

Cloudera Runtime 7.1.7

Apache Impala

Date published: 2019-11-01

Date modified: 2021-07-12

CLOUDERA

<https://docs.cloudera.com/>

Legal Notice

© Cloudera Inc. 2024. All rights reserved.

The documentation is and contains Cloudera proprietary information protected by copyright and other intellectual property rights. No license under copyright or any other intellectual property right is granted herein.

Unless otherwise noted, scripts and sample code are licensed under the Apache License, Version 2.0.

Copyright information for Cloudera software may be found within the documentation accompanying each component in a particular release.

Cloudera software includes software from various open source or other third party projects, and may be released under the Apache Software License 2.0 (“ASLv2”), the Affero General Public License version 3 (AGPLv3), or other license terms. Other software included may be released under the terms of alternative open source licenses. Please review the license and notice files accompanying the software for additional licensing information.

Please visit the Cloudera software product page for more information on Cloudera software. For more information on Cloudera support services, please visit either the Support or Sales page. Feel free to contact us directly to discuss your specific needs.

Cloudera reserves the right to change any products at any time, and without notice. Cloudera assumes no responsibility nor liability arising from the use of products, except as expressly agreed to in writing by Cloudera.

Cloudera, Cloudera Altus, HUE, Impala, Cloudera Impala, and other Cloudera marks are registered or unregistered trademarks in the United States and other countries. All other trademarks are the property of their respective owners.

Disclaimer: EXCEPT AS EXPRESSLY PROVIDED IN A WRITTEN AGREEMENT WITH CLOUDERA, CLOUDERA DOES NOT MAKE NOR GIVE ANY REPRESENTATION, WARRANTY, NOR COVENANT OF ANY KIND, WHETHER EXPRESS OR IMPLIED, IN CONNECTION WITH CLOUDERA TECHNOLOGY OR RELATED SUPPORT PROVIDED IN CONNECTION THEREWITH. CLOUDERA DOES NOT WARRANT THAT CLOUDERA PRODUCTS NOR SOFTWARE WILL OPERATE UNINTERRUPTED NOR THAT IT WILL BE FREE FROM DEFECTS NOR ERRORS, THAT IT WILL PROTECT YOUR DATA FROM LOSS, CORRUPTION NOR UNAVAILABILITY, NOR THAT IT WILL MEET ALL OF CUSTOMER’S BUSINESS REQUIREMENTS. WITHOUT LIMITING THE FOREGOING, AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, CLOUDERA EXPRESSLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, QUALITY, NON-INFRINGEMENT, TITLE, AND FITNESS FOR A PARTICULAR PURPOSE AND ANY REPRESENTATION, WARRANTY, OR COVENANT BASED ON COURSE OF DEALING OR USAGE IN TRADE.

Contents

Apache Impala Overview.....	4
Components of Impala.....	4

Apache Impala Overview

The Apache Impala provides high-performance, low-latency SQL queries on data stored in popular Apache Hadoop file formats.

The Impala solution is composed of the following components.

Impala

The Impala service coordinates and executes queries received from clients. Queries are distributed among Impala nodes, and these nodes then act as workers, executing parallel query fragments.

Hive Metastore

Stores information about the data available to Impala. For example, the metastore lets Impala know what databases are available and what the structure of those databases is. As you create, drop, and alter schema objects, load data into tables, and so on through Impala SQL statements, the relevant metadata changes are automatically broadcast to all Impala nodes by the dedicated catalog service.

Clients

Entities including Hue, ODBC clients, JDBC clients, Business Intelligence applications, and the Impala Shell can all interact with Impala. These interfaces are typically used to issue queries or complete administrative tasks such as connecting to Impala.

Storage for data to be queried

Queries executed using Impala are handled as follows:

1. User applications send SQL queries to Impala through ODBC or JDBC, which provide standardized querying interfaces. The user application may connect to any impalad in the cluster. This impalad becomes the coordinator for the query.
2. Impala parses the query and analyzes it to determine what tasks need to be performed by impalad instances across the cluster. Execution is planned for optimal efficiency.
3. Storage services are accessed by local impalad instances to provide data.
4. Each impalad returns data to the coordinating impalad, which sends these results to the client.



Note: Impala cannot be used to access FULL ACID transactional tables yet however you can access ACID transactional tables with transaction scope at the row level using HIVE.

Components of Impala

The Impala service is a distributed, massively parallel processing (MPP) database engine. It consists of different daemon processes that run on specific hosts within your Hadoop cluster.

Impala service consists of the following categories of processes, referred as roles.

Impala Daemon

The core Impala component is the Impala daemon, physically represented by the impalad process. A few of the key functions that an Impala daemon performs are:

- Reads and writes to data files.
- Accepts queries transmitted from the impala-shell command, Hue, JDBC, or ODBC.
- Parallelizes the queries and distributes work across the cluster.
- Transmits intermediate query results back to the central coordinator.

Impala daemons can be deployed in one of the following ways:

- HDFS and Impala are co-located, and each Impala daemon runs on the same host as a DataNode.
- Impala is deployed separately in a compute cluster and reads remotely from HDFS, S3, ADLS, etc.

The Impala daemons are in constant communication with StateStore, to confirm which daemons are healthy and can accept new work.

They also receive broadcast messages from the Catalog Server daemon whenever an Impala daemon in the cluster creates, alters, or drops any type of object, or when an INSERT or LOAD DATA statement is processed through Impala. This background communication minimizes the need for REFRESH or INVALIDATE METADATA statements that were needed to coordinate metadata across Impala daemons.

You can control which hosts act as query coordinators and which act as query executors, to improve scalability for highly concurrent workloads on large clusters.

Impala StateStore

The Impala StateStore checks on the health of all Impala daemons in a cluster, and continuously relays its findings to each of those daemons. It is physically represented by a daemon process named `statedstored`. You only need such a process on one host in a cluster. If an Impala daemon goes offline due to hardware failure, network error, software issue, or other reason, the StateStore informs all the other Impala daemons so that future queries can avoid making requests to the unreachable Impala daemon.

Because the StateStore's purpose is to help when things go wrong and to broadcast metadata to coordinators, it is not always critical to the normal operation of an Impala cluster. If the StateStore is not running or becomes unreachable, the Impala daemons continue running and distributing work among themselves as usual when working with the data known to Impala. The cluster just becomes less robust if other Impala daemons fail, and metadata becomes less consistent as it changes while the StateStore is offline. When the StateStore comes back online, it re-establishes communication with the Impala daemons and resumes its monitoring and broadcasting functions.

If you issue a DDL statement while the StateStore is down, the queries that access the new object the DDL created will fail.

Impala Catalog Server

The Catalog Server relays the metadata changes from Impala SQL statements to all the Impala daemons in a cluster. It is physically represented by a daemon process named `catalogd`. You only need such a process on one host in a cluster. Because the requests are passed through the StateStore daemon, it makes sense to run the `statedstored` and `catalogd` services on the same host.

The catalog service avoids the need to issue REFRESH and INVALIDATE METADATA statements when the metadata changes are performed by statements issued through Impala. When you create a table, load data, and so on through Hive, you do need to issue REFRESH or INVALIDATE METADATA on an Impala node before executing a query there.