Big Data @ Facebook

Aravind Menon
Facebook
Facebook - A Data Company

- Ads
- Reports
- Newsfeed
- Ad-Hoc Analysis
- Messages/Chat
- Search
- Site Integrity
- Data
- SPAM
Facebook - A Data Company

Data

Ads

Reports

Ad-Hoc Analysis

Site Integrity

Sponsored

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Top Global Topics on Facebook

1. Death of Osama bin Laden
2. Packers win the Super Bowl
3. Casey Anthony found not guilty
4. Charlie Sheen
5. Death of Steve Jobs
6. The Royal Wedding
7. Death of Amy Winehouse
8. Call of Duty: Modern Warfare 3
9. Military operations begin in Libya
10. Hurricane Irene

Facebook Memology 2011 - Top Ten Global Topics

- Status update mentions ranked by growth (2010 vs. 2011)
Facebook - A Data Company

Reports

Ad-Hoc Analysis

Data

Ads

Search

Site Integrity

SPAM
Data Infrastructure Overview

Data Infrastructure @ FB built on open source technologies:

- Many committers across all the projects
- Plans to open source other parts of the data stack
- Figure out a model to stay in sync and still work at FB speed
Agenda

• Life of a tag for data infrastructure
• Warehouse architecture
• Challenges
Life of a tag for data infrastructure
Life of a tag for data infrastructure

Periodic Analysis
- Daily report on count of photo tags by country (1day)

Adhoc Analysis
- Count photos tagged by users yesterday

Warehouse
- Log line reaches warehouse (1hr)
- User info reaches warehouse (1day)

UDB
- Scrape

Realtime Analytics
- Count users tagging photos in the last hour (1min)

Scribe Log Storage
- Log line reaches Scribeh (10s)

www.facebook.com
- User tags a photo
- Log line generated: <user_id, photo_id>

copier/loader
- Log line reaches Scribeh (10s)

nocron

hipal

Takeaways

- Log collection - Scribe
- Realtime analytics - Puma
- Batch analytics - Hive
- Adhoc analytics - Peregrine
- Periodic analytics - Nocron
Warehouse Architecture
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Storage (HDFS)
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Compute (MapReduce)

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Warehouse Architecture

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Hadoop
Warehouse Architecture

- Storage (HDFS)
- Compute (MapReduce)
- Query (Hive)
Warehouse Architecture

- Storage (HDFS)
- Compute (MapReduce)
- Query (Hive)
- Workflow (Nocron)

Hadoop
Warehouse Architecture

- UI Tools
- Workflow (Nocron)
- Query (Hive)
- Compute (MapReduce)
- Storage (HDFS)
- Hadoop
Warehouse Challenges
Warehouse Challenges

- Growth
  - Data, data, and more data
Growth Numbers (last 4 years)

<table>
<thead>
<tr>
<th>Facebook Users</th>
<th>Growth</th>
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Growth

- HDFS Federation
- Corona
- RAID
- RCFile
Warehouse Challenges

- Growth
- Isolation
  - Space Isolation
  - Compute Isolation
  - Failure Isolation
Isolation - Now

- Hardware isolation
  - Platinum cluster & Silver cluster

Diagram:
- Platinum
- Silver
- Production
- Adhoc
- Replication
Isolation - Now

- Partial compute isolation
  - Pools
Isolation - Future

- Logical namespace per team
- Create containers for each namespace in every Data-Infrastructure component
- Resource accountability per namespace
Warehouse Challenges

- Growth
- Isolation

- Multiple Regions
  - Hadoop picky about new capacity requirements
  - Need to use any capacity in any location
  - Need to share data between regions
Questions ?
Multi Region

- Hive1
- Map Reduce
- HDFS

Replication
Project Prism

- namespace
- region
- datacenter
- nocron
- MR cluster with pools
- HDFS cluster with NNs
- replication
- hive-metastore

Diagram showing a network of components and services.