BDA 5-3

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Hello everyone, I am Haiying Che, from Institute of Data Science and knowledge Engineering

School of Computer Science, in Beijing Institute of Technology , in this session we discuss batch processing computing model, represented by MapReduce.

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The data processing system provides big data computing and processing capabilities and an application development platform.

From the perspective of computing architecture, the data processing system is divided into data algorithm layer, computing model layer, computing platform layer, computing engine layer, etc.

Computing models are the way that different kinds of big data is processed in different scenarios,

which include batch processing, stream computing, **Large-scale concurrent processing (MPP) model** for structured data, In-memory Computing model, and Data Flow Graph models.

We first look at the batch processing model represented by MapReduce

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Let’s watch a video about “Learn MapReduce with Playing Cards “ to easily understand the mechanism of map reduce process Intuitively

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From the video we understand the basic working mechanism of Map Reduce.

MR tries to parallelize the big computing tasks in distributed environment to improve efficiency.

the storing unit in HDFS is data blocks, Retrieve the data from HDFS data blocks , then organize input data as data split feed into the map tasks.

The output of map task are going through the shuffle phase through sort , copy and merge operations showed in the diagram.

After shuffle the reorganized middle results become the input of the reduce tasks, and after reduce phase , the final result is calculated.

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MapReduce architecture mainly four parts: Client, JobTracker,TaskTracker，Task

1) Client

MapReduce program written by the user is submitted to the JobTracker through the client

Users can view job running status through some interfaces provided by Client

2) JobTracker

JobTracker is responsible for resource monitoring and job scheduling

JobTracker monitors the health status of all TaskTrackers and Jobs, and if it finds a failure, it will transfer the corresponding tasks to other nodes

JobTracker will track the task execution progress, resource usage, and other information, and inform the task scheduler (TaskScheduler), and the scheduler will select the appropriate task to use these resources when resources become free

3) TaskTracker

TaskTracker will periodically report the usage of resources on the node and the progress of the task to the JobTracker through the "heartbeat",

and at the same time receive the commands sent by the JobTracker and perform the corresponding operations (such as starting new tasks, killing tasks, etc.)

TaskTracker uses "slot" to divide the amount of resources (CPU, memory, etc.) on this node. A Task has a chance to run after it gets a slot, and the role of the Hadoop scheduler is to allocate idle slots on each TaskTracker to the Task. Slots are divided into Map slot and Reduce slot, which are used by MapTask and Reduce Task respectively.

4) Task

Task is divided into Map Task and Reduce Task, which are started by TaskTracker

Task scheduler is responsible for Selecting the appropriate task to use these resources when resources become free

Slot is amount of resources (CPU, memory, etc.)., which include Map slot and Reduce slot.

Hadoop scheduler is to allocate idle slots on each TaskTracker to the Task.

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Let’s combine the HDFS and MapReduce together. HDFS and MapReduce should be built on the same cluster. The master node should be both name node in HDFS and Job tracker in MapReduce,

and the slave node should be both the datanode in HDFS and tasktracker in MapReduce.

For example we build a one master node and three slave nodes HDFS and MapReduce cluster.

In order to reduce the data transmission overhead, we should try to make the input data of corresponding map task to be as close as possible, it is better on the same machine.

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In this session, we learned batch processing model MapReduce.

thank you for your attention, if you have any question, feel free to contact me.