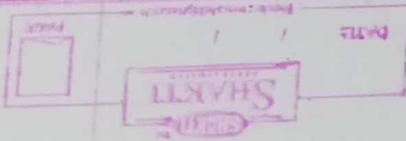


5:00

8:30

Hadoop Administration

The
Guru's
Hadoop
Training



10 Oct '20
Monday

Hadoop Administration.

Hortonworks

Big data:-

1860

1945

40

IETF

IRTF

IP - Pvt
Public

JPEG - Joint Picture Expert group.

MPEG - moving/motion Picture Expert Group.

↓
Sub layer
MP3, MP4

SSD - 1 million IOPS.

SAN.

In Serial communication we use bit
for parallel we use byte.

Google

paper 2003 - GFS - Google file system.
published

- Map Reduce (MR)

- Duck Cutting

- 2005 - DFC - Distributed file System.

- Yahoo - 2006.

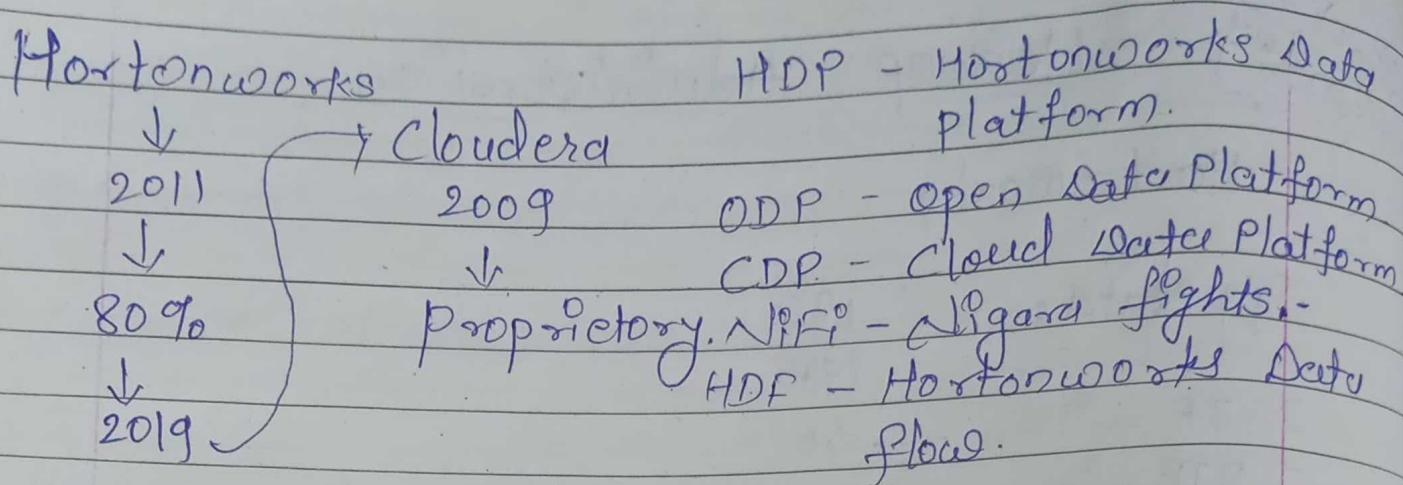
250 IOPS

SATA - Serial advanced Technology Attachment
1 Transmitter - 1 Receiver.

SAS

SCSI - Small Computer System Interface.

Controller



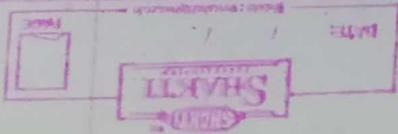
Big Data vendors :-

Top six vendors offering Big Data Hadoop solutions are:

- 1) Cloudera
- 2) Hortonworks
- 3) Amazon Web Services Elastic MapReduce Hadoop Distribution.
- 4) Microsoft - HD Insight
- 5) MapR
- 6) IBM InfoSphere Insights - Big Insights.

Hue - Hadoop user experience.

Hive - used as a warehouse, acting



Hadoop LAB

Any program runs in the background is known as Service.

System

Filesystem OS

(FS) Operating system

8080 8bit

85

86 8-bit

286 - 16bit

386 - 32bit

486 - 32bit

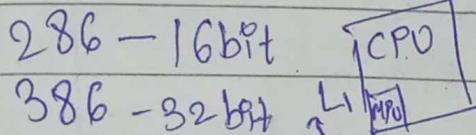
MPU - Mathematical process users.

FPU - floating point unit - 64bit.

Cache memory

$L_1 = 4\text{KB}$ 4KB

$L_2 = 64\text{KB}$



HT - Hyper Threading. - CPU is used something now they are look like 2 logical CPU.

2006 - 64 bit microprocessor we can do virtualisation. done by multithreading

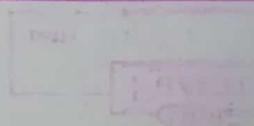
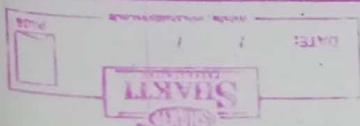
NFS - Network file System.

SMB - Server message Block.

VNC - Universal naming conventional.

Syntax - VNC Path - \\(Server Name)\Shared folder name.

Linux is more Secured as Compared to windows
- everything is treated as a file.



Ambauing
a tool

- YARN is an OS of Hadoop.
- Yahoo - yet another ~~Hierarchical~~ optimised oracle.
- YARN - yet another resource negotiator

Core parts of OS

kernel
(manager) shell
(interpreter)

Hadoop 1.x → MR

Framework
Process engine
Resource negotiate

uses of

Spark

- Process engine like a map reduce.
- machine learning
- real time - (Storm Process engine)
- Graphical data processing known as rendering
- SQL. (Hive like)

Fair Share Scheduler (FSS). — Linux

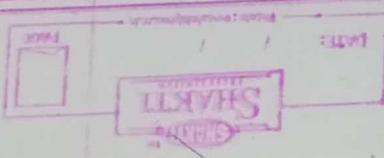
HDFS - for storage also for entire cluster.

YARN - for processing.

knox -

Physical Logical topology.
Star - mostly used

- Map reduce is written in Java, Perl & ~~ruby~~
- Hadoop is entire is based on Java lang



ETL - extract transform load
process engine
Tez must faster than mapreduce
Spark processing 100 times faster than Tez, graphical data
Query - can extract the o/p data.

Hbase - Hadoop database - nosql data can be access.

Indexing Service - solr.

Zeppelin - notebook

Ambassador view.

HUE - Hadoop user experience.

Falcon - graphical tool for data backup.

Atlas - to maintain metadata.

Data workflow

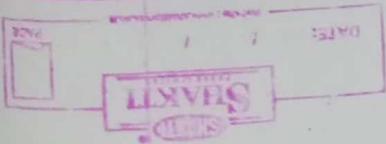
Sqoop - to copy the data to Hadoop from RDBMS.

flume - data ~~processing~~ ingestion

kafka - real time data.

NFS - Network File System - Rest API

WebHDFS - HTTP/HTTPS



India 1 of
the prime
countries who
is designing
their own
communications

SONET

Synchronous

Optical NW

India
Australia

3A - Authentication, Authorization, Auditing Data
servers

1) Authentication :- Verification of credential
Security Principles - User, Devices, Services

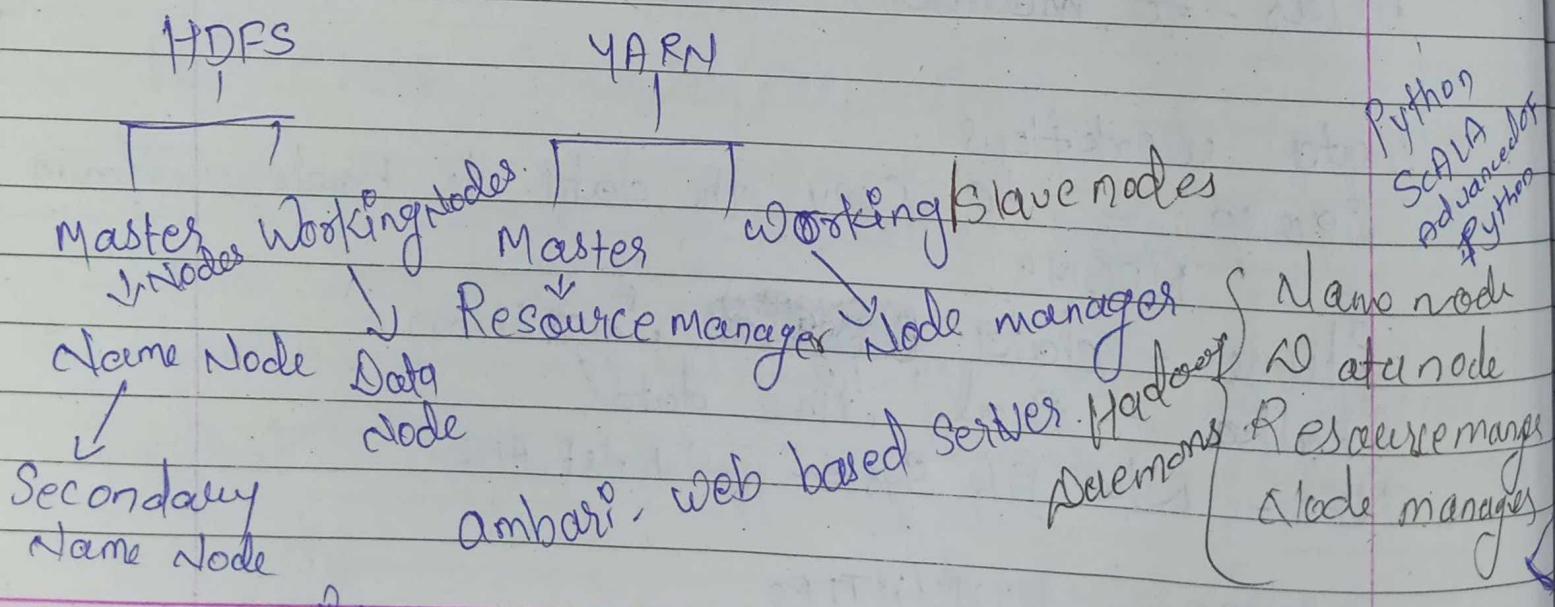
2) Authorization :- ACL - Access control list.
Permissions - read, write, modify,

3) Auditing / Accounting :-

RADIUS Remote Access Dialing User Service

TACAS - Terminal Access Controller Access Control System. (Used in Linux)

TPM - Trusted Platform module.



The major
second
handbook

extension of files in Hadoop is .xml

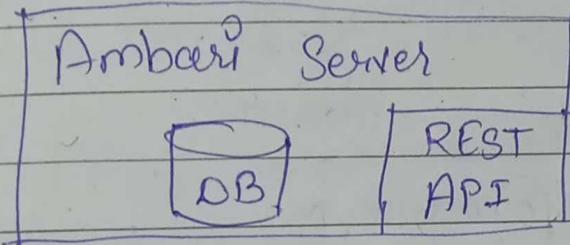
Prux : /etc/
all files are saved
.conf

SCCM - System censor configuration manager

Ambari metric Service (AMS)

Alert Ganglia
dagvos.

Ambari Architecture



Database - PostgreSQL

- Oracle
- MySQL

Todd Lamel Lammale - CCNA
Odom Wendell
Hadoop definitive guide 4th edition

11th Oct '22
Tuesday

Role of OS - Provides a Resource Manager,
Hadoop - Role data link.

Big Data.

3V - Velocity, Variety, Volume

Ambareen - cluster management tool

Virtual Core

Flume Kafka

falcon NFS

Knox Gateway

Atlas Ranger

Spark Solr

SQOOP Pig

Hive

Planning a Hadoop cluster
Deployment

↓ Cost down

Performance ↑ up.

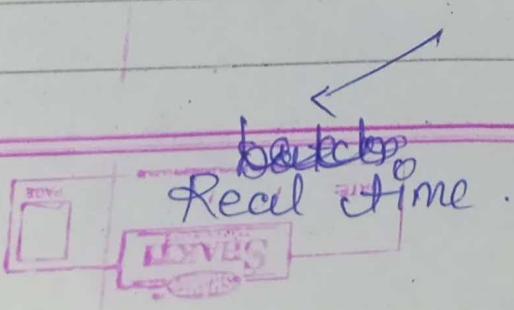
- 1) Planning for a new cluster is not trivial.
- 2) The Core

workload Type Interactive



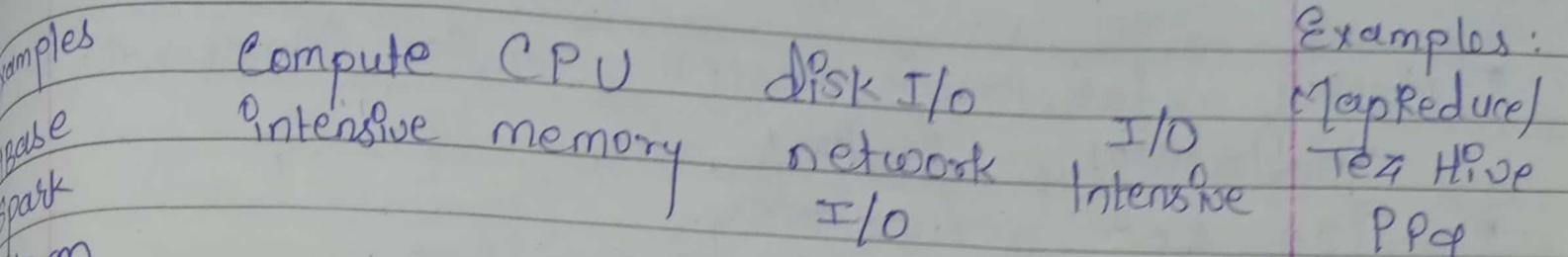
Hadoop
distributed data

Processing



batch

Consider cluster workload patterns.



- memory is required but with the disk. - I/O intensive.
Disk → Memory →

NIC Teaming - Microsoft } worked as
NIC Bonding - Linux } single logical unit

RAID - Redundant Array Interpreted Disk

RAID - 10

OS { RAID 1 - mirroring 1GB - 8 blocks - 3 replica.
RAID 0 - Stripping

Calculator Guidelines

- MapReduce Intermediate Size = 30 - 50% of cluster size
- HDFS replication factor = 3 max^m = 512 min^m = 1
- Temp Space = 1.2
- Average compression ratio = 3.4.

Text = 20 - 80%

DFS - Distributed File System.

JPEG = 0.20%

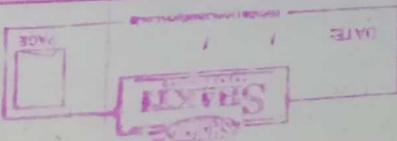
MPEG = 0.20%

Hardware Guidelines for Master nodes

- Master nodes run master service components so availability is key.
- Plan for redundancy!
 - RAID 10 storage configuration
 - OS & data disks
 - Dual bonded ethernet NICs
 - Dual power supplies
 - ECC-protected memory
 - Use redundant hosts
- Use same hardware specification for all master nodes.
 - Eases master service component migration for maintenance or failures.

Hardware Guidelines for worker nodes.

- worker nodes perform data processing so throughput is key.
- worker nodes are redundant in a cluster so hardware redundancy is less necessary.
- Plan for parallelization & performance.
 - Dual-CPU socket servers
 - More disks (8-12) & multiple disk controllers
 - fast disk (7200 RPM SATA or SAS)
 - JBOD disk configuration
 - Dual Bonded Ethernet NICs
 - Dual Power Supplies



JBOD - Just Bunch of Disk.

MAC - 48 bit - 6 byte
→ Hexadecimal - 0-16

- ECC - protected memory
- Use same hardware specification for all worker nodes to simplify Hadoop configuration
- Buy & add worker nodes in groups
- The ambari configuration groups feature can handle worker nodes with differing hardware

Guidelines for network -

* redundancy.

NTP - Network Time Protocol.

OS Pre-configuration - Required.

• Synchronize time on all cluster nodes using NTP

FLZ - Forward Lookup Zone

Fully qualified Domain name (FQDN) - 255 characters

Nbtstat -c

hostname - 63 characters.

ipconfig /displaydns

%windir%\System32\Drivers\etc\hosts → open with notepad.

IP. Add.

Host - The device who is having logical address is known as host

IP add. - logical / Software
MAC add - physical / Hardware.

- ① DNS Name Cache (IPV4 + IPV6)
- ② Host file (IPV4 + IPV6)
- ③ DNS Servers (IPV4 + IPV6)
- ④ LLINR (IPV6) Link Layer (IPV4)
- ⑤ NetBIOS Name Cache
- ⑥ Wins Server (IPV4)
- ⑦ Broadcast
- ⑧ Lmhosts file.

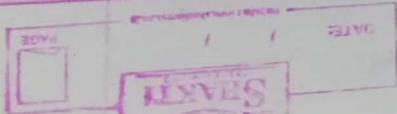
SELinux - Secure Enhanced Linux.

- # Ambaini & Metrics Collector Hardware Guidelines.
- The ambaini Server host should have a minimum of 1 GB RAM.

Hardware Testing :-

Supported OS:

- 64 bit versions of
 - CentOS 6, 7
 - RedHat Enterprise Linux (RHEL) 6, 7
 - Oracle Linux 6, 7
 - SUSE Linux Enterprise Server (SLES) 11-SP4, 12-SP1, 12-SP2
 - Debian 7
 - Ubuntu Precise 12.04 (Deprecated), 14.04, 16.04



Required Software Packages

- yum (centos or RHEL)
(yellow dog update manager)
- zypper (SLES)
- RPM (RedHat package manager)
- php-curl (SLES)
- apt-get (Ubuntu)
- reposync
- rpm (centos, RHEL, or SLES)
- SCP (Secure copy)
- curl - command url
- wget
- unzip
- chkconfig
- tar - tape archival
- Java Software, one of the following:
 - Oracle JDK 1.8
 - Oracle JDK 1.7 u51 or higher - Deprecated
 - OpenJDK 1.8
 - OpenJDK 1.7 u51 or higher - Deprecated.

OS Pre-Configuration - Recommended.

- Use your vendor documentation to:
 - Disable file system last access time update using the noatime mount option.
 - Disable or lower root-reserved space in local file systems.
 - For ex, tunefs -m 0
 - Disable transparent huge pages.
 - For ex, echo never > /sys/kernel/mm/transpa-
rent_hugepage/enabled
 - Enable Ethernet jumbo frames, if supported by network hardware.
 - For ex, add MTU = 9014 in /etc/sysconfig/
network-scripts/ifcfg-eth0
 - Disable BIOS-based power management.
 - Increase the open file & running process limits.
 - Set nofile and nproc in /etc/limits.conf
or /etc/security/

HDP Installation Options.

To Share any file
Select file
↓
Properties

Copper.
1boot - 500 MB
Swap - 4GB
- -

Sharing
↓
Select

Ctrl + Shift - control the font
++ size

Sharing

hostname

S.

hostnamectl --name copper-node2

Done

cat /etc/hosts

hostnamectl Set-hostname Copper-node2

Node - 1 - ambari installation

ddrive ambari - copy documents - Paste

check Apache Server

Node - 1 act as an webserver

Local Repository - Ambari HDP

HDP-UTIL

Systemctl

Systemctl List --Units --type=Service

Yum repolist

Yum install -y apache

cat /var/

Systemctl

Antone
Sremy

yum install webserver → ④

cat /var/www/html/

systemctl status httpd → ⑤

systemctl start httpd → ⑥

systemctl status httpd

systemctl enable httpd → ⑦

systemctl status httpd ← after reboot

systemctl enable httpd.service → ⑧

cd / var/www/html

mkdir ambari

cd ambari → To go to home dir

cd Documents/

ll

tar -xvf ambari-2.7.3.0-centos7. /var/www/html/ambari/ tar.gz

```
# cp ambari-2.7.3.0-centos7.tar.gz /var/www/html/ambari/
```

```
# tar -xvf ambari-2.7.3.0-centos7.tar.gz  
ambari.repo = file is imp.
```

to extract.
ethot 22 wed

ambari-copy to home-Documents

```
# cp /var/www/html/ambari/ambari/ambari.repo
```

```
Cp /var/www/html/ambari/ambari-2.7.3.0-  
-centos7.tar.gz /ambari.repo
```

```
Cp /var/www/html/ambari/ambari-2.7.3.0
```

ok

Copy repo file /etc/yum/repos.d/

```
cp /var/www/html/ambari/centos7/2.7.3.0-  
-139/ambari.repo /etc/yum.repos.d/
```

```
# yum install -y createrepo
```

If createrepo command is not running then
do as follows:-

① go to /etc/yum.repos.d directory
cd /etc/yum.repos.d

② Rename ambari.repo to ambari.

mv ambari.repo ambari

dd → check.

yum repolist

④ yum install -y createrepo.

⑤ again Rename ambari to ambari.repo

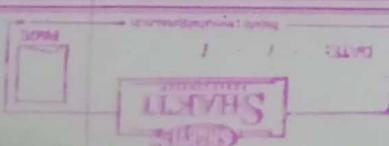
mv ambari ambari.repo

⑥ cat /etc/yum.repos.d/ambari.repo

⑦ vi /etc/yum.repos.d/ambari.repo

To add LAN card.

VM → Setting → add network adapter → finish
→ network adapters - 2 → bridged → ok.



To Support a pendrive

Steps to install NTFS Package

Note - You must be root user

1) yum -y install epel-release

2) yum -y install fuse

3) modprobe fuse

4) mkdir /mnt/ntfs

5) yum install ntfs-3g

To directly go to root file
click on not listed.

→ To create Survey.
go to yum.repo.d directory

cd /etc/yum.repos.d/

vi ambari.repo

baseurl = http://oxygen-node1/ambari/ambari/kentos/
2.7.3.0-139

gpgcheck = 0
gpgkey - comment → to check ambari is not
repoList → zero:

yum

yum install -y ambari-server.x86_64

yum install -y ambari-agent.x86_64

⇒ Set IP to hostname.

vi /etc/hosts

↳ IP & hostname

ex: 192.168.75.45 oxygen-node1

192.168.75.90 oxygen-node2

⇒ Copy the ambari repo file to another host
in cluster.

Path name.

SCP ambari.repo root@oxygen-node2:/etc/yum/repos.d/

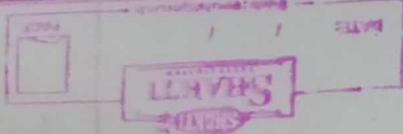
[User [master node]]

⇒ To resync command to send hosts file

rsync /etc/hosts root@oxygen-node2:/etc/hosts

⇒ To Setup ambari-server

Ambari-Server Setup-Space



192.168.75.45

Check Status of Server.

ambari-server status → if not running

then # ambari-server start.

To check ambari-agent status.

ambari-agent status → if not running.

then # ambari-agent start.

run on browser

Oxygen-node:\$ 8080/#

} Cluster information.

Username - admin

Password - admin.

* Check firewall Status.

systemctl status firewalld.service

⇒ If active then stop.

systemctl stop firewalld.service.

Check Status of Server.

ambari-server status → if not running

then # ambari-server start.

To check ambari-agent status.

ambari-agent status → if not running

then # ambari-agent start.

run on browser

Oxygen-node# 8080/ #

} Cluster Information.

Username - admin

Password - admin.

→ Check firewall Status.

systemctl status firewalld.service

⇒ if active then stop

systemctl stop firewalld.service

⇒ To change hostname in vi file.

vi /etc/ambari-agent/conf/ambari-agent.ini



Server :

hostname - localhost (Default)

hostname - oxygen-node1 (changed)

⇒ To restart the server

ambari-agent restart

⇒ Browsers :

http://oxygen-node1:8080/#

13 NOV '22
Tuesday

HDP-3.0.1.0-centos7-
rpm tar.gz

To disable selinux rpm tar.gz
getenforce

Setenforce enforcing press tab

Setenforce disable } ntp - network time protocol.

Setenforce 0

getenforce permissible

vi /etc/selinux/config
enforcing (By default)
SELINUX = disabled.

reboot.

getenforce → after rebooting
See its disabled if yes then ok.
⇒ To manage clusters time same.

systemctl status ntp to be
could not found.

yum install -y ntp

systemctl status ntpd.service
active

systemctl start ntpd.service.

Systemctl stop firewalld.service

Node 1

Create hdp directory.

mkdir - /var/www/html/hdp

cd /var/www/html/hdp - To check.

ls

→ To copy tar file to hdp directory.

mv → if

cp Documents/HDP-3.0.0-centos7-
rpm.tar.gz /var/www/html/hdp/

To extract a copied tar file.

tar -xvf /root/Documents/HDP-3.0.0-
centos7-rpm.tar.gz /var/www/html/hdp/

T

If by this path is not working, then go
to directly go to the directory & then
extract them.

from Documents → copy to /var/www/html/
hdp

cd /var/www/html/hdp/

Ambari

ls

tar -xvf HDP-UTILS-1.1.0.22-centos7.
tar.gz

tar -xvf HDP-3.1.0.0-centos7- rpm.
tar.gz

yum repolist.

createrepo HDP

createrepo HDP- UTILS /

ls -R → for checking exact all the files path.

copy repo files. If don't want to copy we can directly move - repo files
cp HDP-UTILS/centos7/1.1.0.22/hdp-utils.repo
(etc/yum.repos.d/)

cp HDP/centos7/3.1.0.0-78/hdp.repo /etc/
yum.repos.d/

yum repolist

HDP-3.1.0.0

& HDP-UTILS-1.1.0.22

Status
is 0.

to remove zero
we have to go to
up file.

cd etc/yum/repos.d/

vi hdp.repo.

⇒ To change base url. hdp.repo.

baseurl = http://oxygen-node1/hdp/HDP/
CentOS 7/3.1.0.0-78

gpgcheck = 0

Comment #gpgkey.

yum repolist → check repo file converted
to -201

⇒ To change base url hdp-utils.repo

cd etc/yum/repos.d/

vi hdp-utils.repo

baseurl = http://oxygen-node1/hdp/HDP-UTILS/
CentOS 7/1.1.0.22

gpgcheck = 0

yum repolist → check hdp-utils.repo file
Status converted 0 to 16

* Get started
Browser
login ambari

* Confirm hosts | G
Success - 2.

any agent
If, ~~and~~ & unsuccessful.

Launch] Button

Name your cluster

then check on terminal

[oxygen]

↓
Next
choose HDP 3.1

ambari-agent status

↓
If not running

* Select version. Then

ambari-agent start.

↓ warning.

* Repository - Local click.

↓ Next

↓ Next Page.

OS names redhat or centos

dp.repoUrl - http://oxygen-node1/help/HDP/centos7/
3.1.0.0-48

hdp-utils.repo url - http://oxygen-node1/help/
HDP-UTELS/centos7/1.1.0.22

↓

Next * Install options.

↓ Target hosts

Oxygen-node [1-2]

+

select manual - warning ok. check :-

Register & Confirm

cat /etc/ambari-agent

config/ambari-agent.properties

to check hostnames
it is localhost by default

↓ Warning
next

Remove * Choose file System
HDFS YARN + M HDFS

HBase Tez
Squoop Hive
Oozie Pig
Storm Zookeeper
Ambari metrics

↓ warning.

Next

↓

* Assign masters.

↓ Default

Next

↓

* Assign Slaves & clients

all

all

all 20

Data node

Data manager

client

↓ Next

* credentials / customize Services

Password

Admin

admin

Hive

hive

Activity

admin

admin

download

* HIVE Database

browser

→ Go to url

MySQL

Select Red Hat

↓
Red Hat or

Centos 7

{Fedora:}

after downloading MySQL

Command Terminal

rpm -ivh /root/Downloads/mysql

Copy Path

* Browser -# Ambari - Server Setup - jdbc - db = mysql
--- jdbcdriver =

Terminal pasted

Successfully ~~start~~ ambari setup

server

14 Oct 22

Friday

Tool

SCCM → System

BI - Business Intelligence

LDAP -

A DD & Windows AD

Permission

RBAC - Role based Access

to check users present.

tail /etc/passwd or cat /etc/passwd

tail /etc/shadow or cat /etc/shadow

encrypted the password of user is done
by MD5.

Ambari application → ambari views

Ambari can manage only local users &
groups.

Local users authenticate to Ambari

Core Hadoop Configuration files

top level - /etc/hadoop/conf root directory

- Ambari installs the core Hadoop configuration files in /etc/hadoop/conf.

core-site.xml Hadoop con. H

Per Job Configuration - # your job → prop = value

cat /etc/hadoop/conf/hdfs-site.xml

version

YARN-HBase instance

storage service

Amazon-S3 storage service

Simple storage service

ambari maintains per-service configuration history.

Azure BLOB storage service Binary large object

- Cat /var/log/ambari-server/ambari-config-changes.log on ambari Server.

8088 - Port no. of

Resource manager.

curl - Command url Single node

Every Component Pseudo mode (Single node).
have their different Multi node

JVM.

Z

hdfs dfs - ls file://usr/bin
Shell.

bin time before failure

Worm - write once read many times → ^{data} immutable

In hadoop only one user can write a data no other users cannot be make changes on it.

18th Oct '22
Tuesday

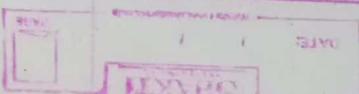
HDFS characteristics :-

- 1) Hierarchical
- 2) Distributed
- 3) Replicated
- 4) Write-once, read many optimized
- 5) Sequential access
- 6) Multiple readers
- 7) Single writer
- 8) Append only.

NTFS accessing . command line

Accessing HDFS . (7 options to access HDFS)

- HDFS Shell
- Web HDFS
- HDFS NFS Gateway
- Java API
- Libhdfs library
- Ambari files
- HUE (Hadoop User Experience) — GUI Tool, web based API



NFS

Linux

Linux

Windows

SAMBA

These

Linux - Index - Inode + table.

HDFS & - namespace

other

rest

ACL - Access Control Lists.

Master - Data only for communication not for writing.

File & Directory Attributes.

HDFS, Shell

```
[root@node1 ~]# hdfs dfs -ls /user/root
Found 2 items.
SSH    root@oxygen - node1 - for accessing node
# hdfs dfs -ls /user
```

```
# Systemctl status sshd:Service
```

```
# Ssh-keygen
```

```
# cd .ssh
```

```
# ll.
```

```
#
```

HDFS shell

Shell Command; list the directory/ user /root

hdfs dfs -ls /user/root

-rwxr--r-- 3 root root 1814809

drwxr-xr-x 2 root root 0

Role type of permissions (- = file, d = directory)

owner of

group membership

no. of replicas
(Directories not replicated)

root Superuser root

hdfs Superuser hdfs

su hdfs → To go to root directory of hdfs.

hdfs dfs -ls / → To check home directory of hdfs.

hadoop fs - to see which commands can be execute.

hdfs dfs -help ls

hdfs dfs -mkdir /user/root

⇒ To make a directory in a specific path.

make a series of directories in a specific path:

hdfs dfs -mkdir -p /user/steve/dirs/dir4

-p-parent

⇒ List the contents of a directory recursively.

hdfs dfs -ls -R /user/steve

absolute path - start with forward slash '/'

relative path

put - one file can be

put - multiple files can be put.

get -

rmget

hdfs dfs -put /home/steve/fileA /user/steve/fileA

local path
uses

hdfs path

- Append more data to an existing HDFS files.

- File larger than the HDF5 block size spans multiple blocks.
- Default data block is 128 MB.
- Each data block is also replicated to multiple Data nodes.
- Default replication factor is 3.
- * -tail - 1 kB data size
- # hdfs dfs -tail /user/steve
- * get -> from hdfs → local files.
- * mv -> hdfs → hdfs.
- * multiple files can be move
- * -getmerge - Copy & merge multiple HDF5 files
 - ① F ② G ③ PG.
- * -rm -R to remove entire directory
- fs.trash.checkpoint.interval(0 in core-default.xml)
- D → other than default, default is 3 replicas can be change to 5

1st Jan 1970 - Unix bhd

Changing File & Directory Permissions.

Generation Octal values.

$$\begin{array}{l} \text{read} + \text{write} + \text{execute} = 9 \text{ max} \\ +4 +2 +1 \end{array}$$

Configuring HDFS for the files view.

Select Services > HDFS > Configs > Advanced > Custom core-site > Add property.

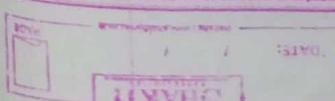
RPC - Remote procedure control.

NTLM version 2. NTLMv2 → windows authentication

New Technology authentication version 2.

- KDC - Key Distribution centers namenode Data port, node port
- DC - Domain controller
- TGT - Ticket granting Ticket.
- TGS - Ticket granting Service ticket.
- SSO - Single Sign On.

Hadoop kerberos - authenticate services access
Simple & Protected GSSAPI



~~rw~~ -r--r- +
L

User::rw

unnamed user (owner)

group ::r

unnamed group (Primary group)

hdfs dfs -setfacl -m group:eng:rwx -fileA
modify.

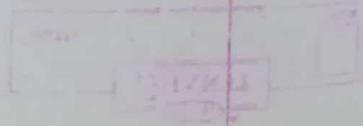
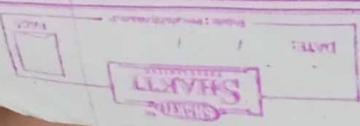
default mask = directories.

mask -

Unname Group
named User
named group } cumulate rwx } rwx
r x }

HDFS ACLS are not enabled by default.

Name Node - namespace
@metadata
write audit logs
Hierarchy
Directory names
file names
ACLs
Permissions & ownership
user quotes
WAL



Algo

Checksum value RS 232C Ps 512 Byte - 4B
Used in checksum min / data Should available

20 ms - for one process to process. Hadoop Version 4.
128 MB - 1B. *Definition*

21 Oct 22
Today

ll /hadoop/hdfs/namenode

→ To see the location of file :-

hdfs fsck /anaconda-ks.cfg -files
-blocks -locations -blocks

• Transition a NameNode into Safe mode :

hdfs dfsadmin -Safemode enter.

• Force a Namenode checkpoint (Generates new fsimage & edits files)

hdfs dfsadmin -SaveNameSpace

hdfs dfsadmin -SetQuota<n><directory>[<directory>]
4W/H

When to take Backup -

When to take Backup - freq

Where to take Backup - media

Where to place?

How

22 Oct '22

Saturday

ORC

- optimal / Row column
optimized

work node Resource Manager

Yarn Node Manager. (Master Node)

- Manages local CPU & RAM resources on behalf of requesting services.
 - Tracks node health & communicates status to the Resource Manager.
- ★ Application master is responsible for all depth Containers - Allocated RAM & CPU cores by the node manager.
- Runs Application Master job.
 - New Container is Specified for each discrete job task.

Application Master

- Bootstrap process for YARN applications.
- Negotiates for resources with Resource Manager.
- Works with Node Managers to configure & execute containers & monitors application resource consumption.
- provides application fault tolerance & thus significant horizontal scale capabilities.

All jobs started the new containers will allocate to different jobs.

Every job have their own application master

Resource Manager

Scheduler

- controls global clusters
- resource usage
- configurable by the Hadoop Administrator
- enables Multitenancy & Service Level Agreements.

Node Management

- monitor Node Manager state
- Submit Application Masters Requests.
- verify Container launch
- monitor Application Masters State.

Security

Web Application Proxy

- uses ACLs - Access Control Lists
- manages tokens to ensure validity of all container requests made by Application Masters.

hdfs dfs -ls /app -dogr

YARN applications -

- 1) MapReduce & Tez
- 2) Apache Pig
- 3) Apache Hive

~~28 Oct '12~~
~~Friday~~

Node manager -
Data node -

-g - user for program group
-G - Secondary group n.no. can be added

Application master.

- Bootstrap process for YARN applications
- negotiates for resource with Resource Manager.

* YARN Resource Manager (Master Node)

- Scheduler
- node management
- Security

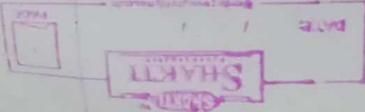
* The YARN Capacity Scheduler

- 1) Fair-Share scheduler - default scheduler for generic hadoop & cloudera.
- 2) Capacity scheduler - default scheduler for Hortonworks.

* Organisation Structure

HDP Budget Allocation

Engineering (18 total users)	Marketing (6 total users)	Support (9 total users)
60%	30%	10%
dev / QA	Sales / Promo	



Application Reservations

* YARN Queues

Aggregate Pool of resources = default queue.

[SLAs - Service level agreement.]

Resource manager - handles the YARN Queue

* Default queue mapping - Syntax:

• User mapping format: u:<username>:<groupname>

Group mapping format: g:<username>:<groupname>

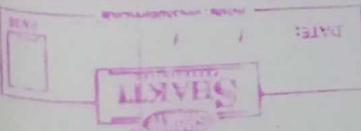
- Example: u: Support01: Support, u: Support02: Support, g: u: Support09: Support,

- g:promo:marketing,

Note - the leaf queue names (Dev & QA above) do not contain their parent queue names.

• ACLs & Default queue mapping

ACL Settings must allow application



English Chinese be differ

- i) minimum user limit.
- ii) User limit factors.

* HDP cluster ~~because~~ resources are aggregated into a unit of work is called Queue.

* YARN Node Labels :-

* (HA) High availability for HDP :-

Highly available servers.

99.9 → 39's - NameNode information

99.99 → 89's - stored in memory

99.999 → 79's - NameNode d.

99.9999 → 79's

only 8 min out of this is down in 365 days

NLB - New load balancing

NameNode High Availability.

- The HDFS NameNode is a single point of failure.
- The entire cluster is unavailable if the NameNode:
 - fails or becomes unreachable
 - is stopped to perform maintenance

Recoverability versus Availability. Assign

AN → 1 hr
1 million SNN

- 1) A Standby Namenode enables high availability.
 - An automatic failover process that takes seconds -
 - No loss of Namenode state.
- 2) A Secondary Namenode enables only recoverability.
 - A manual recovery process that could take hours.
 - Some Namenode state information will be lost.

* Automatic Failover Components

Zookeeper acts as a Quorum.

Zookeeper acting as a server

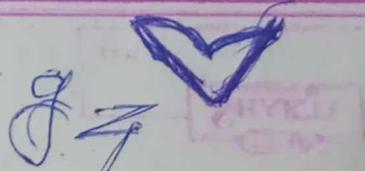
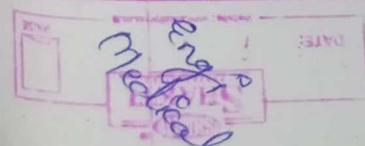
is fairly highly speedy service but light in weight.
election ZKFC - maintain/ Health of a service.
perform check

If problem occurred it sends to Zookeepers.

#ZKFC - Zookeeper failure controllers.

RM (Resource manager Components)

Zookeeper port no. - 2181



1) What are three main phases of MapReduce job?

⇒ MapInput, MapSort, mapSpill
Mapper, sorting / shuffle, Reducers

2) Suppose the mappers of a MapReduce job output $\langle \text{key}, \text{value} \rangle$ pairs that are of type $\langle \text{Integer}, \text{String} \rangle$. What will the pairs look like that are processed by the corresponding reducers?
⇒ $\langle \text{Integer}, \text{String} \rangle$

3) What happens if all the $\langle \text{key}, \text{value} \rangle$ pairs output by a mapper do not fit into the memory of the mapper.

⇒ Spill

4) What determines the number of mappers of a MapReduce job?
⇒ Spill data blocks.

5) What determines the number of reducers of a MapReduce job?

⇒ developer will decide

i) The Shuffle / sort phase sorts the keys & values as they are passed to the reducers.
→ True.