HashData Lightning Web Platform Documentation

Release v1.5.4

HashData

Jul 12, 2024

Contents

CHAPTER

ONE

DEPLOY HASHDATA LIGHTNING THROUGH VISUAL INTERFACE

HashData Lightning Web Platform is a console tool for deploying and managing HashData Lightning clusters, providing a simple and intuitive user interface. Compared to the manual method, deployment through visual interface is simpler and more intuitive. You only need to follow the interface prompts to operate, without understanding complex commands and configuration files, making deployment more efficient.

1.1 Applicable version

Make sure that you are deploying HashData Lightning v1.5.4 or a later version.

1.2 Deploy HashData Lightning cluster

This section introduces how to deploy HashData Lightning on physical machines using the Web Platform.

Software and hardware configuration requirements

HashData Lightning supports deployment on the following operating systems and CPU architectures. See the table below for details.

Operating system	Supported CPU architectures
RHEL/CentOS 7.6+	x86_64 and AArch64
Kylin V10 SP1 or SP2	x86_64 and AArch64

Installation steps

Installing HashData Lightning on servers mainly involves 4 steps: preparation, installation of the database RPM package, database deployment, and post-installation setup.

Step 1: Prepare to deploy

1. Before installation, check and confirm the basic information of the server to better plan and deploy the cluster.

Step	Command	Purpose
1	`free -h`	Views memory information of the operating system.
2	`df -h`	Checks disk space.
3	`lscpu`	Checks the number of CPUs.
4	`cat/etc/system-release`	Views the version information of the operating system.
5	`uname -a`	Outputs all kernel information in this order (where if the detection results of -p and -i are unknown, they are omitted): kernel name, hostname on the network node, kernel release number, kernel version, hardware architecture name of the host, processor type, hardware platform, operating system name.
6	`tail -11 /proc/cpuinfo`	Views CPU information.

2. Create a `gpadmin` user on each node server as the admin user. Create a user group and username `gpadmin`, and set the identification number of the user group and username to `520`. Create and specify the home directory `/home/gpadmin/`. The commands are as follows.

```
groupadd -g 520 gpadmin  # Creates the user group gpadmin.
useradd -g 520 -u 520 -m -d /home/gpadmin/ -s /bin/bash gpadmin  # Creates the␣
↪user gpadmin and the home directory.
passwd gpadmin  # Sets password for gpadmin.
```

3. Configure as follows on the machine where HashData Lightning is to be installed:
   1. Turn off the firewall. Otherwise, you cannot deploy through the Web Platform.

```
sudo systemctl stop firewalld.service
sudo systemctl disable firewalld.service
```

   2. Disable SELinux. You can edit the `/etc/selinux/config` file and set the value of SELINUX to `disabled`:

```
sudo sed s/^SELINUX=.*$/SELINUX=disabled/ -i /etc/selinux/config
sudo setenforce 0
```

4. Set system parameters on each server.
5. Permanently disable IPv6.

   To do that, you need to edit the `/etc/sysctl.conf` file (or create a new configuration file in the `/etc/sysctl.d/` directory) and add the following line:

```
net.ipv6.conf.all.disable_ipv6 = 1
net.ipv6.conf.default.disable_ipv6 = 1
```

   After that, run `sudo sysctl -p` to apply the changes, or restart your system.

6. Configure password-free login between servers. Enable password-free login to each machine from other nodes in the `gpadmin` account. The check command is `ssh ip`, such as `ssh 192.168.48.58`. If the password-free setting is successful, no password is required.

7. Enable the gpadmin user to perform `sudo` without password.

   Note: After switching to the `gpadmin` user by running `su - gpadmin`, if you cannot run the `ifconfig` command, you need to configure the environment variable for `ifconfig`. Assuming the `ifconfig` file is in the `/usr/sbin` directory, you need to add a line `export PATH=/usr/sbin:$PATH` in the `~/.bashrc` file, and then run `source ~/.bashrc` to make it effective.

8. Copy the RPM package. Copy the RPM package to each node server where you want to install HashData Lightning.

Step 2: Install the database RPM package

On each node machine, run the following commands to install the database RPM package, and the system dependencies will be automatically installed.

```
cd /home/gpadmin
sudo yum install hashdata-lightning-1.5.4-1.el7.x86_64-75889-release.rpm
sudo chown -R gpadmin:gpadmin /usr/local
sudo chown -R gpadmin:gpadmin /usr/local/cloudberry*
```

Note: During the actual installation process, you need to replace the RPM file name `hashdata-lightning-1.5.4-1.el7.x86_64-75889-release.rpm` with the real RPM package name.

Step 3: Deploy the database through the interface

Use Web Platform, the embedded visual interface, to deploy HashData Lightning. By default, the visual deployment tool accesses the `7788` port of the database node server. After installation, the `7788` port is open by default for all nodes.

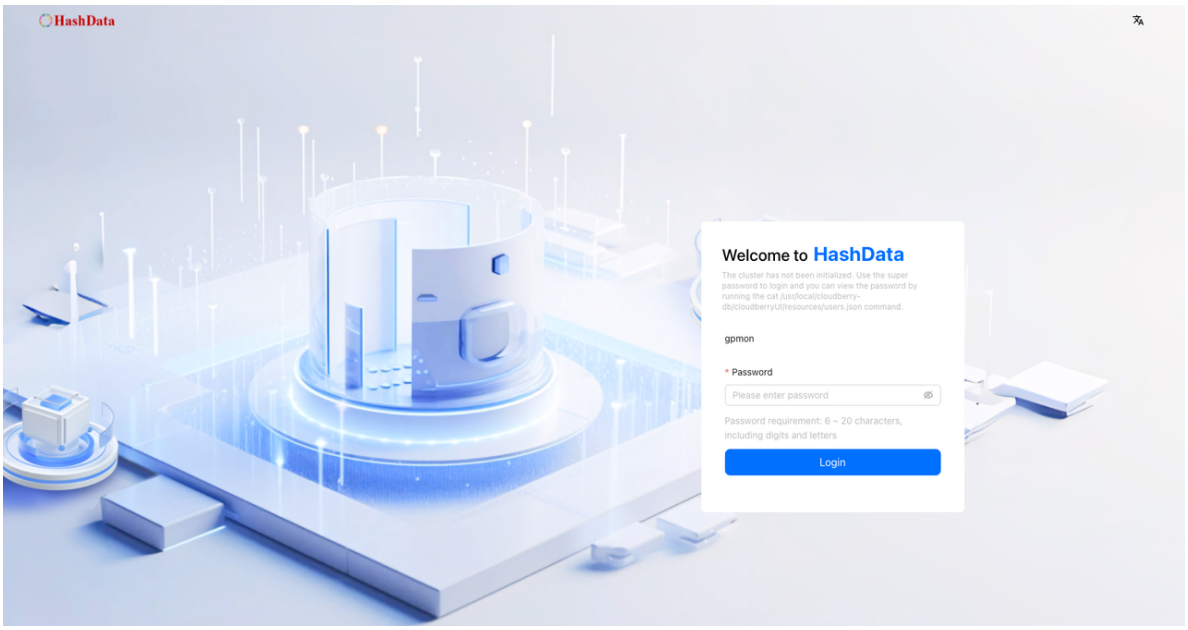
Access the deployment interface

1. Visit the deployment visual interface. Open your browser (IE series browsers are not supported) and visit the following link to open the interface. You need to replace `<IP>` with the IP address of any node server:

   ```
   http://<IP>:7788/
   ```

2. Fill in the superuser password to log in to the deployment node, as shown in the following figure. To view the superuser password, run the command `find / -path "*/cloudberry-*/cloudberryUI/resources/users.json" 2>/dev/null | xargs cat | grep -A1 '"username": "gpmon",'`.

   The default installation directory is /usr/local, and you can view the username and password of the gpmon account using the command `cat /usr/local/cloudberry-db/cloudberryUI/resources/users.json`.



After successful login, choose the deployment mode: single-node deployment or multi-node deployment.

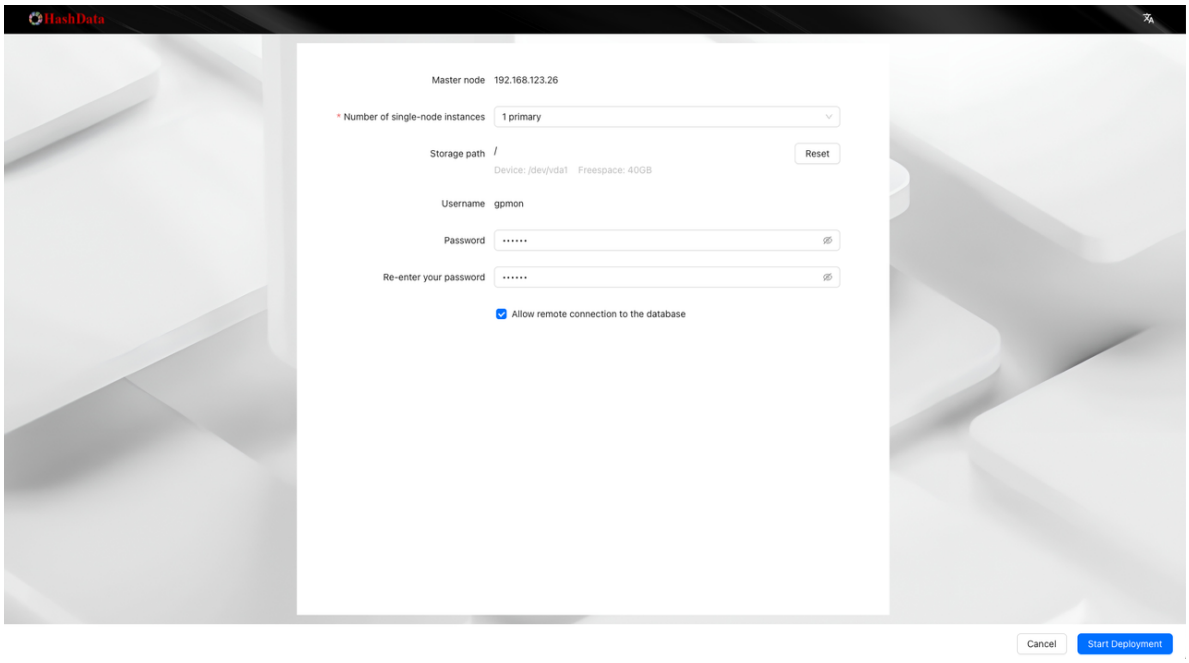
Note: You cannot log in with the same IP address and user at the same time. Otherwise, an error will be prompted.

Deploy in single-node mode

The single-node deployment mode is intended for testing purposes. This mode does not support high availability. Do not use this mode in production environments.

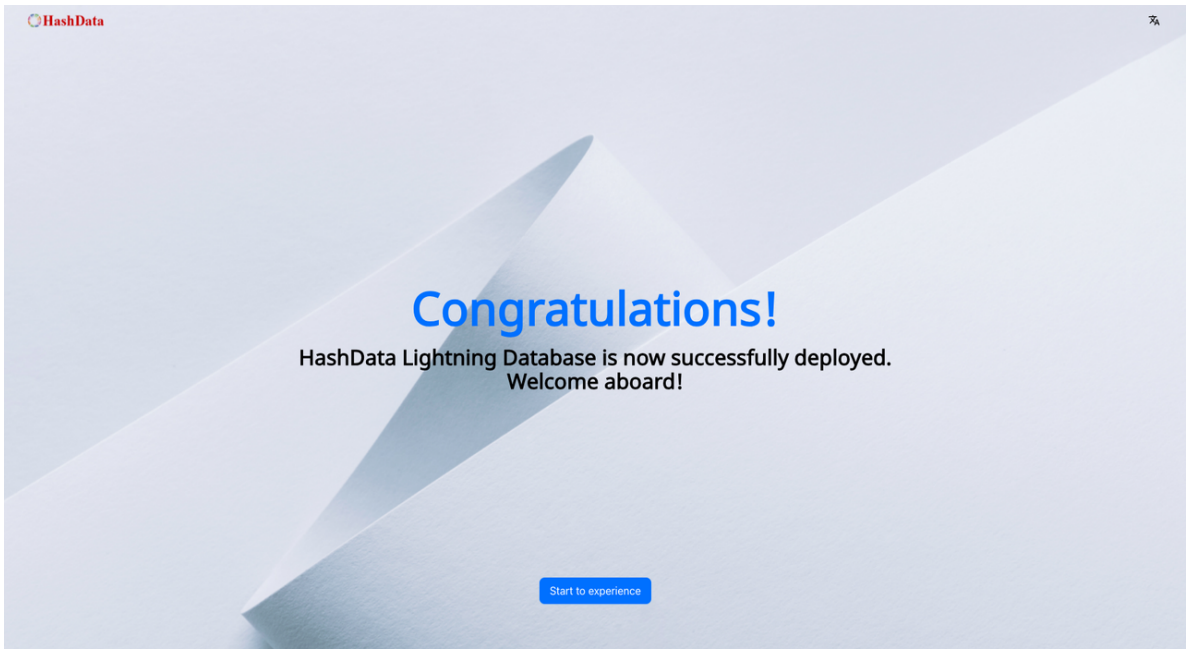
This mode only requires one physical machine because all services will be deployed on the same machine.

1. Once logged in, select **Single Node Deployment** and click **Next**.
2. Set the configuration items for a single node. The screenshot below shows an example configuration:



3. Click **Perform Deployment** and wait for the deployment to complete.

   After the deployment is complete, you will see the following screen:



Deploy in multi-node mode

1. Once logged in, select **Add nodes and start database cluster** and click Next.
2. Add a node. You can use the **Add in batch** to add nodes quickly, or you can add a node manually.
   - To quickly add nodes: The deployment tool will automatically detect all nodes that have the RPM packages installed and show the **one-click add** in the upper-left corner of the window.

     Click **one-click add** and the deployment tool will automatically add the available nodes.
   - To manually add nodes: Enter the hostname or IP address of the node that you want to add in the text box, such as `i-uv2qw6ad` or `192.168.176.29`, and then click **Add node**.

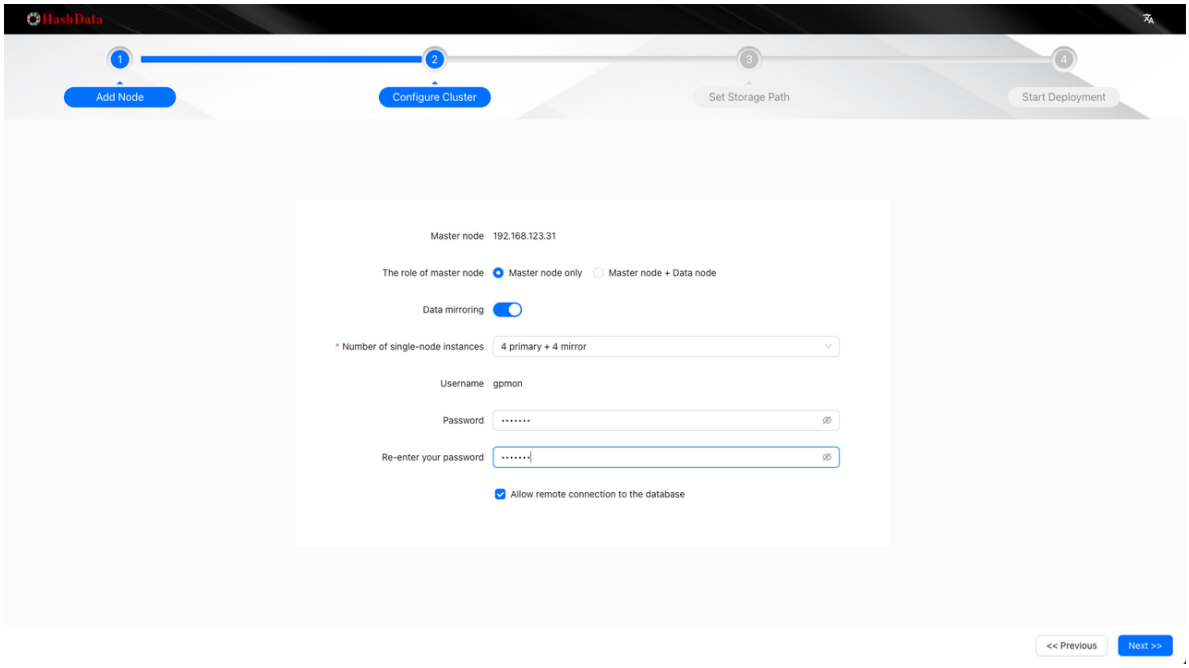
   Note:

   – Make sure that the nodes you add can be detected and are not duplicated. Otherwise, the deployment tool will report an error at the top of the window, indicating that the hostname was not detected or the node to be added already exists.

   – The multi-node deployment mode cannot proceed if you only add one node.

   ---

3. Complete the following configuration for the cluster:
   - Configure the standby node for the primary node and configure mirror nodes for the data nodes.
   - **Data mirroring** determines whether the cluster’ s data nodes have mirror copies. It is recommended to enable this option in production environments to ensure high availability.
   - Change the `gpmon` password and check **Allow remote connection to the database**.



4. Set the storage path. Note that the current HashData Lightning version requires the mounting points of all nodes to be specified to the same one. Otherwise, an error message is prompted. Then click **Next**.
5. Confirm the configurations made in the previous steps. You can go back to correct the wrong setting if there is one. Click **Start Deployment** in the lower-right corner. The deployment starts and a progress bar is displayed.

If the deployment is completed, you will be taken to the completion page. Note that you will be asked if you want to deploy again the next time you log in.

6. Run `psql` to check whether the database is up. If yes, you can continue with the post-installation configuration. If not, try to log into the node server again and run `psql` as the `gpadmin` user.

Step 4: Perform post-installation configuration

- Run the following command as the `gpadmin` user.

```
sudo chown -R gpadmin:gpadmin /usr/local/cloudberry-db/cloudberryUI/resources
```

- Enable remote connection.

  HashData Lightning supports remote connections. If **Allow remote connection to database** is not checked when you configure the cluster parameters (as described in Step 3 of the above **Deploy in multi-node mode** section), you can add the following code line to the `$COORDINATOR_DATA_DIRECTORY/pg_hba` file to allow users from any IP to connect through password authentication.

  To ensure security, restrict the IP range or database name based on actual needs. For `pg_hba.conf`, the HashData technical support team has an auto-generated initialization version. The support engineers will configure the version on-site based on the actual situation and security requirements. It is recommended to check `pg_hba.conf`.

```
host  all       all   0.0.0.0/0  md5
```

  Once the changes are made, run the following command to reload the database configuration file `pg_hba.conf`:

```
gpstop -u
```

- You can use the following commands to start, stop, restart, and view the status of HashData Lightning.

Command	Description
`gpstop -a`	Stops the cluster. In this mode, if there is a connected session, you need to wait for the session to be closed before stopping the cluster.
`gpstop -af`	Forcibly shuts down the cluster.
`gpstop -ar`	Restarts the cluster. Waits for the SQL statement to finish execution. In this mode, if there is a connected session, you need to wait for the session to be closed before stopping the cluster.
`gpstate -s`	Shows the current status of the cluster.

1.3 Troubleshooting tips

- After logging into the console through `http://<IP>:7788/`, if you see a message indicating that the cluster nodes are not connected or stuck in the process of collecting host information, it is recommended to check that the SSH mutual trust between the nodes is properly configured, and then run the following commands to restart the node:

```
su - gpadmin
cd /usr/local/cloudberry-db
sudo pkill cbuiserver
./cbuiserver
```

- If the node machines have previously undergone visual deployment and you wish to reinstall the RPM packages on these machines, run `sudo pkill cbuiserver` on each machine before installation and then clear the `/usr/local/cloudberry-db` directory.

CHAPTER

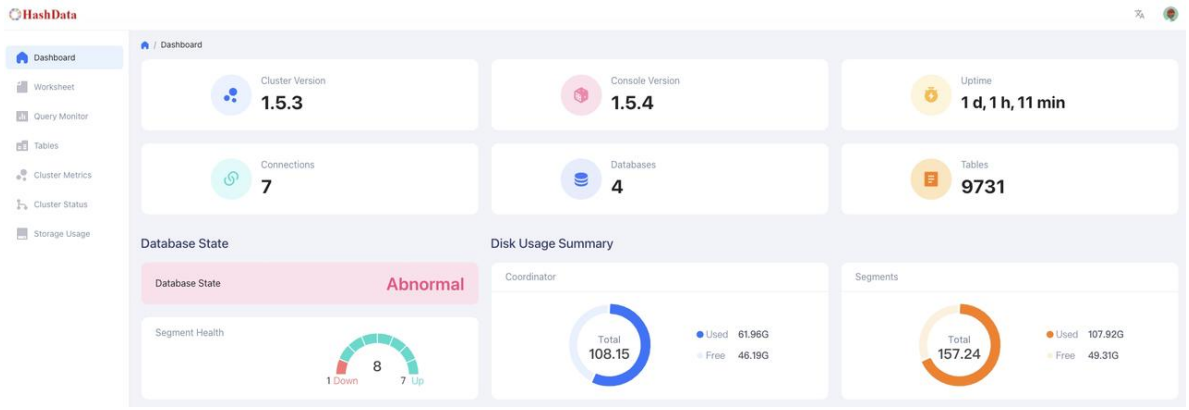
TWO

VIEW MONITORING DATA USING THE WEB PLATFORM

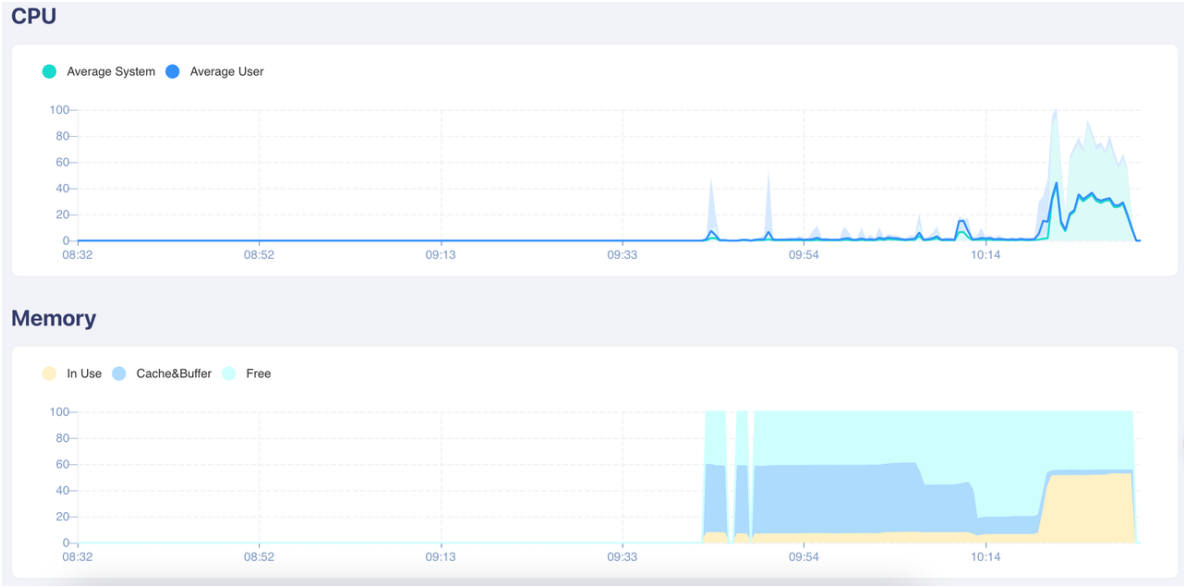
2.1 View Cluster Information

Steps

1. Access `http://<ip>:7788/` to log into the Web Platform console.
2. Click **Dashboard** in the left navigation menu to view the cluster overview.



Display item	Description
Overview	Cluster version, console version, cluster uptime, the number of cluster connection sessions, the total number of databases in the cluster, and total number of tables.
Database State	The overall status of the database and the number of normal and abnormal segments.
Disk Usage Summary	Disk usage of the coordinator and segments.



Display item	Description
CPU	Shows the average CPU and maximum CPU usage of the cluster in the past 2 hours. - The orange and blue lines represent the system processes and user processes, respectively. Click the legend in the upper left corner to show or hide the line. - Hover the cursor over the chart to display the CPU usage percentage at specific time points.
Memory	Shows the average memory usage percentage of the cluster in the past 2 hours. - Hover the cursor over the chart to display the average memory and maximum memory usage percentage at specific time points.

2.2 Cluster Status and Metrics

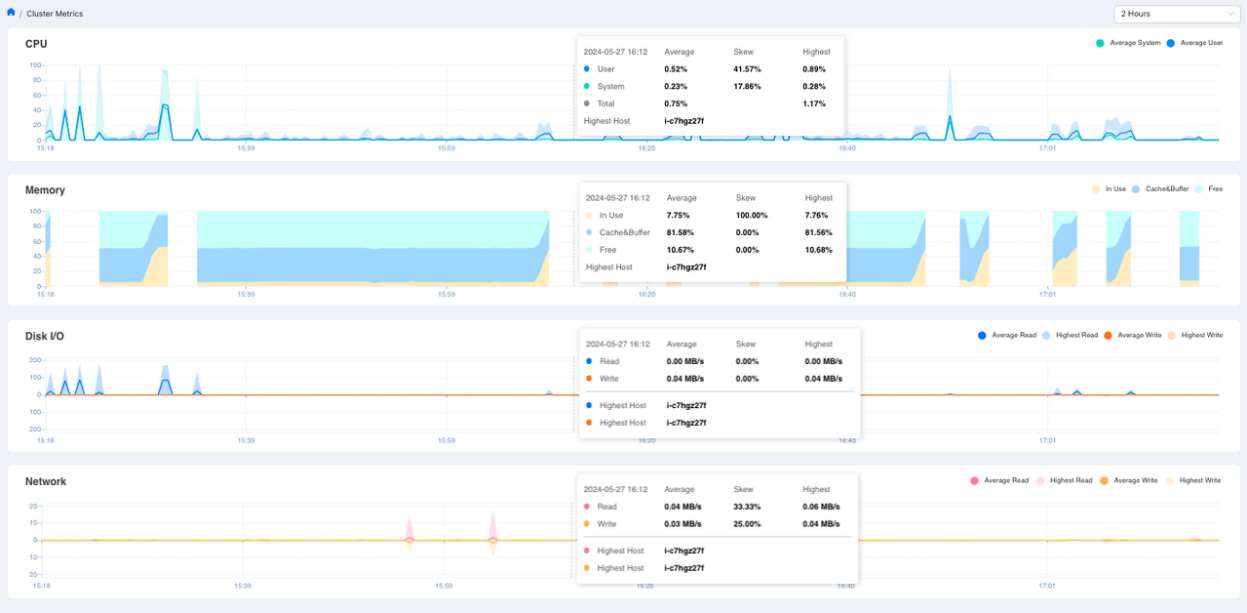
You can view the near-real-time status and metric data of the cluster on the **Cluster Metrics** and **Cluster Status** pages.

Access the pages

To access the **Cluster Metrics** and **Cluster Status** pages, you need to:

1. Access the Web Platform dashboard in your browser via `http://<cluster_node_IP>:7788/`.
2. Click **Cluster Metrics** or **Cluster Status** in the left navigation menu to enter the page.

View the overall status and data of the cluster



The **Cluster Metrics** page displays the cluster's CPU, memory, disk I/O, and network data.

You can adjust the time range of the data displayed through the drop-down menu on the upper-right corner of the page. Available time range options are "2 hours", "6 hours", "1 day" and "7 days". Data calculation time units vary with the selected time range.

The charts have time as the X axis and numerical value or percentage as the Y axis. When you hover over a certain time point, the data of that time will pop up. You can view data from different time points by moving the cursor horizontally. Corresponding legends are provided in the upper right corner of each chart.

Cluster CPU usage status

The chart displays the following metrics:

- Average, skewness, and maximum value of the total CPU usage (%) of all user processes.
- Average, skewness, and maximum value of the total CPU usage (%) of all system processes.
- Average, skewness, and maximum of the total CPU usage (%).
- Name of the busiest host.

Cluster memory usage status

The chart displays the following metrics:

- Average, skewness, and maximum of the total memory in use (%).
- Average, skewness, and maximum of the total buffer and cache memory (%).
- Average, skewness, and maximum value of the total available memory (%).
- Name of the busiest host

Cluster disk I/O rate

The chart displays the following indicators:

- Average, skewness, and maximum value of the total disk read rate (MB/s).
- Average, skewness, and maximum value of the total disk write rate (MB/s).
- Name of the busiest host by disk read.
- Name of the busiest host by disk write.

Attention: The part above the X axis of the chart displays disk read data, and the part below the X axis displays disk write data.

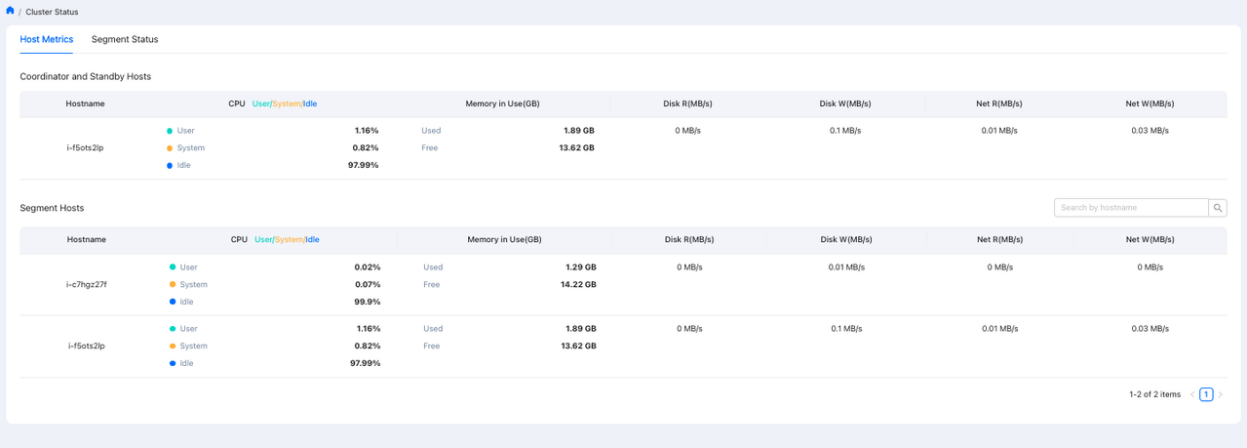
Network I/O rate

- Average, skewness, and maximum value of the total network read rate (MB/s).
- Average, skewness, and maximum value of the total network write rate (MB/s).
- Name of the busiest host by network read.
- Name of the busiest host by network write.

Note: The part above the X axis of the chart displays network read data, and the part below the X axis displays network write data.

View the status and data of nodes and hosts

The **Cluster Status** page displays the status and data of the hosts and nodes in the cluster. You can switch between host and segment tabs from the upper-left corner of the page.



Host metrics

The **Host Metrics** tab displays data of the coordinator host, its backup host, and the segment hosts:

Note: Users can search for a specific segment host by hostname.

Field	Description
Hostname	The name of the coordinator or segment host
CPU User/System/Idle	% of the user processes CPU usage, system processes CPU usage, and idle CPU
Memory in Use (GB)	In-use and available memory
Disk R (MB/s)	Disk read rate
Disk W (MB/s)	Disk write rate
Net R (MB/s)	Network read rate
Net W (MB/s)	Network write rate

Segment status

The **Segment Status** tab displays the status and data of each segment.

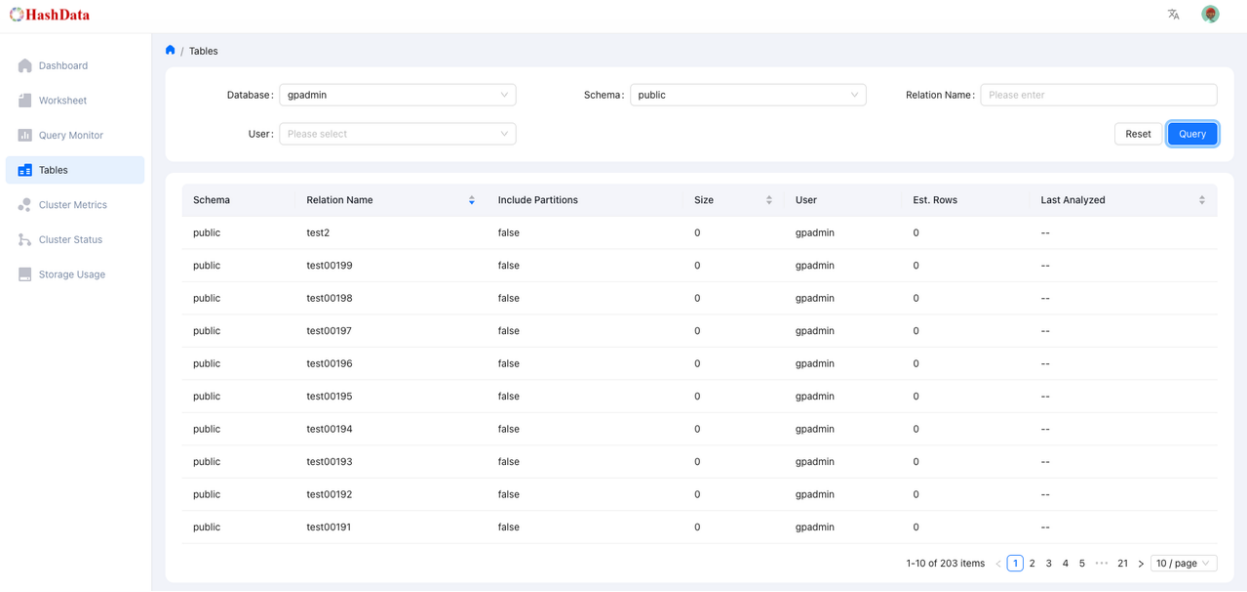
The top of the tab shows the overall status of the database, segment count, segment-specific host count, and a segment status indicator.

The table displays the following metrics and status:

Field	Description
Hostname	The name of the segment host
Address	The address of the segment on the segment host
Port	The listening TCP port of the segment host
DB ID	Database ID
Content ID	The content identifier of the segment
Status	Segment status. Values: Up or Down
Role	The current role of the segment. Values: p (Primary) or m (Mirror)
Preferred Role	The role that is set for the segment when it is initialized. Values: p (Primary) or m (Mirror)
Replication Mode	The synchronization status of the segment with its mirror copy. Values: s (Synchronized) or n (Not In Sync)

2.3 View Database Object Information

HashData Lightning Web Platform provides information of database objects. On the **Tables** page, you can view detailed information about tables in the database, such as the schema to which the table belongs, the table name, whether the table contains partitions, the table size, the user, and the estimated number of rows. An example page is as follows:



To access the **Tables** page, you need to:

1. Access the Web Platform dashboard in your browser via `http://<cluster_node_IP>:7788/`.
2. Click **Tables** in the left navigation menu to enter the page.

View table objects

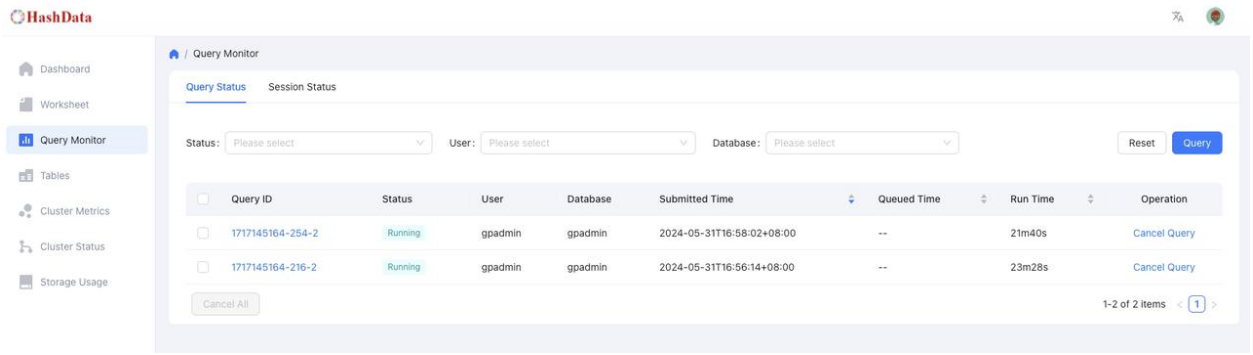
To query the information of a table, you can fill in the drop-down option boxes according to the database, the schema, the table name, and the user. Then click **Query**. The **User** box supports multiple selections.

The fields for the table information are described as follows:

Field name	Description
Schema	The schema to which the table belongs.
Relation Name	The table or view name.
Include Partitions	Indicates whether the table contains partitions. `False` means no, and `true` means yes.
Size	The storage size that the table occupies.
User	The database user to which the table belongs.
Est. Rows	The estimated number of rows.
Last Analyzed	The last time the table was analyzed for updated statistics.

2.4 View SQL Monitoring Information

HashData Lightning Web Platform provides monitoring information for SQL statements being executed in the database. On the **Query Monitor** page, you can see the execution status and details of each SQL statement, and the status of each database session. An example is as follows:



Access the page

To access the **Query Monitor** page, you need to:

1. Access the Web Platform dashboard in your browser via `http://<cluster_node_IP>:7788/`.
2. Click **Query Monitor** in the left navigation menu to enter the page.

View SQL execution status

To view the execution status of a SQL statement, click the **Query Status** tab.

In the search area, fill in the corresponding drop-down option box according to the execution status of the SQL statement, the user, and the database. Then click **Query** to search. The **User** box supports multiple selections.

The options in the **Status** drop-down box are described as follows:

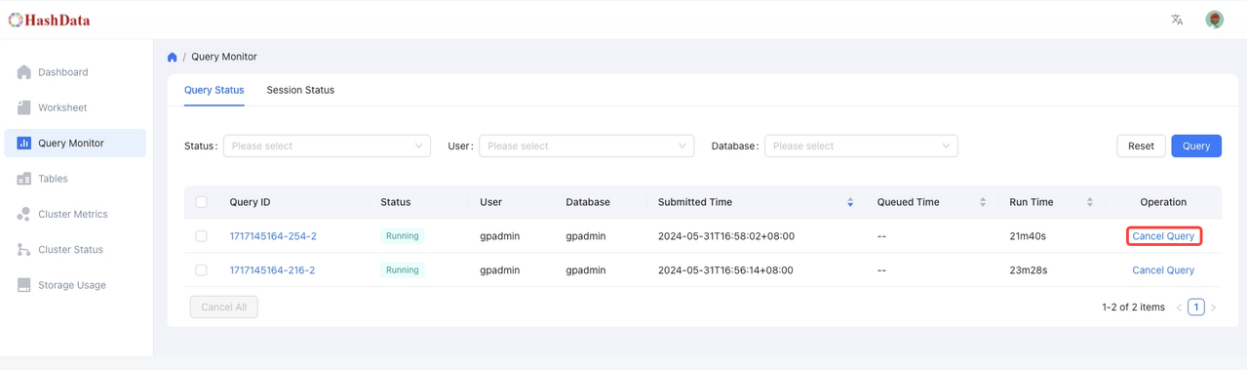
Option name	Description
Running	The SQL statement is being executed.
Done	The SQL statement has been executed.
Abort	The SQL statement has been aborted.
Canceling	SQL statement is being canceled.

After clicking **Query**, a SQL list will be displayed in the area below, and you should be able to find the target SQL statement from the list. The fields of the SQL list are described as follows:

Field name	Description
Query ID	Identifies the unique ID of the SQL statement being executed in the database.
Status	The status of the SQL statement execution.
User	The user who executes the SQL statement.
Database	The database where the SQL statement is executed.
Submitted Time	The time when the SQL statement was submitted.
Queue Time	The queue time before executing the SQL statement.
Run Time	The execution time of the SQL statement.
Operation	For a SQL statement, you can click Cancel Query to cancel the SQL statement.

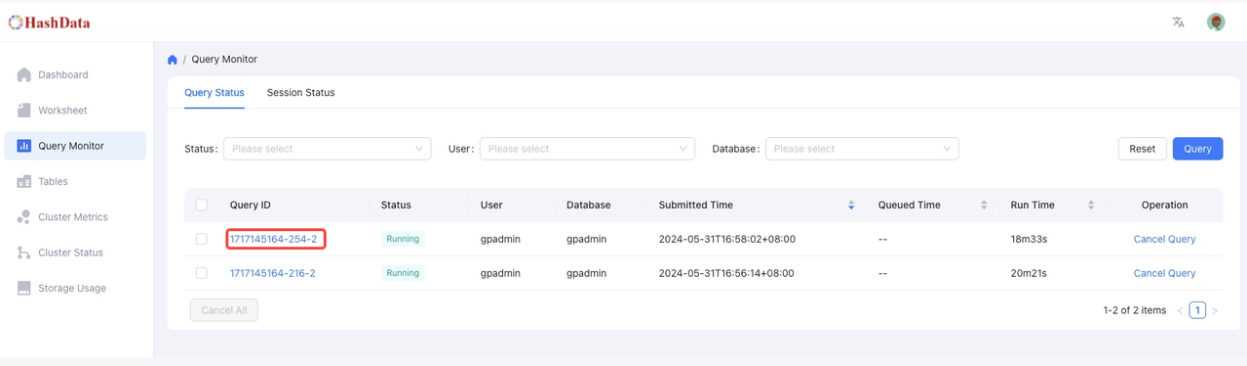
Cancel SQL execution

To cancel one or more SQL statements, locate the **Operation** column of the corresponding SQL statement in the SQL list, and then click **Cancel Query**.

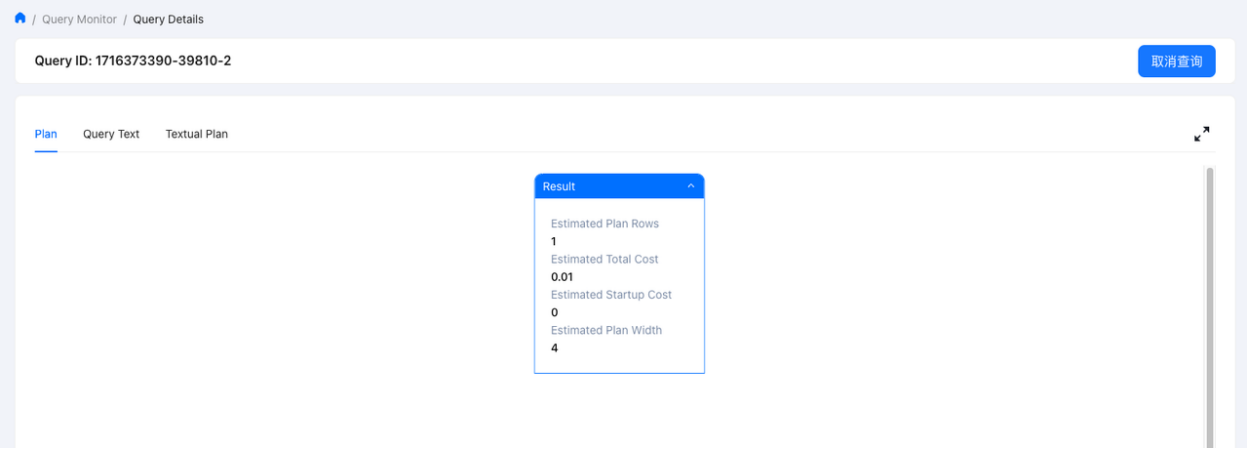


View SQL details

To view the details of a SQL statement, click the query ID of the SQL statement, and then enter the details page.



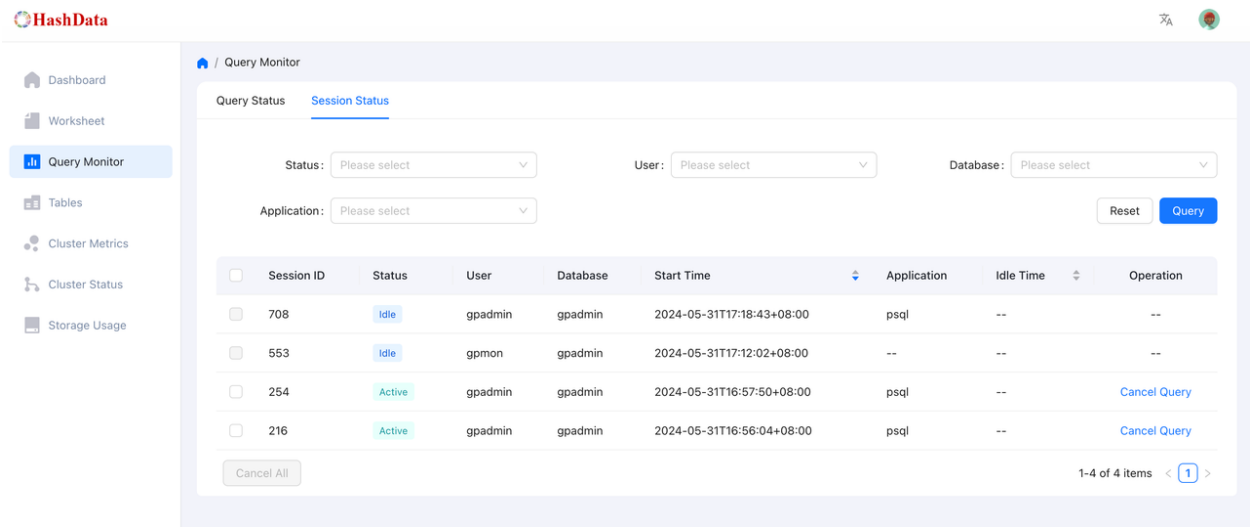
The details page displays the details of SQL execution. You can click different tabs to view the query plan diagram, SQL text, and the query plan text of the SQL statement. An example is as follows:



View session status

To view session status in the database, click the **Session Status** tab on the **Query Monitor** page.

A list of real-time sessions running in the database is displayed, including session ID, execution status, the user who operates, the database where the session is running, the start time, the application, and idle time.



To view the details of a session, in the search area, fill in the corresponding drop-down option box according to the execution status, user, database, and application name. Then click **Query** to search. The **User** box supports multiple selections.

The options in the **Status** drop-down box are described as follows:

Option name	Description
Active	The backend is running the session.
Idle	The backend is waiting for new client commands.
Idle in transaction (aborted)	The backend is in a transaction, but currently, no query is running.
Fastpath function call	The backend is executing the fast path function.
Disabled	The status is reported when `track_activities` is disabled in the backend.
Unknown	The session status is unknown.

After clicking **Query**, a list of sessions is displayed in the area below, and you should be able to find the target session from the list.

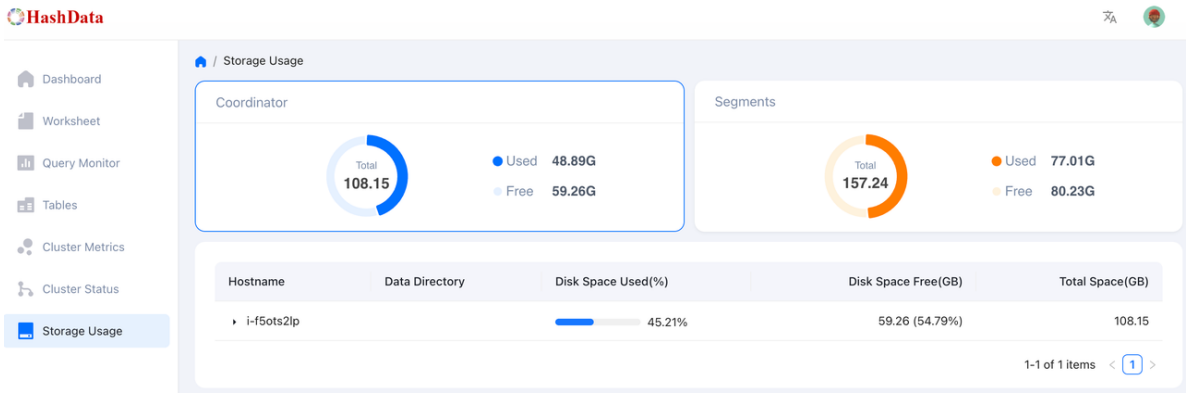
By default, the session list is sorted by **Start Time** in descending order. You can click **Start Time** to sort in ascending order, or sort by **Idle Time**. The description of the fields in the list is as follows:

Option name	Description
Session ID	Identifies the unique ID of the session being executed in the database.
Status	The status of the session.
User	The user who performs the session operation.
Database	The database where the session is running.
Start Time	The start time of the session.
Application	The client application for executing the session.
Idle time	The idle time of the session.
Operation	For running sessions, you can click **Cancel Query** to cancel the session.

2.5 View Storage Information

Steps

1. Access `http://<ip>:7788/` to log into the Web Platform console.
2. Click **Storage Usage** in the left navigation menu to view the storage overview information.



3. Click the **Coordinator** and **Segments** cards at the top of the page to view the disk usage of the machines hosting the coordinator and segment nodes respectively.

Display item	Description
Host Name	Host names of the coordinator or segments. There may be multiple hosts.
Data Directory	The mounting point and path information of each machine.
Used Disk Space (%)	The disk usage of each machine and its percentage.
Disk Space Free (GB)	The available amount of disks on each machine and its percentage.
Total Space (GB)	The total capacity of disks on each machine.

4. Click the small triangle to the left of the **Hostname** to expand and view the disk usage under different mount points.