

## Configuring Apache Hive Statistics

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# Generating Hive statistics in Cloudera Data Warehouse

A cost-based optimizer (CBO) generates efficient query plans. Hive does not use the CBO until you generate column statistics for tables. By default, Hive gathers only table statistics. You need to configure Hive to enable gathering of column statistics.

The CBO, powered by Apache Calcite, is a core component in the Hive query processing engine. The CBO optimizes plans for executing a query, calculates the cost, and selects the least expensive plan to use. In addition to increasing the efficiency of execution plans, the CBO conserves resources.

## How the CBO works

After parsing a query, a process converts the query to a logical tree (Abstract Syntax Tree) that represents the operations to perform, such as reading a table or performing a JOIN. Calcite applies optimizations, such as query rewrite, JOIN re-ordering, JOIN elimination, and deriving implied predicates to the query to produce logically equivalent plans. Bushy plans provide maximum parallelism. Each logical plan is assigned a cost that is based on distinct, value-based heuristics.

The Calcite plan pruner selects the lowest-cost logical plan. Hive converts the chosen logical plan to a physical operator tree, optimizes the tree, and converts the tree to a Tez job for execution on the Hadoop cluster.

## Explain plans

You can generate explain plans by running the EXPLAIN query command. An explain plan shows you the execution plan of a query by revealing the operations that occur when you run the query. Having a better understanding of the plan, you might rewrite the query or change Tez configuration parameters.

## Setting up the cost-based optimizer and statistics

You can use the cost-based optimizer (CBO) and statistics to develop efficient query execution plans that can improve performance. You must generate column statistics to make CBO functional.

### About this task

In this task, you enable and configure the cost-based optimizer (CBO) and configure Hive to gather column statistics as well as table statistics for evaluating query performance. Column and table statistics are critical for estimating predicate selectivity and the cost of the plan. Certain advanced rewrites require column statistics.

In this task, you check, and set the following properties:

- `hive.stats.autogather`  
Controls collection of table-level statistics.
- `hive.stats.fetch.column.stats`  
Controls collection of column-level statistics.
- `hive.compute.query.using.stats`  
Instructs Hive to use statistics when generating query plans.

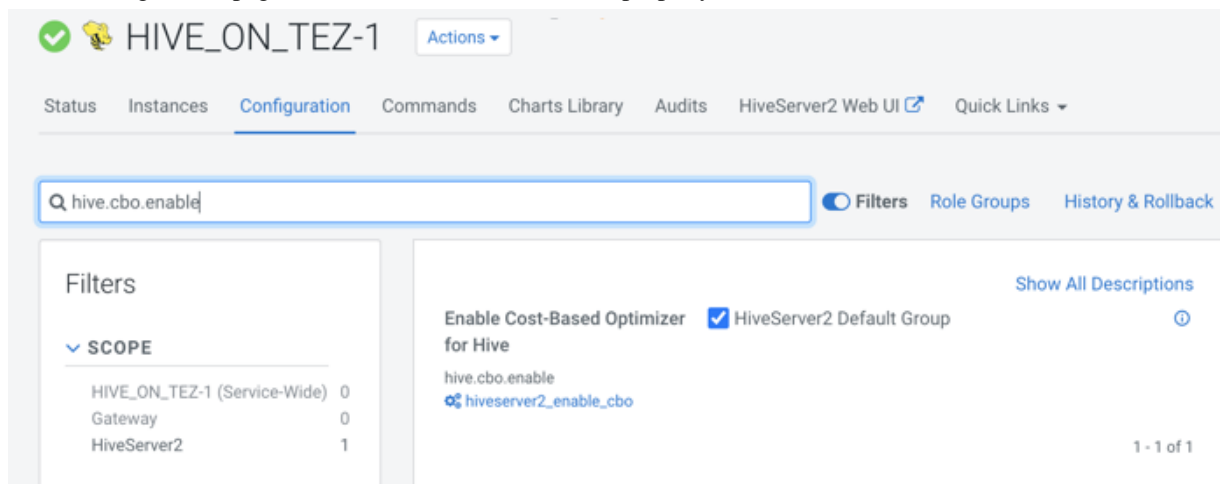
You can manually generate the table-level statistics for newly created tables and table partitions using the ANALYZE TABLE statement.

## Before you begin

- The following components are running:
  - HiveServer
  - Hive Metastore
  - Hive clients
- Minimum Required Role: Configurator (also provided by Cluster Administrator, Full Administrator)

## Procedure

- In Cloudera Manager, click **Clusters Hive On Tez Configuration**.
- In the Configuration page, search for the `hive.cbo.enable` property.



If the property is not visible in your version of Cloudera Manager, add the property to Hive site using the Cloudera Manager Safety Valve (see links below). Set the property to enabled.

- Accept the default (enabled), or check to enable the `hive.cbo.enable` property for the HiveServer Default Group.
- Search for and enable, if necessary, `hive.stats.fetch.column.stats`.
- Search for and enable, if necessary, `hive.compute.query.using.stats`.
- Click **Actions Restart** to restart the Hive on Tez service.

## Related Information

[Example of using the Cloudera Manager Safety Valve](#)

[Custom Configuration \(about Cloudera Manager Safety Valve\)](#)

## Generating and viewing Apache Hive statistics in Cloudera Data Warehouse

You can use statistics to optimize queries for improved performance. The cost-based optimizer (CBO) also uses statistics to compare query plans and choose the best one. By viewing statistics instead of running a query, you can often get answers to your data questions faster.

## About this task

This task shows how to generate different types of statistics about a table.

## Procedure

- Launch a Hive shell or editor.

2. Gather table statistics for the non-partitioned table mytable:

```
ANALYZE TABLE mytable COMPUTE STATISTICS;
```

3. View table statistics you generated:

```
DESCRIBE EXTENDED mytable;
```

4. Gather column-level statistics for the table:

```
ANALYZE TABLE mytable COMPUTE STATISTICS FOR COLUMNS;
```

5. View column statistics for the col\_name column in my\_table in the my\_db database:

```
DESCRIBE FORMATTED my_db.my_table col_name;
```

### Related Information

[Apache Hive Wiki language reference](#)

[Apache Hive Wiki - Statistics in Hive](#)

## Statistics generation and viewing commands in Cloudera Data Warehouse

You can manually generate table and column statistics, and then view statistics using Hive queries. By default, Hive generates table statistics, but not column statistics, which you must generate manually to make cost-based optimization (CBO) functional.

### Commands for generating statistics

The following ANALYZE TABLE command generates statistics for tables and columns:

**ANALYZE TABLE [table\_name] COMPUTE STATISTICS;**

Gathers table statistics for non-partitioned tables.

**ANALYZE TABLE [table\_name] PARTITION(partition\_column) COMPUTE STATISTICS;**

Gathers table statistics for partitioned tables.

**ANALYZE TABLE [table\_name] COMPUTE STATISTICS for COLUMNS [comma\_separated\_column\_list];**

Gathers column statistics for the entire table.

**ANALYZE TABLE partition2 (col1="x") COMPUTE STATISTICS for COLUMNS;**

Gathers statistics for the partition2 column on a table partitioned on col1 with key x.

### Commands for viewing statistics

You can use the following commands to view table and column statistics:

**DESCRIBE [EXTENDED] table\_name;**

View table statistics. The EXTENDED keyword can be used only if the hive.stats.autogather property is enabled in the hive-site.xml configuration file. Use the Cloudera Manager Safety Valve feature (see link below).

**DESCRIBE FORMATTED [db\_name.]table\_name [column\_name] [PARTITION (partition\_spec)];**

View column statistics.

### Related Information

[Example of using the Cloudera Manager Safety Valve](#)

[Custom Configuration \(about Cloudera Manager Safety Valve\)](#)