服务器日志数据分析

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from datetime import datetime
```

1、将数据导入入pandas中，加上列列名

In [2]:
```
data = pd.read_table('log.txt', header=None, names=['id', 'api', 'count', 'res_time_sum', 'res_time_min', 'res_time_max', 'res_time_avg', 'interval', 'created_at'])
data.head()
```

Out[2]:

	id	api	count	res_time_sum	res_time_min	res_time_max	res_tim
0	162542	/front-api/bill/create	8	1057.31	88.75	177.72	132.0
1	162644	/front-api/bill/create	5	749.12	103.79	240.38	149.0
2	162742	/front-api/bill/create	5	845.84	136.31	225.73	169.0
3	162808	/front-api/bill/create	9	1305.52	90.12	196.61	145.0
4	162943	/front-api/bill/create	3	568.89	138.45	232.02	189.0

2、检测是否有重复值

In [3]:
```
data.duplicated().sum()
```

Out[3]: 0

结论：无重复值

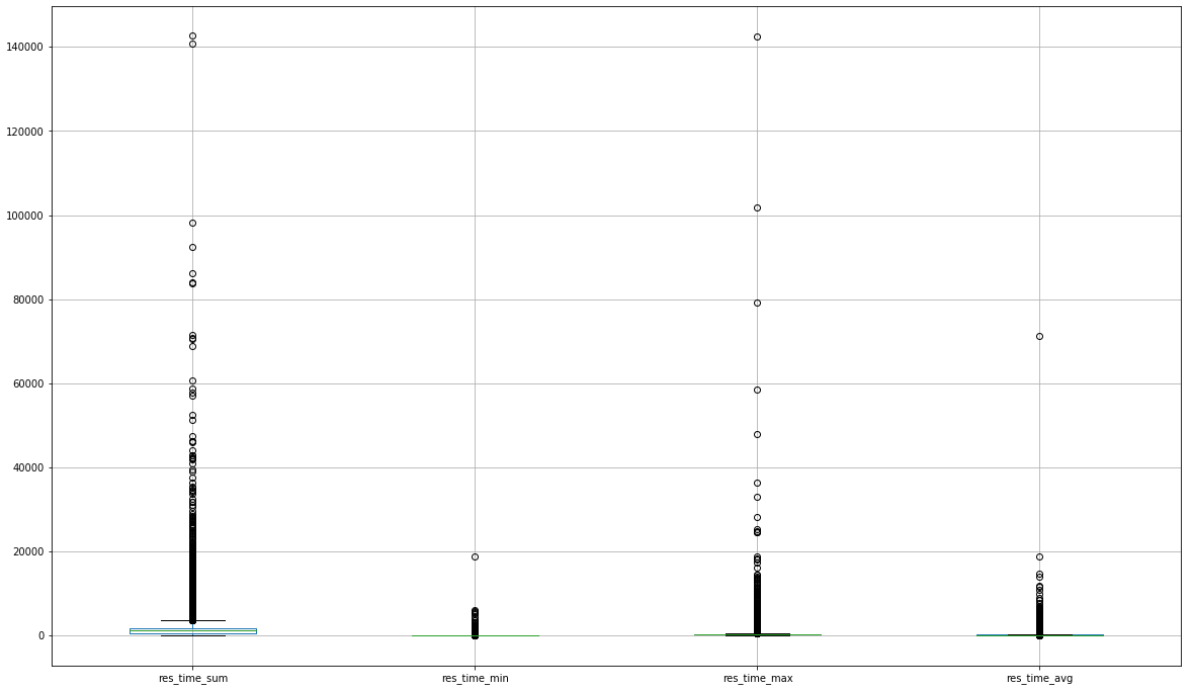
3、检测是否有异常值

In [4]:
```
data.describe()
```

Out[4]:

	id	count	res_time_sum	res_time_min	res_time_max
count	1.794960e+05	179496.000000	179496.000000	179496.000000	179496.000000
mean	6.866490e+06	7.175909	1393.177370	108.419620	359.880351
std	3.686579e+06	4.325160	1499.485881	79.640559	638.919769
min	1.625420e+05	1.000000	36.550000	3.210000	36.550000
25%	3.825183e+06	4.000000	607.707500	83.410000	198.280000
50%	6.811432e+06	7.000000	1154.905000	97.120000	256.090000
75%	9.981397e+06	10.000000	1834.117500	116.990000	374.410000
max	1.343909e+07	31.000000	142650.550000	18896.640000	142468.270000

In [5]:
```
plt.figure(figsize=(20, 12))
data[['res_time_sum', 'res_time_min', 'res_time_max', 'res_time_avg
']].boxplot()
plt.show()
```



结论：从上面表格和箱线图来看，res_time_sum、res_time_min、res_time_max、res_time_avg这四个存在异常值

4、分析api和interval这两列的数据是否对分析有用，如果无用，说明为什么要将这两列丢弃

In [6]:
```
len(data[data['api']!='/front-api/bill/create'])
```

Out[6]: 0

表明所有数据的 api 都是 /front-api/bill/create

In [7]:
```
len(data[data['interval']!=60])
```

Out[7]: 0

表明所有数据的 interval 都是 60

结论：因为整个数据集中这两列的数据都相同，且和其他列无关联，所以无用，可以丢弃。

5. 使用created_at这一列的数据作为时间索引

In [8]:
```
# 这里不能使用set_index，使用set_index后index是str对象，而不是timestamp，后面画图时无法显示x轴的标注
s = pd.to_datetime(data.created_at)
s.head()
data.index = s
```

上面这一步至关重要！！！

In [9]:
```
data.head()
```

Out[9]:

	id	api	count	res_time_sum	res_time_min	res_time_ma
created_at						
2017-11-01 00:00:07	162542	/front-api/bill/create	8	1057.31	88.75	177.72
2017-11-01 00:01:07	162644	/front-api/bill/create	5	749.12	103.79	240.38
2017-11-01 00:02:07	162742	/front-api/bill/create	5	845.84	136.31	225.73
2017-11-01 00:03:07	162808	/front-api/bill/create	9	1305.52	90.12	196.61
2017-11-01 00:04:07	162943	/front-api/bill/create	3	568.89	138.45	232.02

In [10]:
```
data.tail()
```

Out[10]:

	id	api	count	res_time_sum	res_time_min	res_time_
created_at						
2018-05-30 23:06:21	13438800	/front-api/bill/create	11	2783.48	99.24	489.90
2018-05-30 23:07:21	13438866	/front-api/bill/create	10	1951.10	85.37	529.51
2018-05-30 23:08:21	13438917	/front-api/bill/create	3	494.17	103.95	211.47
2018-05-30 23:09:21	13438981	/front-api/bill/create	9	1798.28	101.11	433.30
2018-05-30 23:10:21	13439086	/front-api/bill/create	6	1017.97	74.45	298.97

6. 分析api调用次数情况

In [11]:
```
df = data['2018-05-20 00:00:00' : '2018-05-20 23:59:59']   # 取2018-05-29一天的数据
df.head()
```

Out[11]:

	id	api	count	res_time_sum	res_time_min	res_time_r
created_at						
2018-05-20 00:00:10	12686322	/front-api/bill/create	5	1136.77	150.77	400.61
2018-05-20 00:01:10	12686411	/front-api/bill/create	3	553.82	165.71	219.99
2018-05-20 00:02:10	12686488	/front-api/bill/create	3	559.27	139.82	259.43
2018-05-20 00:03:10	12686558	/front-api/bill/create	5	947.08	119.61	269.42
2018-05-20 00:04:10	12686635	/front-api/bill/create	6	1081.21	138.63	241.77

In [12]:
```
df.tail()
```

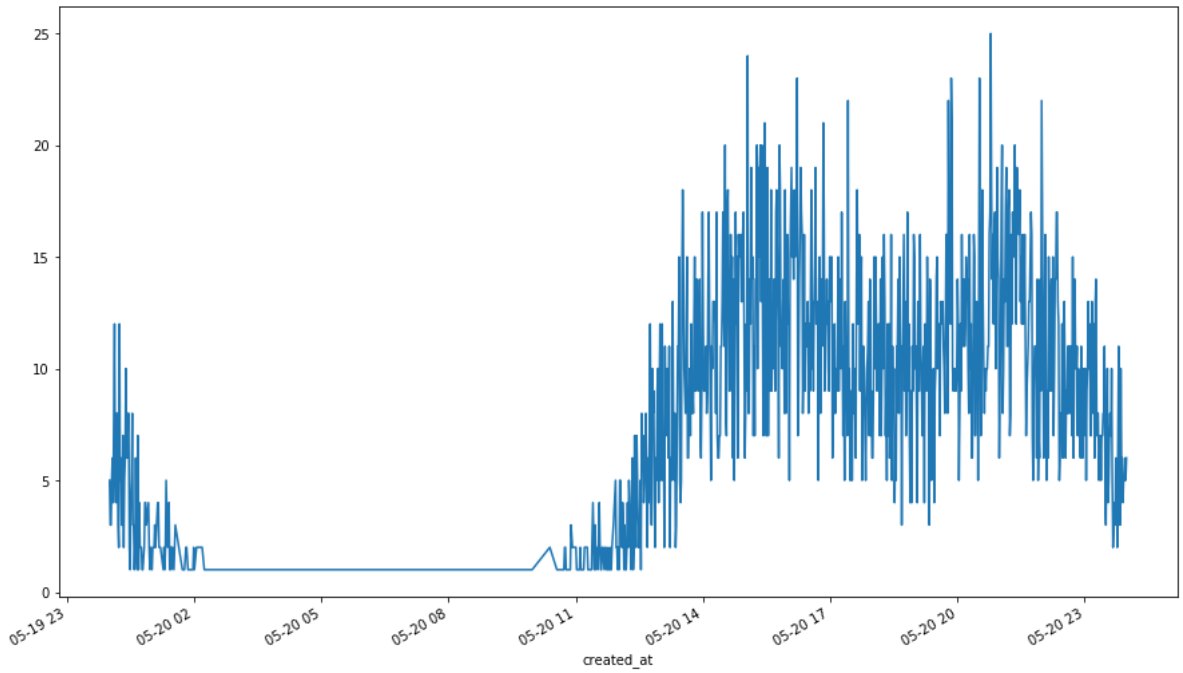
Out[12]:

	id	api	count	res_time_sum	res_time_min	res_time_r
created_at						
2018-05-20 23:55:11	12755831	/front-api/bill/create	5	1249.44	141.59	346.02
2018-05-20 23:56:11	12755902	/front-api/bill/create	5	855.73	120.08	194.33
2018-05-20 23:57:11	12755949	/front-api/bill/create	6	1227.75	74.60	312.44
2018-05-20 23:58:11	12756051	/front-api/bill/create	5	678.46	86.67	218.59
2018-05-20 23:59:11	12756118	/front-api/bill/create	6	1284.77	101.39	347.52

In [13]:
```
df.index[0]
```

Out[13]:
```
Timestamp('2018-05-20 00:00:10')
```

In [14]:
```
plt.figure(figsize=(15, 9))
df['count'].plot()
plt.show()
```



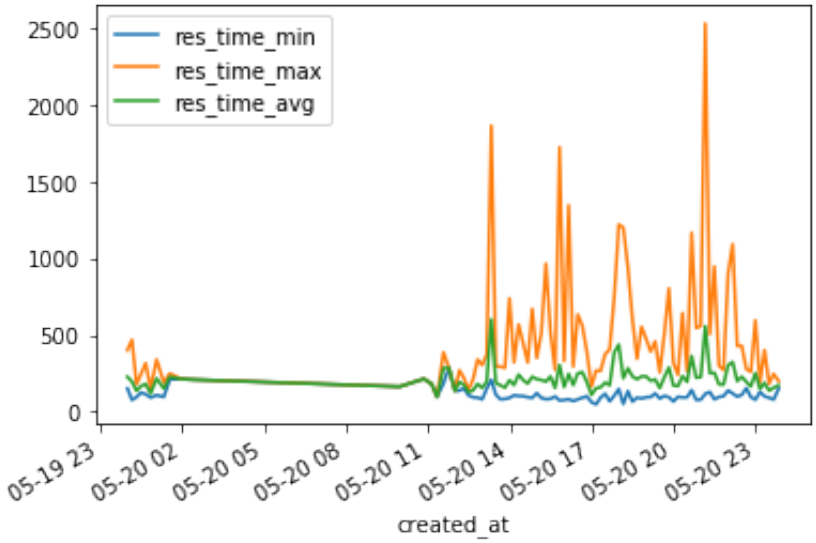
结论：根据上图分析，从凌晨2点到11点访问少，业务高峰在现下午2点到5点、晚上8点到10点

7、分析一天中api响应时间

下面这个不知道为什么 plt.figure(figsize=(15, 9)) 设置无效

In [15]:
```
plt.figure(figsize=(15, 9))
df2 = df[::10]  # 每隔十分钟取一次数据
df2[[ 'res_time_min', 'res_time_max','res_time_avg']].plot()
plt.show()
```

```
<Figure size 1080x648 with 0 Axes>
```



结论：在业务高峰时间段，最大响应时间和平均响应时间都有所上升

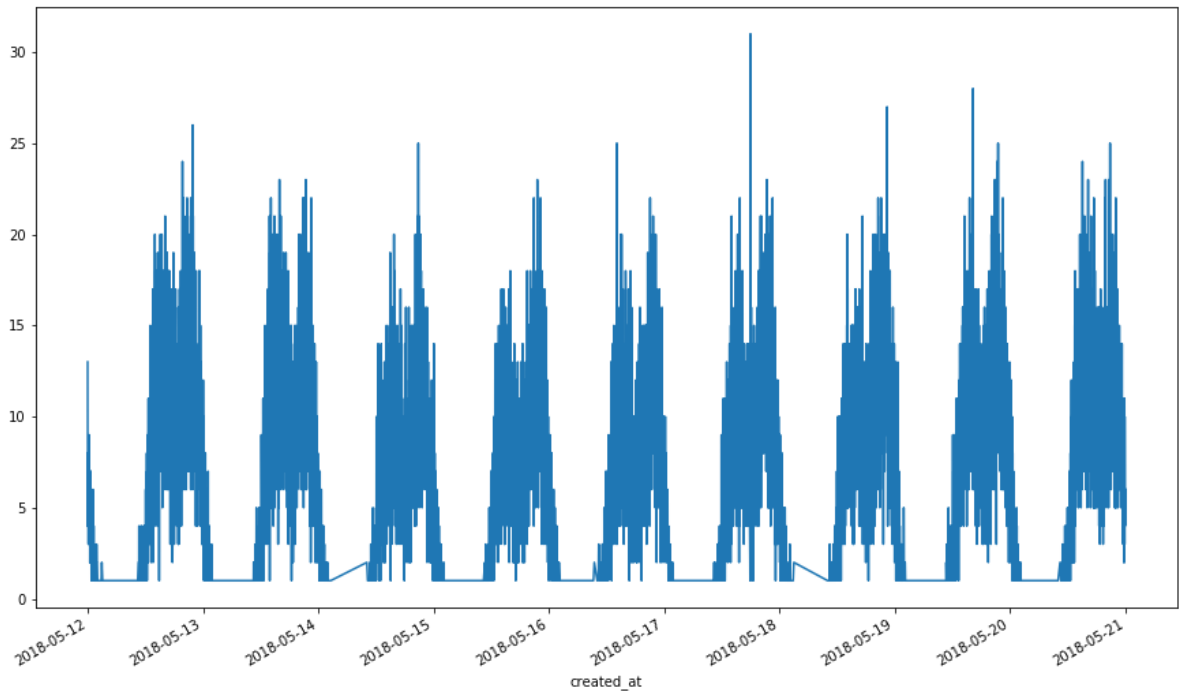
8. 分析连续的几天数据

In [16]:
```
df3 = data['2018-05-12' : '2018-05-20']    # 取2018-05-29一天的数据，且每隔10分钟取一次数据
df3.head()
```

Out[16]:

	id	api	count	res_time_sum	res_time_min	res_time_r
created_at						
2018-05-12 00:00:01	12143170	/front-api/bill/create	13	3340.61	61.82	758.07
2018-05-12 00:01:01	12143256	/front-api/bill/create	6	1287.80	124.29	344.26
2018-05-12 00:02:01	12143360	/front-api/bill/create	4	941.29	112.89	367.51
2018-05-12 00:03:01	12143431	/front-api/bill/create	5	1075.60	95.55	389.41
2018-05-12 00:04:01	12143511	/front-api/bill/create	4	1164.78	134.69	605.19

In [17]:
```
plt.figure(figsize=(15,9))
df3['count'].plot()
plt.show()
```



结论：每天的业务高峰时段都比较相似

9. 分析周末访问量是否有增加

In [18]:
```
time = df.index[0].strftime('%Y-%m-%d %H:%M:%S')
time
```

Out[18]: '2018-05-20 00:00:10'

In [19]:
```
df.index[0]
```

Out[19]: Timestamp('2018-05-20 00:00:10')

In [20]:
```
df4 = df[::30]    # 隔30分钟取一次数据
df4.head()
```

Out[20]:

	id	api	count	res_time_sum	res_time_min	res_time_r
created_at						
2018-05-20 00:00:10	12686322	/front-api/bill/create	5	1136.77	150.77	400.61
2018-05-20 00:30:10	12688476	/front-api/bill/create	4	665.14	123.40	244.76
2018-05-20 01:04:10	12690617	/front-api/bill/create	3	649.72	106.73	339.61
2018-05-20 01:58:10	12693151	/front-api/bill/create	1	212.45	212.45	212.45
2018-05-20 10:51:11	12699445	/front-api/bill/create	1	213.11	213.11	213.11

In [21]:
```
df4.index[0].weekday()+1
```

Out[21]: 7

上面返回7，表示是周日

In [22]:
```
df5 = data['2018-05-22 00:00:00' : '2018-05-22 23:59:59' : 30]
df5.head()
```

Out[22]:

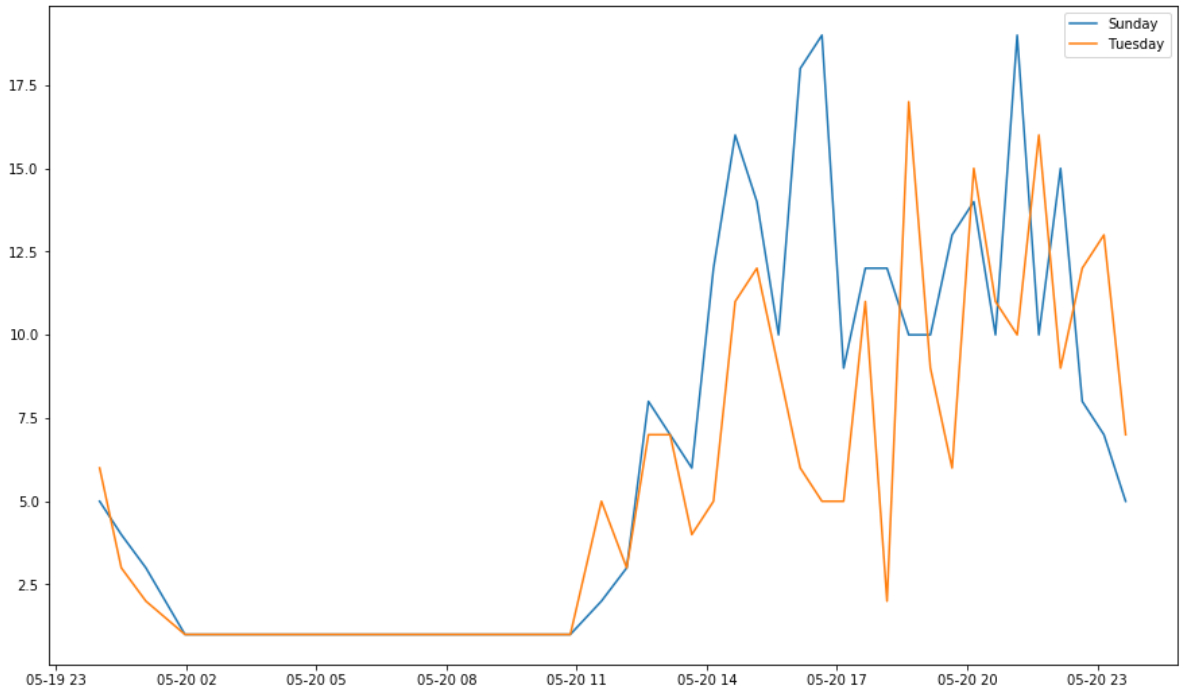
	id	api	count	res_time_sum	res_time_min	res_time_r
created_at						
2018-05-22 00:00:12	12823343	/front-api/bill/create	6	1257.16	92.11	289.67
2018-05-22 00:31:12	12825531	/front-api/bill/create	3	645.92	189.54	239.19
2018-05-22 01:03:12	12827356	/front-api/bill/create	2	421.44	131.02	290.42
2018-05-22 01:40:12	12829288	/front-api/bill/create	1	239.38	239.38	239.38
2018-05-22 10:38:13	12835864	/front-api/bill/create	1	68.70	68.70	68.70

In [23]:
```
df5.index[0].weekday()+1
```

Out[23]: 2

上面返回2，表示是周二

In [24]:
```
plt.figure(figsize=(15, 9))
plt.plot(df4.index, df4['count'], label='Sunday')
plt.plot(df4.index, df5['count'], label='Tuesday')
plt.legend()
plt.show()
```



结论：周末的下午和晚上，比非周末访问量多一些