READ ME

Name node: 159.89.33.2

User: root

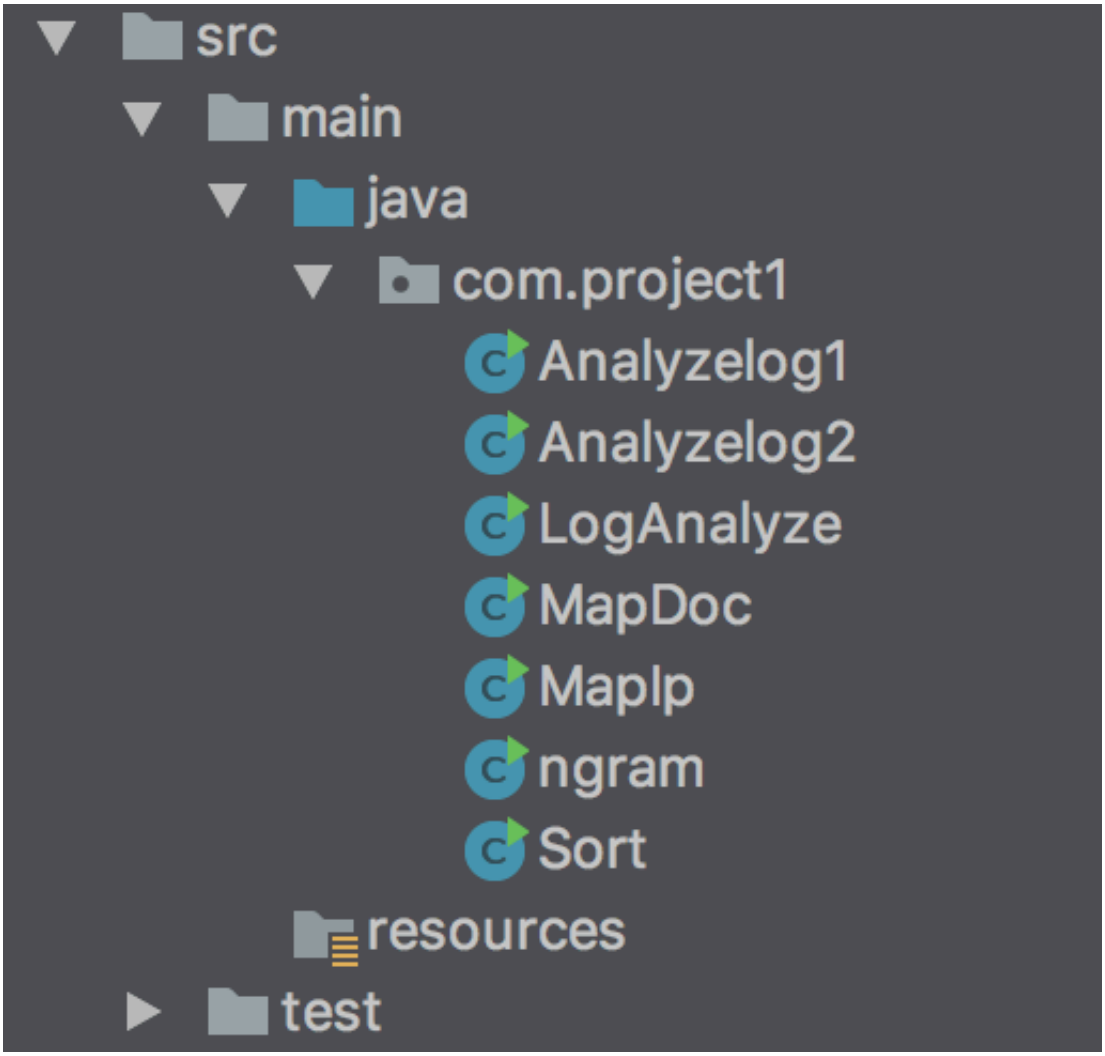
password: Jinruoyu123

Execute the shell script

```
start-all.sh
. ~/project1/project1.sh
```

package name: com.project1

project structure:



Part3

Generate data:

#generate data

```
1  hadoop jar $HADOOP_HOME/share/hadoop/mapreduce/hadoop-mapreduce-
   examples-2.7.5.jar randomtextwriter -
   Dmapreduce.randomtextwriter.totalbytes=10240 /data/ngram/test_big
```

java class: ngram

function description:

- Main: Create a new Instance of Job object;
    - Set n of ngram arg[0] and put it into configuration;
    - Set mapper class;
    - Set reducer class;
    - Set Output key/value;
    - Set Input filepath args[1];
    - Set Input filepath args[2];
- Mapper:
    - Setup function: get n from configuration;
    - Map function:
        - tokenize input word by StringTokenizer;
        - iteratively get the input by nextToken;
        - divide the word into ngram with the parameter n and write (word,1) to context.
- Reducer:
    - Get total frequency of each ngram part of characters.
    - write (word,frequence) to context.

Part4:

Q1:

java class: Analyzelog1

- Main: Create a new Instance of Job object;
    - Set mapper class;
    - Set reducer class;
    - Set Output key/value;
    - Set Input filepath args[0];
    - Set Input filepath args[1].
- Mapper:
    - Map function:

        - tokenize input word by StringTokenizer;
        - iteratively get the input by nextToken;
        - use pattern matcher to separate one log into %h %l %u %t \"%r\" %>s %b.
        - get the path equal to specific path in matcher.group(5).
        - write (word,1) to context
- Reducer:
    - Get total frequency of the specific Path.
    - write (word,frequence) to context.

Q2:

java class: Analyzelog1

- Main: Create a new Instance of Job object;
    - Set mapper class;
    - Set reducer class;
    - Set Output key/value;
    - Set Input filepath args[0];
    - Set Input filepath args[1].
- Mapper:
    - Map function:
        - tokenize input word by StringTokenizer;
        - iteratively get the input by nextToken;
        - use pattern matcher to separate one log into %h %l %u %t \"%r\" %>s %b.
        - get the path equal to specific IP in matcher.group(1).
        - write (word,1) to context
- Reducer:
    - Get total frequency of the specific IP.
    - write (word,frequence) to context.

Q3:

First phase get all paths:

java class: MapDoc

- Main: Create a new Instance of Job object;
    - Set mapper class;
    - Set reducer class;
    - Set Output key/value;
    - set sort comparator
    - Set Input filepath args[0];
    - Set Input filepath args[1].
- Mapper:

    - Map function:
        - tokenize input word by line;
        - use pattern matcher `"(?<=GET).*?(?=HTTP)"`to get file path.
        - write (word,1) to context
- Reducer:
    - Get total frequency of each path.
    - write (word,frequence) to context.

Second phase rank the result:

java class: Sort

- Main: Create a new Instance of Job object;
    - Set mapper class;
    - Set reducer class;
    - Set Output key/value;
    - **setSortComparatorClass;**
    - Set Input filepath args[0];
      Set Input filepath args[1].
- Mapper:
    - Map function:
        - tokenize input text by delimeter " ";
        - exchange the key and value;
        - write(value,key) to context.
    - Reconstruct class My Comparator:
        - Reconstruct two compare function and use it to sort the output into Descending order.
    - Reduce function:
        - just write the (value,key) to context.

Q4:

First phase get all paths:

java class: MapIp

- Main: Create a new Instance of Job object;
    - Set mapper class;
    - Set reducer class;
    - Set Output key/value;
    - set sort comparator
    - Set Input filepath args[0];
    - Set Input filepath args[1].
- Mapper:

    - Map function:
        - tokenize input word by line;
        - use pattern matcher "`(\\d{1,3}\\.\\d{1,3}\\.\\d{1,3}\\.\\d{1,3})`" to get IP address;
        - write (word,1) to context.
- Reducer:
    - Get total frequency of each IP address;
    - write (word,frequence) to context.

Second phase rank the result:

java class: Sort