SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107
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Department of Artificial Intelligence and Data Science

Course Name – 19AD501 Big Data Analytics

III Year / V Semester

Unit 5 – Big Data Database

Topic – Hive

Hive

- Apache Hive is a distributed, fault-tolerant data warehouse system that enables analytics at a massive scale., and is used for analyzing structured and semi-structured data.
- It was developed by the Data Infrastructure Team at Facebook. Hive is also one of the technologies that are being used to address the requirements at Facebook.
- A data warehouse provides a central store of information that can easily be analyzed to make informed, data driven decisions.
- Hive allows users to read, write, and manage petabytes of data using SQL.
- Hive is built on top of Apache Hadoop, which is an open-source framework used to efficiently store and process large datasets.

Hive

- As a result, Hive is closely integrated with Hadoop, and is designed to work quickly on petabytes of data.
- What makes Hive unique is the ability to query large datasets, leveraging Apache Tez or MapReduce, with a SQL-like interface.
- Hive was created to allow non-programmers familiar with SQL to work with petabytes of data, using a SQL-like interface called HiveQL.
- Traditional relational databases are designed for interactive queries on small to medium datasets and do not process huge datasets well.
- Hive instead uses batch processing so that it works quickly across a very large distributed database. Hive transforms HiveQL queries into MapReduce or Tez jobs that run on Apache Hadoop's distributed job scheduling framework, Yet Another Resource Negotiator (YARN).

Hive

- It queries data stored in a distributed storage solution, like the Hadoop Distributed File System (HDFS) Hbase, or Amazon S3.

- Hive stores its database and table metadata in a metastore, which is a database or file backed store that enables easy data abstraction and discovery.

- Hive includes HCatalog, which is a table and storage management layer that reads data from the Hive metastore to facilitate seamless integration between Hive, Apache Pig, and MapReduce.

- By using the metastore, HCatalog allows Pig and MapReduce to use the same data structures as Hive, so that the metadata doesn’t have to be redefined for each engine.

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Features

- Allows programmers to plug in custom Mappers and Reducers.
- Has Data Warehouse infrastructure.
- Provides tools to enable easy data ETL.
- Defines SQL-like query language called QL

Hive


Challenge...
>950 Million Users
>500 Terabytes per day
>70k queries per day
>300 million photos per day
Traditional RDBMS...
Solution...
hadoop MapReduce
Hard to program
Users Know SQL well
HIVE
Tables can be partitioned & bucketed
Schema flexibility & evolution
Easy to plug-in custom mapper/ reducer code
JDBC/ODBC drivers are available
HIVE tables can be befined directly on HDFS
Extensible: Types, Formats, Functions, Scripts

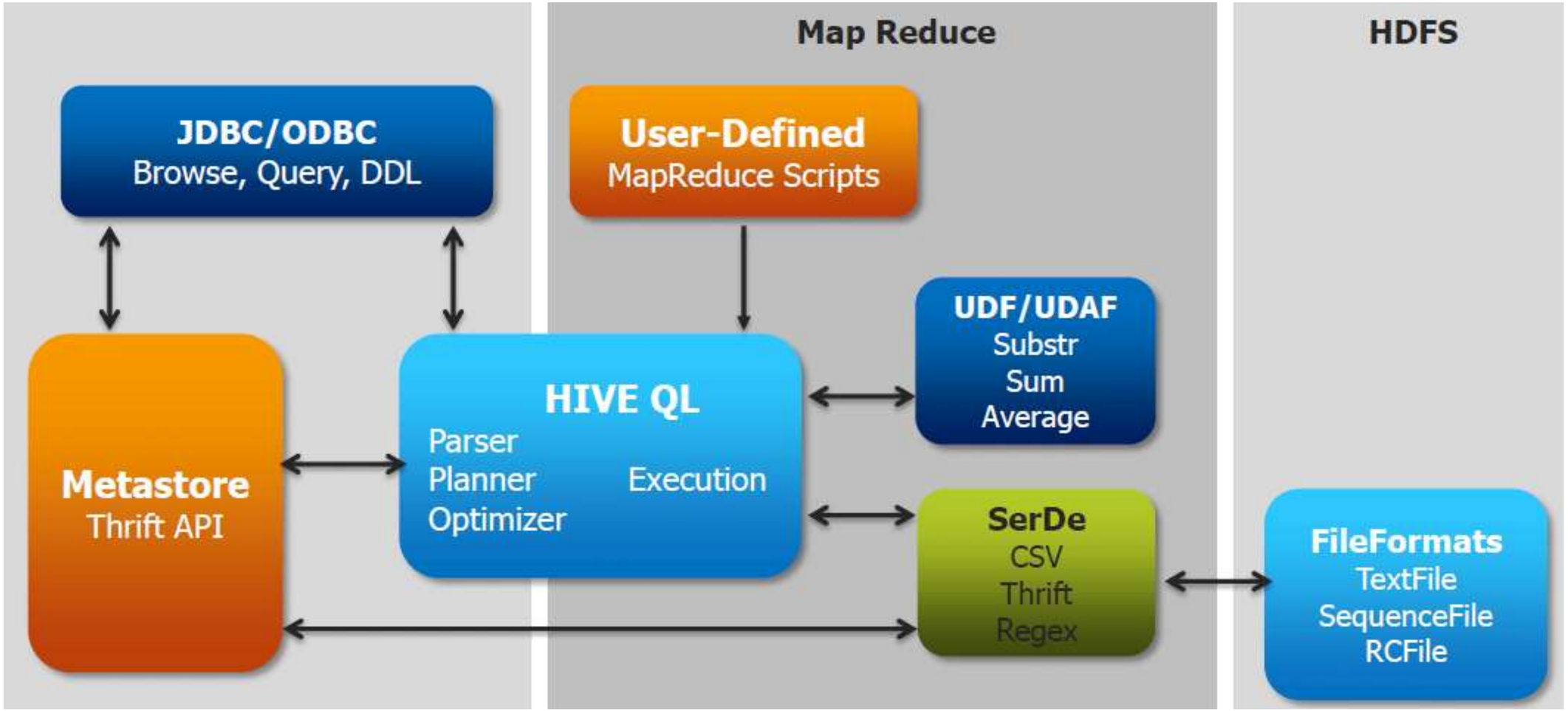
Hive

Advantages of Hive

- Useful for people who aren't from a programming background as it eliminates the need to write complex MapReduce program.
- Extensible and scalable to cope up with the growing volume and variety of data, without affecting performance of the system.
- It is as an efficient ETL (Extract, Transform, Load) tool.
- Hive supports any client application written in Java, PHP, Python, C++ or Ruby by exposing its Thrift server.
- As the metadata information of Hive is stored in an RDBMS, it significantly reduces the time to perform semantic checks during query execution.

Hive

Architecture of Hive



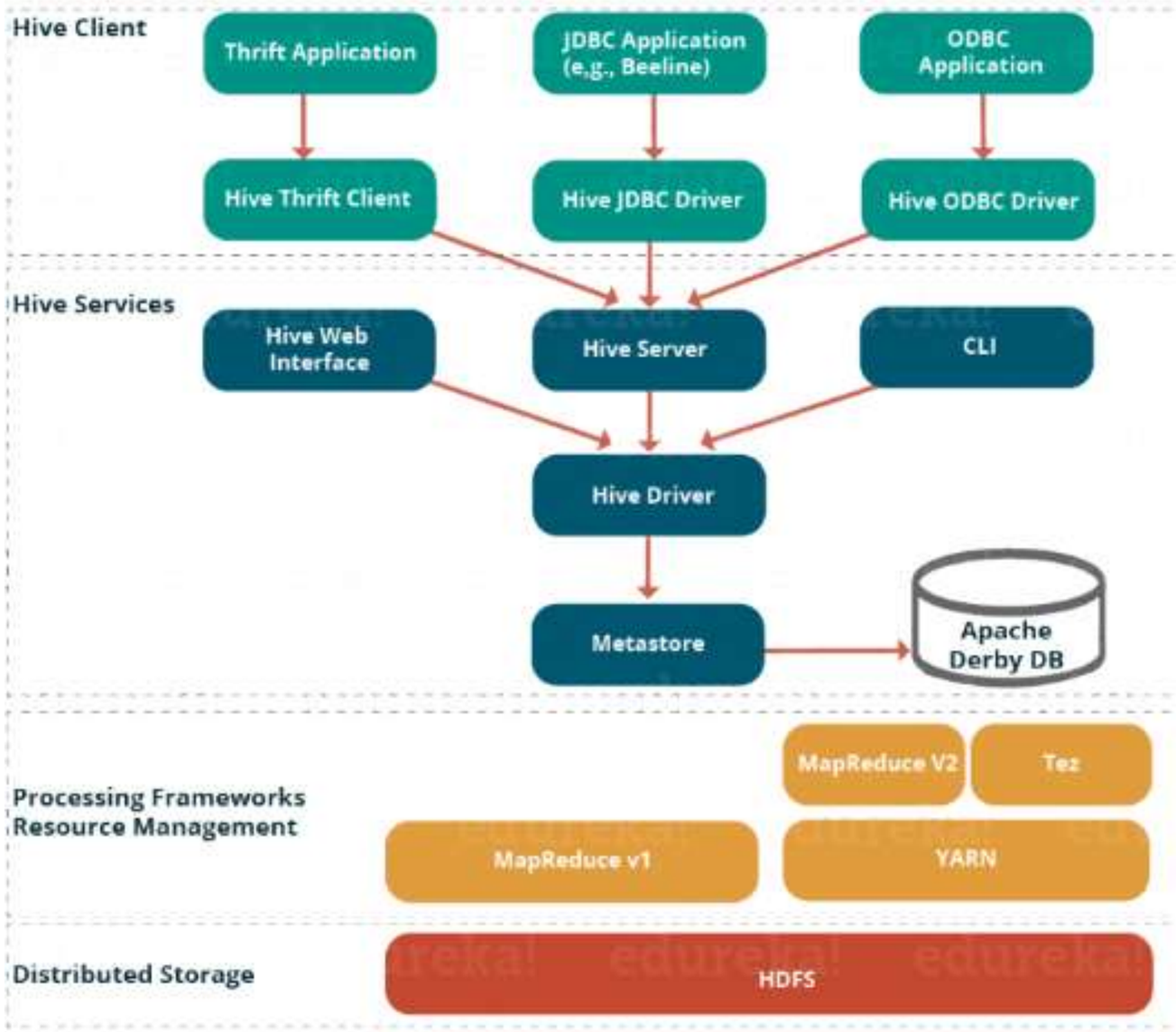
Hive

Hive consists of the following major components:

- Metastore – To store the metadata.
- JDBC/ODBC – Query Compiler and Execution Engine to convert SQL queries to a sequence of MapReduce.
- SerDe and ObjectInspectors – For data formats and types.
- UDF/UDAF – For User Defined Functions.
- Clients – Similar to MySQL command line and a web UI.

Hive

Architecture of Hive



Hive

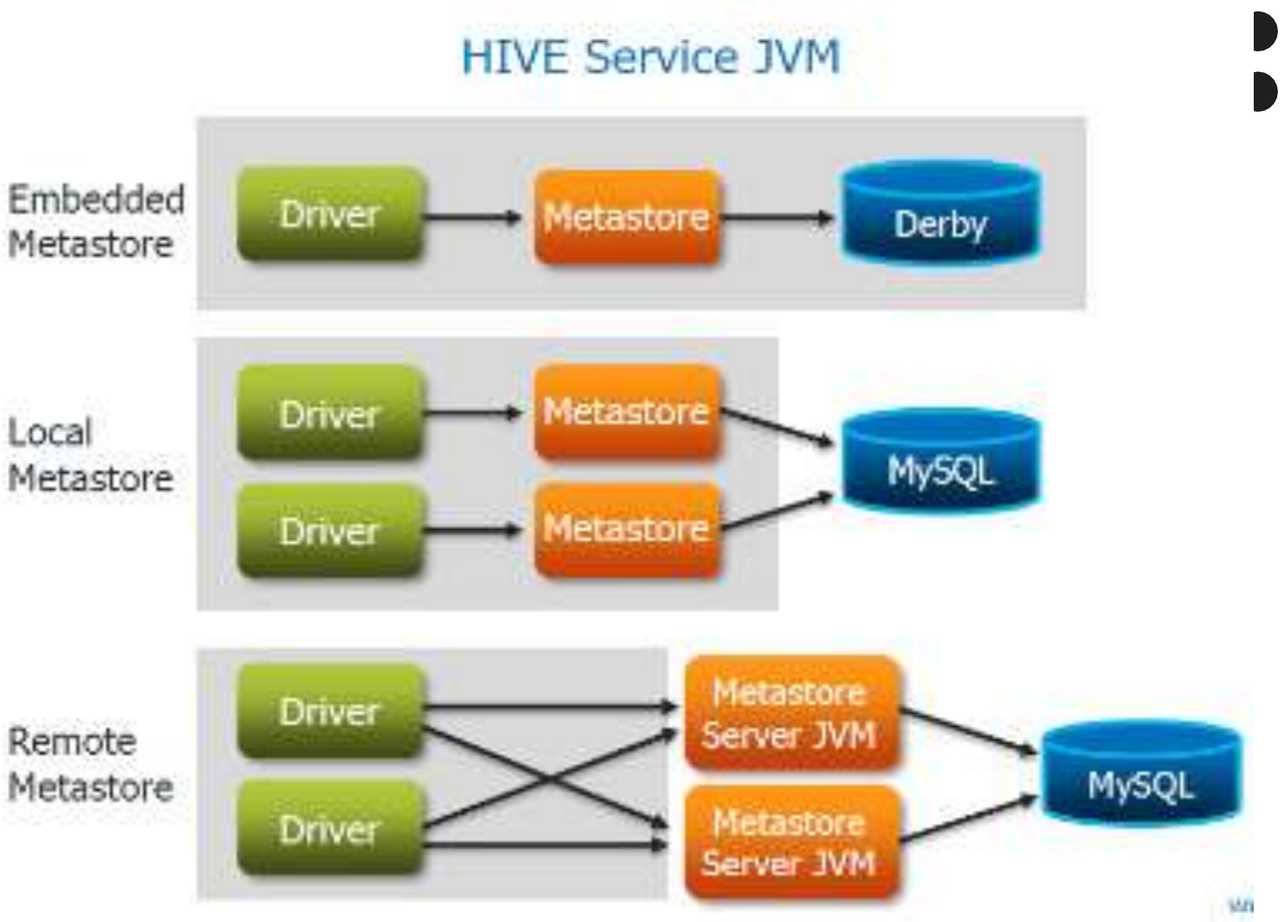
Architecture of Hive

- Hive Clients: Hive supports application written in many languages like Java, C++, Python etc. using JDBC,Thrift and ODBC drivers. Hence one can always write hive client application written in a language of theirchoice.
- Hive Services: Apache Hive provides various services like CLI, Web Interface etc. to perform queries. We will explore each one of them shortly in this Hive tutorial blog.
- Processing framework and Resource Management: Internally, Hive uses Hadoop MapReduce framework asde facto engine to execute the queries. Hadoop MapReduce framework is a separate topic in itself and therefore, is not discussed here.
- Distributed Storage: As Hive is installed on top of Hadoop, it uses the underlying HDFS for the distributed storage. You can refer to the HDFS blog to learn more about it.

Hive

Metastore:

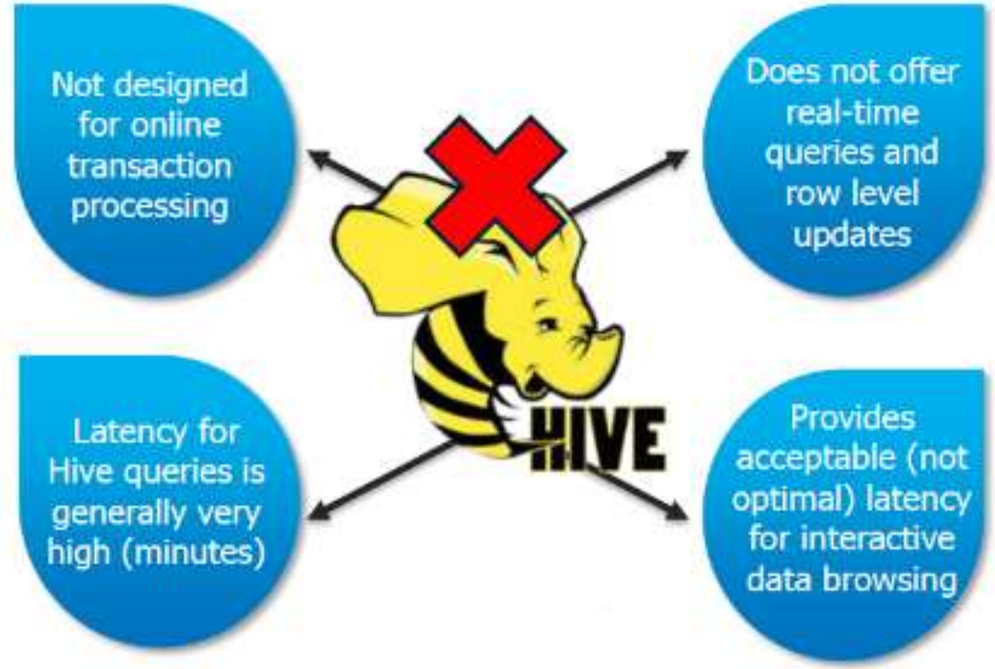
- The Metastore stores the information about the tables, partitions, the columns within the tables.
- There are 3 ways of storing in Metastore: **Embedded Metastore, Local Metastore and Remote Metastore**.
- Mostly, Remote Metastore will be used in production mode.



Hive

Hive has the following limitations and cannot be used under such circumstances:

- Not designed for online transaction processing.
- Provides acceptable latency for interactive data browsing.
- Does not offer real-time queries and row level updates.
- Latency for Hive queries is generally very high.



THANK YOU