

实验报告

实验名称	实验五 HDFS 的 Java API 操作		
实验教室	丹青 922	实验日期	2021 年 6 月 22 日
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一、实验目的

1. 通过编写程序实现 HDFS 的目录操作；
2. 通过编写程序实现 HDFS 的文件操作。

二、实验环境

- (1) 计算机的硬件配置 PC 系列微机。
- (2) 计算机的软件配置 VMware 虚拟机软件及 Ubuntu 虚拟机。

三、实验内容及结果

基于伪分布式运行模式或完全分布式运行模式，使用 Maven，进行如下实验：

尽量在一个项目下进行实验，不同的功能通过运行时指定不同主类实现。

2.1 目录操作

1. 创建用户目录；

```
root@DESKTOP-TSQQRSN:/op | root@DESKTOP-TSQQRSN: | + - x
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.FileSystem;
9 import org.apache.hadoop.fs.Path;
10
11 import org.apache.commons.cli.CommandLineParser;
12 import org.apache.commons.cli.BasicParser;
13 import org.apache.commons.cli.Options;
14 import org.apache.commons.cli.CommandLine;
15
16 public class Mkdir
17 {
18     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
19     {
20         CommandLineParser parser = new BasicParser();
21         Options options = new Options();
22         options.addOption("h", "help", false, "Print this usage information");
23         options.addOption("d", "dir", true, "Dir to make");
24         CommandLine commandLine = parser.parse( options, args );
25
26         if( commandLine.hasOption('h') ) {
27             System.out.println( "Help Message" );
28         }
29         else if( commandLine.hasOption('d') ) {
30             System.out.println( "Help Message" );
31             System.exit(0);
32         }
33         else {
34             String file = "";
35             if( commandLine.hasOption('d') ) {
36                 file = commandLine.getOptionValue('d');
37             }
38             else {
39                 System.out.println( "need input param: -d" );
40                 System.exit(1);
41             }
42
43             Configuration conf = new Configuration(); //读取配置文件
44             conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
45
46             //1 获取hdfs客户端对象
47             FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
48             // 三个变量 namenode工作地址 配置文件 用户
49
50             //2 在hdfs上创建路径
51             fs.mkdirs(new Path(file));
52
53             //3 关闭资源
54             fs.close();
55             System.out.printf("HDFS mkdir: %s\n", file);
56         }
57     }
58 }
NORMAL Mkdir.java
java  utf-8[unix]  1% ln :1/54≡ %:1 ≡ [16]trailing
```

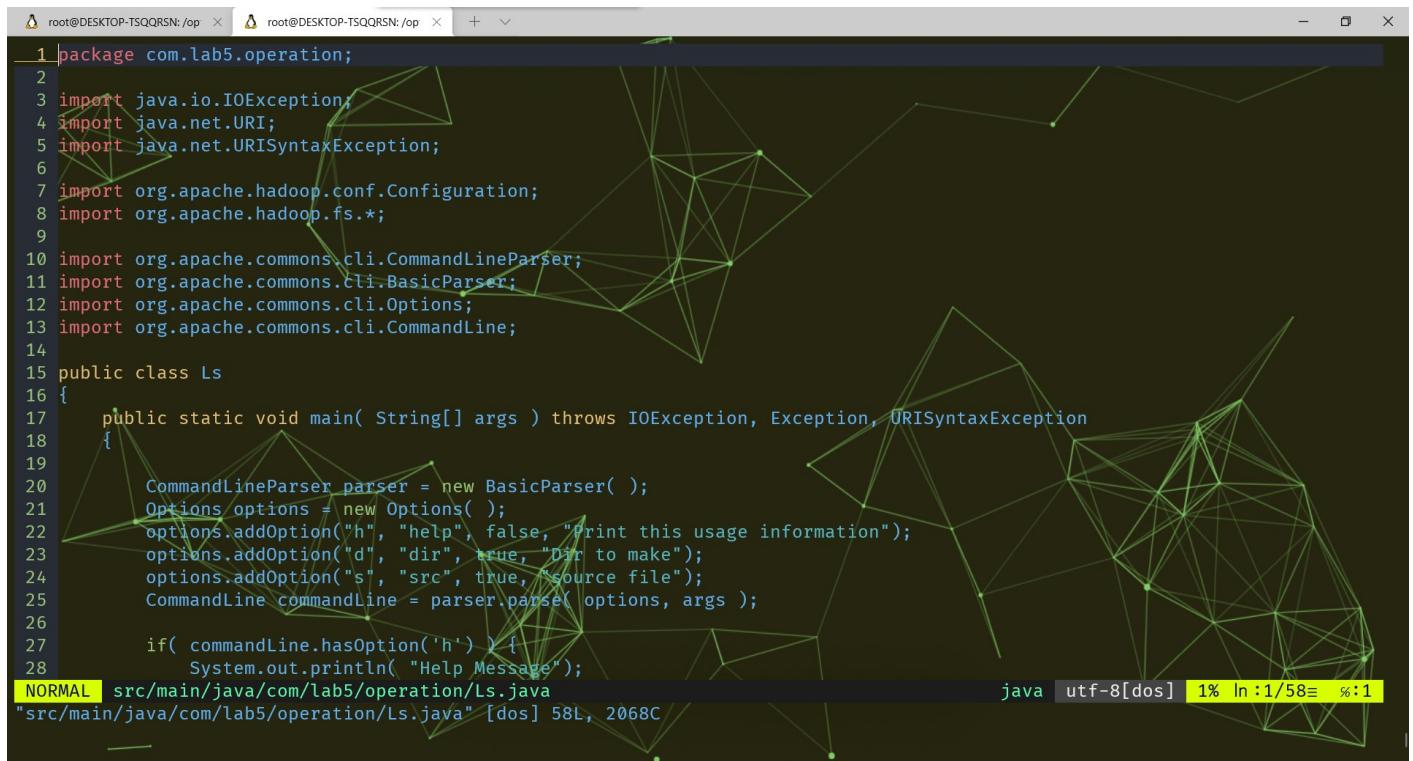
```
root@DESKTOP-TSQQRSN:/op | root@DESKTOP-TSQQRSN:/op | + - x
27
28     if( commandLine.hasOption('h') ) {
29         System.out.println( "Help Message" );
30         System.exit(0);
31     }
32
33     String file = "";
34     if( commandLine.hasOption('d') ) {
35         file = commandLine.getOptionValue('d');
36     }
37     else {
38         System.out.println( "need input param: -d" );
39         System.exit(1);
40     }
41
42     Configuration conf = new Configuration(); //读取配置文件
43     conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
44
45     //1 获取hdfs客户端对象
46     FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
47     // 三个变量 namenode工作地址 配置文件 用户
48
49     //2 在hdfs上创建路径
50     fs.mkdirs(new Path(file));
51
52     //3 关闭资源
53     fs.close();
54     System.out.printf("HDFS mkdir: %s\n", file);
55 }
NORMAL Mkdir.java
java  utf-8[unix]  100% ln :54/54≡ %:1 ≡ [16]trailing
```

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Mkdir -d /user
2021-06-22 17:50:15,822 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS mkdir: /user
```

Browse Directory

/								Go!
Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp	
drwxr-xr-x	root	supergroup	0 B	2021/6/21下午8:35:30	0	0 B	user	

2. 显示 HDFS 中与当前用户对应的目录内容;



```
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.*;
9
10 import org.apache.commons.cli.CommandLineParser;
11 import org.apache.commons.cli.BasicParser;
12 import org.apache.commons.cli.Options;
13 import org.apache.commons.cli.CommandLine;
14
15 public class Ls
16 {
17     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
18     {
19         CommandLineParser parser = new BasicParser();
20         Options options = new Options();
21         options.addOption("h", "help", false, "Print this usage information");
22         options.addOption("d", "dir", true, "Dir to make");
23         options.addOption("s", "src", true, "source file");
24         CommandLine commandLine = parser.parse( options, args );
25
26         if( commandLine.hasOption('h') )
27             System.out.println( "Help Message" );
28     }
29 }
```

The screenshot shows a terminal window with two tabs open, both titled 'root@DESKTOP-TSQQRSN: /op'. The terminal is displaying Java code for a command-line parser named 'Ls'. The code uses the Apache Commons CLI library to handle command-line arguments. It defines a main method that creates a BasicParser, sets up some Options (including 'h' for help, 'd' for directory, and 's' for source file), and then parses the arguments. If the 'h' option is present, it prints a help message. The code is written in Java and is being run in a terminal window with a dark background and light text.

```

34     dest = commandLine.getOptionValue('d');
35   } else {
36     System.out.println( "need input param: -d" );
37     System.exit(1);
38   }
39
40   Configuration conf = new Configuration(); //读取配置文件
41   conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
42
43   //1 获取hdfs客户端对象
44   FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
45   // 三个变量 namenode工作地址 配置文件 用户
46
47   //2 listFile
48   FileStatus[] fileStatuses = fs.listStatus(new Path(dest));
49   for (FileStatus fileStatus : fileStatuses) {
50     if(fileStatus.isFile()) {
51       System.out.println("f: " + fileStatus.getPath().getName());
52     } else {
53       System.out.println("d: " + fileStatus.getPath().getName());
54     }
55   }
56   //3 关闭资源
57   fs.close();
58   System.out.printf("HDFS ls: %s\n", dest);
59 }
60 }
61

```

NORMAL src/main/java/com/lab5/operation/Ls.java java utf-8[dos] 100% ln:61/61≡ %:1

```

root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Ls -d /user
2021-06-22 17:47:05,324 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
f: README.md
HDFS ls: /user

```

Browse Directory

/user								Go!
Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
-rw-r--r--	root	supergroup	34 B	2021/6/21下午8:35:06	1	128 MB	README.md	

3. 列出 HDFS 上的所有目录;

```
root@DESKTOP-TSQQRSN:/op x root@DESKTOP-TSQQRSN:/op x + v
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.*;
9
10 import org.apache.commons.cli.CommandLineParser;
11 import org.apache.commons.cli.BasicParser;
12 import org.apache.commons.cli.Options;
13 import org.apache.commons.cli.CommandLine;
14
15 public class Ls
16 {
17     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
18     {
19         CommandLineParser parser = new BasicParser();
20         Options options = new Options();
21         options.addOption('h', "help", false, "Print this usage information");
22         options.addOption('d', "dir", true, "Dir to make");
23         options.addOption('s', "src", true, "source file");
24         CommandLine commandLine = parser.parse( options, args );
25
26         if( commandLine.hasOption('h') )
27             System.out.println( "Help Message" );
28     }
}
NORMAL src/main/java/com/lab5/operation/Ls.java
"src/main/java/com/lab5/operation/Ls.java" [dos] 58L, 2068C
java utf-8[dos] 1% ln :1/58≡ %:1
```

```
root@DESKTOP-TSQQRSN:/op x root@DESKTOP-TSQQRSN:/op x + v
34     dest = commandLine.getOptionValue('d');
35 } else {
36     System.out.println( "need input param: -d" );
37     System.exit(1);
38 }
39 Configuration conf = new Configuration(); //读取配置文件
40 conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
41
42 //获取hdfs客户端对象
43 FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
44 //三个变量 namenode工作地址 配置文件 用户
45
46 //2 listFile
47 FileStatus[] fileStatuses = fs.listStatus(new Path(dest));
48 for (FileStatus fileStatus : fileStatuses) {
49     if(fileStatus.isFile()) {
50         System.out.println("f: " + fileStatus.getPath().getName());
51     } else {
52         System.out.println("d: " + fileStatus.getPath().getName());
53     }
54 }
55 //3 关闭资源
56 fs.close();
57 System.out.printf("HDFS ls: %s\n", dest);
58 }
59 }
60 }
61 }
NORMAL src/main/java/com/lab5/operation/Ls.java
java utf-8[dos] 100% ln :61/61≡ %:1
```

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Ls -d /
2021-06-22 17:52:04,588 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
d: tmp
d: user
HDFS ls: /
```

Browse Directory

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp
drwxr-xr-x	root	supergroup	0 B	2021/6/21下午8:35:30	0	0 B	user

Hadoop 2015

4. 用户目录下创建一个 input 目录;

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Mkdir -d /user/input
2021-06-22 17:52:44,712 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS mkdir: /user/input
```

Browse Directory

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
-rw-r--r--	root	supergroup	34 B	2021/6/21下午8:35:06	1	128 MB	README.md
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:52:45	0	0 B	input

5. 根目录下创建 input 的目录;

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Mkdir -d /input
2021-06-22 17:53:22,239 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS mkdir: /input
```

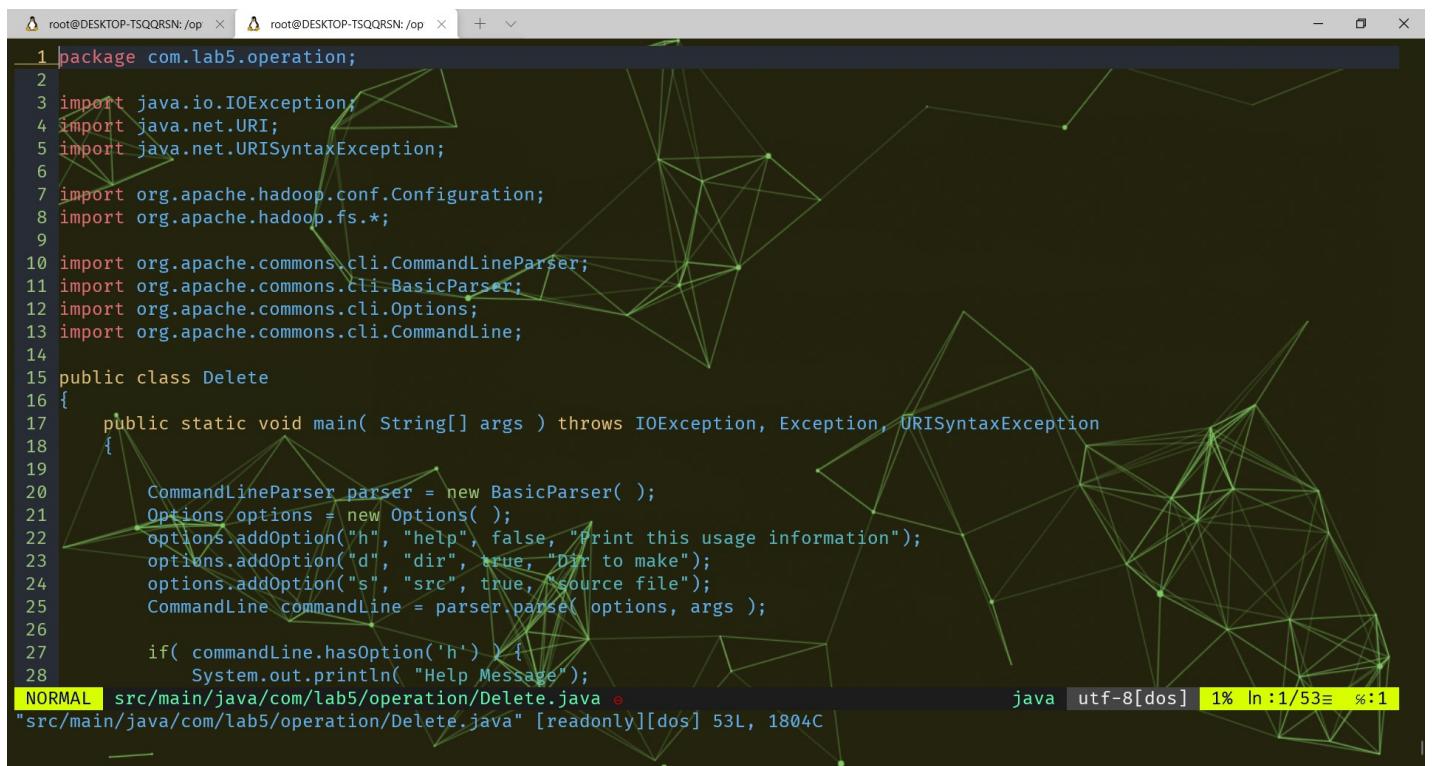
Browse Directory

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:53:22	0	0 B	input
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:52:45	0	0 B	user

6. 删除子目录。

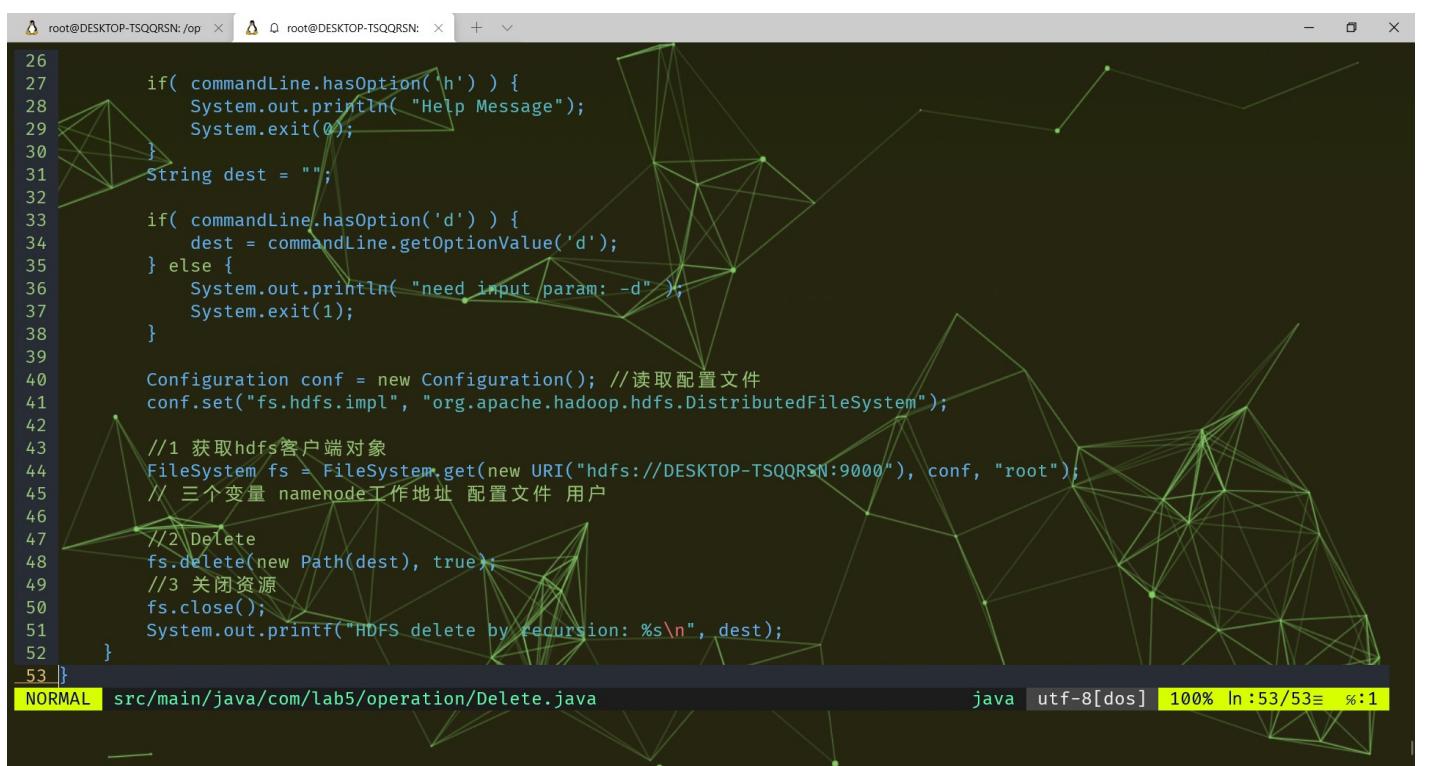
```
root@DESKTOP-TSQQRSN:/op | root@DESKTOP-TSQQRSN:/op | + - x
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.*;
9
10 import org.apache.commons.cli.CommandLineParser;
11 import org.apache.commons.cli.BasicParser;
12 import org.apache.commons.cli.Options;
13 import org.apache.commons.cli.CommandLine;
14
15 public class Delete
16 {
17     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
18     {
19         CommandLineParser parser = new BasicParser();
20         Options options = new Options();
21         options.addOption("h", "help", false, "print this usage information");
22         options.addOption("d", "dir", true, "Dir to make");
23         options.addOption("s", "src", true, "source file");
24         CommandLine commandLine = parser.parse( options, args );
25
26         if( commandLine.hasOption('h') )
27             System.out.println( "Help Message" );
28
NORMAL src/main/java/com/lab5/operation/Delete.java ◊
"src/main/java/com/lab5/operation/Delete.java" [readonly][dos] 53L, 1804C

```



```
root@DESKTOP-TSQQRSN:/op | root@DESKTOP-TSQQRSN: | + - x
26
27     if( commandLine.hasOption('h') )
28         System.out.println( "Help Message" );
29         System.exit(0);
30
31     String dest = "";
32
33     if( commandLine.hasOption('d') )
34         dest = commandLine.getOptionValue('d');
35     else {
36         System.out.println( "need input param: -d" );
37         System.exit(1);
38     }
39
40     Configuration conf = new Configuration(); //读取配置文件
41     conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
42
43     //1 获取hdfs客户端对象
44     FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
45     // 三个变量 namenode工作地址 配置文件 用户
46
47     //2 Delete
48     fs.delete(new Path(dest), true);
49     //3 关闭资源
50     fs.close();
51     System.out.printf("HDFS delete by recursion: %s\n", dest);
52
53 }
NORMAL src/main/java/com/lab5/operation/Delete.java

```



```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Delete -d /input
2021-06-22 17:55:35,901 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS delete by recursion: /input
```

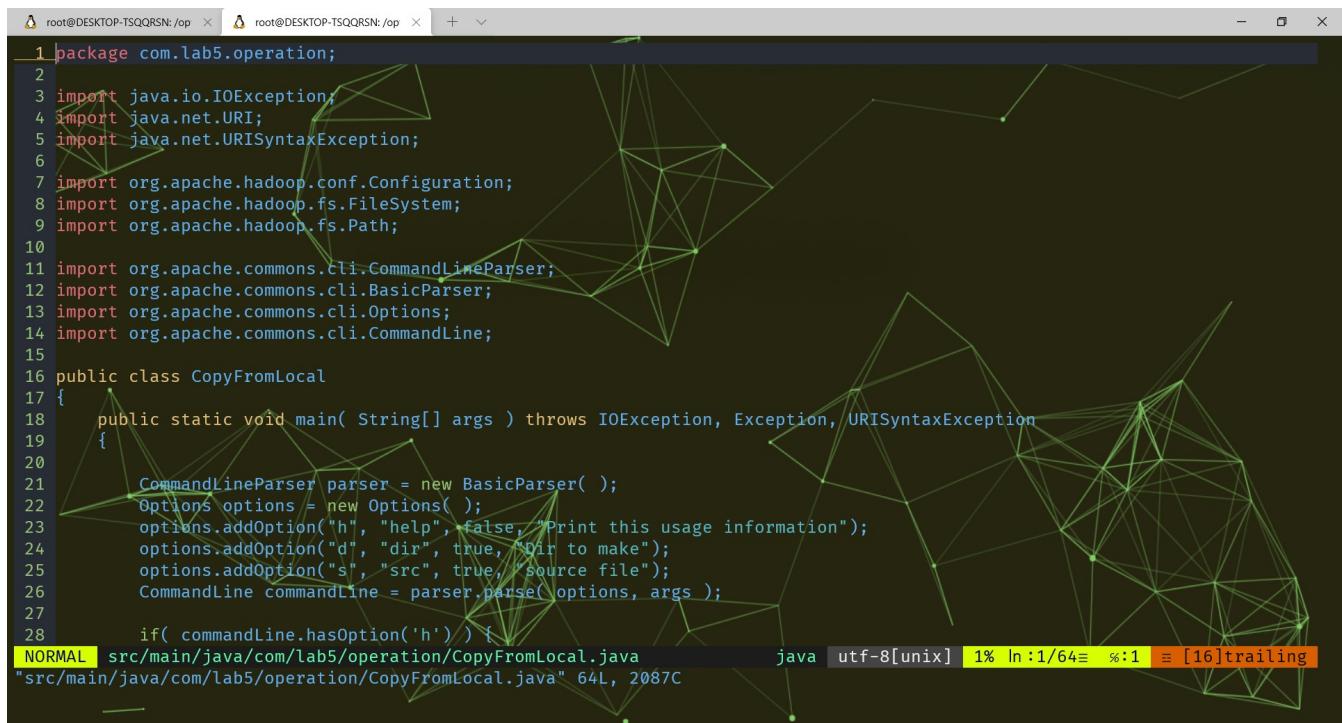
Browse Directory

/								Go!
Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp	
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:52:45	0	0 B	user	

Hadoop, 2015.

2.2 文件操作

1. 向 HDFS 中上传任意文本文件;



The screenshot shows a terminal window with two tabs, both titled "root@DESKTOP-TSQQRSN: /op". The terminal is displaying Java code for a class named CopyFromLocal. The code imports various Java and Apache Hadoop classes, including IOException, URI, URISyntaxException, Configuration, FileSystem, Path, CommandLineParser, BasicParser, Options, and CommandLine. It defines a main method that initializes a CommandLineParser, creates Options, adds options for help, directory, and source file, and then parses command-line arguments. If the 'h' option is present, it prints usage information. The code is annotated with line numbers from 1 to 28. The status bar at the bottom of the terminal window shows "NORMAL src/main/java/com/lab5/operation/CopyFromLocal.java" and "src/main/java/com/lab5/operation/CopyFromLocal.java" 64L, 2087C. The terminal window has a dark background with a green network graph overlay.

```
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.FileSystem;
9 import org.apache.hadoop.fs.Path;
10
11 import org.apache.commons.cli.CommandLineParser;
12 import org.apache.commons.cli.BasicParser;
13 import org.apache.commons.cli.Options;
14 import org.apache.commons.cli.CommandLine;
15
16 public class CopyFromLocal
17 {
18     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
19     {
20         CommandLineParser parser = new BasicParser( );
21         Options options = new Options( );
22         options.addOption("h", "help", false, "Print this usage information");
23         options.addOption("d", "dir", true, "Dir to make");
24         options.addOption("s", "src", true, "source file");
25         CommandLine commandline = parser.parse( options, args );
26
27         if( commandLine.hasOption('h') )
28     }
```

```

37
38
39     }
40     else{
41         System.out.println( "need input param: -s" );
42         System.exit(1);
43     }
44     if( commandLine.hasOption('d') ) {
45         dest = commandLine.getOptionValue('d');
46     } else {
47         System.out.println( "need input param: -d" );
48         System.exit(1);
49     }
50     Configuration conf = new Configuration(); //读取配置文件
51     conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
52
53     //1 获取hdfs客户端对象
54     FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
55     // 三个变量 namenode工作地址 配置文件 用户
56
57     //2 将本地文件上传到hdfs上
58     fs.copyFromLocalFile(new Path(src), new Path(dest));
59
60     //3 关闭资源
61     fs.close();
62     System.out.printf("HDFS copy from local: %s to %s\n", src, dest);
63 }
64

```

NORMAL src/main/java/com/lab5/operation/CopyFromLocal.java java utf-8[unix] 100% ln :64/64 ≈ %:1 ≈ [16]trailing

```

root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.CopyFromLocal -s pom.xml -d /
2021-06-22 18:08:23,194 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS copy from local: pom.xml to /
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs#

```

Browse Directory

/								Go!
Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
-rw-r--r--	root	supergroup	2.19 KB	2021/6/22下午6:08:23	3	128 MB	pom.xml	
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp	
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:52:45	0	0 B	user	

2. 从 HDFS 中下载指定文件;

```
root@DESKTOP-TSQQRSN:/op < root@DESKTOP-TSQQRSN:/op < + <
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.FileSystem;
9 import org.apache.hadoop.fs.Path;
10
11 import org.apache.commons.cli.CommandLineParser;
12 import org.apache.commons.cli.BasicParser;
13 import org.apache.commons.cli.Options;
14 import org.apache.commons.cli.CommandLine;
15
16 public class CopyToLocal
17 {
18     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
19     {
20         CommandLineParser parser = new BasicParser();
21         Options options = new Options();
22         options.addOption("h", "help", false, "Print this usage information");
23         options.addOption("d", "dir", true, "Dir to make");
24         options.addOption("s", "src", true, "source file");
25         CommandLine commandline = parser.parse( options, args );
26
27         if( commandline.hasOption('h') )
28             if( commandline.hasOption('d') )
29                 dest = commandline.getOptionValue('d');
30             else {
31                 System.out.println( "need input param: -d" );
32                 System.exit(1);
33             }
34
35         Configuration conf = new Configuration(); //读取配置文件
36         conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
37
38         //1 获取hdfs客户端对象
39         FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
40         // 三个变量 namenode工作地址 配置文件 用户
41
42         //2 将本地文件上传到hdfs上
43         fs.copyToLocalFile(new Path(src), new Path(dest));
44
45         //3 关闭资源
46         fs.close();
47         System.out.printf("HDFS copy to local: %s to %s\n", src, dest);
48     }
49
50 }
51
52
53
54
55
56
57
58
59
60
61
62
63
64 }
```

NORMAL src/main/java/com/lab5/operation/CopyToLocal.java [readonly][dos] 64L, 2138C

java utf-8[dos] 1% ln:1/64≡ %:1

```
root@DESKTOP-TSQQRSN:/op < root@DESKTOP-TSQQRSN: < + <
37
38     } else{
39         System.out.println( "need input param: -s" );
40         System.exit(1);
41     }
42
43     if( commandline.hasOption('d') ) {
44         dest = commandline.getOptionValue('d');
45     } else {
46         System.out.println( "need input param: -d" );
47         System.exit(1);
48     }
49
50     Configuration conf = new Configuration(); //读取配置文件
51     conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
52
53     //1 获取hdfs客户端对象
54     FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
55     // 三个变量 namenode工作地址 配置文件 用户
56
57     //2 将本地文件上传到hdfs上
58     fs.copyToLocalFile(new Path(src), new Path(dest));
59
60     //3 关闭资源
61     fs.close();
62     System.out.printf("HDFS copy to local: %s to %s\n", src, dest);
63 }
64 }
```

NORMAL src/main/java/com/lab5/operation/CopyToLocal.java

java utf-8[dos] 100% ln:64/64≡ %:1

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.CopyToLocal -s /user/README.md -d .
2021-06-22 18:13:48,318 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS copy to local: /user/README.md to .
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# ls
README.md  hadoop-hdfs-code.iml  pom.xml  src  target
```

3. 输出 HDFS 指定文件到终端中;

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Ls -d /pom.xml
2021-06-22 20:30:04,633 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
f: pom.xml
HDFS ls: /pom.xml
```

4. 显示 HDFS 中指定的文件信息;

```
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.*;
9
10 import org.apache.commons.cli.CommandLineParser;
11 import org.apache.commons.cli.BasicParser;
12 import org.apache.commons.cli.Options;
13 import org.apache.commons.cli.CommandLine;
14
15 import javax.print.DocFlavor;
16
17 public class ListFiles
18 {
19     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
20     {
21         CommandLineParser parser = new BasicParser();
22         Options options = new Options();
23         options.addOption("h", "help", false, "Print this usage information");
24         options.addOption("d", "dir", true, "Dir to make");
25         options.addOption("s", "src", true, "source file");
26         CommandLine commandLine = parser.parse( options, args );
27
28     }
29 }
```

NORMAL src/main/java/com/lab5/operation/ListFiles.java e
"src/main/java/com/lab5/operation/ListFiles.java" [readonly][dos] 69L, 2565C

java utf-8[dos] 1% ln :1/69 ≡ %:1

```
42 Configuration conf = new Configuration(); //读取配置文件
43 conf.set("fs.hdfs.impl", "org.apache.hadoop.DistributedFileSystem");
44
45 //1 获取hdfs客户端对象
46 FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
47 // 三个变量 namenode工作地址 配置文件 用户
48
49 //2 ListFiles
50 RemoteIterator<LocatedFileStatus> listFiles = fs.listFiles(new Path(dest), true);
51 while(listFiles.hasNext()){
52     LocatedFileStatus fileStatus = listFiles.next();
53     System.out.println(fileStatus.getPath().getName());
54     System.out.println(fileStatus.getPermission());
55     System.out.println(fileStatus.getLength());
56     BlockLocation[] blockLocations = fileStatus.getBlockLocations();
57     for(BlockLocation blockLocation : blockLocations){
58         String[] hosts = blockLocation.getHosts();
59         for(String host : hosts){
60             System.out.println(host);
61         }
62     }
63     System.out.println("-----");
64 }
65 //3 关闭资源
66 fs.close();
67 System.out.printf("HDFS ListFiles: %s\n", dest);
68 }
69 }
```

NORMAL src/main/java/com/lab5/operation/ListFiles.java e
"src/main/java/com/lab5/operation/ListFiles.java" [dos] 69L, 69E

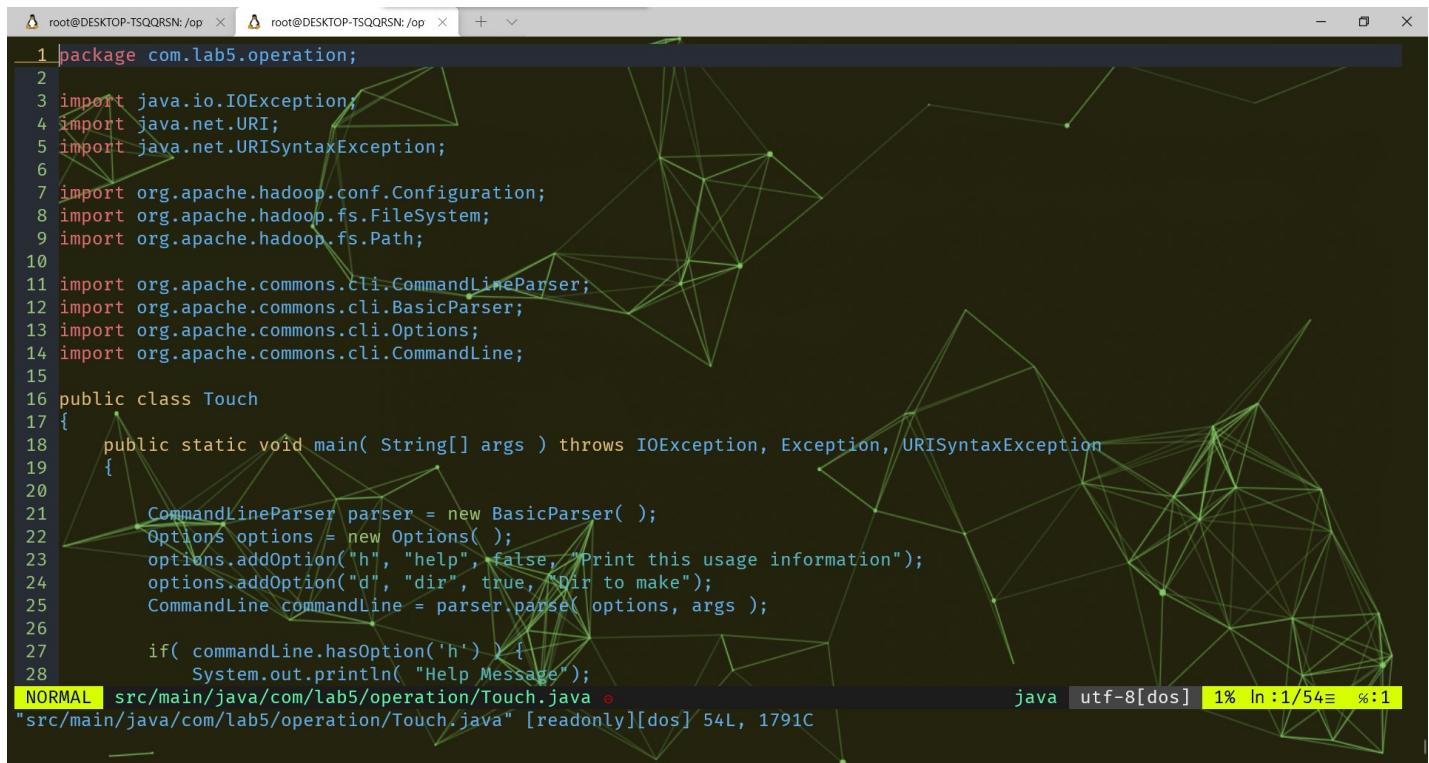
java utf-8[dos] 100% ln :69/69 ≡ %:1

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.ListFiles -d /pom.xml
2021-06-22 20:41:36,750 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
pom.xml
rw-r--r-
2239
DESKTOP-TSQQRSN
-----
HDFS ListFiles: /pom.xml
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# |
```

5. 输出 HDFS 指定目录下文件信息;

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.ListFiles -d /
2021-06-22 20:43:18,412 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
pom.xml
rw-r--r--
2239
DESKTOP-TSQQRSN
-----
README.md
rw-r--r--
34
DESKTOP-TSQQRSN
-----
HDFS ListFiles: /
```

6. 指定路径创建和删除文件;



```
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.FileSystem;
9 import org.apache.hadoop.fs.Path;
10
11 import org.apache.commons.cli.CommandLineParser;
12 import org.apache.commons.cli.BasicParser;
13 import org.apache.commons.cli.Options;
14 import org.apache.commons.cli.CommandLine;
15
16 public class Touch
17 {
18     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
19     {
20         CommandLineParser parser = new BasicParser();
21         Options options = new Options();
22         options.addOption("h", "help", false, "Print this usage information");
23         options.addOption("d", "dir", true, "Dir to make");
24         CommandLine commandLine = parser.parse( options, args );
25
26         if( commandLine.hasOption('h') )
27             System.out.println( "Help Message" );
28     }
29 }
```

The screenshot shows a terminal window with two tabs open. The current tab displays the Java code for the `Touch` class, which implements a command-line interface for creating files in HDFS. The code uses the Apache Commons CLI library for parsing command-line arguments. The terminal window also shows the file path `src/main/java/com/lab5/operation/Touch.java` and its size `54L, 1791C`. The status bar at the bottom indicates the file is in `NORMAL` mode, encoded in `utf-8`, and has `1%` completion.

```

27     if( commandLine.hasOption('h') ) {
28         System.out.println( "Help Message");
29         System.exit(0);
30     }
31     String file = "";
32     if( commandLine.hasOption('d') ) {
33         file = commandLine.getOptionValue('d');
34     } else {
35         System.out.println( "need input param: -d" );
36         System.exit(1);
37     }
38
39     Configuration conf = new Configuration(); //读取配置文件
40     conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
41
42     //1 获取hdfs客户端对象
43     FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSN:9000"), conf, "root");
44     // 三个变量 namenode工作地址 配置文件 用户
45
46     //2 在hdfs上创建路径
47     fs.createNewFile(new Path(file));
48
49     //3 关闭资源
50     fs.close();
51     System.out.printf("HDFS touch: %s\n", file);
52 }
53 }
54 }

```

NORMAL src/main/java/com/lab5/operation/Touch.java ① java utf-8[dos] 100% ln :54/54 ≈ :1

```

root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Touch -d /test.txt
2021-06-22 21:01:52,733 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS touch: /test.txt

```

Browse Directory

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
-rw-r--r--	root	supergroup	2.19 KB	2021/6/22下午6:08:23	3	128 MB	pom.xml
-rw-r--r--	root	supergroup	0 B	2021/6/22下午9:01:53	3	128 MB	test.txt
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:52:45	0	0 B	user

```

root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Delete -d /test.txt
2021-06-22 21:02:45,134 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS delete by recursion: /test.txt

```

Browse Directory

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
-rw-r--r--	root	supergroup	2.19 KB	2021/6/22下午6:08:23	3	128 MB	pom.xml
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:52:45	0	0 B	user
..							

7. 指定路径创建和删除目录;

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Mkdir -d /cc/c
2021-06-22 20:45:11,203 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS mkdir: /cc/c
```

Browse Directory

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午8:45:11	0	0 B	c

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Delete -d /cc
2021-06-22 20:45:51,573 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS delete by recursion: /cc
```

Browse Directory

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
-rw-r--r--	root	supergroup	2.19 KB	2021/6/22下午6:08:23	3	128 MB	pom.xml
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:52:45	0	0 B	user

8. 向 HDFS 中指定的文件追加内容;

```
root@DESKTOP-TSQQRSN:/op | root@DESKTOP-TSQQRSN:/op | + | - | X |  
1 package com.lab5.operation;  
2  
3 import java.io.*;  
4 import java.net.URI;  
5 import java.net.URISyntaxException;  
6  
7 import org.apache.hadoop.conf.Configuration;  
8 import org.apache.hadoop.fs.FileSystem;  
9 import org.apache.hadoop.fs.Path;  
10 import org.apache.hadoop.io.IOUtils;  
11  
12 import org.apache.commons.cli.CommandLineParser;  
13 import org.apache.commons.cli.BasicParser;  
14 import org.apache.commons.cli.Options;  
15 import org.apache.commons.cli.CommandLine;  
16  
17 public class Append  
18 {  
19     public static void main( String[] args ) throws IOException, Exception, URISyntaxException  
20     {  
21         CommandLineParser parser = new BasicParser( );  
22         Options options = new Options( );  
23         options.addOption("h", "help", false, "Print this usage information");  
24         options.addOption("s", "src", true, "source file");  
25         options.addOption("d", "dest", true, "destination file to append");  
26         CommandLine commandLine = parser.parse( options, args );  
27  
28     }  
29 }  
NORMAL <operation/Append.java java utf-8[unix] 1% ln:1/71≡ %:1 ≡ [36]trailing [31]mixed-indent [31:19]mix-indent-file  
"src/main/java/com/lab5/operation/Append.java" 71L, 2340C
```

```
root@DESKTOP-TSQQRSN:/op | root@DESKTOP-TSQQRSN:/op | + | - | X |  
44     dest = commandLine.getOptionValue('d');  
45     } else {  
46         System.out.println( "need input param: -d" );  
47         System.exit(1);  
48     }  
49     Configuration conf = new Configuration();  
50     conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");  
51     conf.setBoolean("dfs.supportappend", true);  
52     FileSystem fs = null;  
53  
54     try {  
55         //1 获取hdfs客户端对象  
56         String hdfs_path = "hdfs://DESKTOP-TSQQRSN:9000" + dest;  
57         //FileSystem fs = FileSystem.get(new URI("hdfs://hadoop1:9000"), conf, "root");  
58         fs = FileSystem.get(new URI(hdfs_path), conf, "root");  
59         InputStream in = new BufferedInputStream(new FileInputStream(src));  
60         OutputStream out = fs.append(new Path(hdfs_path));  
61         IOUtils.copyBytes(in, out, 4096);  
62     } catch (IOException e) {  
63         e.printStackTrace();  
64     }  
65     //3 关闭资源  
66     fs.close();  
67 }  
71 }  
NORMAL <action/Append.java java utf-8[unix] 100% ln:71/71≡ %:1 ≡ [36]trailing [31]mixed-indent [31:19]mix-indent-file
```

```
root@DESKTOP-TSQQRSN:/opt/apache-maven-3.0.5/workplace/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Append -s README.md -d /README.md  
2021-06-22 21:12:38,660 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform ... using builtin-java classes where applicable
```

```
root@DESKTOP-TSQQRSPN:/opt/apache-maven-3.0.5/work_place/hdfs# hadoop fs -cat /README.md
My love is lby.
My name is liusy.
My love is lby.
My name is liusy.
```

9. 删除 HDFS 中指定的文件;

```
root@DESKTOP-TSQQRSPN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Delete -d /README.md
2021-06-22 21:14:26,254 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS delete by recursion: /README.md
```

Browse Directory

/								Go!
Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
-rw-r--r--	root	supergroup	2.19 KB	2021/6/22下午6:08:23	3	128 MB	pom.xml	
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp	
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午5:52:45	0	0 B	user	

10. 删除 HDFS 中指定的目录;

```
root@DESKTOP-TSQQRSPN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Delete -d /user
2021-06-22 21:15:23,602 WARN  [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS delete by recursion: /user
```

Browse Directory

/								Go!
Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
-rw-r--r--	root	supergroup	2.19 KB	2021/6/22下午6:08:23	3	128 MB	pom.xml	
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp	

11. 将文件从源路径移动到目的路径

```
1 package com.lab5.operation;
2
3 import java.io.IOException;
4 import java.net.URI;
5 import java.net.URISyntaxException;
6
7 import org.apache.hadoop.conf.Configuration;
8 import org.apache.hadoop.fs.FileSystem;
9 import org.apache.hadoop.fs.Path;
10
11 import org.apache.commons.cli.CommandLineParser;
12 import org.apache.commons.cli.BasicParser;
13 import org.apache.commons.cli.Options;
14 import org.apache.commons.cli.CommandLine;
15
16 public class Rename
17 {
18     public static void main( String[] args ) throws IOException, Exception, URISyntaxException
19     {
20         CommandLineParser parser = new BasicParser();
21         Options options = new Options();
22         options.addOption("h", "help", false, "Print this usage information");
23         options.addOption("d", "dir", true, "Dir to make");
24         options.addOption("s", "src", true, "source file");
25         CommandLine commandLine = parser.parse( options, args );
26
27         if( commandLine.hasOption('h') ) {
28             if( commandLine.hasOption('d') ) {
29                 dest = commandLine.getOptionValue('d');
30             } else {
31                 System.out.println( "need input param: -d" );
32                 System.exit(1);
33             }
34
35             Configuration conf = new Configuration(); //读取配置文件
36             conf.set("fs.hdfs.impl", "org.apache.hadoop.hdfs.DistributedFileSystem");
37
38             //1 获取hdfs客户端对象
39             FileSystem fs = FileSystem.get(new URI("hdfs://DESKTOP-TSQQRSPN:9000"), conf, "root");
40
41             // 三个变量 namenode工作地址 配置文件 用户
42
43             //2 rename
44             fs.rename(new Path(src), new Path(dest));
45
46             //3 关闭资源
47             fs.close();
48             System.out.printf("HDFS rename from %s to %s\n", src, dest);
49         }
50     }
51 }
52
53
54
55
56
57
58
59
60
61
62
63
64 }
```

NORMAL src/main/java/com/lab5/operation/Rename.java e

java utf-8[dos] 1% ln:1/64≡ %:1

```
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64 }
```

NORMAL src/main/java/com/lab5/operation/Rename.java e

java utf-8[dos] 100% ln:64/64≡ %:1

```
root@DESKTOP-TSQQRSPN:/opt/apache-maven-3.0.5/work_place/hdfs# java -cp target/hadoop-hdfs-code-1.0-SNAPSHOT-jar-with-dependencies.jar com.lab5.operation.Rename -s /pom.xml -d /user/pom.xml
2021-06-22 21:17:41,217 WARN [org.apache.hadoop.util.NativeCodeLoader] - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HDFS rename from /pom.xml to /user/pom.xml
```

Browse Directory

/ Go!

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
drwxrwx---	root	supergroup	0 B	2021/5/29下午1:09:18	0	0 B	tmp
drwxr-xr-x	root	supergroup	0 B	2021/6/22下午9:17:41	0	0 B	user

Hadoop, 2015.

Browse Directory

/user Go!

Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
-rw-r--r--	root	supergroup	2.19 KB	2021/6/22下午6:08:23	3	128 MB	pom.xml

四、 实验过程分析与讨论

对于实现 Java API 操作还是不太熟练，对于 jar 包的掌握还有待加强，通过编写程序实现 HDFS 的目录操作，通过编写程序实现 HDFS 的文件操作。

五、指导教师意见

指导教师签字：卢洋