Apache Hbase&&Phoenix

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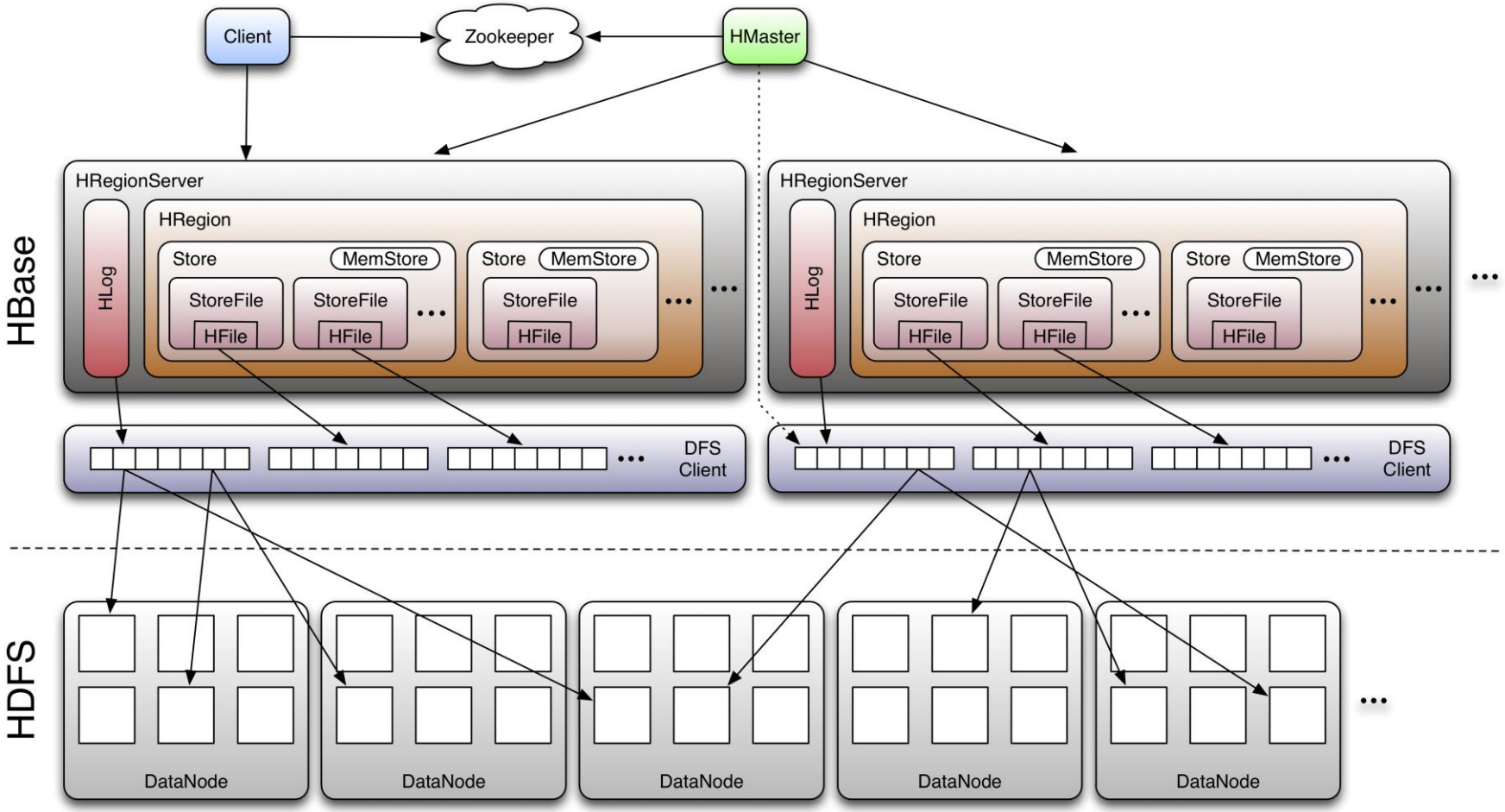
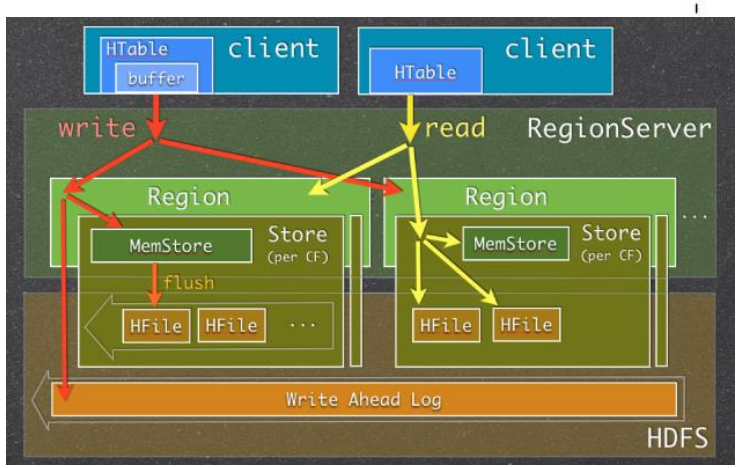
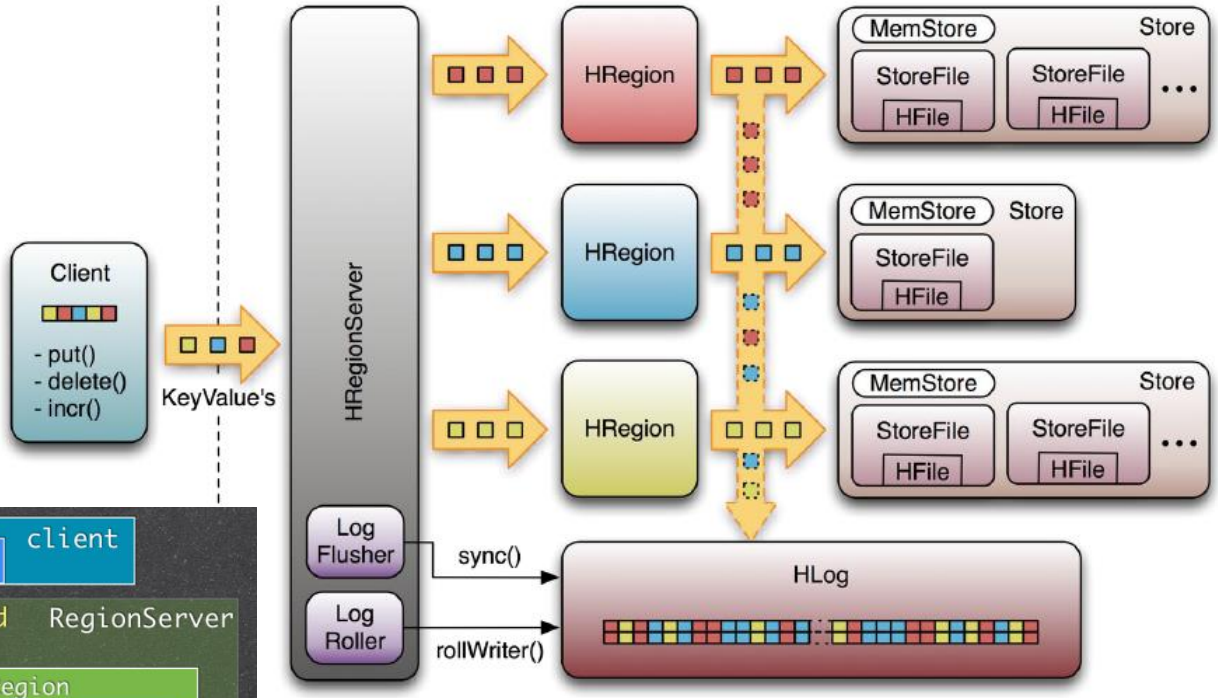
Hbase架构剖析

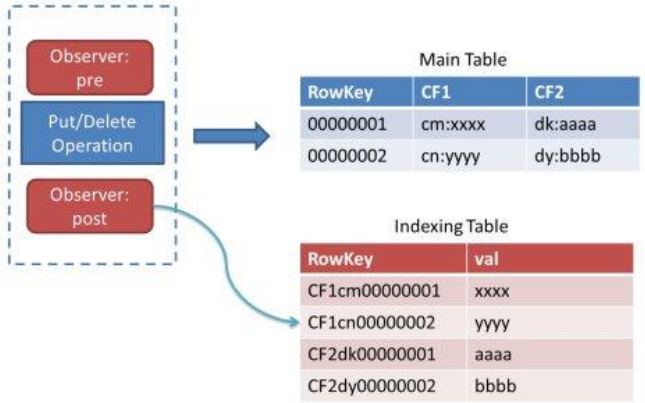

Client
Zookeeper
HMaster
HBase
HRegionServer
HLog
HRegion
Store
MemStore
StoreFile
HFile
DFS Client
HDFS
DataNode

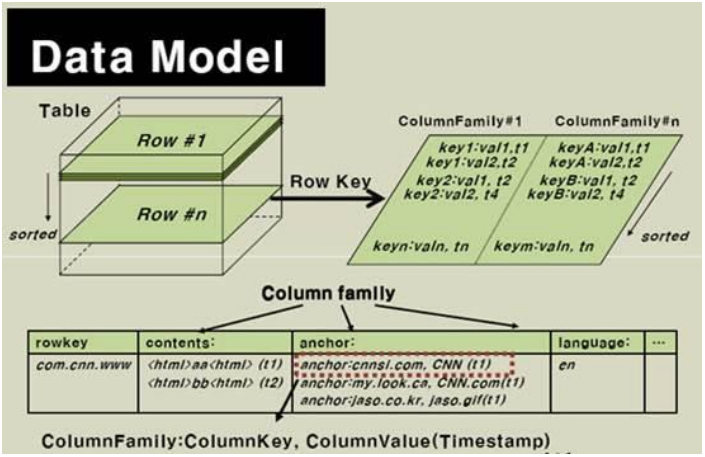
Hbase HRegion

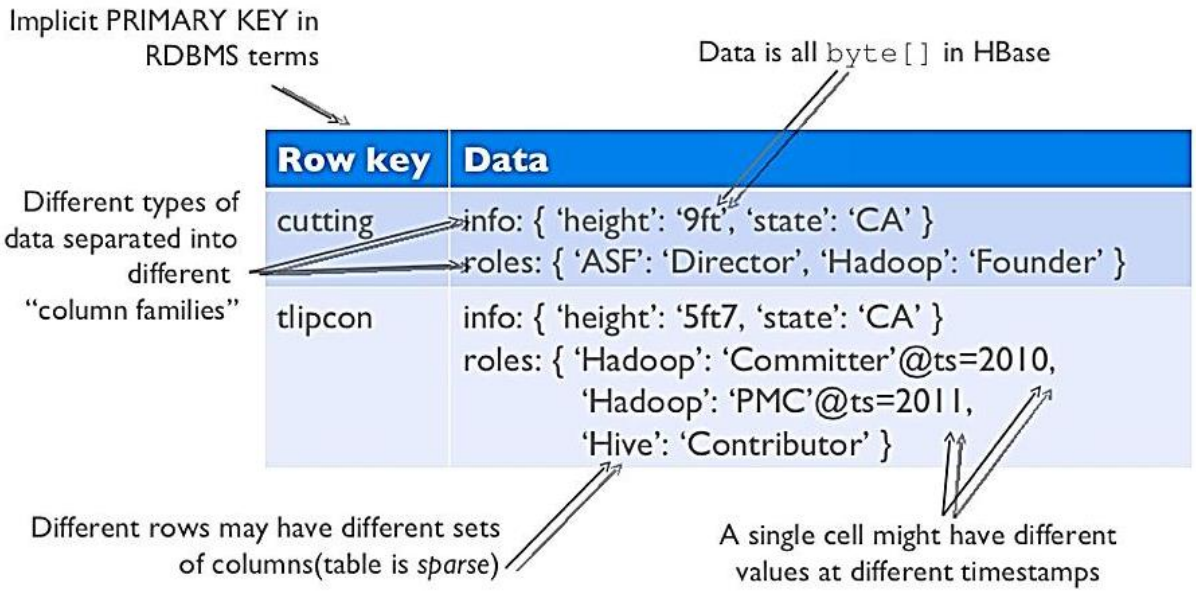




Hbase Table


Observer: pre
Put/Delete Operation
Observer: post
Main Table
RowKey | CF1 | CF2
00000001 | cm:xxxx | dk:aaaa
00000002 | cn:yyyy | dy:bbbb
Indexing Table
RowKey | val
CF1cm00000001 | xxxx
CF1cn00000002 | yyyy
CF2dk00000001 | aaaa
CF2dy00000002 | bbbb


Data Model
Table
Row #1
Row #n
sorted
Row Key
ColumnFamily#1
ColumnFamily#n
key1:val1,t1
key1:val2,t2
keyA:val1,t1
keyA:val2,t2
key2:val1, t2
key2:val2, t4
keyB:val1, t2
keyB:val2, t4
keyn:valn, tn
keym:valn, tn
sorted
Column family
rowkey
contents:
anchor:
language:
com.cnn.www
anchor:cnnsi.com, CNN (t1)
anchor:my.look.ca, CNN.com(t1)
anchor:jaso.co.kr, jaso.gif(t1)
en
ColumnFamily:ColumnKey, ColumnValue(Timestamp)


Implicit PRIMARY KEY in RDBMS terms
Data is all byte[] in HBase
Row key
Data
Different types of data separated into different "column families"
cutting
info: { 'height': '9ft', 'state': 'CA' }
roles: { 'ASF': 'Director', 'Hadoop': 'Founder' }
tlipcon
info: { 'height': '5ft7, 'state': 'CA' }
roles: { 'Hadoop': 'Committer'@ts=2010,
'Hadoop': 'PMC'@ts=2011,
'Hive': 'Contributor' }
Different rows may have different sets of columns(table is sparse)
A single cell might have different values at different timestamps

NOSQL-> NewSQL

类型	主要产品	简介
KV存储	Redis Memcached	使用key快速查到其value，Memcached支持string类型的value，Redis除string类型外还支持set、hash、sort set、list等类型
文档存储	MongoDB CouchDB	使用JSON或类JSON的BSON数据结构，存储内容为文档型，能实现部分关系数据库的功能
列存储	HBase Cassandra	按照列进行数据存储，便于存储结构化和半结构化数据，方便做数据压缩和针对某一列和某几列的数据查询
图存储	Neo4J FlockDB	图形关系的存储，能够很好弥补关系数据库在图形存储的不足
对象存储	Db4o Versant	通过类似面向对象语言的方式操作数据库，通过对象的方式存取数据
XML数据库	Berkeley DB XML BaseX	高效存储XML数据，支持XML的内部查询语法，如XQuery、XPath

Apache Phoenix

APACHE PHOENIX

OLTP and operational analytics for Hadoop

Overview

Apache Phoenix enables OLTP and operational analytics in Hadoop for low latency applications by combining the best of both worlds:

- the power of standard SQL and JDBC APIs with full ACID transaction capabilities and
- the flexibility of late-bound, schema-on-read capabilities from the NoSQL world by leveraging HBase as its backing store

Apache Phoenix is fully integrated with other Hadoop products such as Spark, Hive, Pig, Flume, and Map Reduce.

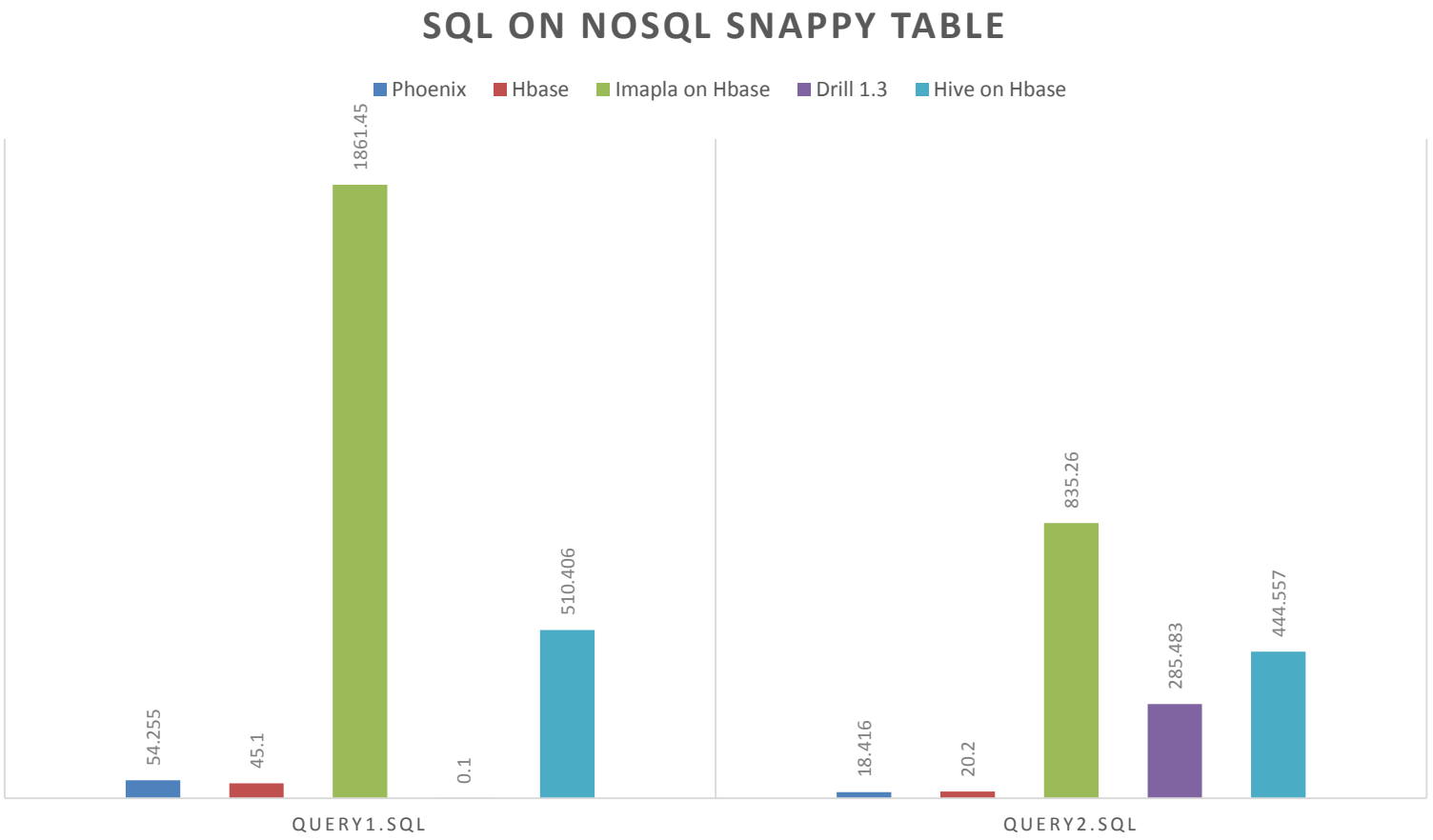
Who is using Apache Phoenix? Read more here...

http://phoenix.apache.org/who_is_using.html

Apache Phoenix

- Phoenix实现类sql查询Nosql数据库
- Phoenix将Query Plan直接使用HBaseAPI实现
- SQL语句解析为hbase查询语法
- OLTP 场景提供低延迟查询(CURD)
- 支持JDBC && Full ACID事物
- 集成其他Hadoop产品, Spark, Hive, Pig, Flume, and Map Reduce

性能测试



执行时间为0s，0是语法不支持,0.1执行失败

http://phoenix.apache.org/performance.html

性能测试

SQL	Phoenix	Hbase	Imapla on Hbase	Drill 1.3	Hive on Hbase
query1.sql	54.255	45.1	1861.45	0.1	510.406
query2.sql	18.416	20.2	835.26	285.483	444.557
query3.sql	0	0	0.1	0	1128.97
query4.sql	0	0	0.1	331.574	418.449
query5.sql	0	0	0.1	333.974	1092.463

执行时间为0s，0是语法不支持,0.1执行失败

SQL and Datasource： http://www.itweet.cn/2016/03/20/Impala-Hive-performance-tuning/

在线演示

Thank you

提问时间？

Blog： http://www.itweet.cn

PPT： https://github.com/itweet/course

Video： http://www.tudou.com/home/sparkjvm/