Session 5: ADVANCE MAP REDUCE AND INTRODUCTION TO UNIX CONCEPTS

Assignment 5

Problem Statement

Dataset is sample data of songs heard by users on an online streaming platform. The

Description of data set attached in musicdata.txt is as follows: -

1st Column - UserId

2nd Column - TrackId

3rd Column - Songs Share status (1 for shared, 0 for not shared)

4th Column - Listening Platform (Radio or Web - 0 for radio, 1 for web)

5th Column - Song Listening Status (0 for skipped, 1 for fully heard)

Write Map Reduce program for following tasks.

Task 1:

- Find the number of unique listeners in the data set.

CODE written for the resolution:

```
package task1_Assignment5;


import java.io.IOException;
import java.util.HashSet;
import java.util.Set;


import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;


import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.Mapper;
import org.apache.hadoop.mapreduce.Reducer;
```

```
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class UniqueListeners {
	private enum COUNTERS {
		INVALID_RECORD_COUNT
	}

	public static void main(String[] args) throws Exception {
		Configuration conf = new Configuration();
		if (args.length != 2) {
			System.err.println("Usage: uniquelisteners <in> <out>");
			System.exit(2);
		}
		Job job = new Job(conf, "Unique listeners per track");
		job.setJarByClass(UniqueListeners.class);
		job.setMapperClass(UniqueListenersMapper.class);
		job.setReducerClass(UniqueListenersReducer.class);
		job.setOutputKeyClass(IntWritable.class);
		job.setOutputValueClass(IntWritable.class);
		FileInputFormat.addInputPath(job, new Path(args[0]));
		FileOutputFormat.setOutputPath(job, new Path(args[1]));
		System.exit(job.waitForCompletion(true) ? 0 : 1);
		org.apache.hadoop.mapreduce.Counters counters = job.getCounters();
		System.out.println("No. of Invalid Records :"
				+ counters.findCounter(COUNTERS.INVALID_RECORD_COUNT)
						.getValue());
	}

	public static class UniqueListenersReducer extends
			Reducer<IntWritable, IntWritable, IntWritable, IntWritable> {
```

```
		public void reduce(
				IntWritable trackId,
				Iterable<IntWritable> userIds,
				Reducer<IntWritable, IntWritable, IntWritable, IntWritable>.Context
context)
				throws IOException, InterruptedException {

			Set<Integer> userIdSet = new HashSet<Integer>();
			for (IntWritable userId : userIds) {
				userIdSet.add(userId.get());
			}
			IntWritable size = new IntWritable(userIdSet.size());
			context.write(trackId, size);
		}
	}

	public static class UniqueListenersMapper extends
			Mapper<Object, Text, IntWritable, IntWritable> {

		IntWritable trackId = new IntWritable();
		IntWritable userId = new IntWritable();

		public void map(Object key, Text value,
				Mapper<Object, Text, IntWritable, IntWritable>.Context context)
				throws IOException, InterruptedException {

			String[] parts = value.toString().split("[|]");
			trackId.set(Integer.parseInt(parts[1]));
			userId.set(Integer.parseInt(parts[0]));

			if (parts.length == 5) {
```

```
                    context.write(trackId, userId);
                } else {
                    // add counter for invalid records
        context.getCounter(COUNTERS.INVALID_RECORD_COUNT).increment(1L);
                    }

                }
        }
}
```

Output

Command used to run the user-count.jar created:

```
[acadgild@localhost ~]$ hadoop jar /home/acadgild/user_count.jar /user/acadgild/
hadoop/musicdata.txt /user/acadgild/hadoop/user_countpertrackoutput1
18/12/12 05:00:07 WARN util.NativeCodeLoader: Unable to load native-hadoop libra
```

Output of the jar file execution seen as contents of file ‘’part-r-00000”of the directory “user_countpertrackoutput1” :

```
[acadgild@localhost ~]$ hadoop fs -cat /user/acadgild/hadoop/user_countpertracko
utput1/part-r-00000
18/12/12 05:00:56 WARN util.NativeCodeLoader: Unable to load native-hadoop libra
ry for your platform... using builtin-java classes where applicable
222     1
223     1
225     2
[acadgild@localhost ~]$
```

Task 2:

- What are the number of times a song was heard fully?

Code written for the task:

```
package task1_Assignment5;


import java.io.IOException;

import java.util.HashSet;

import java.util.Set;


import org.apache.hadoop.conf.Configuration;

import org.apache.hadoop.fs.Path;
```

```
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.Mapper;
import org.apache.hadoop.mapreduce.Reducer;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class SongFullyHeard {
   private enum COUNTERS {
      INVALID_RECORD_COUNT
   }

   public static void main(String[] args) throws Exception {
      Configuration conf = new Configuration();
      /**if (args.length != 2) {
         System.err.println("Usage: No. of times fully heard per track <in> <out>");
         System.exit(2);
      }**/
      Job job = new Job(conf, "No. of times fully heard per track");
      job.setJarByClass(SongFullyHeard.class);
      job.setMapperClass(SongFullyHeardMapper.class);
      job.setReducerClass(SongFullyHeardReducer.class);
      job.setOutputKeyClass(IntWritable.class);
      job.setOutputValueClass(IntWritable.class);
      FileInputFormat.addInputPath(job, new Path(args[0]));
      FileOutputFormat.setOutputPath(job, new Path(args[1]));
      System.exit(job.waitForCompletion(true) ? 0 : 1);
      org.apache.hadoop.mapreduce.Counters counters = job.getCounters();
      System.out.println("No. of Invalid Records :"
```

```
        + counters.findCounter(COUNTERS.INVALID_RECORD_COUNT)
              .getValue());
}

public static class SongFullyHeardReducer extends
      Reducer<IntWritable, IntWritable, IntWritable, IntWritable> {

   public void reduce(
         IntWritable trackId,
         Iterable<IntWritable> heardStatuses,
         Reducer<IntWritable, IntWritable, IntWritable, IntWritable>.Context context)
         throws IOException, InterruptedException {

      Set<Integer> heardStatusSet = new HashSet<Integer>();
      for (IntWritable heardStatus : heardStatuses) {
         if(heardStatus.equals(new IntWritable(1))) {
         heardStatusSet.add(heardStatus.get());
         }
      }
      IntWritable size = new IntWritable(heardStatusSet.size());
      context.write(trackId, size);
   }
}

public static class SongFullyHeardMapper extends
      Mapper<Object, Text, IntWritable, IntWritable> {

   IntWritable trackId = new IntWritable();
   IntWritable heardStatus = new IntWritable();

   public void map(Object key, Text value,
```

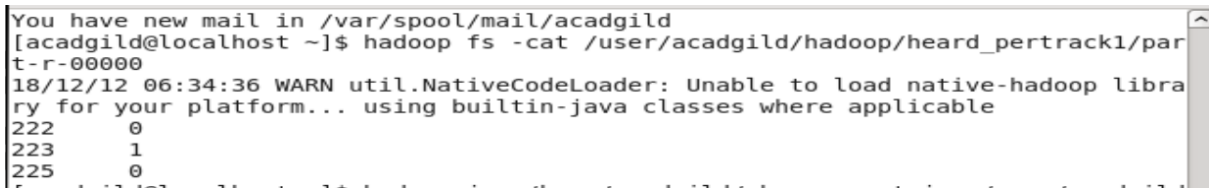
```
        Mapper<Object, Text, IntWritable, IntWritable>.Context context)
        throws IOException, InterruptedException {

      String[] parts = value.toString().split("[|]");
      trackId.set(Integer.parseInt(parts[1]));
      heardStatus.set(Integer.parseInt(parts[4]));

      if (parts.length == 5) {
        context.write(trackId, heardStatus);
      } else {
        // add counter for invalid records
        context.getCounter(COUNTERS.INVALID_RECORD_COUNT).increment(1L);
      }

    }
  }
}
```

OUTPUT:



Task 3:

- What are the number of times a song was shared?

Code written for execution of task:

```
package task1_Assignment5;

import java.io.IOException;
import java.util.HashSet;
import java.util.Set;
```

```
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;

import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.Mapper;
import org.apache.hadoop.mapreduce.Reducer;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class SongShareCount {
   private enum COUNTERS {
      INVALID_RECORD_COUNT
   }

   public static void main(String[] args) throws Exception {
      Configuration conf = new Configuration();

      Job job = new Job(conf, "No. of times per track is shared");
      job.setJarByClass(SongShareCount.class);
      job.setMapperClass(SongShareCountMapper.class);
      job.setReducerClass(SongShareCountReducer.class);
      job.setOutputKeyClass(IntWritable.class);
      job.setOutputValueClass(IntWritable.class);
      FileInputFormat.addInputPath(job, new Path(args[0]));
      FileOutputFormat.setOutputPath(job, new Path(args[1]));
      System.exit(job.waitForCompletion(true) ? 0 : 1);
      org.apache.hadoop.mapreduce.Counters counters = job.getCounters();
      System.out.println("No. of Invalid Records :"
```

```
        + counters.findCounter(COUNTERS.INVALID_RECORD_COUNT)
              .getValue());
}

public static class SongShareCountReducer extends
      Reducer<IntWritable, IntWritable, IntWritable, IntWritable> {

   public void reduce(
         IntWritable trackId,
         Iterable<IntWritable> sharedStatuses,
         Reducer<IntWritable, IntWritable, IntWritable, IntWritable>.Context context)
         throws IOException, InterruptedException {

      Set<Integer> sharedStatusSet = new HashSet<Integer>();
      for (IntWritable sharedStatus : sharedStatuses) {
         if(sharedStatus.equals(new IntWritable(1))) {
            sharedStatusSet.add(sharedStatus.get());
         }
      }
      IntWritable size = new IntWritable(sharedStatusSet.size());
      context.write(trackId, size);
   }
}

public static class SongShareCountMapper extends
      Mapper<Object, Text, IntWritable, IntWritable> {

   IntWritable trackId = new IntWritable();
   IntWritable sharedStatus = new IntWritable();

   public void map(Object key, Text value,
```

```
        Mapper<Object, Text, IntWritable, IntWritable>.Context context)
        throws IOException, InterruptedException {

      String[] parts = value.toString().split("[|]");
      trackId.set(Integer.parseInt(parts[1]));
      sharedStatus.set(Integer.parseInt(parts[2]));

      if (parts.length == 5) {
        context.write(trackId, sharedStatus);
      } else {
        // add counter for invalid records
        context.getCounter(COUNTERS.INVALID_RECORD_COUNT).increment(1L);
      }

    }
  }
}
```

OUTPUT:

```
[acadgild@localhost ~]$ hadoop fs -cat /user/acadgild/hadoop/shared_pertrack/par
t-r-00000
18/12/12 06:55:43 WARN util.NativeCodeLoader: Unable to load native-hadoop libra
ry for your platform... using builtin-java classes where applicable
222     0
223     0
225     1
```