

# 大数据课程设计2——LogAnalysis

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## 小组信息&分工情况

项目地址: <https://github.com/Jaderest/LogAnalysis>

### 小组信息

- 组长: 江思源 221840206
- 组员: 廖琪 221220105

### 分工情况

- 江思源: task3、task4的代码及实验报告
- 廖琪: task1、task2的代码及实验报告
- 共同完成实验环境搭建、代码测试、实验报告撰写、最终验收等工作

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## 详细设计说明

- 本实验四个任务均采用MapReduce框架实现，环境如下

```
hadoop version: 3.2.1
openjdk version "1.8.0_452"
Apache Maven 3.6.3
```

- 基本框架为
  - Mapper
  - Partitioner (根据key将Mapper分出的内容传给不同的Reducer，由此提高代码的可扩展性，在更大的集群上也具有同样的扩展性)
  - Combiner (可选，通常用于对Mapper的输出进行局部聚合，减少传输数据量，此处仅用于K-means聚类算法中)
  - Reducer
  - Driver (负责将Mapper和Reducer连接起来，设置输入输出路径等)

### Task1

解析Nginx日志文件，提取关键字段信息，根据客户端IP地址进行数据分区处理，以此实现日志数据的结构化输出

设计思路：使用正则表达式匹配提取包括IP地址、访问时间、请求URL、状态码等关键字段，同时根据IP地址的第一个八位字节实现数据分区

### Mapper设计

- LogMapper类

- 输入键值对: `<LongWritable, Text>`, `LongWritable`为行号, `Text`为原始日志行内容
- 输出键值对: `<Text, Text>`, 分别为IP地址和格式化后的日志信息
- 代码如下:

```
Matcher matcher = logPattern.matcher(value.toString());
if (matcher.find()) {
    String remoteAddr = matcher.group(1);
    StringBuilder sb = new StringBuilder();
    //按日志内容分类
    sb.append("remote_addr:").append(remoteAddr).append("\n");
    sb.append("remote_user:").append(matcher.group(2)).append("
").append(matcher.group(3)).append("\n");
    sb.append("time_local:").append(matcher.group(4)).append("\n");
    sb.append("request:").append(matcher.group(5)).append("\n");
    sb.append("status:").append(matcher.group(6)).append("\n");

    sb.append("body_bytes_sent:").append(matcher.group(7)).append("\n");

    sb.append("http_referer:").append(matcher.group(8)).append("\n");

    sb.append("http_user_agent:").append(matcher.group(9)).append("\n");
    ;

    context.write(new Text(remoteAddr), new Text(sb.toString()));
}
```

## Reducer设计

- LogReducer类
- 输入键值对: `<Text, Iterable<Text>>`, `Text`为IP地址, `Iterable<Text>`为对应的日志信息集合
- 输出键值对: `<Text, NullWritable>`, `Text`为格式化后的日志信息
- 代码如下:

```
for (Text val : values) {
    context.write(val, NullWritable.get());
}
```

## Partitioner设计

- 根据IP地址的第一个八位字节分组
- 代码如下:

```
try {
    String ip = key.toString();
    String firstOctetStr = ip.split("\\.")[0]; // 取第一个字段
```

```
int firstOctet = Integer.parseInt(firstOctetStr);
return (firstOctet < 127) ? 0 : 1;
} catch (Exception e) {
    // 如果>=127, 默认分到 Reducer 1
    return 1;
}
```

## 输出结果截图

- 输出两个结果文件对应不同IP段
- 每个文件包含完整格式化的日志信息 样例输出示例如下:

```
remote_addr:1.202.186.37
remote_user:- -
time_local:18/Sep/2013:20:58:58
request:/hadoop-family-roadmap/?cf_action=sync_comments&post_id=2210
status:200
body_bytes_sent:1103
http_referer:"- "
http_user_agent:"Mozilla/5.0 (Windows NT 5.1; rv:23.0) Gecko/20100101 Firefox/23.0"
```

平台全部数据输出示例如下:

文件 - /user/gr58/final/output/task1/part...

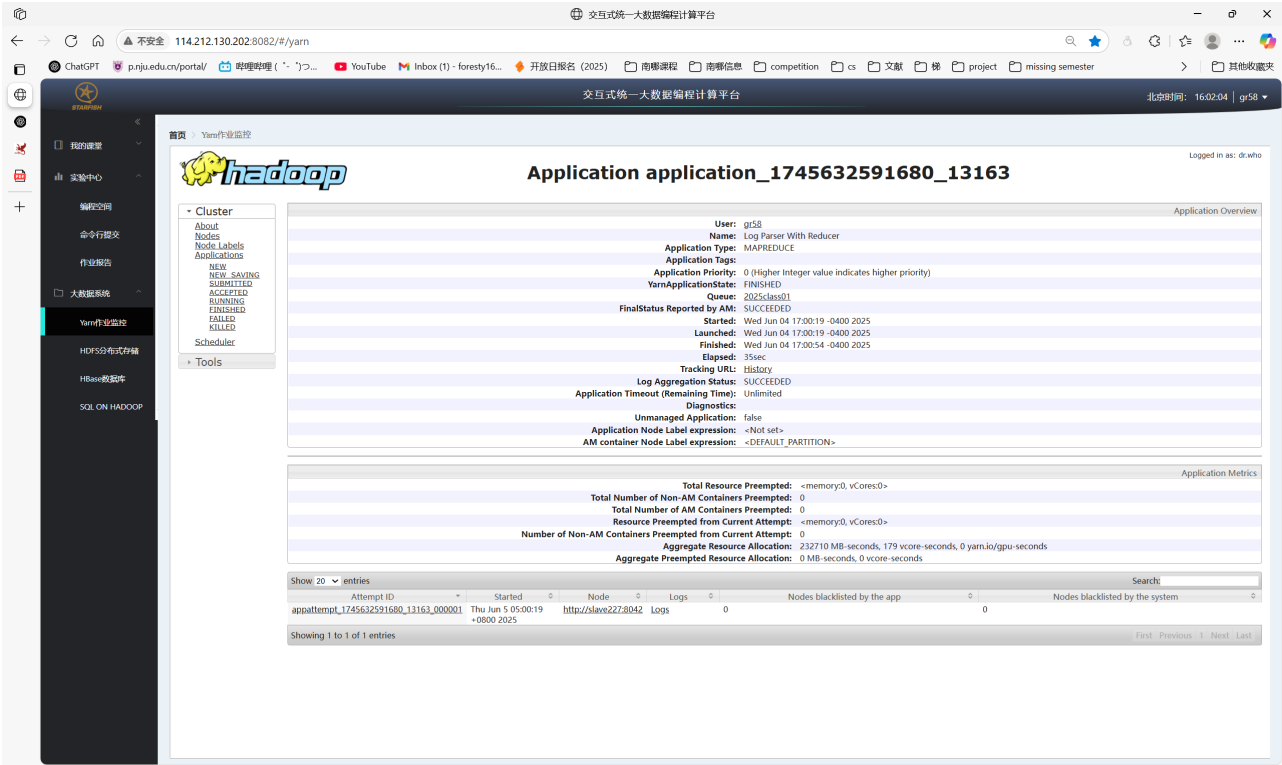
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```
remote_addr:1.162.203.134
remote_user:- -
time_local:18/Sep/2013:21:39:37
request:/
status:200
body_bytes_sent:93128
http_referer:"https://www.google.com.sg/"
http_user_agent:"Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/28.0.1500.95 Safari/537.36"

remote_addr:1.162.203.134
remote_user:- -
time_local:18/Sep/2013:20:09:55
request:/
status:200
```

- 文件路径: /user/gr58/final/output/task1

平台job截图



Task2

统计每小时网站浏览量和访问网站的客户端类型，实现统计结果的排序输出

设计思路：使用两个独立MapReduce作业分别处理每小时网站浏览量统计和访问网站的客户端类型统计，再实现二次排序功能

代码设计

每小时网站浏览量

- `HourMapper`类
  - 输入键值对: `<LongWritable, Text>`, `LongWritable`为行号, `Text`为原始日志行内容
  - 输出键值对: `<Text, IntWritable>`, 输出时间和计数1
  - 代码如下:

```
Matcher matcher = logPattern.matcher(value.toString());
if (matcher.find()) {
    String hour = matcher.group(3) + matcher.group(2) +
matcher.group(1) + matcher.group(4);
    context.write(new Text(hour), new IntWritable(1));
}
```

访问网站的客户端类型

- `UserAgentMapper`类
  - 输入键值对: `<LongWritable, Text>`, `LongWritable`为行号, `Text`为原始日志行内容

- 输出键值对: `<Text, IntWritable>`, 输出客户端类型和计数1
- 代码如下:

```
Matcher matcher = userAgentPattern.matcher(value.toString());
if (matcher.find()) {
    String userAgent = matcher.group(1);
    String type = classifyUserAgent(userAgent); //判断是什么类型的客户端
    context.write(new Text(type), new IntWritable(1));
}
```

## 整合统计数据

- `SumReducer`类
  - 输入键值对: `<Text, IntWritable>`, `Text`为统计类型, `IntWritable`为统计次数1
  - 输出键值对: `<key, IntWritable>`, `Text`为统计类型 (同输入键值对), `IntWritable`为该类型总出现次数
  - 代码如下:

```
int sum = 0;
for (IntWritable val : values)
    sum += val.get();
context.write(key, new IntWritable(sum));
```

## 排序实现

- `SwapMapper`类
  - 交换键值对为`<计数, 类型>`
  - 代码如下:

```
String[] parts = value.toString().split("\\t");
if (parts.length == 2) {
    long count = Long.parseLong(parts[1]);
    context.write(new LongWritable(count), new Text(parts[0]));
}
```

- `DescendingKeyComparator`类
  - 实现降序比较
  - 代码如下:

```
return -super.compare(a, b); // 降序排序
```

- `OutputReducer`类

◦ 代码如下:

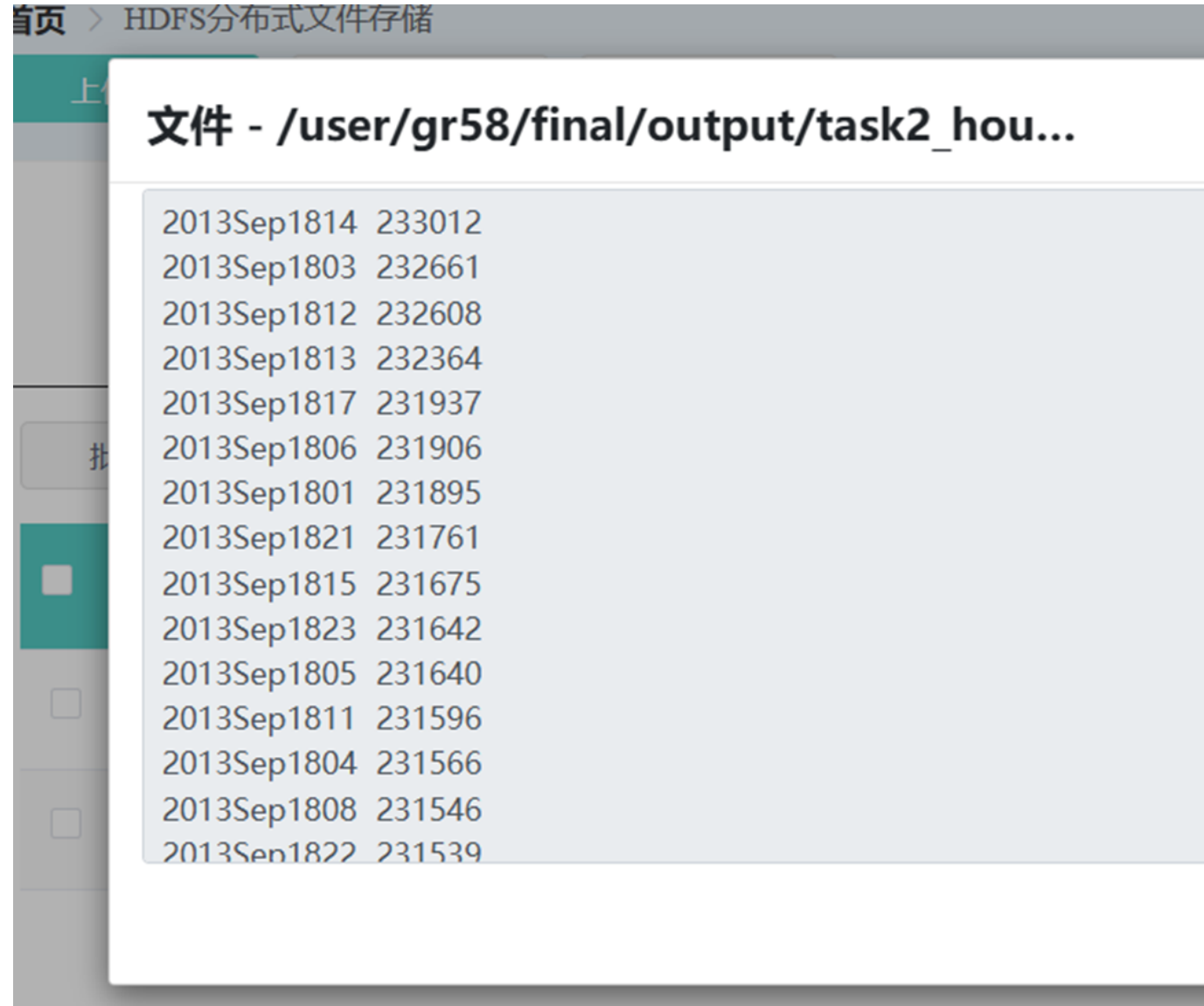
```
for (Text val : values) {  
    context.write(val, key);  
}
```

输出结果截图

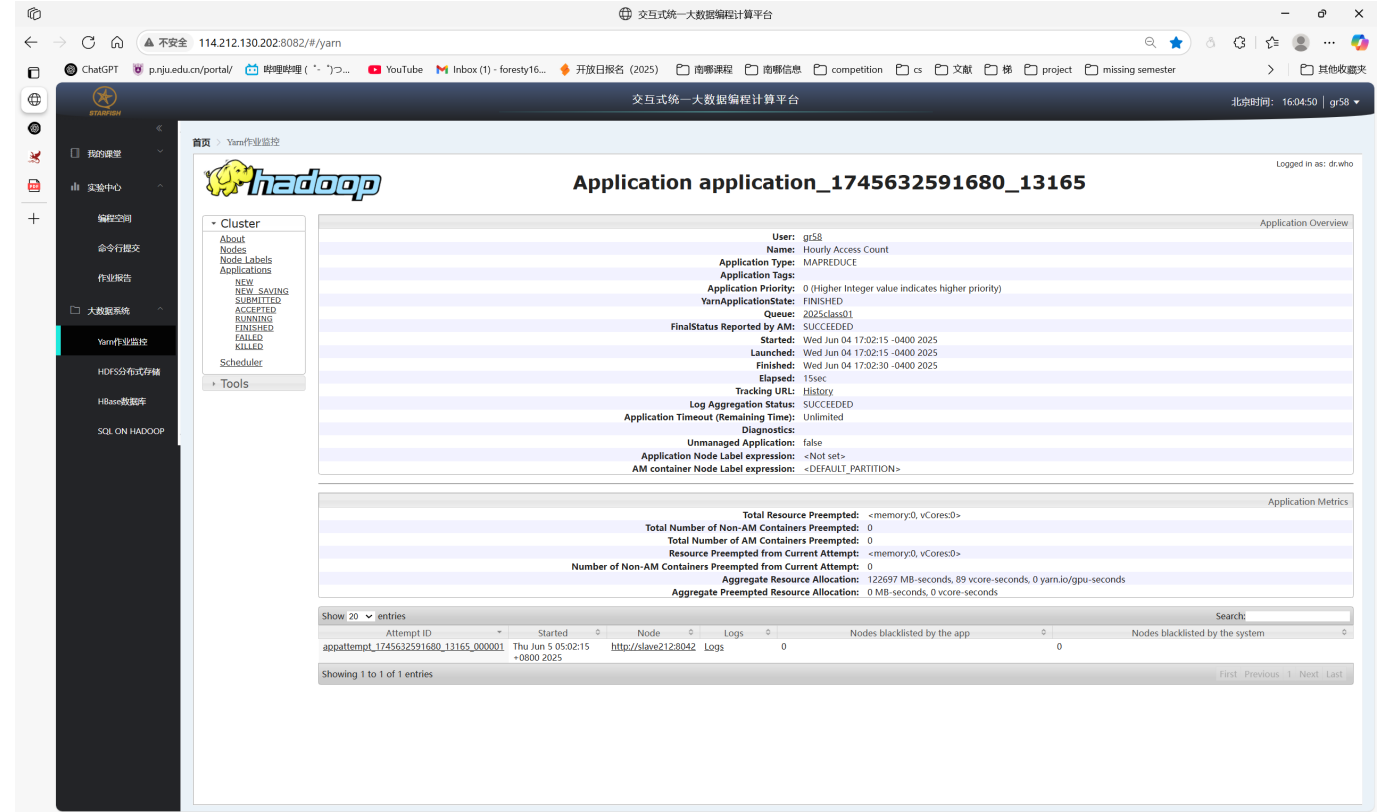
每小时网站浏览量统计

2013Sep1815	52
2013Sep1800	52
2013Sep1806	48
2013Sep1817	47
2013Sep1818	46
2013Sep1807	46
2013Sep1810	45
2013Sep1803	45
2013Sep1823	44
2013Sep1821	43
2013Sep1804	43
2013Sep1812	42
2013Sep1805	42
2013Sep1811	41
2013Sep1808	40
2013Sep1822	39
2013Sep1816	39
2013Sep1813	39
2013Sep1819	38
2013Sep1814	38
2013Sep1820	35
2013Sep1802	34
2013Sep1801	32
2013Sep1809	30

平台截图如下



Job如下

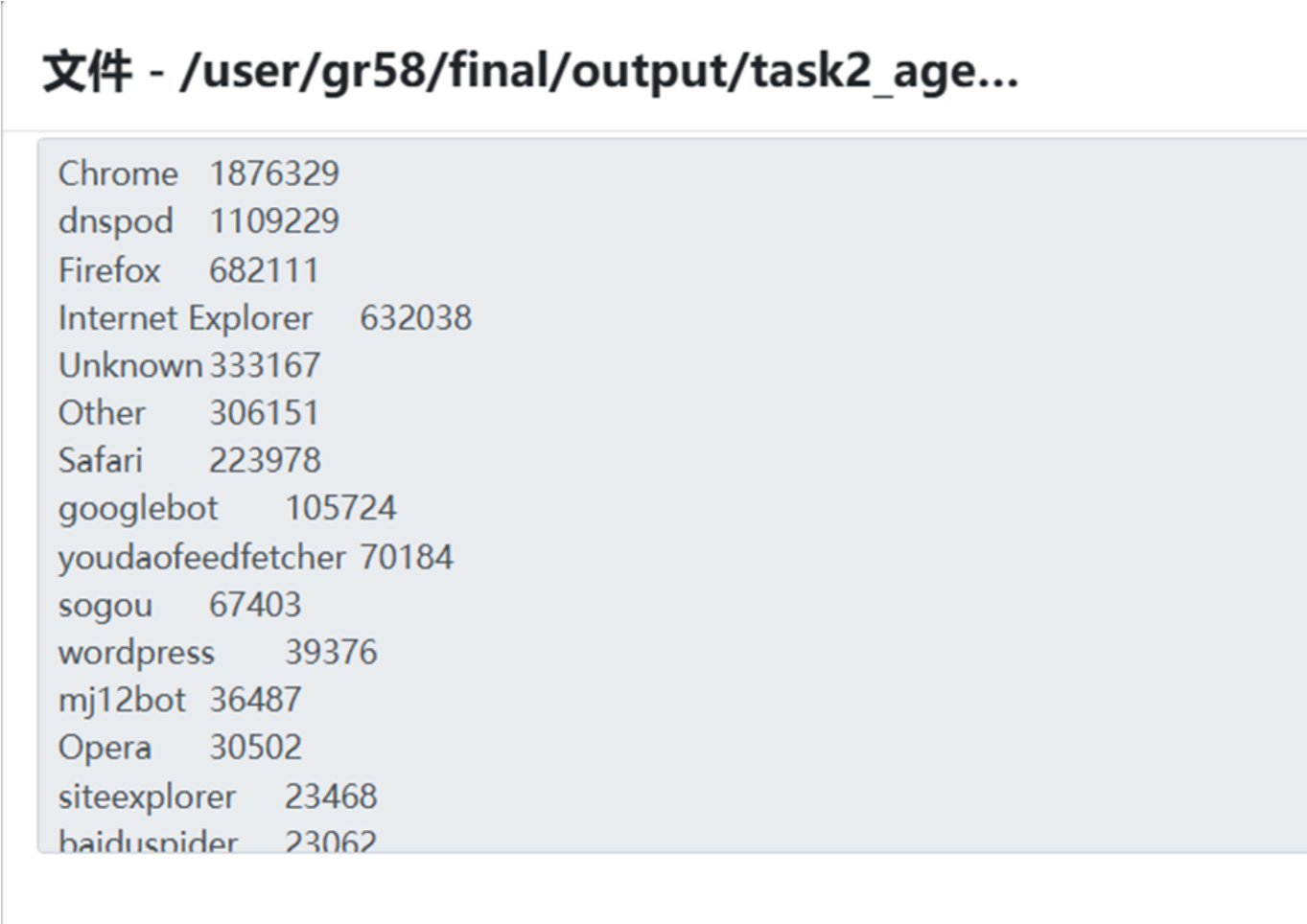




访问网站的客户端类型

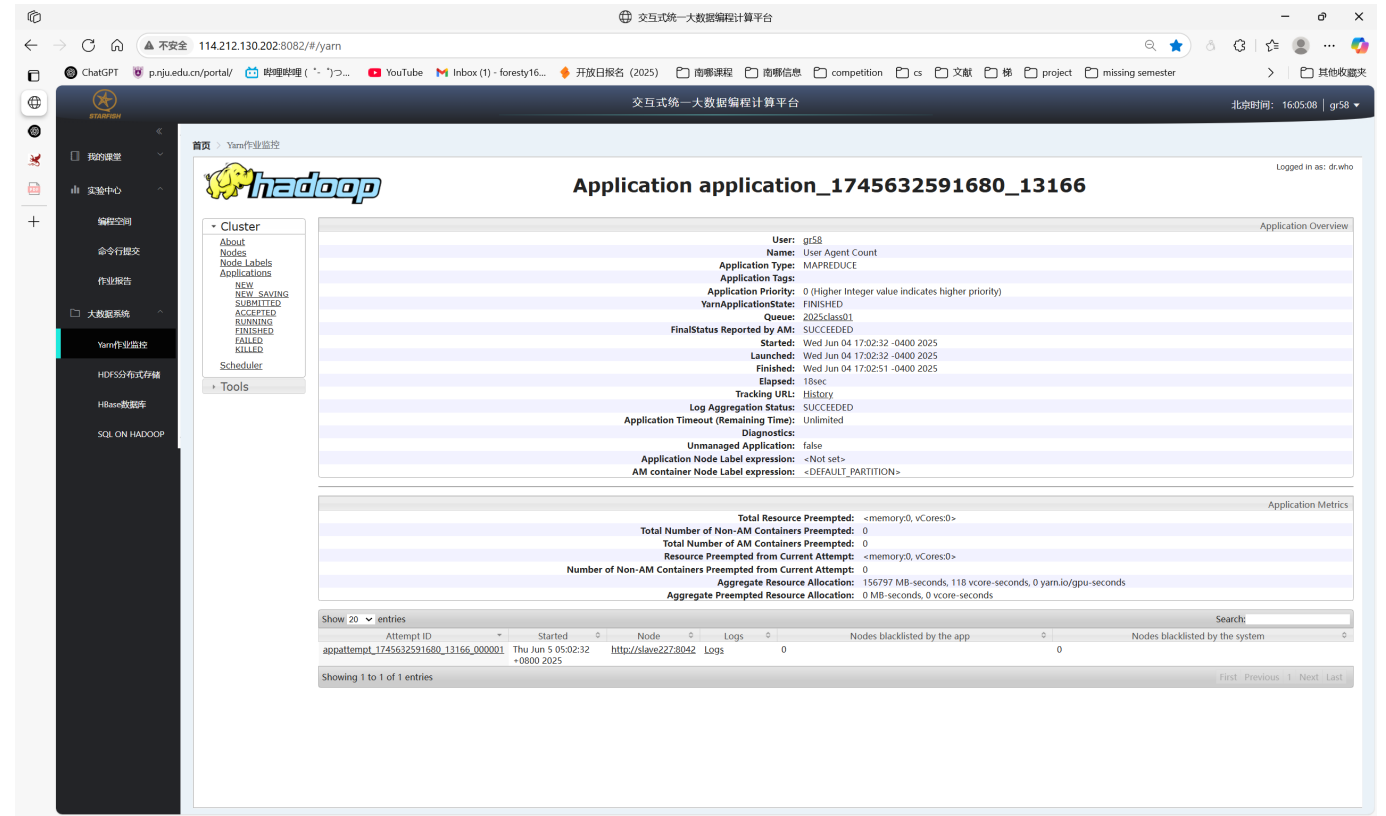
Chrome	321	
dnspod	204	
Internet Explorer		125
Firefox	115	
Unknown	69	
Other	51	
Safari	37	
googlebot		23
sogou	16	
youdaofeedfetcher		11
wordpress	9	
mj12bot	5	
siteexplorer	5	
Opera	4	
baiduspider	4	
Bing Preview	1	

平台截图如下



运行结果文件路径: /user/gr58/final/output/task2

Job如下



Task3\_part1

分析传输数据量与状态码的关系：根据body\_bytes\_sent字段和status字段，分析请求失败与大文件传输是否相关。

设计思路：根据状态码进行区分，统计每个状态码对应的body\_bytes\_sent字段的平均值，分析传输数据量与状态码的关系。使用两个Reducer对数据进行处理，一个Reducer处理状态码为2xx的请求（成功请求），另一个Reducer处理状态码为4xx和5xx的请求（失败请求）。

Mapper设计

- LogMapper类
  - 输入键值对：(LongWritable, Text)，其中LongWritable为行号，Text为原始日志行内容
  - 输出键值对：(Text, FloatWritable)，其中Text为状态码，FloatWritable为body\_bytes\_sent字段的值
- 代码如下：

```
Matcher matcher = logPattern.matcher(value.toString());
if (matcher.find()) {
    String status = matcher.group(6); // 通过正则表达式获取状态码
    String bodyBytesSent = matcher.group(7); // 获取body_bytes_sent字段
    float dataSent = Float.parseFloat(bodyBytesSent);
    context.write(new Text(status), new FloatWritable(dataSent));
}
```

Reducer设计

- LogReducer类
  - 输入键值对: <Text, Iterable<FloatWritable>>, 其中Text为状态码, Iterable为所有相同状态码的body\_bytes\_sent值
  - 输出键值对: <Text, FloatWritable>, 其中Text为状态码, FloatWritable为body\_bytes\_sent的平均值
  - 代码如下:

```
float sum = 0;
int count = 0;
for (FloatWritable value : values) { // 统计同一状态码的所有发送数量
    sum += value.get();
    count++;
}
float average = sum / count;
context.write(key, new FloatWritable(average));
```

## Partitioner设计

- 根据状态码进行分组
- 代码如下:

```
if (status.equals("200") || status.equals("201") || status.equals("202") ||
    status.equals("204")) {
    return 0;
} else {
    return 1;
}
```

## 输出结果截图

- 输出结果为两个文件, 分别对应状态码为2xx和4xx/5xx的请求
- 成功请求 (2xx) 输出示例:



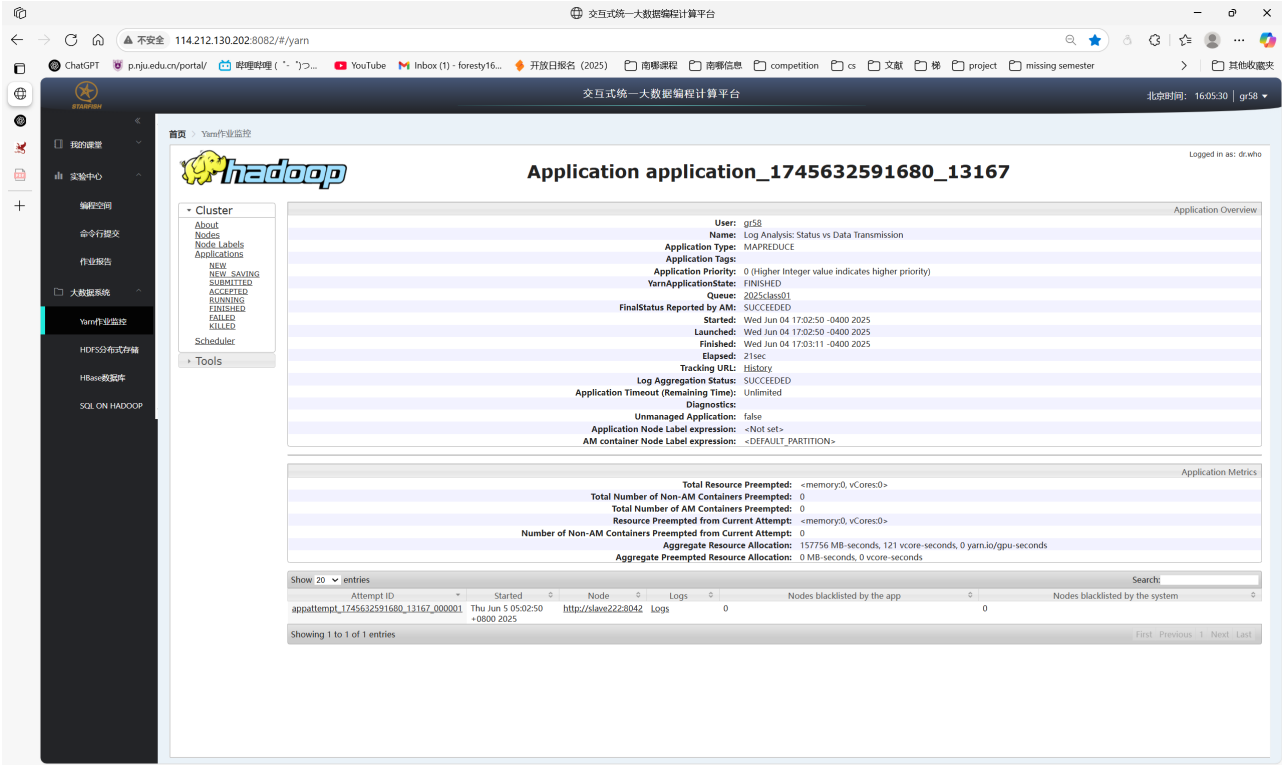
200 14948.972

- 失败请求 (4xx/5xx) 输出示例:



- 分析如下：
  - 请求成功失败与否和传输数据量并无太大关系
  - 只有一个499状态码比较可疑，499状态码通常出现在 Nginx 服务器日志中，表示 客户端主动关闭了请求连接
    - 同时客户端传输数据量较大，可能是因为客户端在传输大文件时超时，或是服务器生成大响应（如复杂查询、文件下载）耗时过长，导致用户失去耐心

平台job截图



本任务以小时为粒度统计错误请求占比（即错误率），通过排序分析不同时间段内的错误率波动情况

## Mapper设计

- 输入键值对：<LongWritable, Text>
- 输出键值对：<Text, IntWritable> Text表示时间段，IntWritable表示是否错误，不是错误则为0，是错误则为1
- 代码如下：

```
String status = matcher.group(6); // 请求状态码
String timeLocal = matcher.group(4); // 获取访问时间
// 将访问时间转换为小时
Date date = sdf.parse(timeLocal);
String hour = new SimpleDateFormat("HH").format(date);

// 如果请求状态是失败（非200系列），则认为是错误
int isError = (status.startsWith("2")) ? 0 : 1;

// 输出时间段（小时）和错误计数
context.write(new Text(hour), new IntWritable(isError));
```

## Reducer设计

- 对相同小时所有记录进行聚合
- 输入键值对：Text, [IntWritable(isError)...]>, 其中Text为小时，IntWritable为是否为错误
- 输出键值对：<Text, FloatWritable>, 输出小时和平均错误率
- 代码如下：

```
int totalRequests = 0;
int failedRequests = 0;

for (IntWritable value : values) {
    totalRequests++;
    if (value.get() == 1) {
        failedRequests++;
    }
}

float errorRate = totalRequests > 0 ? (float) failedRequests / totalRequests : 0.0f;
context.write(key, new FloatWritable(errorRate));
```

## Partitioner设计

LogPartitioner 将小时划分为白天（08~22）与夜间（00~07和23）两类，分别交由两个Reducer处理，以便观察昼夜之间错误率的差异。代码如下：

```
int hour = Integer.parseInt(key.toString());  
// 将小时分为两组: 8-22点 和 0-7点、23点  
if (hour >= 8 && hour <= 22) {  
    return 0; // 白天时间段  
} else {  
    return 1; // 夜间时间段  
}
```

### 输出结果截图

- 时间结果

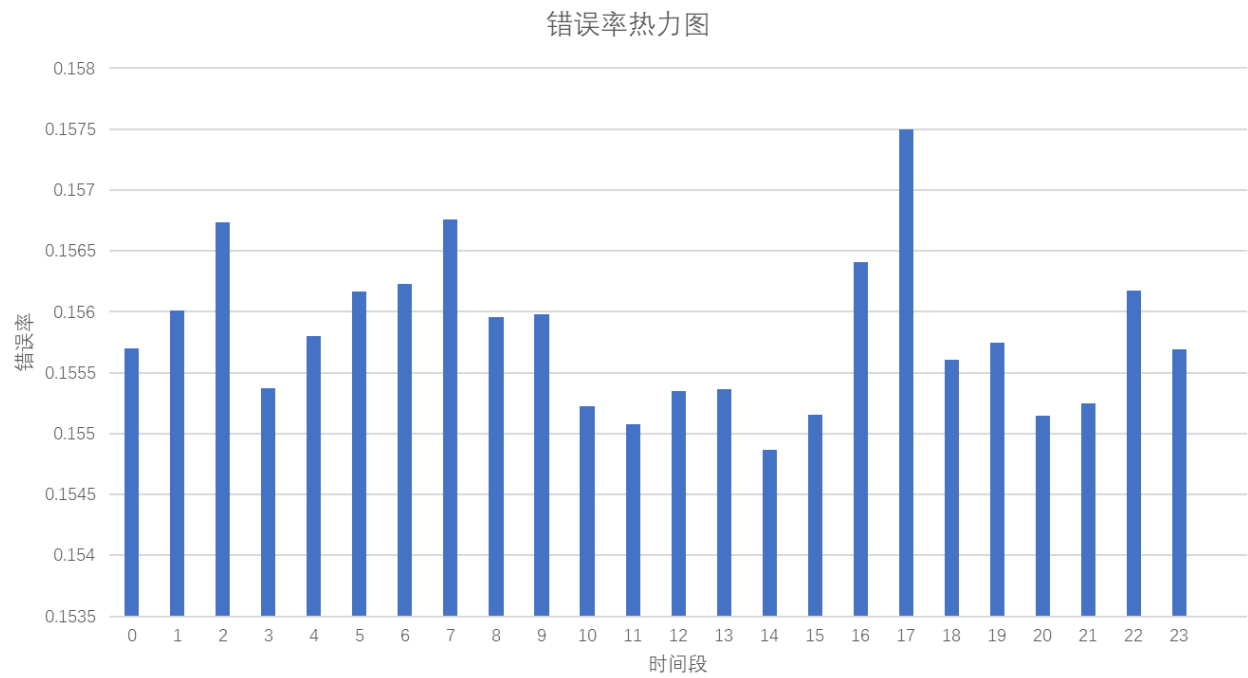
文件 - /user/gr58/final/

00	0.15569887
01	0.15601154
02	0.15673144
03	0.15537369
04	0.15580168
05	0.1561648
06	0.1562284
07	0.15675773
23	0.1556887

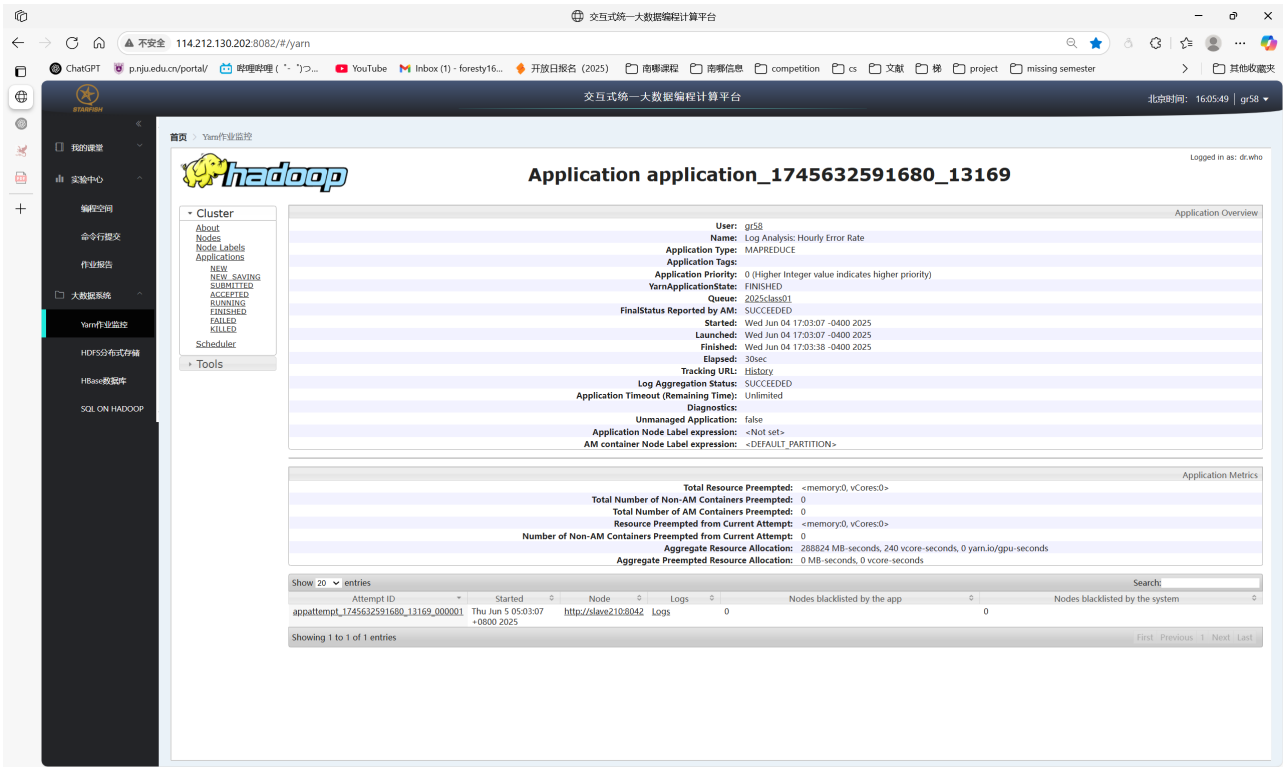
## 文件 - /user/gr58/final/ou

08	0.15595797
09	0.15598375
10	0.15522687
11	0.15507592
12	0.15535332
13	0.15536685
14	0.1548634
15	0.15515377
16	0.1564094
17	0.15749574
18	0.15560763
19	0.15575033
20	0.15514494
21	0.15524687
22	0.15617466

时间热力图



平台job截图



分析

- 总体错误率波动较小
- 2点时间段，7点和16、17点错误率尤其高，可能是因为缺少维护或使用人数多流量过大，导致错误率升高

Task3\_part3

本任务旨在基于Web日志数据，结合浏览器类型，统计每种浏览器的请求错误率和平均传输数据量，并对错误率进行降序排序，识别风险较高的浏览器类型，辅助站点运维与防御策略制定。



任务分为两个MapReduce Job如下：

1. 统计浏览器的错误率与平均传输数据量（核心任务，使用了3个reducer）
2. 错误率排序：按照任务要求根据错误率进行降序排序

### Mapper设计 (BrowserTypeMapper)

- 输入：<LongWritable, Text>，其中LongWritable为行号，Text为原始日志行内容
- 输出：<Text, Text>，key为浏览器类型，值为状态码:字节数
- 代码如下：

```
browser = classifyUserAgent(matcher.group(9)); // 提取浏览器类型
status = matcher.group(6); // 提取状态码
dataSent = matcher.group(7); // 提取传输数据量
// browserRank是setup阶段构造的map，读取任务2(2)的输出，将用户人数最高的十种浏览器类型
存储在browserRank中
if (browserRank.containsKey(browser)) {
    // 输出键值对：浏览器类型 -> 状态码:错误/成功, 数据量
    context.write(new Text(browser), new Text(status + ":" + dataSent));
}
```

### Reducer设计 (BrowserTypeReducer)

- 输入：<Text, Iterable<Text>>，其中Text为浏览器类型，Iterable为状态码和传输数据量的集合
- 输出：<Text, Text>，key为浏览器类型，值为ErrorRate:x.xx,AvgDataSent:y.yy
- 代码如下：

```
int totalRequests = 0;
int failedRequests = 0;
float totalDataSent = 0;
// 计算每种浏览器类型下不同状态码的错误率与平均数据传输量
for (Text value : values) {
    String[] parts = value.toString().split(":");
    String status = parts[0];
    float dataSent = Float.parseFloat(parts[1]);
    totalRequests++;
    totalDataSent += dataSent;
    if (!status.startsWith("2")) { // 非200系列为失败请求
        failedRequests++;
    }
}
float errorRate = totalRequests > 0 ? (float) failedRequests / totalRequests : 0.0f;
float averageDataSent = totalRequests > 0 ? totalDataSent / totalRequests : 0.0f;
// 输出浏览器类型和相关的状态码统计信息
context.write(key, new Text("ErrorRate: " + errorRate + ", AvgDataSent: " + averageDataSent));
```

Partitioner设计

- 根据浏览器名的哈希值分配到不同的Reducer

输出结果截图

- 错误率输出

文件 - /user/gr58/final/output/task3\_3/p...

Chrome	ErrorRate: 0.15586297, AvgDataSent: 14979.323
Firefox	ErrorRate: 0.15536316, AvgDataSent: 14963.28
Internet Explorer	ErrorRate: 0.15597789, AvgDataSent: 14939.588
googlebot	ErrorRate: 0.15560001, AvgDataSent: 14856.385

文件 - /user/gr58/final/output/task3\_3/p...

Other	ErrorRate: 0.15587121, AvgDataSent: 14986.605
dnspod	ErrorRate: 0.15606432, AvgDataSent: 15002.779
youdaofeedfetcher	ErrorRate: 0.15511008, AvgDataSent: 14990.255

文件 - /user/gr58/final/output/task3\_3/p...

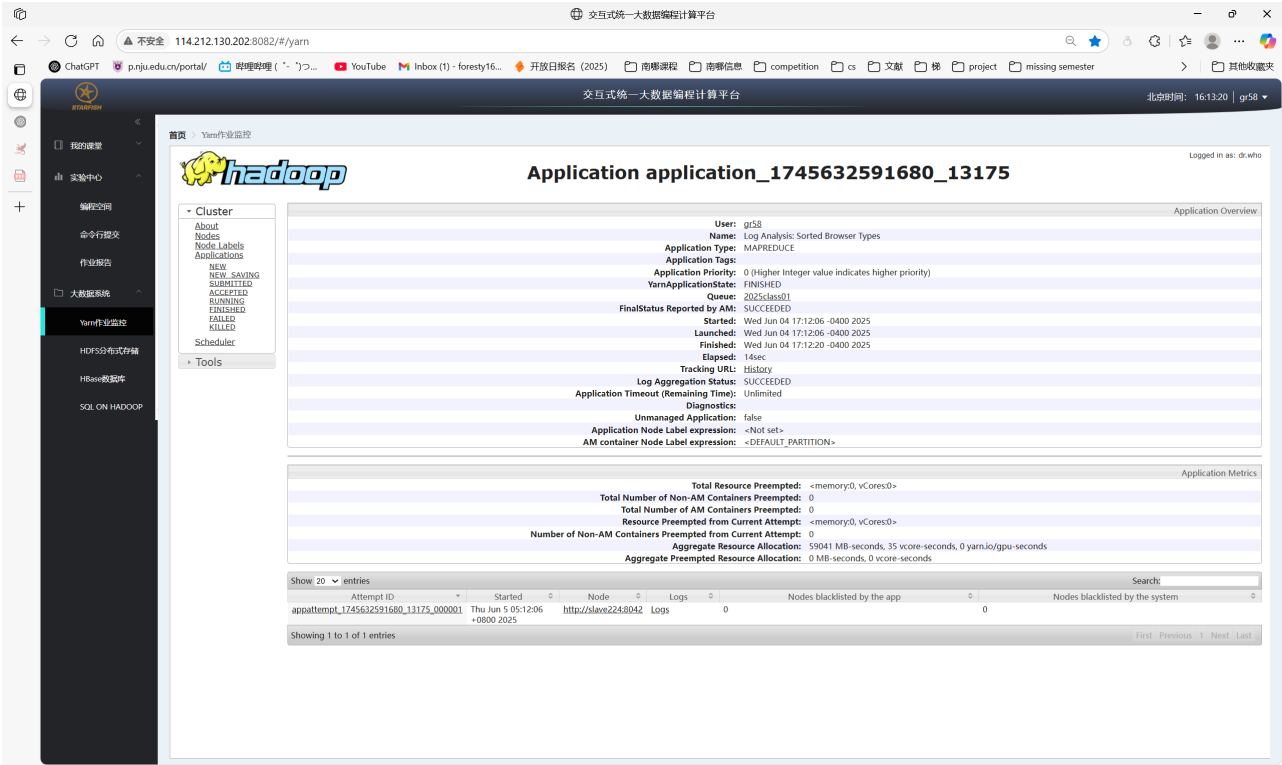
Safari	ErrorRate: 0.15585198, AvgDataSent: 14913.501
sogou	ErrorRate: 0.15327515, AvgDataSent: 15112.057

- 降序排序结果

文件 - /user/gr58/final/output/task3\_3\_so...

dnspod	ErrorRate: 0.15606432, AvgDataSent: 15002.779
Internet Explorer	ErrorRate: 0.15597789, AvgDataSent: 14939.588
Other	ErrorRate: 0.15587121, AvgDataSent: 14986.605
Chrome	ErrorRate: 0.15586297, AvgDataSent: 14979.323
Safari	ErrorRate: 0.15585198, AvgDataSent: 14913.501
googlebot	ErrorRate: 0.15560001, AvgDataSent: 14856.385
Firefox	ErrorRate: 0.15536316, AvgDataSent: 14963.28
youdaofeedfetcher	ErrorRate: 0.15511008, AvgDataSent: 14990.255
sogou	ErrorRate: 0.15327515, AvgDataSent: 15112.057

平台job截图



分析

- 错误率的差值仅千分之一，平均数据传输量也很接近，无特别的异常浏览器类型

Task4\_part1

本部分主要是从日志文件中提取数据用以给part2阶段使用K-Means聚类算法进行用户分群，所以在设计的时候不同于手册，我尽可能将数据细化并提高区分度

Mapper设计 (LogMapper)

- 输入：<LongWritable, Text>，其中LongWritable为行号，Text为原始日志行内容
- 输出：<Text, Text>，key为用户ID，value 为格式化的特征信息，包括设备类型、访问时间段、请求类型、发送字节数等
- 代码如下：

```
// 提取 IP、时间戳、User-Agent 等字段
String remoteAddr = matcher.group(1);
String timeLocal = matcher.group(4);
String requestType = matcher.group(5);
String bytesSended = matcher.group(8);
String userAgent = matcher.group(10);

// 判断设备类型 (PC端为1，移动端为0)
String deviceType = userAgent.toLowerCase().contains("mobile") ? "0" : "1";

// 判断访问时间段 (6点至18点为白天，其余为夜晚)
String timeOfDay = classifyTimeOfDay(timeLocal);
```

```
// 构造输出特征向量格式
StringBuilder featureVector = new StringBuilder();
featureVector.append("device:").append(deviceType).append("\t");
featureVector.append("timeOfDay:").append(timeOfDay).append("\t");
featureVector.append("requestType:").append(requestType).append("\t");
featureVector.append("bytesSent:").append(bytesSended);

// 输出: <IP地址, 特征信息 + 请求次数计数1>
context.write(new Text(remoteAddr), new Text(featureVector.toString() + "\t1"));
```

## Reducer设计 (LogReducer)

- 输入: `<Text, Iterable<Text>>`, 按IP聚合的特征集合
- 输出: `<Text, Text>`, key为IP地址, value为聚合后的完整行为特征向量
- 代码如下:

```
// 解析日志特征字段
long totalRequestsDay = 0;
long totalBytesSentDay = 0;
long totalRequestsNight = 0;
long totalBytesSentNight = 0;
Map<String, Integer> requestTypeCount = new HashMap<>();
String deviceType = "";

// 遍历日志记录, 进行分类统计
for (Text val : values) {
    String[] parts = val.toString().split("\t");
    if (deviceType.isEmpty()) {
        deviceType = parts[0].split(":")[1];
    }
    String timeOfDay = parts[1].split(":")[1];
    String requestType = parts[2].split(":")[1];
    long bytesSent = Long.parseLong(parts[3].split(":")[1]);

    requestTypeCount.put(requestType, requestTypeCount.getOrDefault(requestType, 0) + 1);

    if ("day".equals(timeOfDay)) {
        totalRequestsDay += 1;
        totalBytesSentDay += bytesSent;
    } else {
        totalRequestsNight += 1;
        totalBytesSentNight += bytesSent;
    }
}

// 计算平均值
double avgBytesSentDay = totalRequestsDay > 0 ? (double) totalBytesSentDay / totalRequestsDay : 0;
double avgBytesSentNight = totalRequestsNight > 0 ? (double) totalBytesSentNight / totalRequestsNight : 0;
```

```

long totalRequests = totalRequestsDay + totalRequestsNight;
double totalAvgBytesSent = totalRequests > 0
    ? (totalRequestsDay * avgBytesSentDay + totalRequestsNight *
    avgBytesSentNight) / totalRequests
    : 0;

// 构造请求类型向量, 例如 [GET:10, POST:3]
StringBuilder requestTypeString = new StringBuilder();
for (Map.Entry<String, Integer> entry : requestTypeCount.entrySet()) {
    if (requestTypeString.length() > 0) requestTypeString.append(", ");
    requestTypeString.append(entry.getKey()).append(":").append(entry.getValue());
}

// 输出完整的特征向量
StringBuilder featureVector = new StringBuilder();
featureVector.append("deviceType:").append(deviceType).append("\t");
featureVector.append("requestTypes:[").append(requestTypeString).append("]\t");
featureVector.append("dayRequests:").append(totalRequestsDay).append("\t");
featureVector.append("dayAvgBytesSent:").append(avgBytesSentDay).append("\t");
featureVector.append("nightRequests:").append(totalRequestsNight).append("\t");
featureVector.append("nightAvgBytesSent:").append(avgBytesSentNight).append("\t");
featureVector.append("totalRequests:").append(totalRequests).append("\t");
featureVector.append("totalAvgBytesSent:").append(totalAvgBytesSent);

context.write(key, new Text(featureVector.toString()));

```

## Partitioner设计

- 根据IP地址首字节划分, 小于127的IP分到Reducer 0, 大于等于127的分到Reducer 1
- 代码如下:

```

public int getPartition(Text key, Text value, int numPartitions) {
    try {
        String ip = key.toString();
        int firstOctet = Integer.parseInt(ip.split("\\.")[0]);
        return (firstOctet < 127) ? 0 : 1;
    } catch (Exception e) {
        return 1; // 异常默认分到 1
    }
}

```

## Task4\_part2

本部分主要是对Task4\_part1的输出结果进行K-Means聚类分析, 从而挖掘不同群体用户的典型行为特征, 例如移动端夜间高频用户、白天大流量访问用户等, 为个性化推荐、用户画像等应用构建基础

## 特征选取与用户行为向量设计

- 特征选取

- dayRequests: 白天请求次数
- dayAvgBytesSent: 白天平均传输字节数
- nightRequests: 夜间请求次数
- nightAvgBytesSent: 夜间平均传输字节数
- 每个用户最终被表示为一个四维向量: `[dayRequests, dayAvgBytesSent, nightRequests, nightAvgBytesSent]`

## K-Means聚类算法聚类流程

1. 初始中心设定 在Mapper的`setup()`方法中预设两个初始聚类中心:

- Cluster0:[10.0, 500.0, 8.0, 400.0]
- Cluster1:[20.0, 1500.0, 30.0, 1300.0]

2. 距离计算与分配(Mapper)

- 对每个用户行为向量, 计算其与各个中心的欧式距离。
- 将该用户分配到最近的聚类中心。
- 输出格式为:

```
<聚类编号, IP, dayReq, dayAvg, nightReq, nightAvg, 1>
```

3. 局部聚合(Combiner)

- 对每个聚类编号的多个用户数据, 进行局部合并, 计算加权求和与频数

4. 全局聚合更新中心(Reducer)

- 接收所有同一聚类编号的数据, 重新计算聚类中心 (即四个维度的加权平均)

5. 迭代执行

## Mapper设计

- 提取用户行为向量并分配聚类

```
double[] point = { dayRequests, dayAvgBytesSent, nightRequests, nightAvgBytesSent };
double distance = computeEuclideanDistance(point, center.getCenter());
```

- 输出格式

```
context.write(new IntWritable(closestClusterId),
              new Text(ip + "," + dayRequests + "," + dayAvgBytesSent + "," +
                        nightRequests + "," + nightAvgBytesSent + ",1"));
```

## Combiner设计 (和Reducer的核心逻辑一致)

- 计算所有点的加权平均 (中心更新)

```
sum[0] += dayReq * freq;
sum[1] += dayAvg * freq;
...
newCenter[i] = sum[i] / count;
```

聚类结果分析

- 四次迭代输出

文件 - /user/gr58/final\_kmeans/task4\_2\_1...Page 1 of 1

0	1184.6536082474227,	14635.479748811167,	998.420618556701,	14885.085936537078,	485	0
1	19018.682352941178,	15025.328681112289,	16095.058823529413,	14899.135570519837,	85	
2	3205.762962962963,	16187.043126763569,	2705.259259259259,	16235.595289038505,	135	
3	542.8436578171091,	14944.997619177739,	458.99705014749264,	15203.534616758085,	339	
0	622.5684454756381,	14517.98226638229,	524.092807424594,	14835.778174178318,	431	1
1	26518.87037037037,	15043.254099718612,	22447.62962962963,	14912.34209920451,	54	
2	3841.885931558935,	15618.45182980707,	3242.3688212927755,	15631.902922169367,	263	
3	328.3277027027027,	15032.860546106309,	278.125,	15273.038739383144,	296	
0	782.6880466472303,	14576.964821865968,	658.5539358600583,	14348.873008709628,	343	2
1	27673.843137254902,	15041.44019824921,	23420.49019607843,	14926.243314876174,	51	
2	4113.708,	15668.456343177395,	3472.856,	15332.652403502554,	250	
3	249.23,	14857.09790319304,	211.4525,	15788.579624735317,	400	
0	806.538873994638,	14710.662134182407,	679.6246648793566,	14489.24016297407,	373	3
1	28513.897959183672,	15047.614936457436,	24130.244897959183,	14938.516708733217,	49	
2	4290.4092827004215,	15707.895409305684,	3623.1181434599157,	15219.993590974673,	237	
3	241.8181818181818,	14752.686522442604,	204.05974025974027,	15812.68680840934,	385	

- 可以发现数据逐渐趋于稳定

真正能够分群的是平均访问，用户根据使用频次可以分为如下四组

1. 白天晚上平均访问次数均达到2w次以上的用户，有约50人（重度用户）
2. 平均访问次数在3k~4k左右的用户，有约250人（中高强度用户）
3. 平均访问次数在800左右的用户，有约400人（中强度用户）
4. 平均访问次数在250左右的用户，有约400人（低强度用户）

平台job截图



第0次迭代

我的家堡

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HBase数据库

SQL ON HADOOP

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Application application\_1745632591680\_12996

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  - FAILED
  - KILLED
- Scheduler

Tools

Application Overview

User: gr58

Name: KMeans Clustering

Application Type: MAPREDUCE

Application Tags:

Application Priority: 0 (Higher Integer value indicates higher priority)

YarnApplicationState: FINISHED

Queue: 2025class01

FinalStatus Reported by AM: SUCCEEDED

Started: Wed Jun 04 11:29:29 -0400 2025

Launched: Wed Jun 04 11:29:29 -0400 2025

Finished: Wed Jun 04 11:29:44 -0400 2025

Elapsed: 14sec

Tracking URL: History

Log Aggregation Status: SUCCEEDED

Application Timeout (Remaining Time): Unlimited

Diagnostics:

Unmanaged Application: false

Application Node Label expression: <Not set>

AM container Node Label expression: <DEFAULT\_PARTITION>

Application Metrics

Total Resource Preempted: <memory0, vCores0>

Total Number of Non-AM Containers Preempted: 0

Total Number of AM Containers Preempted: 0

Resource Preempted from Current Attempt: <memory0, vCores0>

Number of Non-AM Containers Preempted from Current Attempt: 0

Aggregate Resource Allocation: 54960 MB-seconds, 31 vcore-seconds, 0 yarn.io/gpu-seconds

Aggregate Preempted Resource Allocation: 0 MB-seconds, 0 vcore-seconds

Show 20 entries

Attempt ID	Started	Node	Logs	Nodes blacklisted by the app	Nodes blacklisted by the system
appattempt_1745632591680_12996_000001	Wed Jun 4 23:29:29 +0800 2025	http://slave211:8042	Logs	0	0

Showing 1 to 1 of 1 entries

第1次迭代

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hadoop

Application application\_1745632591680\_13006

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  - FINISHED
  - FAILED
  - KILLED
- Scheduler

Tools

Application Overview

User: gr58

Name: KMeans Clustering

Application Type: MAPREDUCE

Application Tags:

Application Priority: 0 (Higher Integer value indicates higher priority)

YarnApplicationState: FINISHED

Queue: 2025class01

FinalStatus Reported by AM: SUCCEEDED

Started: Wed Jun 04 11:46:39 -0400 2025

Launched: Wed Jun 04 11:46:39 -0400 2025

Finished: Wed Jun 04 11:46:54 -0400 2025

Elapsed: 14sec

Tracking URL: History

Log Aggregation Status: SUCCEEDED

Application Timeout (Remaining Time): Unlimited

Diagnostics:

Unmanaged Application: false

Application Node Label expression: <Not set>

AM container Node Label expression: <DEFAULT\_PARTITION>

Application Metrics

Total Resource Preempted: <memory0, vCores0>

Total Number of Non-AM Containers Preempted: 0

Total Number of AM Containers Preempted: 0

Resource Preempted from Current Attempt: <memory0, vCores0>

Number of Non-AM Containers Preempted from Current Attempt: 0

Aggregate Resource Allocation: 54585 MB-seconds, 31 vcore-seconds, 0 yarn.io/gpu-seconds

Aggregate Preempted Resource Allocation: 0 MB-seconds, 0 vcore-seconds

Show 20 entries

Attempt ID	Started	Node	Logs	Nodes blacklisted by the app	Nodes blacklisted by the system
appattempt_1745632591680_13006_000001	Wed Jun 4 23:46:39 +0800 2025	http://slave227:8042	Logs	0	0

Showing 1 to 1 of 1 entries

第2次迭代



交互式统一大数据编程计算平台

114.212.130.202:8082/#/yarn

ChatGPT p.nju.edu.cn/portal/ 哔哩哔哩 (゜-゜)つ... YouTube Inbox (1) - forestry16... 开放日报 (2025) 南邮课程 南邮信息 competition cs 文献 梯 project missing semester 其他收藏夹

交互式统一大数据编程计算平台

北京时间: 15:45:03 | gr58

Yarn作业监控

hadoop

Cluster

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  - KILLED
- Scheduler

Tools

Application application\_1745632591680\_13007

Logged in as: dr.who

Application Overview

User: gr58

Name: KMeans Clustering

Application Type: MAPREDUCE

Application Tags:

Application Priority: 0 (Higher Integer value indicates higher priority)

YarnApplicationState: FINISHED

Queue: 2025class01

FinalStatus Reported by AM: SUCCEEDED

Started: Wed Jun 04 11:54:25 -0400 2025

Launched: Wed Jun 04 11:54:25 -0400 2025

Finished: Wed Jun 04 11:54:41 -0400 2025

Elapsed: 15sec

Tracking URL: History

Log Aggregation Status: SUCCEEDED

Application Timeout (Remaining Time): Unlimited

Diagnostics:

Unmanaged Application: false

Application Node Label expression: <Not set>

AM container Node Label expression: <DEFAULT\_PARTITION>

Application Metrics

Total Resource Preempted: <memory0, vCores0>

Total Number of Non-AM Containers Preempted: 0

Total Number of AM Containers Preempted: 0

Resource Preempted from Current Attempt: <memory0, vCores0>

Number of Non-AM Containers Preempted from Current Attempt: 0

Aggregate Resource Allocation: 57057 MB-seconds, 32 vcore-seconds, 0 yarn.io/gpu-seconds

Aggregate Preempted Resource Allocation: 0 MB-seconds, 0 vcore-seconds

Show 20 entries

Attempt IDStartedNodeLogsNodes blacklisted by the appNodes blacklisted by the system

appattempt\_1745632591680\_13007\_000001Wed Jun 4 23:54:25 +0800 2025http://slave205:8042Logs00

Showing 1 to 1 of 1 entries

First Previous 1 Next Last

第3次迭代

交互式统一大数据编程计算平台

114.212.130.202:8082/#/yarn

ChatGPT p.nju.edu.cn/portal/ 哔哩哔哩 (゜-゜)つ... YouTube Inbox (1) - forestry16... 开放日报 (2025) 南邮课程 南邮信息 competition cs 文献 梯 project missing semester 其他收藏夹

交互式统一大数据编程计算平台

北京时间: 15:44:07 | gr58

Yarn作业监控

hadoop

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Tools

Application application\_1745632591680\_13008

Logged in as: dr.who

Application Overview

User: gr58

Name: KMeans Clustering

Application Type: MAPREDUCE

Application Tags:

Application Priority: 0 (Higher Integer value indicates higher priority)

YarnApplicationState: FINISHED

Queue: 2025class01

FinalStatus Reported by AM: SUCCEEDED

Started: Wed Jun 04 12:09:42 -0400 2025

Launched: Wed Jun 04 12:09:42 -0400 2025

Finished: Wed Jun 04 12:09:56 -0400 2025

Elapsed: 14sec

Tracking URL: History

Log Aggregation Status: SUCCEEDED

Application Timeout (Remaining Time): Unlimited

Diagnostics:

Unmanaged Application: false

Application Node Label expression: <Not set>

AM container Node Label expression: <DEFAULT\_PARTITION>

Application Metrics

Total Resource Preempted: <memory0, vCores0>

Total Number of Non-AM Containers Preempted: 0

Total Number of AM Containers Preempted: 0

Resource Preempted from Current Attempt: <memory0, vCores0>

Number of Non-AM Containers Preempted from Current Attempt: 0

Aggregate Resource Allocation: 55062 MB-seconds, 31 vcore-seconds, 0 yarn.io/gpu-seconds

Aggregate Preempted Resource Allocation: 0 MB-seconds, 0 vcore-seconds

Show 20 entries

Attempt IDStartedNodeLogsNodes blacklisted by the appNodes blacklisted by the system

appattempt\_1745632591680\_13008\_000001Thu Jun 5 00:09:42 +0800 2025http://slave207:8042Logs00

Showing 1 to 1 of 1 entries

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