Apache Hama
a BSP for Advanced Analytics

Edward J. Yoon

@eddieyoon
edwardyoon@apache.org

I am ..

- Vice President of Apache Hama
- PMC member and Committer of ..
  - Apache BigTop
  - Apache MRQL

- Oracle corp. (2012 ~ 2013)
- Korea Telecom (2011 ~ 2012)
- NHN, corp. (2006 ~ 2011)

Agenda

1. Introduction of Hama
   a. What's Hama?
   b. Why Hama?
   c. Benchmarks
2. Use cases of Apache Hama
   a. Netflow Analytics at Korea Telecom
   b. SiteRank at Sogou.com
3. What's Next?

Introduction of Hama BSP

What's Hama?

- Apache Top Level Project
- Written in Java
- a general BSP computing engine
  - Java, Python, and C/C++ Interface
  - MRQL - BSP Query Language

- 10+ Active committers!

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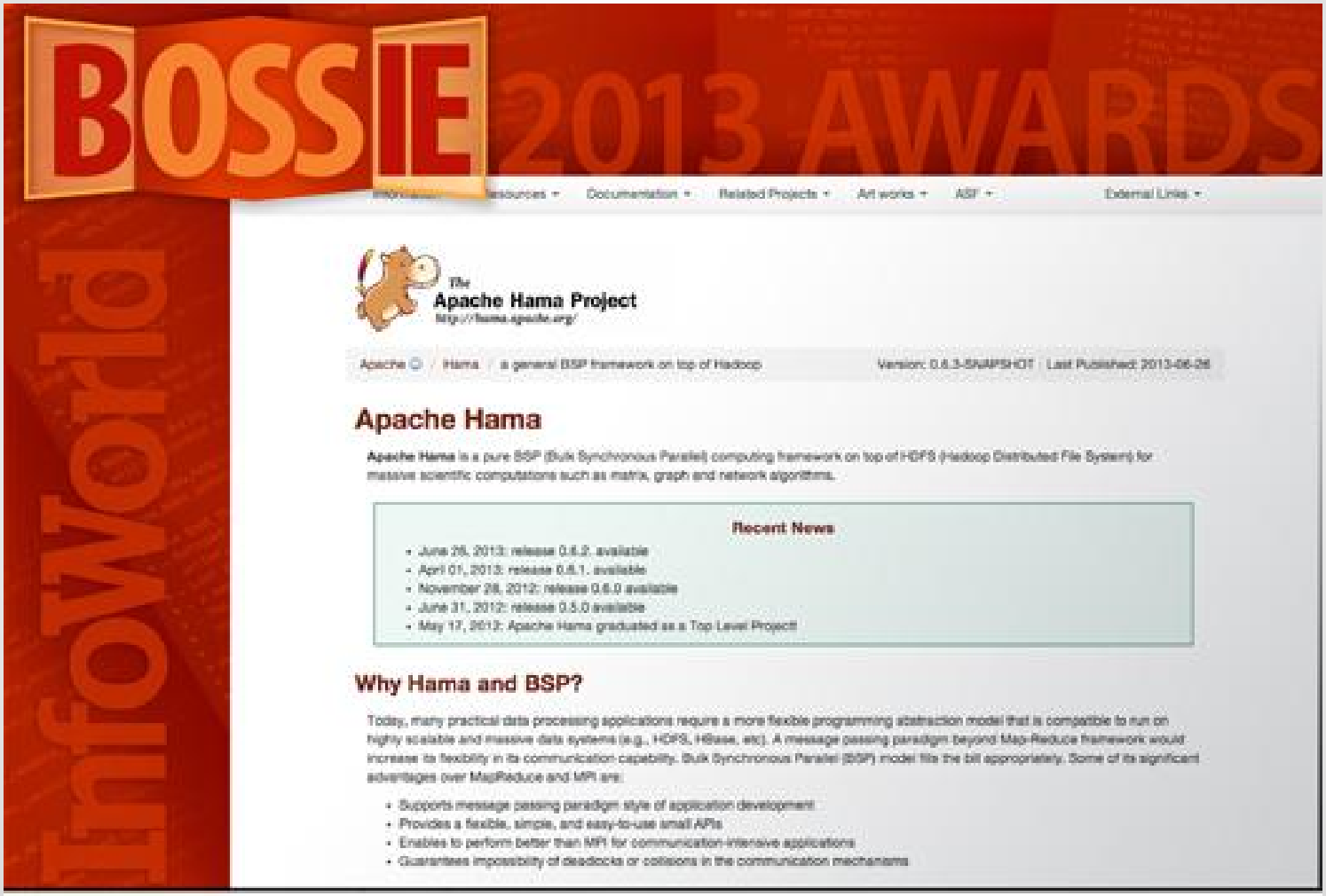
Listed in Bossie Awards 2013



Hama

What's BSP?

- a Parallel computing model on **Message-Passing Architecture**

MapReduce vs. Hama BSP

Data-Intensive

Complex

Computation-intensive

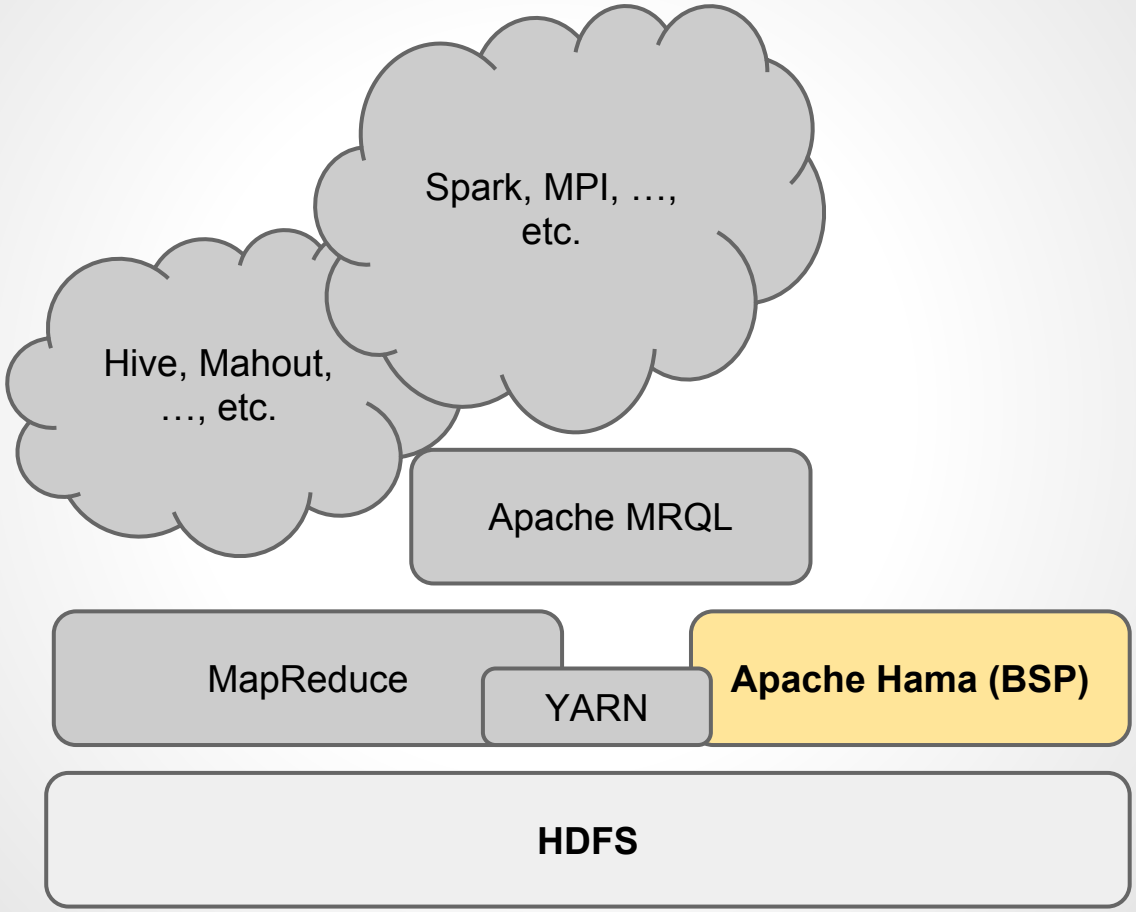
MPI on YARN vs. BSP

How can you solve the below problems of MPI?

- Data partitioning and data locality aware task scheduling
- Job Fault Tolerance
- Deadlock or Race Conditions
- Complexity of Interface

The BSP is answer!

Hadoop Ecosystem



Why Hama?

Evolution of the WWW

- 1990 ~ : Web Documents

Web 2.0

Blog, Open API

Smartphone

Social Network

- ~ 2013 : Responsive Apps for multi-devices

Evolution of the Infrastructure

- 1990 ~ : Server/Web Hosting

Google Apps

Cloud Computing

IaaS, PaaS, SaaS

- ~ 2013 : Cloud/App Hosting

Transition of the Technologies

- 2003 ~ :
  - SQL Database connectivity interface
  - Web-scale data processing
    - MapReduce
    - Hive, Pig, Mahout, ...
- 2007 ~ :
  - Key/Value interface
  - Realtime, ML and Graph Processing
    - Storm
    - Apache Hama!
    - GraphLab, Spark, …, etc.

So, why Hama?

- Simple and Flexible message-passing programming Interface

And,

- Machine Learning Package
  - K-Means clustering is almost 500x ~ 1000x faster than Mahout MR version
- Graph Package (Google's Pregel)
  - PageRank is almost 10 ~ 20x faster than MapReduce version

Benchmarks with 256 cores

- SSSP on random 1 Billion edges

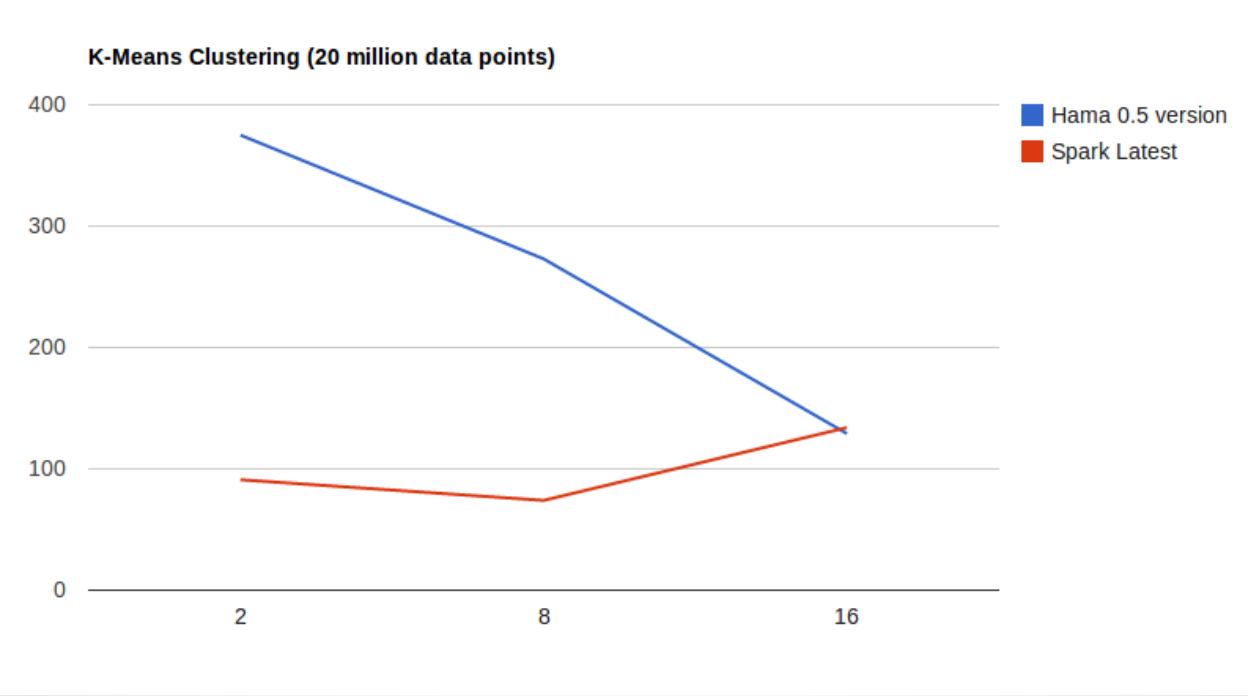
  400 secs!

- PageRank on Wikipedia link DataSet, contains 5,716,808 pages and 130,160,392 links).

  17 secs!

Hama vs. Spark - KMeans

Seconds



Nodes

Use cases of Apache Hama

Netflow Analytics at Korea Telecom

Weather forecasting for Clouds

- 4 Full Racks
- Used as a Real-time event processing
  - Monitoring the network usage of each VMs as a real time
  - Detecting anomaly traffics
  - Sharing the risks among Servers
  - Billing, …, etc.

SiteRank at Sogou.com

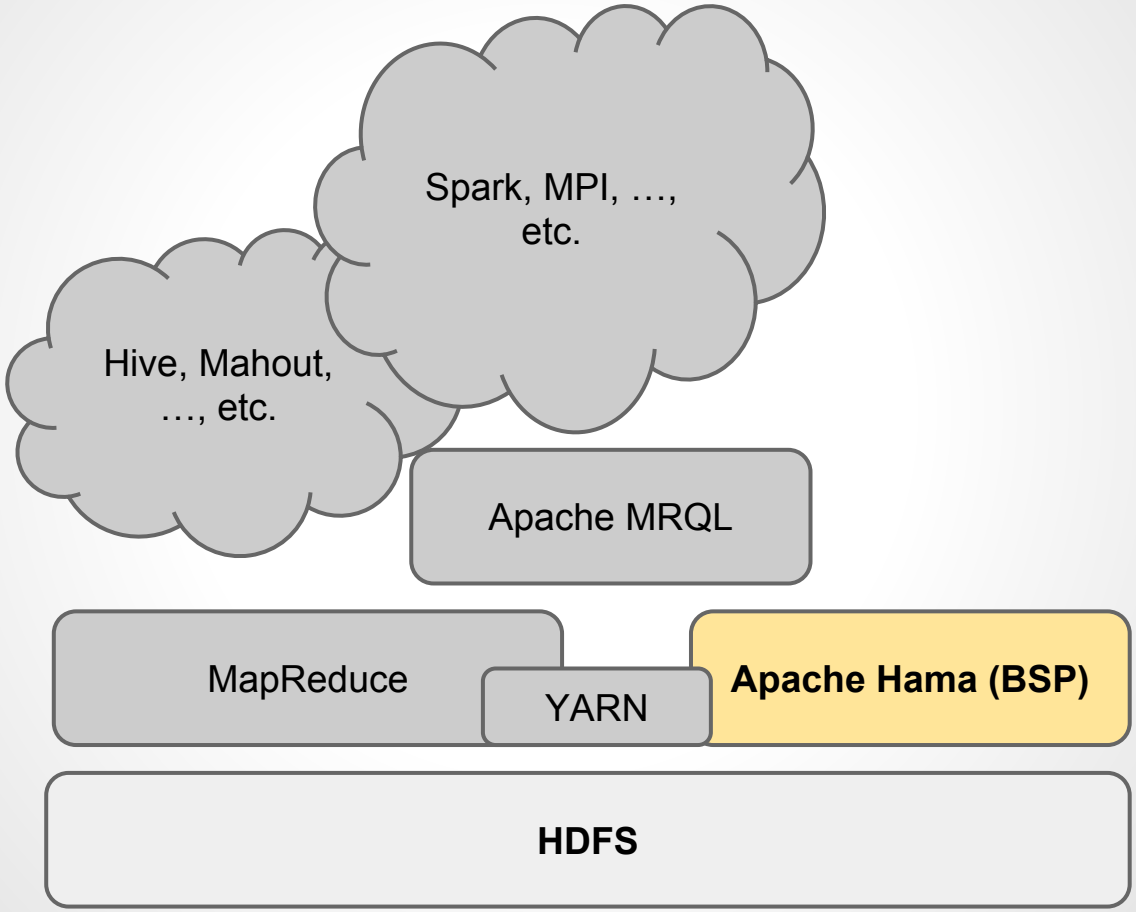
Sogou.com runs SiteRank algorithm on a 7,200 cores Hama cluster.

- SiteRank is the ranking generated by applying the classical PageRank algorithm to the graph of Web sites.
- Dataset is about 400GB contains about 600M vertices and 6B edges

What's Next?

- Performance Improvement
- Develop the Hadoop Ecosystem

Hadoop Ecosystem



Thanks, Questions?