Hortonworks Data Platform

Reference

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Hortonworks Data Platform : Reference

The Hortonworks Data Platform, powered by Apache Hadoop, is a massively scalable and 100% open source platform for storing, processing and analyzing large volumes of data. It is designed to deal with data from many sources and formats in a very quick, easy and cost-effective manner. The Hortonworks Data Platform consists of the essential set of Apache Hadoop projects including MapReduce, Hadoop Distributed File System (HDFS), HCatalog, Pig, Hive, HBase, Zookeeper and Ambari. Hortonworks is the major contributor of code and patches to many of these projects. These projects have been integrated and tested as part of the Hortonworks Data Platform release process and installation and configuration tools have also been included.

Unlike other providers of platforms built using Apache Hadoop, Hortonworks contributes 100% of our code back to the Apache Software Foundation. The Hortonworks Data Platform is Apache-licensed and completely open source. We sell only expert technical support, training and partner-enablement services. All of our technology is, and will remain free and open source.

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1. Hadoop Service Accounts

This topic provides information about the service users for Hadoop. HDP Installer creates the following service users:

Note

The user names for these service users cannot be modified.

Table 1.1. Hadoop Service Accounts

HDP Service	User Name	Notes
HDFS	`hdfs`	NameNode, Secondary NameNode, and the DataNodes run as the `hdfs` user.
YARN	`yarn`	ResourceManager and the NodeManagers run as the `yarn` user.
HBase	`hbase`	HBase Master and the RegionServers run as the `hbase` user.
Hive Metastore	`hive`	Hive Metastore runs as the `hive` user.
Zookeeper	`zookeeper`	Zookeeper server runs as the `zookeeper` user.
Oozie	`oozie`	Oozie metastore runs as the `oozie` user.

2. Configuring Ports

The tables below specify which ports must be opened for which ecosystem components to communicate with each other. Make sure the appropriate ports are opened before you install HDP.

HDFS Ports: The following table lists the default ports used by the various HDFS services.

Table 2.1. HDFS Ports

Service	Servers	Default Ports Used	Protocol	Description	Need End User Access?	Configuration Parameters
NameNode WebUI	Master Nodes (NameNode and any back-up NameNodes)	50070	http	Web UI to look at current status of HDFS, explore file system	Yes (Typically admins, Dev/ Support teams)	`dfs.http.address`
		50470	https	Secure http service		`dfs.https.address`
NameNode metadata service		8020/9000	IPC	File system metadata operations	Yes (All clients who directly need to interact with the HDFS)	Embedded in URI specified by `fs.default.name`
DataNode	All Slave Nodes	50075	http	DataNode WebUI to access the status, logs etc.	Yes (Typically admins, Dev/ Support teams)	`dfs.datanode.http.address`
		50475	https	Secure http service		`dfs.datanode.https.address`
		50010		Data transfer		`dfs.datanode.address`
		50020	IPC	Metadata operations	No	`dfs.datanode.ipc.address`
Secondary NameNode	Secondary NameNode and any backup Secondanry NameNode	50090	http	Checkpoint for NameNode metadata	No	`dfs.secondary.http.address`

YARN Ports: The following table lists the default ports used by the various YARN services.

Table 2.2. YARN Ports

Service	Servers	Default Ports Used	Protocol	Description	Need End User Access?	Configuration Parameters
Resource Manager WebUI	Master Nodes (Resource Manager and any back-up Resource Manager node)	8088	http	Web UI for Resource Manager	Yes	`yarn.resourcemanager.webapp.address`
Resource Manager	Master Nodes (Resource Manager Node)	8032	IPC	For application submissions	Yes (All clients who need to submit the YARN applications including Hive, Hive server, Pig)	Embedded in URI specified by `yarn.resourcemanager.address`
NodeManager Web UI	All Slave Nodes	50060	http		Yes (Typically admins, Dev/ Support teams)	`yarn.nodemanager.webapp.address`

Hive Ports: The following table lists the default ports used by the various Hive services.

Note

Neither of these services are used in a standard HDP installation.

Table 2.3. Hive Ports

Service	Servers	Default Ports Used	Protocol	Description	Need End User Access?	Configuration Parameters
Hive Server	Hive Server machine (Usually a utility machine)	10000		Service for programatically (Thrift/ JDBC) connecting to Hive	Yes (clients who need to connect to Hive either programatically or through UI SQL tools that use JDBC)	`ENV Variable HIVE_PORT`
Hive Web UI	Hive Server machine (Usually a utility machine)	9999	http	Web UI to explore Hive schemas	Yes	`hive.hwi.listen.port`
Hive Metastore		9933	http		Yes (Clients	`hive.metastore.uris`

Service	Servers	Default Ports Used	Protocol	Description	Need End User Access?	Configuration Parameters
					that run Hive, Pig and potentially M/R jobs that use HCatalog)	

HBase Ports: The following table lists the default ports used by the various HBase services.

Table 2.4. HBase Ports

Service	Servers	Default Ports Used	Protocol	Description	Need End User Access?	Configuration Parameters
HMaster	Master Nodes (HBase Master Node and any back-up HBase Master node)	60000			Yes	`hbase.master.port`
HMaster Info Web UI	Master Nodes (HBase master Node and back up HBase Master node if any)	60010	http	The port for the HBase-Master web UI. Set to -1 if you do not want the info server to run.	Yes	`hbase.master.info.port`
Region Server	All Slave Nodes	60020			Yes (Typically admins, dev/ support teams)	`hbase.regionserver.port`
Region Server	All Slave Nodes	60030	http		Yes (Typically admins, dev/ support teams)	`hbase.regionserver.info.port`
	All ZooKeeper Nodes	2888		Port used by ZooKeeper peers to talk to each other.See here for more information.	No	`hbase.zookeeper.peerport`
	All ZooKeeper Nodes	3888		Port used by ZooKeeper		`hbase.zookeeper.leaderport`

Service	Servers	Default Ports Used	Protocol	Description	Need End User Access?	Configuration Parameters
				peers to talk to each other.See here for more information.		
		2181		Property from ZooKeeper's config `zoo.cfg`. The port at which the clients will connect.		`hbase.zookeeper.property.clientPort`

MySQL Ports: The following table lists the default ports used by the various MySQL services.

Table 2.5. MySQL Ports

Service	Servers	Default Ports Used	Protocol	Description	Need End User Access?	Configuration Parameters
MySQL	MySQL database server	3306				

3. Controlling HDP Services Manually

In this document:

3.1. Starting HDP Services

Start all the Hadoop services in the following order:

- HDFS
- YARN
- ZooKeeper
- HBase
- Hive Metastore
- HiveServer2
- WebHCat
- Oozie

Instructions

1. Start HDFS

   a. Execute these commands on the NameNode host machine:

   ```
   su -l hdfs -c "/usr/lib/hadoop/bin/hadoop-daemon.sh --config /etc/hadoop/
   conf start namenode"
   ```

   b. Execute these commands on the Secondary NameNode host machine:

   ```
   su -l hdfs -c "/usr/lib/hadoop/bin/hadoop-daemon.sh --config /etc/hadoop/
   conf start secondarynamenode”
   ```

   c. Execute these commands on all DataNodes:

   ```
   su -l hdfs -c "/usr/lib/hadoop/bin/hadoop-daemon.sh --config /etc/hadoop/
   conf start datanode"
   ```

2. Start YARN

   a. Execute these commands on the ResourceManager host machine:

   ```
   su -l yarn
   ```

```
/usr/lib/hadoop-yarn/sbin/yarn-daemon.sh --config $HADOOP_CONF_DIR start
 resourcemanager
```

b. Execute these commands on the JobTracker History Server host machine:

```
su -l mapred -c "/usr/lib/hadoop-mapreduce/sbin/mr-jobhistory-daemon.sh
 start historyserver --config $HADOOP_CONF_DIR"
```

c. Execute these commands on all NodeManagers:

```
su -l yarn -c "/usr/lib/hadoop-yarn/sbin/yarn-daemon.sh --
config $HADOOP_CONF_DIR start nodemanager"
```

3. Start ZooKeeper. Execute these commands on the ZooKeeper host machine machine(s).

```
su - zookeeper -c "export  ZOOCFGDIR=/etc/zookeeper/conf ; export ZOOCFG=
zoo.cfg ; source /etc/zookeeper/conf/zookeeper-env.sh ; /usr/lib/zookeeper/
bin/zkServer.sh start"
```

4. Start HBase

a. Execute these commands on the HBase Master host machine:

```
su -l hbase -c "/usr/lib/hbase/bin/hbase-daemon.sh --config /etc/hbase/
conf start master; sleep 25"
```

b. Execute these commands on all RegionServers:

```
su -l hbase -c "/usr/lib/hbase/bin/hbase-daemon.sh --config /etc/hbase/
conf start regionserver"
```

5. Start Hive Metastore. On the Hive Metastore host machine, execute the following command:

```
 su -l hive -c "env HADOOP_HOME=/usr nohup hive --service metastore
 > $HIVE_LOG_DIR /hive.out 2> $HIVE_LOG_DIR /hive.log   &"
```

where, *$HIVE_LOG_DIR* is the directory where Hive server logs are stored. For example, `/var/logs/hive`.

6. Start HiveServer2. On the Hive Server2 host machine, execute the following command:

```
sudo su hive -c "nohup /usr/lib/hive/bin/hiveserver2 -hiveconf hive.
metastore.uris=\" \" > $HIVE_LOG_DIR /hiveServer2.out 2>$HIVE_LOG_DIR/
hiveServer2.log &"
```

where *$HIVE_LOG_DIR* is the directory where Hive server logs are stored. For example, `/var/logs/hive`.

7. Start WebHCat. On the WebHCat host machine, execute the following command:

```
su -l hcat -c "/usr/lib/hcatalog/sbin/webhcat_server.sh start"
```

8. Start Oozie. Execute these commands on the Oozie host machine.

```
<login as $OOZIE_USER$OOZIE_USER>
/usr/lib/oozie/bin/oozie-start.sh
```

where *$OOZIE_USER* is the Oozie user. For example, `oozie`.

3.2. Stopping HDP services

Before trying any upgrades or uninstalling software, stop all the hadoop services in the following order::

- Oozie
- WebHCat
- HiveServer2
- Hive Metastore
- ZooKeeper
- HBase
- YARN
- HDFS

Instructions

1. Stop Oozie. Execute these commands on the Oozie host machine.

```
<login as OOZIE_USER>
/usr/lib/oozie/bin/oozie-stop.sh
```

2. Stop WebHCat. On the WebHCat host machine, execute the following command:

```
su -l hcat -c "/usr/lib/hcatalog/sbin/webhcat_server.sh stop"
```

3. Stop Hive. Execute these commands on the Hive Metastore and Hive Server2 host machine.

```
ps aux | awk '{print $1,$2}' | grep hive | awk '{print $2}' | xargs kill >/
dev/null 2>&1
```

4. Stop ZooKeeper. Execute these commands on the ZooKeeper host machine

```
su - zookeeper -c "export ZOOCFGDIR=/etc/zookeeper/conf ; export ZOOCFG=zoo.
cfg ;source /etc/zookeeper/conf/zookeeper-env.sh ; /usr/lib/zookeeper/bin/
zkServer.sh stop"
```

5. Stop HBase

   a. Execute these commands on all RegionServers:

   ```
   su -l hbase -c "/usr/lib/hbase/bin/hbase-daemon.sh --config /etc/hbase/
   conf stop regionserver"
   ```

   b. Execute these commands on the HBase Master host machine:

   ```
   su -l hbase -c "/usr/lib/hbase/bin/hbase-daemon.sh --config /etc/hbase/
   conf stop master"
   ```

6. Stop YARN

a. Execute these commands on all NodeManagers:

```
su -l yarn -c "/usr/lib/hadoop-yarn/sbin/yarn-daemon.sh --
config $HADOOP_CONF_DIR
stop nodemanager"
```

b. Execute these commands on the JobTracker History Server host machine:

```
su -l mapred -c "/usr/lib/hadoop-mapreduce/sbin/hadoop-daemon.sh --
config /etc/hadoop/conf
stop historyserver"
```

c. Execute theses commands on the ResourceManager host machine:

```
su -l yarn
```

```
/usr/lib/hadoop-yarn/sbin/yarn-daemon.sh --config $HADOOP_CONF_DIR stop
 resourcemanager
```

7. Stop HDFS

a. Execute these commands on all DataNodes:

```
su -l hdfs -c "/usr/lib/hadoop/bin/hadoop-daemon.sh --config /etc/hadoop/
conf stop datanode"
```

b. Execute these commands on the Secondary NameNode host machine:

```
su -l hdfs -c "/usr/lib/hadoop/bin/hadoop-daemon.sh --config /etc/hadoop/
conf stop secondarynamenode”
```

c. Execute these commands on the NameNode host machine:

```
su -l hdfs -c "/usr/lib/hadoop/bin/hadoop-daemon.sh --config /etc/hadoop/
conf stop namenode"
```

4. Deploying HDP In Production Data Centers with Firewalls

In this document:

- Deployment strategies for data centers with firewall
- Recommendations for deploying HDP
- Detailed instructions for creating mirrors and proxies

4.1. Deployment Strategies for Data Centers with Firewalls

A typical Hortonworks Data Platform (HDP) install requires access to the Internet in order to fetch software packages from a remote repository. Since corporate networks typically have various levels of firewalls, these firewalls may limit or restrict Internet access, making it impossible for your cluster nodes to access the HDP repository during the install process.

The solution for this is to either:

- Create a local mirror repository inside your firewall hosted on a local mirror server inside your firewall; or
- Provide a trusted proxy server inside your firewall that can access the hosted repositories.

This document will cover these two options in detail, discuss the trade-offs, provide configuration guidelines, and will also provide recommendations for your deployment strategy.

In general, before installing Hortonworks Data Platform in a production data center, it is best to ensure that both the Data Center Security team and the Data Center Networking team are informed and engaged to assist with these aspects of the deployment.

4.1.1. Terminology

Table 4.1. Terminology

Item	Description
Yum Package Manager (yum)	A package management tool that fetches and installs software packages and performs automatic dependency resolution. See http://yum.baseurl.org/ for more information.
Local Mirror Repository	The yum repository hosted on your Local Mirror Server that will serve the HDP software.
Local Mirror Server	The server in your network that will host the Local Mirror Repository. This server must be accessible from all hosts in your cluster where you will install HDP.
HDP Repositories	A set of repositories hosted by Hortonworks that contains the HDP software packages. HDP software packages include the HDP Repository and the HDP-UTILS Repository.

Item	Description
HDP Repository Tarball	A tarball image that contains the complete contents of the HDP Repositories.

4.1.2. Options for Mirroring or Proxying

HDP uses yum to install software, and this software is obtained from the: HDP Repositories, and the Extra Packages for Enterprise Linux (EPEL) repository.

If your firewall prevents Internet access, it will be necessary to mirror and/or proxy both the HDP repository and the Extra Packages for Enterprise Linux (EPEL) repository. Many Data Centers already mirror or proxy the EPEL repository, so discuss with your Data Center team whether EPEL is already available from within your firewall.

Mirroring a repository involves copying the entire repository and all its contents onto a local server and enabling an HTTPD service on that server to serve the repository locally. Once the local mirror server setup is complete, the `*.repo` configuration files on every repository client (i.e. cluster nodes) must be updated, so that the given package names are associated with the local mirror server instead of the remote repository server.

There are three options for creating a local mirror server. Each of these options is explained in detail in a later section.

- **Option I:** Mirror server has no access to Internet at all

  Use a web browser on your workstation to download the HDP Repository Tarball, move the tarball to the selected mirror server using scp or an USB drive, and extract it to create the repository on the local mirror server.

- **Option II:** Mirror server has temporary access to Internet

  Temporarily configure a server to have Internet access, download a copy of the HDP Repository to this server using the **reposync** command, then reconfigure the server so that it is back behind the firewall.

- **Option III:** Mirror server has permanent access to Internet (modified form of Option II)

  Establish a "trusted host", by permanently configuring a server to have Internet access, but still be accessible from within the firewall. Download a copy of the HDP Repository to this server using the **reposync** command.

Note

Option I is probably the least effort, and in some respects, is the most secure deployment option.

Option III is best if you want to be able to update your Hadoop installation periodically from the Hortonworks Repositories.

However, if you are considering Option III, you should also consider the fourth option, which is to proxy the HDP Repositories through a trusted proxy server. If you have a network administrator who has expertise in setting up proxies, and if the proxy option is acceptable within your Data Center Security policies, this can be the easiest of all the options.

- **Option IV:** Trusted proxy server

  Proxying a repository involves setting up a standard HTTP proxy on a local server to forward repository access requests to the remote repository server and route responses back to the original requestor. Effectively, the proxy server makes the repository server accessible to all clients, by acting as an intermediary.

  Once the proxy is configured, change the `/etc/yum.conf` file on every repository client (i.e. cluster nodes), so that when the client attempts to access the repository during installation, the request will go through the local proxy server instead of going directly to the remote repository server.

4.1.3. Considerations for choosing a Mirror or Proxy solution

The following table lists some benefits provided by these alternative deployment strategies:

Table 4.2. Comparison - HDP Deployment Strategies

Advantages of repository mirroring (Options I, II, and III)	Advantages of creating a proxy (Options IV)
• Minimizes network access (after the initial investment of copying the repository to local storage). The install process is therefore faster, reliable, and more cost effective (reduced WAN bandwidth minimizes the data center costs). • Allows security-conscious data centers to qualify a fixed set of repository files. It also ensures that the remote server will not change these repository files. • Large data centers may already have existing repository mirror servers for the purpose of OS upgrades and software maintenance. You can easily add the HDP Repositories to these existing servers.	• Avoids the need for long term management of the repository files (including periodic updates for upgrades, new versions, and bug fixes). • Almost all data centers already have a setup of well-known proxies. In such cases, you can simply add the local proxy server to the existing proxies' configurations. This approach is easier compared to creating local mirror servers in data centers with no mirror server setup. • The network access is same as that required when using a mirror repository, but the source repository handles file management.

However, each of the above approaches are also known to have the following disadvantages:

- Mirrors have to be managed for updates, upgrades, new versions, and bug fixes.
- Proxy servers rely on the repository provider to not change the underlying files without notice.
- Caching proxies are necessary, because non-caching proxies do not decrease WAN traffic and do not speed up the install process.

4.2. Recommendations for Deploying HDP

This section provides information on the various components of the Apache Hadoop ecosystem.

In many data centers, the following deployment strategy may be optimal:

- Use a mirror for the HDP Repositories. The HDP Repositories are small and easily mirrored, thereby allowing secure control over the contents of the Hadoop packages accepted for use in your data center.

- Use a caching proxy for the EPEL repository, which is a well-known and trustworthy repository managed by the Fedora Project team, and which may be too large to mirror in your data center. If your data center already mirrors or proxies EPEL, use that mirror or proxy.

Note

The installer pulls many packages from the base OS repositories (repos). If you do not have a complete base OS available to all your machines at the time of installation, you may run into issues.

If you encounter problems with base OS repos being unavailable, please contact your system administrator to arrange for these additional repos to be proxied or mirrored.

4.2.1. RPMs in the HDP repository

In the HDP repository, you will find two differenct source RPM for each component.

For example, for Hadoop, you should find the following two RPMs:

- `hadoop-x.x.x.x.el6.src.rpm`
- `hadoop-source-x.x.x.x.el6.i386.rpm`

The `src` and `source` are two different packages that serve the following purpose:

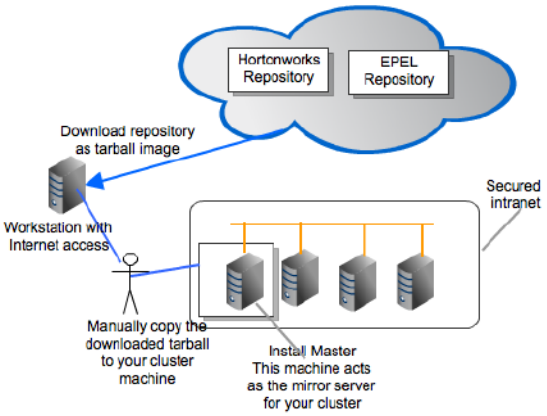
- The `src` package is used to re-create the binary in a given environment. You can use the `src` package of a particular component if you want to rebuild RPM for that component.
- The `source` package on the other hand, is used for reference or debuging purpose. The `source` package is particularly useful when you want to examine the source code of a particular component in a deployed cluster.

4.3. Detailed Instructions for Creating Mirrors and Proxies

In this section:

4.3.1. Option I - Mirror server has no access to the Internet

The local mirror setup for Option I is shown in the following illustration:



Complete the following instructions to set up a mirror server that has no access to the Internet:

1. Prerequisites
2. Instructions

4.3.1.1. Prerequisites

Select a mirror server host with the following characteristics:

- This server runs on either CentOS (v5.x, v6.x) or RHEL (v5.x, v6.x) and has several GB of storage available. [For Beta, only RHEL/CentOS/Oracle Linux 6.x is supported]
- This server and the cluster nodes are all running the same OS.

Note

To support repository mirroring for heterogeneous clusters requires a more complex procedure than the one documented here.

- The firewall allows all cluster nodes (the servers on which you want to install HDP) to access this server.

4.3.1.2. Instructions

1. Use a workstation with access to the Internet and download the tarball image of the appropriate Hortonworks yum repository.

Table 4.3. Deploying HDP - Option I

Cluster OS	HDP Repository Tarballs

RHEL/ CentOS 5.x
 	
[Not supported for Beta]
	`wget http://public-repo-1.hortonworks.com/HDP/centos5/HDP-2.0.5.0-centos5-rpm.tar.gz`
	
	`wget http://public-repo-1.hortonworks.com/HDP-UTILS-1.1.0.16/repos/centos5/HDP-UTILS-1.1.0.16-centos5.tar.gz`

Cluster OS	HDP Repository Tarballs

RHEL/ CentOS 6.x	`wget http://public-repo-1.hortonworks.com/HDP/centos6/HDP-2.0.5.0-centos6-rpm.tar.gz`
	
	`wget http://public-repo-1.hortonworks.com/HDP-UTILS-1.1.0.16/repos/centos6/HDP-UTILS-1.1.0.16-centos6.tar.gz`

2. Create an HTTP server.

   a. On the mirror server, install an HTTP server (such as Apache httpd) using the instructions provided here.

   b. Activate this web server.

   c. Ensure that the firewall settings (if any) allow inbound HTTP access from your cluster nodes to your mirror server.

   Note

   If you are using EC2, make sure that SELinux is disabled.

3. On your mirror server, create a directory for your web server.

   - For example, from a shell window, type: **mkdir –p** ***/var/www/html/hdp/***
   - If you are using a symlink, enable the **followsymlinks** on your web server.

4. Copy the HDP Repository Tarball to the directory created in step 3, and untar it.

5. Verify the configuration.

   - The configuration is successful, if you can access the above directory through your web browser.

     To test this out, browse to the following location: `http://yourwebserver/hdp/$os/HDP-2.0.5.0/`.

     You should see directory listing for all the HDP components along with the RPMs at: `$os/HDP-2.0.5.0`.

     Note

     If you are installing a 2.x.0 release, use: `http://$yourwebserver/hdp/$os/2.x/GA`

     If you are installing a 2.x.x release, use:`http://$yourwebserver/hdp/$os/2.x/updates`

     where

     - `$yourwebserver` is FQDN of your local mirror server.
     - `$os` can be `centos5` or `centos6`. Use the following options table for `$os` parameter:

Table 4.4. Options for *$os* parameter in repo URL

Operating System	Value
CentOS 5	centos5
RHEL 5	[Not supported for Beta]
CentOS 6	centos6
RHEL 6	

6. Configure the **yum** clients on all the nodes in your cluster.

   a. Fetch the yum configuration file from your mirror server.

   ```
   http://yourwebserver>/hdp/$os/2.x/updates/2.0.5.0/hdp.repo
   ```

   Note

   If you are installing a 2.x.0 release, use: `http://$yourwebserver/hdp/$os/2.x/GA`

   If you are installing a 2.x.x release, use:`http://$yourwebserver/hdp/$os/2.x/updates`

   b. Store the `hdp.repo` file to a temporary location.

   c. Edit `hdp.repo` file changing the value of the **baseurl** property to point to your local repositories based on your cluster OS.

   ```
   [HDP-2.x]
   name=Hortonworks Data Platform Version - HDP-2.x
   baseurl=http://$yourwebserver/hdp/HDP-2.0.5.0/$os/2.x/GA
   gpgcheck=1
   gpgkey=http://public-repo-1.hortonworks.com/HDP/$os/RPM-GPG-KEY/RPM-GPG-
   KEY-Jenkins
   enabled=1
   priority=1

   [HDP-UTILS-1.1.0.16]
   name=Hortonworks Data Platform Utils Version - HDP-UTILS-1.1.0.16
   baseurl=http://$yourwebserver/HDP-UTILS-1.1.0.16/repos/$os
   gpgcheck=1
   gpgkey=http://public-repo-1.hortonworks.com/HDP/centos6/RPM-GPG-KEY/RPM-
   GPG-KEY-Jenkins
   enabled=1
   priority=1

   [HDP-2.0.5.0]
   name=Hortonworks Data Platform HDP-2.0.5.0
   baseurl=http://$yourwebserver/HDP/$os/2.x/updates/2.0.5.0
   gpgcheck=1
   gpgkey=http://public-repo-1.hortonworks.com/HDP/centos6/RPM-GPG-KEY/RPM-
   GPG-KEY-Jenkins
   enabled=1
   priority=1
   ```

where

- *$yourwebserver* is FQDN of your local mirror server.
- *$os* can be centos5 or centos6. Use the following options table for *$os* parameter:

Table 4.5. Options for *$os* parameter in repo URL

Operating System	Value
CentOS 5	centos5
RHEL 5	[Not supported for Beta]
CentOS 6	centos6
RHEL	

Note

If you are installing a 2.x.0 release, use: `http://$yourwebserver/hdp/$os/2.x/GA`

If you are installing a 2.x.x release, use:`http://$yourwebserver/hdp/$os/2.x/updates`

d. Use **scp** or **pdsh** to copy the client yum configuration file to `/etc/yum.repos.d/` directory on every node in the cluster.

7. [Conditional]: If you have multiple repositories configured in your environment, deploy the following plugin on all the nodes in your cluster.

a. Install the plugin.

- **For RHEL and CentOs v5.x** [Not supported for Beta]

```
yum install yum-priorities
```

- **For RHEL and CentOs v6.x**

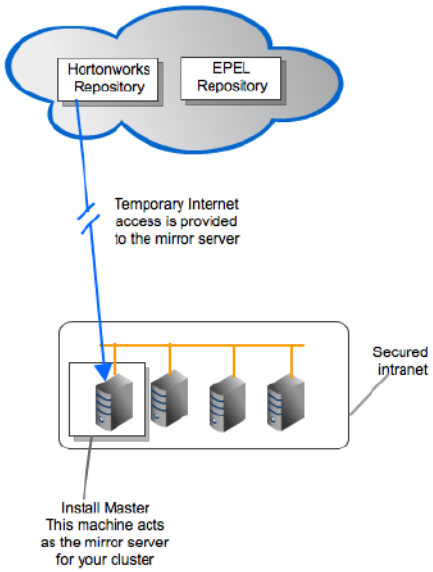
```
yum install yum-plugin-priorities
```

b. Edit the `/etc/yum/pluginconf.d/priorities.conf` file to add the following:

```
[main]
enabled=1
gpgcheck=0
```

4.3.2. Option II - Mirror server has temporary access to the Internet

The local mirror setup for Option II is shown in the following illustration:



Complete the following instructions to set up a mirror server that has temporary access to the Internet:

1. Prerequisites
2. Instructions

4.3.2.1. Prerequisites

Select a local mirror server host with the following characteristics:

- This server runs on either CentOS/RHEL/Oracle Linux 5.x or 6.x and has several GB of storage available. [5.x not supported for Beta]
- The local mirror server and the cluster nodes must have the same OS. If they are not running CentOS or RHEL, the mirror server must not be a member of the Hadoop cluster.

Note

To support repository mirroring for heterogeneous clusters requires a more complex procedure than the one documented here.

- The firewall allows all cluster nodes (the servers on which you want to install HDP) to access this server.
- Ensure that the mirror server has **yum** installed.
- Add the **yum-utils** and **createrepo** packages on the mirror server.

```
yum install yum-utils createrepo
```

4.3.2.2. Instructions

- Temporarily reconfigure your firewall to allow Internet access from your mirror server host.

- Execute the following command to download the appropriate Hortonworks yum client configuration file and save it in `/etc/yum.repos.d/` directory on the mirror server host.

Table 4.6. Deploying HDP - Option II

Cluster OS	HDP Repository Tarballs
RHEL/ CentOS 5.x [Not supported for Beta]	`wget http://public-repo-1.hortonworks.com/HDP/centos5/2.x/updates/2.0.5.0/hdp.repo -O /etc/yum.repos.d/hdp.repo`
RHEL/ CentOS 6.x	`wget http://public-repo-1.hortonworks.com/HDP/centos6/2.x/updates/2.0.5.0/hdp.repo -O /etc/yum.repos.d/hdp.repo`

- Create an HTTP server.

  1. On the mirror server, install an HTTP server (such as Apache `httpd`) using the instructions provided http://httpd.apache.org/download.cgi
  2. Activate this web server.
  3. Ensure that the firewall settings (if any) allow inbound HTTP access from your cluster nodes to your mirror server.

Note

If you are using EC2, make sure that SELinux is disabled.

- On your mirror server, create a directory for your web server.
  - For example, from a shell window, type: `mkdir –p` *`/var/www/html/hdp/`*.
  - If you are using a symlink, enable the `followsymlinks` on your web server.
- Copy the contents of entire HDP repository for your desired OS from the remote yum server to your local mirror server.
  - Continuing the previous example, from a shell window, type:

```
cd /var/www/html/hdp
reposync -r HDP-2.0.5.0
reposync -r HDP-UTILS-1.1.0.16
```

    You should now see both an `HDP-2.0.5.0` directory and an `HDP-UTILS-1.1.0.16` directory, each with several subdirectories.

- Generate appropriate metadata.

  This step defines each directory as a yum repository. From a shell window, type:

```
createrepo /var/www/html/hdp/HDP-2.0.5.0
createrepo /var/www/html/hdp/HDP-UTILS-1.1.0.16
```

You should see a new folder called `repodata` inside both HDP directories.

- Verify the configuration.
  - The configuration is successful, if you can access the above directory through your web browser.

    To test this out, browse to the following location: **http://*yourwebserver*/hdp/*$os*/2.x/updates/HDP-2.0.5.0/**

    Note

    If you are installing a 2.x.0 release, use: `http://$yourwebserver/hdp/$os/2.x/GA`

    If you are installing a 2.x.x release, use:`http://$yourwebserver/hdp/$os/2.x/updates`
  - You should now see directory listing for all the HDP components.
- At this point, it is okay to disable external Internet access for the mirror server, so that the mirror server is once again entirely within your data center firewall.
- Depending on your cluster OS, configure the **yum** clients on all the nodes in your cluster
  1. Edit the `/etc/yum.repos.d/hdp.repo` file, changing the value of the `baseurl` property to point to your local repositories based on your cluster OS.

```
[HDP-2.x]
name=Hortonworks Data Platform Version - HDP-2.x
baseurl=http://$yourwebserver/hdp/HDP-2.0.5.0/$os/2.x/GA
gpgcheck=1
gpgkey=http://public-repo-1.hortonworks.com/HDP/$os/RPM-GPG-KEY/RPM-GPG-
KEY-Jenkins
enabled=1
priority=1

[HDP-UTILS-1.1.0.16]
name=Hortonworks Data Platform Utils Version - HDP-UTILS-1.1.0.16
baseurl=http://$yourwebserver/HDP-UTILS-1.1.0.16/repos/$os
gpgcheck=1
gpgkey=http://public-repo-1.hortonworks.com/HDP/centos6/RPM-GPG-KEY/RPM-
GPG-KEY-Jenkins
enabled=1
priority=1

[HDP-2.0.5.0]
name=Hortonworks Data Platform HDP-2.0.5.0
baseurl=http://$yourwebserver/HDP/$os/2.x/updates/2.0.5.0
gpgcheck=1
gpgkey=http://public-repo-1.hortonworks.com/HDP/centos6/RPM-GPG-KEY/RPM-
GPG-KEY-Jenkins
enabled=1
priority=1
```

     where

- *$yourwebserver* is FQDN of your local mirror server.
- *$os* can be `centos5` or `centos6`. Use the following options table for *$os* parameter:

Table 4.7. Options for *$os* parameter in repo URL

Operating System	Value
CentOS 5	centos5
RHEL 5	[Not supported for Beta]
CentOS 6	centos6
RHEL 6	

2. Use **scp** or **pdsh** to copy the client yum configuration file to **/etc/yum.repos.d/** directory on every node in the cluster.

- If you have multiple repositories configured in your environment, deploy the following plugin on all the nodes in your cluster.

1. Install the plugin.

   - **For RHEL and CentOs v5.x** [Not supported for Beta]

     ```
     yum install yum-priorities
     ```

   - **For RHEL and CentOs v6.x**

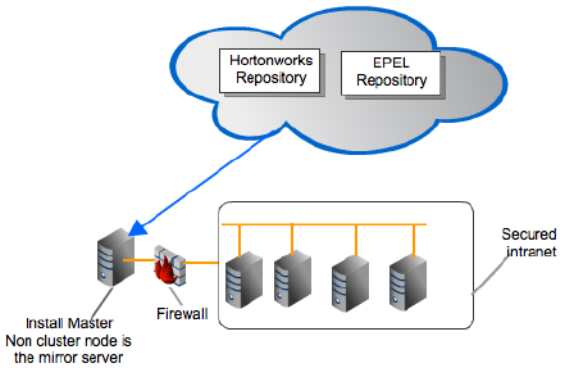
     ```
     yum install yum-plugin-priorities
     ```

2. Edit the `/etc/yum/pluginconf.d/priorities.conf` file to add the following:

   ```
   [main]
   enabled=1
   gpgcheck=0
   ```

4.3.3. Option III - Mirror server has permanent access to the Internet

The local mirror setup for Option III is shown in the following illustration:



Complete the following instructions to set up a mirror server that has permanent access to the Internet:

1. Prerequisites
2. Instructions

4.3.3.1. Prerequisites

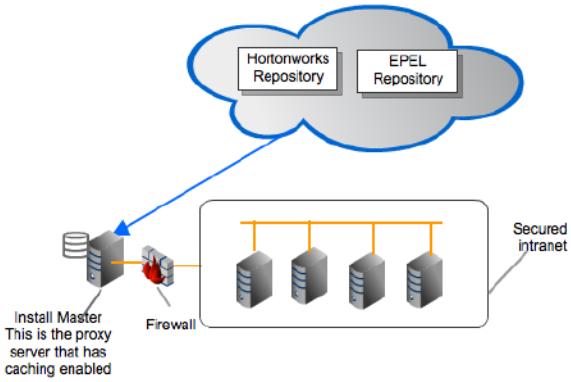
Same as Option II.

4.3.3.2. Instructions

Same as Option II but Step 1 and Step 8 are unnecessary and may be skipped.

4.3.4. Option IV - Trusted proxy server

The local mirror setup for Option IV is shown in the following illustration:



Complete the following instructions to set up a trusted proxy server:

1. Prerequisites
2. Instructions

4.3.4.1. Prerequisites

Select a mirror server host with the following characteristics:

- This server runs on either CentOS/RHEL/Oracle Linux (5.x or 6.x) and has several GB of storage available. [5.x not supported for Beta]
- The firewall allows all cluster nodes (the servers on which you want to install HDP) to access this server, and allows this server to access the Internet (at least those Internet servers for the repositories to be proxied).

4.3.4.2. Instructions

1. Create a caching HTTP PROXY server on the selected host.

a. It is beyond the scope of this document to show how to set up an HTTP PROXY server, given the many variations that may be required, depending on your data center's network security policy. If you choose to use the Apache HTTPD server, it starts by installing `httpd`, using the instructions provided here, and then adding the `mod_proxy` and `mod_cache modules`, as stated here.

   Please engage your network security specialists to correctly set up the proxy server.

b. Activate this proxy server and configure its cache storage location.

c. Ensure that the firewall settings (if any) allow inbound HTTP access from your cluster nodes to your mirror server, and outbound access to the desired repo sites, including `public-repo-1.hortonworks.com`.

Note

If you are using EC2, make sure that SELinux is disabled.

2. Depending on your cluster OS, configure the **yum** clients on all the nodes in your cluster.

- 

Note

The following description is taken from the CentOS documentation here.

a. On each cluster node, add the following lines to the **/etc/yum.conf** file.

   (As an example, the settings below will enable **yum** to use the proxy server **mycache.mydomain.com**, connecting to port **3128**, with the following credentials **yum-user/qwerty**.

```
# proxy server:port number
proxy=http://mycache.mydomain.com:3128
```

```
# account details for secure yum proxy connections
proxy_username=yum-user
proxy_password=qwerty
```

b. Once all nodes have their **/etc/yum.conf** file updated with appropriate configuration info, you can proceed with the HDP installation just as though the nodes had direct access to the Internet repositories.

c. If this proxy configuration does not seem to work, try adding a **/** at the end of the proxy URL. For example:

```
proxy=http://mycache.mydomain.com:3128/
```

5. Wire Encryption in Hadoop

This section provides an overview on encryption over-the-wire in Hadoop. Data can be moved in and out of Hadoop over RPC, HTTP, Data Transfer Protocol, and JDBC. Network traffic over each of these protocols can be encrypted to provide privacy for data movement.

5.1. HTTP Encryption

Encryption over the HTTP protocol is implemented with the support for SSL in various HTTP listeners across Hadoop cluster.

To enable WebHDFS to listen for HTTP over SSL, you must configure SSL on the NameNode and all DataNodes by setting `dfs.https.enable=true` in the `hdfs-site.xml` file.

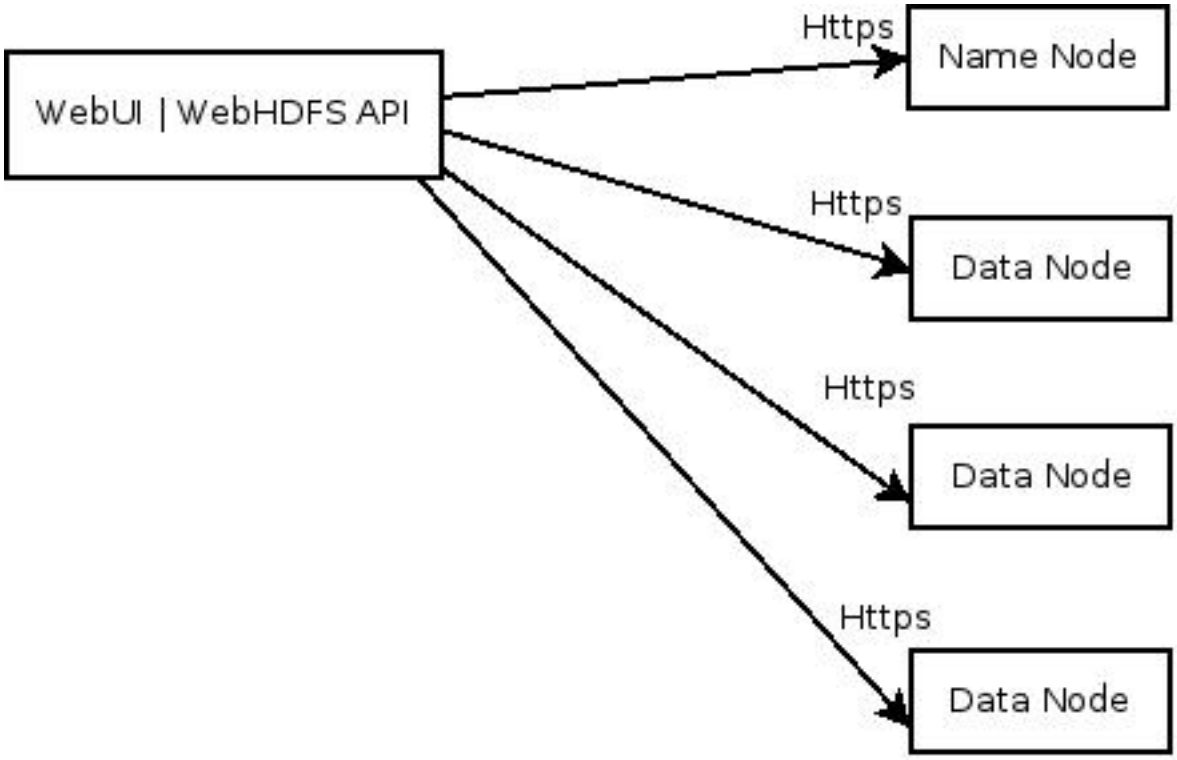
Most commonly SSL is configured to authenticate only the Server, a mode called 1-way SSL. For 1-way SSL you only need to configure the keystore on the NameNode and each DataNode, using the properties shown in the table below. These parameters are set in the `ssl-server.xml` file on the NameNode and each DataNodes.

SSL can also be configured to authenticate the client, a m ode called mutual authentication or 2-way SSL. To configure 2-way SSL also set `dfs.client.https.need-auth=true` in the `hdfs-site.xml` file on the NameNode and each DataNode.

Table 5.1. Configuration Properties in ssl-server.xml

Property	Default Value	Description	1-way	2-way
ssl.server.keystore.type	JKS	The type of the keystore, JKS = Java Keystore, the de-facto standard in Java	Y	Y
ssl.server.keystore.location	None	The location of the keystore file	Y	Y
ssl.server.keystore.password	None	The password to open the keystore file	Y	Y
ssl.server truststore.type	JKS	The type of the trust store	N	Y
ssl.server.truststore.location	None	The location of the truststore file	N	Y
ssl server.truststore.password	None	The password to open the trustsore	N	Y

The following diagram shows an HTTP or REST client's interaction with the NameNode and the DataNodes over HTTPS.



5.2. Encryption during Shuffle

Data securely loaded into HDFS is processed by Mappers and Reducers to derive meaningful business intelligence. Hadoop code moves data between Mappers and Reducers over the HTTP protocol in a step called the shuffle. In SSL parlance, the Reducer is the SSL client that initiates the connection to the Mapper to ask for data. Enabling HTTPS for encrypting shuffle traffic involves the following steps.

- In the `mapred-site.xml` file, set `mapreduce.shuffle.ssl.enabled=true`.
- Set keystore and optionally truststore (for 2-way SSL) properties as in the table above.

5.3. RPC Encryption

The most common way for a client to interact with a Hadoop cluster is through RPC. A Hadoop client when talking to a secure cluster uses the SASL protocol to authenticate itself. The client uses RPC to connect to the NameNode when serving the HDFS protocol. For RPC connections, Hadoop uses Java's SASL abstraction. Java's SASL library supports quality of protection settings. When the `hadoop.rpc.protection` property is set to privacy, the data over RPC is encrypted with symmetric keys. Please refer to Hortonworks' blog for more details on the `hadoop.rpc.protection` setting. Note that RPC encryption covers not only the channel between a client and Hadoop cluster but also the inter cluster communication among Hadoop services.

5.4. Data Transfer Protocol

The NameNode gives the client the address of the first Data Node to read or write the block. The actual data transfer between the client and the DataNode is over Hadoop's Data Transfer Protocol. To encrypt this protocol you must set `dfs.encryt.data.transfer=true` on the NameNode and all DataNodes. The actual algorithm used for encryption can be customized with `dfs.encrypt.data.transfer.algorithm` set to either "3des" or "rc4". If nothing is set, then the default on the system is used (usually 3DES.) While 3DES is more cryptographically secure, RC4 is substantially faster.

5.5. JDBC

Note

Currently HDP 2 does not support encryption with JDBC. This section describes a feature that will be implemented in upcoming releases.

Recently HiveServer2 implemented encryption with the Java SASL protocol's quality of protection (QOP) setting. Using this the data moving between a HiveServer2 over JDBC and a JDBC client can be encrypted. On the HiveServer2, set the `hive.server2.thrift.sasl.qop` property in `hive-site.xml`, and on the JDBC client specify `sasl.sop` as part of the JDBC-Hive connection string, for example `jdbc:hive://hostname/dbname;sasl.qop=auth-int`. See HIVE-4911 for more details on this enhancement.

6. Supported Database Matrix for Hortonworks Data Platform

This page contains certification information on supported databases for Hortonworks Data Platform (HDP).

The following table identifies the supported databases for HDP.

Table 6.1. Supported Databases for HDP Stack

Operating System	Component	Database	
		MySQL 5.x	**Other**
RHEL/ Centos/ Oracle Linux 5.x [Not supported for Beta] RHEL/ CentOS/ Oracle Linux 6.x SLES 11 [Not supported for Beta]	Hive / HCatalog	Default. For instructions on configuring this database for Hive metastore, either see Instructions for Manual Install or see Instructions for Ambari.	
	Oozie	Supported. For instructions on configuring this database for Oozie metastore, either see Instructions for Manual Install or see Instructions for Ambari.	Derby (default).

Table 6.2. Supported Databases for Ambari

Operating System	Component	Database
RHEL/CentOS/Oracle Linux 5.x [Not supported for Beta] RHEL/CentOS/Oracle Linux 6.x SLES 11 [Not supported for Beta]	Ambari	PostgreSQL 8.x (default). For more information, see, see Getting Started - Database Requirements.