Hive* – A Petabyte Scale Data Warehouse Using Hadoop

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Overview

Massively Parallel Toolkit

Linearly Scalable

Fault Tolerant

Big Data Processing

Massively Parallel

MapReduce

Decisions Making

Familiarity

Hive

Hadoop
### Hive Data Structure

#### Primitive Data Types
- INT
- TINYINT
- SMALLINT
- BIGINT
- BOOLEAN
- FLOAT

#### Complex Data Types
- Associative arrays
- Lists
- Structs

#### Complex Datatypes Composition
`list<map<string, struct<p1:int, p2:int>>>`

#### Complex Schema Creation
`CREATE TABLE t1(st string, fl float, li list<map<string, struct<p1:int, p2:int>>>)`

#### Hive Data Incorporation
- + SerDe Interface
- + ObjectInspector Interface
- + `getObjectInspector` method

#### **Serialization**
Process of translating data structures or object state into a format that can be stored and reconstructed later.
Hive Query Language

HiveQL Semantics (SQL)

- SUBQUERIES
- INNER, LEFT & RIGHT OUTER JOINS
- CARTESIAN PROD
- GROUP By
- AGGREGATION
- UNION
- CREATE TABLE

HiveQL Data Insertion

- INSERT OVERWRITE

HiveQL Supports Map-Red Programs

```
FROM ( 
    MAP stocks USING 'python ce_mapper.py'
    AS (company,value)
    FROM stocksStat
    CLUSTER BY value
) a
Reduce company,value USING 'python ce_reduce.py'
```

**HQL**

Hibernate Query Language
Data Storage

Logical Partitioning

HDFS

Buckets

/hive/stocks/
/hive/stocks/2014-11-13/
/hive/stocks/2014-11-13/10
/hive/stocks/2014-11-13/11
/hive/stocks/2014-11-13/12

Prune/Bucket Data

Hive

MetaStore

Library

Schema

MetaData

CREATE TABLE Stocks
(Company STRING, val DOUBLE)
PARTITIONED BY (day STRING, hr INT);
System Architecture (1/3)*

Hadoop (Map-Reduce + HDFS)

- Job Tracker
- Name Node
- Data Node + Task Tracker

Hive

- JDBC
- ODBC
- CLI
- Web Interface
- Thrift Server
- Driver (Compiler, Optimizer, Executor)

MetaStore

ODBC

JDBC

Web Interface

Thrift Server

Driver (Compiler, Optimizer, Executor)

CLI
Interoperability is the ability of a system to work with other systems without special effort on the customer side.

Logical/Physical Plan

Abstract Syntax Tree (AST) for the query, Query Block Tree, Involved Interfaces, Directed Acyclic Graph
System Architecture (3/3)

Job Tracker

MapReduce

Task Trackers (MAP)

Map Op. Tree

SerDe

Task Trackers (Reduce)

Map Op. Tree

SerDe

HDFS

Data Nodes

6.1. exeJob

6.2. jobDone
FROM(SELECT a.status, b.school, b.gender
FROM status_updates a JOIN profiles b
ON (a.userid = b.userid AND a.ds='2009-03-20')) subq1

INSERT OVERWRITE TABLE gender_summary PARTITION (ds='2009-03-20')
SELECT subq1.gender, COUNT(1)
GROUP BY subq1.gender

INSERT OVERWRITE TABLE school_summary PARTITION (ds='2009-03-20')
SELECT subq1.school, COUNT(1)
GROUP BY subq1.school
status_updates
(userid, status, ds)

profiles
(userid, school, gender)
SELECT subq1.school, COUNT(1)
GROUP BY subq1.school

SELECT subq1.gender, COUNT(1)
GROUP BY subq1.gender
Brief Recap.*

- Hive is created to simplify big data analysis. (1 hour for new users to master)
- Hive is improving the performance of Hadoop. (+20% efficiency)
- Hive enables data processing at a fraction of the cost of more traditional WD.
- Hive is working towards to subsume SQL syntax.
- Hive is enhancing the Query Compiler and the interoperability.

http://hadoop.apache.org/

http://hive.apache.org/
Thanks!*  

Questions?