

Large Scale OLAP

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Preliminaries

- OLAP
 - On-Line Analytical Processing
 - Traditional solutions: data warehouses built by parallel databases
- MapReduce-based systems
 - Off-Line Analytical Processing
 - Modern solutions to large scale data over cluster
- Large scale OLAP
 - Scalable and efficient OLAP
 - Bring MapReduce-based systems into OLAP

Paper List

- Group 1 – translate SQL-like query into MapReduce-based jobs
 - Pig [sigmod08]
 - SCOPE [vldb08]
 - Hive [vldb09, icde10]
- Group 2 – install database on datanode
 - HadoopDB [sigmod09, vldb09, sigmod10, sigmod11]
- Group 3 – combine multi-level trees and columnar layout
 - Dremel [vldb10]

Motivation

- Why I choose these papers?
 - Yahoo!, Microsoft, Facebook, Yale and Google
 - Great works and writings
- Why we need large scale OLAP?
 - Massive data with rapid growth
 - Traditional data warehouses built by parallel databases are expensive
 - Low latency and powerful query language requirements
- What can we learn from these papers?
 - The design overview and implementation details of state-of-art systems
 - The great scientific English writing skills

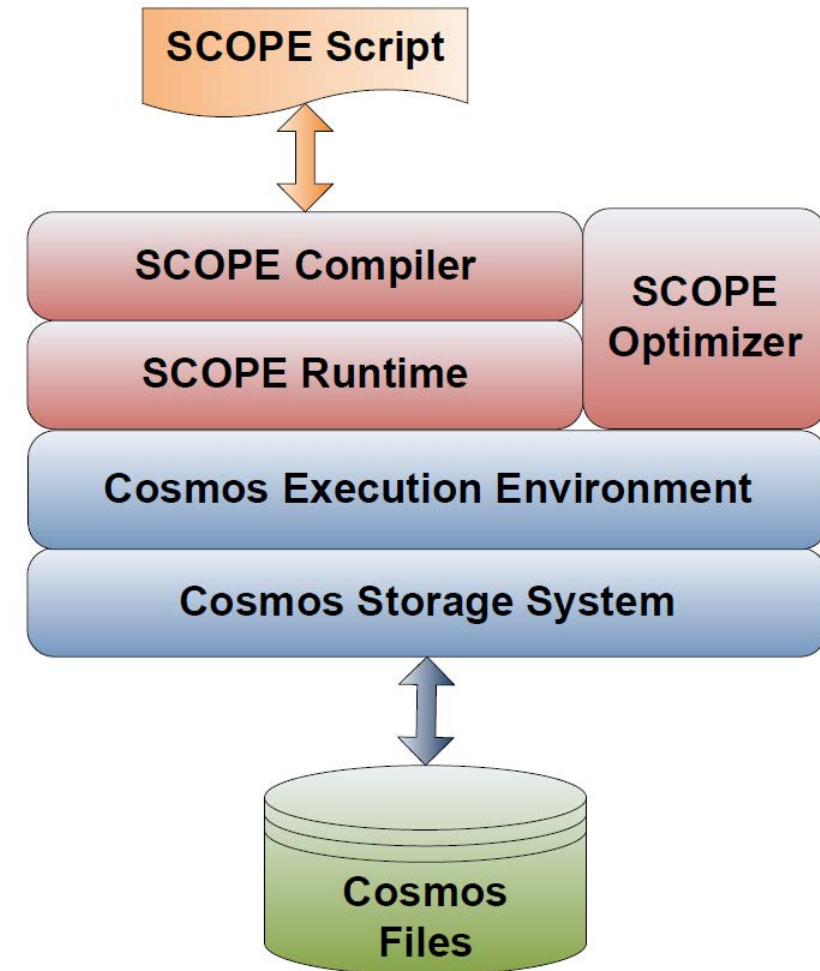
Group 1 - **Pig** is developed by Yahoo! [1]



- <http://pig.apache.org/>
- A new language called **Pig Latin**
 - Between the declarative style of SQL and the procedural style of map-reduce
- An accompanying system called **Pig**
 - Compile Pig Latin into physical plans that are executed over Hadoop
- A novel debugging environment called **Pig Pen**
 - Lead to even higher productivity gains

Group 1 - **SCOPE** is developed by Microsoft [2]

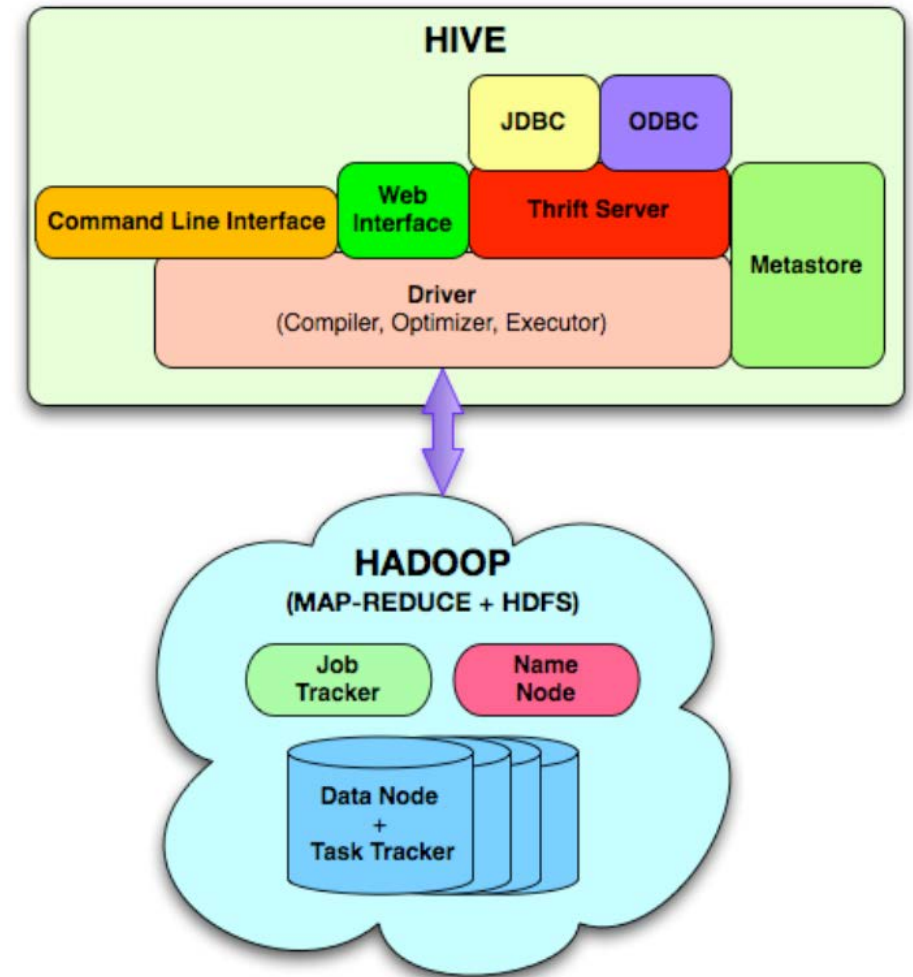
- A new declarative and extensible scripting language, SCOPE(Structured Computations Optimized for Parallel Execution), is targeted for massive data analysis.



Group 1 - **Hive** is developed by Facebook [3-4]

- <http://hive.apache.org/>

A data warehousing solution is built on top of Hadoop which supports HiveQL (a SQL-like declarative language) for OLAP.



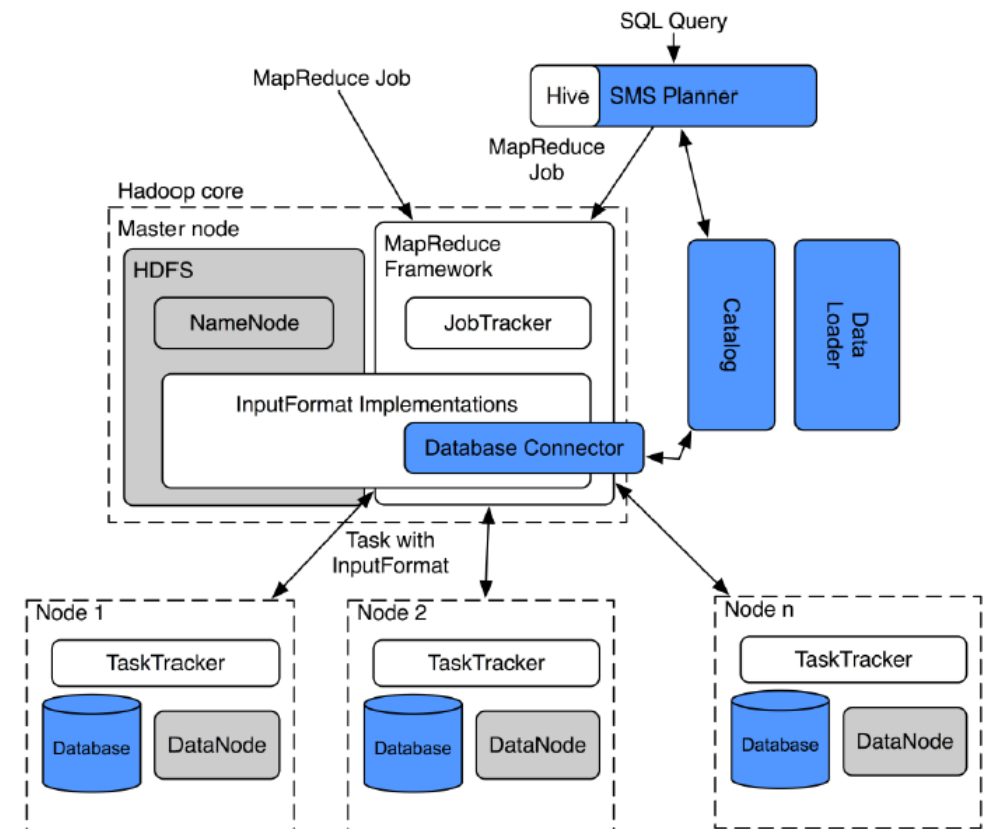
Group 1 - Writing Skill

- Name system after a catching abbreviation
 - SCOPE (Structured Computations Optimized for Parallel Execution)
- Use a dash to set off an abrupt break or interruption and to announce a long appositive or summary
 - SCOPE has a strong resemblance to SQL – an intentional design choice
- Place the emphatic words of a sentence at the end
 - They wrench programmers away from their preferred method of analyzing data, namely writing imperative scripts or code, toward writing declarative queries in SQL, which they often find unnatural, and overly restrictive

Group 2 - HadoopDB is developed by Yale [5-8]

- <http://db.cs.yale.edu/hadoopdb/hadoopdb.html>

- A hybrid system integrated with MapReduce-based systems (superior scalability, fault tolerance, and flexibility) and parallel databases (high performance and efficiency) for OLAP.



Group 2 - Writing Skill

- Hybrid system
 - HadoopDB
 - The prototype we built approaches parallel databases in performance and efficiency, yet still yields the scalability, fault tolerance, and flexibility of MapReduce-based systems
- Emphasize the contributions of your work
 - In summary, the primary contributions of our work include:
 1. ...
 2. ...
 3. ...

Group 3 - **Dremel** is developed by Google [9]

- Dremel is a scalable, interactive ad-hoc query system for analysis of read-only nested data
- Dremel builds on ideas from web search and parallel DBMSs. By combining multi-level execution trees and columnar data layout, it is capable of running aggregation queries over trillion-row tables in seconds
- In contrast to layers such as Pig and Hive, Dremel executes queries natively without translating them into MR jobs.

Group 3 - Writing Skill

- Add BACKGROUND to provide preliminaries
- Move RELATED WORK behind if it breaks the whole story
- Choose a suitable design and hold to it
- Make the paragraph the unit of composition

Future work

- Bring in-memory techniques into large scale OLAP to future boost processing performance
- Specifically, integrate in-memory column store MonetDB and in-memory row store VoltDB into Hadoop-based systems
- Increase data volume of benchmark and find the bottleneck of in-memory database
- Bring optimization techniques such as partition used in parallel databases to resolve bottleneck of in-memory database

References

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Thank You!