Cloudera Impala

Impala

- Cloudera'a Massively Parallel Processing (MPP) SQL query engine.
- Impala brings scalable parallel database technology to Hadoop, enabling low latency and high concurrency SQL queries.
  - This is something not possible with Hive, HBase, etc
- Impala is promoted for data scientists to perform analytics on data stored in Hadoop via SQL or other BI tools.
- You can get interactive queries in (near) real-time.
- It consists of different daemon processes that run on specific hosts within your cluster.

Impala

- Impala implements a distributed architecture based on daemon processes that are responsible for all aspects of query execution and that run on the same machines as the rest of the Hadoop infrastructure
- Impala is the highest performing SQL-on-Hadoop system, especially under multi-user workloads [see attached paper for details]

Impala Daemon

- The core Impala component is a daemon process that runs on each node of the cluster, physically represented by the impalad process
- Functions:
  - It reads and writes to data files;
  - Accepts queries transmitted from the impala-shell command, Hue, JDBC, or ODBC;
  - Parallelizes the queries and distributes work to other nodes in the Impala cluster;

Impala Queries

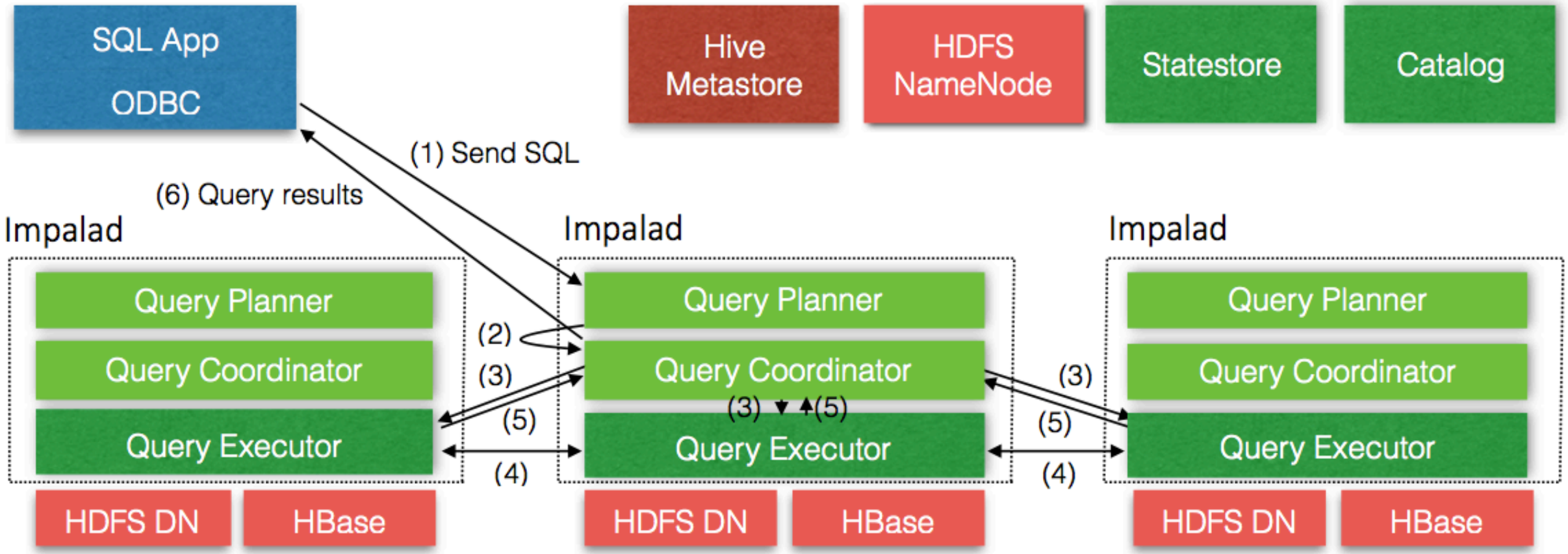
- You can submit a query to the Impala daemon running on any node, and that node serves as the coordinator node for that query
- The other nodes transmit partial results back to the coordinator, which constructs the final result set for a query
- The Impala daemons are in constant communication with the statestore, to confirm which nodes are healthy and can accept new work.

Impala Statestore

- The Impala statestore checks on the health of Impala daemons on all the nodes in a cluster, and continuously relays its findings to each of those daemons

Impala Catalog Service

- Catalog service relays the metadata changes from Impala SQL statements to all the nodes in a cluster. It is physically represented by a daemon process named catalogd; you only need such a process on one node in the cluster.


SQL App
ODBC
Hive Metastore
HDFS NameNode
Statestore
Catalog
(1) Send SQL
(6) Query results
Impalad
Impalad
Impalad
Query Planner
Query Coordinator
Query Executor
Query Planner
Query Coordinator
Query Executor
Query Planner
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(2)
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HDFS DN
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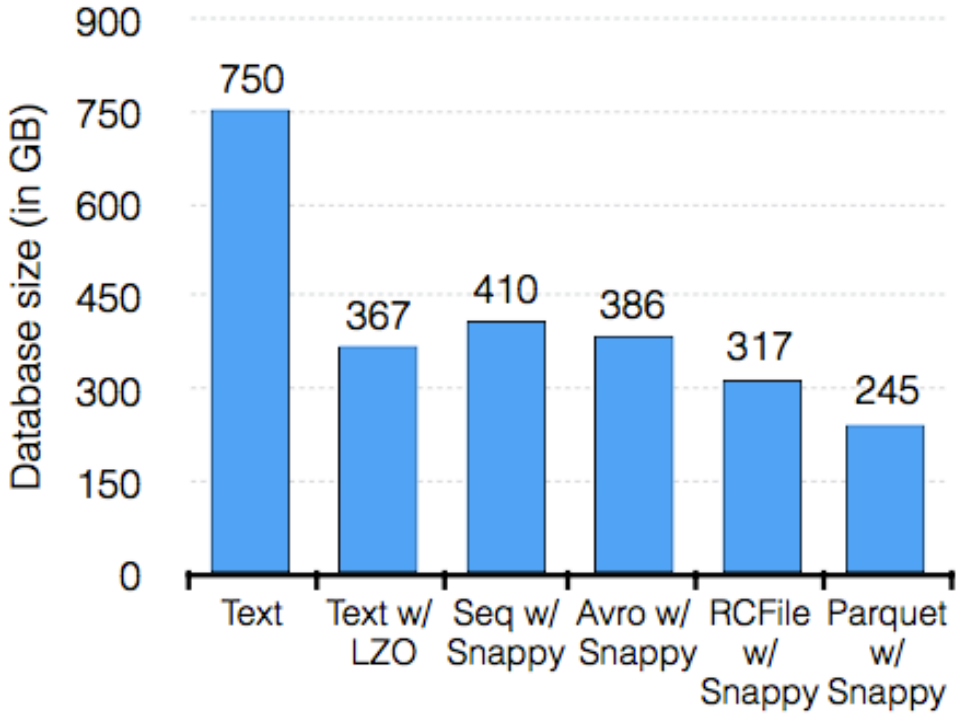
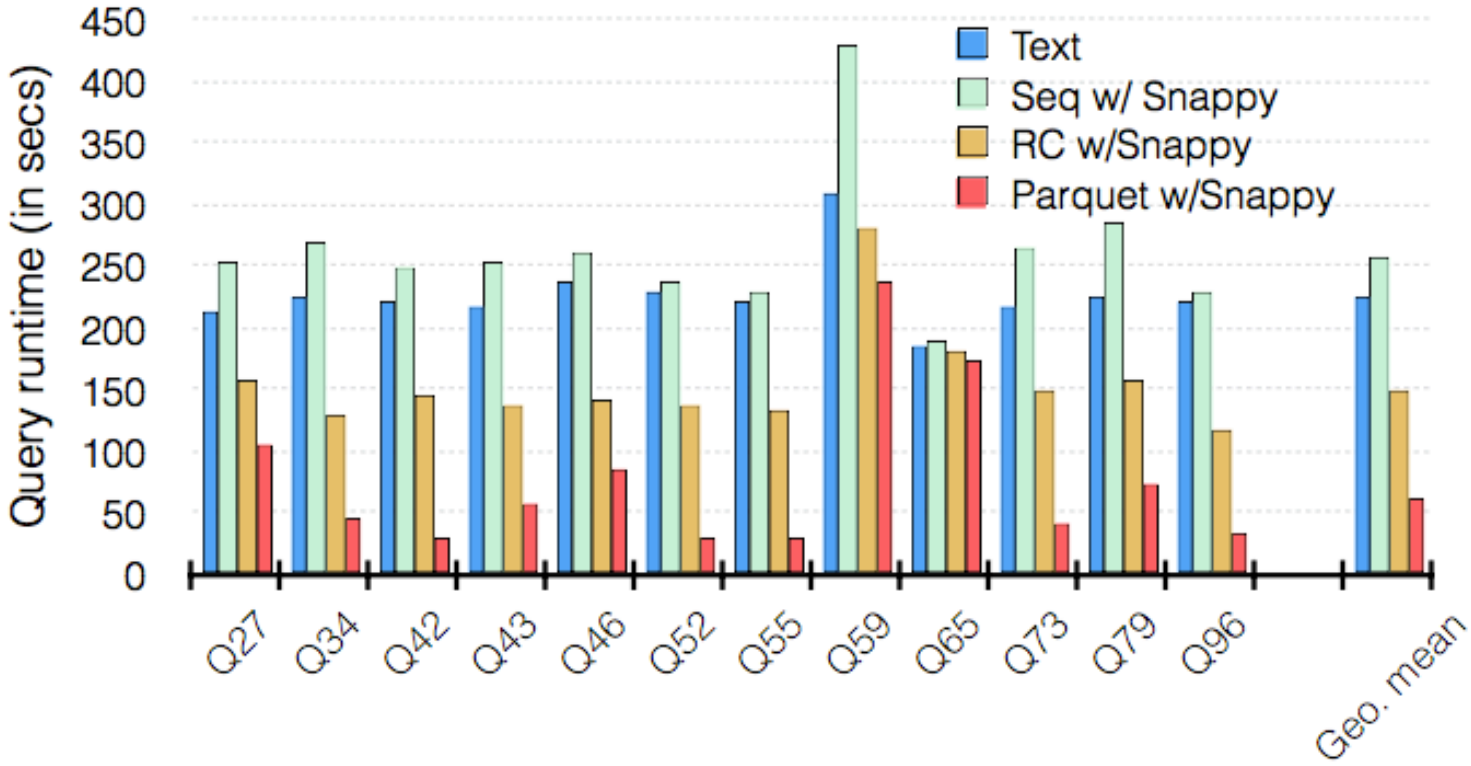
HBase

Impala supports various file formats





Apache Parquet is a high efficiency columnar storage format available to any project in the Hadoop ecosystem,

How does Impala compare

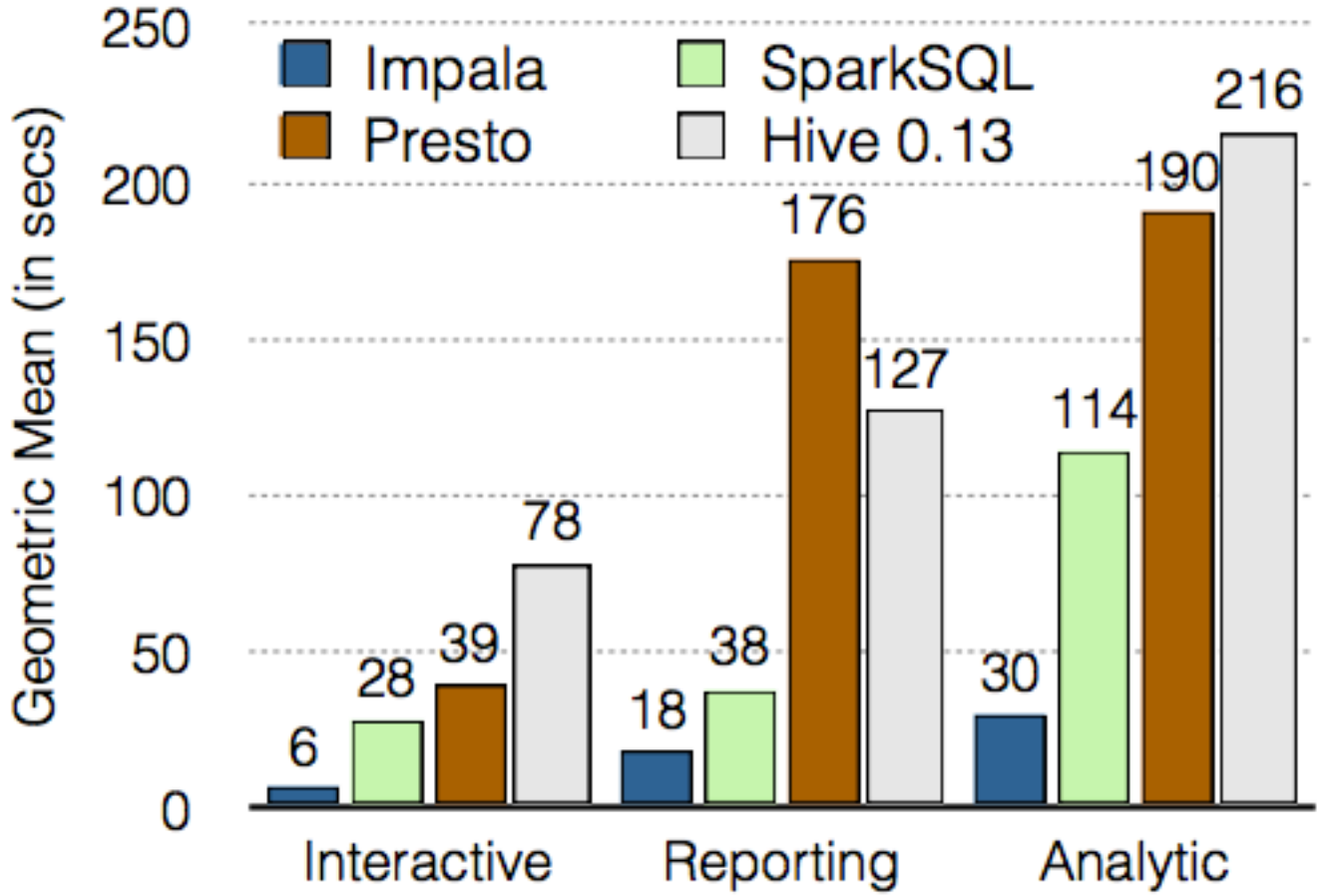
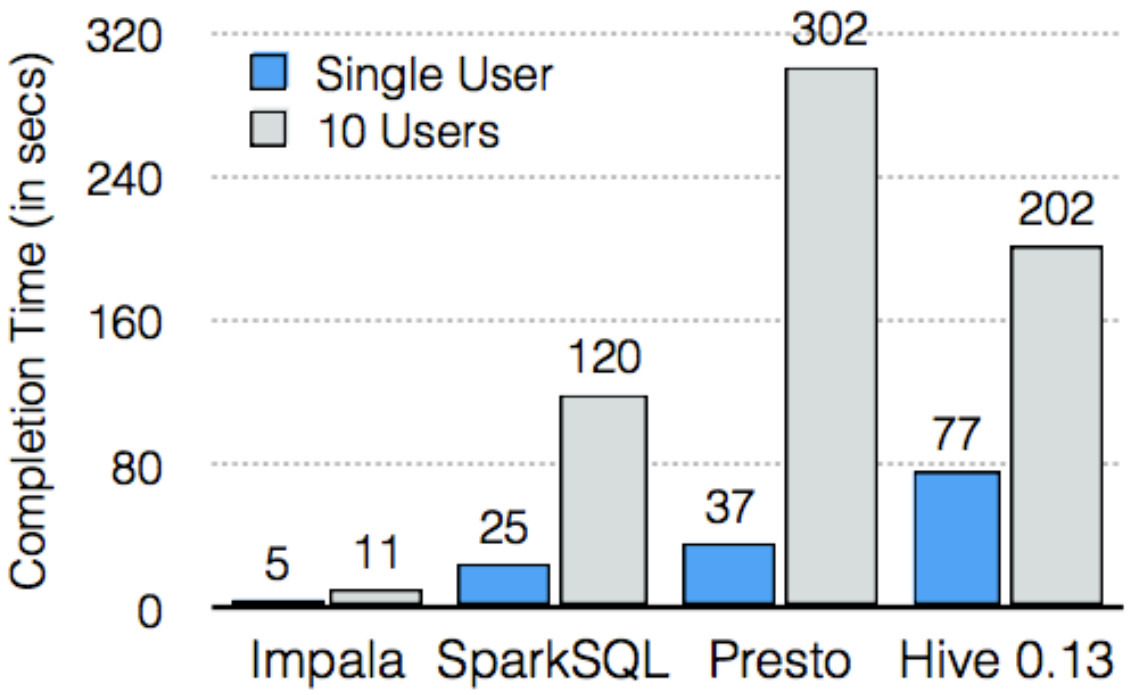


Figure 6: Comparison of query response times on single-user runs.

How does Impala compare



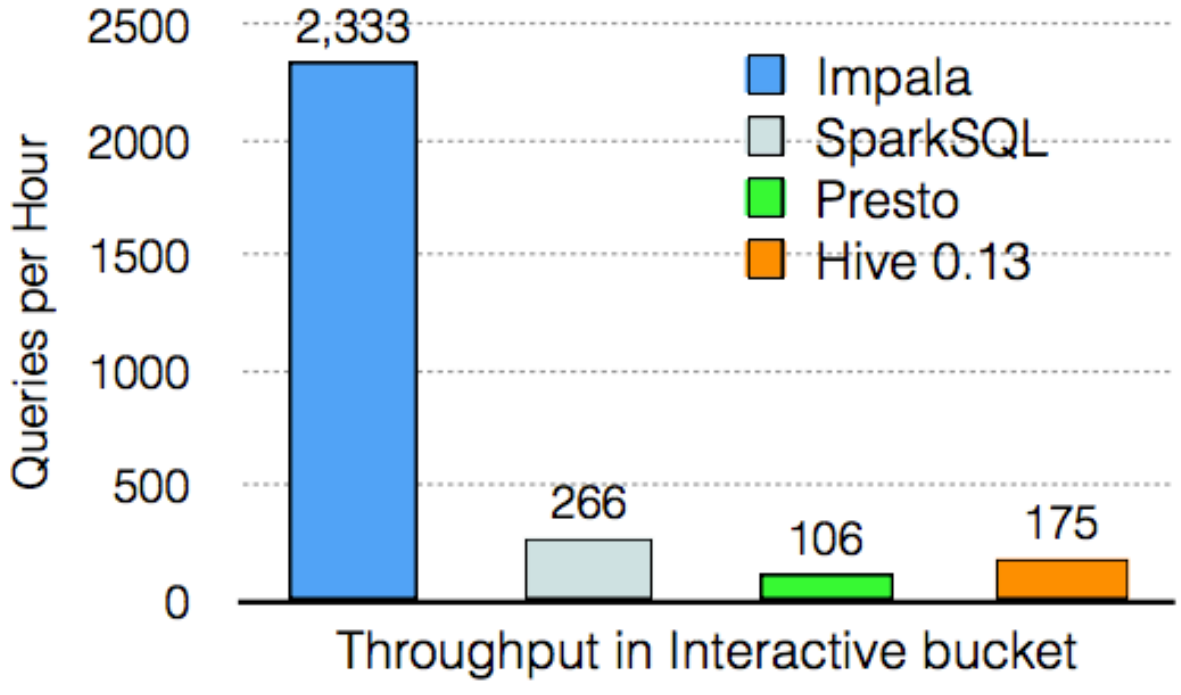


Figure 7: Comparison of query response times and throughput on multi-user runs.

How does Impala compare

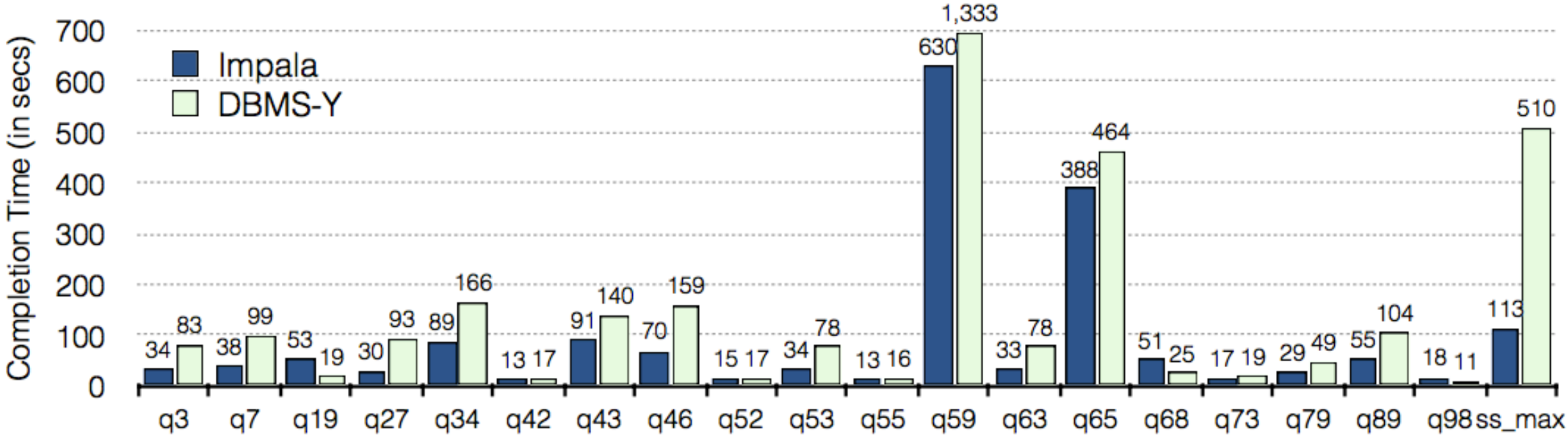


Figure 8: Comparison of the performance of Impala and a commercial analytic RDBMS.

What makes Impala popular

- Distributed query processing
- No single point of failure - each datanode can act as coordinator for any query.
- Low latency, fast queries
- Supports a variety of file formats (including compressed)
- It's the fastest SQL query engine – even when compared to Spark SQL

How to get access to Impala

- Cloudera distribution (5.5)
- Docker container: https://hub.docker.com/r/cloudera/impala-dev/
- More details: http://impala.io/index.html