Siraj Bagwan

Project on Big Data Platform Engineering

Challenges

- Improve click-through rates

Improving click-through rate (the number of clicks that your content receives divided by the number of times your content is shown.) by recommending content to relevant users.

- Personalize online ads and content

Showing more relevant ads and content basis on their past interaction to online users to improve user experience.

- Lead acquisition

By improving user experience and interaction can be able to raise the ratio of subscription.

Solution

- Collect

Collect and gather data of user behavior and interaction and store it to data lake from different sources in order to process.

- Process

Transform the click stream data on data lake and ingest it to data warehouse. Ingest the data from OLTP system to Data Warehouse.

- Analyze

Analyze the data present on the cluster using different tools available in order to generate insights.

- Data retention period: 1 year
- Total data collected per year: 250 TB
- Data to be stored on each data node: 50 TB (10 TB * 6)
- Taken 6 disk to avoid over optimization of disks
- No. of data nodes required: 250/50 = 5
- 10% overhead (node failure): 1
- Total data nodes required: 6
- Kafka nodes: 3

Cluster Planning

Hosts	No. of Hosts Required	Specification
Master Hosts	3	Instance Type: r6a.4xlarge Ram: 128 GB Core: 16
Utility Hosts	2	Instance Type: r6a.4xlarge Ram: 128 GB Core: 16
Edge hosts	1	Instance Type: c6a.8xlarge Ram: 64 GB Core: 32
Worker Hosts	6	Instance Type: c5.12xlarge Ram: 96 GB Core: 48 HDD: 10 TB * 6

Cluster Planning

Nodes	Services
Master Node 1:	NN, JN, Failover Controller, Zookeeper Resource Manager,
Master Node 2:	Standby NN, JN, Failover Controller, Standby Resource Manager, Zookeeper
Master Node 3:	JN, Zookeeper, JHS,SHS
Utility Node 1:	Cloudera Manager
Utility Node 2:	HMS,HS2,ICS,SS,
Edge Node:	Gateway of HDFS, YARN, HIVE. HUE, OOZIE
Data Nodes:	DN, NM, ID
3 Kafka Nodes:	Kafka Brokers

Cluster Planning

- Block size of HDFS: 128 MB
- 1 MB fsimage size for per 1000 blocks (Suggested by Cloudera)
- 250 TB = 256000 GB = 262,144,000 MB
- Block Size = 128 MB
- Total No. of Blocks = 262144000/128 = 2,048,000
- Fsimage = 2,048,000/1000 = 2 GB
- Heap Size of name node = 2 GB = 4GB (Cloudera Suggest At least 4 GB)
- HDD: size 10 TB * 06 disks = 60TB
- IOPS is 4000 can be easily achieve throughput of 1000 MiB/S

Worker Host Configuration

STEP 1: Worker Host Configuration

Enter your likely machine configuration in the input boxes below. If you are uncertain what machines you plan on buying, put in some minimum values that will suit what you expect to buy.

Host Components	Quantity	Size	Total	Description
RAM	96G		96G	Node memory
CPU	24	1	48	Number of CP
HyperThreading CPU	yes			Does the CPU
HDD (Hard Disk Drive)	6	10T	60G	Number of Ha
Ethernet	1	10G	10G	Number of Et

Worker Host Planning

STEP 2: Worker Host Planning

Now that you have your base Host configuration from Step 1, use the table below to allocate resources, mainly CPU and memory, to the various software components that run on the host.

Service	Category	CPU (cores)	Memory (MB)	Notes
Operating System	Overhead	1	8192	Most operatir
Other services	Overhead	0	0	Enter the requ
Cloudera Manager agent	Overhead	1	1024	Allocate 1GB
HDFS DataNode	CDH	1	2048	Allocation for
YARN NodeManager	CDH	1	2048	Allocation for
Impala daemon	CDH	1	16384	(Optional Ser
Hbase RegionServer	CDH	0	0	(Optional Ser
Solr Server	CDH	0	0	(Optional Ser
Kudu Server	CDH	0	0	(Optional Ser
Available Container Resources		43	68608	
Container resources				
Physical Cores to Vcores Multiplier		1		Set this ratio
YARN Available Vcores		43		This value wil
YARN Available Memory			68608	This value wil

STEP 3: Cluster Size

Enter the number of nodes you have (or expect to have) in the cluster

	Quantity
Number of Worker Hosts in the cluster	6

Yarn Tuning

STEP 4: YARN Configuration on Cluster

These are the first set of configuration values for your cluster. You can set these values in YARN->Configuration

YARN NodeManager Configuration Properties	Value	Note
yarn.nodemanager.resource.cpu-vcores	43	Copied from S
yarn.nodemanager.resource.memory-mb	68608	Copied from S

STEP 5: Verify YARN Settings on Cluster

Go to the Resource Manager Web UI (usually http://<ResourceManagerIP>:8088/ and verify the "Memory Total" and "Vcores Total" matches the values above. If your machine has no bad nodes, then the numbers should match exactly.

Resource Manager Property to Check	Value	Note
Expected Value for "Vcores Total"	258	Calculated fro
Expected Value for "Memory Total" (in GB)	402	Calculated fro

STEP 6: Verify Container Settings on Cluster

In order to have YARN jobs run cleanly, you need to configure the container properties.

YARN Container Configuration Properties (Vcores)	Value	Description
yarn.scheduler.minimum-allocation-vcores	1	Minimum vco
yarn.scheduler.maximum-allocation-vcores	43	Maximum vco
yarn.scheduler.increment-allocation-vcores	1	Vcore allocati

YARN Container Configuration Properties (Memory)	Value	Description
yarn.scheduler.minimum-allocation-mb	1024	Minimum me
yarn.scheduler.maximum-allocation-mb	68608	Maximum me
yarn.scheduler.increment-allocation-mb	512	Memory alloc

Cluster Container Capacity

Step 6A: Cluster Container Capacity

This section will tell you the capacity of your cluster (in terms of containers).

Cluster Container Estimates	Minimum	Maximum
Max possible number of containers, based on memory configuratio		402
Max possible number of containers, based on vcore configuration		258
Container number based on 2 containers per disk spindles		72
Min possible number of containers, based on memory configuratio	6	
Min possible number of containers, based on vcore configuration	6	

STEP 6B: Container Sanity Checking

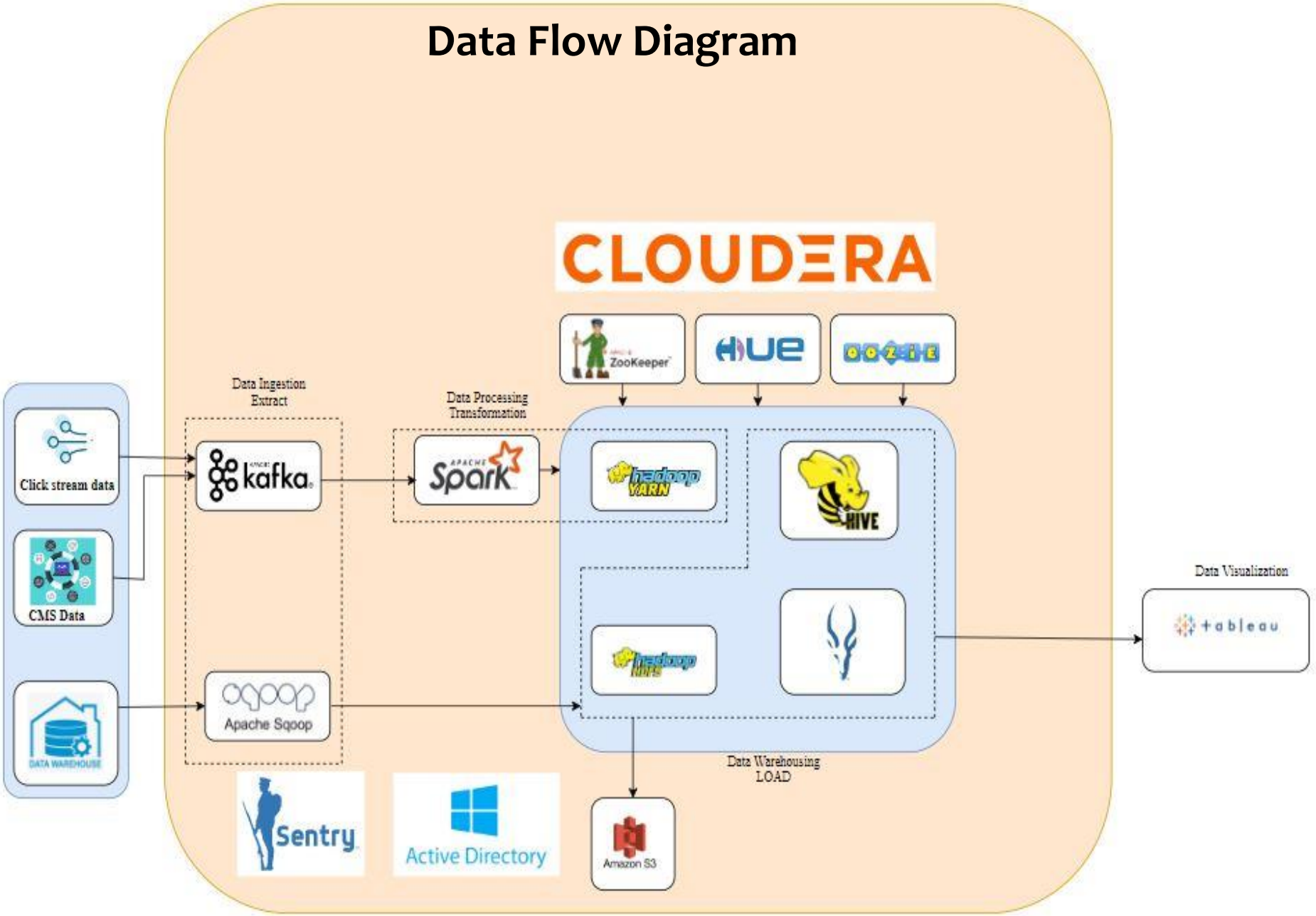
This section will do some basic checking of your container parameters in STEP 6 against the hosts.

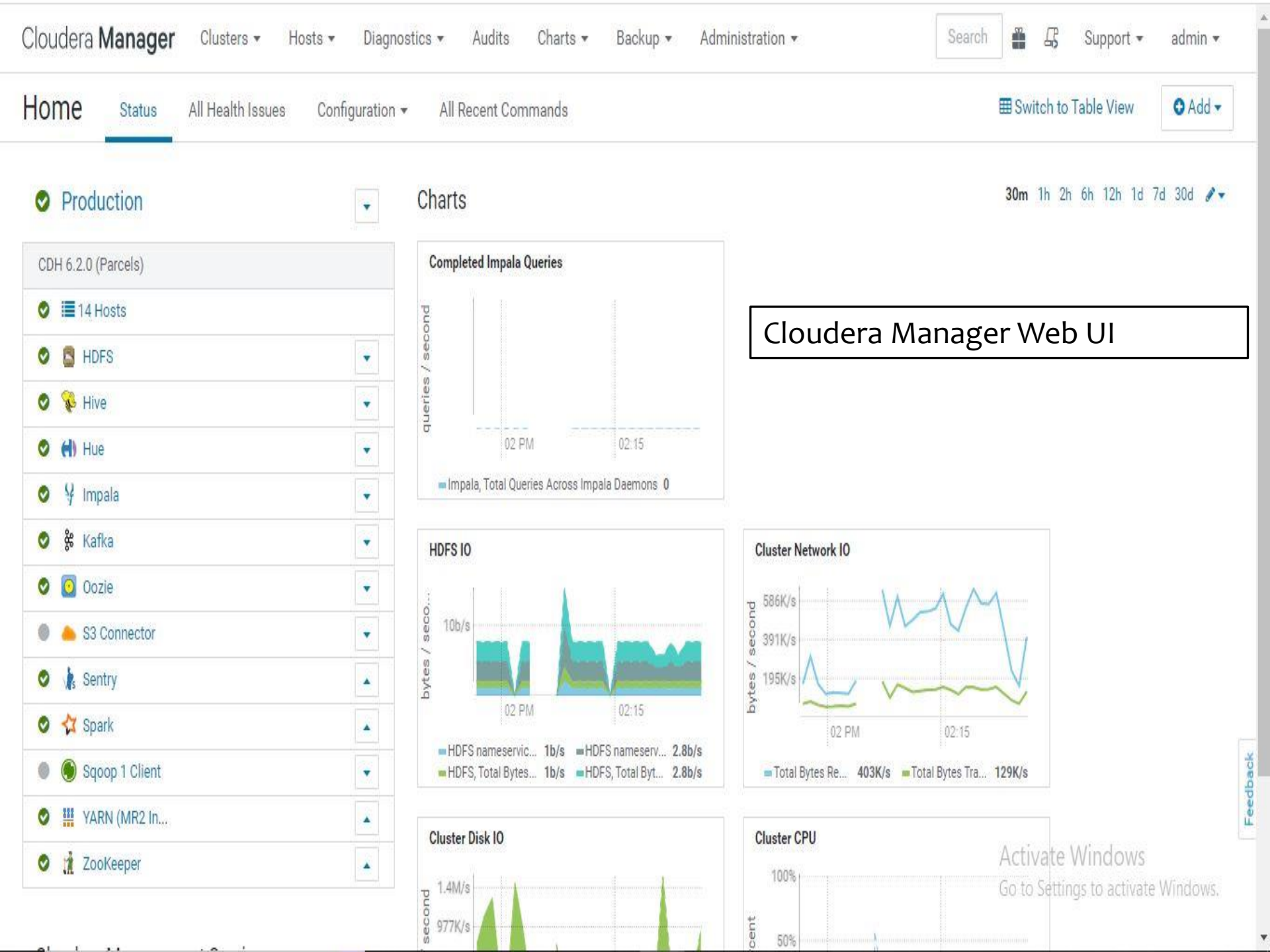
Sanity Check	Check Status	Description
Scheduler maximum vcores must be larger than minimum	GOOD	yarn.schedule
Scheduler maximum allocation MB must be larger than minimum	GOOD	yarn.schedule
Scheduler minimum vcores must be greater than or equal to 0	GOOD	yarn.schedule
Scheduler maximum vcores must be greater than or equal to 1	GOOD	yarn.schedule
Host vcores must be larger than scheduler minimum vcores	GOOD	yarn.nodema
Host vcores must be larger than scheduler maximum vcores	GOOD	yarn.nodema
Host allocation MB must be larger than scheduler minimum	GOOD	yarn.nodema
Host allocation MB must be larger than scheduler maximum	GOOD	yarn.nodema
Small container limit	GOOD	If yarn.schedu

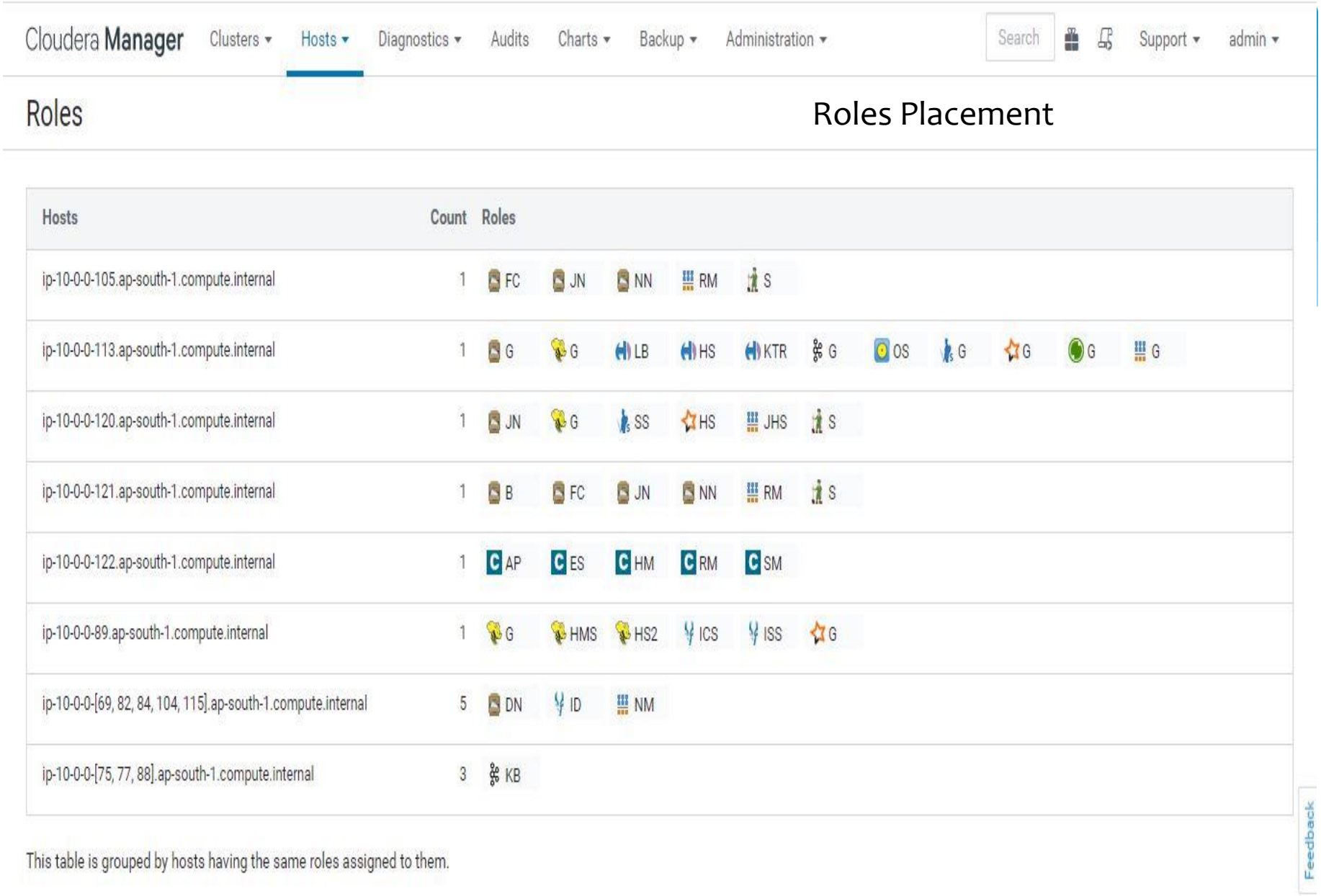
Service Stack

Services	Versions
Hadoop	3.0.0
Kafka	2.1.0
Sqoop	1.4.7
Spark	2.4.0
Hive	2.1.1
Impala	3.2.0
Hue	4.3.0
Oozie	5.1.0
Zookeeper	3.4.5
Sentry	2.1.0

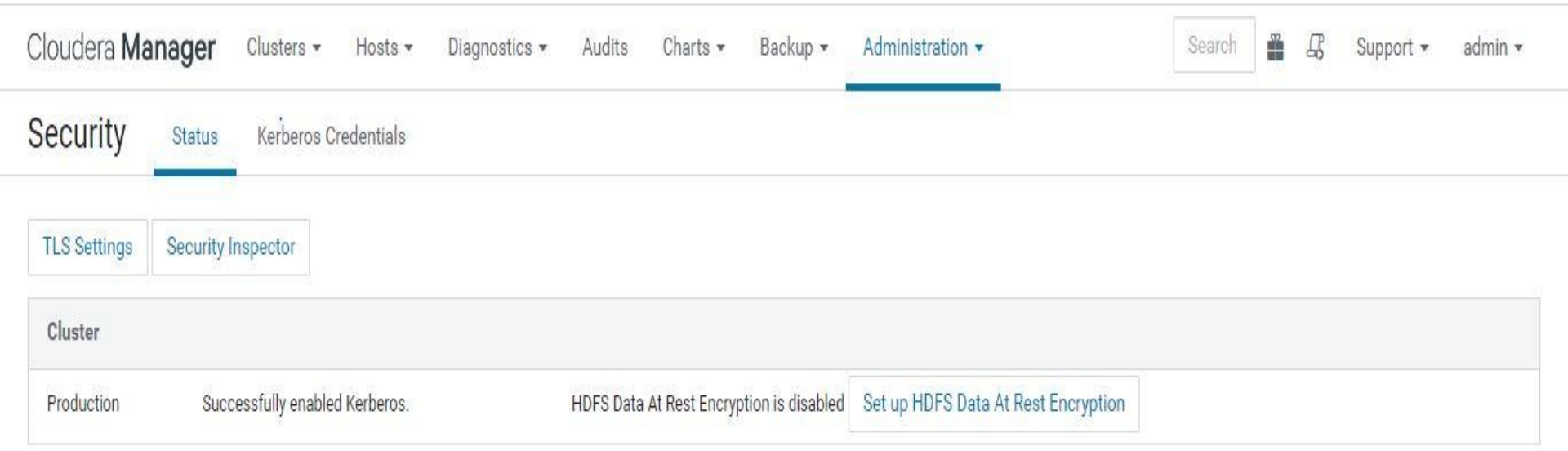
Data Flow Diagram



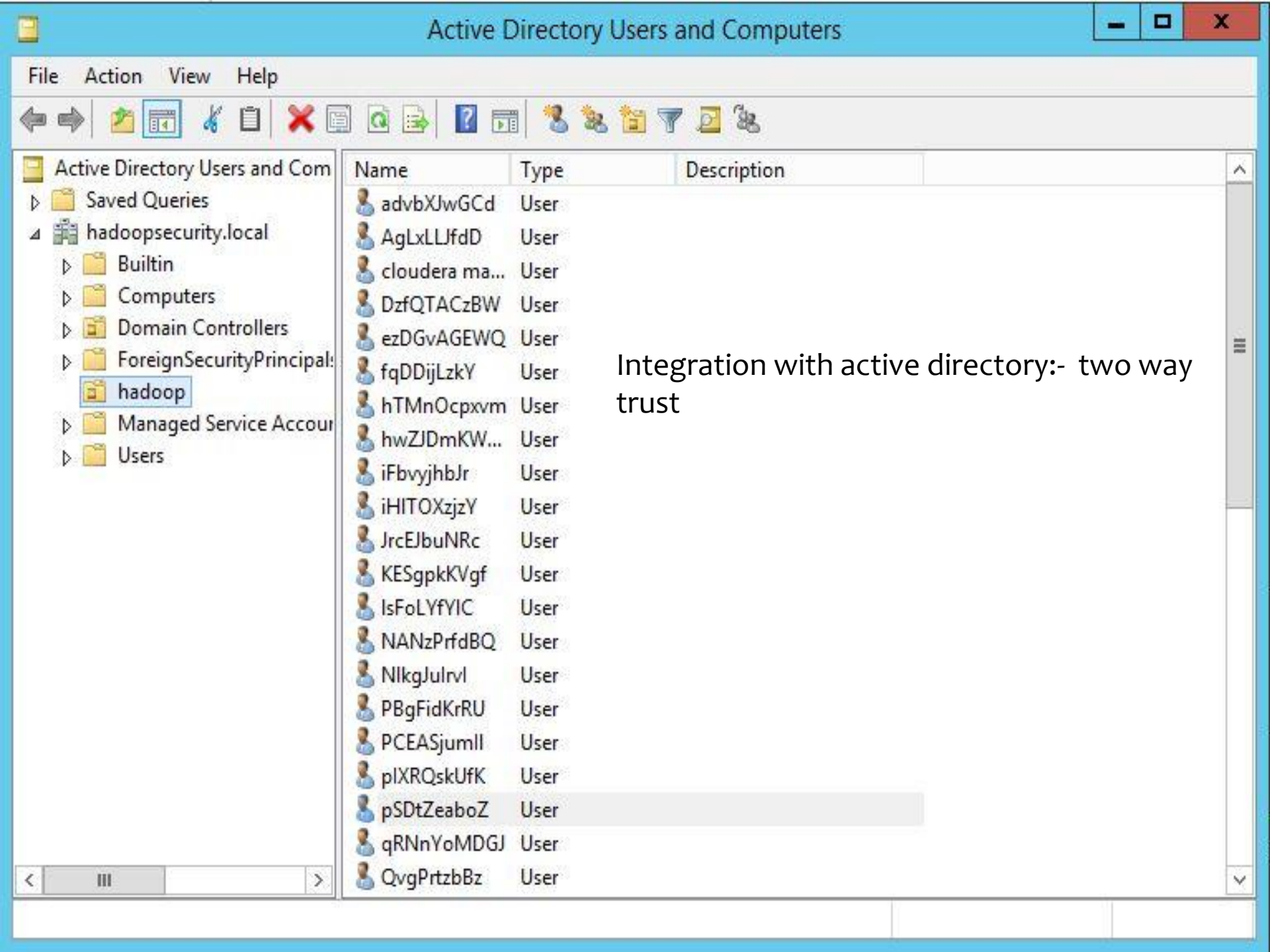

Cloudera Manager
Clusters
Hosts
Diagnostics
Audits
Charts
Backup
Administration
Search
Support
admin
Home
Status
All Health Issues
Configuration
All Recent Commands
Switch to Table View
Add
Production
CDH 6.2.0 (Parcels)
14 Hosts
HDFS
Hive
Hue
Impala
Kafka
Oozie
S3 Connector
Sentry
Spark
Sqoop 1 Client
YARN (MR2 In...
ZooKeeper
Charts
30m 1h 2h 6h 12h 1d 7d 30d
Completed Impala Queries
queries / second
02 PM
02:15
Impala, Total Queries Across Impala Daemons 0
Cloudera Manager Web UI
HDFS IO
bytes / seco...
10b/s
02 PM
02:15
HDFS nameservic... 1b/s
HDFS nameserv... 2.8b/s
HDFS, Total Bytes... 1b/s
HDFS, Total Byt... 2.8b/s
Cluster Network IO
bytes / second
586K/s
391K/s
195K/s
02 PM
02:15
Total Bytes Re... 403K/s
Total Bytes Tra... 129K/s
Cluster Disk IO
1.4M/s
977K/s
Cluster CPU
100%
50%
Activate Windows
Go to Settings to activate Windows.
Feedback

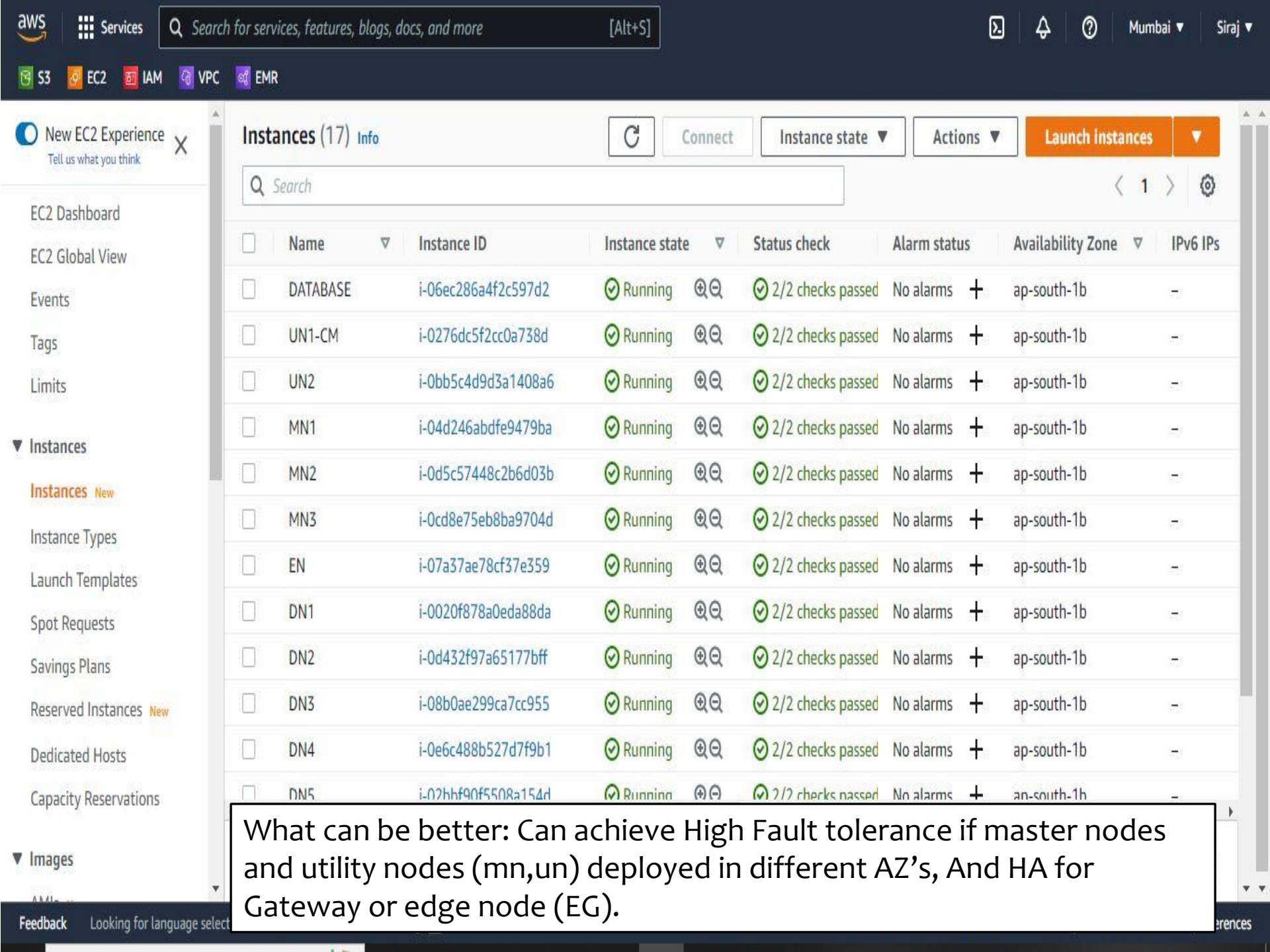


Improvements to be done: Could Be better by adding one more utility host and configuring high availability for Hive, oozie, Hue, Sentry



Authentication Mechanism Enable


Active Directory Users and Computers
File Action View Help
Active Directory Users and Com
Saved Queries
hadoopsecurity.local
Builtin
Computers
Domain Controllers
ForeignSecurityPrincipals
hadoop
Managed Service Accour
Users
Name Type Description
advbXJwGCd User
AgLxLLJfdD User
cloudera ma... User
DzfQTACzBW User
ezDGvAGEWQ User
fqDDijLzkY User
hTMnOcpxvm User
hwZJDmKW... User
iFbvyjhbJr User
iHITOXzjzY User
JrcEJbuNRc User
KESgpkKVgf User
IsFoLYfYIC User
NANzPrfdBQ User
NIkgJulrvl User
PBgFidKrRU User
PCEASjumll User
plXRQskUfK User
pSDtZeaboZ User
qRNnYoMDGJ User
QvgPrtzbBz User
Integration with active directory:- two way trust


aws
Services
Search for services, features, blogs, docs, and more
[Alt+S]
Mumbai
Siraj
S3
EC2
IAM
VPC
EMR
New EC2 Experience
Tell us what you think
EC2 Dashboard
EC2 Global View
Events
Tags
Limits
Instances
Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances New
Dedicated Hosts
Capacity Reservations
Images
Instances (17) Info
Connect
Instance state
Actions
Launch instances
Search
1
Name
Instance ID
Instance state
Status check
Alarm status
Availability Zone
IPv6 IPs
DATABASE i-06ec286a4f2c597d2 Running 2/2 checks passed No alarms ap-south-1b
UN1-CM i-0276dc5f2cc0a738d Running 2/2 checks passed No alarms ap-south-1b
UN2 i-0bb5c4d9d3a1408a6 Running 2/2 checks passed No alarms ap-south-1b
MN1 i-04d246abdfe9479ba Running 2/2 checks passed No alarms ap-south-1b
MN2 i-0d5c57448c2b6d03b Running 2/2 checks passed No alarms ap-south-1b
MN3 i-0cd8e75eb8ba9704d Running 2/2 checks passed No alarms ap-south-1b
EN i-07a37ae78cf37e359 Running 2/2 checks passed No alarms ap-south-1b
DN1 i-0020f878a0eda88da Running 2/2 checks passed No alarms ap-south-1b
DN2 i-0d432f97a65177bff Running 2/2 checks passed No alarms ap-south-1b
DN3 i-08b0ae299ca7cc955 Running 2/2 checks passed No alarms ap-south-1b
DN4 i-0e6c488b527d7f9b1 Running 2/2 checks passed No alarms ap-south-1b
DN5 i-02bbf90f5508a154d Running 2/2 checks passed No alarms ap-south-1b
What can be better: Can achieve High Fault tolerance if master nodes and utility nodes (mn,un) deployed in different AZ's, And HA for Gateway or edge node (EG).
Feedback
Looking for language select

THANK YOU