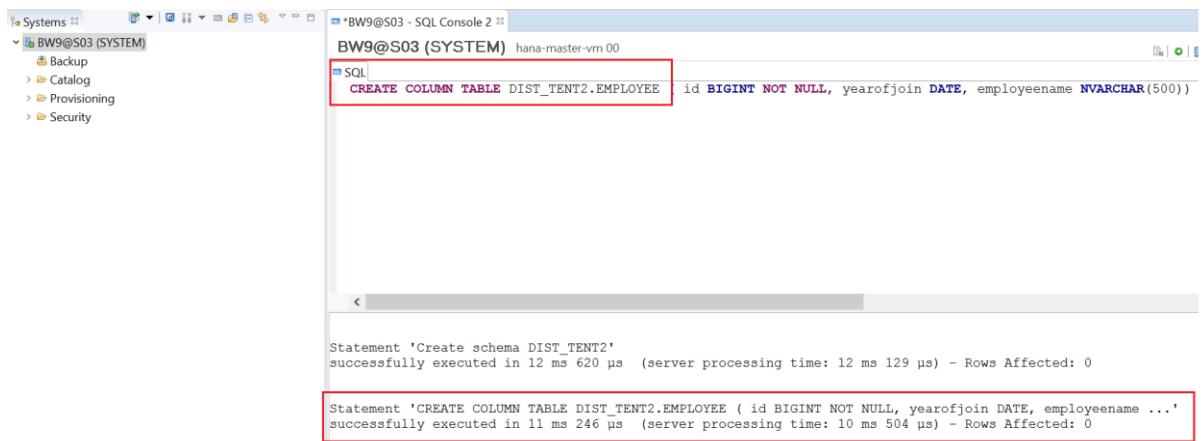
- 1.1. Create Schema “DIST\_TENT2” in Tenant DB “BW9”. For that Open SQL Console & Execute the attached Script.

**Create schema DIST\_TENT2**



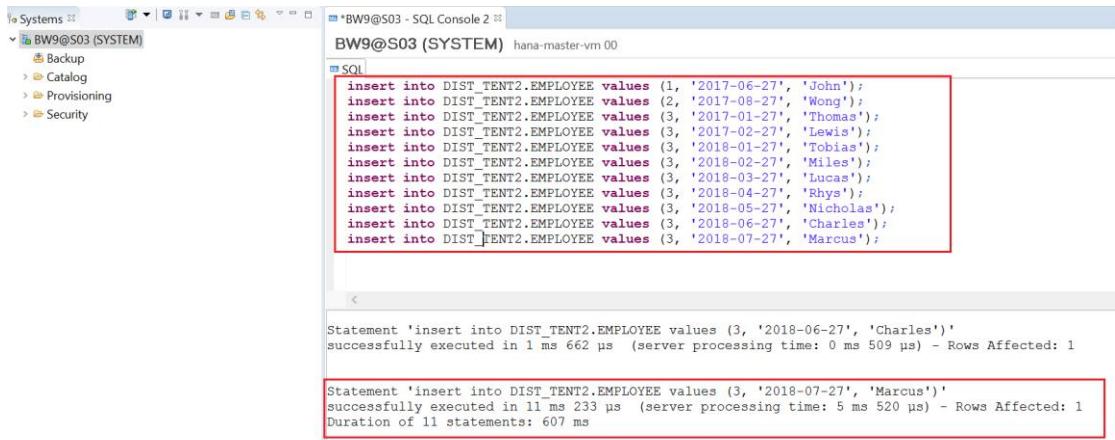
- 1.2. Execute the below script to create a column table with partition based on a date column.

<<Please refer the attached file “Commands-HANA-Scaleout.txt” file for column table creation>>



- 1.3. Insert the values into the Table.

<<Please refer the attached file “Commands-HANA-Scaleout.txt” file to insert the values>>



The screenshot shows the SAP HANA Studio interface. On the left, there's a tree view under 'Systems' for 'BW9@S03 (SYSTEM)' with nodes like 'Backup', 'Catalog', 'Provisioning', and 'Security'. On the right, there's a 'SQL' tab in a 'BW9@S03 - SQL Console 2' window. The SQL code consists of multiple 'INSERT INTO DIST\_TENT2.EMPLOYEE' statements. The output shows two successful insertions:

```

insert into DIST_TENT2.EMPLOYEE values (1, '2017-06-27', 'John');
insert into DIST_TENT2.EMPLOYEE values (2, '2017-08-27', 'Wong');
insert into DIST_TENT2.EMPLOYEE values (3, '2017-01-27', 'Thomas');
insert into DIST_TENT2.EMPLOYEE values (3, '2017-02-27', 'Lewis');
insert into DIST_TENT2.EMPLOYEE values (3, '2018-01-27', 'Tobias');
insert into DIST_TENT2.EMPLOYEE values (3, '2018-02-27', 'Miles');
insert into DIST_TENT2.EMPLOYEE values (3, '2018-03-27', 'Lucas');
insert into DIST_TENT2.EMPLOYEE values (3, '2018-04-27', 'Rhys');
insert into DIST_TENT2.EMPLOYEE values (3, '2018-05-27', 'Nicholas');
insert into DIST_TENT2.EMPLOYEE values (3, '2018-06-27', 'Charles');
insert into DIST_TENT2.EMPLOYEE values (3, '2018-07-27', 'Marcus');

Statement 'insert into DIST_TENT2.EMPLOYEE values (3, '2018-06-27', 'Charles')' successfully executed in 1 ms 662 µs (server processing time: 0 ms 509 µs) - Rows Affected: 1
Statement 'insert into DIST_TENT2.EMPLOYEE values (3, '2018-07-27', 'Marcus')' successfully executed in 11 ms 233 µs (server processing time: 5 ms 520 µs) - Rows Affected: 1
Duration of 11 statements: 607 ms

```

## Exercise 5: Failover & Failback

### Task 1: Failover & Failback (Between Worker & Standby node)

- 1.1. Stop the HDB service in “hana-worker-vm” node.

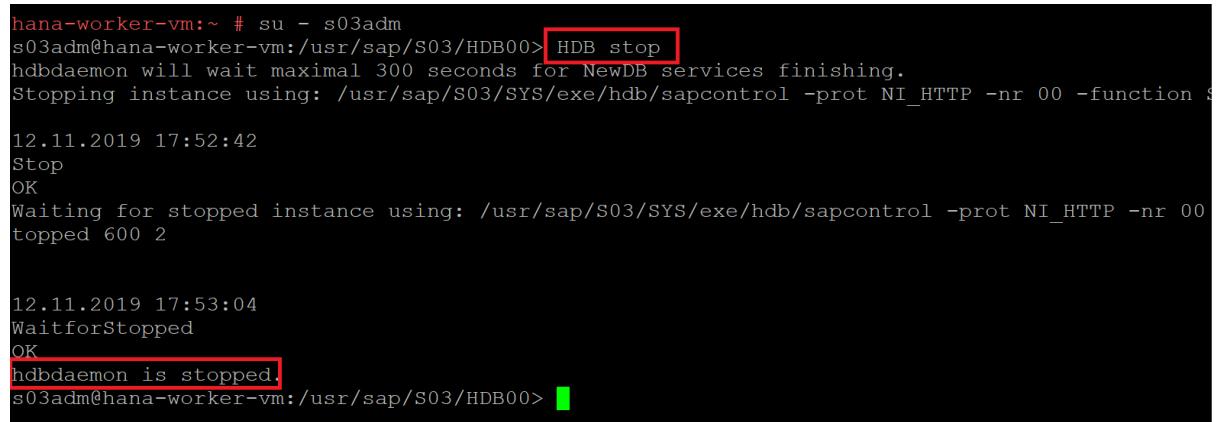
Switch to “hana-worker-vm” node as “s03adm” user.



The PuTTY terminal window shows the command `su - s03adm` being run by the user `hana-worker-vm:~ #`. The password prompt is obscured. The user then types `s03adm@hana-worker-vm:/usr/sap/S03/HDB00>`.

- 1.2. Execute the command

**HDB stop**



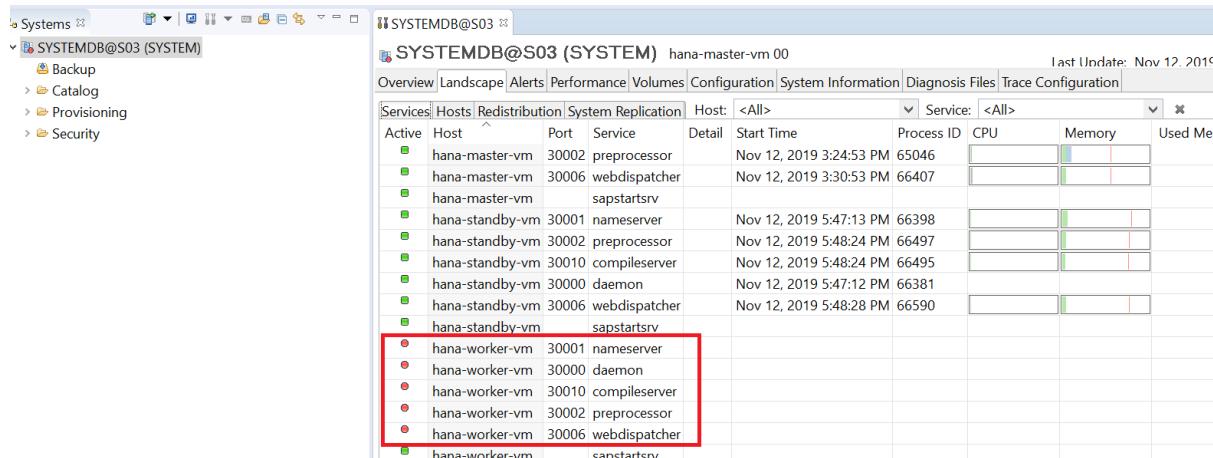
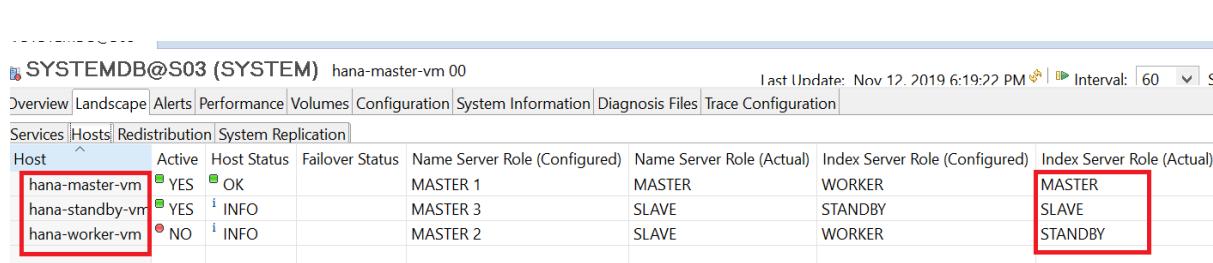
The terminal session on `hana-worker-vm:~ #` shows the command `su - s03adm` followed by `HDB stop`. The output indicates that the hdbdaemon will wait for 300 seconds and then stop the instance using `/usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTPP -nr 00 -function S`. The process continues with logs for the stop operation, including timestamps and status messages like 'OK' and 'Waiting for stopped instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI\_HTTPP -nr 00 topped 600 2'. Finally, it shows the hdbdaemon is stopped and the user is back at the prompt `s03adm@hana-worker-vm:/usr/sap/S03/HDB00>`.

- 1.3. Now, we can check the Node status in Hana Studio.

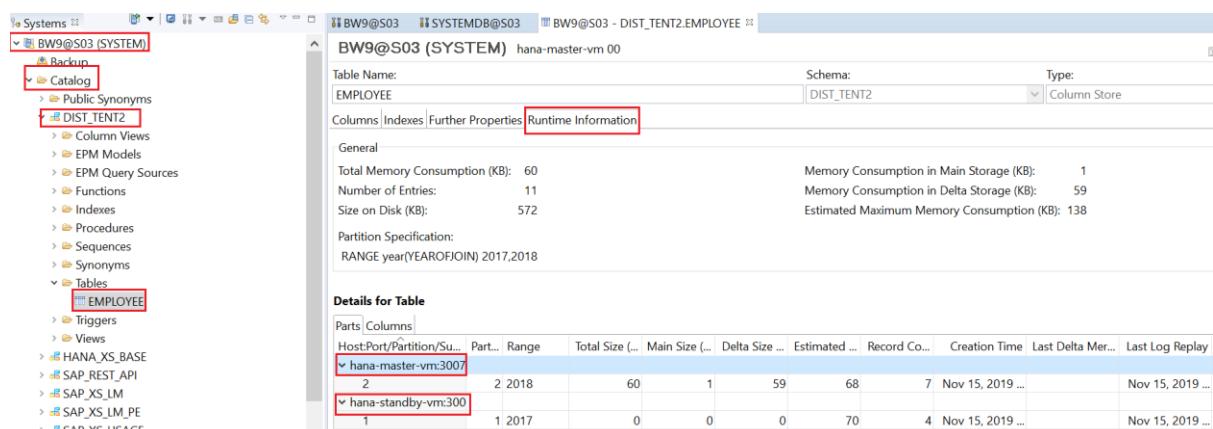
`hana-master-vm: MASTER`

`hana-worker-vm: STANDBY`

**hana-standby-vm: SLAVE**

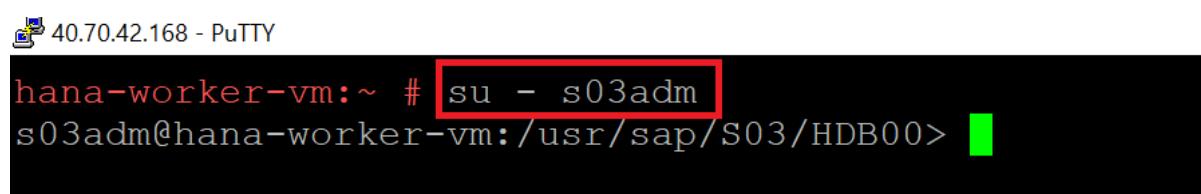

  


#### 1.4. Check the Data in Distributed Table. BW9 → Catalog → DIST\_TENT2 → Tables → EMPLOYEE → Runtime Information.



#### 1.5. Start the HDB Server in “hana-worker-vm”

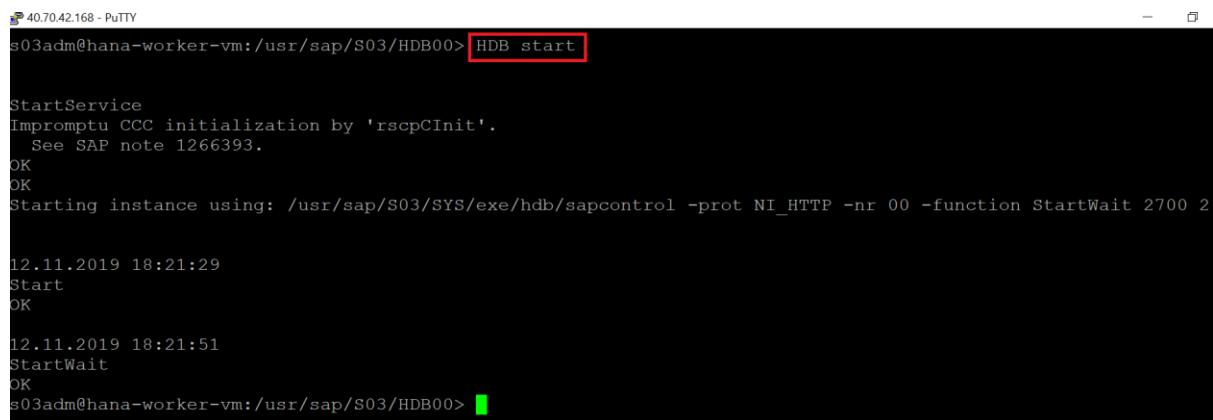
Switch to “hana-worker-vm” node & switch into “s03adm” user.



```
40.70.42.168 - PuTTY
hana-worker-vm:~ # su - s03adm
s03adm@hana-worker-vm:/usr/sap/S03/HDB00>
```

## 1.6. Execute the command

**HDB start**



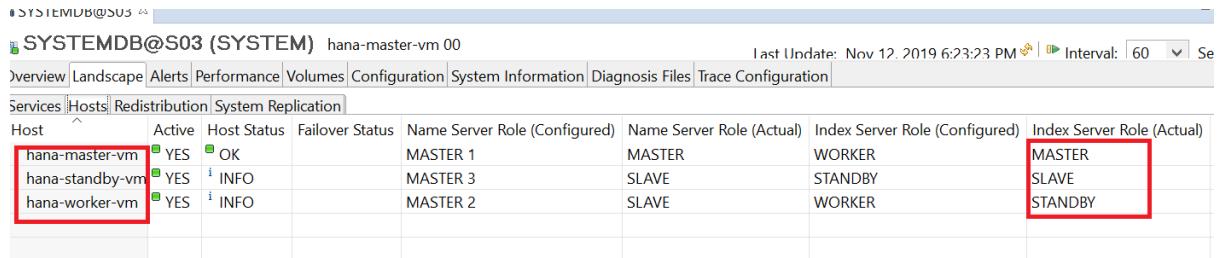
```
40.70.42.168 - PuTTY
s03adm@hana-worker-vm:/usr/sap/S03/HDB00> HDB start

StartService
Impromptu CCC initialization by 'rscpcInit'.
See SAP note 1266393.
OK
OK
Starting instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTP -nr 00 -function StartWait 2700 2

12.11.2019 18:21:29
Start
OK

12.11.2019 18:21:51
StartWait
OK
s03adm@hana-worker-vm:/usr/sap/S03/HDB00>
```

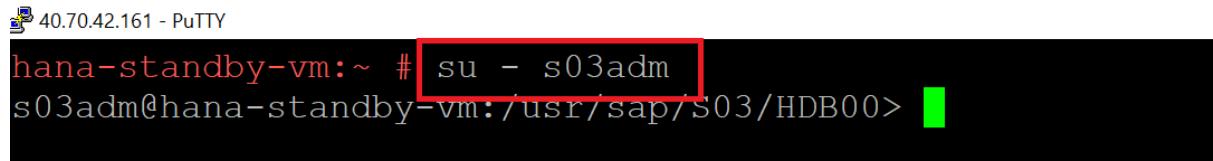
## 1.7. Now, check the Node status in HANA Studio.



Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	YES	OK		MASTER 1	MASTER	WORKER	MASTER
hana-standby-vm	YES	INFO		MASTER 3	SLAVE	STANDBY	SLAVE
hana-worker-vm	YES	INFO		MASTER 2	SLAVE	WORKER	STANDBY

## 1.8. Stop HDB Service in “hana-standby-vm” machine.

Switch into “hana-standby-vm” node as “s03adm” user.



```
40.70.42.161 - PuTTY
hana-standby-vm:~ # su - s03adm
s03adm@hana-standby-vm:/usr/sap/S03/HDB00>
```

## 1.9. Execute the command

**HDB stop**

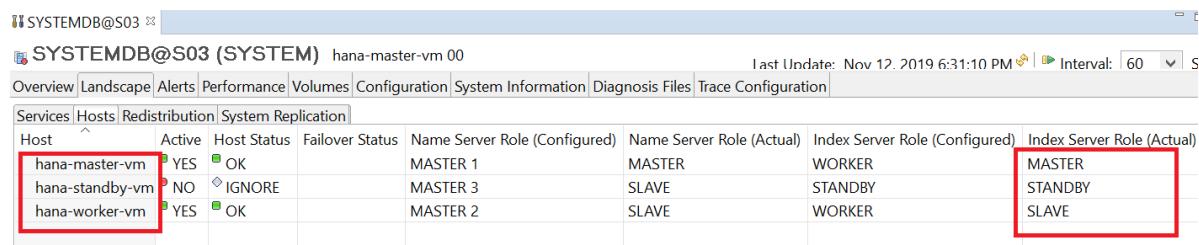
```
s03adm@hana-standby-vm:/usr/sap/S03/HDB00> HDB stop
hdbdaemon will wait maximal 300 seconds for NewDB services finishing.
Stopping instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTP -nr 00 -fu
0

12.11.2019 18:25:24
Stop
OK
Waiting for stopped instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTP
ion WaitforStopped 600 2

12.11.2019 18:26:00
WaitforStopped
OK
hdbdaemon is stopped.
s03adm@hana-standby-vm:/usr/sap/S03/HDB00>
```

#### 1.10. Now check the Node status in HANA Studio.

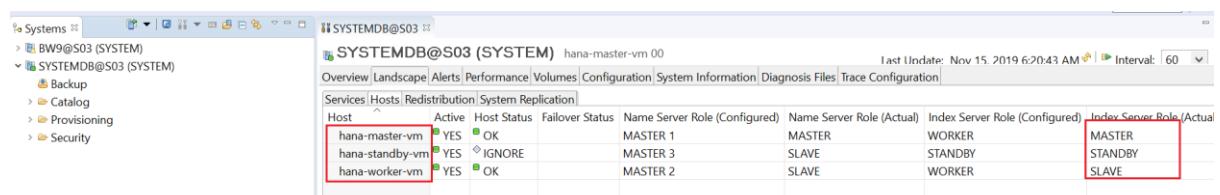
<b>hana-master-vm:</b>	<b>MASTER</b>
<b>hana-standby-vm:</b>	<b>STANDBY</b>
<b>hana-worker-vm:</b>	<b>SLAVE</b>



The screenshot shows the HANA Studio interface for the SYSTEMDB@S03 database. In the top navigation bar, the path is SYSTEMDB@S03 > SYSTEM. The main window displays the 'System' tab of the 'Hosts' section. The table lists three hosts: hana-master-vm, hana-standby-vm, and hana-worker-vm. The columns include Host, Active, Host Status, Failover Status, Name Server Role (Configured), Name Server Role (Actual), Index Server Role (Configured), and Index Server Role (Actual). The 'Index Server Role (Actual)' column for all hosts is highlighted with a red box. The 'Name Server Role (Actual)' column for hana-standby-vm is also highlighted with a red box.

Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	YES	OK		MASTER 1	MASTER	WORKER	MASTER
hana-standby-vm	NO	IGNORE		MASTER 3	SLAVE	STANDBY	STANDBY
hana-worker-vm	YES	OK		MASTER 2	SLAVE	WORKER	SLAVE

#### 1.11. start the HDB Service in “hana-standby-vm” node & check the node status.



This screenshot shows the same HANA Studio interface as the previous one, but it has been updated. The 'Index Server Role (Actual)' column for hana-standby-vm now shows 'STANDBY' instead of 'MASTER', indicating that the failover has occurred. The other host statuses remain the same.

Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	YES	OK		MASTER 1	MASTER	WORKER	MASTER
hana-standby-vm	YES	IGNORE		MASTER 3	SLAVE	STANDBY	STANDBY
hana-worker-vm	YES	OK		MASTER 2	SLAVE	WORKER	SLAVE

### Task 2: Failover & Failback (Between Master & Standby node)

#### 2.1. Stop the HDB service in “hana-master-vm” node.

Switch to “hana-master-vm” node as “s03adm” user & execute command.

### HDB stop

```
s03adm@hana-master-vm:/usr/sap/S03/HDB00> HDB stop
hdbdaemon will wait maximal 300 seconds for NewDB services finishing.
Stopping instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTP -nr 00 -function
0

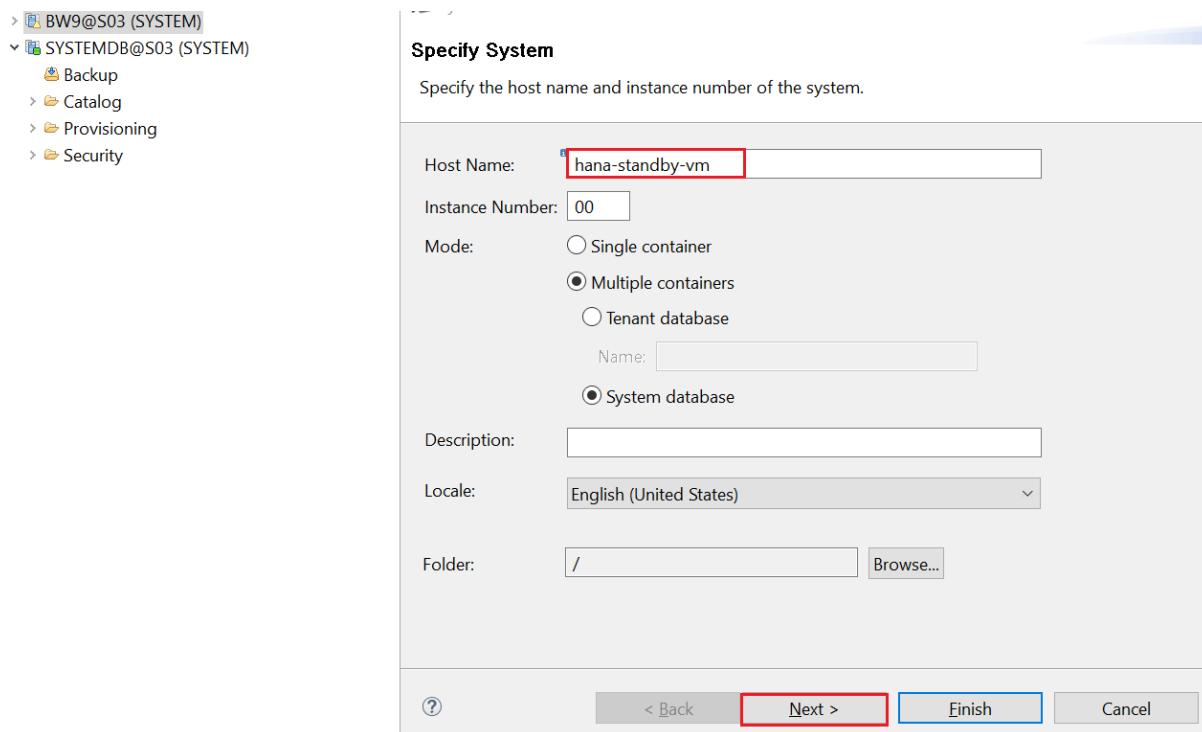
15.11.2019 06:24:18
Stop
OK
Waiting for stopped instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTP -nr 00
ion WaitforStopped 600 2

15.11.2019 06:25:12
WaitforStopped
OK
hdbdaemon is stopped.
s03adm@hana-master-vm:/usr/sap/S03/HDB00>
```

**2.2.** Now, we can check the Node status in Hana Studio (Windows Jumpbox). “hana-master-vm” node is down. Please connect the “hana-standby-vm” node with SYSTEM database.

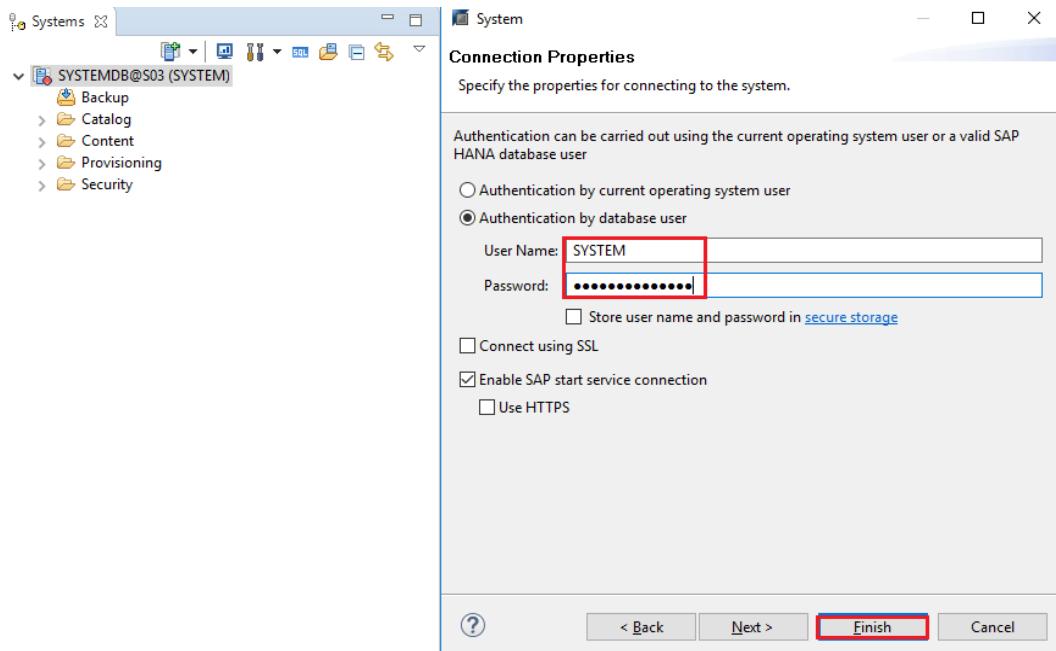
**2.3.** Add System in Hana Studio with the below details.

<b>Hostname:</b>	<b>hana-standby-vm</b>
<b>Instance:</b>	<b>00</b>
<b>Mode:</b>	<b>Multi Containers → System Database</b>

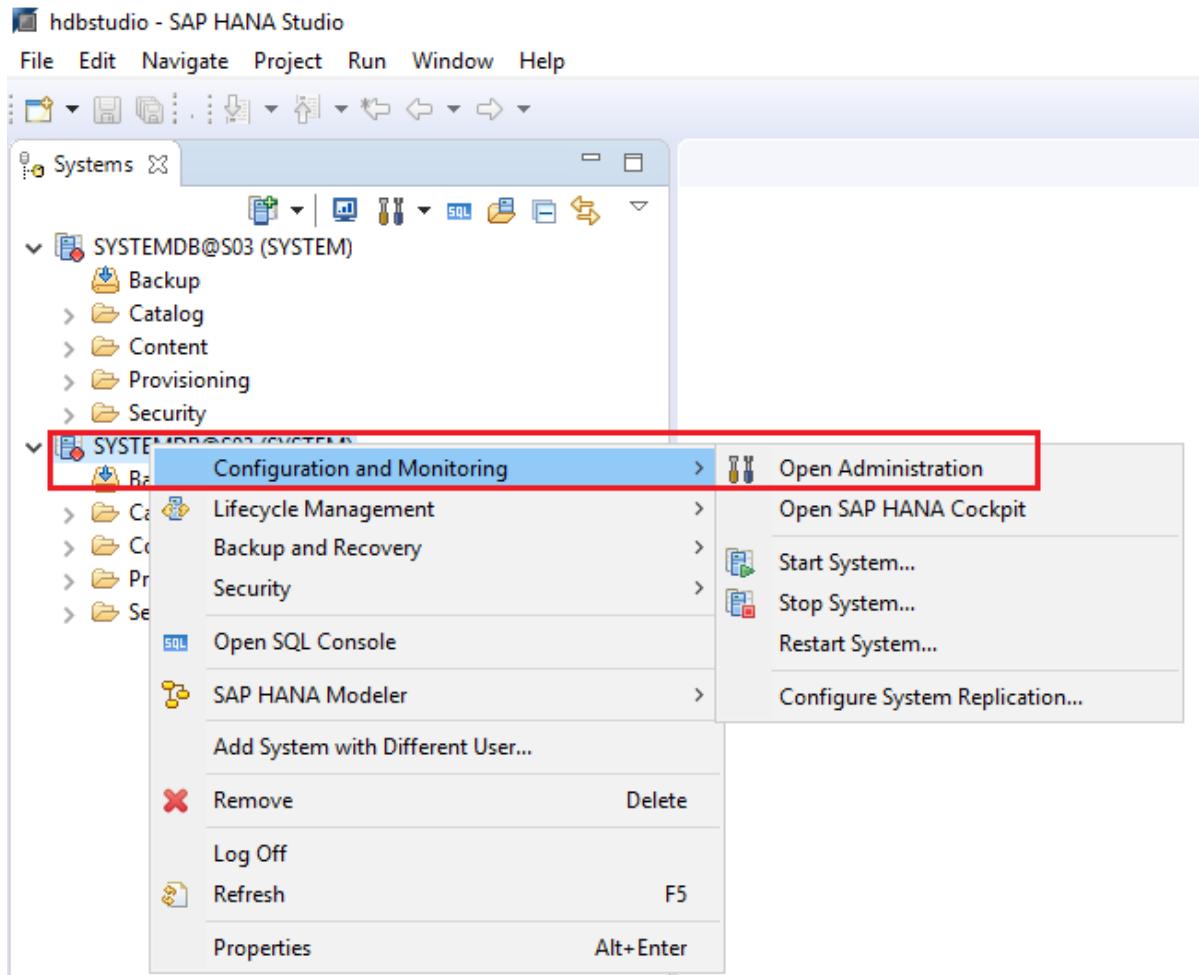


2.4. Enter the below username & password.

User:	SYSTEM
Password:	demoPassword1!



2.5. Right Click SystemDB → Configuration & Monitoring → Open Administration



2.6. Click Landscape → Hosts → Check the Index Server Roles.

hana-master-vm → Standby  
hana-standby-vm → Master  
hana-worker-vm → Slave

SYSTEMDB@S03 (SYSTEM) hana-standby-vm 00							
Last Update: Nov 15, 2019 6:36:14 AM   Interval: 60   Se							
Overview   Landscape   Alerts   Performance   Volumes   Configuration   System Information   Diagnosis Files   Trace Configuration							
Services   Hosts   Redistribution   System Replication							
Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	NO	INFO		MASTER 1	SLAVE	WORKER	STANDBY
hana-standby-vm	YES	INFO		MASTER 3	MASTER	STANDBY	MASTER
hana-worker-vm	YES	OK		MASTER 2	SLAVE	WORKER	SLAVE

2.7. Now, Start the HDB in “hana-master-vm” node.

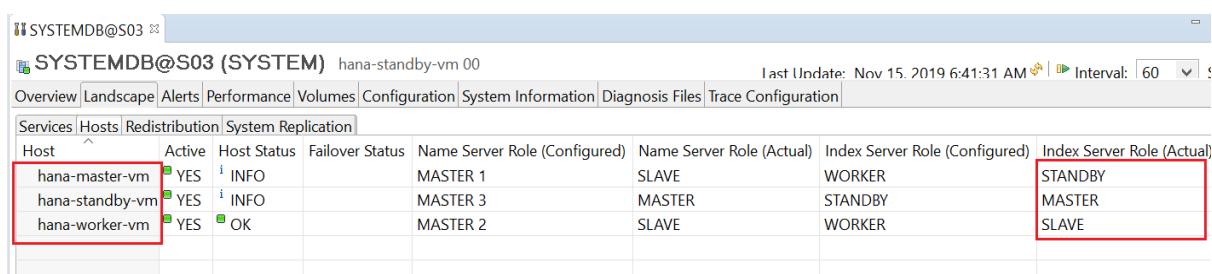
HDB start

```
s03adm@hana-master-vm:/usr/sap/S03/HDB00> HDB start
StartService
Impromptu CCC initialization by 'rscpcInit'.
See SAP note 1266393.
OK
OK
Starting instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTP
it 2700 2

15.11.2019 06:39:56
Start
OK

15.11.2019 06:40:16
StartWait
OK
s03adm@hana-master-vm:/usr/sap/S03/HDB00>
```

## 2.8. Now, check the node status in Hana Studio.



Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	YES	INFO		MASTER 1	SLAVE	WORKER	STANDBY
hana-standby-vm	YES	INFO		MASTER 3	MASTER	STANDBY	MASTER
hana-worker-vm	YES	OK		MASTER 2	SLAVE	WORKER	SLAVE

## 2.9. For Failback, stop the “HDB” in “hana-standby-vm” Node.

**HDB stop**

```
s03adm@hana-standby-vm:/usr/sap/S03/HDB00> HDB stop
hdbdaemon will wait maximal 300 seconds for NewDB services finishing.
Stopping instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTP -nr 00 -fu
0

12.11.2019 18:25:24
Stop
OK
Waiting for stopped instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTP
ion WaitforStopped 600 2

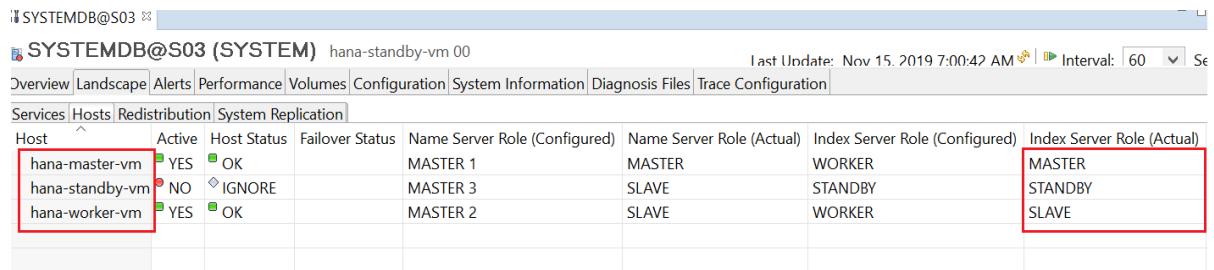
12.11.2019 18:26:00
WaitforStopped
OK
hdbdaemon is stopped.
s03adm@hana-standby-vm:/usr/sap/S03/HDB00>
```

## 2.10. Now, check the node status in HANA Studio.

hana-master-vm → Master

**hana-standby-vm** → **Standby**

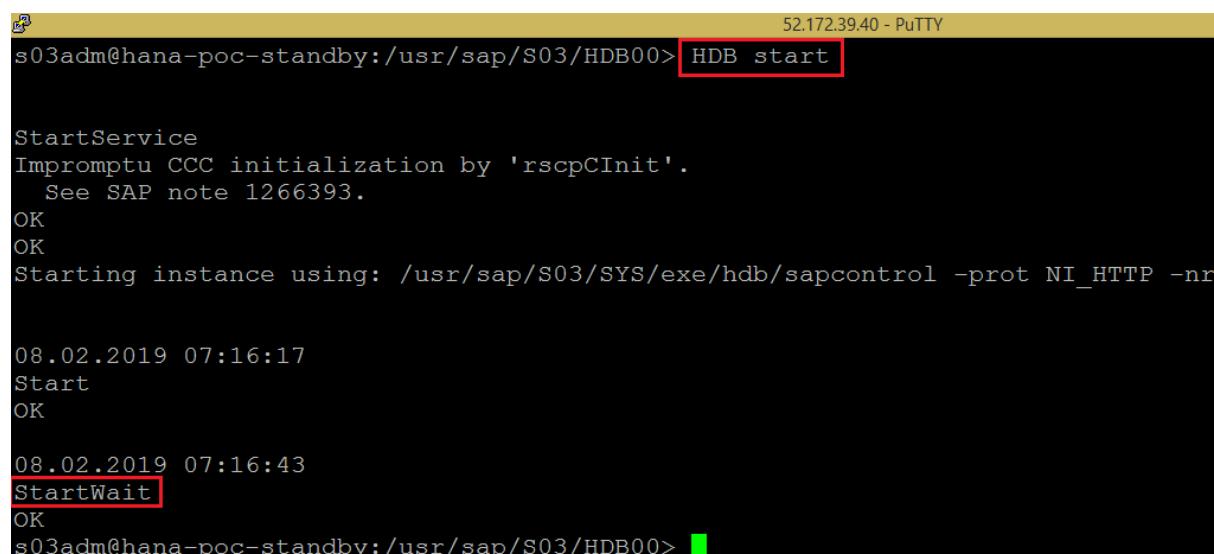
**hana-worker-vm** → **Slave**



Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	YES	OK		MASTER 1	MASTER	WORKER	MASTER
hana-standby-vm	NO	IGNORE		MASTER 3	SLAVE	STANDBY	STANDBY
hana-worker-vm	YES	OK		MASTER 2	SLAVE	WORKER	SLAVE

### 9.11. Start the “HDB” service in “hana-standby-vm”.

**HDB start**



```

52.172.39.40 - PuTTY
s03adm@hana-poc-standby:/usr/sap/S03/HDB00> HDB start

StartService
Impromptu CCC initialization by 'rscpCInit'.
See SAP note 1266393.
OK
OK
Starting instance using: /usr/sap/S03/SYS/exe/hdb/sapcontrol -prot NI_HTTPP -nr

08.02.2019 07:16:17
Start
OK

08.02.2019 07:16:43
StartWait
OK
s03adm@hana-poc-standby:/usr/sap/S03/HDB00>

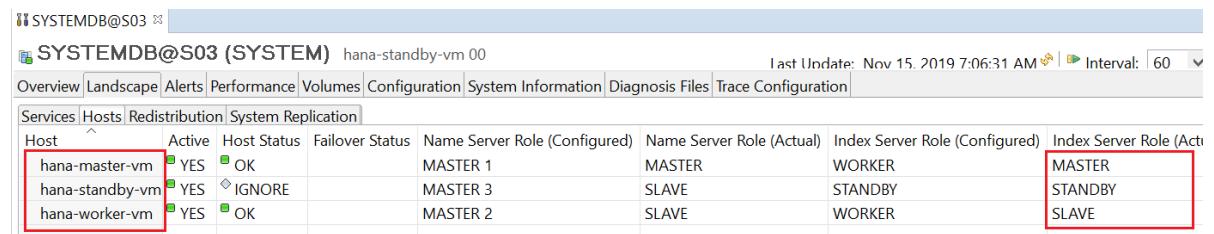
```

### 9.12. Check the Node Status in “hana studio”.

**hana-master-vm** → **Master**

**hana-standby-vm** → **Standby**

**hana-worker-vm** → **Slave**



Host	Active	Host Status	Failover Status	Name Server Role (Configured)	Name Server Role (Actual)	Index Server Role (Configured)	Index Server Role (Actual)
hana-master-vm	YES	OK		MASTER 1	MASTER	WORKER	MASTER
hana-standby-vm	YES	IGNORE		MASTER 3	SLAVE	STANDBY	STANDBY
hana-worker-vm	YES	OK		MASTER 2	SLAVE	WORKER	SLAVE