

API单位误解造成的 严重故障



Agenda

- 故障案例分享
- **Java**问题排查工具箱



故障现象

■ 访问就进入如下限流页面

淘宝网



服务器忙, 请稍等10秒后再刷新页面! [刷新1](#)

休息一下

买家:老板, 能不能帮我挑一部最好的?

卖家:好的, 我把几百部手机组织起来, 让它们先海选后PK .

■ 重启应用后恢复



排查过程回顾

■ 出现限流页面的原因

- 应用中活跃的线程数超过了阈值
 - 最重要的是要知道这些线程都在干什么
 - 不幸的是当时没做线程dump
 - 幸运的是有一台做了heap dump



排查过程回顾

■ 分析活跃的线程在做什么

● MAT分析heap dump，查看线程状况

```
▼ java.lang.Thread @ 0x7585c60b8 http-0.0.0.0-7001-44
  ▶ at org.apache.commons.httpclient.MultiThreadedHttpConnectionManager.doGetConnection(Lorg/apache/commons/httpclie
    at org.apache.commons.httpclient.MultiThreadedHttpConnectionManager.getConnectionWithTimeout(Lorg/apache/commo
  ▶ at org.apache.commons.httpclient.HttpMethodDirector.executeMethod(Lorg/apache/commons/httpclient/HttpMethod;)V (Ur
  ▶ at org.apache.commons.httpclient.HttpClient.executeMethod(Lorg/apache/commons/httpclient/HostConfiguration;Lorg/apa
    at org.apache.commons.httpclient.HttpClient.executeMethod(Lorg/apache/commons/httpclient/HttpMethod;)I (Unknown;Sor
  ▶ at com.taobao.tmallsearch.httpclient.HttpClientWrapper.getHttpResponseFrom(Ljava/lang/String;)[B (HttpClientWrapper.java:
  ▶ at com.taobao.tmallsearch.httpclient.HttpClientWrapper.getBytes(Ljava/lang/String;)[B (HttpClientWrapper.java:70)
    at com.taobao.common.searchengine.SearchEngine.getHttpResponseSyncByThird(Ljava/lang/String;)[B (SearchEngine.jav
  ▶ at com.taobao.common.searchengine.SearchEngine.doQuery(Lcom/taobao/common/searchengine/SearchCondition;Lcom
  ▶ at com.taobao.common.searchengine.DefaultSearchManager.queryInternal(Lcom/taobao/common/searchengine/SearchCon
    at com.taobao.common.searchengine.DefaultSearchManager.queryList(Lcom/taobao/common/searchengine/SearchCondi
  ▶ at com.taobao.tmallsearch.manager.search.impl.ProductSearchManagerImpl.queryList(Lcom/taobao/common/searchengin
  ▶ at com.taobao.tmallsearch.repository.search.impl.ProductSearchRepositoryImpl.search(Lcom/taobao/tmallsearch/query/Pr
    at com.taobao.tmallsearch.common.bo.BaseSearchBO.getProductSearchDO(Lcom/taobao/tmallsearch/query/ProductSearc
  ▶ at com.taobao.tmallsearch.bo.search.impl.ProductSearchBOImpl.search(Lcom/taobao/tmallsearch/query/ProductSearchQu
  ▶ at com.taobao.tmallsearch.ao.search.impl.ProductSearchAOImpl.search(Lcom/taobao/tmallsearch/query/ListProductSearc
  ▶ at com.taobao.tmallsearch.web.handler.wap.WapSearchHandler.handleRequestInternal(Lcom/taobao/tmallsearch/query/L
  ▶ at com.taobao.tmallsearch.web.handler.BaseSearchHandler.handleRequest(Lcom/taobao/tmallsearch/query/ListProductSe
    at com.taobao.tmallsearch.web.module.screen.m.SearchData.execute(Lcom/alibaba/citrus/turbine/TurbineRunData;Lcom/
    at com.taobao.tmallsearch.web.module.screen.m.SearchData$$FastClassByCGLIB$$3b314b5e.invoke([Ljava/lang/Object;[L
    at net.sf.cglib.reflect.FastMethod.invoke(Ljava/lang/Object;[Ljava/lang/Object;)Ljava/lang/Object; (FastMethod.java:53)
    at com.alibaba.citrus.service.moduleloader.impl.adapter.MethodInvoker.invoke(Ljava/lang/Object;Lorg/slf4j/Logger;)V (Met
    at com.alibaba.citrus.service.moduleloader.impl.adapter.DataBindingAdapter.execute(I)V (DataBindingAdapter.java:37)
  ▶ at com.alibaba.citrus.turbine.pipeline.valve.PerformScreenValve.performScreenModule(Lcom/alibaba/citrus/turbine/Turbine
  ▶ at com.alibaba.citrus.turbine.pipeline.valve.PerformScreenValve.invoke(Lcom/alibaba/citrus/service/pipeline/PipelineConte
  Σ Total: 25 of 86 entries; 61 more
  ▼ java.lang.Thread @ 0x759faaef8 http-0.0.0.0-7001-125
  ▼ java.lang.Thread @ 0x758e9f400 http-0.0.0.0-7001-55
  ▼ java.lang.Thread @ 0x758e9e670 http-0.0.0.0-7001-99
  ▼ java.lang.Thread @ 0x7585c52d0 http-0.0.0.0-7001-39
```



排查过程回顾

- 所有活跃的**http**线程都在等一把锁
 - 到底哪个线程持有了这把锁呢
 - MAT分析没有直接的线程dump文件
 - 借助google查了下可能是什么原因
 - google提示有可能是因为idle timeout thread



排查过程回顾

■ 持有锁的Idle Timeout Thread

→ *.IdleConnectionTimeoutThread.*	
▼	org.apache.commons.httpclient.util.IdleConnectionTimeoutThread @ 0x752c0d678
▷	at java.net.PlainSocketImpl.socketClose0(Z)V (Native Method)
	at java.net.PlainSocketImpl.socketPreClose()V (PlainSocketImpl.java:678)
▷	at java.net.PlainSocketImpl.close()V (PlainSocketImpl.java:512)
	at java.net.SocksSocketImpl.close()V (SocksSocketImpl.java:1029)
▷	at java.net.Socket.close()V (Socket.java:1352)
▷	at java.net.SocketOutputStream.close()V (SocketOutputStream.java:150)
▷	at java.io.FilterOutputStream.close()V (FilterOutputStream.java:143)
▷	at org.apache.commons.httpclient.HttpConnection.closeSocketAndStreams()V (Unknown Source)
▷	at org.apache.commons.httpclient.HttpConnection.close()V (Unknown Source)
▷	at org.apache.commons.httpclient.util.IdleConnectionHandler.closeIdleConnections()V (Unknown Source)
▷	at org.apache.commons.httpclient.MultiThreadedHttpConnectionManager\$ConnectionPool.closeIdleConnections()V (Unkn
▷	at org.apache.commons.httpclient.MultiThreadedHttpConnectionManager.closeIdleConnections()V (Unknown Source)
▷	at org.apache.commons.httpclient.util.IdleConnectionTimeoutThread.run()V (Unknown Source)
Σ	Total: 13 entries



排查过程回顾

■ Idle timeout thread为什么会卡住呢

● socketClose竟然一直没关掉

■ 查看了下内存去关连接的server

- 经确认在那个时间段内对应的server集群有几台在维修;

■ 但为什么会`导致socketClose`一直没关掉呢

- 代码里有调用`setLinger(1000)`

➤ 这个会影响到关闭的速度，开发告诉我这是1s

➤ 那理论上也不会卡住，于是有点怀疑...



排查过程回顾

- 查了下**setLinger**的说明
 - 结果这个的单位是s
 - 于是意味着socketClose那个地方会卡住1000s
 - ok，到此问题确认。



故障案例总结

- **API单位误解造成了严重故障；**
 - 对于代码中使用到的API要清楚的知道其行为。
- **其他**
 - 未根据故障现象做相应的现场保留动作；
 - 导致排查比较折腾。
 - Google是排查故障的得力帮手。



故障案例总结

■ API单位误解造成的经典故障

- 火星气候探测者号任务失败的主要原因是人为因素，因为火星气候探测者号上的飞行系统软件使用公制单位牛顿计算推进器动力，而地面人员输入的方向校正量和推进器参数则使用英制单位磅力，导致探测器进入大气层的高度有误，最终瓦解碎裂。
- 造成的损失估计过亿美金





Java问题排查工具箱

■ 默认值相关问题

- `-XX:+PrintFlagsFinal || jinfo -flags`

■ 类装载相关问题

- `-XX:+TraceClassLoading`

■ 应用无响应相关问题

- `sar`等系统指标
- `jstack [-l] [-m]`



Java问题排查工具箱

■ 内存相关问题

- `-XX:+HeapDumpOnOutOfMemoryError -XX:+PrintGCDetails -XX:+PrintGCDateStamps -Xloggc:<gc log文件>`
- `jmap`
 - `-histo:live [pid]`
 - `-dump:file=<文件名>,format=b [pid]`
- `gcore [pid]`
- `MAT`
- `btrace`
- `gperftools`
- `ulimit`
 - `cat /proc/[pid]/limits`



Java问题排查工具箱

■ CPU利用率相关问题

- top -H+jstack
- perf -top
 - 阿里版本的[perf](#) & [JDK](#)
- jstack+btrace
- blktrace+debugfs+btrace



Java问题排查工具箱

■ Java进程退出相关问题

- core dump
 - gdb
- dmesg | grep -i kill
- hs_err_pid[pid].log
- JDK bugs



谢谢大家！

■ 更多故障排查的**cases**以及技巧请关注

