



Spark Program

CHAPTER 1: HDFS

Chapter Objectives

In this chapter, we will:

- Learn about the Hadoop Distributed Files System (HDFS)
- Run a standalone instance of HDFS
- Create directories and files in HDFS

About HDFS—I

- The Hadoop Distributed File System (HDFS) is the main storage used by Hadoop MapReduce applications
 - Distributed, POSIX-like file system
 - Designed to run on commodity hardware
 - Scales to clusters composed of thousands of nodes
 - Highly fault tolerant
 - Automatically detects hardware faults
 - Supports quick recovery
 - Implemented in Java
- Can be used as a standalone general purpose file system, but relaxes certain POSIX filesystem requirements
 - Designed for storing and reading very large files (>TB)
 - Supports high throughput read and writes
 - Write once, read many
 - Aimed at batch processing
 - Default block size is 128MB
 - Does not support random insertion or modification of data
 - Appending/truncating data is possible

About HDFS—II

- HDFS is used either directly or indirectly by many Big Data and NoSQL applications including:
 - Hadoop
 - Spark
 - HBase
 - Pig
 - Hive
 - Others

Core HDFS Services

- HDFS is implemented as several services which are usually deployed on a cluster of machines
 - Referred to as an HDFS cluster
 - Arranged in a controller/worker architecture
- Core HDFS services include:
 - **NameNode** (controller) stores file system metadata
 - **DataNode** (worker) stores file data (data blocks)
- The NameNode is the master server
 - Implements a POSIX-like hierarchical file system with '/' as the root directory
 - Enforces read/write permissions on files and directories
 - Tracks the location of the data blocks for each file
- The DataNode is the slave server
 - Handles read and write requests from HDFS clients
 - Performs block creation, deletion, and replication as instructed by the NameNode

Start Hadoop



➤ To start Hadoop on the VM

- Open a terminal window and type the following commands:

```
su -  
cd /home/student  
./start-hadoop.sh  
jps
```

➤ From a command line, enter the following commands:

```
hdfs  
hdfs dfs  
hdfs dfs -ls /  
hdfs dfs -put ~/ROI/datasets/northwind/CSV/categories  
/  
hdfs dfs -ls /
```

Start Jupyter



- ➡ To start Jupyter with the latest lesson on the VM
Open a terminal window and type the following commands:

```
cd ~/ROI  
./start.sh
```

- This will launch the browser so you can navigate to which lesson folder you want to work on

Command Line Examples



➤ As we have seen, HDFS provides a command line interface

➤ From a command line, enter the following commands:

```
hdfs
```

```
hdfs dfs
```

```
hdfs dfs -ls /
```

```
hdfs dfs -put ~/ROI/datasets/northwind/CSV/categories /
```

```
hdfs dfs -ls /
```


Chapter Summary

In this chapter, we have:

- Learned about the Hadoop Distributed Files System (HDFS)
- Ran a standalone instance of HDFS
- Created directories and files in HDFS