

Table of Contents

Table of Contents	1
Greenplum Command Center User Guide	2
Dashboard	3
Query Monitor	5
Host Metrics	7
Cluster Metrics	8
Monitoring Multiple Greenplum Database Clusters	9
History	10
System	12
Segment Status	13
Storage Status	15

Greenplum Command Center User Guide

The Greenplum Command Center web interface is a management tool that provides system status and query monitoring facilities for Greenplum Database administrators and users.

Command Center views allow you to instantly view the overall status of the Greenplum Database system. You can drill down to see details about hosts, database segments, queries, and CPU, memory, and disk resource utilization.

The following topics describe the information displayed on each Command Center view.

- [Dashboard](#)
The Dashboard displays when you first log in to the Command Center. It shows an overview of the status of the Greenplum Database cluster the Command Center manages and provides easy access to detailed information about any aspect of system status.
- [Query Monitor](#)
View current running and queued queries. Select a query to view its query text and execution plan. With proper permissions, choose queries and cancel them.
- [Host Metrics](#)
View real-time statistics by server in a table format.
- [Cluster Metrics](#)
View charts of current and recent statistics for all hosts (excluding master and standby).
- [History](#)
View queries and historical charts of statistics for a selected time period, optionally filtered by database and user.
- [System->Segment Status](#)
View a status summary for all primary and mirror segments and details for each segment.
- [System->Storage Status](#)
View the current percentage disk space in use for master and segment hosts, a historical chart of segment host disk usage, and current disk usage by host.

Dashboard

The **Dashboard** displays when you first sign in to Pivotal Greenplum Command Center. The **Dashboard** provides a quick view of the current system status, Segment Health, Queries, CPU, Memory, and Disk usage. Clicking on a panel provides more detailed information about the metric.

System Information

The following system information is displayed at the top of the page.

Uptime

The elapsed time since the Greenplum Database system was last started.

GPDB Version

The version of the Greenplum Database software the monitored cluster is running.

Connections

The number of active Greenplum Database sessions (client connections).

Last Sync

Date and time the data was last synchronized. The Command Center user interface updates views with live data every 15 seconds.

System Summary

The **Segment Health** section of the Dashboard provides a quick overview of the status of the Greenplum Database managed by this instance of the Command Center.

Clicking the **Segment Health** panel displays the [Segment Status](#) Command Center page.

Database State is the current state of the Greenplum Database system. The state can be one of the following:

- **Normal:** The database is functioning with no major errors or performance issues.
- **Segment(s) Down:** The database is in change-tracking mode or resync mode. Overall performance and system reliability is greatly reduced. See the *Pivotal Greenplum Database System Administrator Guide* for information about resolving this condition.
- **Database Unreachable:** The Greenplum Performance Monitor agent cannot connect to the database. The database is likely down. See the *Pivotal Greenplum Database System Administrator Guide* for troubleshooting information.
- **Unbalanced:** Some segments are not running in their preferred roles. That is, primaries are running as mirrors and mirrors are running as primaries, resulting in unbalanced processing.
- **Resyncing:** The database is performing a recovery or rebalance operation.

The bar graph in the **Segment Health** section shows the up or down status of all database segments in your Pivotal Greenplum Database system. A color indicator and associated number indicate the number of database segments that are currently in that particular state. Segments can have the following states:

- **Up** (Green)
- **Down** (Red)

Disk Usage Summary

This chart displays total disk usage and disk available for the Greenplum master host and segment hosts at the last synchronization. Hover over the chart to see the amount of disk used, free, and total.

Queries

This graph displays a summary view of active and queued queries for the last 60 minutes. Click on the colored dot next to the **Running** or **Queued** label to toggle the line on or off. At least one line must be visible at all times. Hover over the graph to display the number of queries for each visible line at that point in time.

CPU

This graph displays average CPU usage across the entire cluster, for the last 60 minutes. The graph displays separate lines for system processes and user processes. The user CPU usage includes the Greenplum database master, standby, and segment processes. Click on the colored dot next to the **System** or **User** label to toggle that line on or off. At least one line must be visible at all times.

Hovering the cursor over a line in the graph displays a small window with the percentage of CPU used at that point in time for the visible lines and the total if both the system and user lines are visible.

Memory

This graph displays the average percent of memory used across the entire cluster over the last 60 minutes. Hover over the line to display the percent of memory used at that point in time.

Query Monitor

The **Query Monitor** view allows you to view detailed information for active queries running on the Greenplum Database system. Superusers and users assigned the operator role can see and cancel all users' queries.

Data is collected on currently running queries and the query monitor metrics are updated every 15 seconds. The time of the last update and a graphical timer showing the time remaining before the next update are displayed at the top of the page.

With the information available in this view, Greenplum Database administrators can easily:

- Understand how the system is being used — both in real-time and trending over time.
- Identify and diagnose problem queries while they are running, detect skew, find runaway queries, and so on.
- Review and balance the query load on the system by better optimizing and scheduling the query load.
- Cancel queries that disrupt system performance.

Query Metrics

The Query Monitor table displays the following columns for queries.

Query ID

An identification string for the query. In the Console, this looks like "1295397846-56415-2". Command Center generates this ID by combining the query record's `tmid`, `ssid`, and `cont` fields. (See [queries_*](#) in the *Command Center Database Reference*.)

Status

The status of the query. This can be one of the following:

- Queued: the query has not yet started to execute
- Running: execution has started, is not yet complete
- Done: completed successfully
- Cancelling: cancel request sent, cancel pending
- Cancelled: terminated, no longer running

User

The Greenplum Database user who submitted the query.

Database

The name of the database that was queried.

Submit Time

The time the query was submitted to the query planner.

Queue Time

The amount of time the query has been (or was) in queue awaiting execution.

Run Time

The amount of time since execution began.

CPU %

(Active queries only.) Current CPU percent average for all processes executing this query. The percentages for all processes running on each segment are averaged, and then the average of all those values is calculated to render this metric. Current CPU percent average is always zero in historical and tail data.

CPU Skew

The amount of CPU skew. CPU skew occurs when query executor processes for one segment use a disproportionate amount of CPU compared to processes for other segments executing the query. This value is the coefficient of variation for the CPU used by processes running this query on each segment, multiplied by 100. For example, a value of .95 is shown as 95.

Row Skew

A measure of row skew in the system. Row skew occurs when one segment produces a disproportionate number of rows for a query. This value is the coefficient of variation for the Rows Out metric of all iterators across all segments for this query, multiplied by 100. For example, a value of .95 is shown as 95.

Queue

The name of the resource queue for the query.

Priority

Each query inherits the priority assigned to its resource queue. For more information about Resource Queues and Query Plans, refer to the *Greenplum Database Administrator Guide*.

Using the Query Monitor Controls

- Click a column heading to sort the rows on that column in ascending or descending order.
- Click the checkbox at the left of a row to choose a query to cancel or export. Click the checkbox in the heading row to choose all queries.
- Click **Cancel Query** to cancel selected queries.
- Click **Export** to download a comma-separated values (CSV) text file containing rows for the selected queries. When no queries are selected, all rows are exported. The default file name is `spreadsheet.csv`.
- Click any query ID to see the [Query Details](#), including metrics, the text of the query, and the query plan.

Host Metrics

The **Host Metrics** page displays a table of the hosts in the cluster with statistics collected at the most recent quantum interval. At the top, **Last Sync** displays the time the statistics were last updated.

Click a column header to sort the table by that column. Click again to toggle between ascending and descending sort. Master and standby hosts are not included in the sort and are always displayed following the sorted list of segment hosts.

For each server, the following columns are displayed:

Hostname

The hostname name of the server.

CPU Total/Sys/User (%)

The total percentage of CPU in use is displayed next to a graph illustrating the CPU used for system and user processes. Hover over the table cell to show the percentages used for system and user processes and the percentage CPU idle.

Memory In Use (%)

The percentage of host memory in use is displayed next to a graph illustrating the memory in use and available. Hover over the table cell to see memory used and available in gigabytes.

Memory is calculated as follows:

Total = MemTotal

Free = MemFree + Buffers + Cached

Used = Total - Free

Disk R (MB/s) | Skew

Disk read rate in megabytes per second is displayed next to a graph of calculated disk read skew. Hover over the table cell to see a Low/Medium/High rating for disk skew.

Disk W (MB/s) | Skew

Disk write rate in megabytes per second is displayed next to a graph of calculated disk write skew. Hover over the table cell to see a Low/Medium/High rating for disk write skew.

Net R (MB/s) | Skew

Network read rate in megabytes per second is displayed next to a graph of calculated network read skew. Hover over the table cell to see a Low/Medium/High rating for network read skew.

Net W (MB/s) | Skew

Network write rate in megabytes per second is displayed next to a graph of calculated network write skew. Hover over the table cell to see a Low/Medium/High rating for network write skew.

About Skew Calculations

Disk and Network skew ratings are calculated as each server's standard deviation from the mean calculated from all segment hosts.

Low

Value is within 1 standard deviation from the mean. (Note: if the variance of the set is less than 3, skew is considered low regardless of deviation from mean.)

Moderate

Value is between 1 and 2 standard deviations from the mean.

Very High

Value is greater than 3 standard deviations from the mean.

Cluster Metrics

The **Cluster Metrics** page shows consolidated statistics for all segment hosts in the Greenplum cluster. Master and standby master hosts are excluded from the metrics.

The charts display metrics for the last time period set by the control in the top right corner of the screen. The current value of the metric is in the upper right corner of the chart.

Hover over any of the charts to see values for the metrics at a point in time in pop-up boxes. The charts are synchronized so that hovering over any chart shows the same point in time in all charts.

On charts with multiple metrics, toggle the display for a line on or off by clicking the line's label in the legend at the top right of the chart. At least one line must be displayed. All lines are redisplayed at the next quantum interval.

The page has charts for the following metrics:

Queries

The number of queries running and the number of queries queued to run.

CPU

The percentage CPU used by system processes and the percentage CPU used by user processes.

Memory

Percentage of memory in use.

Memory is calculated as follows:

Total = MemTotal

Free = MemFree + Buffers + Cached

Used = MemTotal - Free

Disk I/O

Disk read and write rates in megabytes per second.

Network

Network I/O read and write rates in megabytes per second. Network metrics include traffic over all NICs (network interface cards), including internal interconnect and administrative traffic.

Load

System load average for 1-minute, 5-minute, and 15-minute periods.

Swap

Percentage of swap space used.

Monitoring Multiple Greenplum Database Clusters

The Greenplum Command Center Multi-cluster view displays health status for multiple Greenplum Database clusters. The charts can be divided into categories.

Each Greenplum Database cluster that appears in the Multi-cluster view must have its own Command Center instance. The Multi-cluster view is hosted on a single, designated master Command Center instance. The master instance retrieves the health status data from each of the clusters' Command Center instances.

Clicking the status panel for a cluster loads that cluster's Command Center into a new browser window. If auto-login is enabled in the multi-cluster configuration file, the login screen is bypassed and the Dashboard is displayed.

Multi-cluster support is enabled by deploying a configuration file to the Command Center instance directories. See [Enabling Multi-Cluster Support](#) for instructions to set up the Multi-Cluster page.

The Multi-cluster view displays the following information for each cluster.

Cluster Name

The name for the cluster, as specified in the multi-cluster configuration file.

Database State

The current state of the Greenplum Database cluster. The state can be one of the following:

- **Normal:** The database is functioning with no major errors or performance issues.
- **Segment(s) Down:** The database is in change-tracking mode or resync mode. Overall performance and system reliability is greatly reduced. See the *Pivotal Greenplum Database System Administrator Guide* for information about resolving this condition.
- **Database Unreachable:** The Greenplum Performance Monitor agent cannot connect to the database. The database is likely down. See the *Pivotal Greenplum Database System Administrator Guide* for troubleshooting information.
- **Unbalanced:** Some segments are not running in their preferred roles. That is, primaries are running as mirrors and mirrors are running as primaries, resulting in unbalanced processing.
- **Resyncing:** The database is performing a recovery or rebalance operation.

Uptime

The elapsed time since the Greenplum Database system was last started.

GPDB Version

The version of the Greenplum Database software each monitored cluster is running.

Connections

The number of active Greenplum Database sessions (client connections).

Active Queries

The number queries queued or currently executing in the database.

History

The **History** page allows you to display system metrics and queries executed during a specified time period. Queries may also be filtered by database and/or user.

Set the time period to display by entering dates and times in the **From** and **To** date and time fields. You can enter dates by typing them into the date field or by choosing from the pop-up calendar. Enter 24-hour times in HH:MM format.

To restrict queries that display in the query table at the bottom of the page, enter a Greenplum database name in the **Database** field, a user name in the **User** field, or both. Filtering by database and user only affects the queries displayed in the table. The metrics displayed in charts include all activity during the selected time period.

Click **Search** to display results that match your criteria.

You can click and drag on a chart to zoom in on a time range. Click **Search** to update the query list and charts to the selected range.

Scroll charts left or right by hovering over the edge of the chart and clicking an arrow. Click < or > to move in half steps. Click « or » to move in full steps.

In the query list, select or hover over a query to highlight its queued and run time in the charts.

Charts of the following metrics are available. Show or hide them at any time with the checklist at the upper right of the view.

Queries

The number of queries running and the number of queries queued to run.

CPU

The percentage CPU used by system processes and the percentage CPU used by user processes.

Memory

Percentage of memory in use.

Disk I/O

Disk read and write rates in megabytes per second.

Network

Network I/O read and write rates in megabytes per second. Network metrics include traffic over all NICs (network interface cards), including internal interconnect and administrative traffic.

Load

System load average for 1-minute, 5-minute, and 15-minute periods.

Swap

Percentage of swap space used.

Query Metrics

The Query table displays queries that were active during the specified time period, including queries that started before or finished after the specified time. However, queries that are still active are not included in the table; these queries can be viewed on the [Query Monitor](#) page.

The query table has the following columns:

Query ID

An identification string for the query. In the Console, this looks like "1295397846-56415-2".

Status

The final status of the query. This can be one of the following:

- Done
- Cancelled

User

The Greenplum Database user who submitted the query.

Database

The name of the database that was queried.

Submit Time

The time the query was submitted to the query planner.

Queued Time

The amount of time a query spent in the queue before it was executed.

Run Time

The amount of time the query required to produce a result.

End Time

The time the query completed or was cancelled.

CPU Skew

The amount of CPU skew. CPU skew occurs when query executor processes for one segment use a disproportionate amount of CPU compared to processes for other segments executing the query. This value is the coefficient of variation for the CPU used by processes running this query on each segment, multiplied by 100. For example, a value of .95 is shown as 95.

Row Skew

A measure of row skew in the system. Row skew occurs when one segment produces a disproportionate number of rows for a query. This value is the coefficient of variation for the Rows Out metric of all iterators across all segments for this query, multiplied by 100. For example, a value of .95 is shown as 95.

Queue

The name of the resource queue for the query.

Priority

Each query inherits the priority assigned to its resource queue.

For more information about Resource Queues and Query Plans, refer to the *Greenplum Database Administrator Guide*.

System

The **System** view provides system metrics for individual hosts in the Greenplum cluster and for the entire cluster. Click **Host Metrics** to display metrics for each host. Click **Cluster Metrics** to display consolidated metrics for the entire cluster.

[Segment Status](#)

[Storage Status](#)

Segment Status

The **Segment Status** page provides a health overview for the Greenplum Database segments and details for each primary and mirror segment.

Segment Summary

Greenplum Database is most efficient when all segments are operating in their preferred roles. The **Segment Summary** panel tells you the overall segment status and if any mirrors are acting as primaries.

The **Segment Summary** panel provides the following information:

Database State

The database state can be one of the following:

- **Normal:** The database is functioning with no major errors or performance issues.
- **Segment(s) Down:** The database is in change-tracking mode or resync mode. Overall performance and system reliability is greatly reduced. See the *Pivotal Greenplum Database System Administrator Guide* for information about resolving this condition.
- **Database Unreachable:** The Greenplum Performance Monitor agent cannot connect to the database. The database is likely down. See the *Pivotal Greenplum Database System Administrator Guide* for troubleshooting information.
- **Unbalanced:** Some segments are not running in their preferred roles. That is, primaries are running as mirrors and mirrors are running as primaries, resulting in unbalanced processing.
- **Resyncing:** The database is performing a recovery or rebalance operation.

Mirrors Acting as Primary

The number of mirror segments acting as primary segments.

Recommended Actions

Suggests actions to perform to restore the cluster to balance. These include:

- Recover and Rebalance
- Rebalance

These actions are executed from the command line using the `gprecoverseg` Greenplum management utility. See `gprecoverseg` in the *Pivotal Greenplum Database Utility Reference* for more information.

Total Segments

The total number of primary and mirror segments in the Greenplum cluster.

Segment Hosts

The total number of segment hosts in the Greenplum cluster.

Segment Health

The **Segment Health** panel contains charts for Greenplum Database segments' status, replication mode, and preferred roles.

Status

Numbers of segments that are down and up.

Replication Mode

A chart that shows the number of segments in each of the possible replication modes.

- **Not Syncing:** The primary segment and mirror segment are active and all changes to the primary segment have been copied to the mirror using a file block replication process.
- **Change Tracking:** If a primary segment is unable to copy changes to its mirror segment using the file replication process, it logs the unsent changes locally so they can be replicated when the mirror again becomes available. This can happen if a mirror segment goes down or if a primary segment goes down and its mirror segment automatically assumes the primary role.
- **Resyncing:** When a down segment is brought back up, administrators initiate a recovery process to return it to operation. The recovery process synchronizes the segment with the active primary and copies the changes missed while the segment was down.
- **Synced:** Once all mirrors and their primaries are synchronized, the system state becomes synchronized.

Preferred Roles

The red portion of the Preferred Role chart shows the numbers of segments that not operating in their preferred primary or mirror roles. If the chart is not solid green, the performance of the Greenplum cluster is not optimal.

Primary and mirror segments are distributed evenly among the segment hosts to ensure that each host performs an equivalent share of the work and primary segments and their mirror segments reside on different segment hosts. When a primary segment goes down, its mirror on another host in the cluster automatically assumes the primary role, increasing the number of primary segments running on that host. This uneven distribution of the workload will affect query performance until the down segment is restored and the segments are returned to their original, preferred, roles.

Segment Table

The table at the bottom of the **Segment Status** page contains a detailed row for every primary and mirror segment in the Greenplum Cluster. The table has the following columns for each segment:

Hostname

The name of the segment host where the segment is running.

Address

The network interface on the segment host for the segment.

Port

The port number assigned to the segment.

DBID

The unique identifier for the segment instance.

ContentID

The content identifier for the segment, from 0 to the number of segments minus 1. A primary segment and its mirror have the same ContentID. The master and standby master, which have ContentID -1, are excluded from the table.

Status

“UP” if the segment is running, “DOWN” if the segment has failed or is unreachable.

Role

The segment’s current role, either “primary” or “mirror”.

Preferred Role

The segment’s intended role, either “primary” or “mirror”.

Replication Mode

The replication status for the segment. See [Segment Health](#) for possible values.

Last Event[[Total]

The date and time of last segment health-related activity. Click to display a list of recent events.

Storage Status

The **Storage Status** page shows current historical disk usage for Greenplum master and segment hosts.

Disk Usage Summary

You can see current disk space in use, space free, and total space in the Disk Usage Summary panel. Disk space metrics for the segment hosts (GP Segments) and the master (GP Master) are shown in separate bar charts.

The GP Segments bar chart shows combined disk space for all segments.

The GP Masters bar chart shows combined disk space for master and standby master.

Hover over either of the charts to see the space used, free, and total in gigabytes and as a percentage of the total.

GP Segments Usage History

The GP Segments Usage History panel presents a chart of percentage of disk space in use for the time period set by the control in the panel header.

Hover over the chart to see the percentage disk in use on any given point.

Storage Status Table

The Storage Status table provides current disk space usage metrics for each host and by data directory within hosts.