Session 3

Hbase, Hive, Pig Hadoop workshop

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Background:

- How we get into big data
- Distributed memory
- Shared memory
- Package size (coin example)
- SuperCube

Area effected by parallel processing:

- Since we have a big data need to process it in parallel
- Datamining such as tweets analysists
- Image processing training set
- Algorithm
- Networking

Map Reduce Optimization:

- Before — for example just English word.
- On load — change the compression ratio, how big the size.
- Map — Done by code, Don't want to use high complex.
- Shuffle — highly complex, if you are good try it.
- Reduce — reducing process.
- After — just give the first result fast, and use the data again for further processing.

Tweet example

Optimization Before Running a job:

- File size. Use the right size.
- Compression. How much can compress and how it does effect the processing. Text Transfer example.
- Encryption. Encrypting and decrypting takes time

Physical Map Reduce:

- Verify your cluster configuration, and document the reason if not using **default**.
- Unused resources
- Overstress resources (can’t fit in memory and goes to desk)
- Collaboration of local and web data storage

Reducer Optimization:

- Subdividing tasks — prevent over flow of memory
- Debugging — provided on the nodes that has been used unlike mapper
- Spill ration — define how much it goes to disk

What is Pig?

ETL library for Hadoop.
Extract Transform Load
Generate MapReduce
Developed at Yahoo

Example:

- Transform the data: By dividing sentence and collecting word. Classic word count for blog.
- Clean and filtering the data: Such as data for sensor that needs to be clean.
- Process the data: For example data for specific location that you may need.

How Does Pig Works:

Load <file>

Filter, Join, Group By, Foreach, Generate <values>

Dump <to screen for testing>

Store <new file>

Pig data:

- Field: a piece of data
- Tuple: a set of field
- Bag: a collection of tuples
- Pig is complete relation database.

Pig Concepts:

- Filter <set> By <value> = <number>

  Filter A by quantity > 2000;

  Similar to where in relational database

- Supported operations :
  - Logical: NOT, AND, OR
  - Relational: < , > , == , != , >= , <=

Pig Function:

- It is quite powerful and rich, it is worth digging into it.
  - General: AVG, MAX, TOKENIZE
  - Relational: FILTER, MAPREDUCE. can call MAPREDUCE inside a pig script.
  - String: UPERCASE, LOWERCASE
  - Math: ABS, LOG, ROUND
- Write your own function (Write, Register, Test the function in JAVA or PYTHON)

Run Pig:

- Run from Hadoop or pig shell
- Use as embedded within the java code

We should think about mapper and reducer in our code.

What is Hive?

- SQL-like query language that generates MapReduce Code.
- Hive use H-SQL (Hibernate Query Language)
- Developed at Facebook
- Batch, not interactive. means takes time to come up with result.
- It is open source.

NoSql:

- Object oriented
- Beyond the relational database
- Horizontal Scaling, building out instead of up
- mapping

What is HBase?

- Wide-column NoSQL database.
- Use CREATE TABLE over HDFS data.
- It is very different from relational database
- It is distributed, multidimensional sorted map.

Using Hive With Hadoop:

- Hive library are integrated with Hbase.
- Hive libraries include the HQL language.

Why Use Hive?

- You are an analyst and you know SQL.
- You want to ask analytical question.
- You work with excel.
- Hive is batch, not interactive. It does produce MapReduce. So, takes time.
- You don’t want to do word count by Hive. Pig works better in that manner.

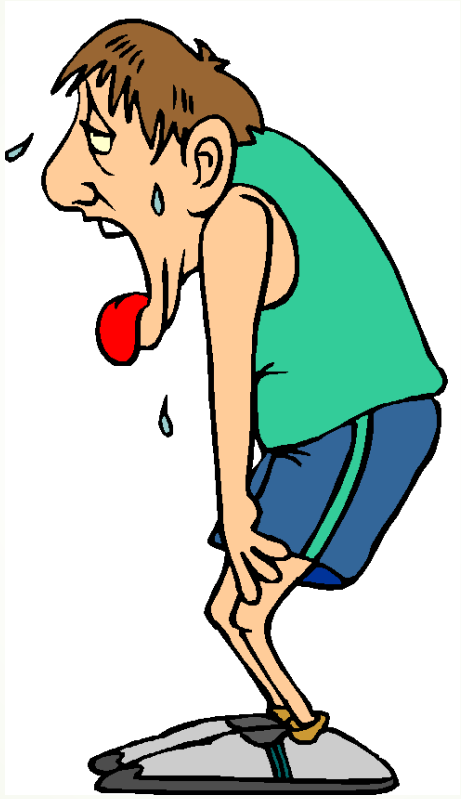
For Hive Query Optimization:

- Partitioning or sampling using subset.
- Cost-based optimization (CBO) by looking at execution method and locating bottleneck.

HQL Query Plan:

```
[impalad-host:21000] > explain select count(*) from customer_address;
+-----------------------------------------------------------+
| Explain String                                            |
+-----------------------------------------------------------+
| Estimated Per-Host Requirements: Memory=42.00MB VCores=1 |
|                                                           |
| 03:AGGREGATE [MERGE FINALIZE]                             |
| |  output: sum(count())                                   |
| |                                                         |
| 02:EXCHANGE [PARTITION=UNPARTITIONED]                     |
| |                                                         |
| 01:AGGREGATE                                              |
| | output: count(*)                                        |
| |                                                         |
| 00:SCAN HDFS [default.customer_address]                   |
|    partitions=1/1 size=5.25MB                             |
+-----------------------------------------------------------+
```

Pig	vs	Hive
Has a protocol data flow language called pig Latin		Has a declarative SQLish language called HiveQL
Mainly used for programming		Mainly used for creating report
Generally used by researchers and programmers		Used by data analysists
pig SQL-Like takes time to get expert		Close to SQL can be learned faster



Works To Do:

- Fire up your vmware or your virtualbox.
- If you have no memory open cloudera.
- Open the browser and type the address.
- Use maria_dev as your username and password
- Go to this link and go through the steps for Pig:

http://hortonworks.com/hadoop-tutorial/how-to-process-data-with-apache-pig/

Go to this link and go through the steps for Hive:

http://hortonworks.com/hadoop-tutorial/how-to-process-data-with-apache-hive/

Hortonworks Sandbox with | Ambari - Sandbox | Hadoop Tutorial: How to Pr

172.16.182.130:8080/#/main/views/PIG/1.0.0/Pig

Share Failed.
Publishing "Hadoop-Workshop-Session2" to YouTube has failed.
Close
Details

Ambari Sandbox 0 ops 0 alerts

Dashboard Services Hosts Alerts maria_dev

pigexanple

Save
Copy
Delete

Script History pigexanple - Completed pigexanple - Running

pigexanple

Execute on Tez Execute

PIG helper UDF helper /tmp/.pigscripts/pigexanple-2016-04-07_05-53.pig

```
batting = load 'Batting.csv' using PigStorage(',');
```

Arguments

This pig script has no arguments defined.

Pig argument + Add

pigexanple

Save

Copy

Delete

Script | History | pigexanple - Completed

pigexanple

Execute on Tez | Execute

PIG helper | UDF helper

/tmp/.pigscripts/pigexanple-2016-04-07_05-53.pig

```
batting = load 'Batting.csv' using PigStorage(',');
raw_runs = FILTER batting BY $1>0;
runs = FOREACH raw_runs GENERATE $0 as playerID, $1 as year, $8 as runs;
grp_data = GROUP runs by (year);
max_runs = FOREACH grp_data GENERATE group as grp,MAX(runs.runs) as max_runs;
join_max_run = JOIN max_runs by ($0, max_runs), runs by (year,runs);
join_data = FOREACH join_max_run GENERATE $0 as year, $2 as playerID, $1 as runs;
DUMP join_data;
```

Arguments

This pig script has no arguments defined.

Pig argument | + Add

pigexanple

Save

Copy

Delete

Script | History | pigexanple - Completed

pigexanple - COMPLETED

Job ID job_1458391481865_0015

Started 2016-04-07 15:10

Results Download

```
(1982,molitpa01,136.0)
(1983,raineti01,133.0)
(1984,evansdw01,121.0)
(1985,henderi01,146.0)
(1986,henderi01,130.0)
(1987,raineti01,123.0)
(1988,boggswa01,128.0)
(1989,boggswa01,113.0)
(1990,henderi01,119.0)
(1991,molitpa01,133.0)
(1992,phillto02,114.0)
(1993,dykstle01,143.0)
(1994,thomafr04,106.0)
(1995,biggicr01,123.0)
(1996,burksel01,142.0)
(1997,biggicr01,146.0)
(1998,sosasa01,134.0)
(1999,bagweje01,143.0)
(2000,bagweje01,152.0)
(2001,sosasa01,146.0)
(2002,soriaal01,128.0)
(2003,pujolal01,137.0)
(2004,pujolal01,133.0)
(2005,pujolal01,129.0)
(2006,sizemgr01,134.0)
(2007,rodrial01,143.0)
(2008,ramirha01,125.0)
(2009,pujolal01,124.0)
(2010,pujolal01,115.0)
(2011,grandcu01,136.0)
```

Logs Download

Script Details

Ambari Sandbox 0 ops 0 alerts Dashboard Services Hosts Alerts maria_dev

Hive Query Saved Queries History UDFs Upload Table

Database Explorer

default

Search tables...

Databases

- default
- xademo

Query Editor

LoadData

```
LOAD DATA INPATH '/user/maria_dev/Batting.csv' OVERWRITE INTO TABLE temp_batting;
```

SQL

TEZ

Execute Explain Save as... Kill Session New Worksheet

Query Process Results (Status: Succeeded) Save results...

Logs Results

Filter columns...

previous next

Hive | Query | Saved Queries | History | UDFs | Upload Table

Database Explorer

default

Search tables...

Databases

- default
  - sample_07
    - code STRING
    - description STRING
    - total_emp INT
    - salary INT
  - sample_08
    - code STRING
    - description STRING
    - total_emp INT
    - salary INT
- xademo

Query Editor

insert

```
insert overwrite table batting
SELECT
  regexp_extract(col_value, '^(?:([^,]*)\,?){1}', 1) player_id,
  regexp_extract(col_value, '^(?:([^,]*)\,?){2}', 1) year,
  regexp_extract(col_value, '^(?:([^,]*)\,?){9}', 1) run
from temp_batting;
```

Execute | Explain | Save as... | Kill Session | New Worksheet

SQL | TEZ | 8

Query Process Results (Status: Succeeded) Save results...

Logs | Results

Filter columns...

previous | next

Hive | Query | Saved Queries | History | UDFs | Upload Table

Database Explorer

default

Search tables...

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    - code STRING
    - description STRING
    - total_emp INT
    - salary INT
- xademo

Query Editor

select

```
1 SELECT year, max(runs) FROM batting GROUP BY year;
```

Execute | Explain | Save as... | Kill Session | New Worksheet

SQL | TEZ | 10

Query Process Results (Status: Succeeded)

Save results...

Logs | Results

Filter columns...

previous | next

year	_c1
1871	66
1872	94
1873	125
1874	91
1875	115
1876	126
1877	68
1878	60
1879	85
1880	91

Hive | Query | Saved Queries | History | UDFs | Upload Table

Database Explorer

default

Search tables...

Databases

- default
  - sample_07
    - code STRING
    - description STRING
    - total_emp INT
    - salary INT
  - sample_08
    - code STRING
    - description STRING
    - total_emp INT
    - salary INT
- xademo

Query Editor

select

```
SELECT a.year, a.player_id, a.runs from batting a
JOIN (SELECT year, max(runs) runs FROM batting GROUP BY year ) b
ON (a.year = b.year AND a.runs = b.runs);
```

Execute | Explain | Save as... | Kill Session | New Worksheet

SQL | TEZ

Query Process Results (Status: Succeeded) Save results...

Logs | Results

Filter columns... previous next

a.year	a.player_id	a.runs
1963	aaronha01	121
1967	aaronha01	113
1964	allendi01	125
1966	aloufe01	122
1999	bagweje01	143
2000	bagweje01	152
1871	barnero01	66
1873	barnero01	125
1875	barnero01	115
1876	barnero01	126

Ambari Sandbox 0 ops 0 alerts Dashboard Services Hosts Alerts maria_dev

pigexanple

Save

Copy

Delete

Script History pigexanple - Completed

pigexanple - COMPLETED

Job ID job_1458391481865_0025

Started 2016-04-07 16:36

Results Download

```
(1871,barnero01,66.0)
(1872,eggleda01,94.0)
(1873,barnero01,125.0)
(1874,mcveyca01,91.0)
(1875,barnero01,115.0)
(1876,barnero01,126.0)
(1877,orourji01,68.0)
(1878,highadi01,60.0)
(1879,jonesch01,85.0)
(1880,dalryab01,91.0)
(1881,gorege01,86.0)
(1882,gorege01,99.0)
(1883,stoveha01,110.0)
(1884,dunlafr01,160.0)
(1885,stoveha01,130.0)
(1886,kellyki01,155.0)
(1887,oneilti01,167.0)
(1888,pinknge01,134.0)
(1889,griffmi01,152.0)
(1889,stoveha01,152.0)
(1890,duffyhu01,161.0)
(1891,brownto01,177.0)
(1892,childcu01,136.0)
(1893,longhe01,149.0)
(1894,hamilbi01,192.0)
(1895,hamilbi01,166.0)
(1896,burkeje01,160.0)
(1897,hamilbi01,152.0)
(1898,mcgrajo01,143.0)
(1899,keelewi01,140.0)
```

Logs Download

Script Details