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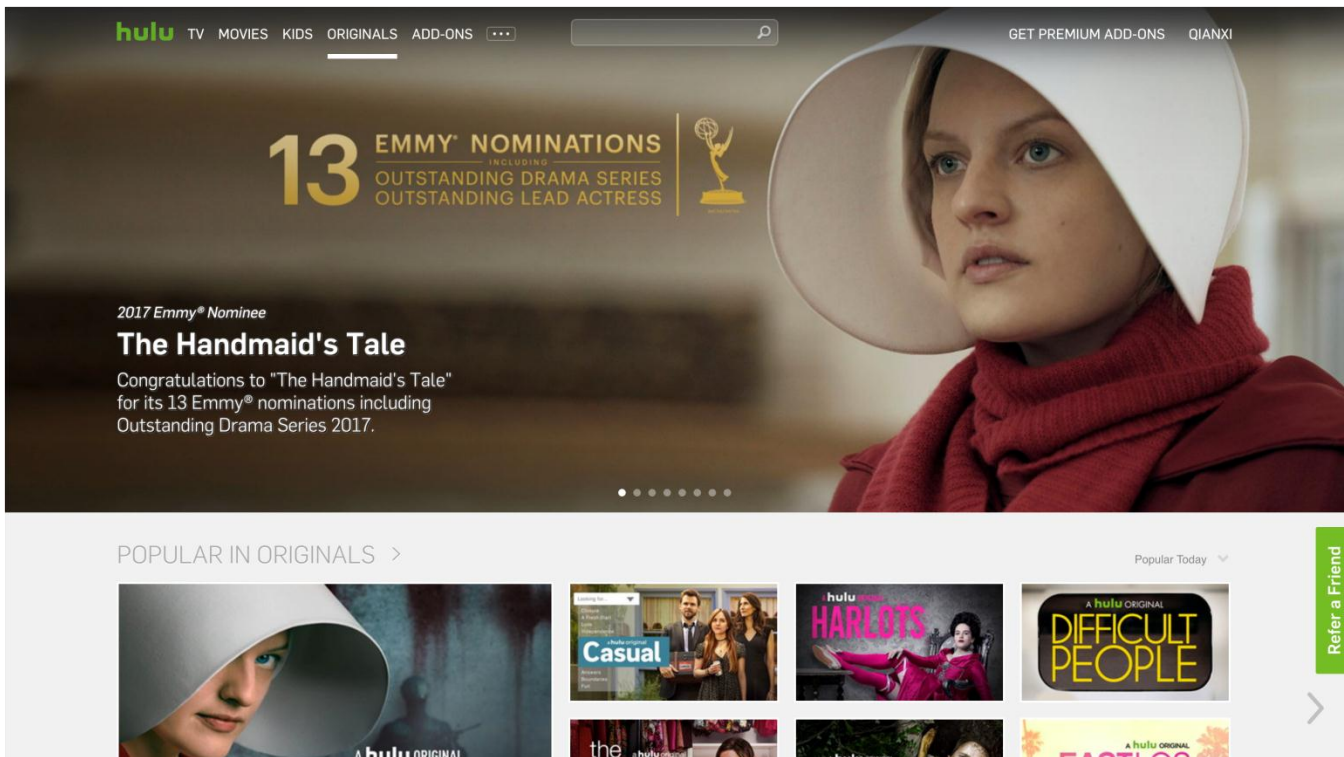
# Hulu大数据架构与应用经验

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# About Hulu



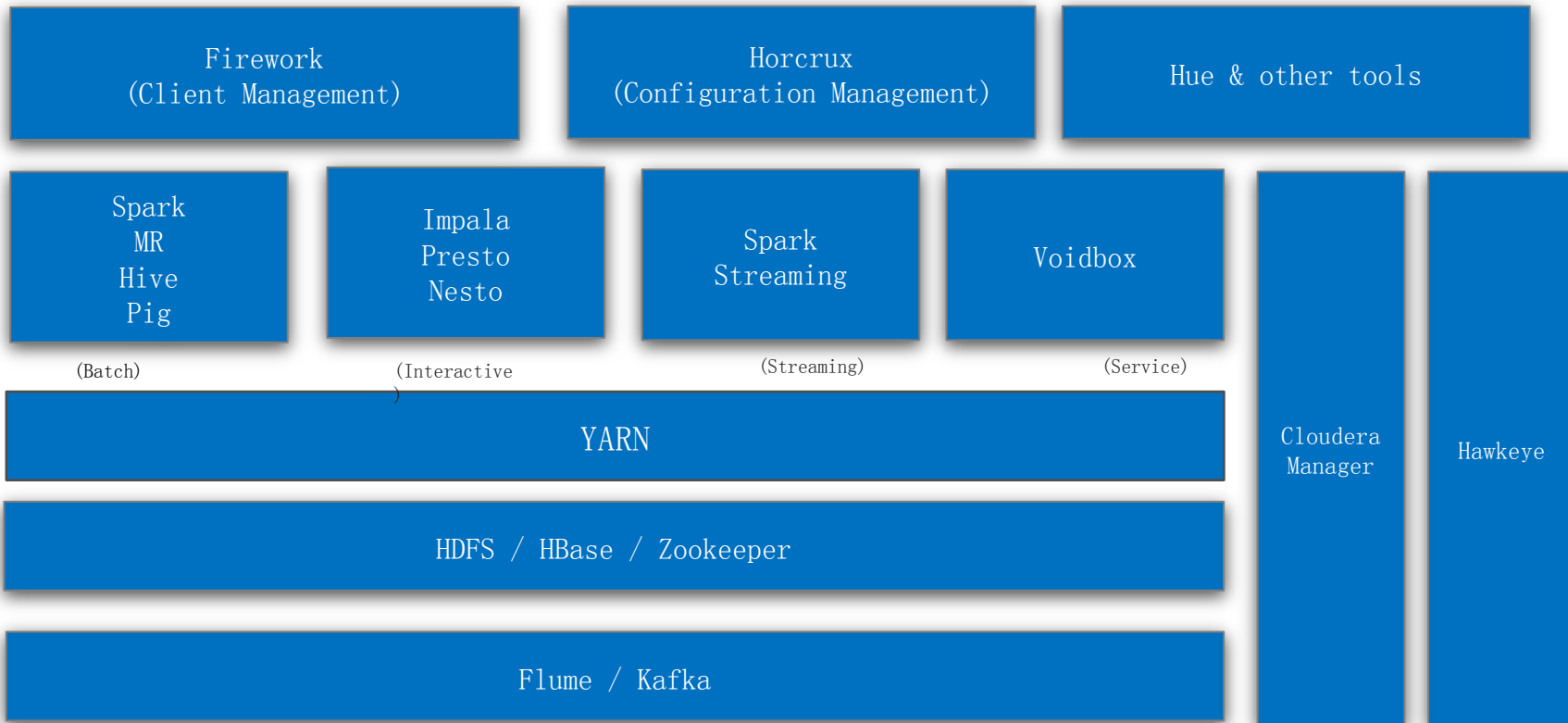


# Agenda

- Overview
- Hulu Focus
- Hadoop Multi-DC Solution
- Conclusion



# Overview(1)





## Overview(2)

- 4 clusters, 3 datacenters
- Shared by all teams(Beijing and USA)
- ~10 members in big data infrastructure team

# Hulu Focus: Hawkeye

- A system to help users to understand data & application in infrastructure level

## report

- cold data
- small files
- data growth
- ...

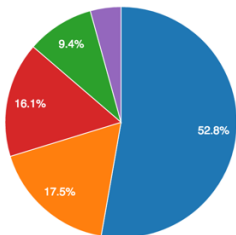
## alert

- data growth
- large applications
- service status
- ...

## operation

- bad disk repairing
- bad machines repairing
- bad disk/mach tracking

File Number



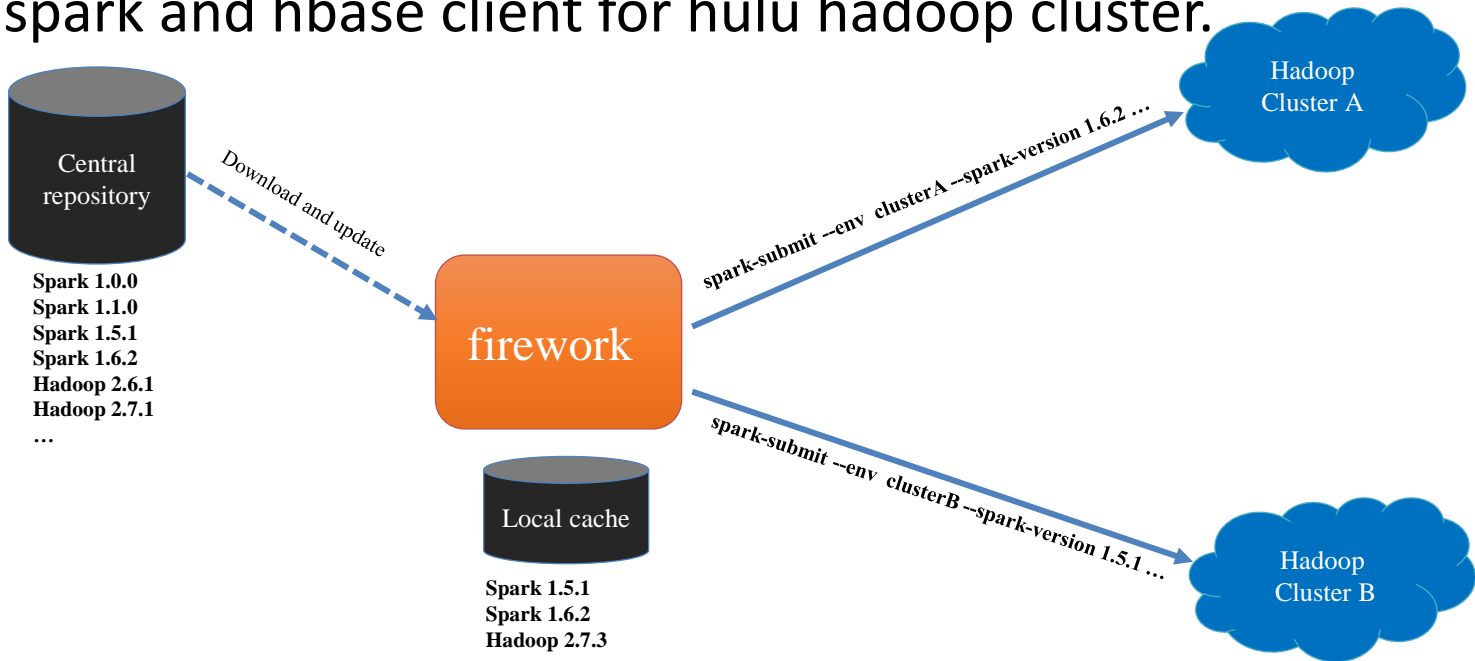
■ < 0.5 year ■ 0.5 - 1 year ■ 1 - 2 years ■ 2 - 3 years ■ others

Rule Name	Values	Last Running Time	State	Reports
Huge Output Applications	0	Dec 14, 2016, 9:28 AM	Good	<ul style="list-style-type: none"> <li>Dec 14, 2016, 9:28 AM Huge output applications, application_1480065467134_297088, 5.47B (Type=MAPREDUCE, queue=reporting, user=root)</li> <li>Dec 14, 2016, 4:28 AM Huge output applications, ...</li> </ul>
Huge Output Hive Query	0	Dec 14, 2016, 10:13 AM	Good	<ul style="list-style-type: none"> <li>Dec 13, 2016, 1:03 PM Huge output hive query, query of Hive job 13, 77B data, current app: application_1480065467134_289107, 200 reducers</li> <li>Dec 13, 2016, 12:43 PM ...</li> </ul>

Jira Issue	Status	Create Time	Disks
BDI-559	Done	2016-12-08 17:43:55	elshadoop-d18#/mnt/volume6/dfs/data elshadoop-d12#/mnt/volume3/dfs/data elshadoop-h11#/mnt/volume3/dfs/data elshadoop-c18#/mnt/volume5/dfs/data
BDI-558	Done	2016-12-06 18:21:27	elshadoop-g19#/mnt/volume4/dfs/data elshadoop-h09#/mnt/volume4/dfs/data elshadoop-h31#/mnt/volume5/dfs/data

# Hulu Focus: Firework

- a client management tool inside hulu, it has integrated hadoop, hive, spark and hbase client for hulu hadoop cluster.





## Hulu Focus: Hulu Spark

- Hulu internal version based on apache spark 2.1
- 30+ patches
- Highlight
  - ✓ Enhance spark streaming stability when kafka leader election
  - ✓ Increase executors or adjust log level dynamically
  - ✓ Blacklist bad executors in a heuristic method
  - ✓ One executor per node for high cpu applications



# Hulu Focus: OLAP Engines

Tableau

Hulu BI Portal

OLAP  
Analysis

Time Serial  
Analysis

Cohort  
Analysis

Funnel  
Analysis

Impala

Presto

Nesto

Druid

# Hulu Focus: OLAP - Impala



# Hulu Focus: OLAP - Presto



- Presto In Hulu
  - ✓ Resource group feature (similar to YARN queues)
  - ✓ Elastic Presto: Deploy Presto On YARN
    - Simplify deployment
    - Rolling upgrade
    - Scale computation resource by workload

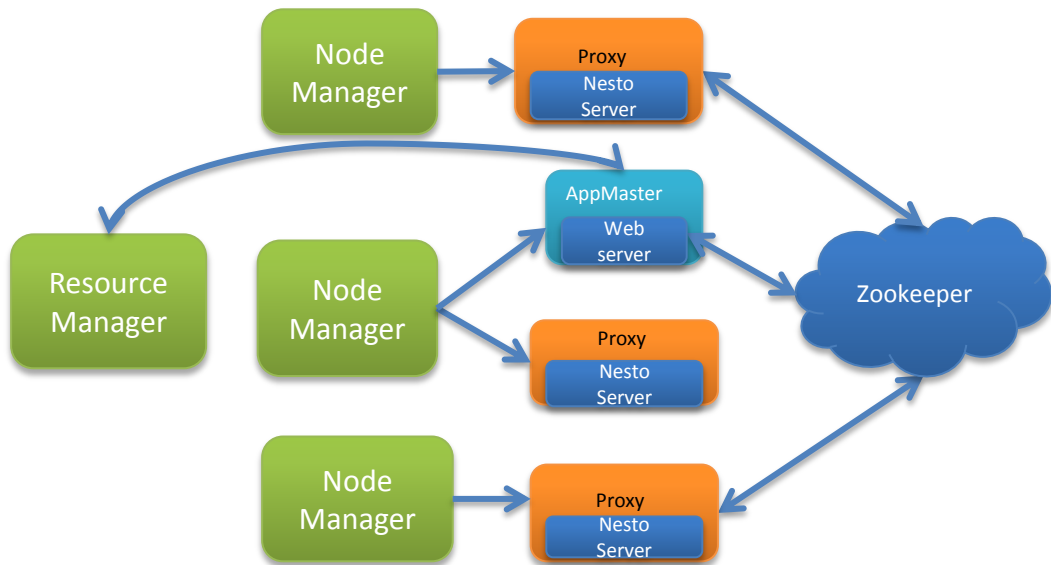
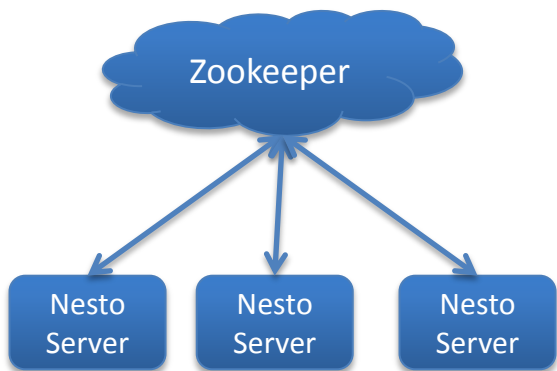


# Hulu Focus: OLAP – Nesto Background

- What is Nesto
  - ✓ A distributed query engine for parquet-like nested data
  - ✓ MPP + Parquet (On HDFS)
- Nesto features
  - ✓ support large nested data(e.g. 200+ columns, 4 levels)
  - ✓ support filter, groupby, limit and map-side join
  - ✓ Support json expression and Programming API
- use cases in hulu
  - ✓ Cohort analysis
  - ✓ Funnel analysis

```
behavior
|- watch
  |-- {"cid":60311148,"duc":"Computer","dlc":"HULU", "s":1}
  |-- {"cid":60311148,"duc":"Computer","dlc":"HULU", "f":1}
  |-- {"cid":60311149,"duc":"Computer","dlc":"HULU", "s":1}
  |-- {"cid":60311150,"duc":"Computer","dlc":"HULU", "s":1}
  {"expr":["greater_than",["sum_list",["time_range_filter","last",1,"months"],["get_val","watch"],["s"],5]]}
```

# Hulu Focus: OLAP – Nesto Achitecture



# Hadoop Multi-DC: Background

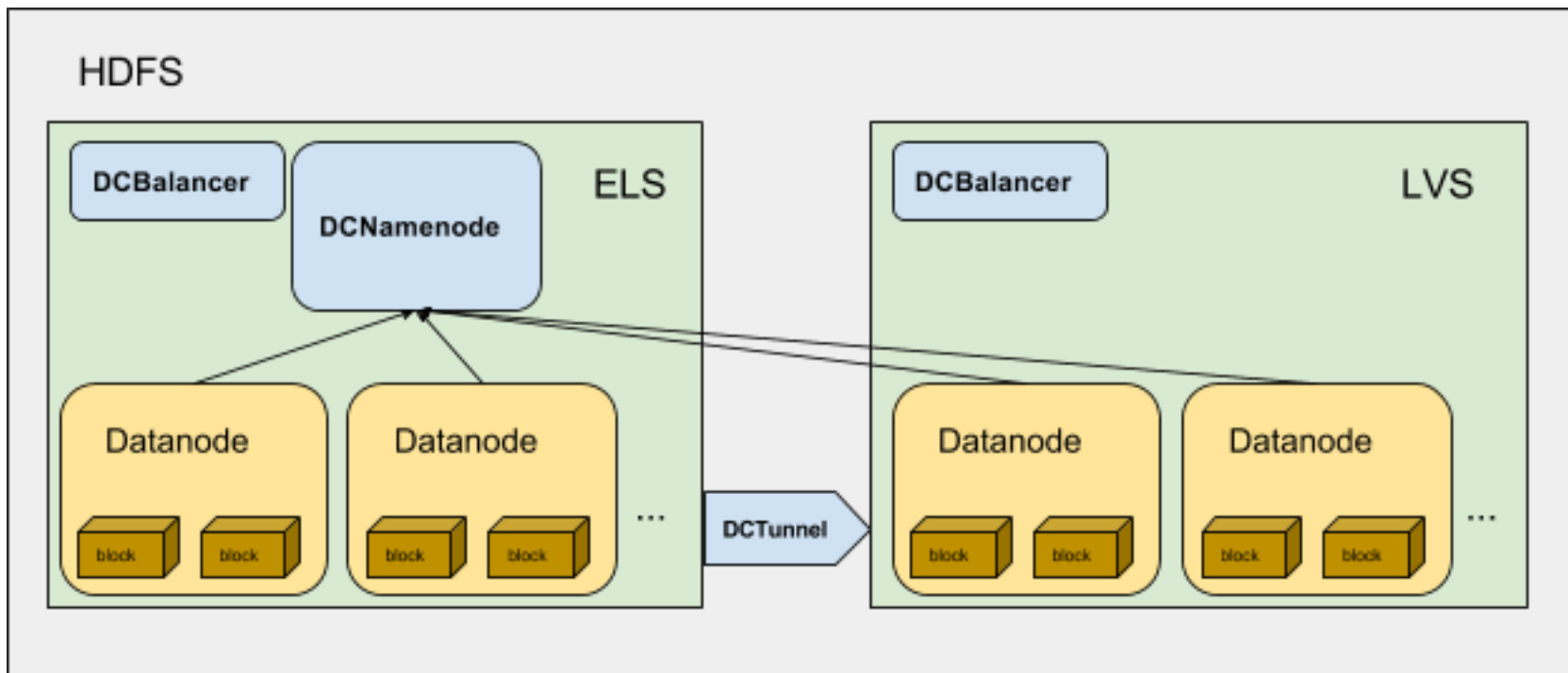




# Hadoop Multi-DC: Challenge

- data & applications
  - ✓ Big data volume
  - ✓ Large number of applications
  - ✓ Mixed types of applications(MapReduce,Hive, Spark, docker...)
- Expect small downtime(1 day)
- Coordination with all data teams in multiple offices
- Customize infrastructure (code-level) to guarantee migration smoothly

# Hadoop Multi-DC Solution: Data Storage(HDFS)







# Hadoop Multi-DC Solution: Components

- DCNamenode
  - ✓ Support datacenter-level topology
- DCTunnel
  - ✓ Sync blocks according to folder-level whitelist & blacklist
  - ✓ Bandwidth limitation
  - ✓ Priority-based block replication
  - ✓ Quote adjustment
  - ✓ Web portal to display progress
- DCBalancer
  - ✓ balance within each datacenter



## Conclusion

- Build fundamental tools to better serve users
- Customize open-source project for your case
- Build new system for special scenario



**THANKS**

