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# ThoughtSpot Deployment Guide

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# Deploying on the Dell appliance

**Summary:** Follow these steps to deploy ThoughtSpot on your Dell appliance.

Follow the steps in this checklist to deploy ThoughtSpot on your Dell appliance.

- Step 1: Complete installation prerequisites [See page 4]
- Step 2: Review hardware requirements [See page 5]
- Step 3: Connect your appliance [See page 6]
- Step 4: Configure management settings [See page 9]
- Step 5: Configure nodes [See page 11]
- Step 6: Install cluster [See page 14]

## Related information

Use these references to aid you in successful installation and administration of ThoughtSpot.

- the `nodes.config` file [See page 0]
- Parameters of the `nodes.config` file [See page 0]
- Using the `cluster create` command [See page 0]
- Parameters of the `cluster create` command [See page 0]
- Cable Reference [See page 0]
- ThoughtSpot Documentation [See page 0]
- Contact Support [See page 184]

# Prerequisites

**Summary:** Complete these prerequisites to deploy ThoughtSpot on your Dell appliance.

## Installation prerequisites

Ensure that you have the following items, information, and understanding of policies before you begin installing your Dell 6420 appliance.

- 10gbE switch with IPv6 broadcast and multicast enabled. You need one switch for each node.
- Data center with proper environment controls, such as cooling.
- AC power
- 10G connection: SFP+ for the switch side
- 10GbE network cables, either direct attach copper (DAC) or fiber. See [Cable Reference \[See page 0\]](#) for more information to decide between the two types.
- 10bps switch for connection to the iDRAC (Out of Band Management) port
- Cat5 network cables. You need one for each node.
- Rack space of 2U or 3.5 inches for each appliance, and a power strip
- Monitor and keyboard
- Networking information, for data, management IPs, DNS, timezone, and default gateway IP. Contact your network administrator for this information, and fill out the ThoughtSpot site survey so that you have a quick reference.

## Review hardware requirements

Next, [review hardware requirements. \[See page 5\]](#)

# Hardware Requirements

**Summary:** Learn about the Dell hardware before deploying ThoughtSpot.

## About the Hardware

These pictures show the front and back view of the Dell C6420 appliance.



Dell front view



Dell back view

## Connect appliance

Next, [connect the appliance](#). [See page 6]

# Connect the Appliance

**Summary:** Connect your Dell appliance before you can deploy ThoughtSpot.

After you rack and stack the appliance, it is time to configure it. Follow the steps in this checklist.

- Step 1: Connect switches to 10GbE ports [See page 0]
- Step 2: Connect iDRAC ports [See page 0]
- Step 3: Connect a keyboard and monitor [See page 0]
- Step 4: Turn on nodes [See page 0]

## Step 1: Connect switches to 10GbE ports

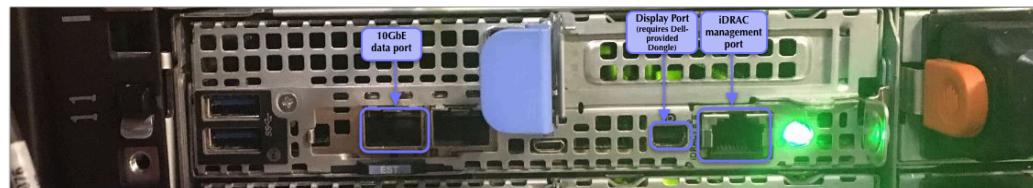
Connect the 10GbE port of each node, as illustrated in [Dell Port Location](#) [See page 6], to the 10GbE switches on your own rack, using either fiber or DAC cables.

Refer to the [Cable reference](#) [See page 0] for information on the cable types:

- [Fiber Cables](#) [See page 0]
- [DAC Cables](#) [See page 0]

**Note:** Ask your hardware vendor for more details about what they supply and what you need to buy.

The ports are on the back of the Dell appliance.



*Dell port location*

- Connect to switches **only** the appliances (4 nodes each) that you plan to use in your cluster.
- You must power off, or disconnect from the switch, any other nodes or appliances.  
This prevents accidental configuration of incorrect nodes.
- You must connect all nodes, even if using only one node, to a 10GbE switch.

**Note:** You need at least three nodes for high availability (HA). Each appliance can have up to four nodes.

## Step 2: Connect iDRAC ports

Connect the iDRAC management ports of each node to the management switch.

See [Dell Port Location \[See page 6\]](#).

## Step 3: Connect a keyboard and monitor

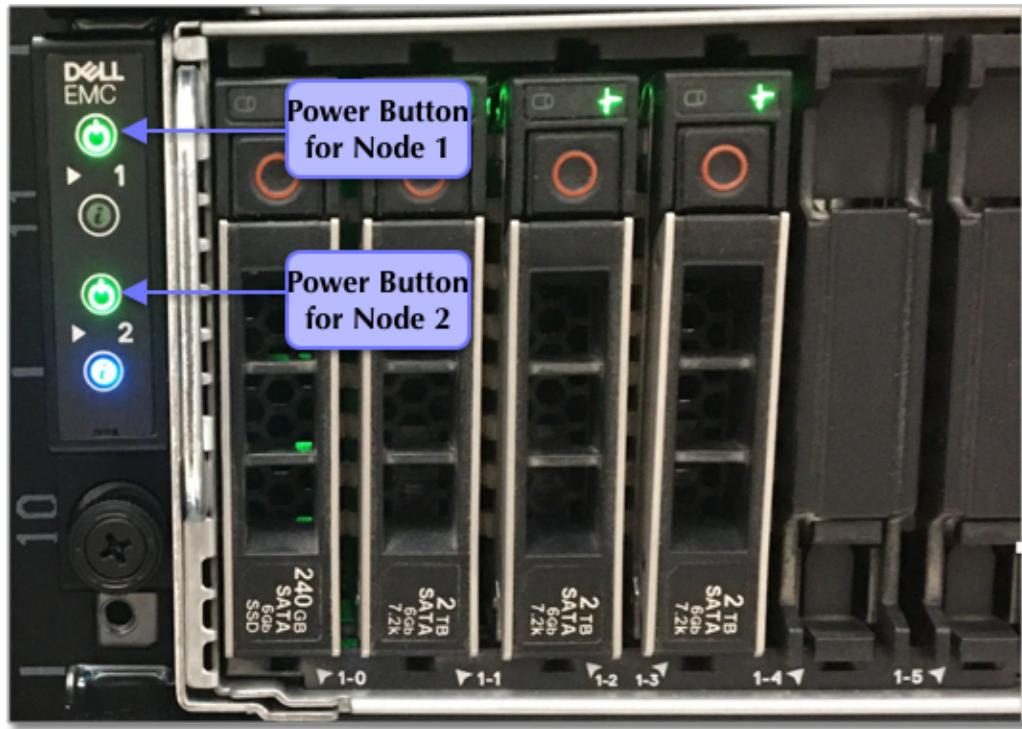
Connect a keyboard and monitor to the appliance. You need these to initially configure the appliance, and you can disconnect them later. Use the adapter Dell provides. Plug it into the Display Port shown in [Dell Port Location \[See page 6\]](#), and plug the monitor in on the other side of the adapter.



*Dell-provided display to VGA adapter*

## Step 4: Turn on nodes

Turn on power for the nodes by pressing the power button for each one; see [Dell Power Buttons \[See page 8\]](#).



Dell power buttons

There is one power button for each node.

## Configure the management settings

Next, [configure the management settings](#). [See page 9]

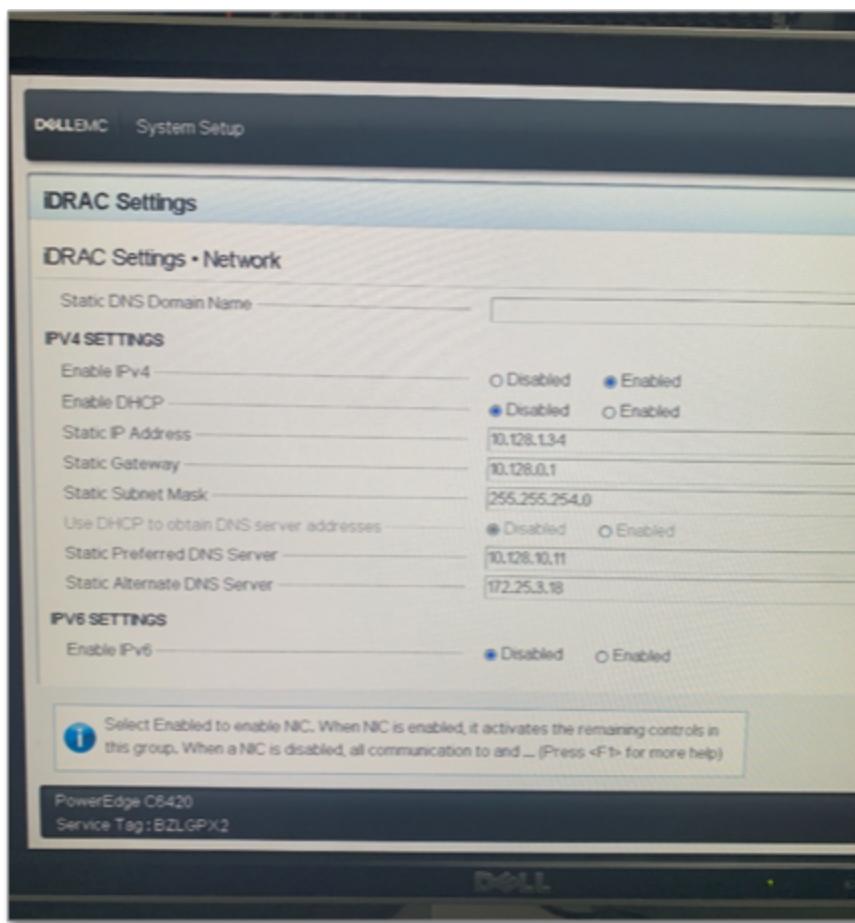
# Configure the Dell Management Settings

**Summary:** Configure the management settings for Dell before you can deploy ThoughtSpot.

Input your specific network information to configure the management settings for your Dell appliance.

Refer to [Dell Management Configuration \[See page 10\]](#). If you need additional guidance, view [Dell Support \[See page 0\]](#) for this product.

1. **Open the iDRAC settings modal** Before the node boots, a screen appears on your monitor with several options. Click F11 to enter the Boot Manager.
2. **Press F2** Click F2 when the option to do so appears on your screen.
3. **Select iDRAC** In the Bios setup screen, there are several options. Select **iDRAC** to configure your iDRAC management settings.
4. **Select network configuration** From the iDRAC settings options, select **network**.
5. **Fill out the iDRAC settings form** Add your specific network information for the IP address, Gateway, and Netmask in the empty boxes. DNS information is optional. Refer to your ThoughtSpot site survey for a quick reference, and ask your network administrator for help if you have not filled out the site survey yet.
  - For **Enable IPv4**, select **enabled**.
  - For **Enable DHCP**, select **disabled**.
  - For **Enable IPv6**, select **disabled**.
6. **Save changes and reboot** Follow the prompts on the monitor to save changes to the management settings form, exit, and reboot the system.
7. **Log into ThoughtSpot** After the system reboots, the login page appears. Log in as an administrator. Ask your network administrator if you do not know the admin credentials.



Dell Management Configuration

## Configure nodes

Next, [configure nodes](#). [See page 11]

# Configure Nodes

**Summary:** Configure ThoughtSpot nodes on your Dell appliance.

After you connect the appliance, a command line appears on your console. Configure the nodes on this command line. Follow the steps in this checklist.

- Step 1: Get a template for network configuration [See page 0]
- Step 2: Prepare node configuration [See page 0]
- Step 3: Configure the nodes [See page 0]
- Step 4: Confirm node configuration [See page 0]

## Step 1: Get a template for network configuration

Make sure you have logged into your cluster. If you have not, use admin credentials to log into your cluster.

Run the `tscli cluster get-config` command to get a template for network configuration. Redirect it to the file `nodes.config`.

You can find more information on this process in the `nodes.config` file reference [See page 0].

```
$ tscli cluster get-config |& tee nodes.config
```

## Step 2: Prepare node configuration

1. Add your specific network information for the nodes in the `nodes.config` file, as demonstrated in the [autodiscovery of one node example \[See page 0\]](#).
2. Fill in the areas specified in [Parameters of the nodes.config file \[See page 0\]](#) with your specific network information.  
If you have additional nodes, complete each node within the `nodes.config` file in the same way.

Do not edit any part of the `nodes.config` file except the sections described in [Parameters of the nodes.config file \[See page 0\]](#). If you delete quotation marks, commas, or other parts of the code, it may cause setup to fail.

## Step 3: Configure the nodes

Configure the nodes in the `nodes.config` file using the `set-config` command.

Run `$ cat nodes.config | tscli cluster set-config` in your terminal.

If the command returns an error, refer to [set-config error recovery \[See page 0\]](#).

```
$ cat nodes.config | tscli cluster set-config

Connecting to local node-scout
Setting up hostnames for all nodes
Setting up networking interfaces on all nodes
Setting up hosts file on all nodes
Setting up IPMI configuration
Setting up NTP Servers
Setting up Timezone
Done setting up ThoughtSpot
```

## Step 4: Confirm node configuration

Use the `get-config` command to confirm node configuration.

Your output may look similar to the following:

```
$ tscli cluster get-config

{
    "ClusterId": "",
    "ClusterName": "",
    "DataNetmask": "255.255.252.0",
    "DataGateway": "192.168.4.1",
    "IPMINetmask": "255.255.252.0",
    "IPMIGateway": "192.168.4.1",
    "Timezone": "America/Los_Angeles",
    "NTPServers": "0.centos.pool.ntp.org,1.centos.pool.ntp.or
g,2.centos.pool.ntp.org,3.centos.pool.ntp.org",
    "DNS": "192.168.2.200,8.8.8.8",
    "SearchDomains": "example.company.com",
    "Nodes": {
        "ac:1f:6b:8a:77:f6": {
            "NodeId": "ac:1f:6b:8a:77:f6",
            "Hostname": "Thoughtspot-server1",
            "DataIface": {
                "Name": "eth2",
                "IPv4": "192.168.7.70"
            },
            "IPMI": {
                "IPv4": "192.168.5.70"
            }
        }
    }
}
```

## Install your cluster

Next, [install your cluster. \[See page 14\]](#)

# Install Cluster

**Summary:** Install your ThoughtSpot cluster(s) on your Dell appliance.

Install the cluster using the release tarball. Installation takes approximately one hour. Make sure you can connect to ThoughtSpot remotely. If you can, you can run the installer on your local computer.

Refer to your welcome letter from ThoughtSpot to find the link to download the release tarball. If you do not have a link to download the release tarball, open a support ticket at [ThoughtSpot Support \[See page 184\]](#) to access the release tarball.

Follow the steps in this checklist to install your cluster.

- Step 1: Run the installer [See page 0]
- Step 2: Check cluster health [See page 0]
- Step 3: Finalize installation [See page 0]

## Step 1: Run the installer

1. Copy the downloaded release tarball to `/home/admin`:

Run `scp <release-number> admin@<hostname>:/home/admin/<file-name>`. Note the following parameters:

- `release-number` is the version of ThoughtSpot on your cluster, in the form `0.0.tar.gz`. For example, `6.0.tar.gz`.
- `hostname` is your network hostname. Ask your network administrator if you do not know your hostname.
- `file-name` is the name of the tarball file on your local computer.

```
$ scp 0.0.tar.gz admin@<hostname>:/home/admin/<file-name>
```

2. Create the cluster using `tscli cluster create <release-number>`.

```
$ tscli cluster create 0.0.tar.gz
```

3. Edit the output using your specific cluster information. For more information on this process, refer to [Using the cluster create command \[See page 0\]](#) and [Parameters of the cluster create command \[See page 0\]](#).

The cluster installer automatically reboots all the nodes after the install. Wait at least 15 minutes for the installation process to complete. The system is rebooting, which takes a few minutes. Log into any node to check the current cluster status, using the command `tscli cluster status`.

## Step 2: Check cluster health

After you install the cluster, check its status using the `tscli cluster status` command.

Your output may look something like the following:

```
$ tscli cluster status
Cluster: RUNNING
Cluster name      : thoughtspot
Cluster id       : 1234X11111
Number of nodes  : 3
Release          : 6.0
Last update      = Wed Oct 16 02:24:18 2019
Heterogeneous Cluster : False
Storage Type     : HDFS

Database: READY
Number of tables in READY state: 2185
Number of tables in OFFLINE state: 0
Number of tables in INPROGRESS state: 0
Number of tables in STALE state: 0
Number of tables in ERROR state: 0

Search Engine: READY
Has pending tables. Pending time = 1601679ms
Number of tables in KNOWN_TABLES state: 1934
Number of tables in READY state: 1928
Number of tables in WILL_REMOVE state: 0
Number of tables in BUILDING_AND_NOT_SERVING state: 0
Number of tables in BUILDING_AND_SERVING state: 128
Number of tables in WILL_NOT_INDEX state: 0
```

## Step 3: Finalize installation

After the cluster status changes to **READY**, sign into the ThoughtSpot application on your browser.

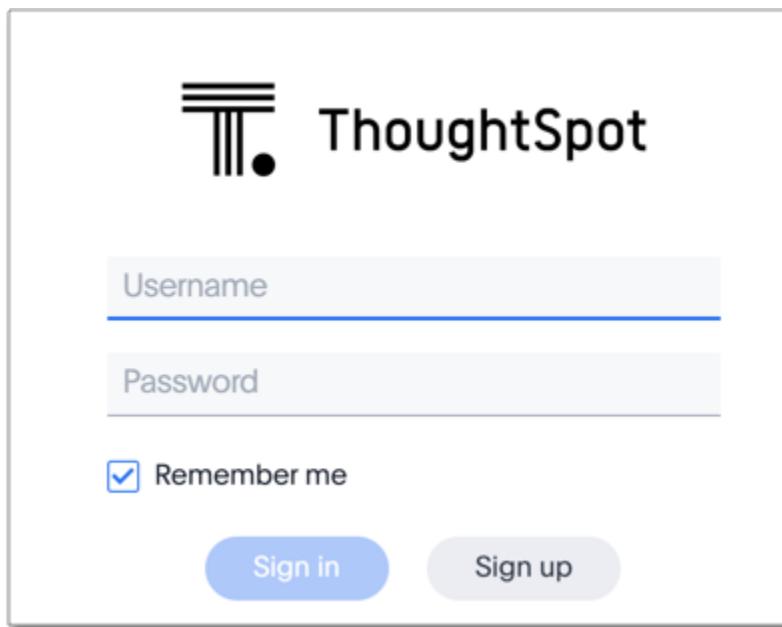
Follow these steps:

1. Start a browser from your computer.
2. Enter your secure IP information on the address line.

`https://<IP-address>`

3. If you don't have a security certificate for ThoughtSpot, you must bypass the security warning to proceed:
  - Click **Advanced**
  - Click **Proceed**

4. The ThoughtSpot login page appears.
5. In the [ThoughtSpot sign-in window \[See page 17\]](#), enter admin credentials, and click **Sign in**.  
ThoughtSpot recommends changing the default admin password.



ThoughtSpot's sign-in window

## Error recovery

### Set-config error recovery

If you get a warning about node detection when you run the `set-config` command, restart the node-scout service.

Your error may look something like the following:

```
Connecting to local node-scout
WARNING: Detected 0 nodes, but found configuration for
only 1 nodes.
Continuing anyway. Error in cluster config validation: [] is not a valid link-local
IPv6 address for node: 0e:86:e2:23:8f:76 Configuration failed.
Please retry or contact support.
```

Restart the node-scout service with the following command.

```
$ sudo systemctl restart node-scout
```

Ensure that you restarted the node-scout by running `sudo systemctl status node-scout`. Your output should specify that the node-scout service is active. It may look something like the following:

```
$ sudo systemctl status node-scout
● node-scout.service - Setup Node Scout service
  Loaded: loaded (/etc/systemd/system/node-scout.service; enabled; vendor preset: disabled)
  Active: active (running) since Fri 2019-12-06 13:56:29 PST; 4s ago
```

Next, retry the `set-config` command.

```
$ cat nodes.config | tscli cluster set-config
```

The command output should no longer have a warning.

# Deploying on the SMC appliance

**Summary:** Follow these steps to deploy ThoughtSpot on your Super Micro Computer appliance.

Follow these steps to deploy ThoughtSpot on your Super Micro Computer (SMC) appliance.

- Step 1: Complete prerequisites [See page 20]
- Step 2: Review hardware requirements [See page 21]
- Step 3: Connect the SMC appliance [See page 24]
- Step 4: Configure nodes [See page 28]
- Step 5: Install cluster [See page 33]

## Related information

Use these references to aid you in successful installation and administration of ThoughtSpot.

- the `nodes.config` file [See page 0]
- Parameters of the `nodes.config` file [See page 0]
- Using the `cluster create` command [See page 0]
- Parameters of the `cluster create` command [See page 0]
- Deployment Overview [See page 38]
- Contact Support [See page 184]

# Prerequisites

**Summary:** Complete these prerequisites before installing your ThoughtSpot clusters on the SMC appliance.

## Installation Prerequisites

Ensure that you have the following items, information, and understanding of policies before you begin deploying ThoughtSpot on your SMC appliance.

- Appliance Port Location [See page 25], to locate data and IPMI ports.
- Data center with proper environment controls, such as cooling.
- AC power
- 10GbE switch, with enabled IPv6 broadcast and multicast. You need one for each node.
- 10GbE network cables, either direct attach copper (DAC) or fiber. Refer to the [Cable reference \[See page 0\]](#) for more information to decide between the two types.
- 100Mbps or 1Gbps switch for IPMI, for Out of Band Management. You need one for each node.
- Cat5 network cables. You need one for each node.
- Rack space of 2U or 3.5 inches for each appliance, and a power strip
- Monitor and keyboard
- 10G connection: SFP+ for the switch side
- Networking information: for data, management IPs, DNS, timezone, and default gateway IP. Contact your network administrator for this information, and fill out the ThoughtSpot site survey so that you have a quick reference before beginning the install process.
- Network policies [See page 172], to determine the ports you need to have open for your cluster.

## Review hardware requirements

Next, [review hardware requirements \[See page 21\]](#).

# Hardware Requirements

**Summary:** Learn about your SMC hardware before deploying ThoughtSpot.

## About the Hardware

You can deploy ThoughtSpot on two different appliance hardware platforms: Haswell and Skylake. Both of the platforms provide the same performance. Refer to [Haswell and Skylake hardware details \[See page 21\]](#) for details on their physical differences.

Details	Haswell	Skylake
<b>Dimensions</b>	2 RU chassis (17.25" x 3.47" x 28.5" (WxHxD))	2 RU chassis (17.6" x 3.47" x 28.75" (WxHxD))
<b># of nodes</b>	Populated with 1 to 4 nodes	Populated with 1 to 4 nodes
<b>Node specifications</b>	Each node is independent and consists of a server board (removable from rear), 1x 200GB SSD, 3x 2TB HDD	Each node is independent and consists of a server board (removable from rear), 1x 240GB SSD, 3x 2TB HDD
<b>Max power consumption</b>	2000 W	2200 W
<b>Required power input</b>	200-240V / 11.8 - 9.8A / 50-60Hz	220-240 VAC 50-60 Hz

## Haswell front and back views

These images show the front and back views of each appliance.

The nodes on the back of both appliances are in a reverse N shape, with Node A at the bottom right and Node D at the top left.



Haswell front view



Haswell back view

The Haswell appliance shown here is not fully populated, as it only has three nodes. Your appliance may be populated with 1-4 nodes, depending on the ordered configuration. If you order less than four nodes, ThoughtSpot fills the empty slot with a filler panel.

## Skylake front and back views



Skylake front view



*Skylake back view*

The Skylake appliance shown here is fully populated with four nodes.

## Connect the appliance

Next, [connect the appliance](#). [See page 24]

# Connect the SMC appliance

**Summary:** Connect the SMC appliance before you can deploy ThoughtSpot.

After you rack and stack the appliance, it is time to configure it. If necessary, review the [Hardware Appliance Overview \[See page 39\]](#). Follow the steps in this checklist.

- Step 1: Connect switches to 10GbE ports [\[See page 0\]](#)
- Step 2: Connect IPMI ports [\[See page 0\]](#)
- Step 3: Turn on nodes [\[See page 0\]](#)
- Step 4: Log in [\[See page 0\]](#)

## Step 1: Connect switches to 10GbE ports

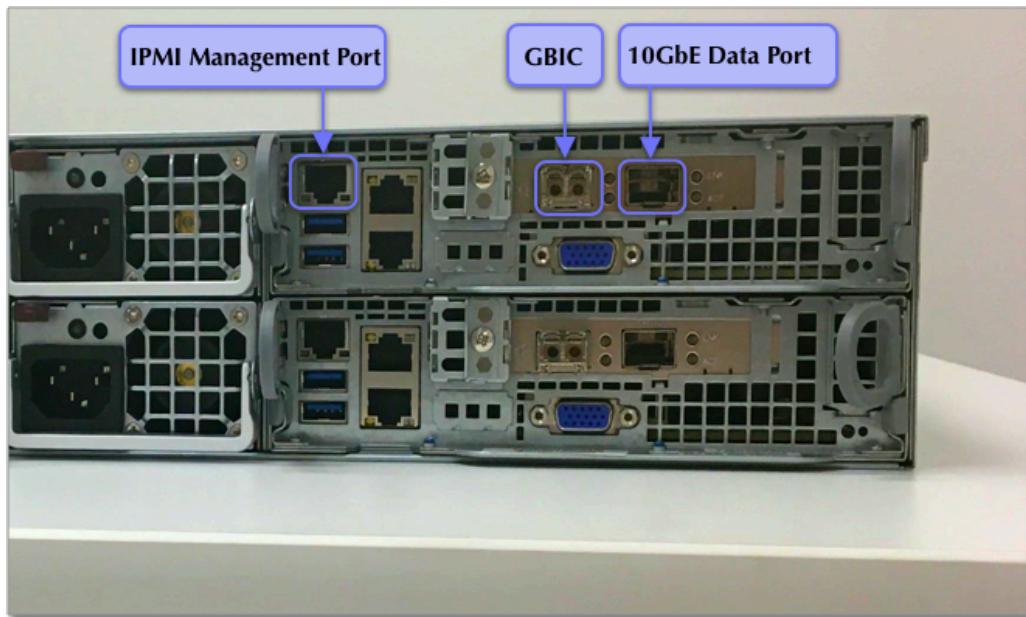
Connect the 10GbE port of each node, as illustrated in [Haswell port location \[See page 25\]](#) and [Skylake port location \[See page 25\]](#), to the 10GbE switches on your own rack, using either fiber or DAC cables.

Refer to the [Cable reference \[See page 0\]](#) for information on the cable types:

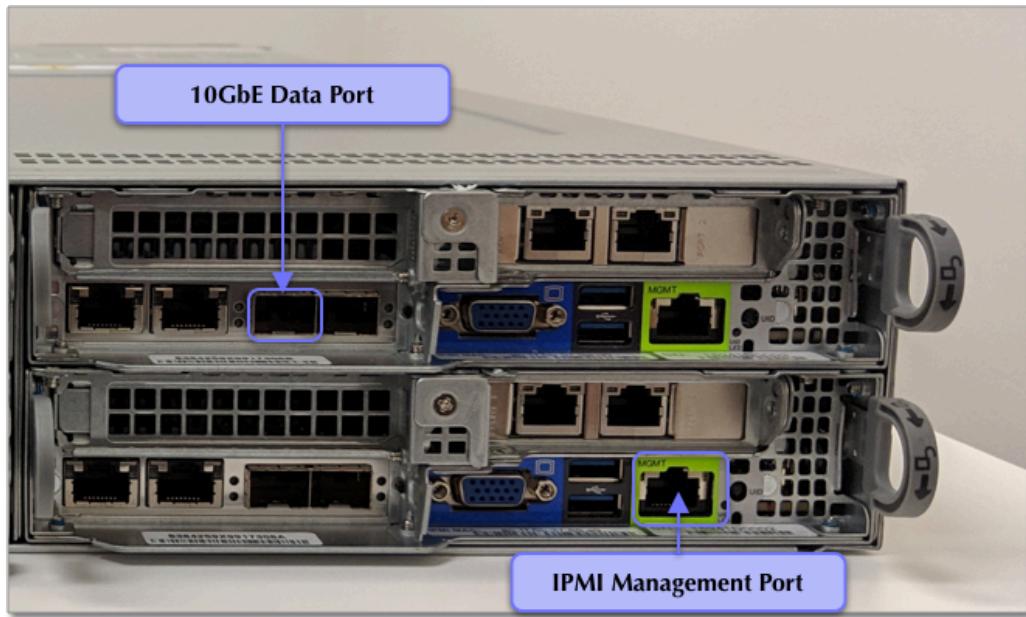
- [Fiber Cables \[See page 0\]](#)
- [DAC Cables \[See page 0\]](#)

**Note:** Ask your hardware vendor for more details about what they supply and what you need to buy.

Depending on which version of the SMC appliance you have, Haswell or Skylake, your 10GbE ports are in a different spot on the back of the appliance. Here is a picture of the back of each appliance.



Haswell port location



Skylake port location

- Connect to switches **only** the appliances (4 nodes each) that you plan to use in the cluster.
- You must power off, or disconnect from the switch, all other appliances or nodes.  
This prevents accidental configuration of incorrect nodes.
- You must connect all nodes, even if using only one node, to a 10G switch.

## *Connect the SMC appliance*

- Verify that the connection is valid by pinging the gateway:

Enter `ping <default-gateway-IP>`.

Ask your network administrator for your default gateway IP if you have not already listed it in your ThoughtSpot site survey.

```
$ ping <default-gateway-IP>
```

## **Step 2: Connect IPMI ports**

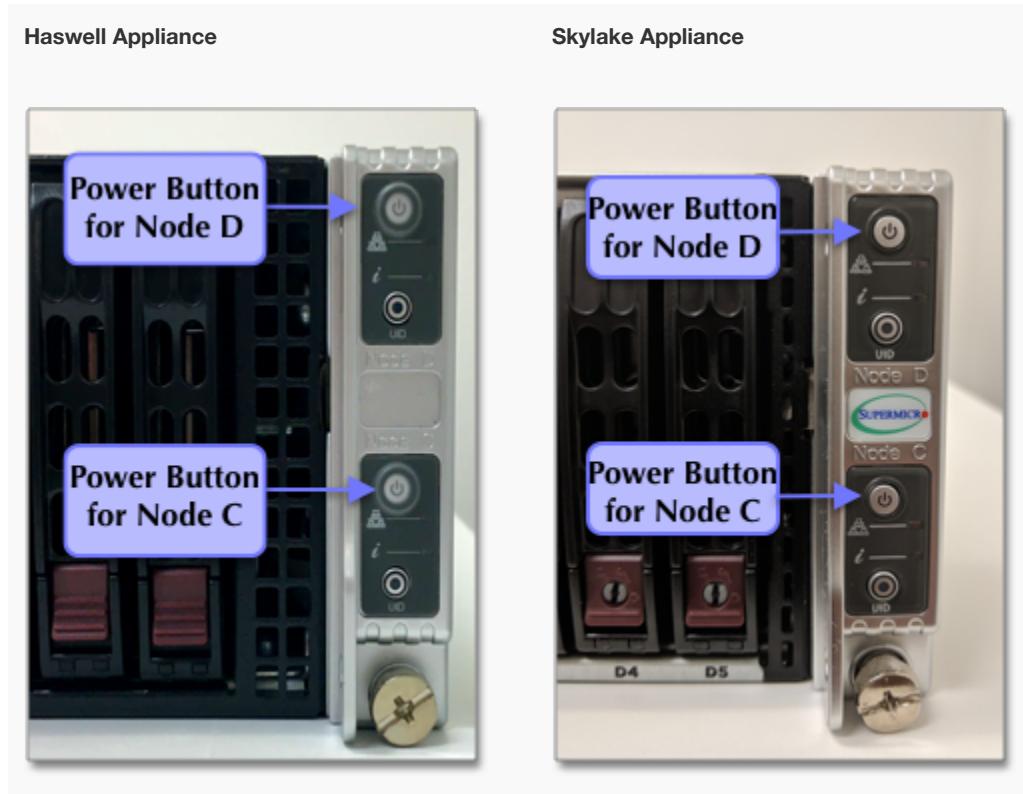
Connect the IPMI port of each node to the management switch.

See [Haswell port location \[See page 25\]](#) and [Skylake port location \[See page 25\]](#).

## **Step 3: Turn on nodes**

Turn on the power to the nodes by pressing the power button; see [Appliance Power Button \[See page 27\]](#).

There is one power button for each node.



## Step 4: Log in

1. Connect a keyboard and the mouse to each node on the appliance.
2. You should see a login prompt on the screen. If you don't see one or the screen isn't responsive, press the key combination **control-alt-F2** on your keyboard to bring up the login prompt.
3. Log in using the admin user credentials for the console. If you do not know the admin credentials, ask your network administrator.

## Configure nodes

Next, [configure nodes](#). [See page 28]

# Configure ThoughtSpot Nodes on the SMC Appliance

**Summary:** Configure your nodes before you can install your cluster(s).

After you connect the appliance, configure the nodes in your Mac or Windows terminal emulator. Follow the steps in this checklist.

- Step 1: SSH into your cluster [See page 0]
- Step 2: Change to the `install` directory [See page 0]
- Step 3: Get a template for network configuration [See page 0]
- Step 4: Prepare node configuration [See page 0]
- Step 5: Configure the nodes [See page 0]
- Step 6: Confirm node configuration [See page 0]

If you completed ThoughtSpot's site survey form and returned it to [ThoughtSpot Support](#) [See page 184] before ThoughtSpot shipped the appliance, the appliance may be pre-configured for your network environment and ready to install and connect to your network.

If the network configuration was not pre-set, then this step must be done as part of the installation process.

Follow these steps to determine the configuration status of your appliance.

1. SSH into your cluster. Run `ssh admin@<cluster-IP>` or `ssh admin@<hostname>`.

```
$ ssh admin@<clusterIP>
```

2. Run `tscli cluster status`.

```
$ tscli cluster status
```

3. If the output shows READY, and looks like the [cluster status output \[See page 34\]](#) in the next article, your appliance is configured.
4. Skip to [Finalize installation \[See page 35\]](#).

If your status is not READY, continue with the installation process outlined below.

## Step 1: SSH into your cluster

SSH into your cluster with admin credentials.

1. Run the command `ssh admin@<cluster-IP>` or `ssh admin@<hostname>` on the command line.

Replace `clusterIP` or `hostname` with your specific network information.

```
$ ssh admin@<clusterIP>
```

2. Enter your admin password when prompted.

Ask your network administrator if you don't know the password.

## Step 2: Change to the install directory

In your terminal, change directory to `/home/admin/install` by running the command `cd /home/admin/install`. If your `/install` subdirectory does not exist, you may have to use the `/home/admin` directory.

```
$ cd /home/admin/install
```

## Step 3: Get a template for network configuration

Run the `tscli cluster get-config` command to get a template for network configuration. Redirect it to the file `nodes.config`. You can find more information on this process in the [nodes.config file reference \[See page 0\]](#).

```
$ tscli cluster get-config |& tee nodes.config
```

## Step 4: Prepare node configuration

1. Add your specific network information for the nodes in the `nodes.config` file, as demonstrated in the [autodiscovery of one node example \[See page 0\]](#).
2. Fill in the areas specified in [Parameters of the nodes.config file \[See page 0\]](#) with your specific network information.  
If you have additional nodes, complete each node within the `nodes.config` file in the same way.

Edit only the parts of the `nodes.config` file that are explicitly discussed in [Parameters of nodes.config \[See page 0\]](#). If you delete quotation marks, commas, or other parts of the code, it may cause setup to fail.

## Step 5: Configure the nodes

Configure the nodes in the `nodes.config` file using the `set-config` command.

Run `$ cat nodes.config | tscli cluster set-config` in your terminal.

If the command returns an error, refer to [set-config error recovery \[See page 36\]](#).

```
$ cat nodes.config | tscli cluster set-config

Connecting to local node-scout
Setting up hostnames for all nodes
Setting up networking interfaces on all nodes
Setting up hosts file on all nodes
Setting up IPMI configuration
Setting up NTP Servers
Setting up Timezone
Done setting up ThoughtSpot
```

## Step 6: Confirm node configuration

Use the `get-config` command to confirm node configuration.

Your output may look similar to the following:

```
$ tscli cluster get-config

{
    "ClusterId": "",
    "ClusterName": "",
    "DataNetmask": "255.255.252.0",
    "DataGateway": "192.168.4.1",
    "IPMINetmask": "255.255.252.0",
    "IPMIGateway": "192.168.4.1",
    "Timezone": "America/Los_Angeles",
    "NTPServers": "0.centos.pool.ntp.org,1.centos.pool.ntp.or
g,2.centos.pool.ntp.org,3.centos.pool.ntp.org",
    "DNS": "192.168.2.200,8.8.8.8",
    "SearchDomains": "example.company.com",
    "Nodes": {
        "ac:1f:6b:8a:77:f6": {
            "NodeId": "ac:1f:6b:8a:77:f6",
            "Hostname": "Thoughtspot-server1",
            "DataIface": {
                "Name": "eth2",
                "IPv4": "192.168.7.70"
            },
            "IPMI": {
                "IPv4": "192.168.5.70"
            }
        }
    }
}
```

## Install the cluster

Next, [install your cluster. \[See page 33\]](#)

# Install ThoughtSpot Clusters on the SMC Appliance

**Summary:** Install your clusters on the SMC appliance.

Install the cluster using the release tarball. Installation takes approximately one hour. Make sure you can connect to ThoughtSpot remotely. If you can, you can run the installer on your local computer.

Refer to your welcome letter from ThoughtSpot to find the link to download the release tarball. If you have not received a link to download the release tarball, open a support ticket at [ThoughtSpot Support](#) [See page 0] to access the release tarball.

## Step 1. Run the Installer

1. Copy the downloaded release tarball to `/home/admin`. Run `scp <release-number>.tar.gz admin@<hostname>:/home/admin/<file-name>`.

Note the following parameters:

- `release-number` is the release number of your ThoughtSpot installation, such as `6.0`, `5.3`, `5.3.1`, and so on.
- `hostname` is your specific hostname.
- `file-name` is the name of the tarball file on your local machine.

```
$ scp 0.0.tar.gz admin@hostname:/home/admin/file-name
```

2. Create the cluster.

Run `tscli cluster create <release-number>`.

```
$ tscli cluster create 6.0.tar.gz
```

3. Edit the output using your specific cluster information. For more information on this process, refer to [Using the cluster create command](#) [See page 0] and [Parameters of the cluster](#)

create [command \[See page 0\]](#).

The cluster installer automatically reboots all the nodes after the install. Wait at least 15 minutes for the installation process to complete. The system is rebooting, which takes a few minutes.

Log into any node to check the current cluster status, using the command `tscli cluster status`.

## Step 2. Check Cluster Health

After you install the cluster, check its status using the `tscli cluster status` command.

```
$ tscli cluster status
Cluster: RUNNING
Cluster name      : thoughtspot
Cluster id       : 1234X11111
Number of nodes : 3
Release          : 6.0
Last update      = Wed Oct 16 02:24:18 2019
Heterogeneous Cluster : False
Storage Type     : HDFS

Database: READY
Number of tables in READY state: 2185
Number of tables in OFFLINE state: 0
Number of tables in INPROGRESS state: 0
Number of tables in STALE state: 0
Number of tables in ERROR state: 0

Search Engine: READY
Has pending tables. Pending time = 1601679ms
Number of tables in KNOWN_TABLES state: 1934
Number of tables in READY state: 1928
Number of tables in WILL_REMOVE state: 0
Number of tables in BUILDING_AND_NOT_SERVING state: 0
Number of tables in BUILDING_AND_SERVING state: 128
Number of tables in WILL_NOT_INDEX state: 0
```

## Step 3. Finalize Installation

After the cluster status changes to “Ready,” sign into the ThoughtSpot application on your browser.

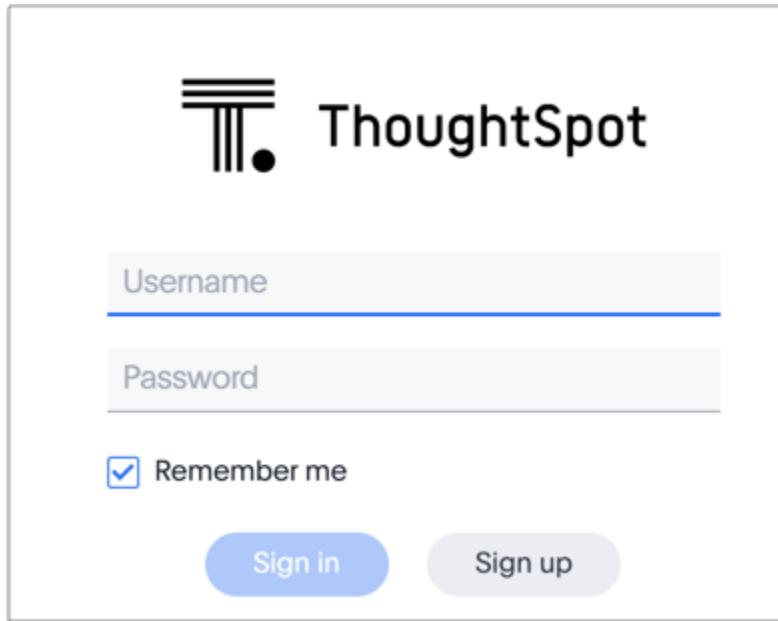
Follow these steps:

1. Start a browser from your computer.
2. Enter your secure IP information on the address line.

`https://<IP-address>`

3. If you don’t have a security certificate for ThoughtSpot, you must bypass the security warning to proceed:
  - Click **Advanced**
  - Click **Proceed**
4. The ThoughtSpot sign-in page appears.
5. In the [ThoughtSpot sign-in window \[See page 35\]](#), enter admin credentials, and click **Sign in**.

If you do not know the admin credentials, ask your network administrator. ThoughtSpot recommends changing the default admin password.



ThoughtSpot's sign-in window

## Error recovery

### Set-config error recovery

If you get a warning about node detection when you run the `set-config` command, restart the node-scout service.

Your error may look something like the following:

```
Connecting to local node-scout
WARNING: Detected 0 nodes, but found configuration for only 1 nodes.
Continuing anyway. Error in cluster config validation: [] is not a valid link-local IPv6 address for node: 0e:86:e2:23:8f:76
Configuration failed.
Please retry or contact support.
```

Restart the node-scout service with the following command.

```
$ sudo systemctl restart node-scout
```

Ensure that you restarted the node-scout by running `sudo systemctl status node-scout`. Your output should specify that the node-scout service is active. It may look something like the following:

```
$ sudo systemctl status node-scout
● node-scout.service - Setup Node Scout service
  Loaded: loaded (/etc/systemd/system/node-scout.service; enabled; vendor preset: disabled)
  Active: active (running) since Fri 2019-12-06 13:56:29 PS
          T; 4s ago
```

Next, retry the set-config command.

```
$ cat nodes.config | tscli cluster set-config
```

The command output should no longer have a warning.

# Overview

You can install a ThoughtSpot cluster on a hardware appliance, cloud service, or VMware appliance.

Your ThoughtSpot installation cannot mix node types. For example, you can have either hardware or VMware nodes, but not both. You can, however, have a cloud cluster for development and use an appliance for production.

This guide instructs you how to prepare each of the following:

- [Hardware appliance \[See page 39\]](#)
- [Amazon Web Services \(AWS\) EC2 \[See page 80\]](#)
- [Microsoft Azure \[See page 104\]](#)
- [Google Cloud Platform \(GCP\) \[See page 127\]](#)
- [VMware \[See page 152\]](#)

After you configure your nodes, you can contact [ThoughtSpot Support \[See page 184\]](#) by phone, mail, email, or by filing a support ticket.

# Hardware appliance overview

## Summary: What is in the box.

The ThoughtSpot appliance hardware will be installed in a rack in your data center. This section describes the typical physical configuration.

## Hardware provided by ThoughtSpot

When your ThoughtSpot appliance arrives, the following items will be included:

Item Name	UOM	Qty
Round Hole to Sq Hole Adapter Kit (For Slide Rail Management)	Each	1
Power Cord, C13 to C14, 6 feet	Each	2
Power Cord, C13 to NEMA 5-15, 6 feet <sup>1</sup> <b>This power cord is not included with the Haswell platform.</b>	Each	2
Document, Rack Rail Installation, TS-2000	Each	1
TS-2000 Quick Start Guide	Each	1
Bezel Assembly, TS-2000	Each	1
Slide Rail Kit	Each	1
Appliance (containing 1-4 nodes, depending on ordered configuration)	Each	1
SFP+ Connector per ordered node (data connection)	Each	1
5m Fiber cable per ordered node (data connection)	Each	1
5m Network cable per ordered node (management connection)	Each	1

<sup>1</sup>: The supply voltage, 120 VAC, available when using a NEMA-15 power cord is an insufficient input to achieve the full power output required by the Haswell power supply. Only the C13 to C14 power cord should be used with the Haswell platform.



## Additional hardware requirements

You must supply the following items, as they will not be included with your ThoughtSpot appliance:

- Data center with proper cooling
- 2U of rack space per appliance (post depth 26.5" - 36.4")
- AC power **Attention:** Refer to [Hardware details \[See page 0\]](#) for power input requirements.
- 10GbE infrastructure (switch) - 1x port required / node
- 100MbE infrastructure (switch) - 1x port required /node
- Network cable Cat 5e/6 (node management)<sup>1</sup>
- 10G connection: SFP+ for switch side<sup>2</sup>

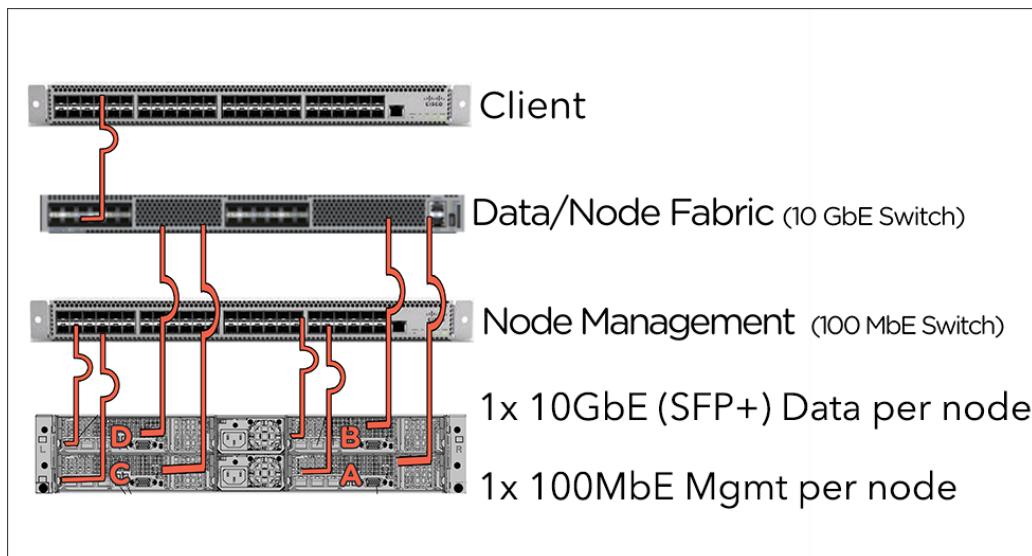
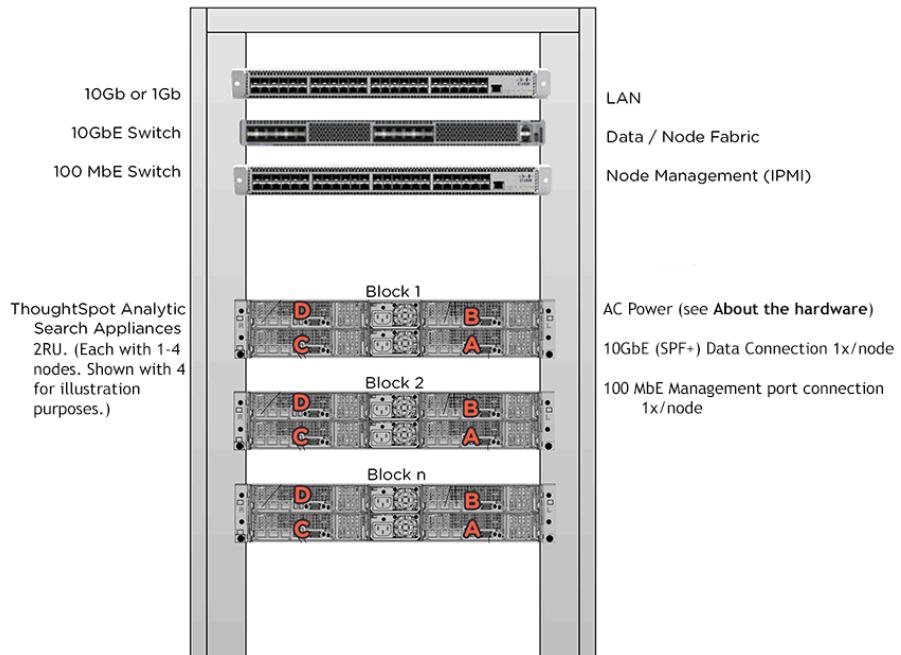
1. One 5m CAT 5e/6 network cable, per node, is provided with the appliance for management port connection. Customer supplied cable can be used if preferred.

2. One SFP+ connector is provided, per node, for the node side data connection. One 5m fiber cable is also provided. The customer must provide switch side SFP+ that is compatible with their switch. Customer supplied DAC cables or fiber cables can be used if preferred.

## Typical physical deployment

These diagrams show a physical configuration with three blocks of four nodes each. Your appliance can have 1-4 nodes, depending on the ordered configuration.

### Server Rack (42U) Back (Customer Supplied)



# Deploying on the SMC appliance

**Summary:** Follow these steps to deploy ThoughtSpot on your Super Micro Computer appliance.

Follow these steps to deploy ThoughtSpot on your Super Micro Computer (SMC) appliance.

- Step 1: Complete prerequisites [See page 20]
- Step 2: Review hardware requirements [See page 21]
- Step 3: Connect the SMC appliance [See page 24]
- Step 4: Configure nodes [See page 28]
- Step 5: Install cluster [See page 33]

## Related information

Use these references to aid you in successful installation and administration of ThoughtSpot.

- the `nodes.config` file [See page 0]
- Parameters of the `nodes.config` file [See page 0]
- Using the `cluster create` command [See page 0]
- Parameters of the `cluster create` command [See page 0]
- Deployment Overview [See page 38]
- Contact Support [See page 184]

# Prerequisites

**Summary:** Complete these prerequisites before installing your ThoughtSpot clusters on the SMC appliance.

## Installation Prerequisites

Ensure that you have the following items, information, and understanding of policies before you begin deploying ThoughtSpot on your SMC appliance.

- Appliance Port Location [See page 25], to locate data and IPMI ports.
- Data center with proper environment controls, such as cooling.
- AC power
- 10GbE switch, with enabled IPv6 broadcast and multicast. You need one for each node.
- 10GbE network cables, either direct attach copper (DAC) or fiber. Refer to the [Cable reference \[See page 0\]](#) for more information to decide between the two types.
- 100Mbps or 1Gbps switch for IPMI, for Out of Band Management. You need one for each node.
- Cat5 network cables. You need one for each node.
- Rack space of 2U or 3.5 inches for each appliance, and a power strip
- Monitor and keyboard
- 10G connection: SFP+ for the switch side
- Networking information: for data, management IPs, DNS, timezone, and default gateway IP. Contact your network administrator for this information, and fill out the ThoughtSpot site survey so that you have a quick reference before beginning the install process.
- Network policies [See page 172], to determine the ports you need to have open for your cluster.

## Review hardware requirements

Next, [review hardware requirements \[See page 21\]](#).

# Hardware Requirements

**Summary:** Learn about your SMC hardware before deploying ThoughtSpot.

## About the Hardware

You can deploy ThoughtSpot on two different appliance hardware platforms: Haswell and Skylake. Both of the platforms provide the same performance. Refer to [Haswell and Skylake hardware details \[See page 21\]](#) for details on their physical differences.

Details	Haswell	Skylake
<b>Dimensions</b>	2 RU chassis (17.25" x 3.47" x 28.5" (WxHxD))	2 RU chassis (17.6" x 3.47" x 28.75" (WxHxD))
<b># of nodes</b>	Populated with 1 to 4 nodes	Populated with 1 to 4 nodes
<b>Node specifications</b>	Each node is independent and consists of a server board (removable from rear), 1x 200GB SSD, 3x 2TB HDD	Each node is independent and consists of a server board (removable from rear), 1x 240GB SSD, 3x 2TB HDD
<b>Max power consumption</b>	2000 W	2200 W
<b>Required power input</b>	200-240V / 11.8 - 9.8A / 50-60Hz	220-240 VAC 50-60 Hz

## Haswell front and back views

These images show the front and back views of each appliance.

The nodes on the back of both appliances are in a reverse N shape, with Node A at the bottom right and Node D at the top left.



Haswell front view



Haswell back view

The Haswell appliance shown here is not fully populated, as it only has three nodes. Your appliance may be populated with 1-4 nodes, depending on the ordered configuration. If you order less than four nodes, ThoughtSpot fills the empty slot with a filler panel.

## Skylake front and back views



Skylake front view



*Skylake back view*

The Skylake appliance shown here is fully populated with four nodes.

## Connect the appliance

Next, [connect the appliance](#). [See page 24]

# Connect the SMC appliance

**Summary:** Connect the SMC appliance before you can deploy ThoughtSpot.

After you rack and stack the appliance, it is time to configure it. If necessary, review the [Hardware Appliance Overview \[See page 39\]](#). Follow the steps in this checklist.

- Step 1: Connect switches to 10GbE ports [\[See page 0\]](#)
- Step 2: Connect IPMI ports [\[See page 0\]](#)
- Step 3: Turn on nodes [\[See page 0\]](#)
- Step 4: Log in [\[See page 0\]](#)

## Step 1: Connect switches to 10GbE ports

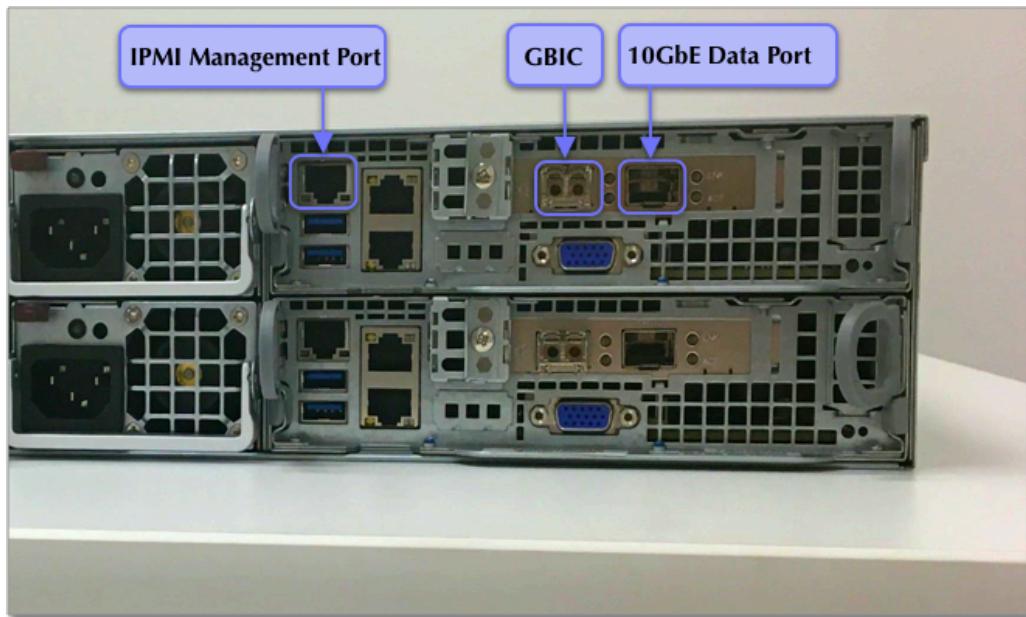
Connect the 10GbE port of each node, as illustrated in [Haswell port location \[See page 25\]](#) and [Skylake port location \[See page 25\]](#), to the 10GbE switches on your own rack, using either fiber or DAC cables.

Refer to the [Cable reference \[See page 0\]](#) for information on the cable types:

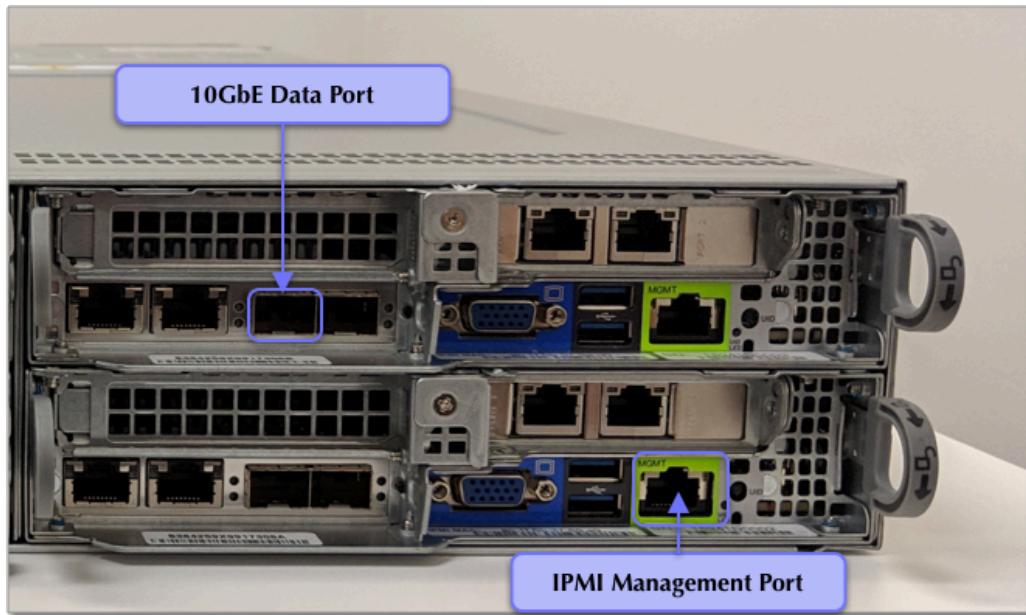
- [Fiber Cables \[See page 0\]](#)
- [DAC Cables \[See page 0\]](#)

**Note:** Ask your hardware vendor for more details about what they supply and what you need to buy.

Depending on which version of the SMC appliance you have, Haswell or Skylake, your 10GbE ports are in a different spot on the back of the appliance. Here is a picture of the back of each appliance.



Haswell port location



Skylake port location

- Connect to switches **only** the appliances (4 nodes each) that you plan to use in the cluster.
- You must power off, or disconnect from the switch, all other appliances or nodes.  
This prevents accidental configuration of incorrect nodes.
- You must connect all nodes, even if using only one node, to a 10G switch.

- Verify that the connection is valid by pinging the gateway:

Enter `ping <default-gateway-IP>`.

Ask your network administrator for your default gateway IP if you have not already listed it in your ThoughtSpot site survey.

```
$ ping <default-gateway-IP>
```

## Step 2: Connect IPMI ports

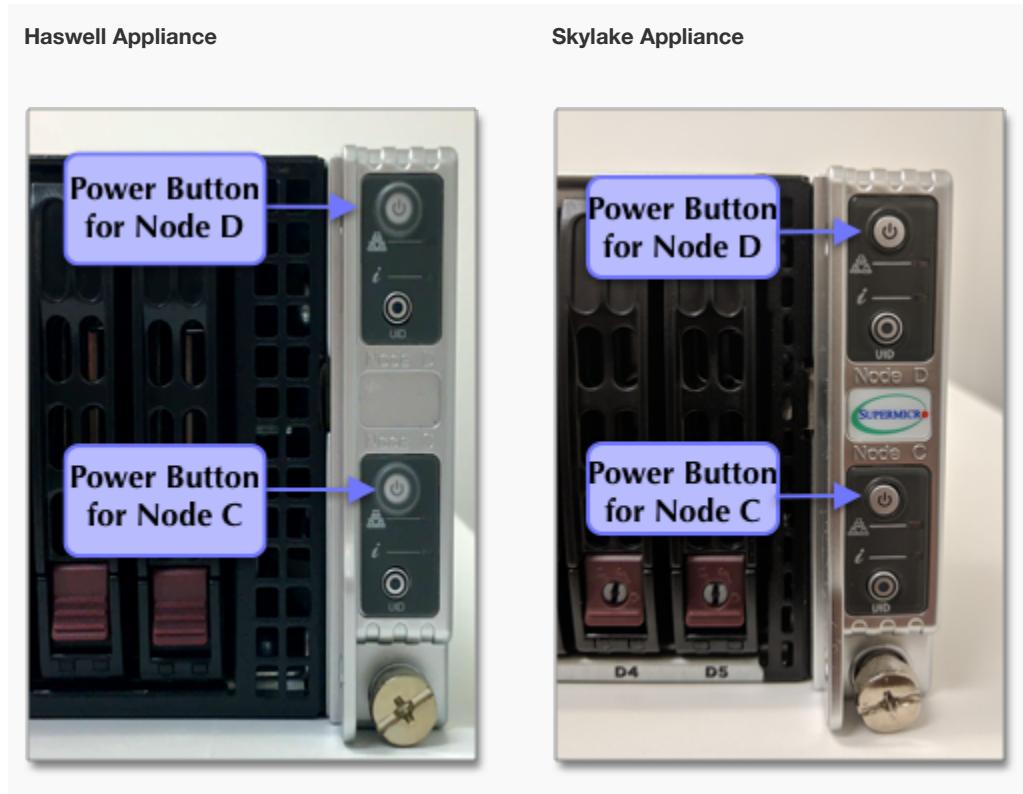
Connect the IPMI port of each node to the management switch.

See [Haswell port location \[See page 25\]](#) and [Skylake port location \[See page 25\]](#).

## Step 3: Turn on nodes

Turn on the power to the nodes by pressing the power button; see [Appliance Power Button \[See page 27\]](#).

There is one power button for each node.



## Step 4: Log in

1. Connect a keyboard and the mouse to each node on the appliance.
2. You should see a login prompt on the screen. If you don't see one or the screen isn't responsive, press the key combination **control-alt-F2** on your keyboard to bring up the login prompt.
3. Log in using the admin user credentials for the console. If you do not know the admin credentials, ask your network administrator.

## Configure nodes

Next, [configure nodes](#). [See page 28]

# Configure ThoughtSpot Nodes on the SMC Appliance

**Summary:** Configure your nodes before you can install your cluster(s).

After you connect the appliance, configure the nodes in your Mac or Windows terminal emulator. Follow the steps in this checklist.

- Step 1: SSH into your cluster [See page 0]
- Step 2: Change to the `install` directory [See page 0]
- Step 3: Get a template for network configuration [See page 0]
- Step 4: Prepare node configuration [See page 0]
- Step 5: Configure the nodes [See page 0]
- Step 6: Confirm node configuration [See page 0]

If you completed ThoughtSpot's site survey form and returned it to [ThoughtSpot Support](#) [See page 184] before ThoughtSpot shipped the appliance, the appliance may be pre-configured for your network environment and ready to install and connect to your network.

If the network configuration was not pre-set, then this step must be done as part of the installation process.

Follow these steps to determine the configuration status of your appliance.

1. SSH into your cluster. Run `ssh admin@<cluster-IP>` or `ssh admin@<hostname>`.

```
$ ssh admin@<clusterIP>
```

2. Run `tscli cluster status`.

```
$ tscli cluster status
```

3. If the output shows READY, and looks like the [cluster status output \[See page 34\]](#) in the next article, your appliance is configured.
4. Skip to [Finalize installation \[See page 35\]](#).

If your status is not READY, continue with the installation process outlined below.

## Step 1: SSH into your cluster

SSH into your cluster with admin credentials.

1. Run the command `ssh admin@<cluster-IP>` or `ssh admin@<hostname>` on the command line.

Replace `clusterIP` or `hostname` with your specific network information.

```
$ ssh admin@<clusterIP>
```

2. Enter your admin password when prompted.

Ask your network administrator if you don't know the password.

## Step 2: Change to the install directory

In your terminal, change directory to `/home/admin/install` by running the command `cd /home/admin/install`. If your `/install` subdirectory does not exist, you may have to use the `/home/admin` directory.

```
$ cd /home/admin/install
```

## Step 3: Get a template for network configuration

Run the `tscli cluster get-config` command to get a template for network configuration. Redirect it to the file `nodes.config`. You can find more information on this process in the [nodes.config file reference \[See page 0\]](#).

```
$ tscli cluster get-config |& tee nodes.config
```

## Step 4: Prepare node configuration

1. Add your specific network information for the nodes in the `nodes.config` file, as demonstrated in the [autodiscovery of one node example \[See page 0\]](#).
2. Fill in the areas specified in [Parameters of the nodes.config file \[See page 0\]](#) with your specific network information.  
If you have additional nodes, complete each node within the `nodes.config` file in the same way.

Edit only the parts of the `nodes.config` file that are explicitly discussed in [Parameters of nodes.config \[See page 0\]](#). If you delete quotation marks, commas, or other parts of the code, it may cause setup to fail.

## Step 5: Configure the nodes

Configure the nodes in the `nodes.config` file using the `set-config` command.

Run `$ cat nodes.config | tscli cluster set-config` in your terminal.

If the command returns an error, refer to [set-config error recovery \[See page 36\]](#).

```
$ cat nodes.config | tscli cluster set-config

Connecting to local node-scout
Setting up hostnames for all nodes
Setting up networking interfaces on all nodes
Setting up hosts file on all nodes
Setting up IPMI configuration
Setting up NTP Servers
Setting up Timezone
Done setting up ThoughtSpot
```

## Step 6: Confirm node configuration

Use the `get-config` command to confirm node configuration.

Your output may look similar to the following:

```
$ tscli cluster get-config

{
    "ClusterId": "",
    "ClusterName": "",
    "DataNetmask": "255.255.252.0",
    "DataGateway": "192.168.4.1",
    "IPMINetmask": "255.255.252.0",
    "IPMIGateway": "192.168.4.1",
    "Timezone": "America/Los_Angeles",
    "NTPServers": "0.centos.pool.ntp.org,1.centos.pool.ntp.or
g,2.centos.pool.ntp.org,3.centos.pool.ntp.org",
    "DNS": "192.168.2.200,8.8.8.8",
    "SearchDomains": "example.company.com",
    "Nodes": {
        "ac:1f:6b:8a:77:f6": {
            "NodeId": "ac:1f:6b:8a:77:f6",
            "Hostname": "Thoughtspot-server1",
            "DataIface": {
                "Name": "eth2",
                "IPv4": "192.168.7.70"
            },
            "IPMI": {
                "IPv4": "192.168.5.70"
            }
        }
    }
}
```

## Install the cluster

Next, [install your cluster. \[See page 33\]](#)

# Install ThoughtSpot Clusters on the SMC Appliance

**Summary:** Install your clusters on the SMC appliance.

Install the cluster using the release tarball. Installation takes approximately one hour. Make sure you can connect to ThoughtSpot remotely. If you can, you can run the installer on your local computer.

Refer to your welcome letter from ThoughtSpot to find the link to download the release tarball. If you have not received a link to download the release tarball, open a support ticket at [ThoughtSpot Support](#) [See page 0] to access the release tarball.

## Step 1. Run the Installer

1. Copy the downloaded release tarball to `/home/admin`. Run `scp <release-number>.tar.gz admin@<hostname>:/home/admin/<file-name>`.

Note the following parameters:

- `release-number` is the release number of your ThoughtSpot installation, such as `6.0`, `5.3`, `5.3.1`, and so on.
- `hostname` is your specific hostname.
- `file-name` is the name of the tarball file on your local machine.

```
$ scp 0.0.tar.gz admin@hostname:/home/admin/file-name
```

2. Create the cluster.

Run `tscli cluster create <release-number>`.

```
$ tscli cluster create 6.0.tar.gz
```

3. Edit the output using your specific cluster information. For more information on this process, refer to [Using the cluster create command](#) [See page 0] and [Parameters of the cluster](#)

`create` command [See page 0].

The cluster installer automatically reboots all the nodes after the install. Wait at least 15 minutes for the installation process to complete. The system is rebooting, which takes a few minutes.

Log into any node to check the current cluster status, using the command `tscli cluster status`.

## Step 2. Check Cluster Health

After you install the cluster, check its status using the `tscli cluster status` command.

```
$ tscli cluster status
Cluster: RUNNING
Cluster name      : thoughtspot
Cluster id       : 1234X11111
Number of nodes : 3
Release          : 6.0
Last update      = Wed Oct 16 02:24:18 2019
Heterogeneous Cluster : False
Storage Type     : HDFS

Database: READY
Number of tables in READY state: 2185
Number of tables in OFFLINE state: 0
Number of tables in INPROGRESS state: 0
Number of tables in STALE state: 0
Number of tables in ERROR state: 0

Search Engine: READY
Has pending tables. Pending time = 1601679ms
Number of tables in KNOWN_TABLES state: 1934
Number of tables in READY state: 1928
Number of tables in WILL_REMOVE state: 0
Number of tables in BUILDING_AND_NOT_SERVING state: 0
Number of tables in BUILDING_AND_SERVING state: 128
Number of tables in WILL_NOT_INDEX state: 0
```

## Step 3. Finalize Installation

After the cluster status changes to “Ready,” sign into the ThoughtSpot application on your browser.

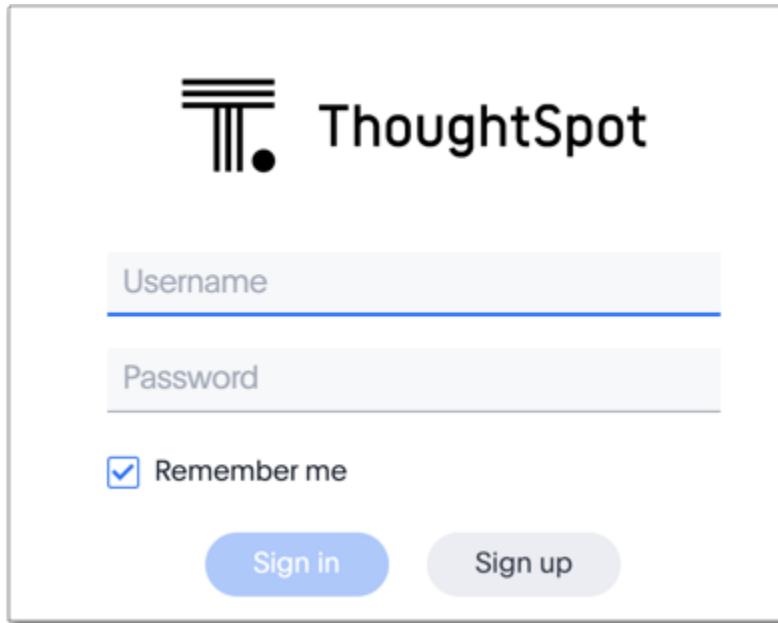
Follow these steps:

1. Start a browser from your computer.
2. Enter your secure IP information on the address line.

`https://<IP-address>`

3. If you don’t have a security certificate for ThoughtSpot, you must bypass the security warning to proceed:
  - Click **Advanced**
  - Click **Proceed**
4. The ThoughtSpot sign-in page appears.
5. In the [ThoughtSpot sign-in window \[See page 35\]](#), enter admin credentials, and click **Sign in**.

If you do not know the admin credentials, ask your network administrator. ThoughtSpot recommends changing the default admin password.



ThoughtSpot's sign-in window

## Error recovery

### Set-config error recovery

If you get a warning about node detection when you run the `set-config` command, restart the node-scout service.

Your error may look something like the following:

```
Connecting to local node-scout
WARNING: Detected 0 nodes, but found configuration for only 1 nodes.
Continuing anyway. Error in cluster config validation: [] is not a valid link-local IPv6 address for node: 0e:86:e2:23:8f:76
Configuration failed.
Please retry or contact support.
```

Restart the node-scout service with the following command.

```
$ sudo systemctl restart node-scout
```

Ensure that you restarted the node-scout by running `sudo systemctl status node-scout`. Your output should specify that the node-scout service is active. It may look something like the following:

```
$ sudo systemctl status node-scout
● node-scout.service - Setup Node Scout service
  Loaded: loaded (/etc/systemd/system/node-scout.service; enabled; vendor preset: disabled)
  Active: active (running) since Fri 2019-12-06 13:56:29 PS
          T; 4s ago
```

Next, retry the set-config command.

```
$ cat nodes.config | tscli cluster set-config
```

The command output should no longer have a warning.

# Deploying on the Dell appliance

**Summary:** Follow these steps to deploy ThoughtSpot on your Dell appliance.

Follow the steps in this checklist to deploy ThoughtSpot on your Dell appliance.

- Step 1: Complete installation prerequisites [See page 4]
- Step 2: Review hardware requirements [See page 5]
- Step 3: Connect your appliance [See page 6]
- Step 4: Configure management settings [See page 9]
- Step 5: Configure nodes [See page 11]
- Step 6: Install cluster [See page 14]

## Related information

Use these references to aid you in successful installation and administration of ThoughtSpot.

- the `nodes.config` file [See page 0]
- Parameters of the `nodes.config` file [See page 0]
- Using the `cluster create` command [See page 0]
- Parameters of the `cluster create` command [See page 0]
- Cable Reference [See page 0]
- ThoughtSpot Documentation [See page 0]
- Contact Support [See page 184]

# Prerequisites

**Summary:** Complete these prerequisites to deploy ThoughtSpot on your Dell appliance.

## Installation prerequisites

Ensure that you have the following items, information, and understanding of policies before you begin installing your Dell 6420 appliance.

- 10gbE switch with IPv6 broadcast and multicast enabled. You need one switch for each node.
- Data center with proper environment controls, such as cooling.
- AC power
- 10G connection: SFP+ for the switch side
- 10GbE network cables, either direct attach copper (DAC) or fiber. See [Cable Reference \[See page 0\]](#) for more information to decide between the two types.
- 10bps switch for connection to the iDRAC (Out of Band Management) port
- Cat5 network cables. You need one for each node.
- Rack space of 2U or 3.5 inches for each appliance, and a power strip
- Monitor and keyboard
- Networking information, for data, management IPs, DNS, timezone, and default gateway IP. Contact your network administrator for this information, and fill out the ThoughtSpot site survey so that you have a quick reference.

## Review hardware requirements

Next, [review hardware requirements. \[See page 5\]](#)

# Hardware Requirements

**Summary:** Learn about the Dell hardware before deploying ThoughtSpot.

## About the Hardware

These pictures show the front and back view of the Dell C6420 appliance.



Dell front view



Dell back view

## Connect appliance

Next, [connect the appliance](#). [See page 6]

# Connect the Appliance

**Summary:** Connect your Dell appliance before you can deploy ThoughtSpot.

After you rack and stack the appliance, it is time to configure it. Follow the steps in this checklist.

- Step 1: Connect switches to 10GbE ports [See page 0]
- Step 2: Connect iDRAC ports [See page 0]
- Step 3: Connect a keyboard and monitor [See page 0]
- Step 4: Turn on nodes [See page 0]

## Step 1: Connect switches to 10GbE ports

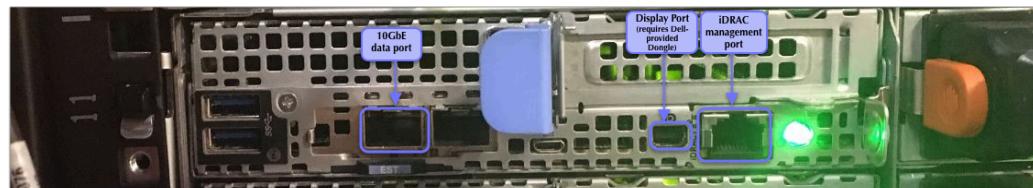
Connect the 10GbE port of each node, as illustrated in [Dell Port Location](#) [See page 6], to the 10GbE switches on your own rack, using either fiber or DAC cables.

Refer to the [Cable reference](#) [See page 0] for information on the cable types:

- [Fiber Cables](#) [See page 0]
- [DAC Cables](#) [See page 0]

**Note:** Ask your hardware vendor for more details about what they supply and what you need to buy.

The ports are on the back of the Dell appliance.



*Dell port location*

- Connect to switches **only** the appliances (4 nodes each) that you plan to use in your cluster.
- You must power off, or disconnect from the switch, any other nodes or appliances.  
This prevents accidental configuration of incorrect nodes.
- You must connect all nodes, even if using only one node, to a 10GbE switch.

**Note:** You need at least three nodes for high availability (HA). Each appliance can have up to four nodes.

## Step 2: Connect iDRAC ports

Connect the iDRAC management ports of each node to the management switch.

See [Dell Port Location \[See page 6\]](#).

## Step 3: Connect a keyboard and monitor

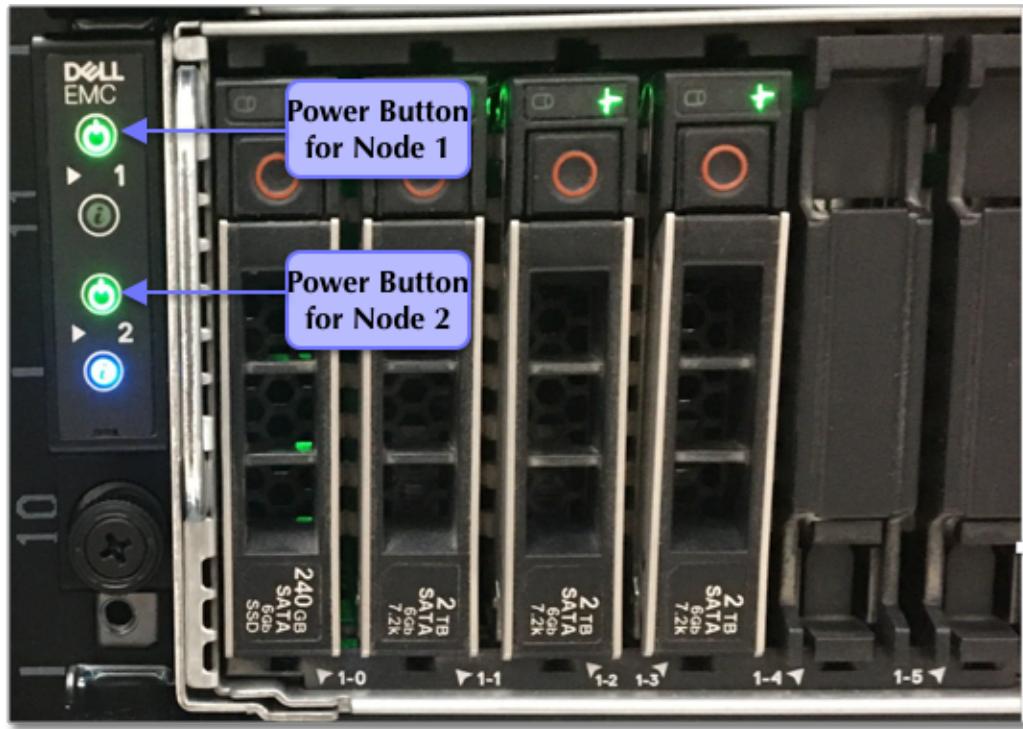
Connect a keyboard and monitor to the appliance. You need these to initially configure the appliance, and you can disconnect them later. Use the adapter Dell provides. Plug it into the Display Port shown in [Dell Port Location \[See page 6\]](#), and plug the monitor in on the other side of the adapter.



*Dell-provided display to VGA adapter*

## Step 4: Turn on nodes

Turn on power for the nodes by pressing the power button for each one; see [Dell Power Buttons \[See page 8\]](#).



Dell power buttons

There is one power button for each node.

## Configure the management settings

Next, [configure the management settings. \[See page 9\]](#)

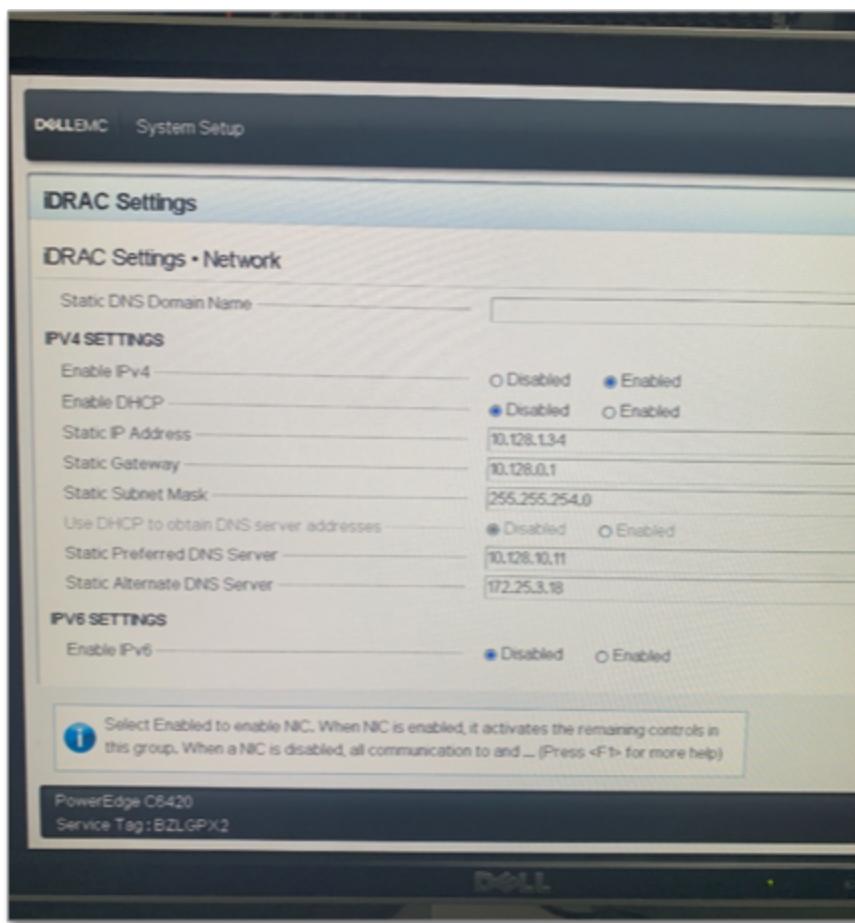
# Configure the Dell Management Settings

**Summary:** Configure the management settings for Dell before you can deploy ThoughtSpot.

Input your specific network information to configure the management settings for your Dell appliance.

Refer to [Dell Management Configuration \[See page 10\]](#). If you need additional guidance, view [Dell Support \[See page 0\]](#) for this product.

1. **Open the iDRAC settings modal** Before the node boots, a screen appears on your monitor with several options. Click F11 to enter the Boot Manager.
2. **Press F2** Click F2 when the option to do so appears on your screen.
3. **Select iDRAC** In the Bios setup screen, there are several options. Select **iDRAC** to configure your iDRAC management settings.
4. **Select network configuration** From the iDRAC settings options, select **network**.
5. **Fill out the iDRAC settings form** Add your specific network information for the IP address, Gateway, and Netmask in the empty boxes. DNS information is optional. Refer to your ThoughtSpot site survey for a quick reference, and ask your network administrator for help if you have not filled out the site survey yet.
  - For **Enable IPv4**, select **enabled**.
  - For **Enable DHCP**, select **disabled**.
  - For **Enable IPv6**, select **disabled**.
6. **Save changes and reboot** Follow the prompts on the monitor to save changes to the management settings form, exit, and reboot the system.
7. **Log into ThoughtSpot** After the system reboots, the login page appears. Log in as an administrator. Ask your network administrator if you do not know the admin credentials.



Dell Management Configuration

## Configure nodes

Next, [configure nodes](#). [See page 11]

# Configure Nodes

**Summary:** Configure ThoughtSpot nodes on your Dell appliance.

After you connect the appliance, a command line appears on your console. Configure the nodes on this command line. Follow the steps in this checklist.

- Step 1: Get a template for network configuration [See page 0]
- Step 2: Prepare node configuration [See page 0]
- Step 3: Configure the nodes [See page 0]
- Step 4: Confirm node configuration [See page 0]

## Step 1: Get a template for network configuration

Make sure you have logged into your cluster. If you have not, use admin credentials to log into your cluster.

Run the `tscli cluster get-config` command to get a template for network configuration. Redirect it to the file `nodes.config`.

You can find more information on this process in the `nodes.config` file reference [See page 0].

```
$ tscli cluster get-config |& tee nodes.config
```

## Step 2: Prepare node configuration

1. Add your specific network information for the nodes in the `nodes.config` file, as demonstrated in the [autodiscovery of one node example \[See page 0\]](#).
2. Fill in the areas specified in [Parameters of the nodes.config file \[See page 0\]](#) with your specific network information.  
If you have additional nodes, complete each node within the `nodes.config` file in the same way.

Do not edit any part of the `nodes.config` file except the sections described in [Parameters of the nodes.config file \[See page 0\]](#). If you delete quotation marks, commas, or other parts of the code, it may cause setup to fail.

## Step 3: Configure the nodes

Configure the nodes in the `nodes.config` file using the `set-config` command.

Run `$ cat nodes.config | tscli cluster set-config` in your terminal.

If the command returns an error, refer to [set-config error recovery \[See page 0\]](#).

```
$ cat nodes.config | tscli cluster set-config

Connecting to local node-scout
Setting up hostnames for all nodes
Setting up networking interfaces on all nodes
Setting up hosts file on all nodes
Setting up IPMI configuration
Setting up NTP Servers
Setting up Timezone
Done setting up ThoughtSpot
```

## Step 4: Confirm node configuration

Use the `get-config` command to confirm node configuration.

Your output may look similar to the following:

```
$ tscli cluster get-config

{
    "ClusterId": "",
    "ClusterName": "",
    "DataNetmask": "255.255.252.0",
    "DataGateway": "192.168.4.1",
    "IPMINetmask": "255.255.252.0",
    "IPMIGateway": "192.168.4.1",
    "Timezone": "America/Los_Angeles",
    "NTPServers": "0.centos.pool.ntp.org,1.centos.pool.ntp.or
g,2.centos.pool.ntp.org,3.centos.pool.ntp.org",
    "DNS": "192.168.2.200,8.8.8.8",
    "SearchDomains": "example.company.com",
    "Nodes": {
        "ac:1f:6b:8a:77:f6": {
            "NodeId": "ac:1f:6b:8a:77:f6",
            "Hostname": "Thoughtspot-server1",
            "DataIface": {
                "Name": "eth2",
                "IPv4": "192.168.7.70"
            },
            "IPMI": {
                "IPv4": "192.168.5.70"
            }
        }
    }
}
```

## Install your cluster

Next, [install your cluster. \[See page 14\]](#)

# Install Cluster

**Summary:** Install your ThoughtSpot cluster(s) on your Dell appliance.

Install the cluster using the release tarball. Installation takes approximately one hour. Make sure you can connect to ThoughtSpot remotely. If you can, you can run the installer on your local computer.

Refer to your welcome letter from ThoughtSpot to find the link to download the release tarball. If you do not have a link to download the release tarball, open a support ticket at [ThoughtSpot Support \[See page 184\]](#) to access the release tarball.

Follow the steps in this checklist to install your cluster.

- Step 1: Run the installer [See page 0]
- Step 2: Check cluster health [See page 0]
- Step 3: Finalize installation [See page 0]

## Step 1: Run the installer

1. Copy the downloaded release tarball to `/home/admin`:

Run `scp <release-number> admin@<hostname>:/home/admin/<file-name>`. Note the following parameters:

- `release-number` is the version of ThoughtSpot on your cluster, in the form `0.0.tar.gz`. For example, `6.0.tar.gz`.
- `hostname` is your network hostname. Ask your network administrator if you do not know your hostname.
- `file-name` is the name of the tarball file on your local computer.

```
$ scp 0.0.tar.gz admin@<hostname>:/home/admin/<file-name>
```

2. Create the cluster using `tscli cluster create <release-number>`.

```
$ tscli cluster create 0.0.tar.gz
```

3. Edit the output using your specific cluster information. For more information on this process, refer to [Using the cluster create command \[See page 0\]](#) and [Parameters of the cluster create command \[See page 0\]](#).

The cluster installer automatically reboots all the nodes after the install. Wait at least 15 minutes for the installation process to complete. The system is rebooting, which takes a few minutes. Log into any node to check the current cluster status, using the command `tscli cluster status`.

## Step 2: Check cluster health

After you install the cluster, check its status using the `tscli cluster status` command.

Your output may look something like the following:

```
$ tscli cluster status
Cluster: RUNNING
Cluster name      : thoughtspot
Cluster id       : 1234X11111
Number of nodes  : 3
Release          : 6.0
Last update      = Wed Oct 16 02:24:18 2019
Heterogeneous Cluster : False
Storage Type     : HDFS

Database: READY
Number of tables in READY state: 2185
Number of tables in OFFLINE state: 0
Number of tables in INPROGRESS state: 0
Number of tables in STALE state: 0
Number of tables in ERROR state: 0

Search Engine: READY
Has pending tables. Pending time = 1601679ms
Number of tables in KNOWN_TABLES state: 1934
Number of tables in READY state: 1928
Number of tables in WILL_REMOVE state: 0
Number of tables in BUILDING_AND_NOT_SERVING state: 0
Number of tables in BUILDING_AND_SERVING state: 128
Number of tables in WILL_NOT_INDEX state: 0
```

## Step 3: Finalize installation

After the cluster status changes to **READY**, sign into the ThoughtSpot application on your browser.

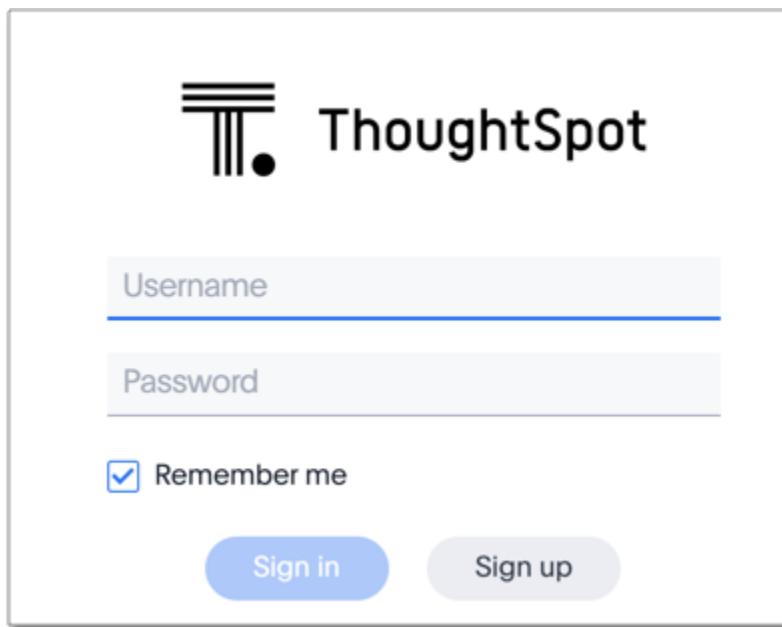
Follow these steps:

1. Start a browser from your computer.
2. Enter your secure IP information on the address line.

`https://<IP-address>`

3. If you don't have a security certificate for ThoughtSpot, you must bypass the security warning to proceed:
  - Click **Advanced**
  - Click **Proceed**

4. The ThoughtSpot login page appears.
5. In the [ThoughtSpot sign-in window \[See page 17\]](#), enter admin credentials, and click **Sign in**.  
ThoughtSpot recommends changing the default admin password.



ThoughtSpot's sign-in window

## Error recovery

### Set-config error recovery

If you get a warning about node detection when you run the `set-config` command, restart the node-scout service.

Your error may look something like the following:

```
Connecting to local node-scout
WARNING: Detected 0 nodes, but found configuration for
only 1 nodes.
Continuing anyway. Error in cluster config validation: [] is not a valid link-local
IPv6 address for node: 0e:86:e2:23:8f:76 Configuration failed.
Please retry or contact support.
```

Restart the node-scout service with the following command.

```
$ sudo systemctl restart node-scout
```

Ensure that you restarted the node-scout by running `sudo systemctl status node-scout`. Your output should specify that the node-scout service is active. It may look something like the following:

```
$ sudo systemctl status node-scout
● node-scout.service - Setup Node Scout service
  Loaded: loaded (/etc/systemd/system/node-scout.service; enabled; vendor preset: disabled)
  Active: active (running) since Fri 2019-12-06 13:56:29 PST; 4s ago
```

Next, retry the `set-config` command.

```
$ cat nodes.config | tscli cluster set-config
```

The command output should no longer have a warning.

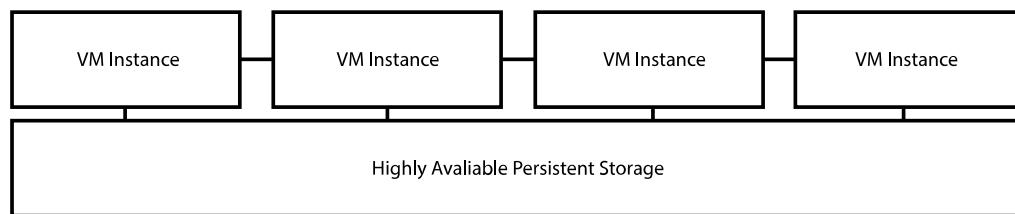
# Cloud overview

ThoughtSpot can currently be deployed in the following cloud provider environments:

- [Amazon Web Services \(AWS\) EC2 \[See page 80\]](#)
- [Microsoft Azure \[See page 104\]](#)
- [Google Cloud Platform \(GCP\) \[See page 127\]](#)

The ThoughtSpot cloud deployment consists of cloud compute (VM) instances and an underlying persistent storage layer. The number of instances required for a cloud deployment is based on the size of the data that needs to be analyzed in ThoughtSpot. The instances act as a distributed cluster of nodes to serve query responses.

	AWS	Azure	GCP
Compute	Virtual machines deployed in your AWS VPC	Virtual machines in your Azure VNET	Virtual machines in your GCP VPC
Persistent storage	Deployment options: 1. Elastic Block Storage 2. S3 + Elastic Block Storage	Premium SSD Managed Disks	Zonal SSD persistent disk



To determine the number of instances and the persistent storage requirements to provision your cluster, please refer to the available instance types for your cloud service provider in the next section.

## ThoughtSpot cloud instance types

Refer to the following guidelines for how to set up ThoughtSpot on each cloud service:

- [AWS instance types \[See page 0\]](#)
- [Azure instance types \[See page 104\]](#)

- GCP instance types [See page 127]

## Reducing your cloud infrastructure costs

ThoughtSpot recommends following these guidelines to help reduce the cost of your cloud deployment.

### Use small and medium instance types when applicable

For ThoughtSpot customers who are deploying their instance with lower data sizes (<=100 GB), ThoughtSpot supports “small” (20 GB data) and “medium” (100 GB data) instance types, as provided at the links above, to help reduce the costs of cloud infrastructure. These are instances with lower CPU/RAM sizes (16/32 vCPU and 128 GB/256 RAM). Advanced lean configuration is required before any data can be loaded onto these instances.

Please contact ThoughtSpot support for assistance with this configuration.

### Shut down and restart your cluster

If you do not need your ThoughtSpot cluster to be up and running 24/7, you can shut down your cluster and restart it during normal usage hours to save on the infrastructure costs of running ThoughtSpot instances in cloud provider environments.

To shut down and restart your cluster, do the following in the tscli:

1. Ensure there are no issues with the cluster by running: `$ tscli cluster check`

The above command should return no failure messages.

2. Stop the cluster by running: `$ tscli cluster stop`

Wait until you see the message: “Done stopping cluster”

3. Go to your cloud provider’s console and shut down all of the ThoughtSpot VMs in your cluster.

4. When you are ready to use ThoughtSpot again, start up your node VMs.

5. Restart your cluster by running: `$ tscli cluster start`

You should see the message: "Started pre-existing cluster"

Depending on the size of your cluster, you may need to wait several minutes before the system is up and running. Make sure you budget for this startup time to ensure that the system is fully operational before you expect people to use it.

6. Ensure that your cluster is ready for use by running: `$ tscli cluster status`

The following messages are displayed to indicate your cluster is up and running:

```
... Cluster: RUNNING  
Database: READY  
Search Engine: READY
```

## Automating your cloud deployment

You can automate your deployment, using the free tools in the [ThoughtSpot Cloud Deployment GitHub repository](#) [See page 0].

For more information about automating your cloud deployment, read [Deploying ThoughtSpot in the Cloud Using Terraform and Ansible](#) [See page 0].

# AWS configuration options

**Summary:** Your instances require specific configurations of memory, CPU, storage, and networking capacity.

ThoughtSpot can be deployed in your AWS environment by deploying compute (VM) instances in your Amazon VPC as well as an underlying persistent storage infrastructure. Currently two configuration modes are supported by ThoughtSpot:

- Mode 1: Compute VMs + EBS-only persistent storage
- Mode 2: Compute VMs + EBS and S3 persistent storage

The cost of infrastructure for deploying ThoughtSpot is cheaper when using S3. However, there are differences in where data is loaded, as well as in the backup and restore procedure. For assistance in choosing the best mode for your organization, contact your ThoughtSpot representative. For more information on purchasing ThoughtSpot in AWS, see: [ThoughtSpot Pricing \[See page 0\]](#).

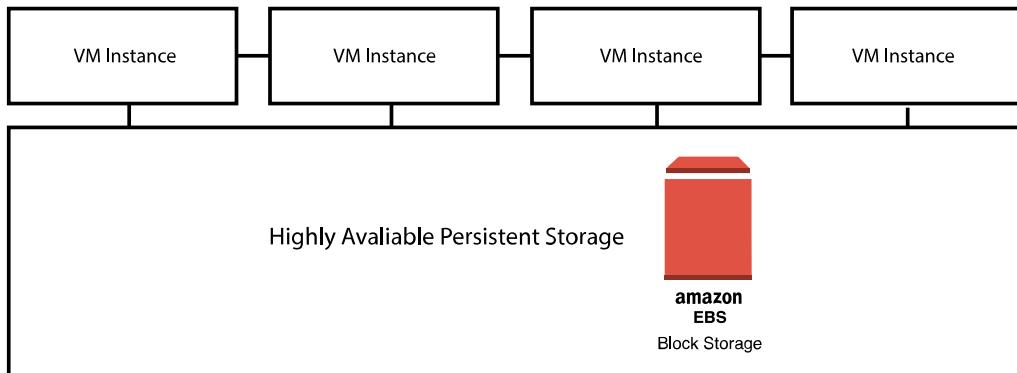
All AWS VMs in a ThoughtSpot cluster must be in the same availability zone (and therefore, also in the same region). ThoughtSpot does not support deploying VMs in the same cluster across availability zones. For more information, see [Regions and Availability Zones \[See page 0\]](#) in Amazon's AWS documentation.

## ThoughtSpot AWS instance types

The following sections contain the supported and recommended instance types for a ThoughtSpot AWS deployment. When setting up your cluster in AWS, use the information here to select an instance type, configure the number of instances required for the storage you need, and add data volumes to your cluster.

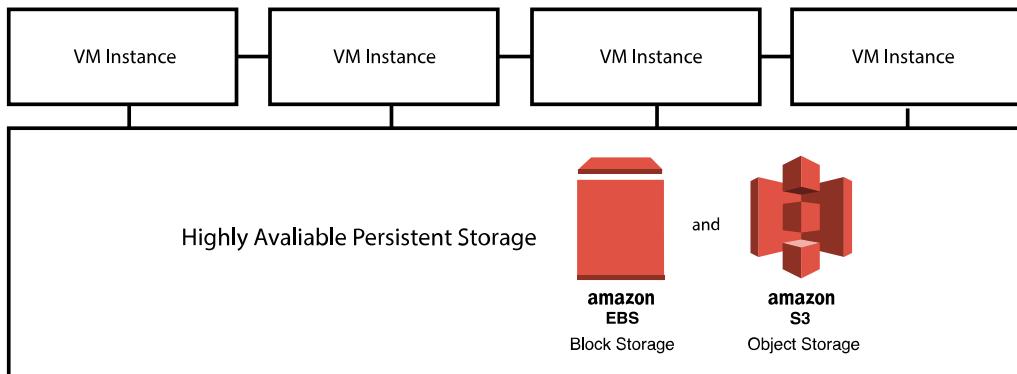
For example: If you were deploying a total cluster data size of 1 TB using the standard r5.16xlarge instance type, you would need 4 instances (VMs), because the per-VM user data capacity of that instance type is 250 GB. If you were deploying EBS-only data volumes, you would need 2x1 TB data volumes per VM.

### VMs with EBS-only persistent storage



Per VM user data capacity	Instance type	CPU/RAM	Recommended per-VM EBS volume
20 GB	r4.4xlarge, r5.4xlarge	16/122, 16/ 128	2X 400 GB
100 GB	r4.8xlarge, r5.8xlarge	32/244, 32/ 256	2X 400 GB
192 GB	m5.24xlarge	96/384	2X 1 TB
250 GB	r4.16xlarge, r5.16xlarge	64/488, 64/ 512	2x 1 TB
384 GB	r5.24xlarge	96/768	2X 1.5 TB

### VMs with EBS and S3 persistent storage



Per VM user data capacity	Instance type	CPU/RAM	Recommended per-VM EBS volume
20 GB	r4.4xlarge, r5.4xlarge	16/122, 16/ 128	1x 500 GB
100 GB	r4.8xlarge, r5.8xlarge	32/244, 32/ 256	1x 500 GB
192 GB	m5.24xlarge	96/384	1x 500 GB
250 GB	r4.16xlarge, r5.16xlarge	64/488, 64/ 512	1x 500 GB
384 GB	r5.24xlarge	96/768	1x 500 GB

**Note:** The S3 bucket size is approximately equal to the size of the user data.

## Related information

- [EC2 instance types \[See page 0\]](#)
- [EC2 pricing \[See page 0\]](#)
- [EBS pricing \[See page 0\]](#)
- [Placement groups \[See page 0\]](#)

# Set up AWS Resources for ThoughtSpot

**Summary:** After you determine your configuration options, you must set up your virtual machines (VMs) in AWS using a ThoughtSpot Amazon Machine Image (AMI).

## Overview of ThoughtSpot setup in AWS

Follow these steps to set up your ThoughtSpot VMs in AWS.

- 1. Gain access to ThoughtSpot's AMI. [See page 0]
- 2. Choose a VM instance configuration recommended by ThoughtSpot. [See page 0]
- 3. Set up your Amazon S3 bucket (optional). [See page 0]
- 4. Set up your ThoughtSpot cluster in AWS. [See page 0]
- 5. Configure security groups. [See page 0]
- 6. Open the required network ports for communication for the nodes in your cluster and end users. [See page 0]
- 7. Configure your nodes and install the cluster. [See page 0]

## About the ThoughtSpot AMI

An Amazon Machine image (AMI) is a preconfigured template that provides the information required to launch an instance. You must specify an AMI when you launch an instance in AWS.

To make deployment easy, the ThoughtSpot AMI includes a custom ThoughtSpot image, with the following components:

- A template for the root volume for the instance, such as an operating system, an appliance server, and applications.
- Launch permissions that control which AWS accounts can use the AMI to launch instances.
- A block device mapping that specifies the volumes to attach to the instance when it launches.

The ThoughtSpot AMI has specific applications on a CentOS base image. The AMI includes the EBS volumes necessary to install ThoughtSpot in AWS. When you launch an EC2 instance from this image, it automatically sizes and provisions the EBS volumes. The base AMI includes 200 GB (xvda), 2X400 GB (xvdb), and SSD (gp2). It contains the maximum number of disks to handle a fully loaded VM.

## Prerequisites

To install and launch ThoughtSpot, you must have the following:

- Familiarity with Linux administration, and a general understanding of cloud deployment models.
- The necessary AWS Identity and Access Management (IAM) users and roles assigned to you to access and deploy the various AWS resources and services as defined in the Required AWS components section that follows.

For more information about IAM, see: [What Is IAM? \[See page 0\]](#) in Amazon's AWS documentation.

### Required AWS components

- An AWS Virtual Private Cloud (VPC). An AWS VPC is a virtual network specifically for your AWS account. It exists in all availability zones in your region, but you can specify a local zone for even lower latency. For more details, see [VPCs and Subnets \[See page 0\]](#) in Amazon's AWS documentation.
- A ThoughtSpot AMI. For details, see [Setting up your EC2 instances \[See page 0\]](#).
- AWS security groups. For required open ports, see [Network Policies \[See page 172\]](#).
- AWS VM instances. For instance type recommendations, see [ThoughtSpot AWS instance types \[See page 80\]](#).
- EBS volumes for data storage.
- (Optional) If deploying with S3 persistent storage, you need one S3 bucket for each ThoughtSpot cluster.

### Setting up your EC2 instances

1. Sign into your [AWS account \[See page 0\]](#).
2. Copy the following ThoughtSpot public AMI to your AWS region:

**AMI Name:** thoughtspot-image-20191031-8ae15008336-prod

**AMI ID:** ami-06276ece42ed96994

**Region:** N. California

**Note:** The AMI is based in the N. California region. You may have to temporarily switch to the N. California region on the AWS website to access it. Then you can return to your own region.

**Note:** The AMI is backward-compatible with ThoughtSpot releases 5.1.x - 6.0.x.

3. Choose the appropriate EC2 instance type: See [ThoughtSpot AWS instance types \[See page 80\]](#) for help choosing the correct instance type for your cluster.
4. Networking requirements: 10 GbE network bandwidth is needed between the VMs. Ensure that you have this bandwidth.
5. Ensure that all your VMs are on the same Amazon Virtual Private Cloud (VPC) and subnetwork. This is necessary because VMs that are part of a cluster need to be accessible by each other. Additional external access may be required to bring data in/out of the VMs to your network.
6. Determine the number of EC2 instances you need: Based on the datasets, this number will vary. Refer to [ThoughtSpot AWS instance types \[See page 0\]](#) for recommended nodes for a given data size.

**Note:** Staging larger datasets (> 50 GB per VM), may require provisioning additional attached EBS volumes that are SSD (gp2).

## Setting up your Amazon S3 bucket (recommended)

If you are going to deploy your cluster using the S3-storage option, you must set up that bucket before you set up your cluster. Contact [ThoughtSpot Support \[See page 0\]](#) to find out if your specific cluster size can benefit from the S3 storage option.

Follow these steps to set up an S3 bucket in AWS.

1. On the AWS website, navigate to the S3 service dashboard by clicking **Services**, then **S3**.

2. Make sure the selected region in the top-right corner of the dashboard is the same region in which you plan to set up your cluster.
3. Click **Create bucket**.
4. In the **Name and region** page, enter a name for your bucket.
5. Select your region.
6. Click **Next**.
7. On the **Properties** page, click **Next**.
8. On the Configure options page, ensure that **Block all public access** is selected.
9. Click **Next**.
10. On the Set permissions page, click **Create bucket**.

## Encrypting your data at rest

ThoughtSpot makes use of EBS for the data volumes to store persistent data (in the EBS deployment model) and the boot volume (in the EBS and S3 deployment models). ThoughtSpot recommends that you encrypt your data volumes prior to setting up your ThoughtSpot cluster. If you are using the S3 persistent storage model, you can encrypt the S3 buckets using SSE-S3 or AWS KMS.

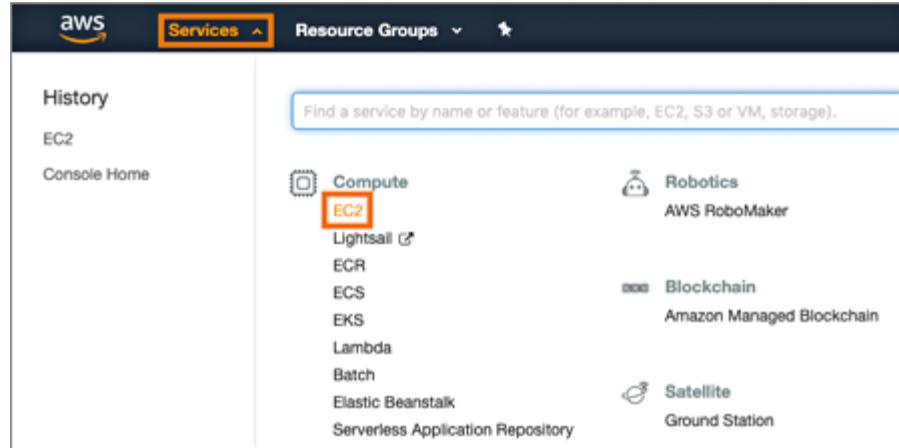
For more information on encryption supported with AWS:

- For EBS, see [Amazon EBS Encryption \[See page 0\]](#) in Amazon's AWS documentation.
- For S3, see [Amazon S3 Default Encryption for S3 Buckets \[See page 0\]](#) in Amazon's AWS documentation.

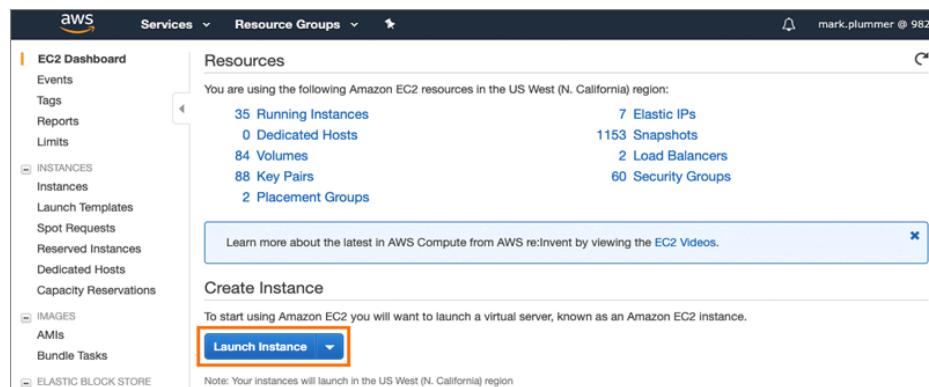
## Setting up your ThoughtSpot cluster

To set up a ThoughtSpot cluster in AWS, follow these steps:

1. On the AWS website, navigate to the EC2 service dashboard by clicking **Services**, then **EC2**.



2. Make sure your selected region is correct in the top-right corner of the dashboard. If not, select your region. Let ThoughtSpot support know if you change your region.
3. Start the process of launching a VM by clicking **Launch Instance**.



4. Click the **My AMIs** tab and search **ThoughtSpot** to find the ThoughtSpot AMI.
5. Click **Select**.
6. On the **Choose an Instance Type** page, select a ThoughtSpot-supported instance type. (See [ThoughtSpot AWS instance types \[See page 0\]](#).)
7. Click **Next: Configure Instance Details**.
8. Configure the instances by choosing the number of EC2 instances you need. The instances must be on the same VPC and subnetwork. ThoughtSpot sets up the instances to be in the same ThoughtSpot cluster.

**S3 storage setting:** If you are going to use the S3 storage option, ThoughtSpot recommends that you restrict access to a specific S3 bucket. Create a new IAM role that provides access to the specific bucket, and select it. For details on that, click **Create new IAM role**.

9. Click **Next: Add Storage**. Add the required storage based on your instance type (either EBS volumes or S3), and the amount of data you are deploying. For specific storage requirements, refer to [ThoughtSpot AWS instance types \[See page 0\]](#).
10. When you are done modifying the storage size, click **Next: Add Tags**.
11. Set a name for tagging your instances. This tag allows you to identify your instance more easily.

## Configure security groups

1. Click **Next: Configure Security Group**.
2. Select an existing security group to attach new security groups to so that it meets the security requirements for ThoughtSpot.

 **Tip: Security setting for ThoughtSpot**

- The VMs need intragroup security, i.e. every VM in a cluster must be accessible from one another. For easier configuration, ThoughtSpot recommends that you enable full access between VMs in a cluster.
- Additionally, more ports must be opened on the VM to provide data staging capabilities to your network. Check [Network policies \[See page 0\]](#) to determine the minimum required ports you must open for your ThoughtSpot appliance.

3. Click **Review and Launch**.
4. After you have reviewed your instance launch details, click **Launch**.
5. Choose a key pair. A key pair consists of a public and private key used to encrypt and decrypt login information. If you don't have a key pair, you must create one. Without a key pair, you cannot SSH into the AWS instance later on.

6. Click **Launch Instances**. Wait a few minutes for it to fully start up. After it starts, it appears on the EC2 console.

## Prepare the VMs

Before installing a ThoughtSpot cluster, an administrator must [prepare the VMs. \[See page 90\]](#)

# Prepare AWS VMs for ThoughtSpot

**Summary:** Prepare the VMs before installing your ThoughtSpot cluster(s).

1. SSH into a VM.

```
ssh admin@<VM-IP>
```

2. Run `sudo /usr/local/scaligent/bin/prepare_disks.sh` to configure the VMs.

**Warning:** Make sure you migrate any data off the disks. This command wipes the disks clean if they are not empty already.

```
$ sudo /usr/local/scaligent/bin/prepare_disks.sh
```

3. Configure the VM based on your specific network information. Refer to your site-survey or ask your network administrator for that information.
4. Run `df -h` to confirm configuration.

```
$ df -h
```

5. Repeat these steps for each of your VMs.

When complete, your storage is mounted and ready for use with your cluster.

When the setup is complete, you can load data into ThoughtSpot for search analytics.

## Open the required network ports

If you have not already opened the required network ports, see [Network policies \[See page 172\]](#) to determine which ports to open.

## Install Cluster

Next, you must configure your nodes and install your cluster. Follow the steps in [Installing AWS \[See page 92\]](#).

## Related information

[EC2 Best Practices \[See page 0\]](#)

[Loading data from an AWS S3 bucket \[See page 0\]](#)

# Configure ThoughtSpot Nodes in AWS

**Summary:** Prepare to install your ThoughtSpot cluster by configuring nodes.

Before you can install a ThoughtSpot cluster in AWS, you must configure your nodes.

## Installation Prerequisites

Ensure the successful creation of the virtual machines (VMs) before you install the ThoughtSpot cluster in AWS:

1. **Review configuration options** Refer to [AWS configuration options \[See page 80\]](#) for detailed instance specs.
2. **Create the instance** Refer to [Set up AWS for ThoughtSpot \[See page 83\]](#) to create and launch your instance.
3. **Review required ports** Refer to [Network Policies \[See page 172\]](#) to view the required ports for successful operation of ThoughtSpot.

## Configure Nodes

After creating the instance, you must configure the nodes. Follow the steps in this checklist.

- Step 1: Log into your cluster [\[See page 0\]](#)
- Step 2: Get a template for network configuration [\[See page 0\]](#)
- Step 3: Prepare node configuration [\[See page 0\]](#)
- Step 4: Configure the nodes [\[See page 0\]](#)
- Step 5: Confirm node configuration [\[See page 0\]](#)

### Step 1: Log into your cluster

Log into your cluster with admin credentials from Terminal on a Mac or a terminal emulator on Windows.

Ask your network administrator if you do not know the admin credentials.

1. Run `ssh admin@<clusterIP>` or `ssh admin@<hostname>`.

Replace `clusterIP` or `hostname` with your specific network information.

```
$ ssh admin@<clusterIP>
```

2. Enter your admin password at the prompt.

Ask your network administrator if you don't know the password.

**Note:** The password does not appear on the screen as you type it.

## Step 2: Get a template for network configuration

Run the `tscli cluster get-config` command to get a template for network configuration for the new cluster. Redirect it to the file `nodes.config`.

You can find more information on this process in the `nodes.config` [file reference \[See page 0\]](#).

```
$ tscli cluster get-config |& tee nodes.config
```

## Step 3: Prepare node configuration

1. Add your specific network information for the nodes in the `nodes.config` file, as demonstrated in the [autodiscovery of one node example \[See page 0\]](#).
2. Fill in the areas specified in [Parameters of the nodes.config file \[See page 0\]](#) with your specific network information.

If you have additional nodes, complete each node within the `nodes.config` file in the same way.

Do not edit any part of the `nodes.config` file except the sections described in [Parameters of the nodes.config file \[See page 0\]](#). If you delete quotation marks, commas, or other parts of the code, it may cause setup to fail.

## Step 4: Configure the nodes

Configure the nodes in the `nodes.config` file using the `set-config` command.

1. Disable the `firewalld` service by running `sudo systemctl stop firewalld` in your terminal. The `firewalld` service is a Linux firewall that must be off for ThoughtSpot installation. After the cluster installer reboots the nodes, `firewalld` automatically turns back on.

```
$ sudo systemctl stop firewalld
```

2. To make sure you temporarily disabled `firewalld`, run `sudo systemctl status firewalld`. Your output should specify that `firewalld` is inactive. It may look something like the following:

```
$ sudo systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
    Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; vendor preset: enabled)
      Active: inactive (dead)
```

3. Run the configuration command: `$ cat nodes.config | tscli cluster set-config`.

If the command returns an error, refer to [set-config error recovery \[See page 95\]](#).

After you run the node configuration command, your output appears similar to the following:

```
$ cat nodes.config | tscli cluster set-config

Connecting to local node-scout
Setting up hostnames for all nodes
Setting up networking interfaces on all nodes
Setting up hosts file on all nodes
Setting up IPMI configuration
Setting up NTP Servers
Setting up Timezone
Done setting up ThoughtSpot
```

## Step 5: Confirm node configuration

Use the `get-config` command to confirm node configuration.

Your output may look similar to the following:

```
$ tscli cluster get-config

{
    "ClusterId": "",
    "ClusterName": "",
    "DataNetmask": "255.255.252.0",
    "DataGateway": "192.168.4.1",
    "IPMINetmask": "255.255.252.0",
    "IPMIGateway": "192.168.4.1",
    "Timezone": "America/Los_Angeles",
    "NTPServers": "0.centos.pool.ntp.org,1.centos.pool.ntp.or
g,2.centos.pool.ntp.org,3.centos.pool.ntp.org",
    "DNS": "192.168.2.200,8.8.8.8",
    "SearchDomains": "example.company.com",
    "Nodes": {
        "ac:1f:6b:8a:77:f6": {
            "NodeId": "ac:1f:6b:8a:77:f6",
            "Hostname": "Thoughtspot-server1",
            "DataIface": {
                "Name": "eth2",
                "IPv4": "192.168.7.70"
            },
            "IPMI": {
                "IPv4": "192.168.5.70"
            }
        }
    }
}
```

## Install ThoughtSpot software

Next, [install your ThoughtSpot clusters \[See page 98\]](#).

## Error recovery

### Set-config error recovery

If you get a warning about node detection when you run the `set-config` command, restart the node-scout service.

Your error may look something like the following:

```
Connecting to local node-scout
WARNING: Detected 0 nodes, but found configuration for
only 1 nodes.
Continuing anyway. Error in cluster config validation: [] is no
t a valid link-local
IPv6 address for node: 0e:86:e2:23:8f:76 Configuration failed.
Please retry or contact support.
```

Restart the node-scout service with the following command.

```
$ sudo systemctl restart node-scout
```

Ensure that you restarted the node-scout by running `sudo systemctl status node-scout`. Your output should specify that the node-scout service is active. It may look something like the following:

```
$ sudo systemctl status node-scout
● node-scout.service - Setup Node Scout service
  Loaded: loaded (/etc/systemd/system/node-scout.service; enabled; vendor preset: disabled)
  Active: active (running) since Fri 2019-12-06 13:56:29 PST; 4s ago
```

Next, retry the `set-config` command.

```
$ cat nodes.config | tscli cluster set-config
```

The command output should no longer have a warning.

## Related information

Use these references for successful installation and administration of ThoughtSpot:

- [the nodes.config file \[See page 0\]](#)
- [Parameters of the nodes.config file \[See page 0\]](#)
- [Using the cluster create command \[See page 0\]](#)

- Parameters of the `cluster create` command [See page 0]
- Deployment Overview [See page 38]
- Contact Support [See page 184]

# Install ThoughtSpot clusters in AWS

**Summary:** Learn how to install ThoughtSpot clusters in AWS.

## Prerequisites

Before you can install your ThoughtSpot clusters in AWS, complete these prerequisites.

1. **Review configuration options** Refer to [AWS configuration options \[See page 80\]](#) for detailed instance specs.
2. **Create the instance** Refer to [Set up AWS for ThoughtSpot \[See page 83\]](#) to create and launch your instance.
3. **Review required ports** Refer to [Network Policies \[See page 172\]](#) to view the required ports for successful operation of ThoughtSpot.
4. **Configure nodes** Refer to [Configure ThoughtSpot Nodes in AWS \[See page 92\]](#) to configure your nodes.

## Install ThoughtSpot Software

Install the cluster using the release tarball. The estimated installation time is one hour. Follow the steps in this checklist.

- Step 1: Run the installer [\[See page 0\]](#)
- Step 2: Check cluster health [\[See page 0\]](#)
- Step 3: Finalize installation [\[See page 0\]](#)

Refer to your welcome letter from ThoughtSpot to find the link to download the release tarball. If you do not have a link, open a support ticket at [ThoughtSpot Support \[See page 0\]](#) to request access to the release tarball.

### Step 1: Run the installer

1. Copy the downloaded release tarball to `/home/admin` using the following command:

```
$ scp <release-number>.tar.gz admin@<hostname>:/home/admin/<file-name>
```

Note the following parameters:

- `release-number` is the release number of your ThoughtSpot instance, such as 5.3, 6.0, and so on.
- `hostname` is your specific hostname.
- `file-name` is the name of the tarball file on your local computer.

2. Create the cluster.

Run `tscli cluster create` to create the cluster.

If you are using an s3 bucket for object storage, include the flag `--enable_cloud_storage=s3a`.

```
$ tscli cluster create <release-number>.tar.gz --enable_cloud_storage=s3a
```

3. Edit the output with your specific cluster information.

For more information on this process, refer to [Using the cluster create command \[See page 0\]](#) and [Parameters of the cluster create command \[See page 0\]](#).

The cluster installer automatically reboots all the nodes after a successful install. The `firewalld` service automatically turns on. At this time, the system is rebooting, which may take approximately 15 minutes.

Log into any node to check the current cluster status:

```
$ tscli cluster status
```

## Step 2: Check cluster health

After the cluster installs, check its status using the `tscli cluster status` command.

Your output may look similar to the following:

```
$ tscli cluster status
Cluster: RUNNING
Cluster name      : thoughtspot
Cluster id       : 1234X11111
Number of nodes  : 3
Release          : 6.0
Last update      = Wed Oct 16 02:24:18 2019
Heterogeneous Cluster : False
Storage Type     : HDFS

Database: READY
Number of tables in READY state: 2185
Number of tables in OFFLINE state: 0
Number of tables in INPROGRESS state: 0
Number of tables in STALE state: 0
Number of tables in ERROR state: 0

Search Engine: READY
Has pending tables. Pending time = 1601679ms
Number of tables in KNOWN_TABLES state: 1934
Number of tables in READY state: 1928
Number of tables in WILL_REMOVE state: 0
Number of tables in BUILDING_AND_NOT_SERVING state: 0
Number of tables in BUILDING_AND_SERVING state: 128
Number of tables in WILL_NOT_INDEX state: 0
```

### Step 3: Finalize installation

After the cluster status changes to `READY`, sign into ThoughtSpot on your browser. Follow these steps:

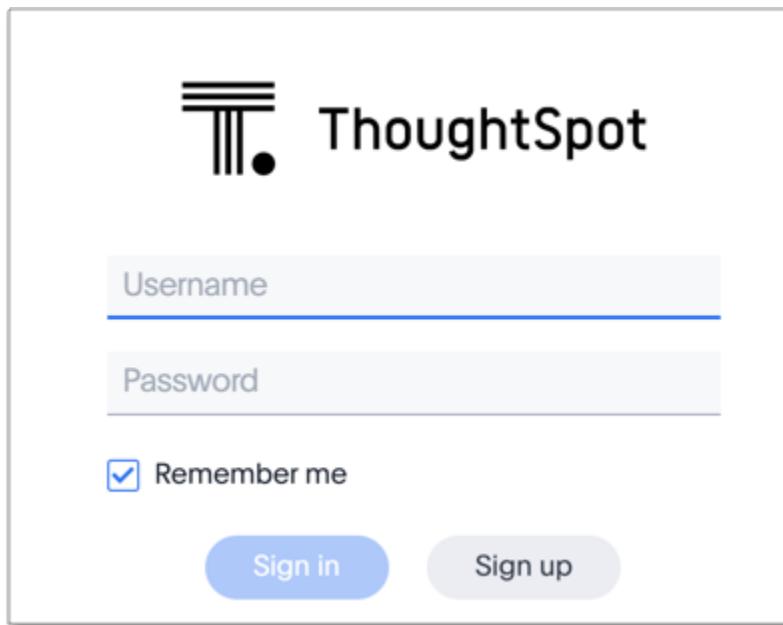
1. Start a browser from your computer.
2. Enter your secure IP information on the address line.

```
https://<IP-address>
```

3. If you don't have a security certificate for ThoughtSpot, you must bypass the security warning:
  - Click **Advanced**
  - Click **Proceed**
4. The ThoughtSpot sign-in page appears.

5. In the [ThoughtSpot sign-in window](#) [See page 101], enter admin credentials, and click **Sign in**.

ThoughtSpot recommends changing the default admin password.



*ThoughtSpot's sign-in window*

## Related information

Use these references for successful installation and administration of ThoughtSpot:

- the `nodes.config` file [See page 0]
- Parameters of the `nodes.config` file [See page 0]
- Using the `cluster create` command [See page 0]
- Parameters of the `cluster create` command [See page 0]
- Deployment Overview [See page 38]
- Contact Support [See page 184]

# Set up high availability for AWS

**Summary:** This article explains how to set up High Availability (HA) for your ThoughtSpot cluster using the AWS Elastic File System (EFS).

## Configure high availability

Follow these steps to set up High Availability (HA) for your ThoughtSpot cluster using the AWS Elastic File System (EFS).

1. Create an EFS File System that spans across different availability zones, and across different subnets. Refer to AWS documentation on [creating an EFS File System](#) [See page 0].
2. Create two ThoughtSpot clusters in each availability zone and in the subnets, where the new file system is.
3. Change the IP addresses of the cluster, if necessary.
4. Create an EFS directory in the `/home/admin` path.
5. Issue the following command to mount the new file system.

Modify the fields as necessary for your installation.

```
sudo mount -t nfs -o nfsvers=4.1,rsize=1048576,wszie=104  
8576,hard,timeo=600,retrans=2,  
      noresvport fs-f756f1ee.efs.us-wes  
t-1.amazonaws.com:/ /home/admin/efs/
```

6. Modify permissions to ensure that all clusters with EFS mount points have read and write permissions.

```
chmod 777 /home/admin/efs
```

7. On the first cluster, create a snapshot on to the EFS mount point, and back it up.

```
tscli snapshot create EfsTest HA 2
```

8. Create a backup on the cluster.

```
tscli backup create --mode full --type full  
--storage_type local EfsTest /home/a  
dmin/efs/Efs-backup
```

9. Ensure that the backup is successful, and that it can be accessed from all clusters where EFS is mounted, by listing all backups and looking for the new one.

```
tscli backup ls
```

10. Take down the first cluster instances.

11. On the second cluster, delete the existing cluster.

12. Create a new cluster by restoring from the first cluster backup. This is accessible from the EFS mount point.

```
tscli cluster restore /home/admin/EFS/Efs-backup
```

Your cluster is now successfully restored to the second cluster from the backup on the EFS, achieving HA for ThoughtSpot clusters.

## Replace a cluster

For information on how to recover from infrastructure failure scenarios, see: [Cluster replacement \[See page 0\]](#).

**⚠ Note:** At this time, ThoughtSpot does not support AWS Auto Scaling or deployment across AWS availability zones or regions.

# Azure configuration options

ThoughtSpot can be deployed in your Azure environment by deploying compute (VM) instances in your VNET as well as an underlying persistent storage infrastructure. Currently we support Premium SSD Managed Disks for persistent storage. For more information, see [Managed Disks pricing \[See page 0\]](#) in Microsoft's Azure documentation.

All Azure VMs (nodes) in a ThoughtSpot cluster must be in the same availability zone (and, therefore, also in the same region). ThoughtSpot does not support deploying VMs( nodes) of the same cluster across availability zones. For more information, see [What are Availability Zones in Azure? \[See page 0\]](#) in Microsoft's Azure documentation.

## ThoughtSpot Azure instance types

Per VM user data capacity	Instance type	CPU/RAM	Recommended per-VM Premium SSD Managed Disk volume
200 GB	E64sv3	64/432	2x1 TB
100 GB	E32sv3	32/256	2X 400 GB
20 GB	E16sv3	16/128	2X 400 GB
120 GB	D64v3	64/256	2X 1 TB

# Set up ThoughtSpot in Azure

**Summary:** After you determine your configuration options, you must set up your virtual machines using a ThoughtSpot image for Azure.

## About the ThoughtSpot image

To provision ThoughtSpot in the Azure portal, access the ThoughtSpot Virtual Machine in the Azure Marketplace.

The ThoughtSpot Virtual Machine comes provisioned with the custom ThoughtSpot image to make hosting simple. A virtual machine is a preconfigured template that provides the information required to launch an instance of ThoughtSpot. It includes the following:

- A template for the root volume for the instance (for example, an operating system, an appliance server, and applications).

The ThoughtSpot Virtual Machine has the ThoughtSpot software installed and configured, on a CentOS base image. Check with your ThoughtSpot contact to learn about the latest version of the ThoughtSpot Virtual Machine.

Due to security restrictions, the ThoughtSpot Virtual Machine does not have default passwords for the administrator users. When you are ready to obtain the password, contact [ThoughtSpot Support \[See page 184\]](#).

## Set up ThoughtSpot in Azure

Follow these steps to provision and set up the VMs and launch ThoughtSpot.

### Prerequisites

Complete these steps before launching your ThoughtSpot Virtual Machine:

1. Obtain an Azure login account.
2. Set up usage payment details with Microsoft Azure.
3. Set up a [Resource Group \[See page 106\]](#).

## Create an instance

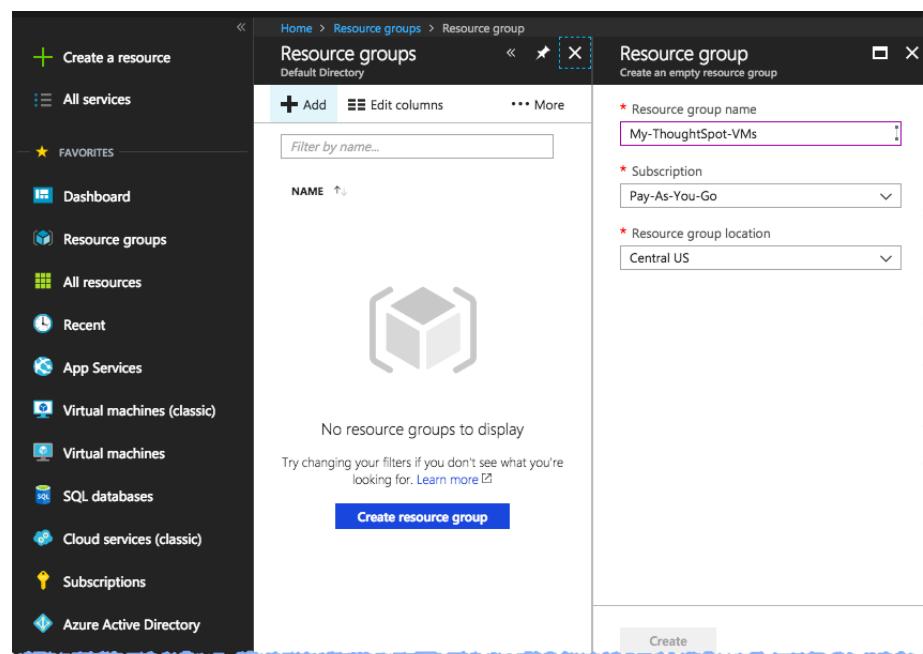
Create a resource group and a resource based on the [ThoughtSpot Virtual Machine \[See page 0\]](#) on the [Azure Marketplace \[See page 0\]](#).

1. Log into the Azure portal.

In a browser, go to <http://azure.microsoft.com> [See page 0], and log into your Azure account.

2. Create a Resource Group.

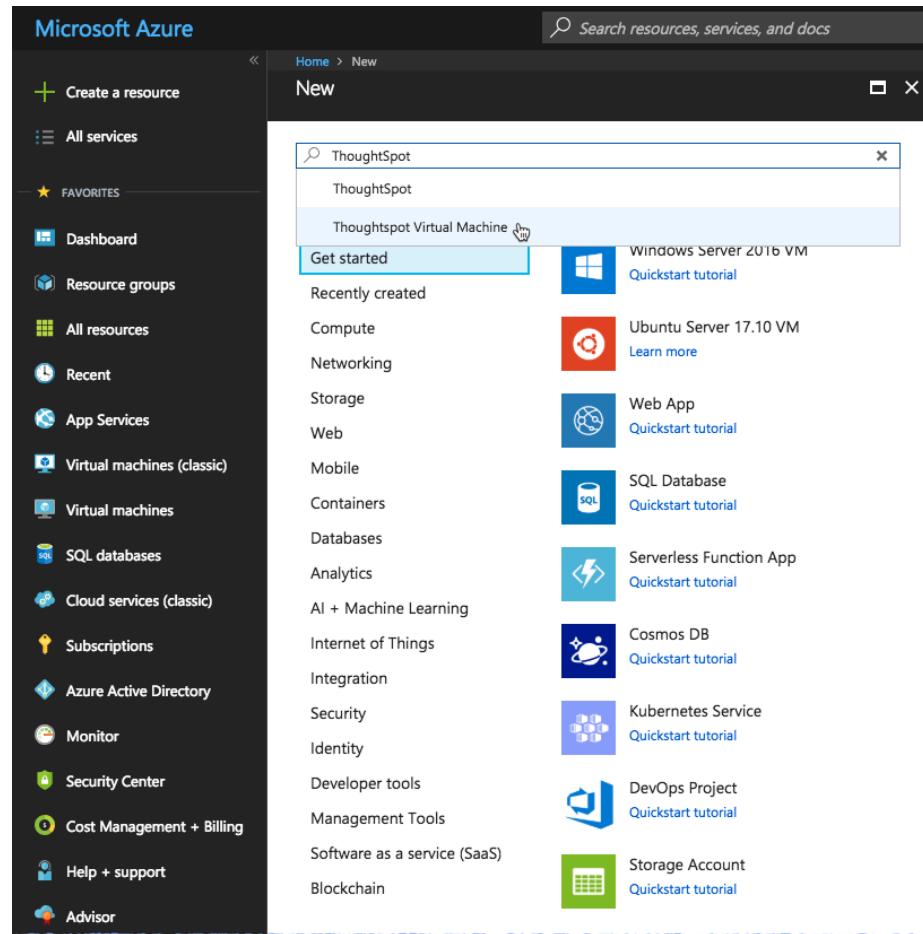
Specify a name, subscription type, and the region in which you are creating your VMs.



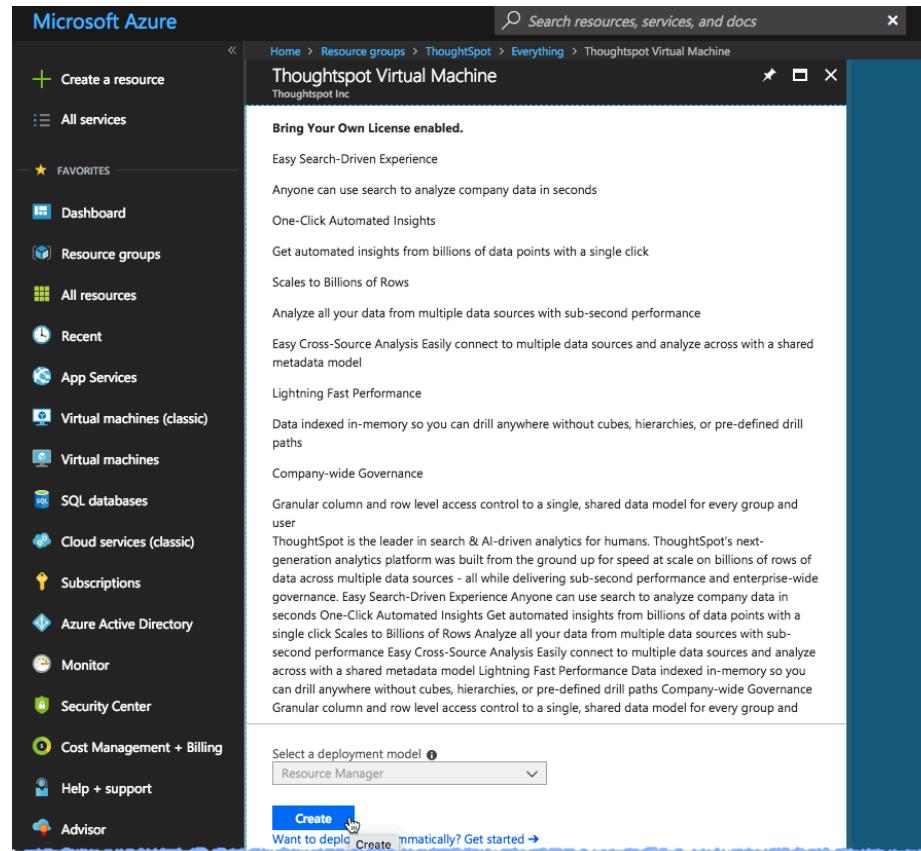
3. Next, create a resource based on the ThoughtSpot Virtual Machine.

a. Click **Create a resource**. If you already have a resource within your company, use that one.

b. Search the [Marketplace \[See page 0\]](#) for the ThoughtSpot Virtual Machine, and select it.



b. On the ThoughtSpot Virtual Machine page, click **Create**.



## Configure basic settings

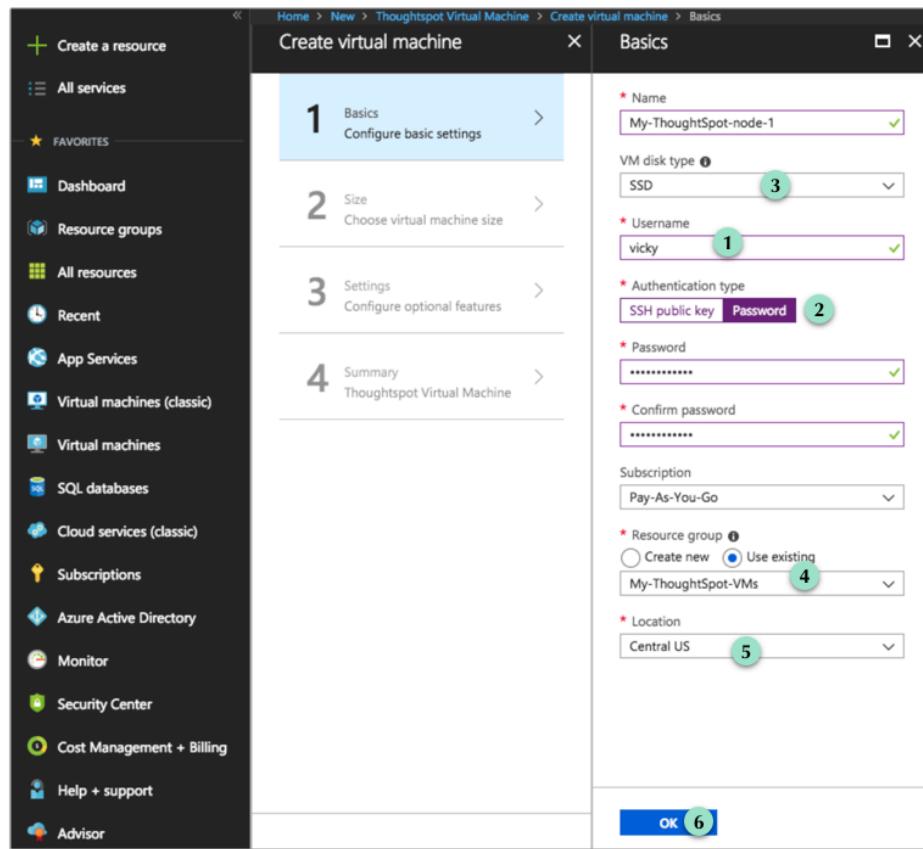
1. Provide a username for your new virtual machine.
2. Select either **SSH public key** or **Password**.
  - If you select **Password**, supply a password and confirm it by typing it again.
  - If you select **SSH public key**, contact [ThoughtSpot Support \[See page 184\]](#) for a key.
3. Choose a disk type.

**Tip:** The new Standard SSD disk types are only available for particular regions. Make sure this disk type is supported in the region you chose for your VM before selecting it.

See [Standard SSD Disks for Virtual Machine workloads \[See page 0\]](#) for more on SSD disks.

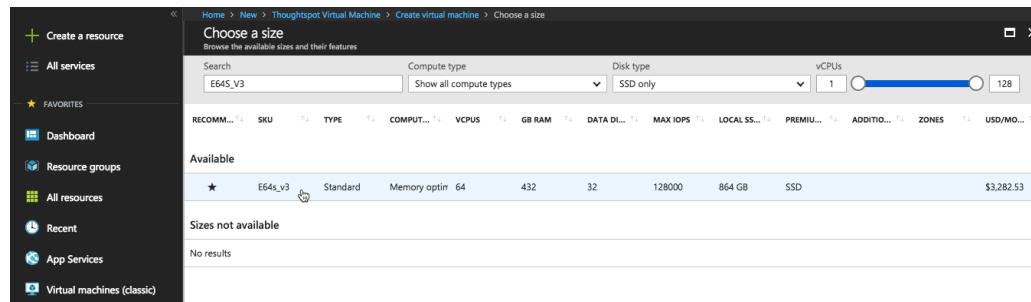
ThoughtSpot recommends the Premium SSD disks.

4. Provide a Resource Group, by clicking `existing` and selecting the one you just created.
5. Select a location.
6. Click **OK** to save the Basics, which should look similar to the following example.



### Choose a machine size

Under **Choose a size**, select `E64S_V3 standard`. For more information, refer to [Azure configuration options \[See page 104\]](#).



Configure network settings, storage, and other options

*Prerequisite:* Get the details needed for setting up the Virtual Network, Subnet, and Network Security Group from your Azure support team.

1. For storage, select **Yes to use managed disks**.
2. Under **Network**, select **Virtual network**, then **Subnet**, then **Public IP addresses**, and set those names, addresses, and ranges appropriately for your network.
3. Open the necessary Inbound and Outbound ports to ensure that the ThoughtSpot processes do not get blocked.

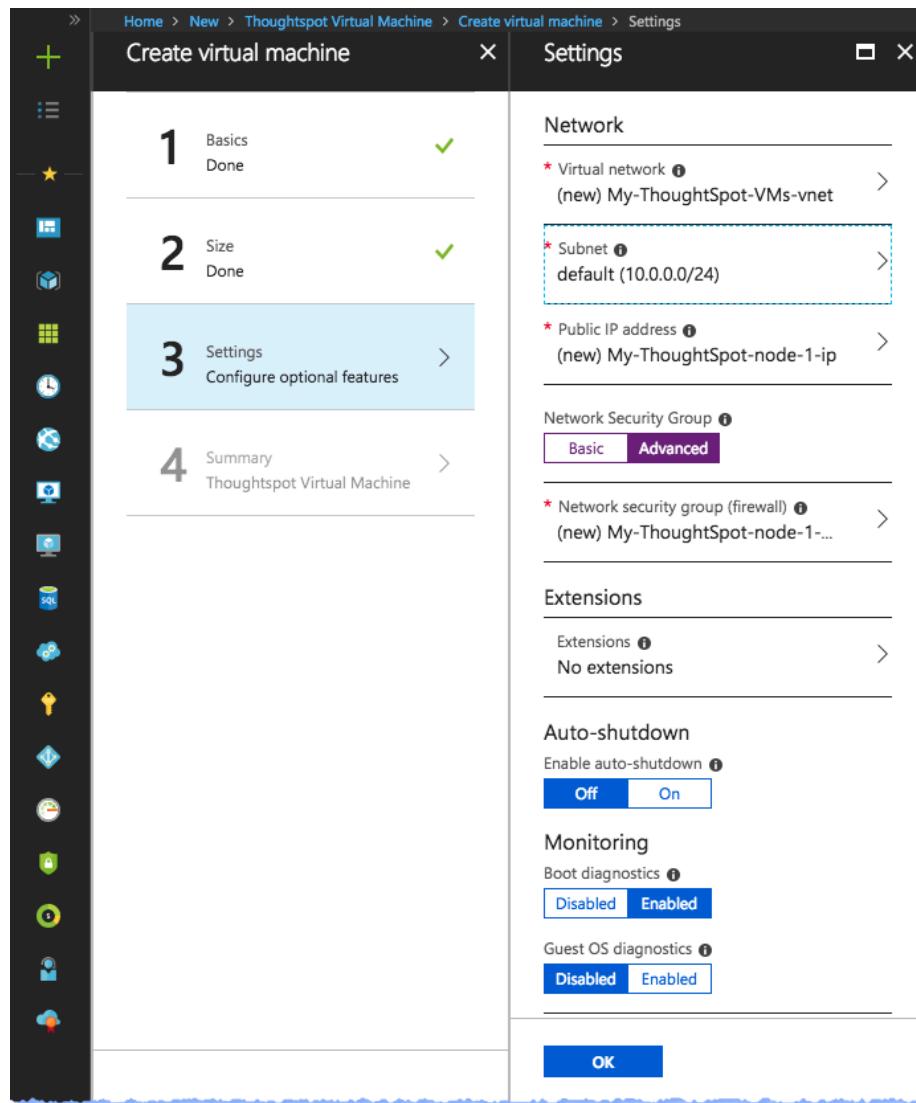
The minimum ports needed are:

Port	Protocol	Service
22	SSH	Secure Shell access
80	HTTP	Web access
443	HTTPS	Secure Web access
12345	TCP	ODBC and JDBC drivers access
2201	HTTP	Cluster Debugging
2101	HTTP	Node daemon Debugging
4001	HTTP	Data Cache Debugging

**Note:** Nodes purchased from Azure must be reachable to each other so that they can communicate and form a distributed environment. ThoughtSpot requires that these ports be accessible between nodes within a cluster. Use your discretion about whether to restrict public access or not for all nodes and all ports.

Refer to [network policies \[See page 172\]](#) for more information.

4. Configure `auto shutdown`, `monitoring`, `guest OS diagnostics`, and any other settings to your preference. If you have no preference, you can leave them on their default settings.



5. Click **OK**.

Azure will do the final validation check.

### Review the Summary

Verify that the validation check succeeded and that summary of information shown is correct. If you find errors, reconfigure as needed.

When you are satisfied with the virtual machine setup, click **Create**.

## Prepare for starting up ThoughtSpot

*Prerequisite:* To log into the VM, you need the private key that is available in the image. You can obtain this from your ThoughtSpot contact.

1. Obtain the VM's public and private IP addresses.
  - To see the public IP, click the VM name link. This will show the public IP of the VM.
  - To see the private IP click Networking (under SETTINGS on the left side of the screen).
2. In a terminal application, connect to the VM through SSH. Use the private key provided for the admin user.
  - You must file a support ticket to obtain this private key; it is necessary for the first login.
  - This key is different from the credentials, or the private keys supplied in earlier steps, which do not work in this context.

```
$ ssh admin@<VM-IP>
```

3. Update the password for both the `admin` and the `thoughtspot` users.

The command prompts you to type in a new password, and then to confirm the password.

```
$ sudo passwd admin  
Changing password for user admin  
$ sudo passwd thoughtspot  
Changing password for user thoughtspot
```

**⚠ Warning:** If you do not change the password, you cannot log back into your Azure VMs. Your private key does not work after initial installation.

4. Update the file `/etc/hosts` with all the node IP addresses for the other VMs that will be part of the ThoughtSpot cluster.

## Add Storage Disks

1. Go back to the VM and click it.
2. Add 2 SSD disks of 1TB each.
3. Click **Add data disk** and choose **Create disk from the menu**.
4. Create one mode data disk (demo-disk2) and save them both.
5. Click **Save** to add the disks to the VM.

6. Verify that the disks were added by issuing `lsblk` in your terminal application:

```
$ lsblk
```

Your result may look something like the following:

NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINT
fd0	2:0	1	4K	0	disk	
sda	8:0	0	200G	0	disk	
└─sda1	8:1	0	1G	0	part	/mntboot
└─sda2	8:2	0	20G	0	part	/
└─sda3	8:3	0	20G	0	part	/update
└─sda4	8:4	0	159G	0	part	/export
sdb	8:16	0	1T	0	disk	
└─sb1	8:17	0	1T	0	part	/mnt/resource
sdc	8:32	0	1T	0	disk	
sdd	8:48	0	1T	0	disk	
sr0	11:0	1	628K	0	rom	

7. Unmount the temporary disk by issuing the following command:

```
$ sudo umount /mnt/resource
```

8. Prepare the disks `/dev/sdc` and `/dev/sdd` for ThoughtSpot by issuing the following command:

**⚠ Warning:** Do not use the disk /dev/sdb. This disk is reserved for ThoughtSpot use.

```
$ sudo /usr/local/scaligent/bin/prepare_disks.sh /dev/sdc /dev/sdd
```

1. Check the disks' status by issuing the following command:

```
$ df -h
```

2. Repeat the steps in this section for each node in your cluster.

### Create network support settings

**☒ Tip:** All changes in this section must be re-applied each time after a cluster is created or updated. If these changes are not present, a reboot of the VMs will not have network access. So when updating these files, keep a backup to copy after any subsequent cluster creation or update.

1. SSH into one of your VMs.

```
ssh admin@<VM-IP>
```

2. Update the VM's hostname:

```
$ sudo hostnamectl set-hostname <HOSTNAME>
```

If you are using a static name, you can issue:

```
sudo hostnamectl set-hostname <HOSTNAME> --static
```

3. Update `/etc/hosts` with the IP and hostname:

```
$ sudo vi /etc/sysconfig/network-scripts/ifcfg-eth0
```

```
DEVICE=eth0 ONBOOT=yes BOOTPROTO=dhcp HWADDR=<Add eth0 M  
AC> TYPE=Ethernet USERCTL=no PEERDNS=yes IPV6INIT=no
```

4. Repeat this process for each node.
5. Do not reboot any of the nodes, until these changes are made to each node:
  - a. Open the grub file `/update/etc/default/grub` in an editor:

```
$ sudo vi /update/etc/default/grub
```

- b. Change the line:

```
GRUB_CMDLINE_LINUX="console=tty0 console=ttyS1,115200  
n8"
```

to:

```
GRUB_CMDLINE_LINUX="console=tty0 console=ttyS1,115200  
n8 net.ifnames=0"
```

- c. Save your changes.

6. Issue these commands:

```
$ sudo cp /update/etc/default/grub /etc/default/  
$ rm /usr/local/scaligent/bin/setup-net-devices.sh
```

7. Reboot the nodes.

# Configure ThoughtSpot nodes in Azure

**Summary:** Prepare to install your ThoughtSpot cluster by configuring nodes.

Before you can install a ThoughtSpot cluster in Azure, you must configure your nodes.

## Installation Prerequisites

Ensure the successful creation of the virtual machines (VMs) before you install the ThoughtSpot cluster in Azure.

1. **Review configuration options** Refer to [Azure configuration options \[See page 104\]](#) for detailed instance specs.
2. **Create the instance** Refer to [Set up Azure for ThoughtSpot \[See page 105\]](#) to create and launch your instance.
3. **Review required ports** Refer to [Network Policies \[See page 172\]](#) to view the required ports for successful operation of ThoughtSpot.

## Configure Nodes

After creating the instance, you must configure the nodes. Follow the steps in this checklist.

- Step 1: Log into your cluster [See page 0]
- Step 2: Get a template for network configuration [See page 0]
- Step 3: Prepare node configuration [See page 0]
- Step 4: Configure the nodes [See page 0]
- Step 5: Confirm node configuration [See page 0]

## Step 1: Log into your cluster

Use Terminal on a Mac or a terminal emulator on Windows to log into your cluster. Log in using the ssh private key provided by ThoughtSpot.

If you do not have a private key, contact [ThoughtSpot Support \[See page 184\]](#) by email or through the support portal.

To log into your cluster, run `ssh -i <private-key> admin@<public-vm-ip>`.

```
$ ssh -i <private_key> admin@<public-vm-ip>
```

## Step 2: Get a template for network configuration

Run the `tscli cluster get-config` command to get a template for network configuration for the new cluster. Redirect it to the file `nodes.config`.

You can find more information on this process in the [nodes.config file reference \[See page 0\]](#).

```
$ tscli cluster get-config |& tee nodes.config
```

## Step 3: Prepare node configuration

1. Add your specific network information for the nodes in the `nodes.config` file, as demonstrated in the [autodiscovery of one node example \[See page 0\]](#).
2. Fill in the areas specified in [Parameters of the nodes.config file \[See page 0\]](#) with your specific network information.

If you have additional nodes, complete each node within the `nodes.config` file in the same way.

Do not edit any part of the `nodes.config` file except the sections described in [Parameters of the nodes.config file \[See page 0\]](#). If you delete quotation marks, commas, or other parts of the code, it may cause setup to fail.

## Step 4: Configure the nodes

Configure the nodes in the `nodes.config` file using the `set-config` command.

1. Disable the `firewalld` service by running `sudo systemctl stop firewalld` in your terminal. The `firewalld` service is a Linux firewall that must be off for ThoughtSpot installation. After the cluster installer reboots the nodes, `firewalld` automatically turns back on.

```
$ sudo systemctl stop firewalld
```

2. To make sure you temporarily disabled `firewalld`, run `sudo systemctl status firewalld`. Your output should specify that `firewalld` is inactive. It may look something like the following:

```
$ sudo systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
          Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; vendor preset: enabled)
            Active: inactive (dead)
```

3. Run the configuration command: `$ cat nodes.config | tscli cluster set-config`.

If the command returns an error, refer to [set-config error recovery \[See page 120\]](#).

After you run the node configuration command, your output appears similar to the following:

```
$ cat nodes.config | tscli cluster set-config

Connecting to local node-scout
Setting up hostnames for all nodes
Setting up networking interfaces on all nodes
Setting up hosts file on all nodes
Setting up IPMI configuration
Setting up NTP Servers
Setting up Timezone
Done setting up ThoughtSpot
```

### Step 5: Confirm node configuration

Use the `get-config` command to confirm node configuration.

Your output may look similar to the following:

```
$ tscli cluster get-config

{
    "ClusterId": "",
    "ClusterName": "",
    "DataNetmask": "255.255.252.0",
    "DataGateway": "192.168.4.1",
    "IPMINetmask": "255.255.252.0",
    "IPMIGateway": "192.168.4.1",
    "Timezone": "America/Los_Angeles",
    "NTPServers": "0.centos.pool.ntp.org,1.centos.pool.ntp.or
g,2.centos.pool.ntp.org,3.centos.pool.ntp.org",
    "DNS": "192.168.2.200,8.8.8.8",
    "SearchDomains": "example.company.com",
    "Nodes": {
        "ac:1f:6b:8a:77:f6": {
            "NodeId": "ac:1f:6b:8a:77:f6",
            "Hostname": "Thoughtspot-server1",
            "DataIface": {
                "Name": "eth2",
                "IPv4": "192.168.7.70"
            },
            "IPMI": {
                "IPv4": "192.168.5.70"
            }
        }
    }
}
```

## Install ThoughtSpot software

Next, [install your ThoughtSpot clusters \[See page 123\]](#).

## Error recovery

### Set-config error recovery

If you get a warning about node detection when you run the `set-config` command, restart the node-scout service.

Your error may look something like the following:

```
Connecting to local node-scout
WARNING: Detected 0 nodes, but found configuration for
only 1 nodes.
Continuing anyway. Error in cluster config validation: [] is no
t a valid link-local
IPv6 address for node: 0e:86:e2:23:8f:76 Configuration failed.
Please retry or contact support.
```

Restart the node-scout service with the following command.

```
$ sudo systemctl restart node-scout
```

Ensure that you restarted the node-scout by running `sudo systemctl status node-scout`. Your output should specify that the node-scout service is active. It may look something like the following:

```
$ sudo systemctl status node-scout
● node-scout.service - Setup Node Scout service
  Loaded: loaded (/etc/systemd/system/node-scout.service; enabled; vendor preset: disabled)
  Active: active (running) since Fri 2019-12-06 13:56:29 PST; 4s ago
```

Next, retry the `set-config` command.

```
$ cat nodes.config | tscli cluster set-config
```

The command output should no longer have a warning.

## Related information

Use these references for successful installation and administration of ThoughtSpot.

- [the nodes.config file \[See page 0\]](#)
- [Parameters of the nodes.config file \[See page 0\]](#)
- [Using the cluster create command \[See page 0\]](#)

- Parameters of the `cluster create` command [See page 0]
- ThoughtSpot Documentation [See page 0]
- Contact Support [See page 184]

# Install ThoughtSpot clusters in Azure

**Summary:** Learn how to install ThoughtSpot clusters in Azure.

## Prerequisites

Before you can install your ThoughtSpot clusters in Azure, complete these prerequisites.

1. **Review configuration options** Refer to [Azure configuration options \[See page 104\]](#) for detailed instance specs.
2. **Create the instance** Refer to [Set up Azure for ThoughtSpot \[See page 105\]](#) to create and launch your instance.
3. **Review required ports** Refer to [Network Policies \[See page 172\]](#) to view the required ports for successful operation of ThoughtSpot.
4. **Configure nodes** Refer to [Configure ThoughtSpot nodes in Azure \[See page 116\]](#) to configure your nodes.

## Install ThoughtSpot Software

Install the cluster using the release tarball. The estimated installation time is one hour. Follow the steps in this checklist.

- Step 1: Run the installer [\[See page 0\]](#)
- Step 2: Check cluster health [\[See page 0\]](#)
- Step 3: Finalize installation [\[See page 0\]](#)

Refer to your welcome letter from ThoughtSpot to find the link to download the release tarball. If you do not have a link, open a support ticket at [ThoughtSpot Support \[See page 0\]](#) to request access to the release tarball.

### Step 1: Run the installer

1. Copy the downloaded release tarball to `/home/admin` using the following command:

```
$ scp <release-number>.tar.gz admin@<hostname>:/home/admin/<file-name>
```

Note the following parameters:

- `release-number` is the release number of your ThoughtSpot instance, such as 5.3, 6.0, and so on.
- `hostname` is your specific hostname.
- `file-name` is the name of the tarball file on your local computer.

2. Create the cluster.

Run `tscli cluster create` to create the cluster.

```
$ tscli cluster create <release-number>.tar.gz
```

3. Edit the output with your specific cluster information.

For more information on this process, refer to [Using the cluster create command \[See page 0\]](#) and [Parameters of the cluster create command \[See page 0\]](#).

The cluster installer automatically reboots all the nodes after a successful install. The `firewalld` service automatically turns on. At this time, the system is rebooting, which may take approximately 15 minutes.

Log into any node to check the current cluster status:

```
$ tscli cluster status
```

## Step 2: Check cluster health

After the cluster installs, check its status using the `tscli cluster status` command.

Your output may look similar to the following:

```
$ tscli cluster status
Cluster: RUNNING
Cluster name      : thoughtspot
Cluster id       : 1234X11111
Number of nodes  : 3
Release          : 6.0
Last update      = Wed Oct 16 02:24:18 2019
Heterogeneous Cluster : False
Storage Type     : HDFS

Database: READY
Number of tables in READY state: 2185
Number of tables in OFFLINE state: 0
Number of tables in INPROGRESS state: 0
Number of tables in STALE state: 0
Number of tables in ERROR state: 0

Search Engine: READY
Has pending tables. Pending time = 1601679ms
Number of tables in KNOWN_TABLES state: 1934
Number of tables in READY state: 1928
Number of tables in WILL_REMOVE state: 0
Number of tables in BUILDING_AND_NOT_SERVING state: 0
Number of tables in BUILDING_AND_SERVING state: 128
Number of tables in WILL_NOT_INDEX state: 0
```

### Step 3: Finalize installation

After the cluster status changes to `READY`, sign into ThoughtSpot on your browser. Follow these steps:

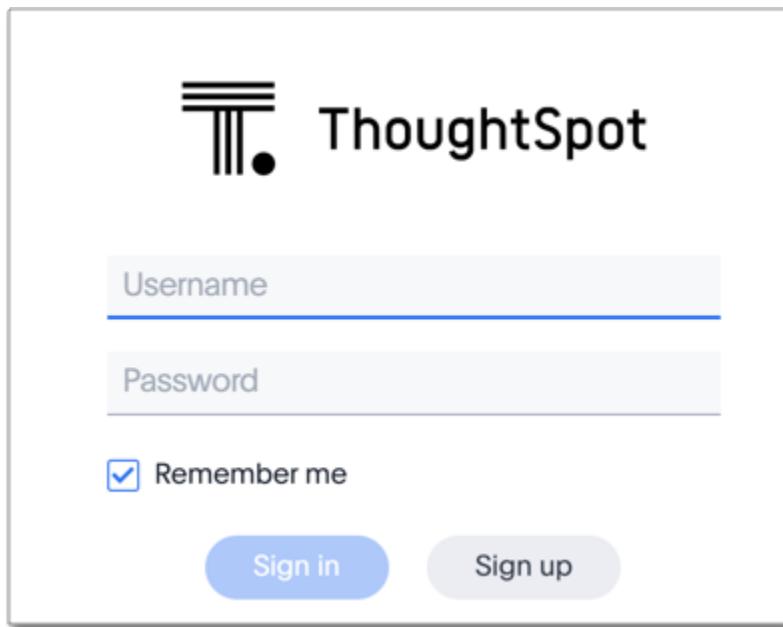
1. Start a browser from your computer.
2. Enter your secure IP information on the address line.

```
https://<IP-address>
```

3. If you don't have a security certificate for ThoughtSpot, you must bypass the security warning:
  - Click **Advanced**
  - Click **Proceed**
4. The ThoughtSpot sign-in page appears.

5. In the [ThoughtSpot sign-in window](#) [See page 126], enter admin credentials, and click **Sign in**.

ThoughtSpot recommends changing the default admin password.



*ThoughtSpot's sign-in window*

## Related information

Use these references for successful installation and administration of ThoughtSpot:

- [the nodes.config file](#) [See page 0]
- [Parameters of the nodes.config file](#) [See page 0]
- [Using the cluster create command](#) [See page 0]
- [Parameters of the `cluster create` command](#) [See page 0]
- [Deployment Overview](#) [See page 38]
- [Contact Support](#) [See page 184]

# GCP configuration options

ThoughtSpot can be deployed in your GCP environment by deploying compute (VM) instances in your VPC as well as an underlying persistent storage infrastructure. Currently two configuration modes are supported by ThoughtSpot:

- Mode 1: Compute VMs + SSD Persistent Disk storage-only
- Mode 2: Compute VMs + SSD Persistent Disk and Google Cloud Storage (GCS).

For more information about Persistent Storage, see [Zonal Persistent SSD disks \[See page 0\]](#) in Google's Cloud documentation.

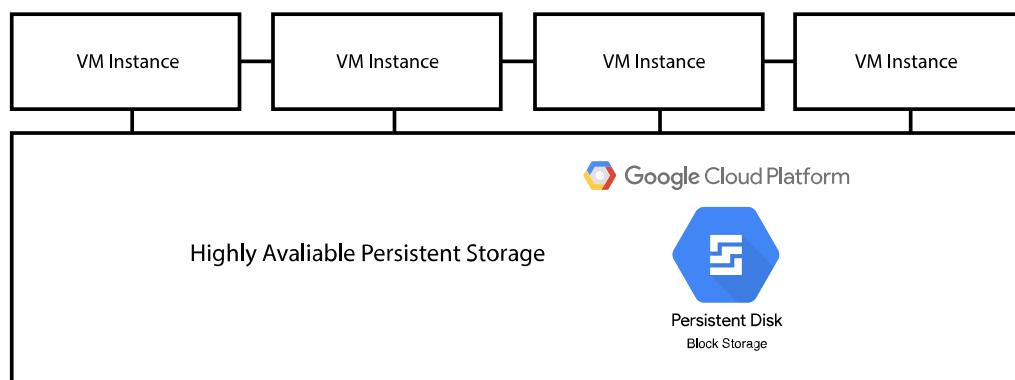
For more information about Google Cloud Storage, see [Cloud Storage Buckets \[See page 0\]](#) in Google's Cloud documentation.

All GCP VMs (nodes) in a ThoughtSpot cluster must be in the same zone (and, therefore, also in the same region). ThoughtSpot does not support deploying VMs (nodes) of the same cluster across zones.

For more information, see [Regions and Zones \[See page 0\]](#) in Google's Cloud documentation.

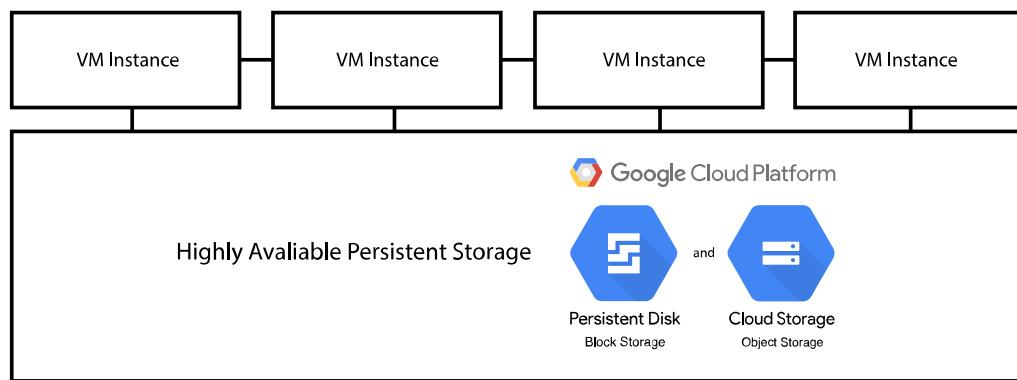
## ThoughtSpot GCP instance types

VMs with Persistent Disk-only storage



Per VM user data capacity	Instance type	CPU/RAM	Recommended per-VM Zonal Persistent SSD Disk volume
208 GB	n1-highmem-64	64/416	2x 1 TB
312 GB	n1-highmem-96	96/624	2x 1.5 TB
100 GB	n1-highmem-32	32/208	2X 400 GB
20 GB	n1-highmem-16	16/122	2X 400 GB
180 GB	n1-standard-96	96/330	2X 1 TB

## VMs with Persistent Disk and Google Cloud storage



Per VM user data capacity	Instance type	CPU/RAM	Recommended per-VM Zonal Persistent SSD Disk volume
208 GB	n1-highmem-64	64/416	1X 500 GB
312 GB	n1-highmem-96	96/624	1X 500 GB
100 GB	n1-highmem-32	32/208	1X 500 GB
20 GB	n1-highmem-16	16/122	1X 500 GB
180 GB	n1-standard-96	96/330	1X 500 GB

# Set up ThoughtSpot in GCP

## Summary: Set up your GCP virtual machines.

After you determine your configuration options, set up your virtual machines (VMs). ThoughtSpot will share the ThoughtSpot base image for booting the VMs and some other aspects of system setup with you on [the GCP platform \[See page 0\]](#).

## About the ThoughtSpot and Google Cloud Platform

ThoughtSpot uses a custom image to populate VMs in GCP. The base image is a Centos derived image. Find the ThoughtSpot custom image under Custom Images in **Boot Disk Options** within your Google Compute Engine project.

Ask your ThoughtSpot contact for access to this image. We need the Google account/email ID of the individual who will be signed into your organization's GCP console. We will share ThoughtSpot's GCP project with them so they can use the contained boot disk image to create ThoughtSpot VMs.

## Overview

Before you can create a ThoughtSpot cluster, you must set up your VMs. Use the Google Compute Engine (GCP) platform to create and run VMs.

The following topics walk you through this process.

## Prerequisites

1. Ensure that your **Network Service Tier** on the [Google Cloud Console \[See page 0\]](#) is set to **Premium** for the best performance of all your VMs.
2. A ThoughtSpot cluster requires 10 Gb/s bandwidth (or better) between any two nodes. You must ensure this before creating a new cluster.

## Setting up your Google Cloud Storage (GCS) bucket

If you are going to deploy your cluster using the GCS-storage option, you must set up that bucket before you set up your cluster. Contact [ThoughtSpot Support \[See page 0\]](#) to find out if your specific cluster size will benefit from the GCS storage option. If you are not using GCS, skip this step and [create an instance \[See page 131\]](#).

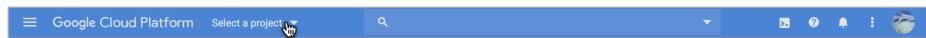
1. Sign in to the [Google Cloud Console \[See page 0\]](#).
2. Go to the Storage dashboard from the navigation bar on the side of your screen.
3. Click **CREATE BUCKET**.
4. Enter a name for your bucket, and click **CONTINUE**.
5. For location type, select **Region**.
6. Use the Location drop-down menu to select the region where you are going to set up your instance.
7. Click **CONTINUE**.
8. For default storage class, make sure **Standard** is selected.
9. Click **CONTINUE**.
10. For access control model, make sure **Set permissions uniformly at bucket-level** is selected.
11. Click **CONTINUE**.
12. Do not edit the advanced settings.  
Leave Encryption set to **Google-managed key** and do not set a retention policy.
13. Click **CREATE**.

When you create your instance, make sure you set Storage to **Read Write** access.

## Create an instance

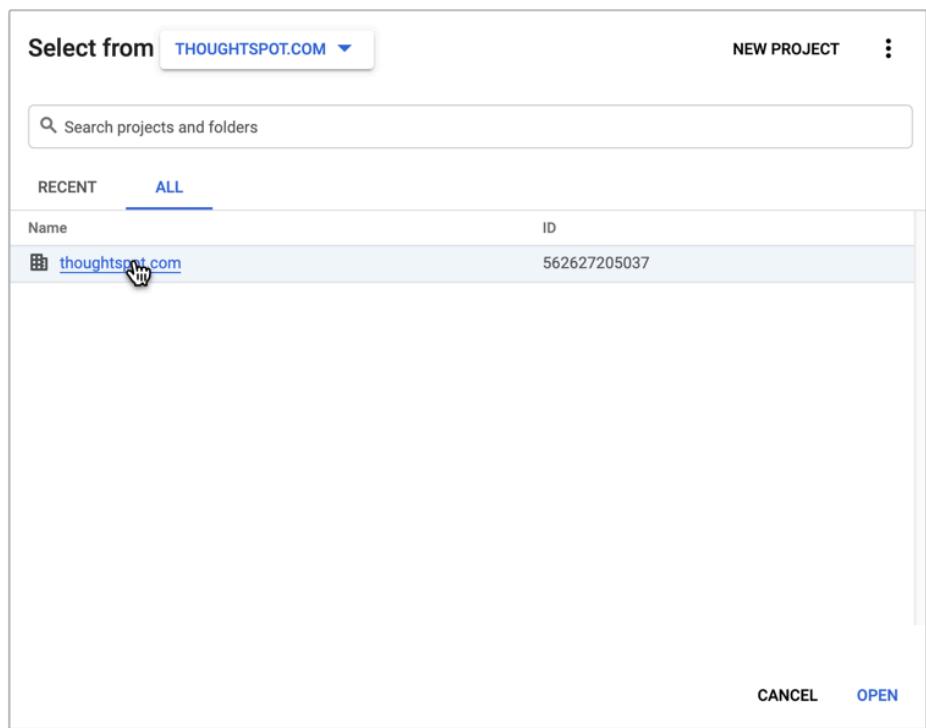
1. Sign in to the [Google Cloud Console](#) [See page 0].

2. Click **Select a Project** from the top bar.

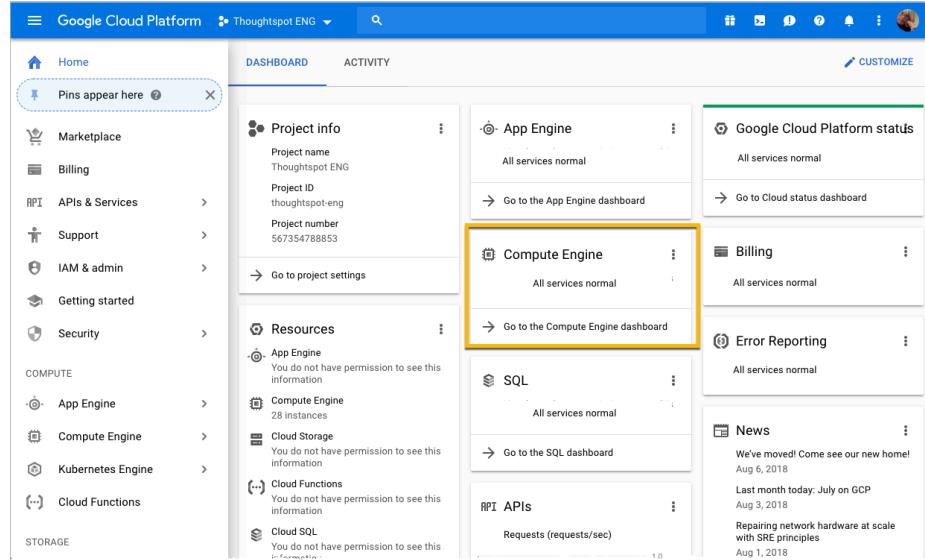


3. Under **Select From** pick THOUGHTSPOT.COM.

4. Select the **thoughtspot.com** project.



5. Go to the Compute Engine dashboard, and select the associated ThoughtSpot project.



6. Select **VM instances** on the left panel and click **CREATE INSTANCE**.
7. Provide a name for the instance.
8. Select the region you are creating the instance in.
9. Select the number of CPUs you need.  
Refer to [ThoughtSpot GCP instance types \[See page 127\]](#) to determine the number of CPUs your cluster needs.
10. Click **Customize** to further configure CPUs and memory.

The screenshot shows the 'Create an instance' form in the Google Cloud Platform. On the left sidebar, 'VM instances' is selected under 'Compute Engine'. The main form fields include:

- Name:** my-ts-instance-2
- Region:** us-west1 (Oregon)
- Zone:** us-west1-a
- Machine type:** 8 vCPUs, 30 GB memory. A yellow box highlights the 'Customize' button.
- Container:** Deploy a container image to this VM instance. (checkbox)
- Boot disk:** New 10 GB standard persistent disk, Image: Debian GNU/Linux 9 (stretch), Change button.

- Under **Machine type**, specify your configuration information. Refer to [ThoughtSpot GCP instance types \[See page 127\]](#).

Your configuration may look something like the following, but with your specific information.

Setting	Value
Cores	64 vCPU
Memory	416 GB
Extend memory	Enabled (checkmark)
CPU platform	Automatic (or select one of the preferred CPU platforms, Intel Skylake or Intel Broadwell, if available)

[Create an instance](#)

Name [?](#)  
my-ts-instance-2

Region [?](#)  
us-west1 (Oregon)

Zone [?](#)  
us-west1-a

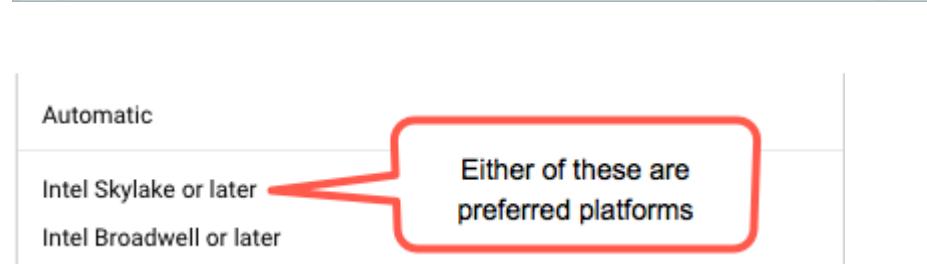
Machine type  
Customize to select cores, memory and GPUs.

Cores [Basic view](#)  
64 vCPU 1 - 96

Memory  
416 GB 57.6 - 624

Extend memory [?](#)

CPU platform [?](#)  
Intel Skylake or later



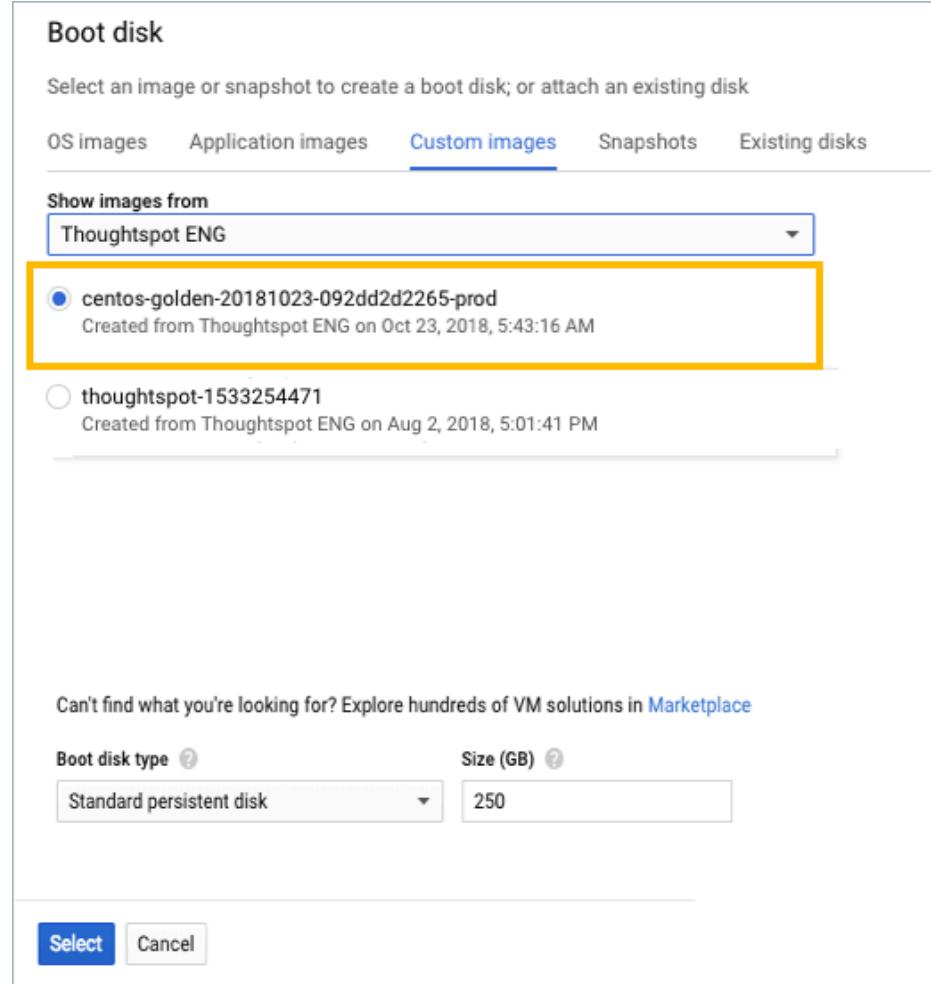
12. Configure the Boot disk.

a. Scroll down to the **Boot disk** section and click **Change**.



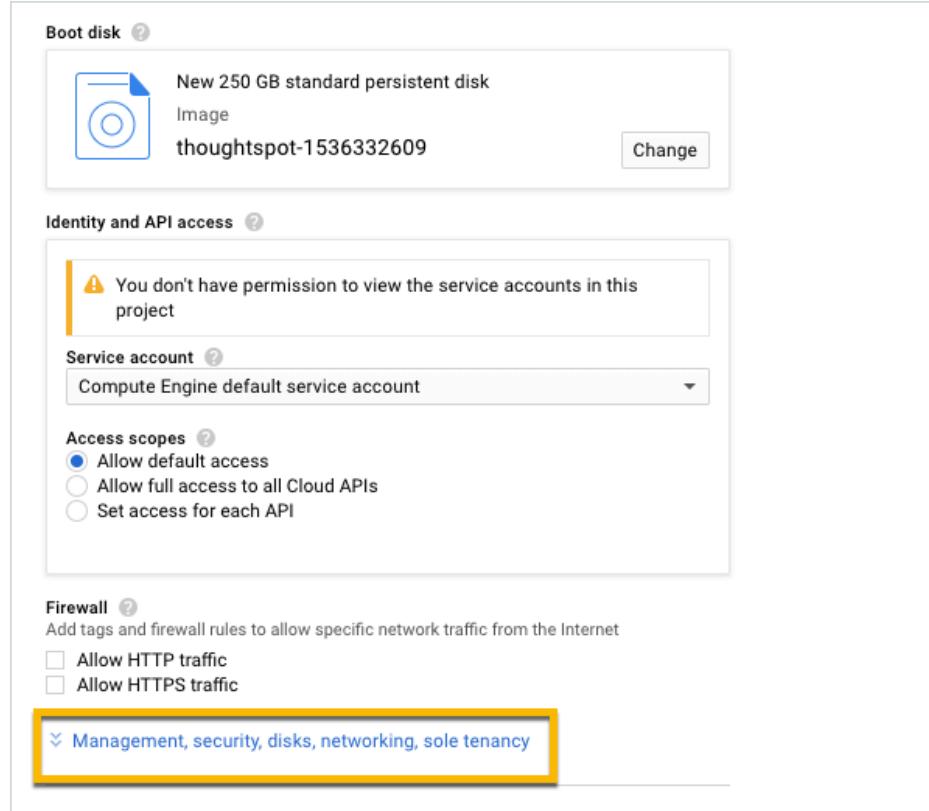
- b. Click **Custom Images** from the options under **Boot disk**.
- c. Select your ThoughtSpot project under **Show images from**.
- d. Select one of the ThoughtSpot base images. The image at the top of the list is the latest one.
- e. Configure the boot disk as follows:

Setting	Value
Image	ThoughtSpot
Boot disk type	Standard persistent disk
Size (GB)	250



**Note:** ThoughtSpot updates these base images with patches and enhancements. If more than one image is available, the latest one is always at the top of the list. Both will work, but we recommend using the latest image because it typically contains the latest security and maintenance patches.

- f. Click **Select** to save the boot disk configuration.
13. Back on the main configuration page, click to expand the advanced configuration options (**Management, security, disks, networking, sole tenancy**).



14. Under **Networking**, open required ports.

These are the minimum ports you must open.

Port	Protocol	Service
22	SSH	Secure Shell access
80	HTTP	Web access
443	HTTPS	Secure Web access
12345	TCP	ODBC and JDBC drivers access
2201	HTTP	Cluster Debugging
2101	HTTP	Node daemon Debugging
4001	HTTP	Data Cache Debugging

15. Attach two 1 TB SSD drives for data storage. If you are using GCS, attach only 1 SSD drive, with 500 GB instead of 1 TB.

- a. Click the **Disks** tab, and click **Add new disk**.

Management Security **Disks** Networking Sole Tenancy

**Boot disk**

**Deletion rule**

Delete boot disk when instance is deleted

**Encryption**

Data is encrypted automatically. Select an encryption key management solution.

Google-managed key  
No configuration required

Customer-managed key  
Manage via Google Cloud Key Management Service

Customer-supplied key  
Manage outside of Google Cloud

**Additional disks (Optional)**

+ Add new disk + Attach existing disk

Less

You can select or unselect the **Deletion rule**, depending on your preferences.

- b. Configure the following settings for each disk. Refer to [ThoughtSpot GCP instance types](#) [See page 127] to determine the size in GB when you have GCS.

Setting	Value
Type	SSD persistent disk
Source type	Blank disk
Size (GB)	1024

Under **Deletion rule**, select either **keep disk** or **delete disk**, depending on your preference.

vmb-ts-data-disk (Blank, 1024 GB)

Name (Optional)

Type

Source type

Mode  
 Read/write  
 Read only

Deletion rule  
When deleting instance  
 Keep disk  
 Delete disk

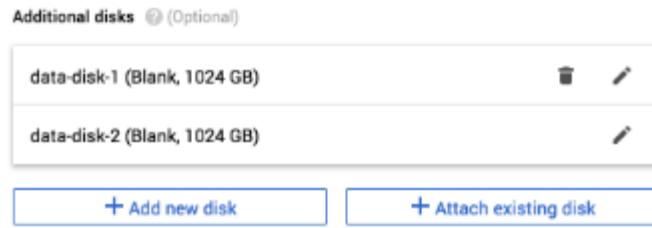
Size (GB)

Estimated performance

Operation type	Read	Write
Sustained random IOPS limit	30,720.00	30,000.00
Sustained throughput limit (MB/s)	491.52	400.00

Encryption  
Data is encrypted automatically. Select an encryption key management solution.  
 Google-managed key  
No configuration required  
 Customer-managed key  
Manage via Google Cloud Key Management Service  
 Customer-supplied key  
Manage outside of Google Cloud

This new disk will be added once you create the new instance



16. (For use with GCS only) In the Identity and API access section, make sure Service account is set to **Compute Engine default service account**, and under Access scopes, select **Set access for each API**.
17. (For use with GCS only) Scroll down to the Storage setting, and set it to one of the following options:
  - To use Google Cloud Storage (GCS) as persistent storage for your instance, select **Read Write**.
  - To only use GCS to load data into ThoughtSpot, select **Read Only**.
18. Customize the network settings as needed. Use your default VPC settings, if you know them. Ask your network administrator if you do not know your default VPC settings.
19. Repeat these steps to create the necessary number of VMs for your cluster.

## Prepare the VMs

Before you can install your ThoughtSpot cluster, an administrator must log into each VM through SSH as user “admin”, and complete the following preparation steps:

1. Open a terminal application on your machine and ssh into one of your VMs.

```
ssh admin@<VM-IP>
```

2. Run `sudo /usr/local/scaligent/bin/prepare_disks.sh`.

```
$ sudo /usr/local/scaligent/bin/prepare_disks.sh
```

3. Configure the VM based on the site-survey.
4. Repeat this process for each of your VMs.

## Install cluster

To install your ThoughtSpot cluster, complete the installation process outlined in [Installing ThoughtSpot in GCP \[See page 142\]](#).

## Related information

[Connecting to Google Cloud Storage buckets \[See page 0\]](#)

[Loading data from a GCP GCS bucket \[See page 0\]](#)

# Configure ThoughtSpot Nodes in GCP

**Summary:** Prepare to install your ThoughtSpot cluster by configuring nodes.

Before you can install a ThoughtSpot cluster in GCP, you must configure your nodes.

## Installation Prerequisites

Ensure the successful creation of the virtual machines (VMs) before you install the ThoughtSpot cluster in GCP.

1. **Review configuration options** Refer to [GCP configuration options \[See page 127\]](#) for detailed instance specs.
2. **Create the instance** Refer to [Set up GCP for ThoughtSpot \[See page 129\]](#) to create and launch your instance.
3. **Review required ports** Refer to [Network Policies \[See page 172\]](#) to view the required ports for successful operation of ThoughtSpot.

## Configure Nodes

After creating the instance, you must configure the nodes. Follow the steps in this checklist.

- Step 1: Log into your cluster [\[See page 0\]](#)
- Step 2: Get a template for network configuration [\[See page 0\]](#)
- Step 3: Prepare node configuration [\[See page 0\]](#)
- Step 4: Configure the nodes [\[See page 0\]](#)
- Step 5: Confirm node configuration [\[See page 0\]](#)

### Step 1: Log into your cluster

Log into your cluster with admin credentials from Terminal on a Mac or a terminal emulator on Windows.

Ask your network administrator if you do not know the admin credentials.

1. Run `ssh admin@<clusterIP>` or `ssh admin@<hostname>`.

Replace `clusterIP` or `hostname` with your specific network information.

```
$ ssh admin@<clusterIP>
```

2. Enter your admin password at the prompt.

Ask your network administrator if you don't know the password.

**Note:** The password does not appear on the screen as you type it.

## Step 2: Get a template for network configuration

Run the `tscli cluster get-config` command to get a template for network configuration for the new cluster. Redirect it to the file `nodes.config`.

You can find more information on this process in the `nodes.config` [file reference \[See page 0\]](#).

```
$ tscli cluster get-config |& tee nodes.config
```

## Step 3: Prepare node configuration

1. Add your specific network information for the nodes in the `nodes.config` file, as demonstrated in the [autodiscovery of one node example \[See page 0\]](#).
2. Fill in the areas specified in [Parameters of the nodes.config file \[See page 0\]](#) with your specific network information.

If you have additional nodes, complete each node within the `nodes.config` file in the same way.

Do not edit any part of the `nodes.config` file except the sections described in [Parameters of the nodes.config file \[See page 0\]](#). If you delete quotation marks, commas, or other parts of the code, it may cause setup to fail.

## Step 4: Configure the nodes

Configure the nodes in the `nodes.config` file using the `set-config` command.

1. Disable the `firewalld` service by running `sudo systemctl stop firewalld` in your terminal. The `firewalld` service is a Linux firewall that must be off for ThoughtSpot installation. After the cluster installer reboots the nodes, `firewalld` automatically turns back on.

```
$ sudo systemctl stop firewalld
```

2. To make sure you temporarily disabled `firewalld`, run `sudo systemctl status firewalld`. Your output should specify that `firewalld` is inactive. It may look something like the following:

```
$ sudo systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
    Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; vendor preset: enabled)
      Active: inactive (dead)
```

3. Run the configuration command: `$ cat nodes.config | tscli cluster set-config`.

If the command returns an error, refer to [set-config error recovery \[See page 145\]](#).

After you run the node configuration command, your output appears similar to the following:

```
$ cat nodes.config | tscli cluster set-config

Connecting to local node-scout
Setting up hostnames for all nodes
Setting up networking interfaces on all nodes
Setting up hosts file on all nodes
Setting up IPMI configuration
Setting up NTP Servers
Setting up Timezone
Done setting up ThoughtSpot
```

## Step 5: Confirm node configuration

Use the `get-config` command to confirm node configuration.

Your output may look similar to the following:

```
$ tscli cluster get-config

{
    "ClusterId": "",
    "ClusterName": "",
    "DataNetmask": "255.255.252.0",
    "DataGateway": "192.168.4.1",
    "IPMINetmask": "255.255.252.0",
    "IPMIGateway": "192.168.4.1",
    "Timezone": "America/Los_Angeles",
    "NTPServers": "0.centos.pool.ntp.org,1.centos.pool.ntp.or
g,2.centos.pool.ntp.org,3.centos.pool.ntp.org",
    "DNS": "192.168.2.200,8.8.8.8",
    "SearchDomains": "example.company.com",
    "Nodes": {
        "ac:1f:6b:8a:77:f6": {
            "NodeId": "ac:1f:6b:8a:77:f6",
            "Hostname": "Thoughtspot-server1",
            "DataIface": {
                "Name": "eth2",
                "IPv4": "192.168.7.70"
            },
            "IPMI": {
                "IPv4": "192.168.5.70"
            }
        }
    }
}
```

## Install ThoughtSpot software

Next, [install your ThoughtSpot clusters \[See page 148\]](#).

## Error recovery

### Set-config error recovery

If you get a warning about node detection when you run the `set-config` command, restart the node-scout service.

Your error may look something like the following:

```
Connecting to local node-scout
WARNING: Detected 0 nodes, but found configuration for
only 1 nodes.
Continuing anyway. Error in cluster config validation: [] is no
t a valid link-local
IPv6 address for node: 0e:86:e2:23:8f:76 Configuration failed.
Please retry or contact support.
```

Restart the node-scout service with the following command.

```
$ sudo systemctl restart node-scout
```

Ensure that you restarted the node-scout by running `sudo systemctl status node-scout`. Your output should specify that the node-scout service is active. It may look something like the following:

```
$ sudo systemctl status node-scout
● node-scout.service - Setup Node Scout service
  Loaded: loaded (/etc/systemd/system/node-scout.service; enabled; vendor preset: disabled)
  Active: active (running) since Fri 2019-12-06 13:56:29 PST; 4s ago
```

Next, retry the `set-config` command.

```
$ cat nodes.config | tscli cluster set-config
```

The command output should no longer have a warning.

## Related information

Use these references for successful installation and administration of ThoughtSpot.

- [the nodes.config file \[See page 0\]](#)
- [Parameters of the nodes.config file \[See page 0\]](#)
- [Using the cluster create command \[See page 0\]](#)

- Parameters of the `cluster create` command [See page 0]
- ThoughtSpot Documentation [See page 0]
- Contact Support [See page 184]

# Install ThoughtSpot Clusters in GCP

**Summary:** Learn how to install ThoughtSpot clusters in GCP.

## Prerequisites

Before you can install your ThoughtSpot clusters in GCP, complete these prerequisites.

1. **Review configuration options** Refer to [GCP configuration options \[See page 127\]](#) for detailed instance specs.
2. **Create the instance** Refer to [Set up ThoughtSpot in GCP \[See page 129\]](#) to create and launch your instance.
3. **Review required ports** Refer to [Network Policies \[See page 172\]](#) to view the required ports for successful operation of ThoughtSpot.
4. **Configure nodes** Refer to [Configure ThoughtSpot Nodes in GCP \[See page 142\]](#) to configure your nodes.

## Install ThoughtSpot Software

Install the cluster using the release tarball. The estimated installation time is one hour. Follow the steps in this checklist.

- Step 1: Run the installer [\[See page 0\]](#)
- Step 2: Check cluster health [\[See page 0\]](#)
- Step 3: Finalize installation [\[See page 0\]](#)

Refer to your welcome letter from ThoughtSpot to find the link to download the release tarball. If you do not have a link, open a support ticket at [ThoughtSpot Support \[See page 0\]](#) to request access to the release tarball.

### Step 1: Run the installer

1. Copy the downloaded release tarball to `/home/admin` using the following command:

```
$ scp <release-number>.tar.gz admin@<hostname>:/home/admin/<file-name>
```

Note the following parameters:

- `release-number` is the release number of your ThoughtSpot instance, such as 5.3, 6.0, and so on.
- `hostname` is your specific hostname.
- `file-name` is the name of the tarball file on your local computer.

2. Create the cluster.

Run `tscli cluster create` to create the cluster.

If you are using a gcs bucket for object storage, include the flag `--enable_cloud_storage=gcs`.

```
$ tscli cluster create <release-number>.tar.gz --enable_cloud_storage=gcs
```

3. Edit the output with your specific cluster information.

For more information on this process, refer to [Using the cluster create command \[See page 0\]](#) and [Parameters of the cluster create command \[See page 0\]](#).

The cluster installer automatically reboots all the nodes after a successful install. The `firewalld` service automatically turns on. At this time, the system is rebooting, which may take approximately 15 minutes.

Log into any node to check the current cluster status:

```
$ tscli cluster status
```

## Step 2: Check cluster health

After the cluster installs, check its status using the `tscli cluster status` command.

Your output may look similar to the following:

```
$ tscli cluster status
Cluster: RUNNING
Cluster name      : thoughtspot
Cluster id       : 1234X11111
Number of nodes  : 3
Release          : 6.0
Last update      = Wed Oct 16 02:24:18 2019
Heterogeneous Cluster : False
Storage Type     : HDFS

Database: READY
Number of tables in READY state: 2185
Number of tables in OFFLINE state: 0
Number of tables in INPROGRESS state: 0
Number of tables in STALE state: 0
Number of tables in ERROR state: 0

Search Engine: READY
Has pending tables. Pending time = 1601679ms
Number of tables in KNOWN_TABLES state: 1934
Number of tables in READY state: 1928
Number of tables in WILL_REMOVE state: 0
Number of tables in BUILDING_AND_NOT_SERVING state: 0
Number of tables in BUILDING_AND_SERVING state: 128
Number of tables in WILL_NOT_INDEX state: 0
```

### Step 3: Finalize installation

After the cluster status changes to `READY`, sign into ThoughtSpot on your browser. Follow these steps:

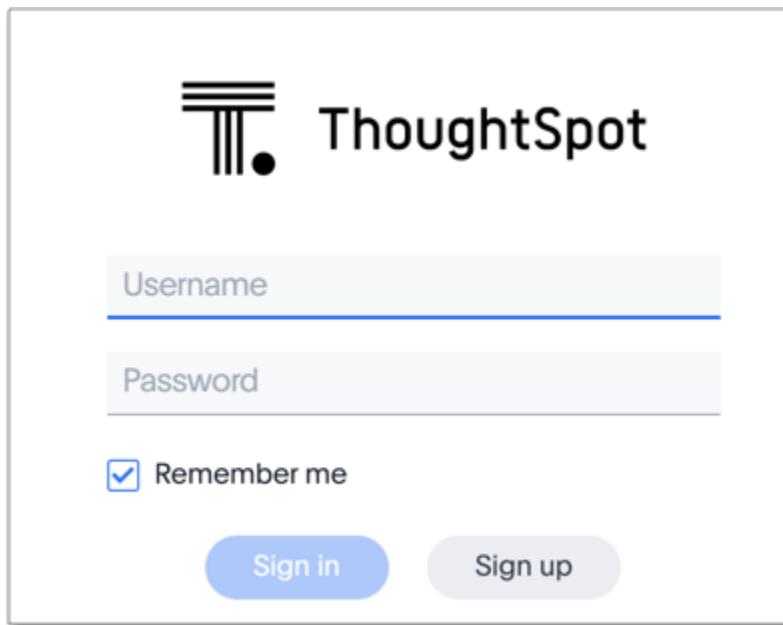
1. Start a browser from your computer.
2. Enter your secure IP information on the address line.

```
https://<IP-address>
```

3. If you don't have a security certificate for ThoughtSpot, you must bypass the security warning:
  - Click **Advanced**
  - Click **Proceed**
4. The ThoughtSpot sign-in page appears.

5. In the [ThoughtSpot sign-in window \[See page 151\]](#), enter admin credentials, and click **Sign in**.

ThoughtSpot recommends changing the default admin password.



*ThoughtSpot's sign-in window*

## Related information

Use these references for successful installation and administration of ThoughtSpot:

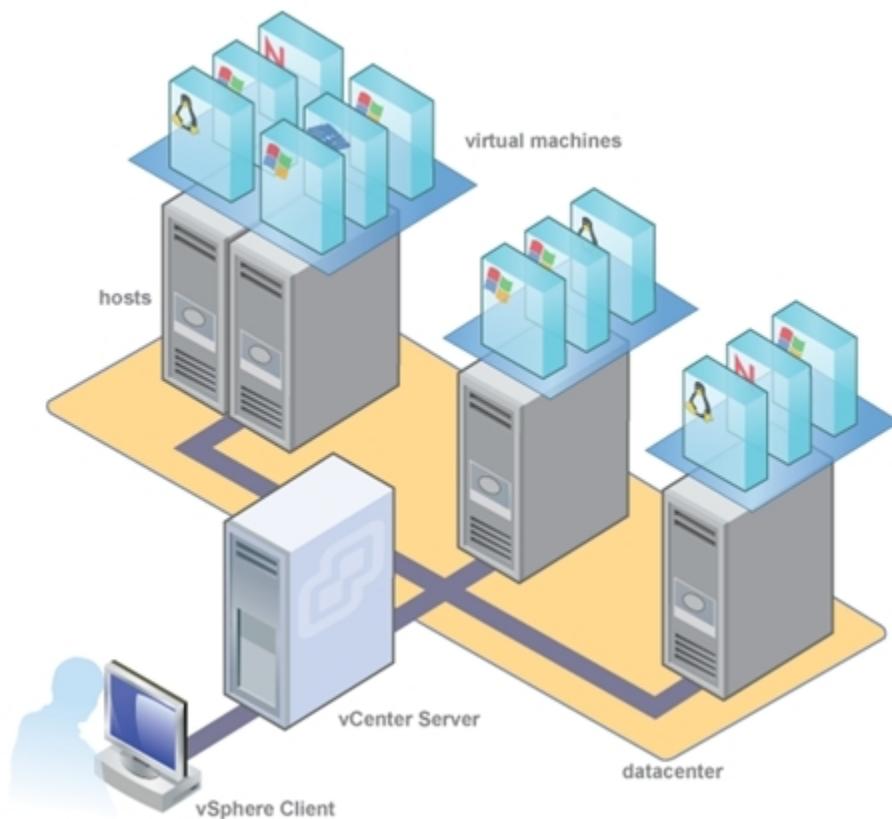
- [the nodes.config file \[See page 0\]](#)
- [Parameters of the nodes.config file \[See page 0\]](#)
- [Using the cluster create command \[See page 0\]](#)
- [Parameters of the `cluster create` command \[See page 0\]](#)
- [Deployment Overview \[See page 38\]](#)
- [Contact Support \[See page 184\]](#)

# VMware configuration overview

Congratulations on purchasing the ThoughtSpot instance. This section is an overview of the ThoughtSpot AI-Driven analytics platform hosted on the VMware vSphere Hypervisor (ESXi) 6.5 environment.

## About ThoughtSpot in VMware

The VMware virtualization platform provides highly scalable and efficient memory and CPU resources management that can be used by ThoughtSpot instances. Additionally, the VMware virtualization environment is an easy transition between development and production environments. The following diagram shows the components of a VMware and ThoughtSpot architecture:



**Note:** This is a generic representation; Only CentOS-based virtual machines are supported with ThoughtSpot.

Your database capacity will determine the number of ThoughtSpot instances and the instance network/storage requirements. In addition, you can scale your ThoughtSpot VMs as your dataset size grows.

## Supported configurations

ThoughtSpot Engineering has performed extensive testing of the ThoughtSpot platform in VMware for the best performance, load balancing, scalability, and reliability. Based on this testing, ThoughtSpot recommends the following *minimum specifications* for an individual VMware ESXi host machine:

Per VM user data capacity	CPU/RAM	Data disk
20 GB	16/128 GB	800 GB
100 GB	32/256 GB	800 GB
256 GB	72/512 GB	6 TB
<b>Note:</b> All cores must be hyperthreaded. 200GB SSD boot disk required for all configurations.		

Locally attached storage provides the best performance.

SAN can be used, but must comply with the following requirements:

- 136 MBps minimum random read bandwidth
- 240 random IOPS (~4ms seek latency)

NAS/NFS is not supported since its latency is so high that it tends to be unreliable.

All virtualization hosts should have VMware vSphere Hypervisor (ESXi) 6.5 installed.

ThoughtSpot provides a VMware template (OVF) together with a VMDK (Virtual Machine Disk) file for configuring a VM. VMDK is a file format that describes containers for virtual hard disk drives to be used in virtual machines like VMware Workstation or VirtualBox. OVF is a platform-independent, efficient, extensible, and open packaging distribution format for virtual machines.

The ThoughtSpot VM configuration uses thin provisioning and sets the recommended reserved memory, among other important specifications. You can obtain these files from your ThoughtSpot Customer Success Engineer.

## Questions or comments?

We hope your experience with ThoughtSpot is excellent. Please let us know how it goes, and what we can do to make it better. You can [contact ThoughtSpot \[See page 184\]](#) by filing a support ticket, email or phone.

# Set up ThoughtSpot in VMware

**Summary:** Learn how to install a ThoughtSpot cluster in a VMware environment.

This page explains how to install a ThoughtSpot cluster in a VMware VSphere Hypervisor (ESXi) 6.5 environment. For each hardware node, you must:

- Complete the prerequisites
- Use the ThoughtSpot Open Virtualization Format (OVF) file to create a virtual machine (VM)
- Add hard disks to the VM

## Prerequisites

This installation process assumes you have already acquired your host machines. You can install on a cluster with any number of nodes. A one node cluster is suitable for a sandbox environment but is insufficient for a production environment. You need at least three nodes for high availability (HA), but there is no limit on the number of nodes.

1. Make sure you have installed the Hypervisor on each of your nodes.

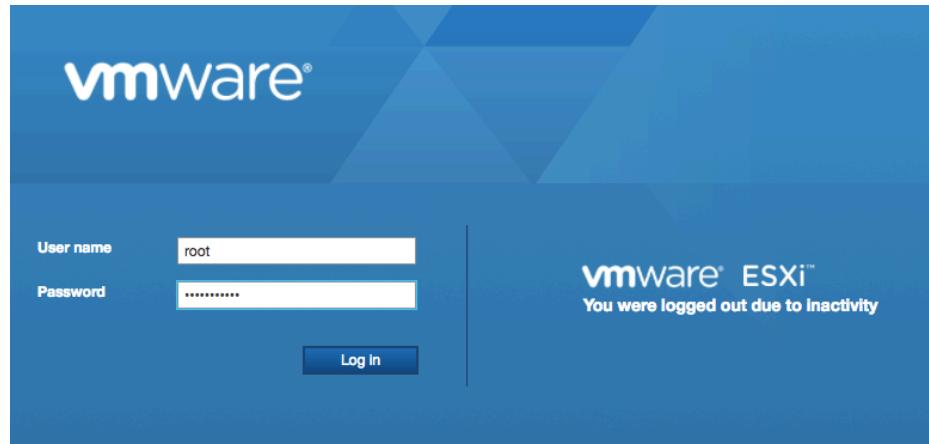
The VM template, by default, captures a 72-core configuration. If your physical host has more than 72 cores, you may want to edit VM to have ( n-2 ) cores (for a physical host with n cores) to fully take advantage of computing power of the physical host. Extra cores help performance.

You should aim to allocate 490 GB or more RAM.

2. Create datastores for all solid-state drive (SSD) and hard drive devices.

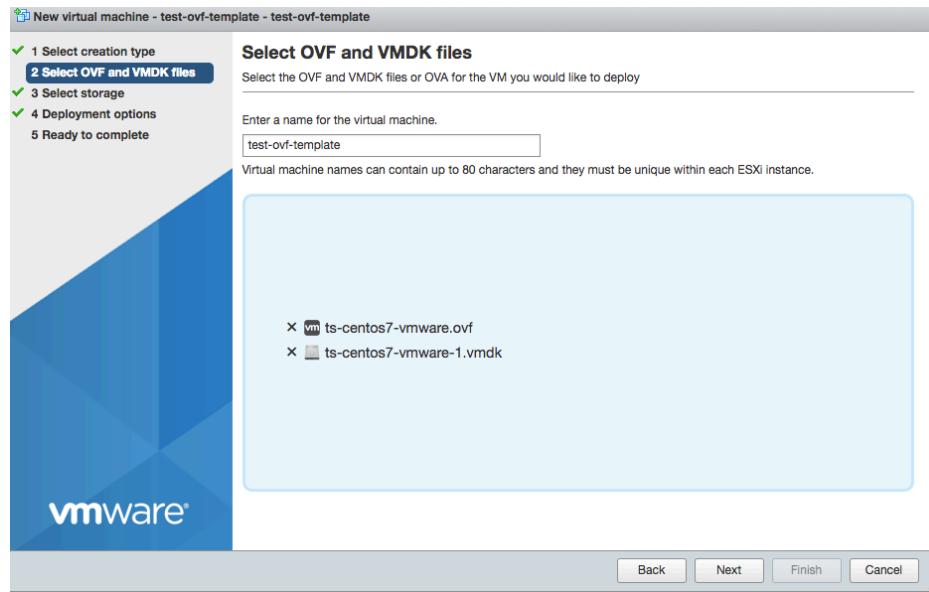
## Use the OVF to Create a VM

1. [Download \[See page 0\]](#) the ThoughtSpot OVF to a location on an accessible disk.
2. Log into the ESXi web portal.



3. Select **Virtual Machines > Create/Register VM**.

The system displays the dialog for selecting an OVF template.



4. Choose the OVF template and click **Next**.

The system prompts you to select a storage.

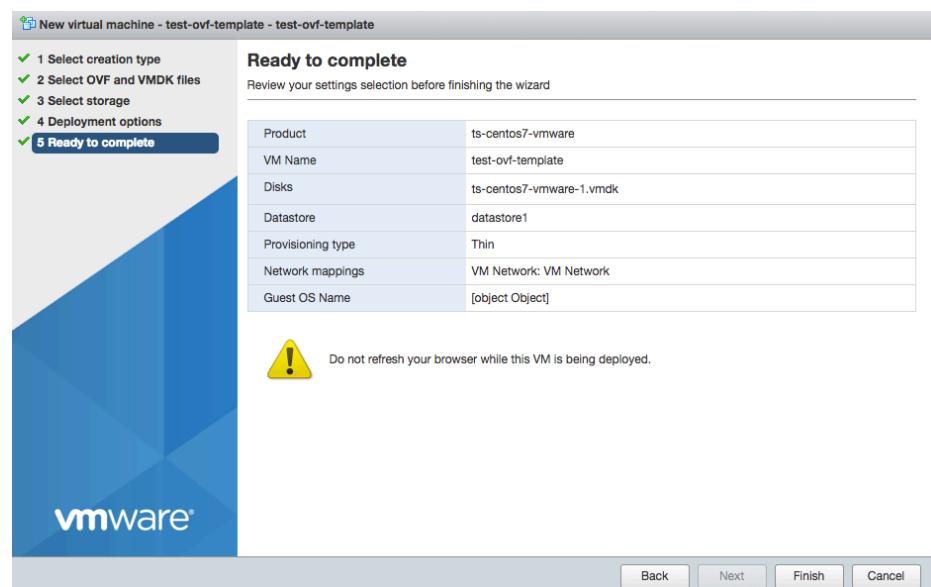
5. Choose the SSD as the destination and click **Next**.

The system displays the **Deployment Options** dialog.

6. Enter the options and click **Next**.

Setting	Value
<b>Network mappings</b>	Select the correct network for your installation.
<b>Disk provisioning</b>	Choose Thin.
<b>Power on automatically</b>	Check this box.

7. Review your selection and click **Finish**.



8. Wait for the template to be loaded.

Depending on your network speed, loading can take several minutes.

Recent tasks						
Task	Target	I	Q	S	Result	C
Upload disk - ts-centos7-vmware-template-1.vmdk ...	test-ovf-template	...	1...	1...	<div style="width: 50%;"><div style="width: 100%;"> </div></div>	R...
Destroy	test-ovf-template	...	1...	1...	<div style="width: 100%;"><div style="width: 100%;"> </div></div>	1...
Power Off VM	test-ovf-template	...	1...	1...	<div style="width: 100%;"><div style="width: 100%;"> </div></div>	1...
Import VApp	Resources	...	1...	1...	<div style="width: 50%;"><div style="width: 100%;"> </div></div>	R...

9. Make sure that VM is powered off.

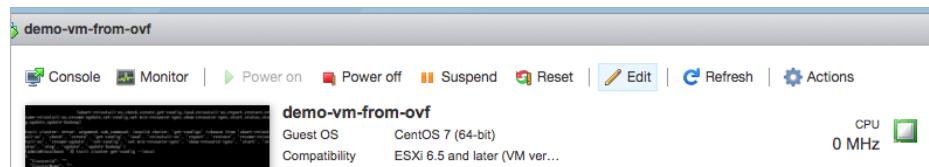
## Add hard disks to the VM

Use Case	HDFS Disk Requirements
POC	2 x 1 TB on HDD
Production	3 x 2 TB on HDD

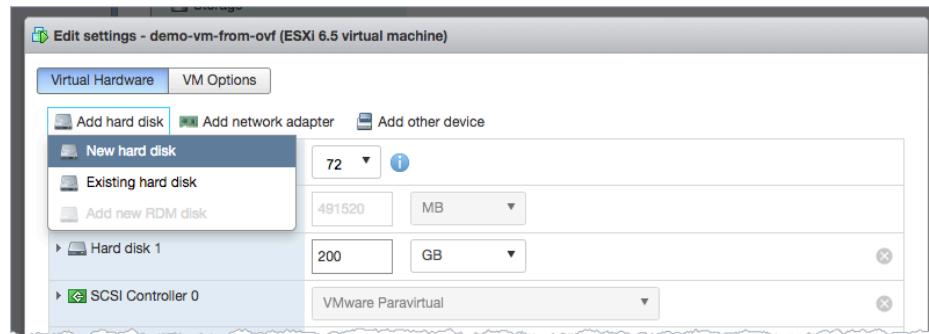
For a proof of concept (POC), follow these steps to create two 1TB HDFS disks on HDD storage, as shown here (2 x 1TB).

For production deployments, ThoughtSpot requires you to have three 2TB HDFS disks on HDD (3 x 2TB). For this use case, follow these same steps to create the additional, larger capacity disks.

1. Edit the VM you just created.



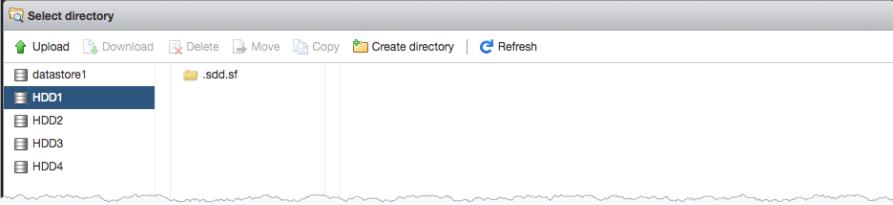
2. Select **Add hard disk > New hard disk**.



The new disk appears as a new row under the only existing SSD row.

3. Click the **New Hard disk** to expand the detailed configuration options.

4. For a proof of concept, set the options as follows. (For production deployments, set the size to 2TB.)

Setting	Value
size	1 TB
<b>Location</b>	Use the <b>Browse</b> button to select the hard disk store.
	

- Thin provisioned** Check this box.

You should see something similar to the following:

New Hard disk	1	TB
Maximum Size	929.83 GB	
Location	[HDD1]	<input type="button" value="Browse..."/>
Disk Provisioning	<input checked="" type="radio"/> Thin provisioned <input type="radio"/> Thick provisioned, lazily zeroed <input type="radio"/> Thick provisioned, eagerly zeroed	
Shares	Normal	1000
Limit - IOPs	Unlimited	
Virtual Device Node	SCSI controller 0	SCSI (0:1)
Disk mode	Dependent	
Sharing	None	
<small>Disk sharing is only possible with eagerly zeroed, thick provisioned disks.</small>		

5. Save your changes.
6. Repeat steps 1-5 to create more hard disks.
7. Power on the VM
8. After the VM is online, run the following command to prepare the HDFS disks:

```
sudo /usr/local/scaligent/bin/prepare_disks.sh
```

## Next steps

There is no network at this point on your VMs. As a prerequisite:

1. Verify that Network Adapter type is set to VMware vmxnet3 (Recommended).
2. Verify that all ESXi hosts in your VMware farm for ThoughtSpot have been trunked to the VLAN assigned to your ThoughtSpot VMs.
3. Verify that the console of all ThoughtSpot VMs is accessible in VMware vCenter Server.

After you finish, go to the [ThoughtSpot Support website \[See page 0\]](#) and use the support ticket for installation tasks. If necessary, create a new ticket.

# Configure ThoughtSpot Nodes in VMware

**Summary:** Prepare to install your ThoughtSpot cluster by configuring nodes.

Before you can install a ThoughtSpot cluster in VMware, you must configure your nodes.

## Installation Prerequisites

Ensure the successful creation of the virtual machines (VMs) before you install the ThoughtSpot cluster in VMware.

1. **Download the OVF** Download the [Open Virtualization Format \[See page 0\]](#) (OVF) file.
2. **Review configuration overview** Refer to [VMware configuration overview \[See page 152\]](#) for detailed instance specs.
3. **Create the instance** Refer to [Set up VMware for ThoughtSpot \[See page 155\]](#) to create and launch your instance.
4. **Review required ports** Refer to [Network Policies \[See page 172\]](#) to view the required ports for successful operation of ThoughtSpot.

## Configure Nodes

After creating the instance, you must configure the nodes. Follow the steps in this checklist.

- Step 1: Log into your cluster [\[See page 0\]](#)
- Step 2: Get a template for network configuration [\[See page 0\]](#)
- Step 3: Prepare node configuration [\[See page 0\]](#)
- Step 4: Configure the nodes [\[See page 0\]](#)
- Step 5: Confirm node configuration [\[See page 0\]](#)

## Step 1: Log into your cluster

Log into your cluster with admin credentials from Terminal on a Mac or a terminal emulator on Windows.

Ask your network administrator if you do not know the admin credentials.

1. Run `ssh admin@<clusterIP>` or `ssh admin@<hostname>`.

Replace `clusterIP` or `hostname` with your specific network information.

```
$ ssh admin@<clusterIP>
```

2. Enter your admin password at the prompt.

Ask your network administrator if you don't know the password.

**❶ Note:** The password does not appear on the screen as you type it.

## Step 2: Get a template for network configuration

Run the `tscli cluster get-config` command to get a template for network configuration for the new cluster. Redirect it to the file `nodes.config`.

You can find more information on this process in the `nodes.config` [file reference \[See page 0\]](#).

```
$ tscli cluster get-config |& tee nodes.config
```

## Step 3: Prepare node configuration

1. Add your specific network information for the nodes in the `nodes.config` file, as demonstrated in the [autodiscovery of one node example \[See page 0\]](#).
2. Fill in the areas specified in [Parameters of the nodes.config file \[See page 0\]](#) with your specific network information.  
If you have additional nodes, complete each node within the `nodes.config` file in the same way.

Do not edit any part of the `nodes.config` file except the sections described in [Parameters of the nodes.config file \[See page 0\]](#). If you delete quotation marks, commas, or other parts of the code, it may cause setup to fail.

#### Step 4: Configure the nodes

Configure the nodes in the `nodes.config` file using the `set-config` command.

1. Disable the `firewalld` service by running `sudo systemctl stop firewalld` in your terminal. The `firewalld` service is a Linux firewall that must be off for ThoughtSpot installation. After the cluster installer reboots the nodes, `firewalld` automatically turns back on.

```
$ sudo systemctl stop firewalld
```

2. To make sure you temporarily disabled `firewalld`, run `sudo systemctl status firewalld`. Your output should specify that `firewalld` is inactive. It may look something like the following:

```
$ sudo systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
    Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; vendor preset: enabled)
      Active: inactive (dead)
```

3. Run the configuration command: `$ cat nodes.config | tscli cluster set-config`.

If the command returns an error, refer to [set-config error recovery \[See page 165\]](#).

After you run the node configuration command, your output appears similar to the following:

```
$ cat nodes.config | tscli cluster set-config

Connecting to local node-scout
Setting up hostnames for all nodes
Setting up networking interfaces on all nodes
Setting up hosts file on all nodes
Setting up IPMI configuration
Setting up NTP Servers
Setting up Timezone
Done setting up ThoughtSpot
```

### Step 5: Confirm node configuration

Use the `get-config` command to confirm node configuration.

Your output may look similar to the following:

```
$ tscli cluster get-config

{
    "ClusterId": "",
    "ClusterName": "",
    "DataNetmask": "255.255.252.0",
    "DataGateway": "192.168.4.1",
    "IPMINetmask": "255.255.252.0",
    "IPMIGateway": "192.168.4.1",
    "Timezone": "America/Los_Angeles",
    "NTPServers": "0.centos.pool.ntp.org,1.centos.pool.ntp.or
g,2.centos.pool.ntp.org,3.centos.pool.ntp.org",
    "DNS": "192.168.2.200,8.8.8.8",
    "SearchDomains": "example.company.com",
    "Nodes": {
        "ac:1f:6b:8a:77:f6": {
            "NodeId": "ac:1f:6b:8a:77:f6",
            "Hostname": "Thoughtspot-server1",
            "DataIface": {
                "Name": "eth2",
                "IPv4": "192.168.7.70"
            },
            "IPMI": {
                "IPv4": "192.168.5.70"
            }
        }
    }
}
```

## Install ThoughtSpot software

Next, [install your ThoughtSpot clusters \[See page 168\]](#).

## Error recovery

### Set-config error recovery

If you get a warning about node detection when you run the `set-config` command, restart the node-scout service.

Your error may look something like the following:

```
Connecting to local node-scout
WARNING: Detected 0 nodes, but found configuration for
only 1 nodes.
Continuing anyway. Error in cluster config validation: [] is no
t a valid link-local
IPv6 address for node: 0e:86:e2:23:8f:76 Configuration failed.
Please retry or contact support.
```

Restart the node-scout service with the following command.

```
$ sudo systemctl restart node-scout
```

Ensure that you restarted the node-scout by running `sudo systemctl status node-scout`. Your output should specify that the node-scout service is active. It may look something like the following:

```
$ sudo systemctl status node-scout
● node-scout.service - Setup Node Scout service
  Loaded: loaded (/etc/systemd/system/node-scout.service; enabled; vendor preset: disabled)
  Active: active (running) since Fri 2019-12-06 13:56:29 PST; 4s ago
```

Next, retry the `set-config` command.

```
$ cat nodes.config | tscli cluster set-config
```

The command output should no longer have a warning.

## Related information

Use these references for successful installation and administration of ThoughtSpot.

- [the nodes.config file \[See page 0\]](#)
- [Parameters of the nodes.config file \[See page 0\]](#)
- [Using the cluster create command \[See page 0\]](#)

- Parameters of the `cluster create` command [See page 0]
- ThoughtSpot Documentation [See page 0]
- Contact Support [See page 184]

# Install ThoughtSpot Clusters in VMware

**Summary:** Learn how to install ThoughtSpot clusters in VMware.

## Prerequisites

Before you can install your ThoughtSpot clusters in VMware, complete these prerequisites.

1. **Download the OVF** Download the [Open Virtualization Format \[See page 0\]](#) (OVF) file.
2. **Review configuration overview** Refer to [VMware configuration overview \[See page 152\]](#) for detailed instance specs.
3. **Create the instance** Refer to [Set up VMware for ThoughtSpot \[See page 155\]](#) to create and launch your instance.
4. **Review required ports** Refer to [Network Policies \[See page 172\]](#) to view the required ports for successful operation of ThoughtSpot.
5. **Configure nodes** Refer to [Configure ThoughtSpot Nodes in VMware \[See page 161\]](#) to configure your nodes.

## Install ThoughtSpot Software

Install the cluster using the release tarball. The estimated installation time is one hour. Follow the steps in this checklist.

- Step 1: Run the installer [\[See page 0\]](#)
- Step 2: Check cluster health [\[See page 0\]](#)
- Step 3: Finalize installation [\[See page 0\]](#)

Refer to your welcome letter from ThoughtSpot to find the link to download the release tarball. If you do not have a link, open a support ticket at [ThoughtSpot Support \[See page 0\]](#) to request access to the release tarball.

### Step 1: Run the installer

1. Copy the downloaded release tarball to `/home/admin` using the following command:

```
$ scp <release-number>.tar.gz admin@<hostname>:/home/admin/<file-name>
```

Note the following parameters:

- `release-number` is the release number of your ThoughtSpot instance, such as 5.3, 6.0, and so on.
- `hostname` is your specific hostname.
- `file-name` is the name of the tarball file on your local computer.

2. Create the cluster.

Run `tscli cluster create` to create the cluster.

```
$ tscli cluster create <release-number>.tar.gz
```

3. Edit the output with your specific cluster information.

For more information on this process, refer to [Using the cluster create command \[See page 0\]](#) and [Parameters of the cluster create command \[See page 0\]](#).

The cluster installer automatically reboots all the nodes after a successful install. The `firewalld` service automatically turns on. At this time, the system is rebooting, which may take approximately 15 minutes.

Log into any node to check the current cluster status:

```
$ tscli cluster status
```

## Step 2: Check cluster health

After the cluster installs, check its status using the `tscli cluster status` command.

Your output may look similar to the following:

```
$ tscli cluster status
Cluster: RUNNING
Cluster name      : thoughtspot
Cluster id       : 1234X11111
Number of nodes  : 3
Release          : 6.0
Last update      = Wed Oct 16 02:24:18 2019
Heterogeneous Cluster : False
Storage Type     : HDFS

Database: READY
Number of tables in READY state: 2185
Number of tables in OFFLINE state: 0
Number of tables in INPROGRESS state: 0
Number of tables in STALE state: 0
Number of tables in ERROR state: 0

Search Engine: READY
Has pending tables. Pending time = 1601679ms
Number of tables in KNOWN_TABLES state: 1934
Number of tables in READY state: 1928
Number of tables in WILL_REMOVE state: 0
Number of tables in BUILDING_AND_NOT_SERVING state: 0
Number of tables in BUILDING_AND_SERVING state: 128
Number of tables in WILL_NOT_INDEX state: 0
```

### Step 3: Finalize installation

After the cluster status changes to `READY`, sign into ThoughtSpot on your browser. Follow these steps:

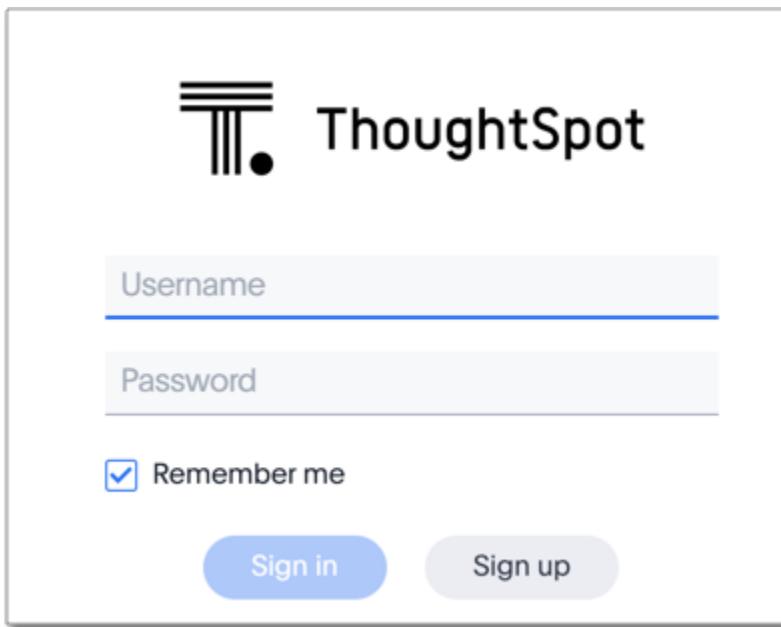
1. Start a browser from your computer.
2. Enter your secure IP information on the address line.

```
https://<IP-address>
```

3. If you don't have a security certificate for ThoughtSpot, you must bypass the security warning:
  - Click **Advanced**
  - Click **Proceed**
4. The ThoughtSpot sign-in page appears.

5. In the [ThoughtSpot sign-in window \[See page 171\]](#), enter admin credentials, and click **Sign in**.

ThoughtSpot recommends changing the default admin password.



*ThoughtSpot's sign-in window*

## Related information

Use these references for successful installation and administration of ThoughtSpot:

- [the nodes.config file \[See page 0\]](#)
- [Parameters of the nodes.config file \[See page 0\]](#)
- [Using the cluster create command \[See page 0\]](#)
- [Parameters of the `cluster create` command \[See page 0\]](#)
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# Network policies

**Summary:** Lists the required and optional ports for an installation.

For regular operations and for debugging, there are some ports you must keep open to network traffic from end users. Another, larger list of ports must be kept open for network traffic between the nodes in the cluster.

## Required ports for operations and debugging

The following ports must be open for requests from your user population. There are two main categories: operations and debugging.

Port	Protocol	Service Name	Direction	Source	Destination	Description
22	SSH	SSH	bidirectional	Administrators IP addresses	All nodes	Secure shell access. Also used for scp (secure copy).
80	HTTP	HTTP	bidirectional	All users IP addresses	All nodes	Hypertext Transfer Protocol for website traffic.
443	HTTPS	HTTPS	bidirectional	All users IP addresses	All nodes	Secure HTTP.
12345	TCP	Simba	bidirectional	Administrators IP addresses	All nodes	Port used by ODBC and JDBC drivers when connecting to ThoughtSpot.
2201	HTTP	Orion master HTTP	bidirectional	Administrator IP addresses	All nodes	Port used to debug the cluster manager.
2101	HTTP	Oreo HTTP	bidirectional	Administrator IP addresses	All nodes	Port used to debug the node daemon.
4001	HTTP	Falcon worker HTTP	bidirectional	Administrator IP addresses	All nodes	Port used to debug the data cache.

Port	Protocol	Service Name	Direction	Source	Destination	Description
4251	HTTP	Sage master HTTP	bidirectional	Administrator IP addresses	All nodes	Port used to debug the search engine.

## Network Ports

This reference lists the potential ports to open when setting up your security group.

### Required ports for intracluster operation

Static ports are used for communication between services within the cluster. ThoughtSpot recommends that you open all ports within a cluster. This is not required, but it will ensure that cluster communication works properly if additional ports are used in a future software release.

If your organization does not allow you to open all ports, make sure you open the required intracluster ports listed in the following table. In addition, a number of ports are dynamically assigned to services, which change between runs. The dynamic ports come from the range of ports that are dynamically allocated by Linux (20K+).

Port	Protocol	Service Name	Direction	Source	Dest.	Description
80	TCP	nginx	inbound	All nodes	All nodes	Primary app HTTP port (nginx)
443	TCP	Secure nginx	inbound	All nodes	All nodes	Primary app HTTPS port (nginx)
2100	RPC	Oreo RPC port	bidirectional	All nodes	All nodes	Node daemon RPC
2101	HTTP	Oreo HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Node daemon HTTP

<b>Port</b>	<b>Protocol</b>	<b>Service Name</b>	<b>Direction</b>	<b>Source</b>	<b>Dest.</b>	<b>Description</b>
2181	RPC	Zookeeper servers listen on this port for client connections	bidirectional	All nodes	All nodes	Zookeeper servers listen on this port for client connections
3181	RPC	Zookeeper servers listen on this port for client connections	bidirectional	All nodes	All nodes	Zookeeper servers listen on this port for client connections
4181	RPC	Zookeeper servers listen on this port for client connections	bidirectional	All nodes	All nodes	Zookeeper servers listen on this port for client connections
2200	RPC	Orion master RPC port	bidirectional	All nodes	All nodes	Internal communication with the cluster manager
2201	HTTP	Orion master HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Port used to debug the cluster manager
2205	TCP	Cluster update service TCP port	bidirectional	All nodes	All nodes	Internal communication with the cluster manager
2210	RPC	Cluster stats service RPC port	bidirectional	All nodes	All nodes	Internal communication with the stats collector
2211	HTTP	Cluster stats service HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Port used to debug the stats collector
2230	RPC	Callosum stats collector RPC port	bidirectional	All nodes	All nodes	Internal communication with the BI stats collector

Port	Protocol	Service Name	Direction	Source	Dest.	Description
2231	HTTP	Callosum stats collector HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Port used to debug the BI stats collector
2240	RPC	Alert manager	bidirectional	All nodes	All nodes	Port where alerting service receives alert events
2241	RPC	Alert manager	bidirectional	All nodes	All nodes	Port where alerting service receives alert events
2888	RPC	Ports used by Zookeeper servers for communication between themselves	bidirectional	All nodes	All nodes	Ports used by Zookeeper servers for communication between themselves
3181	RPC	Ports used by Zookeeper servers for communication between themselves	bidirectional	All nodes	All nodes	Ports used by Zookeeper servers for communication between themselves
3888	RPC	Ports used by Zookeeper servers for communication between themselves	bidirectional	All nodes	All nodes	Ports used by Zookeeper servers for communication between themselves
4000	RPC	Falcon worker RPC port	bidirectional	All nodes	All nodes	Port used by data cache for communication between themselves
4001	HTTP	Falcon worker HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Port used to debug the data cache
4002	HTTP	Falcon worker HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Port used to debug the data cache

<b>Port</b>	<b>Protocol</b>	<b>Service Name</b>	<b>Direction</b>	<b>Source</b>	<b>Dest.</b>	<b>Description</b>
4003	RPC	Falcon worker RPC port	bidirectional	All nodes	All nodes	Port used by data cache for communication between themselves
4004	RPC	Falcon worker RPC port	bidirectional	All nodes	All nodes	Port used by data cache for communication between themselves
4021	RPC	Sage metadata service port (exported by Tomcat), Callousum services like meta-data services, meta-data-dependency service, scheduling service, session-less service, spotiq service	bidirectional	All nodes	All nodes	Port where search service contacts meta-data service for metadata
4181	RPC	Ports used by Zookeeper servers for communication between themselves	bidirectional	All nodes	All nodes	Ports used by Zookeeper servers for communication between themselves
4201	HTTP	Sage auto complete server HTTP interface port	bidirectional	Admin IP addresses and all nodes	All nodes	Port used to debug the search service
4231	HTTP	Sage index server HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Port used to debug the search service
4232	RPC	Sage index server metadata subscriber port	bidirectional	All nodes	All nodes	Port used for search service internal communication
4233	RPC	Sage index server RPC port	bidirectional	All nodes	All nodes	Port used for search service internal communication

<b>Port</b>	<b>Protocol</b>	<b>Service Name</b>	<b>Direction</b>	<b>Source</b>	<b>Dest.</b>	<b>Description</b>
4241	HTTP	Sage auto complete server HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Port used to debug the search service
4242	RPC	Sage auto complete server RPC port	bidirectional	All nodes	All nodes	Port used for search service internal communication
4243	RPC	Sage auto complete server metadata subscriber port	bidirectional	All nodes	All nodes	Port used for search internal communication
4244	RPC	Sage auto complete server metadata subscriber port	bidirectional	All nodes	All nodes	Port used for search internal communication
4245	RPC	Sage auto complete server metadata subscriber port	bidirectional	All nodes	All nodes	Port used for search internal communication
4243	RPC	Sage auto complete server metadata subscriber port	bidirectional	All nodes	All nodes	Port used for search internal communication
4251	RPC	Sage master RPC port	bidirectional	All nodes	All nodes	Port used for search service internal communication
4405	RPC	Diamond (graphite) port	bidirectional	All nodes	All nodes	Port used for communication with monitoring service
4406	RPC	Diamond (graphite) port	bidirectional	All nodes	All nodes	Port used for communication with monitoring service
4500	RPC	Trace vault service RPC port	bidirectional	All nodes	All nodes	Trace collection for ThoughtSpot services
4501	HTTP	Trace vault service HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Debug trace collection

Port	Protocol	Service Name	Direction	Source	Dest.	Description
4851	RPC	Graphite manager RPC port	bidirectional	All nodes	All nodes	Communication with graphite manager
4852	HTTP	Graphite manager HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Debug graphite manager
4853	RPC	Elastic search stack (ELK) manager RPC port	bidirectional	All nodes	All nodes	Communication with log search service
4853	HTTP	Elastic search stack (ELK) manager HTTP port	bidirectional	Admin IP addresses and all nodes	All nodes	Debug log search service
9200	RPC	Elastic search (ELK)	bidirectional	All nodes	All nodes	Communication with log search service
5021	RPC	Callosum services like meta-data services, medata-dependency service, scheduling service, session-less service, spotiq service	bidirectional	All nodes	All nodes	Port where search service contacts meta-data service for metadata
5432	Postgres	Postgres database server port	bidirectional	All nodes	All nodes	Communication with Postgres database
6021	RPC	Callosum services like meta-data services, medata-dependency service, scheduling service, session-less service, spotiq service	bidirectional	All nodes	All nodes	Port where search service contacts meta-data service for metadata
7021	RPC	Callosum services like meta-data services, medata-dependency service, scheduling service, session-less service, spotiq service	bidirectional	All nodes	All nodes	Port where search service contacts meta-data service for metadata

Port	Protocol	Service Name	Direction	Source	Dest.	Description
8020	RPC	HDFS namenode server RPC port	bidirectional	All nodes	All nodes	Distributed file system (DFS) communication with clients
8021	RPC	Callosum services like meta-data services, metadata-dependency service, scheduling service, session-less service, spotiq service	bidirectional	All nodes	All nodes	Port where search service contacts metadata service for metadata
8080	HTTP	Tomcat	bidirectional	All nodes	All nodes	BI engine communication with clients
8081	HTTP	Callosum/Tomcat status	bidirectional	All nodes	All nodes	BI engine communication with clients
8787	HTTP	Periscope (UI) service HTTP port	bidirectional	All nodes	All nodes	Administration UI back end
8888	HTTP	HTTP proxy server (tinyproxy)	bidirectional	All nodes	All nodes	Reverse SSH tunnel
11211	Memcached	Memcached server port	bidirectional	All nodes	All nodes	BI engine cache
12345	ODBC	Simba server port	bidirectional	All nodes	All nodes	Port used for ETL (extract, transform, load)
8480	HTTP	HDFS journalnode server HTTP port	bidirectional	All nodes	All nodes	Debug DFS metadata
8485	HTTP	HDFS journalnode server HTTP port	bidirectional	All nodes	All nodes	Debug DFS metadata
50070	HTTP	HDFS namenode server HTTP port	bidirectional	All nodes	All nodes	Debug DFS metadata
50090	HTTP	HDFS secondary namenode server HTTP port	bidirectional	All nodes	All nodes	Debug DFS metadata
50075	HTTP	HDFS datanode server HTTP port	bidirectional	All nodes	All nodes	Debug DFS data

Port	Protocol	Service Name	Direction	Source	Dest.	Description
50010	HTTP	HDFS datanode server HTTP port	bidirectional	All nodes	All nodes	Debug DFS data
50020	HTTP	HDFS datanode server HTTP port	bidirectional	All nodes	All nodes	Debug DFS data
7000	TCP	Cassandra KV store database	bidirectional	All nodes	All nodes	Debug DFS data
7001	TCP	Cassandra	bidirectional	All nodes	All nodes	Debug DFS data
9042	HTTP	Munshi server impression service, Cassandra	bidirectional	All nodes	All nodes	Debug DFS data
9160	TCP	Cassandra	bidirectional	All nodes	All nodes	Debug DFS data
4010	HTTP	Falcon moderator	bidirectional	All nodes	All nodes	Debug DFS data
4011	HTTP	Falcon moderator	bidirectional	All nodes	All nodes	Debug DFS data
20123 - 32768	TCP (dynamic)	Dynamic port in this range used for various services and ancillary services like atlas, caffeine, call-home, callosum, falcon, monitoring, munshi server, nlp, object_search, postgres, sage UBR, spo-tiq snapshot, timely	All nodes	Services		
5270	TCP	Cluster monitoring service (ELK)	bidirectional	All nodes	All nodes	Services
5271	TCP	Cluster monitoring service (ELK)	bidirectional	All nodes	All nodes	Services
5601	TCP	Kibana UI (ELK)	bidirectional	All nodes	All nodes	Services
6311	TCP	R service	bidirectional	All nodes	All nodes	Services
8008	TCP	Video recorder	bidirectional	All nodes	All nodes	Services

Port	Protocol	Service Name	Direction	Source	Dest.	Description
9090	TCP	Timely	bidirectional	All nodes	All nodes	Services
	ICMPv4	Used for health check of cluster nodes	bidirectional	All nodes	All nodes	Services

### Required ports for inbound and outbound cluster access

ThoughtSpot uses static ports for inbound and outbound access to the cluster.

Port	Protocol	Service Name	Direction	Source	Dest.	Description
22	SCP	SSH	bidirectional	ThoughtSpot Support	All nodes	Secure shell access.
80	HTTP	HTTP	bidirectional	ThoughtSpot Support	All nodes	Hypertext Transfer Protocol for website traffic.
443	HTTPS	HTTPS	bidirectional	ThoughtSpot Support	All nodes	Secure HTTP.
12345	TCP	Simba	bidirectional	ThoughtSpot Support	All nodes	Port used by ODBC and JDBC drivers when connecting to ThoughtSpot.
2049	TCP	NFS: In case one needs to mount NFS share on TS node.	bidirectional	ThoughtSpot Support	All nodes	Port used by NFS.
123	UDP	NTP service	bidirectional	ThoughtSpot Support	All nodes	Port used by NTP service.

Port	Protocol	Service Name	Direction	Source	Destination	Description
443	TCP	HTTPS	outbound	All nodes	208.83.110.20	For transferring files to thoughtspot.egnyte.com.

Port	Protocol	Service Name	Direction	Source	Destination	Description
443	TCP	HTTPS	outbound	All nodes	For transferring product usage data to mixpanel cloud.	outbound
443	TCP	HTTPS	outbound	All nodes	je8b47jfif.execute-api.us-east-2.amazonaws.com s3.us-west-1.amazonaws.com s3-us-west-1.amazonaws.com s3.dualstack.us-west-1.amazonaws.com	For transferring monitoring data to InfluxCloud. (Given address will resolve to point to AWS instances).
25 or 587	SMTP	SMTP or Secure SMTP	outbound	All nodes and SMTP relay (provided by customer)	All nodes	Allow outbound access for the IP address of whichever email relay server is in use. This is for sending alerts to ThoughtSpot Support.
389 or 636	TCP	LDAP or LDAPS	outbound	All nodes and LDAP server (provided by customer)	All nodes	Allow outbound access for the IP address of the LDAP server in use.

### Required ports for IPMI (Intelligent Platform Management Interface)

ThoughtSpot uses static ports for out-of-band IPMI communications between the cluster and ThoughtSpot support.

Port	Protocol	Service Name	Direction	Source	Dest.	Description
80	HTTP	HTTP	bidirectional	ThoughtSpot Support	All nodes	Hypertext Transfer Protocol for website traffic.
443	TCP	S-HTTP	bidirectional	ThoughtSpot Support	All nodes	IPMI GUI and for HTML5-based IPMI console access.

<b>Port</b>	<b>Protocol</b>	<b>Service Name</b>	<b>Direction</b>	<b>Source</b>	<b>Dest.</b>	<b>Description</b>
623	UDP	Serial-over-LAN	bidirectional	ThoughtSpot Support	All nodes	IPMI GUI and for HTML5-based IPMI console access.

# Contact support

You can contact ThoughtSpot by [phone \[See page 184\]](#), [mail \[See page 0\]](#), [email \[See page 184\]](#), or by [filing a support ticket \[See page 184\]](#).

## File a support ticket

If you encounter a technical issue, file a support ticket using the Support Portal ticket filing system at:

[http://support.thoughtspot.com/ \[See page 0\]](http://support.thoughtspot.com/)

Please provide as much detail as possible about your issue, to help us resolve it quickly.

You need a Support Portal login to file a ticket. Please contact ThoughtSpot to get an account, if necessary.

## Address

ThoughtSpot, Inc. 910 Hermosa Ct Sunnyvale, CA 94085

## Phone numbers

Phone Number	Description
1-800-508-7008 ext 1	ThoughtSpot Support
1-800-508-7008	Toll-free number for ThoughtSpot headquarters.

## Email

Reason for contacting us	Email
Sales inquiries	<a href="mailto:sales@thoughtspot.com">sales@thoughtspot.com [See page 0]</a>

*Contact support*

Reason for contacting us	Email
Customer support and software update inquiries	<a href="mailto:support@thoughtspot.com">support@thoughtspot.com</a> [See page 0]
Other inquiries	<a href="mailto:hello@thoughtspot.com">hello@thoughtspot.com</a> [See page 0]