

Pivotal HAWQ

Version 1.1

Installation Guide

Rev: A09

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1 Overview

This document describes how you can install HAWQ manually. HAWQ can be installed along with Pivotal HD Enterprise using the Command Line Interface (CLI); however, if you choose to not install HAWQ using the CLI, then you need to follow the instructions in this chapter.

**Note:**

This document does not describe how to install the Pivotal Extension Framework (PXF), which enables SQL querying on data in the Hadoop components such as HBase, Hive, and any other distributed data file types. To install Pivotal Extension Framework (PXF), see the *Pivotal Extension Framework Installation and User Guide*.

To install HAWQ manually, perform the following tasks:

- Review the System Requirements
- Prepare HDFS
- Install HAWQ
- Run a Basic Query
- Review the HAWQ Configuration Parameter Reference

**Note:**

These tasks should be performed for *a//hosts* in your HAWQ array (master, standby master and segments).

2 System Requirements

Check that you meet the following system requirements before you install HAWQ:

Operating System:

- RedHat 6.4 and 6.2, 64 bit
- CentOS 6.4 and 6.2, 64 bit

Minimum CPU: Pentium Pro compatible (P3/Athlon and above)

Minimum Memory: 16 GB RAM per server

Disk Requirements:

- 150MB per host for Greenplum installation
- Approximately 300MB per segment instance for meta data
- Appropriate free space for data: disks should have at least 30% free space (no more than 70% capacity)
- High-speed, local storage

Network Requirements:

- Gigabit Ethernet within the array
- Dedicated, non-blocking switch

Software and Utilities: bash shell, GNU tar, and GNU zip

3 Preparing HDFS

You need to complete the following steps to configure HDFS:

1. To make sure HDFS block files can be read by other users, configure OS file system umask to 022.

Add the following line into `${HADOOP_HOME}/etc/hadoop/hadoop-env.sh`

```
umask 022
```

Add the following parameter to `hdfs-site.xml`

```
<property>
  <name>dfs.datanode.data.dir.perm</name>
  <value>755</value>
  <description>Permissions for the directories on on the local filesystem w
the DFS data node store its blocks. The permissions can either be octal o:
  symbolic.</description>
</property>
```

2. Edit the `/hdfs-install-directory/etc/hadoop/hdfs-site.xml` file. To do this, change the `dfs.block.local-path-access.user` to the user who starts HDFS if the short circuit feature is enabled in libhdfs3. See HAWQ Parameter Reference for more information.
3. Set the `dfs.namenode.name.dir` and `dfs.datanode.data.dir` to your preferred path as shown in the example:

```
<configuration>
  <property>
    <name>dfs.support.append</name>
    <value>true</value>
  </property>
  <property>
    <name>dfs.client.read.shortcircuit</name>
    <value>true</value>
  </property>
  <property>
    <name>dfs.block.local-path-access.user</name>
    <value>gpadmin</value>
    <description>
      specify the user allowed to do short circuit read
    </description>
  </property>
  <property>
    <name>dfs.namenode.name.dir</name>
    <value>file:/home/gpadmin/hadoop-2.0.0-alpha/dfs/name</value>
  </property>
  <property>
    <name>dfs.datanode.data.dir</name>
```

```
<value>file:/home/gpadmin/hadoop-2.0.0-alpha/dfs/data</value>
</property>
<property>
  <name>dfs.replication</name>
  <value>3</value>
</property>
<property>
  <name>dfs.datanode.max.transfer.threads</name>
  <value>40960</value>
</property>
<property>
</property>
</property>
  <property>
    <name>dfs.client.socket-timeout</name>
    <value>300000000</value>
  </property>
  <property>
    <name>dfs.datanode.handler.count</name>
    <value>60</value>
  </property>
</property>
<property>
<name>ipc.client.connection.maxidletime</name>
<value>3600000</value>

</property>
<property>
<name>ipc.server.handler.queue.size</name>
<value>3300</value>

</property>

</property>
  <property>
<name>ipc.client.connection</name>
  <value>3</value>
  </property>
  <property>
    <name>dfs.datanode.max.transfer.threads</name>
    <value>40960</value>
  </property>
  <property>
</property>
</property>
  <property>
    <name>dfs.replication</name>
    <value>3</value>
  </property>
  <property>
    <name>dfs.namenode.access.time.precision</name>
    <value>-1</value>
  </property>
</property>
```

4. To configure the JVM, edit the `/hdfs-install-directory/etc/hadoop/hadoop-env.sh`

This configures the memory usage of the primary and secondary namenodes and datanode. For example, on servers with 48GB memory, if HDFS and HAWQ are on two separate clusters, Pivotal recommends that the namenodes use 40GB (-Xmx40960m), while each datanode uses 6GB and with a stack size of 256KB (-Xmx6144m -Xss256k).

5. To verify that HDFS has started, run the following command sequence.

1. List the directory:

```
hadoop fs -ls /
```

2. Create a test directory:

```
hadoop fs -mkdir /test
```

3. Put a test file (*/path/file*) into the HDFS root directory:

```
hadoop fs -put /path/file /
```

4. Perform a get on */file* from HDFS to the current local file system directory:

```
hadoop fs -get /file ./
```


4 Installing HAWQ

This section contains the following procedures to help you install HAWQ:

- Install the HAWQ Binaries
- Creating the gpadmin User
- Setting the OS Parameters
- Editing the Configuration Files
- Ensuring that HDFS works

4.1 Install the HAWQ Binaries

There are two ways HAWQ is released, as an RPM and a binary tarball.

4.1.1 To Install the RPM Release:

1. Log in to the master host as *root*.

```
$ su - root
```

2. Launch the installer using rpm. For example:

```
# rpm -ivh hawq-dev-dev.x86_64.rpm
```

The installer installs HAWQ to the default install path (*/usr/local/hawq-dev*), and creates the soft link */usr/local/hawq* for */usr/local/hawq-dev*.

3. Source the path file from your master host's HAWQ installation directory:

```
# source /usr/local/hawq/greenplum_path.sh
```

4. Create a file called *hostfile* that includes host names in your HAWQ system using segment hosts. Make sure there are no blank lines or extra spaces. For example, if you have a standby master and three segments per host, your file will look something like this:

```
smdw  
sdw1  
sdw2  
sdw3
```

5. Perform the ssh key exchange by running the following command. This allows you to log in to all hosts as root user without a password prompt. Use the *hostfile* file you used for installation.

```
gpssh-exkeys -f hostfile
```

6. Run the following command to reference the *hostfile* file you just created and copy the HAWQ rpm file (*hawq-dev-dev.x86_64.rpm*) to all hosts:

```
gpscp -f hostfile  
hawq-dev-dev.x86_64.rpm =:~/
```

7. Run the following command to install HAWQ to all hosts:

```
# gpssh -f hostfile -e "rpm -ivh hawq-dev-dev.x86_64.rpm"
```

4.1.2 To Install from a Binary Tarball

1. Log in to the master host as root.

```
# su - root
```

2. Copy the HAWQ tarball to the binary directory you want to install HAWQ, go to the binary directory and uncompress the tarball. For example:

```
# cp /path/to/hawq-dev-dev.tar.gz /usr/local  
# cd /usr/local  
# tar xf hawq-dev-dev.tar.gz
```

3. Open the file */usr/local/greenplum_path.sh* and edit the *GPHOME* parameter to set it to */usr/local/hawq*

```
GPHOME=/usr/local/hawq
```

4. Source the path file from your master host's HAWQ installation directory:

```
# source /usr/local/hawq/greenplum_path.sh
```

Create a file called *hostfile* that includes host names used in your HAWQ system in segment hosts format. Make sure there are no blank lines or extra spaces. For example, if you have a standby mnaster and three segments per host, your file will look something like this:

```
smdw  
sdw1  
sdw2  
sdw3
```

5. Perform the *ssh* key exchange by running the following command. This allows you to log in to *all_hosts* as root *user* without a password prompt. Use the *all_hosts* file you used for installation:

```
# gpssh-exkeys -f all_hosts
```

6. Run the following commands to reference the hostfile file you just created and copy the HAWQ binary directory (*/usr/local/hawq-dev*) to all hosts:

```
# gpscp -r -f hostfile hawq-dev =:/usr/local/  
# gpssh -f hostfile -e "ln -s /usr/local/hawq-dev /usr/local/hawq"
```

4.2 Creating the gpadmin User

1. Create the *gpadmin* user account on each host:

```
# gpssh -f all_hosts -e '/usr/sbin/useradd gpadmin'  
# gpssh -f all_hosts -e 'echo -e "changeme\nchangeme" | passwd gpadmin'
```

2. Log in to the master host as *gpadmin*.

```
$ su - gpadmin
```

3. Source the path file from the HAWQ installation directory:

```
$ source /usr/local/hawq/greenplum_path.sh
```

4. Run the following command to do the *ssh* key exchange to enable you to log in to all hosts without a password prompt as *gpadmin* user. Use the *all_hosts* file you used for installation:

```
$ gpssh-exkeys -f all_hosts
```

Use the *gpssh* utility to add the above command line to the profile file. For example:

```
$ gpssh -f all_hosts -e "echo source /usr/local/hawq/greenplum_path.sh >> .bashrc"
```

5. Use the *gpssh* utility to confirm that the Greenplum software was installed on all hosts. Use the *all_hosts* file you used for installation. For example:

```
$ gpssh -f all_hosts -e "ls -l $GPHOME"
```

**Note:**

You may want to change the default configuration parameters in */usr/local/hawq/etc/hdfs-client.xml* for *libhdfs3*. See the topic, HAWQ Configuration Parameter Reference.

6. Log in to the master host as *root*.

```
$ su - root
```

4.3 Setting the OS Parameters

This topic describes the OS parameter options that you need to set up for the following:

- Linux
- RHEL
- Security Configuration
- XFS

4.3.1 Linux

**Note:**

Pivotal recommends that you do not set the *vm.overcommit_memory* parameter if you run HAWQ on small memory virtual machines. If you set this parameter you may encounter out of memory issues.

Set the following parameters in the */etc/sysctl.conf* file and reboot:

```
xfs_mount_options = rw,noatime,inode64,allocsize=16m
sysctl.kernel.shmmax = 500000000
sysctl.kernel.shmmni = 4096
sysctl.kernel.shmall = 4000000000
sysctl.kernel.sem = 250 512000 100 2048
sysctl.kernel.sysrq = 1
sysctl.kernel.core_uses_pid = 1
sysctl.kernel.msgmnb = 65536
sysctl.kernel.msgmax = 65536
sysctl.kernel.msgmni = 2048
sysctl.net.ipv4.tcp_syncookies = 0
sysctl.net.ipv4.ip_forward = 0
sysctl.net.ipv4.conf.default.accept_source_route = 0
sysctl.net.ipv4.tcp_tw_recycle = 1
sysctl.net.ipv4.tcp_max_syn_backlog = 200000
sysctl.net.ipv4.conf.all.arp_filter = 1
sysctl.net.ipv4.ip_local_port_range = 1025 65535
sysctl.net.core.netdev_max_backlog = 200000
sysctl.vm.overcommit_memory = 2
sysctl.fs.nr_open = 3000000
sysctl.kernel.threads-max = 798720
sysctl.kernel.pid_max = 798720
#increase network
sysctl.net.core.rmem_max = 2097152
sysctl.net.core.wmem_max = 2097152
```

4.3.2 RHEL

RHEL version 6.x platforms, the above parameters do not include the *sysctl* prefix, as follows:

```
xfs_mount_options = rw,noatime,inode64,allocsize=16m
kernel.shmmax = 500000000
kernel.shmmni = 4096
kernel.shmall = 4000000000
kernel.sem = 250 512000 100 2048
kernel.sysrq = 1
kernel.core_uses_pid = 1
kernel.msgmnb = 65536
kernel.msgmax = 65536
kernel.msgmni = 2048
net.ipv4.tcp_syncookies = 0
net.ipv4.ip_forward = 0
net.ipv4.conf.default.accept_source_route = 0
net.ipv4.tcp_tw_recycle = 1
net.ipv4.tcp_max_syn_backlog = 200000
net.ipv4.conf.all.arp_filter = 1
net.ipv4.ip_local_port_range = 1025 65535
net.core.netdev_max_backlog = 200000
vm.overcommit_memory = 2
fs.nr_open = 3000000
kernel.threads-max = 798720
kernel.pid_max = 798720
# increase network
net.core.rmem_max=2097152
net.core.wmem_max=2097152
```

4.3.3 Security Configuration

Set the following parameters (in the exact sequence displayed in the example) in the `/etc/security/limits.conf` file after updating the `/etc/sysctl.conf`:

```
soft nofile 2900000
```

```
hard nofile 2900000
```

```
soft nproc 131072
```

```
hard nproc 131072
```

4.3.4 XFS

XFS is the preferred file system on Linux platforms for data storage. Pivotal recommends the following xfs mount options:

```
rw,noatime,inode64,allocsize=16m
```

See the Linux manual page (`man`) for the `mount` command for more information about using that command (`man mount` opens the `man` page).

The Linux disk I/O scheduler for disk access supports different policies, such as CFQ, AS, and deadline.

Pivotal recommends the following scheduler option:

deadline

To specify a scheduler, run the following:

```
# echo schedulename > /sys/block/devname/queue/scheduler
```

```
# echo deadline > /sys/block/sdb/queue/scheduler
```

```
# /sbin/blockdev --getra devname
```

```
# /sbin/blockdev --getra /dev/sdb
```

```
# /sbin/blockdev --setra bytes devname
```

```
# /sbin/blockdev --setra 16385 /dev/sdb
```

Refer to the Linux manual page (man) for the blockdev command for more information about using that command (man blockdev opens the man page).

4.4 Editing the Configuration Files

Edit the /etc/hosts file and make sure that it includes the host names and all interface address names for every machine participating in your HAWQ system.

1. Run the following command to copy the /etc/sysctl.conf file and /etc/security/limits.conf file to the same location of all hosts:

```
# gpscp -f all_hosts /etc/sysctl.conf =:/etc
# gpscp -f all_hosts /etc/security/limits.conf =:/etc/security
```

**Note:**

You may need to configure other parameters (for example, scheduler configuration) using Step 16 on all hosts.

2. Create or choose a directory that will serve as your master data storage area. This directory should have sufficient disk space for your data and be owned by the gpadmin user and group. For example, run the following commands as root:

```
# mkdir /data/master
```

3. Change ownership of this directory to the gpadmin user. For example:

```
# chown -R gpadmin /data/master
```

4. Using gpssh, create the master data directory location on your standby master as well. For example:

```
# gpssh -h smdw -e 'mkdir /data/master'
# gpssh -h smdw -e 'chown -R gpadmin /data/master'
```

5. Create a file called seg_hosts. This file should have only one machine configured host name for each segment host. For example, if you have three segment hosts:

```
sdw1
sdw2
sdw3
```

6. Using gpssh, create the data directory locations on all segment hosts at once using the seg_hosts file you just created. For example:

```
# gpssh -f seg_hosts -e 'mkdir /data/primary'
# gpssh -f seg_hosts -e 'chown gpadmin /data/primary'
```

7. To use JBOD, create temporary directory locations for the master, standby, and all the segments. The following example uses two disks with the workfile names /data1/tmp and /data2/tmp.

```
# dirs="/data1/tmp /data2/tmp"
# mkdir $dirs# chown -R gpadmin $dirs.
# gpssh -h smdw -e "mkdir $dirs"
# gpssh -h smdw -e "chown -R gpadmin $dirs"
# gpssh -f seg_hosts -e "mkdir $dirs"
# gpssh -f seg_hosts -e "chown -R gpadmin $dirs"
```

8. Log in to the master host as gpadmin. Make a copy of the gpinitssystem_config file to use as a starting point. For example:

```
$ su - gpadmin$ cp
$GPHOME/docs/cli_help/gpconfigs/gpinitssystem_config
/home/gpadmin/gpconfigs/gpinitssystem_config
```


9. Open the file you just copied in a text editor. Set all of the required parameters according to your environment. A HAWQ system must contain a master instance and at least two segment instances (even if setting up a single node system). The DATA_DIRECTORY parameter is what determines how many segments per host will be created. Here is an example of the required parameters in the gpinitssystem_config file:

```
ARRAY_NAME="EMC GP-SQL"
SEG_PREFIX=gpseg
PORT_BASE=40000
declare -a TEMP_DIRECTORY=(/data1/tmp /data2/tmp)
declare -a DATA_DIRECTORY=(/data/primary /data/primary)
MASTER_HOSTNAME=mdw
MASTER_DIRECTORY=/data/master
MASTER_PORT=5432
TRUSTED_SHELL=ssh
CHECK_POINT_SEGMENT=8
ENCODING=UNICODE
DFS_NAME=hdfs
DFS_URL=mdw:9000/gpsql
```

4.5 Ensuring that HDFS works

Make sure that your hdfs is working and change the following parameters in the gpinitssystem_config:

```
DFS_NAME=hdfs
DFS_URL=namenode-host-name:8020/hawq
```

Save and close the file.

Run the following command referencing the path and file name of your initialization configuration file (gpinitssystem_config) and host file (all_hosts). For example:

```
$ cd ~
$ gpinitssystem -c gpconfigs/gpinitssystem_config -h all_hosts
```

For a fully redundant system (with a standby master and a spread mirror configuration) include the -s and -S options. For example:

```
$ gpinitssystem -c gpconfigs/gpinitssystem_config -h all_hosts -s standby_master_hostname
```

The utility verifies your setup information and ensures that it can connect to each host and access the data directories specified in your configuration. If all of the pre-checks are successful, the utility prompts you to confirm your configuration. For example:

```
=> Continue with Greenplum creation? Yy/Nn  
Press y to start the initialization.
```

Set the MASTER_DATA_DIRECTORY environment variable. For example, add the following line to the profile of the master host:

```
export MASTER_DATA_DIRECTORY=/data/master/gpseg-1
```

5 Initialize a HAWQ Instance on Secure HDFS

If the HDFS is configured with security features enabled, additional configurations in this section are required.

Pre-requirement for HDFS

Configure secure HDFS following the instructions in the *Pivotal HD Enterprise 1.1 Stack and Tool Reference Guide*.

**Note:**

To enable secure HDFS in HAWQ, HDFS configurations should be set as below:

"hadoop.rpc.protection" should be set to "authentication"

"dfs.encrypt.data.transfer" should be set to "false"

Make sure owner of /gpsql on HDFS is postgres before doing HAWQ initialization.

For non-secure HDFS, owner of /gpsql on HDFS should be gpadmin.

Make sure /user/gpadmin exists on HDFS and its owner is gpadmin and its access privileges is 777.

For non-secure HDFS, owner of /user/gpadmin on HDFS should be gpadmin with default access privileges.

Create the Principal for HAWQ master

The form of principal of HAWQ master is postgres@REALM, postgres is the default service name of HAWQ and REALM is default realm in Kerberos configuration.

**Note:**

1. Replace REALM with the KDC realm you are using for your HAWQ cluster where it appears.
2. This principal is also used for client GSSAPI authentication.

Create keytab file for HAWQ master

Create a keytab file for the HAWQ master with the principal postgres@REALM. The keytab file can be placed anywhere which is readable for user "gpadmin".

**Note:**

1. For safety reason, keytab file must be only readable for user "gpadmin".
2. This keytab file is also used for client GSSAPI authentication.

Configure \${GPHOME}/etc/hdfs-client.xml

Add the following two parameters into \${GPHOME}/etc/hdfs-client.xml.

hdfs-client.xml

```
<property>
  <name>hadoop.security.authentication</name>
  <value>kerberos</value>
</property>

<property>
  <name>dfs.namenode.kerberos.principal</name>
  <value>HDFS_NAMENODE_PRINCIPAL</value>
</property>
```

**Note:**

1. Replace HDFS_NAMENODE_PRINCIPAL with real Namenode principal configured in HDFS configuration files.
2. This file should be changed on HAWQ master, standby master, and all segments.

Prepare configuration file for command line tool "gpinitssystem"

Uncomment and change the following parameters in the gpinitssystem_config

```
KERBEROS_KEYFILE = /path/to/keytab/file
ENABLE_SECURE_FILESYSTEM = on
```

**Note:**

Replace /path/to/keytab/file with the real keytab file location.

Now, one can initialize a HAWQ instance on secure HDFS.

6 Running a Basic Query

You can run the create database query to test that HAWQ is running:

```
changl1-mbp:gpshl changl1$ psql -d postgres
psql (8.2.15)
Type "help" for help.
postgres=# create database tpch;
CREATE DATABASE
postgres=# \c tpch
You are now connected to database "tpch" as user "changl1".
tpch=# create table t (i int);
NOTICE: Table doesn't have 'DISTRIBUTED BY' clause -- Using column named 'i' as the Greenplum
Database data distribution key for this table.
HINT: The 'DISTRIBUTED BY' clause determines the distribution of data. Make sure column(s)
chosen are the optimal data distribution key to minimize skew.
CREATE TABLE
tpch=# \timing
Timing is on.
tpch=# insert into t select generate_series(1,100);
INSERT 0 100
Time: 311.390 ms
tpch=# select count(*) from t;
count
-----
100
(1 row)
Time: 7.266 ms
```

7 Installing Cryptographic Functions for PostgreSQL

The pgcrypto package contains the cryptographic functions for PostgreSQL. It must be installed separately from the main installation.

**Note:**

Your HAWQ installation must be running, or the pgcrypto package will fail to install.

All the cryptographic functions run inside database server. That means that all the data and passwords move between pgcrypto and the client application in clear-text. This means you must:

- Connect locally or use SSL connections.
- Trust both system and database administrator.

The pgcrypto package can be installed either through automated or manual installation.

7.1 Automated Installation of pgcrypto

These installation instructions assume you have obtained a precompiled build of pgcrypto from Pivotal.

Extract files from the pgcrypto package. For example:

```
mkdir pgcrypto
mv pgcrypto.tgz pgcrypto
tar -xzf pgcrypto/pgcrypto.tgz
```

Run install.sh script with the *hosts* file as argument. The hosts file must contain hostname of each segment, one per line.

```
cd pgcrypto
./pgcrypto_install.sh -f ~/hosts
```

7.2 Manual Installation of pgcrypto

Extract the files from the pgcrypto package as shown in the example below:

```
mkdir pgcrypto
mv pgcrypto.tgz pgcrypto
tar -xzf pgcrypto/pgcrypto.tgz
```

Copy the pgcrypto.so file to the library directory of your Greenplum installation.

```
cp pgcrypto/lib/postgresql/pgcrypto.so $GPHOME/lib/postgresql
```

(Optional) Edit the pgcrypto.sql file and edit the initial SET command that specifies the schema where the pgcrypto objects will be created. By default, they will be created in the "public" schema. For example:

```
vi pgcrypto/share/postgresql/contrib/pgcrypto.sql
SET search_path = YOUR_SCHEMA;
```

Run the commands in the pgcrypto.sql file, using psql to install the pg crypto objects in your database.

```
psql -d template1 -f
pgcrypto/share/postgresql/contrib/pgcrypto.sql
```

7.3 Uninstalling pgcrypto

To uninstall the pgcrypto objects, use uninstall_pgcrypto.sql

8 HAWQ Configuration Parameter Reference

Describes the configuration in the path `$HAWQ_install_path/etc/hdfs-client.xml`.

Parameter	Description	Default value	Comments
<code>ipc.client.connection.maxidletime</code>	The idle timeout interval of a rpc channel, rpc channel will exit if timeout occurs.	10000 (ms)	
<code>ipc.client.connect.max.retries</code>	The max retry times when a rpc channel failed to connect to the server for any reason except timeout.	1	
<code>ipc.client.connect.max.retries</code>	The max retry times when a rpc channel failed to connect to the server for any reason except timeout.	1	
<code>ipc.client.connect.max.retries.on.timeouts</code>	The max retry times when a rpc channel failed to connect to the server since timeout.	1	
<code>ipc.client.connect.timeout</code>	The timeout interval for a rpc channel to connect to the server.	10000 (ms)	
<code>ipc.client.write.timeout</code>	The timeout interval for a rpc channel to write data into socket	10000 (ms)	
<code>ipc.client.tcpnodela</code>	To set rpc channel to tcpnodelay mode	true	
<code>dfs.ConfigKey.type</code>	Default checksum type, valid value is: CRC32, CRC32C, NULL	CRC32C	Must be set to the same value as the HDFS side.
<code>dfs.bytes-per-ConfigKey</code>	The size of chunk to calculate checksum.	512	
<code>dfs.datanode.rpc.timeout</code>	The timeout interval to the client to wait for the datanode to finish a rpc call.	3	

dfs.namenode.rpc.timeout	The timeout interval to the client to wait for the namenode to finish a rpc call.	3600000	
dfs.client.write.packet.size	The packet size for the output stream.	65536	
dfs.client.block.write.retries	The packet size for the output stream.	3	
dfs.client.close.file.timeout	The timeout interval to the output stream to wait for close file operation completion.	3600000 (ms)	
dfs.client.block.write.timeout	Time of timeout interval to the output stream to write data into socket.	3600000 (ms)	
dfs.prefetchsize	The number of blocks which metadatas will be prefetched.	10	
dfs.client_local_block_read_buffer	The buffer size if read block from local file system instead of network.	1048576	
dfs.client.socket.write.timeout	The timeout interval for socket write operation.	3600000 (ms)	
dfs.client.socket.read.timeout	The timeout interval for socket write operation.	3600000 (ms)	
dfs.client.socket.connect.timeout	The timeout interval to setup a tcp socket connection, include resolve host name.	3600000 (ms)	
dfs.client.read.verifychecksum	Input stream will verify checksum.	true	
dfs.client.enable.read.from.local	Enable input stream to read block directly from local file system. Need to configure on server.	true	
dfs.log.file.prefix	The libhdfs3 log file prefix, see glog document.	libhdfs3	
dfs.log.stderr	Output libhdfs3 log to stderr.	true	
dfs.replication	The default number of replica.	3	
dfs.blocksize	The default block size, can be overwritten when create output stream.	67108864	