

性能项目解析： 互联网银行项目实践 两则实际性能定位案例

高楼（Zee）

MTSC2018

第四届中国移动互联网测试开发大会

TesterHome | IT大咖说

TesterHome



- 专注性能方向，从架构到代码，从需求到运维
- 管理团队靠气质
- 不偏袒，不死板，但偏执（狮子座谁也不听）
- 浪迹职场十几年（流浪欧洲三年）
- 发起**7D Group**，通过公众号发布性能文章（不私藏）
- 经历过的性能项目包罗万象，主要是有钱的客户
- 培训过的客户五花八门（具体评价请联系培训过的客户）
- 今年内的目标是把自己会的都写出来
- 近期主要文章：
《性能分析系列》 《性能工具系列》 《带团队系列》



大神 还有个问题 我一直没思路，就是 我拿到一份“流氓”性能测试报告，上面只写了响应时间多少，tps 是多少 然后罗列了一下压力机基本配置情况，比如 40 个并发响应时间是 5秒 tps 是 260 我怎么判断这次性能测试的有效性，1. 场景是否合理 2. 压力是否传递均匀 或者达到指定目标 3. 是否有干扰因素，或者说那些数据是否有效 4. 有没有一些判断手段？望 大神指点

找到性能瓶颈？

找到系统容量？

给开发、运维提出建议？

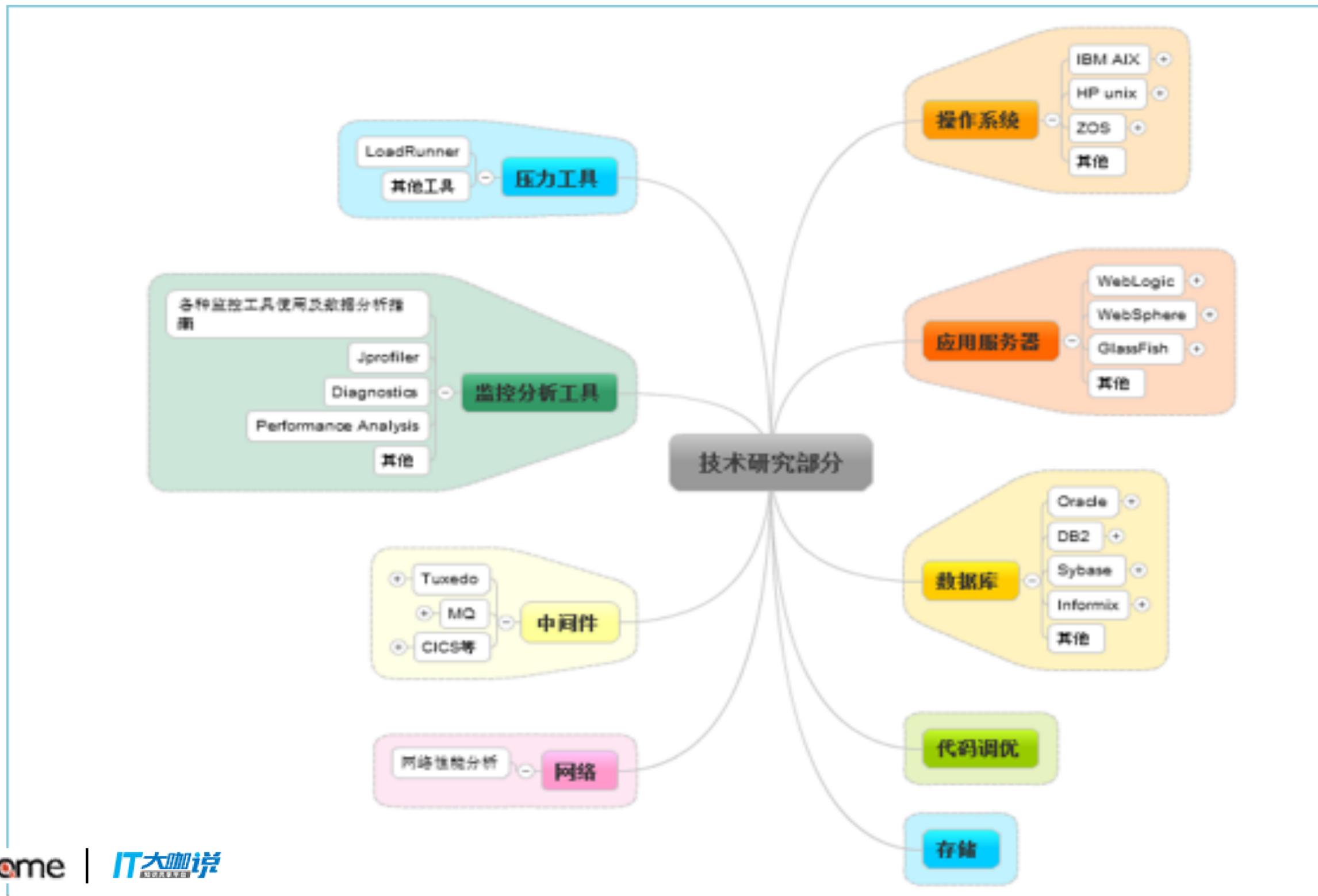
满足生产业务性能需求？



```
procs ----- 0.00 0.00 84.92 56.95 94.68 1569 12.541 70 178.193 190.734 --cpu-----
r b swpd 100.00 0.00 0.00 93.66 94.68 1573 12.939 71 178.193 191.132 y id wa st
0 38 0 1 0.00 0.00 100.00 100.00 95.34 1575 13.624 72 180.447 194.071
0 37 0 1 0.00 0.00 100.00 100.00 95.38 1575 13.624 73 183.737 197.361
0 0 0 0 0.00 0.00 100.00 100.00 95.80 1575 13.624 74 186.081 199.705
0 0 0 0 0.00 0.00 100.00 100.00 96.60 1575 13.624 75 188.589 202.213
0 0 0 0 0.00 0.00 100.00 100.00 96.60 1575 13.624 76 191.062 204.686
9 0 90 0
```

Status	Duration	CPU_user	CPU_system	Context_voluntary	Context_involuntary	Block_ops_in	Block_ops_out	Messages_sent	Messages_received	Page_faults_major	Page_faults_minor	Swaps	Source_function	Source_file	Source_line
starting	0.000275	0.003051	0.000110	1	2	0	0	0	0	0	2	0	NULL	NULL	NULL
checking permissions	0.000204	0.000599	0.002092	7	1	32	64	0	0	0	0	0	check_access	sql_parse.cc	5297
Opening tables	0.000235	0.002979	0.000000	0	4	0	192	0	0	0	8	0	open_tables	sql_base.cc	5069
init	0.000240	0.004058	0.000109	6	2	32	32	0	0	0	4	0	mysql_prepare_select	sql_select.cc	1050
System lock	0.000266	0.003128	0.000109	7	1	0	0	0	0	0	1	0	mysql_lock_tables	lock.cc	304
optimizing	0.000268	0.000801	0.002225	3	2	32	8	0	0	0	1	0	optimize	sql_optimizer.cc	138
statistics	0.000211	0.002840	0.000109	6	0	0	0	0	0	0	1	0	optimize	sql_optimizer.cc	362
preparing	0.000206	0.002647	0.000000	5	4	32	8	0	0	0	1	0	optimize	sql_optimizer.cc	485
executing	0.000194	0.002172	0.000109	3	1	0	0	0	0	0	0	0	exec	sql_executor.cc	110
Sending data	3.347879	42.951565	3.376300	49303	10885	53600	167632	0	0	0	16285	0	exec	sql_executor.cc	190
end	0.001065	0.012369	0.001495	8	1	0	0	0	0	0	0	0	mysql_execute_select	sql_select.cc	1105
query end	0.000171	0.002978	0.000000	5	0	32	0	0	0	0	1	0	mysql_execute_com...	sql_parse.cc	4996
closing tables	0.000174	0.003453	0.000110	0	0	0	0	0	0	0	4	0	mysql_execute_com...	sql_parse.cc	5044
freeing items	0.000286	0.004190	0.001034	3	1	0	8	0	0	0	0	0	mysql_parse	sql_parse.cc	6433
logging slow query	0.000278	0.004860	0.000219	5	0	32	0	0	0	0	0	0	log_slow_do	sql_parse.cc	1874
cleaning up	0.000294	0.005242	0.000109	6	1	0	8	0	0	0	1	0	dispatch_command	sql_parse.cc	1778

```
0 53 0 1 0.00 0.00 100.00 100.00 99.76 1575 13.624 106 269.093 282.718 7 0 93 0
0 41 0 1 0.00 0.00 100.00 100.00 99.80 1575 13.624 108 274.027 287.652 6 0 94 0
2 39 0 1 0.00 0.00 100.00 100.00 99.80 1575 13.624 110 279.182 292.806 7 0 92 0
0 0 0 2 0.00 0.00 100.00 100.00 99.80 1575 13.624 112 283.933 297.557 9 6 82 0
0 0 0 2 0.00 0.00 100.00 100.00 99.80 1575 13.624 113 286.633 300.257 9 6 82 0
0 0 0 2 0.00 0.00 100.00 100.00 99.80 1575 13.624 115 291.874 305.498 1 0 94 0
0 0 0 2 0.00 0.00 100.00 100.00 99.80 1575 13.624 116 294.165 307.789
0 0 0 2 0.00 0.00 100.00 100.00 99.80 1575 13.624 117 296.617 310.241
```





性能场景执行之前

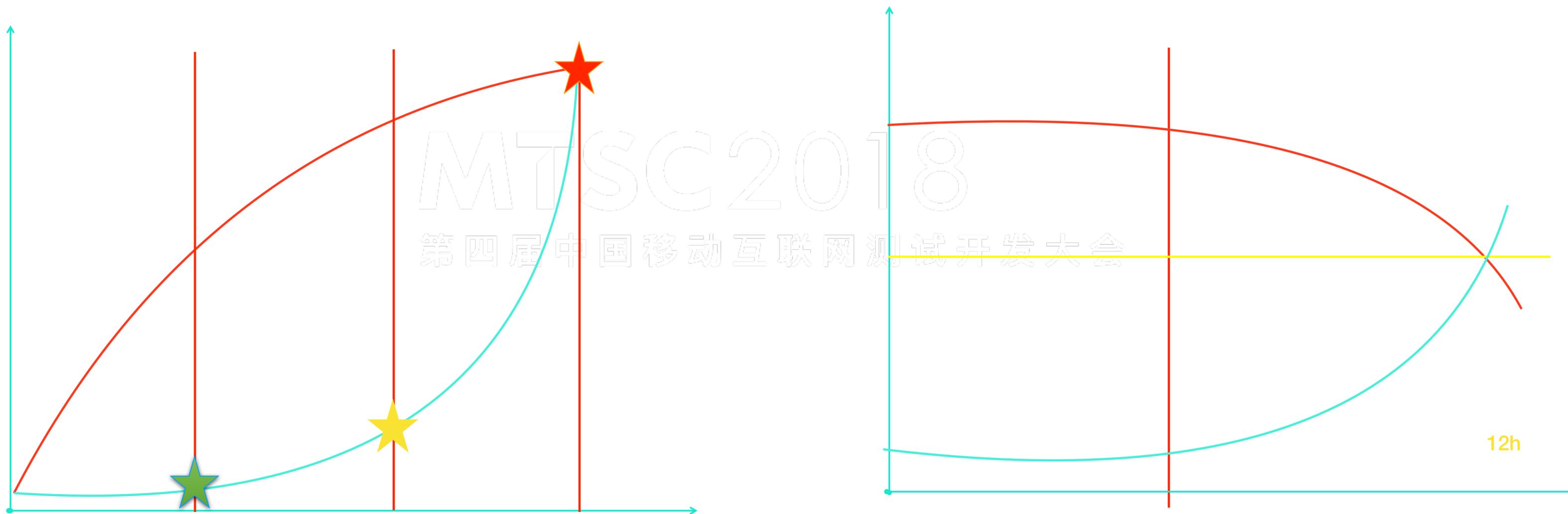
第四届中国移动互联网测试开发大会

业务比例的合理性

系统名称	目标客户数	交易类型	交易名称	交易代码	区域	交易占比	TPS目标值	峰值需求	
核心系统	RDF: 对私 客户500万	联机	个人开户 (渠道)	301102000903	CM	5%	42		
		联机	单笔转账	301102001104	RDFA	25%	208		
		联机	账户余额查询	301302001003	RDFA	25%	208		
		联机	客户账户余额查询	301302000709	RDFA	30%	250		
		联机	账户信息查询	301102000710	RDFA	12%	100		
		联机	热点账户转账 (强支付, 对公热点账户转出到个人账户)	301102001104	RDFA/CDFA	3%	25		
		联机	热点账户转账 (强支付, 对公热点账户转出到个人账户)	301102001003	RDFA/CDFA		批量最大并		
		联机	虚拟币账户开户	301201000501	RDFA		批量最大并		
		联机	虚拟币账户余额增加	301101000301	RDFA		批量最大并		
		联机	虚拟币账户余额查询	301301000301	RDFA		批量最大并		
日终数据	季度结息					2小时			
ICF	RDF: 对私 客户500万	联机	建立个人客户信息	201201000101	CM	5%	35		
		联机	查询个人客户信息 (01全量查询)	201302000501	RDFA	40%	250		
支付平台	CDF: 对公 客户100万	联机	查询客户账户信息	201302000402	RDFA	40%	222		
		联机	查询企业客户信息 (01全量查询)	201302000101	CDFA	85%	94		
支付平台	RDF: 对私 客户250万	联机	账户余额查询	201301000101	CDFA/RDFA	15%	5		
		联机	代付	304202000104	RDFA	20%	67		
		联机	批量代付	304102000206	RDFA	15%	50		
		联机	交易状态查询	304302000501	RDFA	5%	17	Y	
移动支付	RDF: 对私 客户100万	联机	账户认证	304202000601	RDFA	20%	67		
		联机	转账	304102000601	RDFA	20%	67	Y	
		联机	初始化					35	
		联机	账户设置					35	
		联机	查询交易					35	
		联机	转账设置					35	
		联机	绑定卡					35	
		联机	活期检测					35	
		联机	即时设置					35	
		联机	单笔行内转账				10%	1390%	Y
企业网银	CDF: 对公 客户100万	联机	单笔跨行转账			10%	1390%	Y	
		联机	客户明细查询			20%	2780%	Y	
		联机	账户余额查询			10%	1390%	Y	
		联机	余额查询			10%	1390%	Y	
		联机	历史交易明细查询			5%	695%	Y	
		联机	注册			5%	3470%	Y	
		联机	登录			10%	6940%	Y	
		联机	开户			5%	3470%	Y	
		联机	销卡			5%	3470%	Y	
		联机	解绑			5%	3470%	Y	
手机银行	RDF: 对私 客户100万	联机	转账			5%	3470%	Y	
		联机	代付			5%	3470%	Y	
		联机	交易列表查询			5%	3470%	Y	
		联机	智能存款买入			5%	3470%	Y	
		联机	智能存款支取			5%	3470%	Y	
		联机	智能存款余额查询			10%	6940%	Y	
		联机	智能存款交易明细查询			5%	3470%	Y	
		联机	智能存款利率查询			5%	3470%	Y	
		联机	广告			10%	6940%	Y	
		联机	消息盒子			5%	3470%	Y	
信贷	RDF: 对私 客户500万	联机	贷款申请	302202000202	RDFA	10%	6940%	Y	
		联机	借款申请	302202001001	RDFA	10%	6940%	Y	
		联机	提前还款	302102000207	RDFA	10%	6940%	Y	
		联机	结清利息查询	302302000401	RDFA	80%	27760%	Y	
		联机	查询还款记录	302302000704	RDFA	20%	13880%	Y	
		联机	还款明细查询	302302000601	RDFA	10%	6940%	Y	
		日终数据	日终计提					14-87	
		日终数据	日终结息					14-87	
		日终数据	批量扣款					14-87	

支付平台		联机	代收	3041020	RDFA	20%	67
		联机	代付	3041020	RDFA	15%	50
		联机	批量代付	3041030	RDFA	5%	17
		联机	交易状态查询	3043020	RDFA	20%	67
		联机	账户认证	3042020	RDFA	20%	67
		联机	转账	3041020	RDFA	20%	67

企业网银		联机	单笔行内转账			10%	14
		联机	单笔跨行转账			10%	14
		联机	客户明细查询			20%	28
		联机	客户账户余额查询		DMZ	25%	35
		联机	客户信息查询			20%	28
		联机	余额查询			10%	14
		联机	历史交易明细查			5%	7





交易名称	测试环境数据量(W)
个人账户	360万
历史交易明细	1800万
对公账户	100万
个人客户（50万存款，250万贷款+存款，50万贷款）	500万
对公客户	100万
客户	300万
借据	900万
客户	300万
支付历史交易	1800万？
客户	50万



响应时间：

后台账务类交易：**≤1秒**

后台查询类交易：**≤0.3秒**

基础架构组件：**≤50毫秒**

前端账户服务类交易：**≤5秒**

前端账户查询类交易：**≤3秒**

系统处理能力：**客户量TPS指标**

成功率：**不小于99.99%**

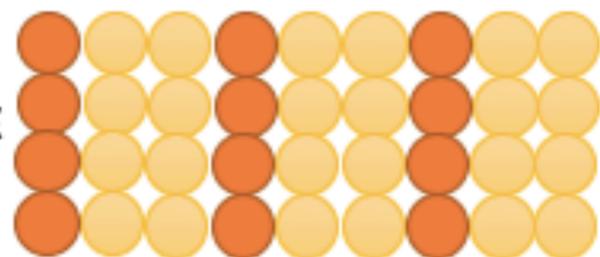
系统资源使用：

CPU平均使用率不高于**80%**

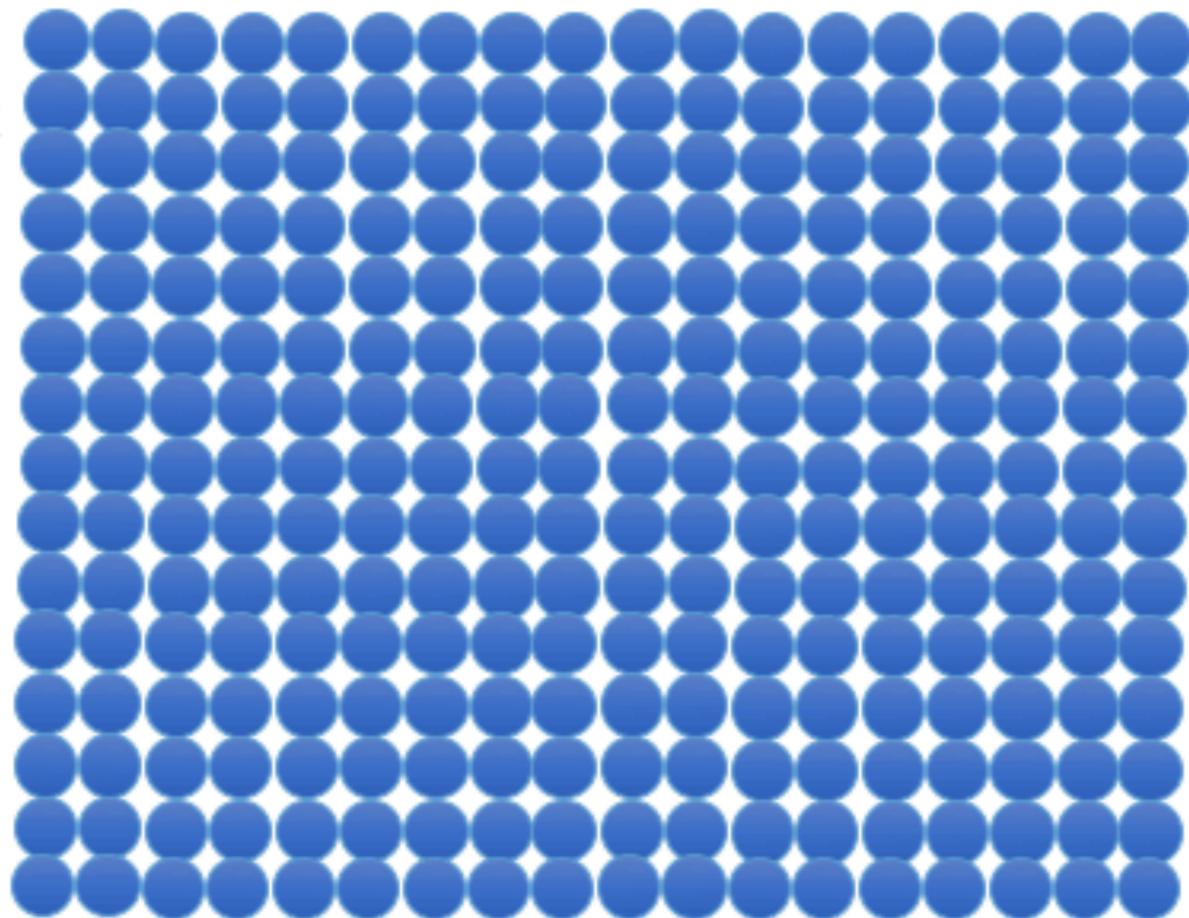
内存使用率不高于**80%**



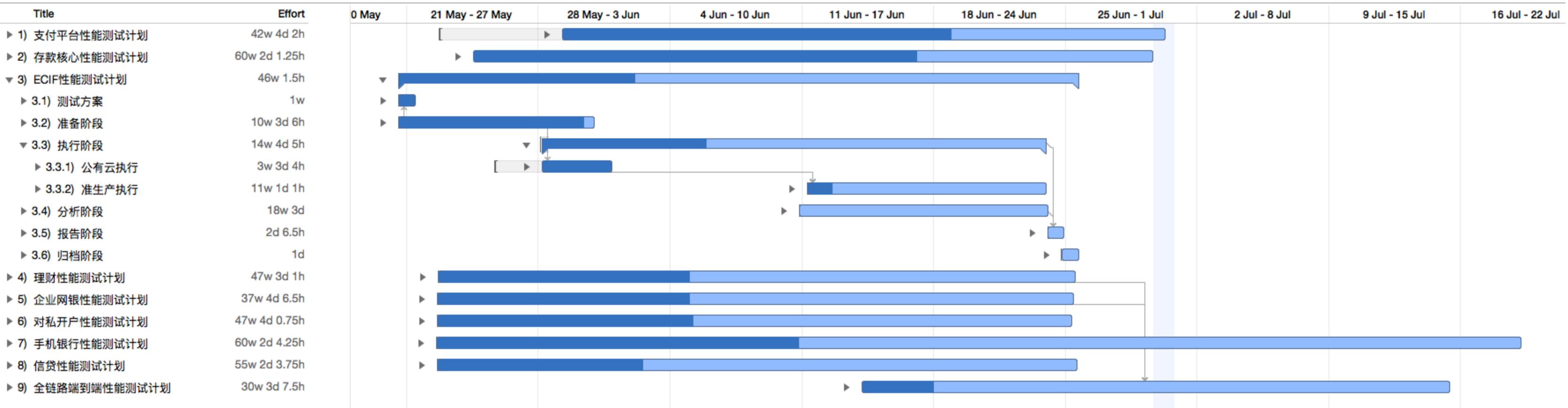
DB集群



主机集群



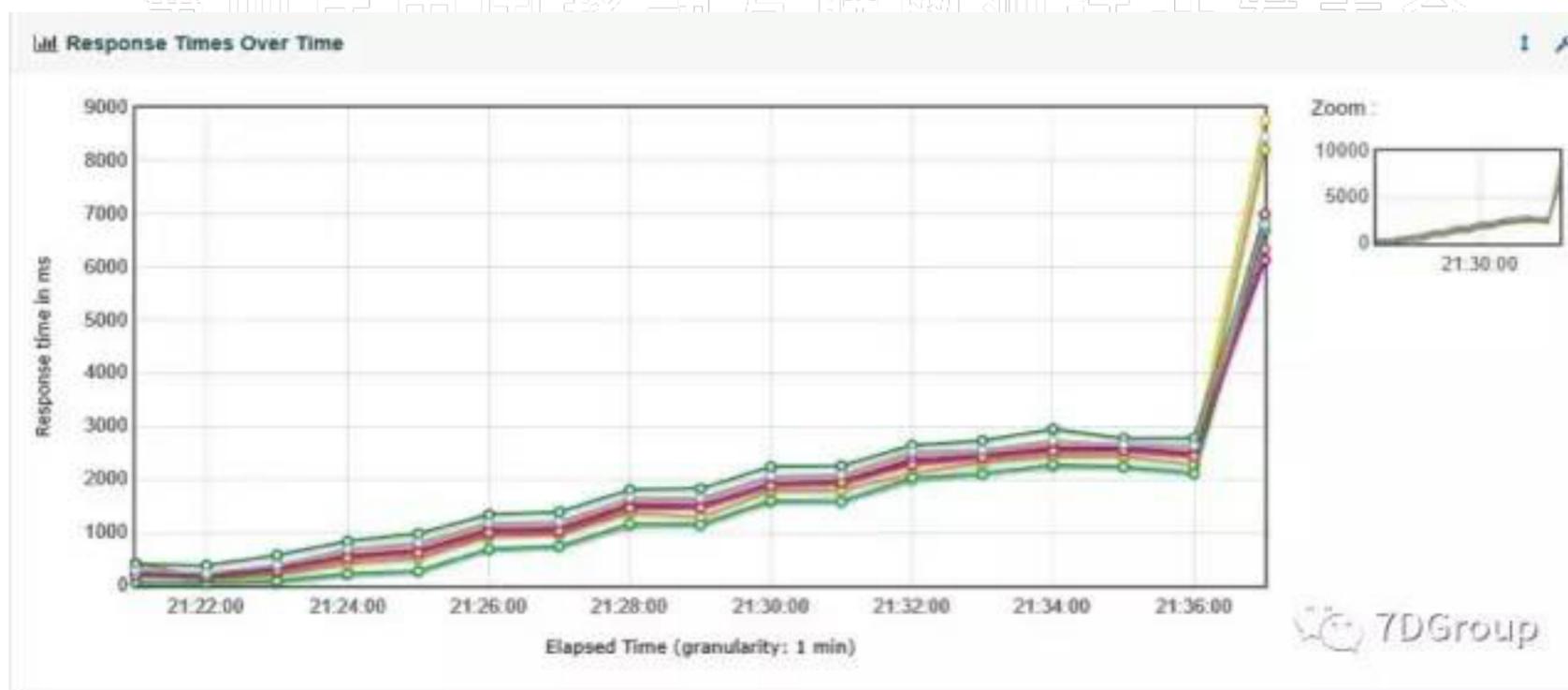
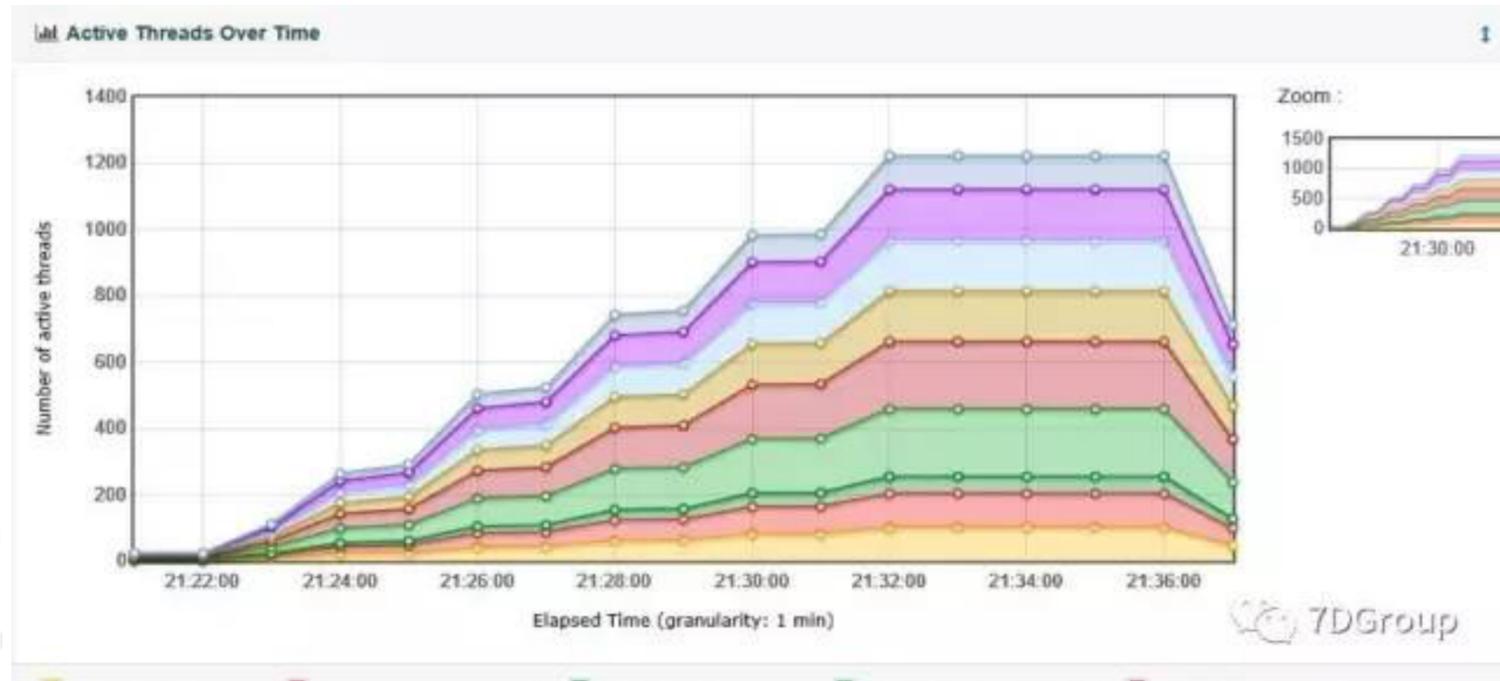
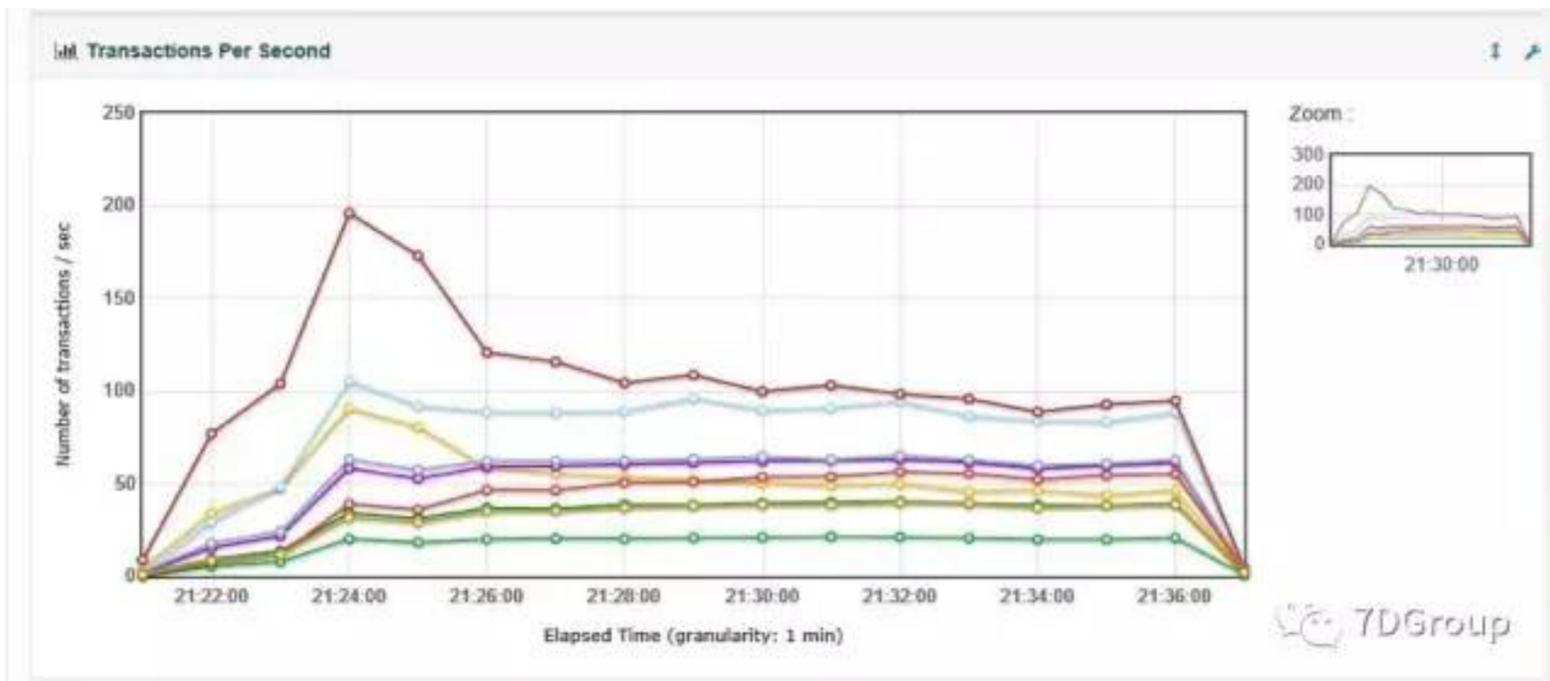
7D





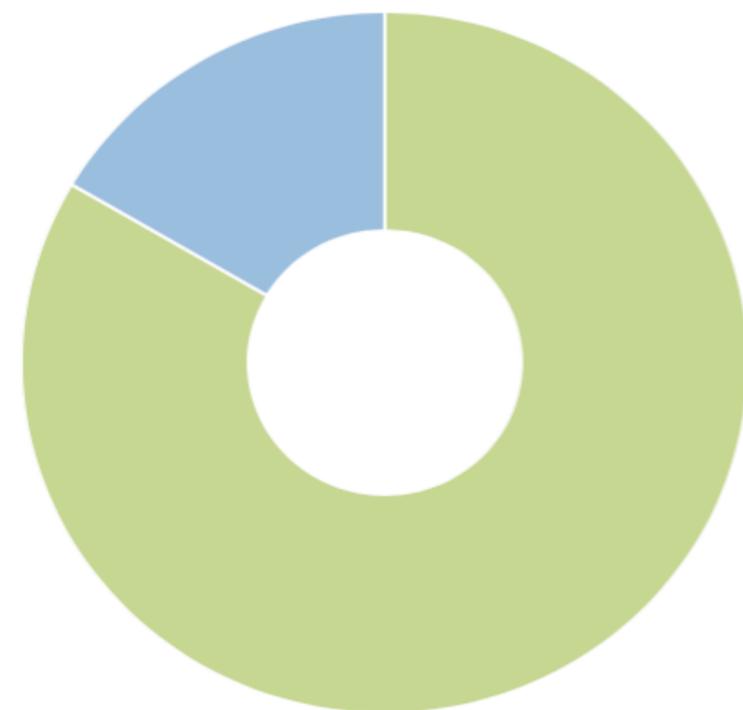
MTSC2018 性能执行之中

第四届中国移动互联网测试开发大会





• 整体问题统计：（之前Excel统计的已经关闭的问题没有整合到jira中，所以总体问题数是78+127=205个）

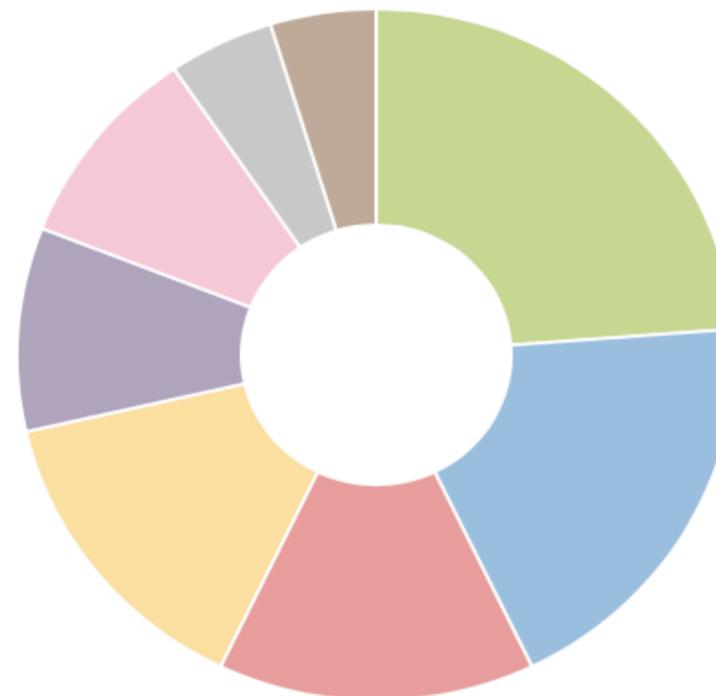


解决结果
问题合计127

完成	106
未解决	21

20
互联网

• 未解决的问题统计：



模块
问题合计21

企业网银	5
信贷系统	4
存款系统	3
移动个人开户	3
手机银行	2
支付平台	2
ECIF	1
理财系统	1



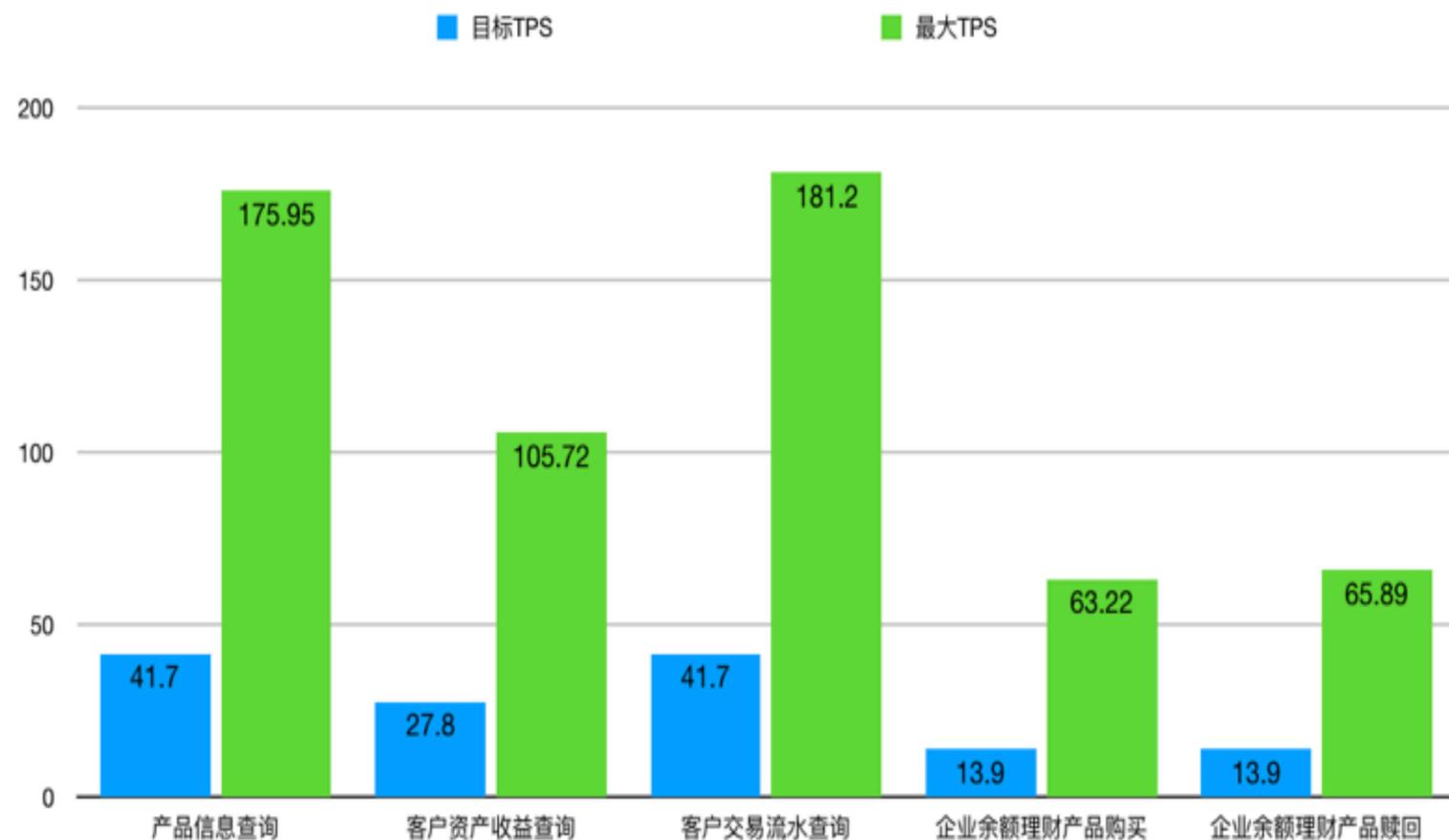
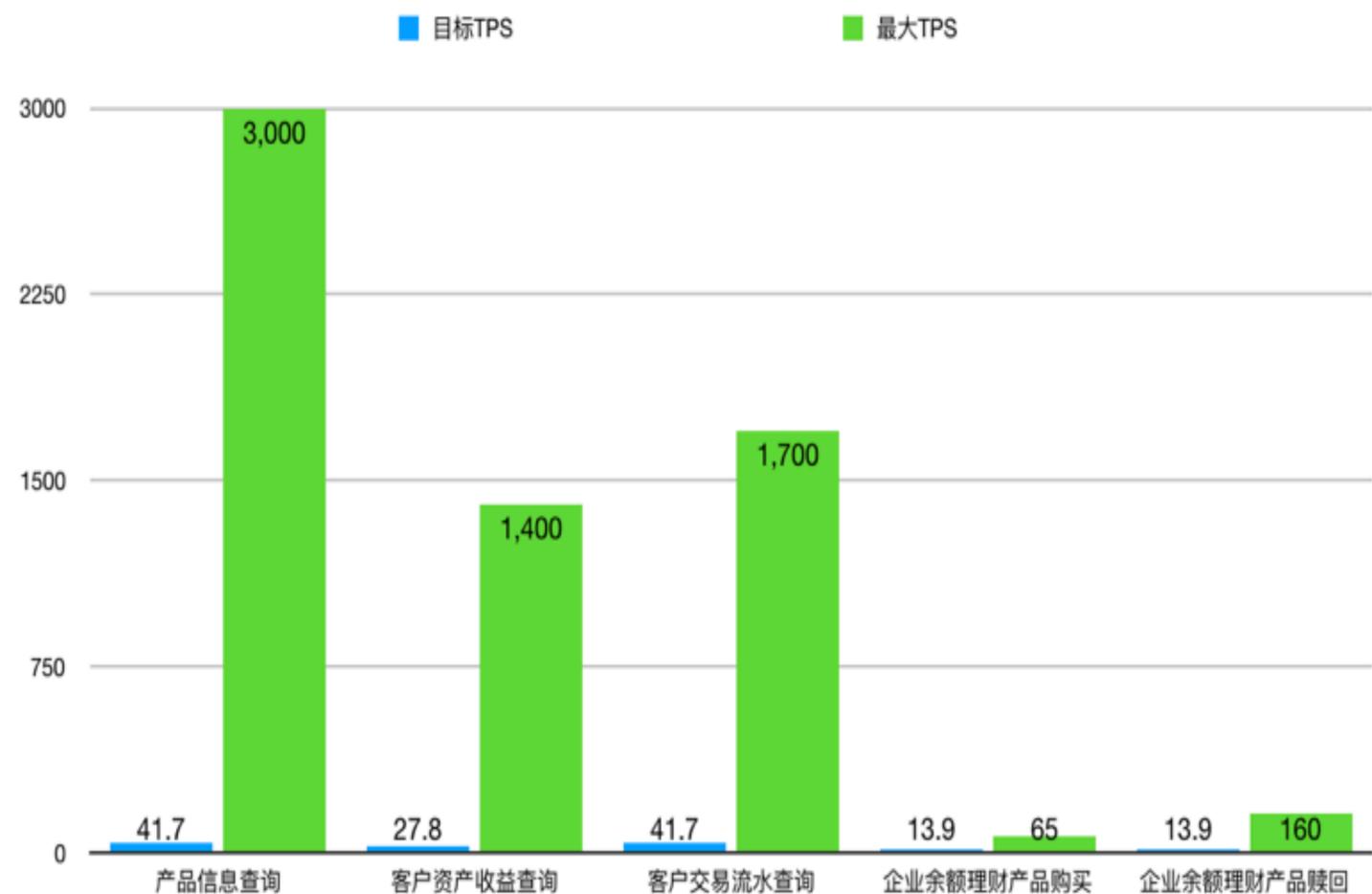
性能场景执行之后

MTSC2018

第四届中国移动互联网测试开发大会

单交易容量

混合容量





脚本归档
数据归档
场景归档
结果归档

MTSC2018

第四届中国移动互联网测试开发大会

写报告 (word/PPT)

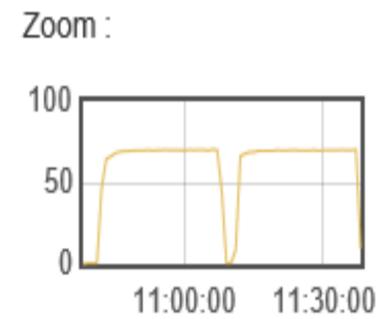
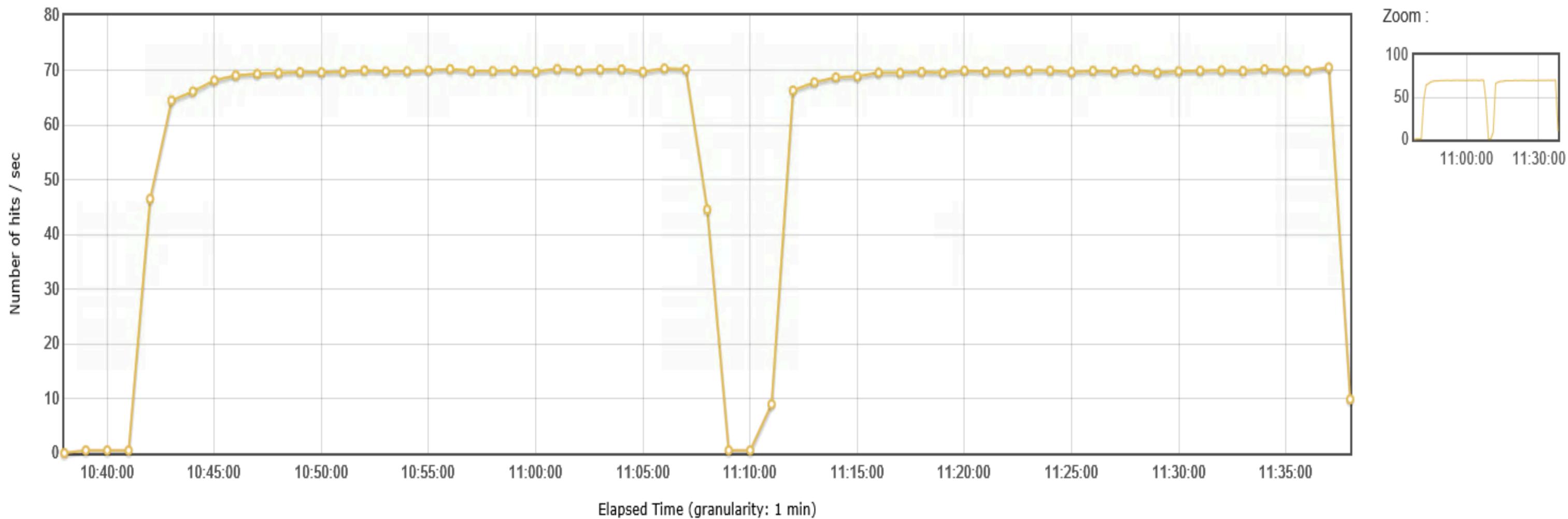


性能分析之一：数据不均衡导致TPS下降

第四届中国移动互联网测试开发大会

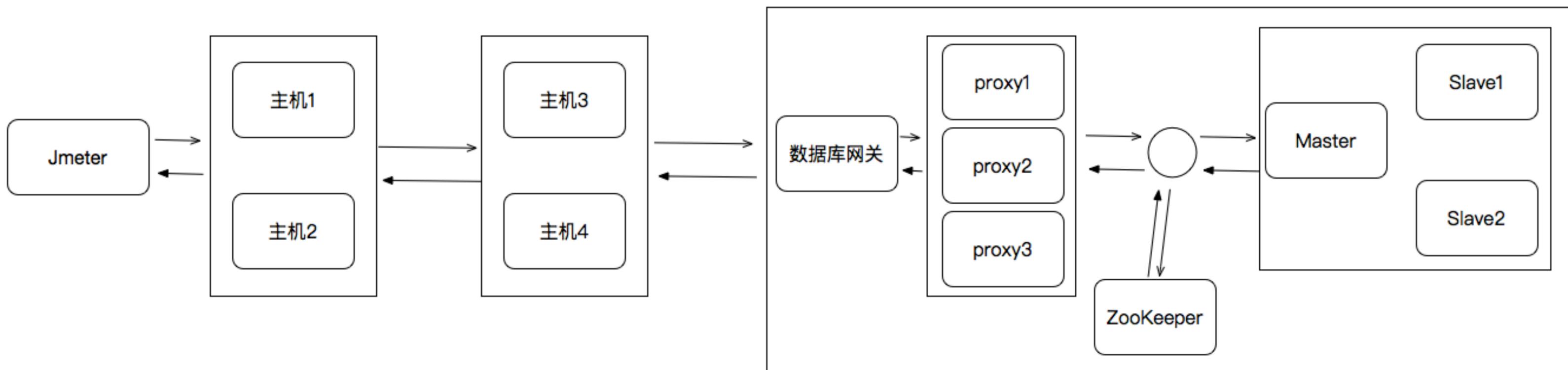


Hits Per Second



hitsPerSecond

线程数: 300 - 100 - 50 - 10 - 1



CPU 使用情况: 1.7%

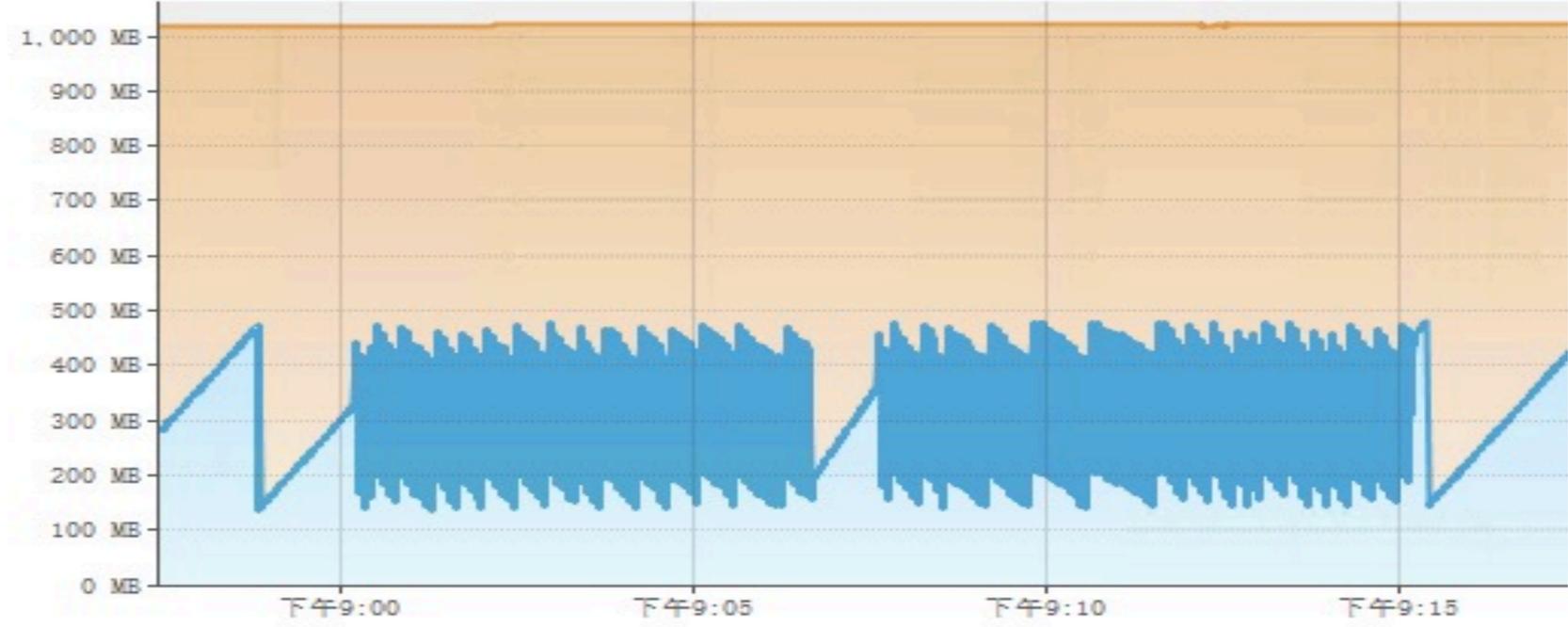
垃圾回收



堆 PermGen

大小: 1,072,693,248 个字节
最大: 3,817,865,216 个字节

已使用:



GC多正常

MTSC2018

第四届中国移动互联网测试开发大会



Server说: 我也正常呀!

```
top - 22:51:42 up 39 days, 6:22, 2 users, load average: 0.22, 0.14, 0.14
Tasks: 121 total, 1 running, 119 sleeping, 0 stopped, 1 zombie
%Cpu0  :  8.6 us,  2.8 sy,  0.0 ni, 88.3 id,  0.0 wa,  0.0 hi,  0.3 si,  0.0 st
%Cpu1  :  8.5 us,  2.7 sy,  0.0 ni, 88.4 id,  0.0 wa,  0.0 hi,  0.3 si,  0.3 st
%Cpu2  :  9.3 us,  3.1 sy,  0.0 ni, 87.6 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu3  :  8.2 us,  3.7 sy,  0.0 ni, 87.4 id,  0.0 wa,  0.0 hi,  0.3 si,  0.3 st
KiB Mem : 8010952 total, 2009128 free, 911736 used, 5090088 buff/cache
KiB Swap: 0 total, 0 free, 0 used. 6813832 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
18860	app	20	0	7954696	716464	10680	S	51.8	8.9	84:03.01	java
13	root	20	0	0	0	0	S	0.3	0.0	21:35.07	rcu_sched
3724	app	20	0	144052	2020	1368	S	0.3	0.0	0:22.64	top
3725	root	20	0	144052	2024	1372	R	0.3	0.0	0:22.73	top
1	root	20	0	78672	41108	2288	S	0.0	0.5	7:31.07	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.45	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:32.56	ksoftirqd/0
5	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kworker/0:0H
7	root	rt	0	0	0	0	S	0.0	0.0	0:18.44	migration/0
8	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_bh
9	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcuob/0
10	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcuob/1
11	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcuob/2
12	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcuob/3
14	root	20	0	0	0	0	S	0.0	0.0	8:54.99	rcuos/0

对jmeter：1. 换jmeter服务器； 2. 换jmeter； 3. 修改windows的time wait值。

对各主机：1. 查主机1、2、3、4的CPU、IO；

2. 查tomcat；

3. 查java；

4. 查主机1、2、3、4的网络；

5. 抓包；

对DB：1. 查processlist/innodb_trx/innodb_locks/innodb_lock_waits；

2. 拿出一条业务sql执行；

```
net.ipv4.tcp_max_orphans = 32768
net.ipv4.tcp_max_syn_backlog = 256
net.ipv4.tcp_max_tw_buckets = 32768
net.ipv4.tcp_nem = 185343
net.ipv4.udp_nem = 187323

net.ipv4.tcp_max_orphans = 65536
net.ipv4.tcp_max_syn_backlog = 512
net.ipv4.tcp_max_tw_buckets = 65536
net.ipv4.tcp_nem = 378864
net.ipv4.udp_nem = 388847
```



Time	Source	Destination	Protocol	Length	Info
4303126 13:29:50.403752	10.21.12.39	10.21.12.21	TCP	60	8080 → 52041 [ACK] Seq=63636 Ack=15499 Win=73216 Len=0
4303430 13:29:52.433451	10.21.12.39	10.21.12.21	TCP	1514	[TCP segment of a reassembled PDU]
4303431 13:29:52.433455	10.21.12.39	10.21.12.21	TCP	1514	[TCP segment of a reassembled PDU]
4303432 13:29:52.433470	10.21.12.39	10.21.12.21	HTTP	915	HTTP/1.1 200 (application/json)
4303433 13:29:52.433534	10.21.12.21	10.21.12.39	TCP	54	52041 → 8080 [ACK] Seq=15499 Ack=67417 Win=131328 Len=0
4303434 13:29:52.434025	10.21.12.21	10.21.12.39	TCP	303	[TCP segment of a reassembled PDU]
4303435 13:29:52.434069	10.21.12.21	10.21.12.39	HTTP	666	POST /bankchannel/wms/query/transreqquery.json HTTP/1.1 (application/json)
4303436 13:29:52.434375	10.21.12.39	10.21.12.21	TCP	60	8080 → 52041 [ACK] Seq=67417 Ack=15748 Win=74368 Len=0
4303437 13:29:52.434378	10.21.12.39	10.21.12.21	TCP	60	8080 → 52041 [ACK] Seq=67417 Ack=16360 Win=75648 Len=0
4303756 13:29:54.445736	10.21.12.39	10.21.12.21	TCP	1514	[TCP segment of a reassembled PDU]
4303757 13:29:54.445741	10.21.12.39	10.21.12.21	TCP	1514	[TCP segment of a reassembled PDU]
4303758 13:29:54.445754	10.21.12.39	10.21.12.21	HTTP	808	HTTP/1.1 200 (application/json)
4303759 13:29:54.445803	10.21.12.21	10.21.12.39	TCP	54	52041 → 8080 [ACK] Seq=16360 Ack=71091 Win=131328 Len=0
4303760 13:29:54.446545	10.21.12.21	10.21.12.39	TCP	303	[TCP segment of a reassembled PDU]
4303761 13:29:54.446591	10.21.12.21	10.21.12.39	HTTP	666	POST /bankchannel/wms/query/transreqquery.json HTTP/1.1 (application/json)
4303762 13:29:54.446800	10.21.12.39	10.21.12.21	TCP	60	8080 → 52041 [ACK] Seq=71091 Ack=16609 Win=76800 Len=0
4303763 13:29:54.446826	10.21.12.39	10.21.12.21	TCP	60	8080 → 52041 [ACK] Seq=71091 Ack=17221 Win=78080 Len=0
4304067 13:29:56.448636	10.21.12.39	10.21.12.21	TCP	1514	[TCP segment of a reassembled PDU]
4304068 13:29:56.448640	10.21.12.39	10.21.12.21	TCP	1514	[TCP segment of a reassembled PDU]
4304069 13:29:56.448656	10.21.12.39	10.21.12.21	HTTP	808	HTTP/1.1 200 (application/json)
4304070 13:29:56.448745	10.21.12.21	10.21.12.39	TCP	54	52041 → 8080 [ACK] Seq=17221 Ack=74765 Win=131328 Len=0
4304071 13:29:56.449230	10.21.12.21	10.21.12.39	TCP	303	[TCP segment of a reassembled PDU]
4304072 13:29:56.449272	10.21.12.21	10.21.12.39	HTTP	666	POST /bankchannel/wms/query/transreqquery.json HTTP/1.1 (application/json)
4304073 13:29:56.449566	10.21.12.39	10.21.12.21	TCP	60	8080 → 52041 [ACK] Seq=74765 Ack=17470 Win=79232 Len=0
4304074 13:29:56.449571	10.21.12.39	10.21.12.21	TCP	60	8080 → 52041 [ACK] Seq=74765 Ack=18082 Win=80512 Len=0
4304405 13:29:58.443957	10.21.12.39	10.21.12.21	TCP	1514	[TCP segment of a reassembled PDU]
4304406 13:29:58.443961	10.21.12.39	10.21.12.21	TCP	1514	[TCP segment of a reassembled PDU]
4304407 13:29:58.443976	10.21.12.39	10.21.12.21	HTTP	808	HTTP/1.1 200 (application/json)
4304408 13:29:58.444022	10.21.12.21	10.21.12.39	TCP	54	52041 → 8080 [ACK] Seq=18082 Ack=78439 Win=131328 Len=0
4304409 13:29:58.444534	10.21.12.21	10.21.12.39	TCP	303	[TCP segment of a reassembled PDU]

4303763 13:29:54.446826 10.21.12.39 10.21.12.21 TCP 60 8080

4304067 13:29:56.448636 10.21.12.39 10.21.12.21 TCP 1514



Time	Query	Message	Duration / Wait
1 19:29:24	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	Dir-Cook: 1946. No database selected. Select the default DB to be used by double-clicking its name in the SCHEMAS list in the toolbar.	0:000 sec
2 19:29:32	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
3 19:29:42	EXPLAIN SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	OK	0:000 sec
4 19:30:30	select * from testtab0 LIMIT 0, 1000	1000 row(s) returned	0:000 sec / 0:000 sec
5 19:31:05	select n_client_no, count(*) from testtab0 group by n_client_no order by n_client_no asc	1000 row(s) returned	0:000 sec / 0:000 sec
6 19:32:21	select n_client_no, count(*) from testtab0 group by n_client_no order by n_client_no desc	1000 row(s) returned	0:000 sec / 0:000 sec
7 19:32:45	select n_client_no, count(*) from testtab0 group by n_client_no order by n_client_no asc	1000 row(s) returned	0:000 sec / 0:000 sec
8 19:33:16	select * from testtab0 LIMIT 0, 1000	1000 row(s) returned	0:000 sec / 0:000 sec
9 19:33:44	select * from testtab0 LIMIT 0, 1000	1000 row(s) returned	0:000 sec / 0:000 sec
10 19:34:15	select n_client_no, count(*) from testtab0 group by n_client_no order by n_client_no asc	1000 row(s) returned	0:000 sec / 0:000 sec
11 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:016 sec / 0:000 sec

0.016s

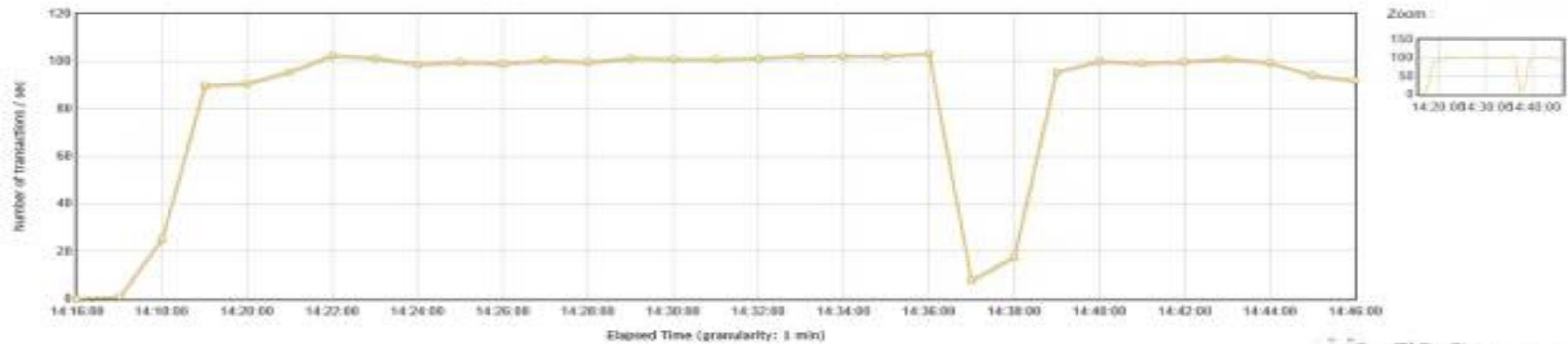
第四届中国移动互联网测试开发大会

Time	Query	Message	Duration / Wait
8 19:33:44	select * from testtab0 LIMIT 0, 1000	1000 row(s) returned	0:000 sec / 0:000 sec
10 19:34:15	select n_client_no, count(*) from testtab0 group by n_client_no order by n_client_no asc	1000 row(s) returned	2:120 sec / 0:000 sec
11 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:219 sec / 0:000 sec
12 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:016 sec / 0:000 sec
13 21:51:36	EXPLAIN SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	OK	0:000 sec
14 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
15 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
16 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
17 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
18 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
19 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
20 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
21 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
22 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
23 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:000 sec / 0:000 sec
24 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:016 sec / 0:000 sec
25 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:219 sec / 0:000 sec
26 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:016 sec / 0:000 sec
27 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:219 sec / 0:000 sec
28 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:016 sec / 0:000 sec
29 21:51:36	SELECT SQL_NO_CACHE COUNT(*) FROM SELECT	1 row(s) returned	0:016 sec / 0:000 sec

0.219s

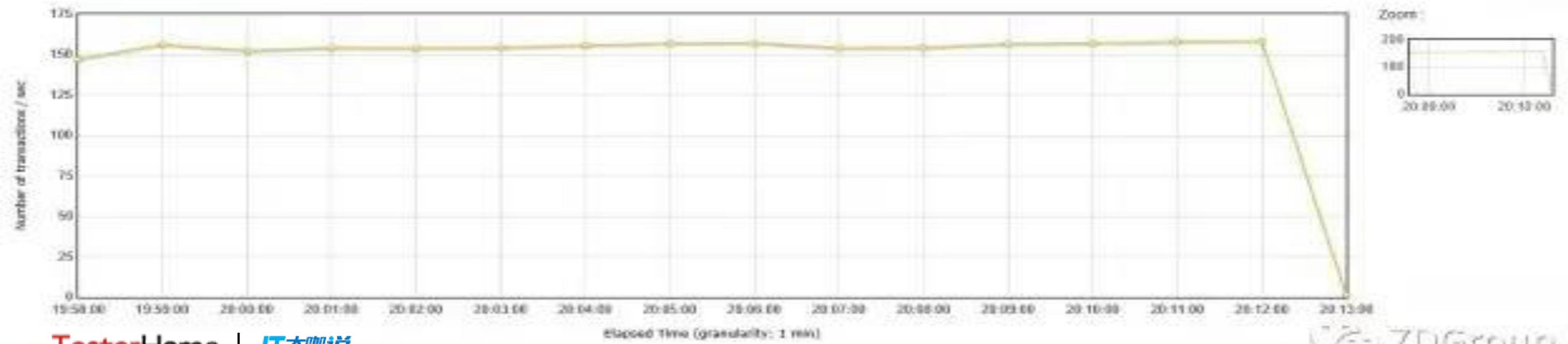
0.219s

Transactions Per Second



7DGroup

Transactions Per Second



7DGroup

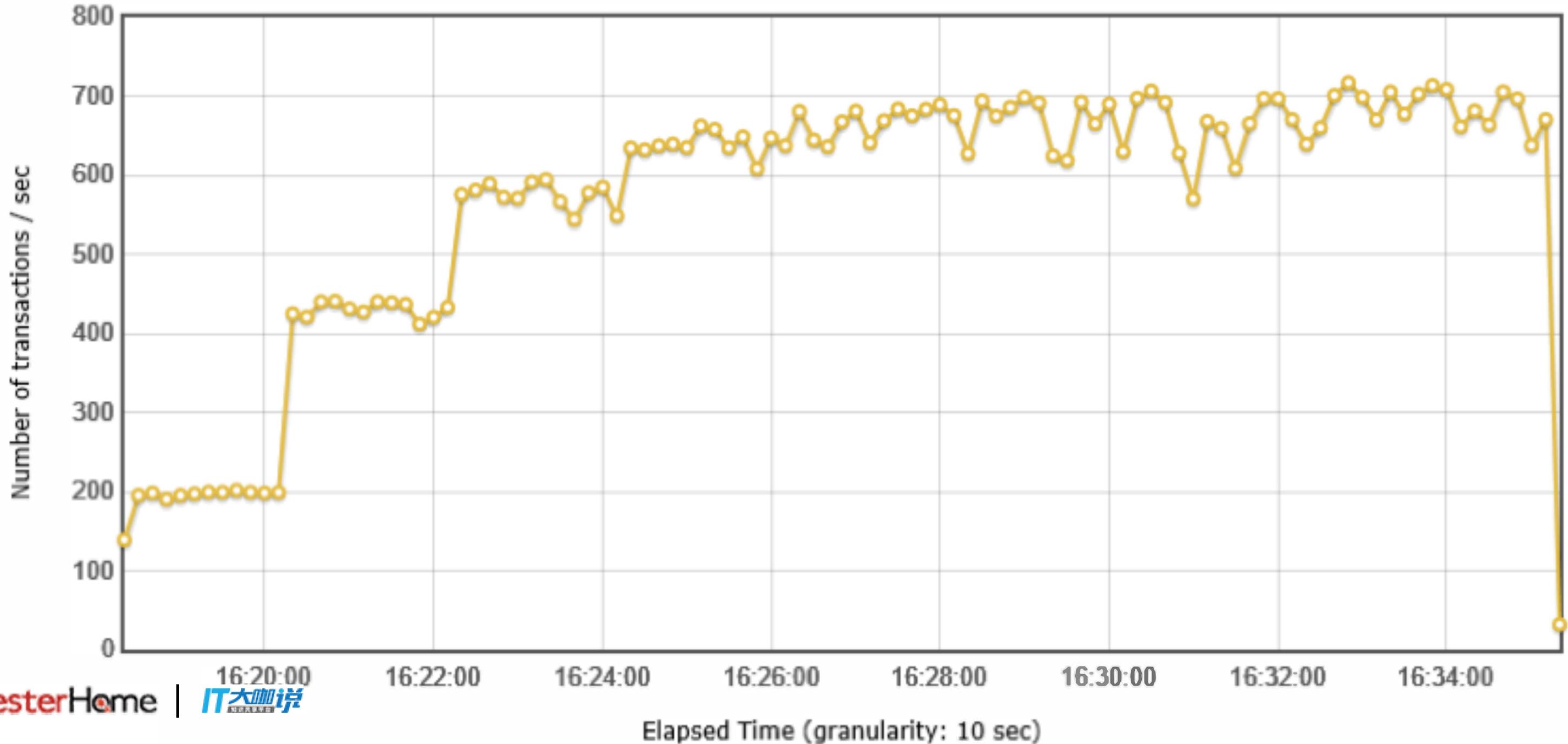


性能分析之二：单队列网卡导致TPS低

第四届中国移动互联网测试开发大会



Transactions Per Second



TPS在400左右

```
top - 14:07:42 up 14 days, 20:54, 2 users, load average: 0.50, 0.54, 0.66
Tasks: 396 total, 1 running, 394 sleeping, 0 stopped, 1 zombie
Cpu0  : 34.5%us, 7.1%sy, 0.0%ni, 58.1%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Cpu1  : 33.0%us, 7.7%sy, 0.0%ni, 58.9%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Cpu2  : 33.1%us, 7.6%sy, 0.0%ni, 59.0%id, 0.0%wa, 0.0%hi, 0.3%si, 0.0%st
Cpu3  : 31.1%us, 7.2%sy, 0.0%ni, 61.8%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu4  : 37.2%us, 7.1%sy, 0.0%ni, 55.7%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu5  : 33.8%us, 7.5%sy, 0.0%ni, 58.7%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu6  : 33.4%us, 7.1%sy, 0.0%ni, 59.1%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Cpu7  : 36.6%us, 8.7%sy, 0.0%ni, 54.4%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Cpu8  : 29.1%us, 6.7%sy, 0.0%ni, 64.2%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu9  : 27.5%us, 6.1%sy, 0.0%ni, 66.4%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu10 : 23.7%us, 5.1%sy, 0.0%ni, 71.2%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu11 : 37.8%us, 7.0%sy, 0.0%ni, 45.5%id, 0.0%wa, 0.0%hi, 8.4%si, 1.3%st
Cpu12 : 35.6%us, 7.9%sy, 0.0%ni, 56.5%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu13 : 28.7%us, 6.8%sy, 0.0%ni, 64.2%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Cpu14 : 9.9%us, 3.7%sy, 0.0%ni, 86.4%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu15 : 36.9%us, 6.9%sy, 0.0%ni, 56.2%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu16 : 34.0%us, 7.2%sy, 0.0%ni, 58.8%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu17 : 44.6%us, 6.1%sy, 0.0%ni, 49.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Cpu18 : 38.2%us, 6.5%sy, 0.0%ni, 54.9%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Cpu19 : 37.3%us, 7.8%sy, 0.0%ni, 54.9%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu20 : 30.4%us, 6.5%sy, 0.0%ni, 63.1%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu21 : 28.3%us, 5.9%sy, 0.0%ni, 65.5%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Cpu22 : 38.5%us, 7.0%sy, 0.0%ni, 31.4%id, 0.0%wa, 0.0%hi, 21.4%si, 1.7%st
Cpu23 : 34.2%us, 6.1%sy, 0.0%ni, 59.3%id, 0.0%wa, 0.0%hi, 0.0%si, 0.3%st
Mem: 49423332k total, 6697276k used, 42726056k free, 298184k buffers
```

Overhead	Shared Object	Symbol
3.25%	[kernel]	[k] __do_softirq
3.08%	[kernel]	[k] _spin_unlock_irqrestore
2.19%	[kernel]	[k] finish_task_switch
1.14%	libjvm.so	[.] vframeStreamCommon::security_get_caller_frame
0.86%	libjvm.so	[.] constantPoolOopDesc::klass_at_impl
0.77%	libjvm.so	[.] ScanClosure::do_oop
0.77%	[kernel]	[k] pvclock_clocksource_read
0.76%	libjvm.so	[.] Reflection::check_for_inner_class
0.75%	[kernel]	[k] retint_careful
0.69%	[kernel]	[k] iowritel6
0.68%	[kernel]	[k] run_timer_softirq
0.59%	perf-12684.map	[.] 0x00007fc30c6987d4
0.57%	libjvm.so	[.] CodeHeap::find_start
0.49%	perf-12684.map	[.] 0x00007fc30c92fea8
0.41%	libjvm.so	[.] JavaThread::security_get_caller_class
0.40%	libjvm.so	[.] HandleMarkCleaner::~HandleMarkCleaner
0.36%	libjvm.so	[.] instanceKlass::method_with_idnum
0.35%	libjvm.so	[.] StringTable::intern
0.34%	perf-12684.map	[.] 0x00007fc30c8da69e
0.33%	[kernel]	[k] system_call_after_swaps
0.33%	perf-12684.map	[.] 0x00007fc30c93a9ea
0.31%	[kernel]	[k] __audit_syscall_exit
0.31%	libjvm.so	[.] ObjectMonitor::TrySpin_VaryDuration
0.30%	libjvm.so	[.] java_lang_Throwable::fill_in_stack_trace
0.29%	perf-12684.map	[.] 0x00007fc30c34d505
0.29%	perf-12684.map	[.] 0x00007fc30c8da50e
0.28%	perf	[.] 0x000000000000be545
0.28%	libjvm.so	[.] DefNewGeneration::copy_to_survivor_space
0.28%	[vdso]	[.] __vdso_gettimeofday
0.28%	[kernel]	[k] copy_user_generic_string
0.28%	libjvm.so	[.] ThreadInVMfromNative::~ThreadInVMfromNative
0.27%	[kernel]	[k] __rcu_process_callbacks
0.26%	perf-12684.map	[.] 0x00007fc30c8da00a
0.26%	perf-12684.map	[.] 0x00007fc30c9831b8
0.26%	libjvm.so	[.] instanceKlass::compute_enclosing_class_impl
0.25%	perf-12684.map	[.] 0x00007fc30c93a8ac
0.25%	libjvm.so	[.] JVM_GetClassLoader
0.24%	perf-12684.map	[.] 0x00007fc30c9831b3
0.24%	[kernel]	[k] rcu_process_callbacks



佐证一下

2018
网测试开发大会

```

[root@VM_16_82_centos ~]# cat /proc/interrupts
CPU0      CPU1      CPU2      CPU3      CPU4      CPU5      CPU6      CPU7
0:         256          0          0          0          0          0          0
IO-APIC-edge timer
1:          6          0          0          0          0          0          0
IO-APIC-edge i8042
4:         94          0          0          0          0          0          0
IO-APIC-edge serial
8:          0          0          0          0          0          0          0
IO-APIC-edge rtc0
9:          0          0          0          0          0          0          0
IO-APIC-fasteoi acpi
11:         0          0          0          0          0          0          0
IO-APIC-fasteoi uhci_hcd:usb1, virtio3
12:        104          0          0          0          0          0          0
IO-APIC-edge i8042
14:         0          0          0          0          0          0          0
IO-APIC-edge ata_piix
15:         0          0          0          0          0          0          0
IO-APIC-edge ata_piix
24:         0          0          0          0          0          0          0
PCI-MSI-edge virtio1-config
25:        1720          0          0          0          0          0          0
PCI-MSI-edge virtio1-requests
26:         0          0          0          0          0          0          0
PCI-MSI-edge virtio2-config
27:       567589          0          0          0          0          0          0
PCI-MSI-edge virtio2-requests
28:         0          0          0          0          0          0          0
PCI-MSI-edge virtio0-config
29:         62          0          0          0          0          0          0
PCI-MSI-edge virtio0-input.0
30:         2          0          0          0          0          0          0
PCI-MSI-edge virtio0-output.0

```

第四层
看得不清楚吧

```

CPU21      CPU22      CPU23
0:          0          0          0 IO-APIC-edge timer
1:          0          0          0 IO-APIC-edge i8042
4:          0          0          0 IO-APIC-edge serial
8:          0          0          0 IO-APIC-edge rtc0
9:          0          0          0 IO-APIC-fasteoi acpi
11:         0          0          0 IO-APIC-fasteoi uhci_hcd:usb1, virtio3
12:         0          0          0 IO-APIC-edge i8042
14:         0          0          0 IO-APIC-edge ata_piix
15:         0          0          0 IO-APIC-edge ata_piix
24:         0          0          0 PCI-MSI-edge virtio1-config
25:         0          0          0 PCI-MSI-edge virtio1-requests
26:         0          0          0 PCI-MSI-edge virtio2-config
27:         0          0          0 PCI-MSI-edge virtio2-requests
28:         0          0          0 PCI-MSI-edge virtio0-config
29:         0 369323558 0 PCI-MSI-edge virtio0-input.0
30:         0          0          0 PCI-MSI-edge virtio0-output.0
NMI:         0          0          0 Non-maskable interrupts
LOC:    34358960  99250302  47490013 Local timer interrupts
SPU:         0          0          0 Spurious interrupts
PMI:         0          0          0 Performance monitoring interrupts
IWI:         29         29         30 IRQ work interrupts
RES:    16436798  51539392  24708443 Rescheduling interrupts
CAL:         153         152         153 Function call interrupts
TLB:     418212  1482582   844790 TLB shutdowns
TRM:         0          0          0 Thermal event interrupts
THR:         0          0          0 Threshold APIC interrupts
MCE:         0          0          0 Machine check exceptions
MCP:     4583     4583     4583 Machine check polls
ERR:
MIS:

```



	CPU19	CPU20	CPU21	CPU22	CPU23
HI:	0	0	0	0	0
TIMER:	17515799	17549596	18144173	76270901	22976699
NET_TX:	29326	29276	29308	50542	34541
NET_RX:	53684	51481	52952	450737428	62483
BLOCK:	0	0	0	0	0
BLOCK_IOPOLL:	0	0	0	0	0
TASKLET:	0	0	0	0	0
SCHED:	5622051	5718662	5846175	9330832	6385842
HRTIMER:	107351	105600	108287	907339	141003
RCU:	18794335	18809641	19377398	79287884	24295063

```
[root@主机A]# ethtool -i eth0
driver: virtio_net
version:
firmware-version:
bus-info: virtio0
supports-statistics: no
supports-test: no
supports-eeprom-access: no
supports-register-dump: no
supports-priv-flags: no
[root@主机A]#
```

```
100  
[root@VM_16_82_centos ~]# ll /sys/class/net/eth0/queues  
总用量 0  
drwxr-xr-x 2 root root 0 6月  3 15:21 rx-0  
drwxr-xr-x 2 root root 0 6月  3 15:21 tx-0
```

```
[root@主机A]# ll /sys/class/net/eth0/queues  
总用量 0  
drwxr-xr-x 2 root root 0 6月  3 15:21 rx-0  
drwxr-xr-x 2 root root 0 6月  3 15:21 tx-0
```



```
00:03.0 Ethernet controller: Red Hat, Inc Virtio network device
Subsystem: Red Hat, Inc Device 0001
Physical Slot: 3
Control: I/O+ Mem+ BusMaster- SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR- FastB2B- DisINTx+
Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-
Interrupt: pin A routed to IRQ 10
Region 0: I/O ports at c0a0 [size=32]
Region 1: Memory at febf1000 (32-bit, non-prefetchable) [size=4K]
Expansion ROM at febe0000 [disabled] [size=64K]
Capabilities: [40] MSI-X: Enable+ Count=3 Masked-
    Vector table: BAR=1 offset=00000000
    PBA: BAR=1 offset=00000800
Kernel driver in use: virtio-pci
Kernel modules: virtio_pci
```



Capabilities: [40] **MSI-X: Enable+** Count=2 Masked-





```
[root@主机A]# cat /proc/irq/29/smp_affinity_list  
22
```

```
[root@主机A]# echo 0-23 > /proc/irq/29/smp_affinity_list  
[root@主机A]# cat /proc/irq/29/smp_affinity_list  
0-23
```

MTSC2018

第四届中国移动互联网测试开发大会

```
[root@VM_16_82_centos virtio0-input.0]# echo 32768 > /sys/class/net/eth0/queues/rx-0/rps_flow_cnt  
[root@VM_16_82_centos virtio0-input.0]# cat /sys/class/net/eth0/queues/rx-0/rps_flow_cnt  
32768
```

实际上没用.....



- 1, 升级母机的kernel.tgz、qemu.tgz、libvirt_agent.tgz三个包。并重启。
- 2, 在母机上修改之前已创建子机对应 配置文件/etc/vm/xxxx.xml (xxxx指子机的uuid), 具体改动为将xxxx.xml的:

```
<driver name='vhost' event_idx='on' />
```

改为

```
<driver name='vhost' event_idx='on' queues='1' />
```

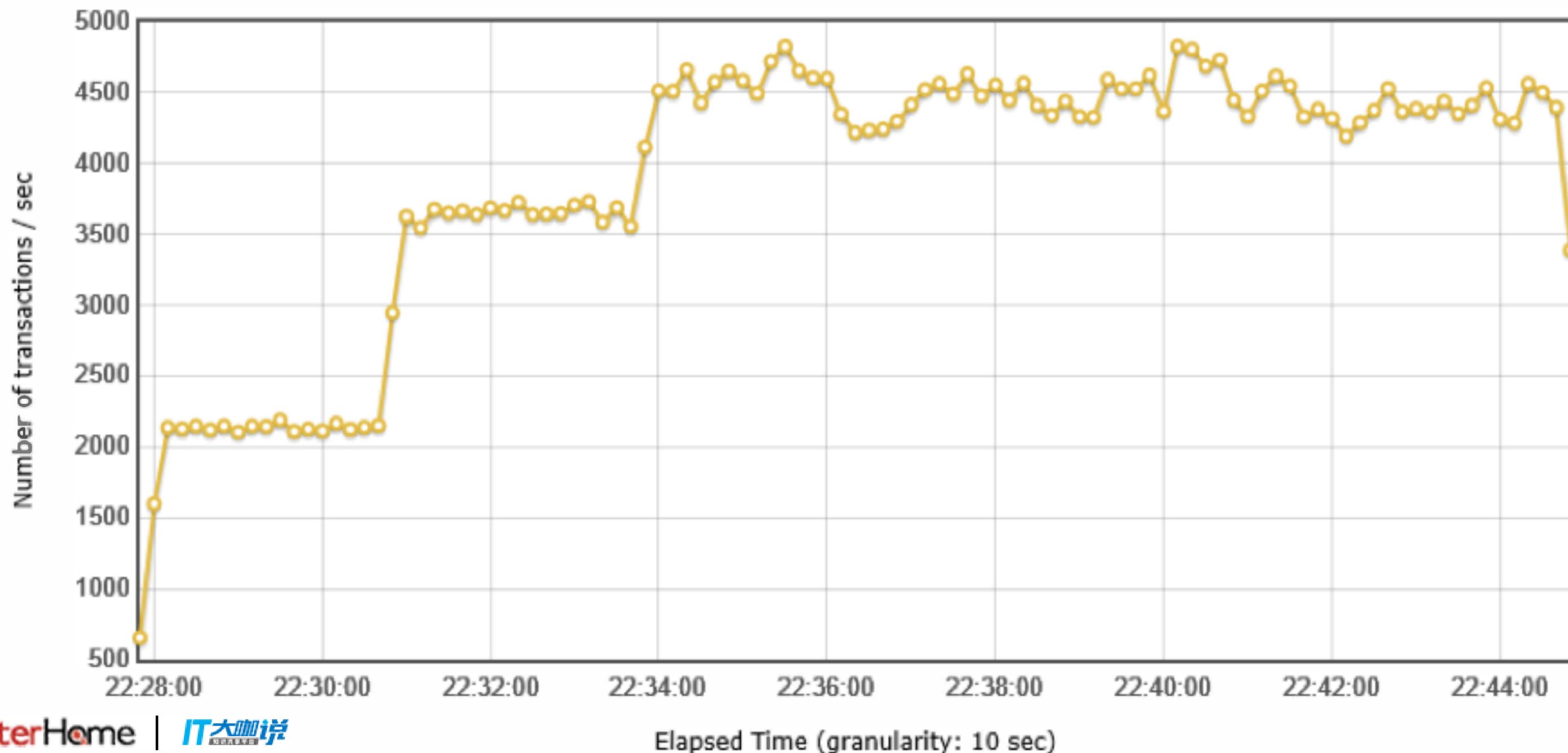
如果子机CPU ≤ 8, queues设置为CPU的数量; 大于等于8, queues则设置为8。
之后执行virsh define /etc/vm/xxxx.xml使改动生效。
- 3, 重启子机, 将20170117161800_5fs6i_basic_linux_install.tar.gz上传到子机, 解压缩并执行install.sh。
- 4, 最后登录子机查看ll /sys/class/net/eth0/queues。|

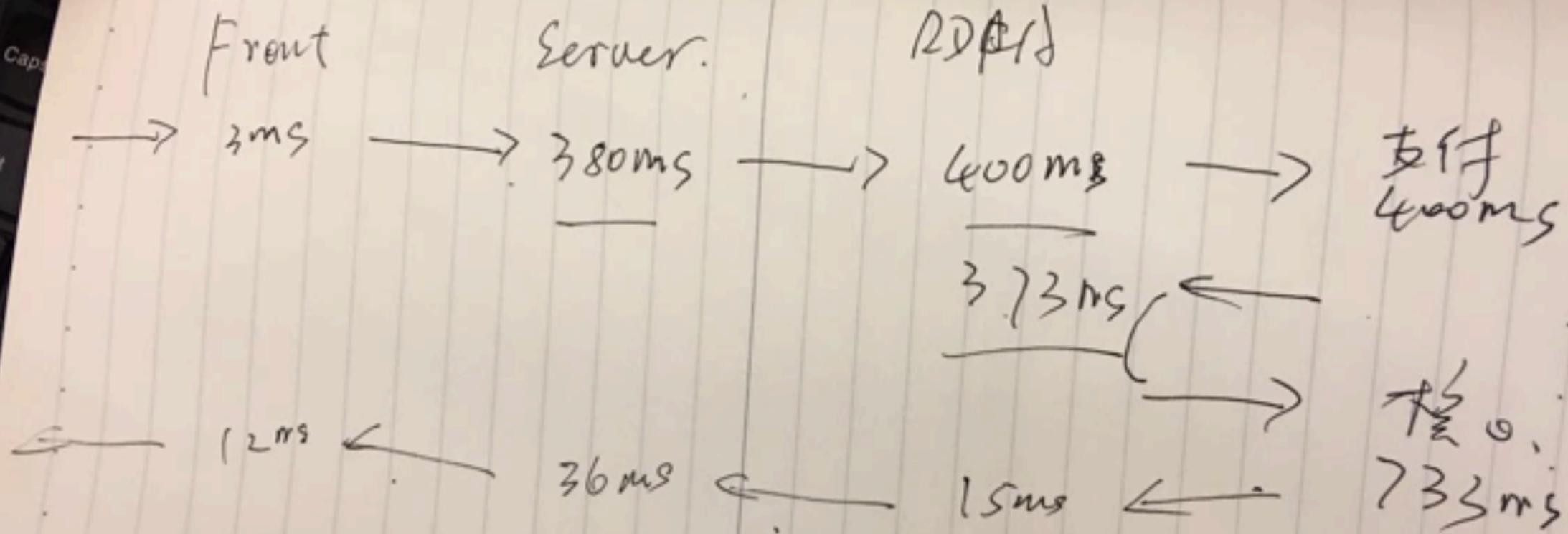


```
drwxr-xr-x 2 root root 0 6月 6 01:10 rx-0
drwxr-xr-x 2 root root 0 6月 7 09:57 rx-1
drwxr-xr-x 2 root root 0 6月 7 09:57 rx-2
drwxr-xr-x 2 root root 0 6月 7 09:57 rx-3
drwxr-xr-x 2 root root 0 6月 7 09:57 rx-4
drwxr-xr-x 2 root root 0 6月 7 09:57 rx-5
drwxr-xr-x 2 root root 0 6月 7 09:57 rx-6
drwxr-xr-x 2 root root 0 6月 7 09:57 rx-7
drwxr-xr-x 2 root root 0 6月 6 01:10 tx-0
drwxr-xr-x 2 root root 0 6月 7 09:57 tx-1
drwxr-xr-x 2 root root 0 6月 7 09:57 tx-2
drwxr-xr-x 2 root root 0 6月 7 09:57 tx-3
drwxr-xr-x 2 root root 0 6月 7 09:57 tx-4
drwxr-xr-x 2 root root 0 6月 7 09:57 tx-5
drwxr-xr-x 2 root root 0 6月 7 09:57 tx-6
drwxr-xr-x 2 root root 0 6月 7 09:57 tx-7
```



Transactions Per Second







MTSC2017

第三届中国移动互联网测试开

谢谢大家



MTSC2018

第四届中国移动互联网测试开发大会

TesterHome

IT大咖说

TesterHome