



超级课程表

分享大学时光，每天都是你的 **Friday!**

超级课程表技术架构变迁

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about me

c, php, python, java

热衷于搜索，社交，数据挖掘

提纲

全文搜索

缓存/存储

分布式爬虫

推送/IM

内核系统优化 (**dns**)

jvm调优

超级课程表

注册1000w+大学生用户

覆盖全国3300多所大学

2000w+全国课程信息数据

日均3000w+次搜索蹭课（最高是3亿次搜索）

下课聊话题日增10w+

全文搜索

Sphinx

Solr

Lucene

Elasticsearch

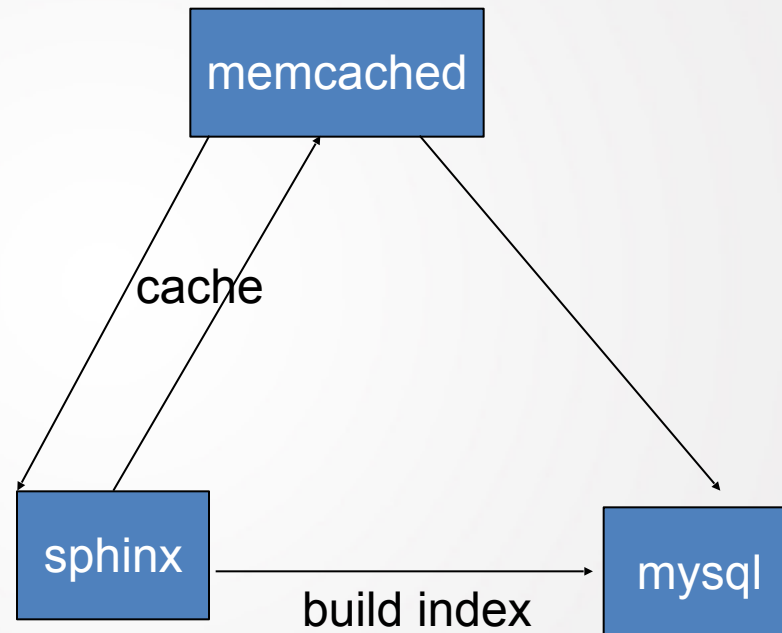
中文分词 MMseg

倒排索引

内存<--文件系统

memcache<--sphinx

key1---->{id1,id2.id3}
key2---->{id1,id2.id3}
key3---->{id1,id2.id3}



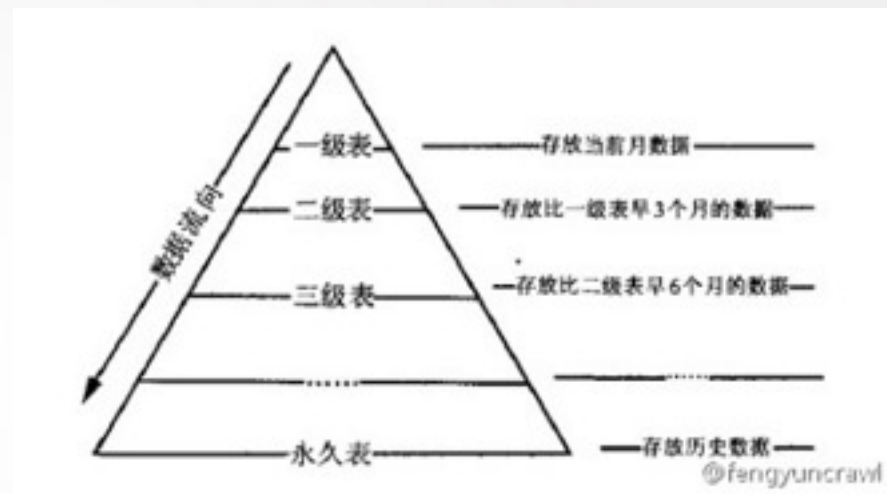
缓存/存储

根据时间维度划分冷热数据

存储同时也是缓存（一级，二级）

redis+mysql

缺点：一致性无法保证，只能保证最终一致性



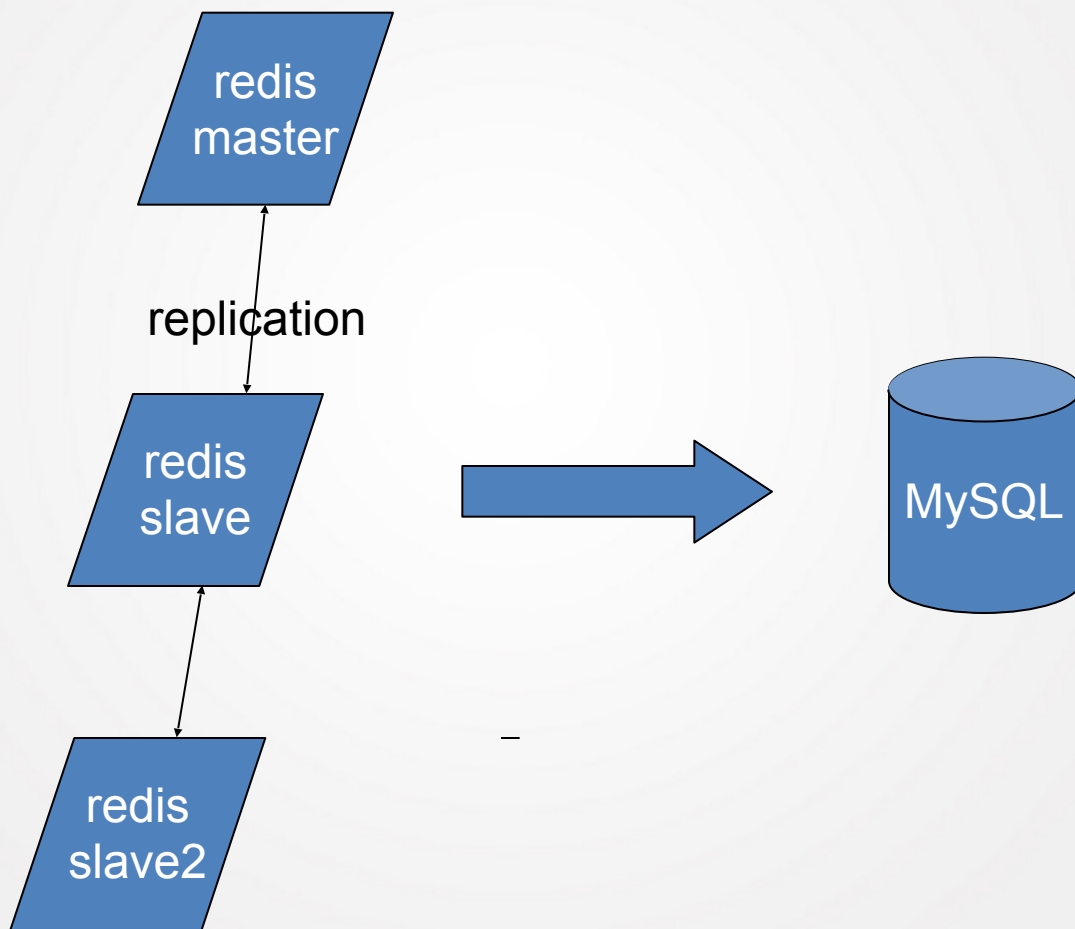
缓存/存储

redis 链式复制

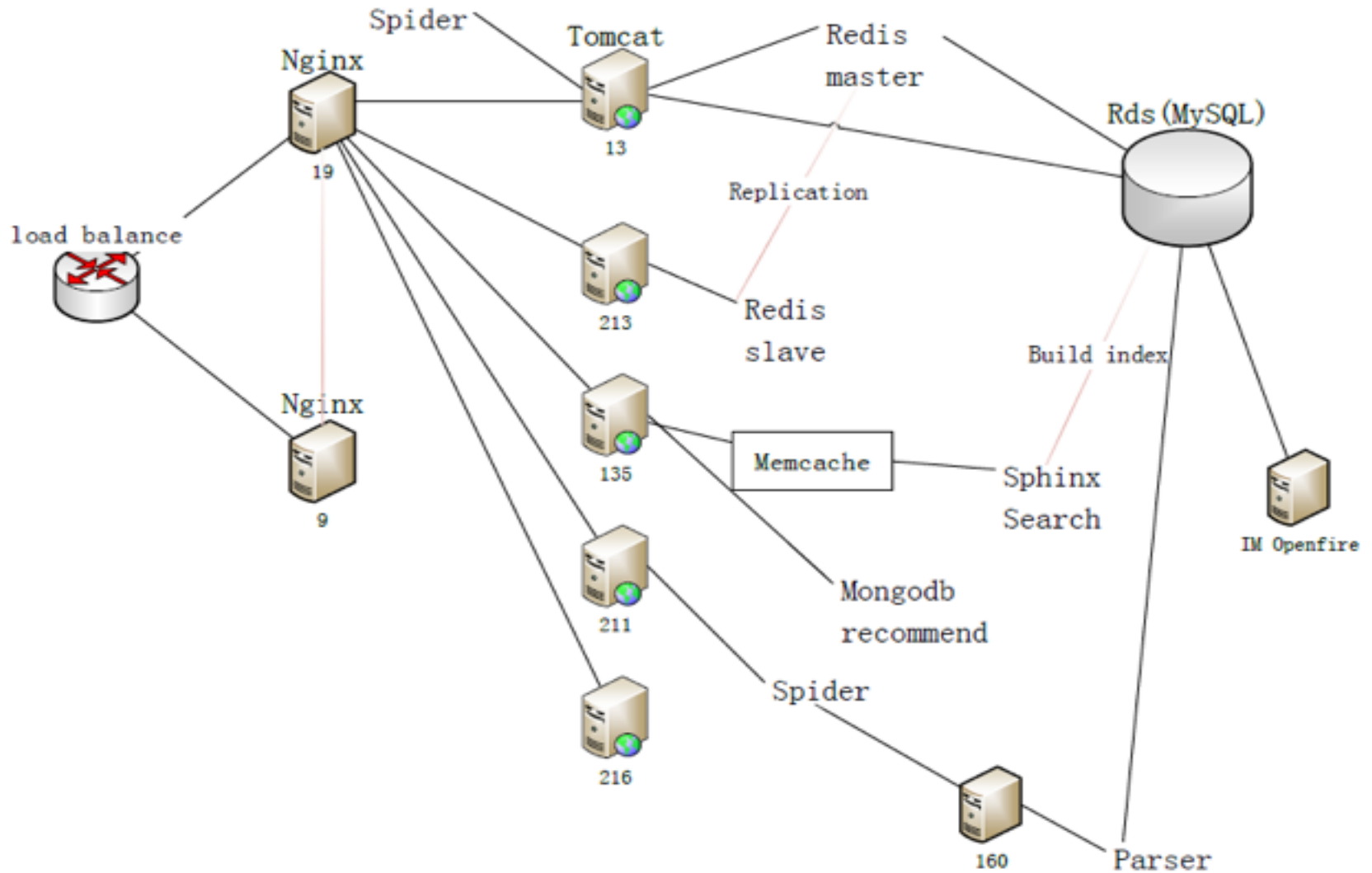
master只写，关闭aof，开启rdb

slave 只读

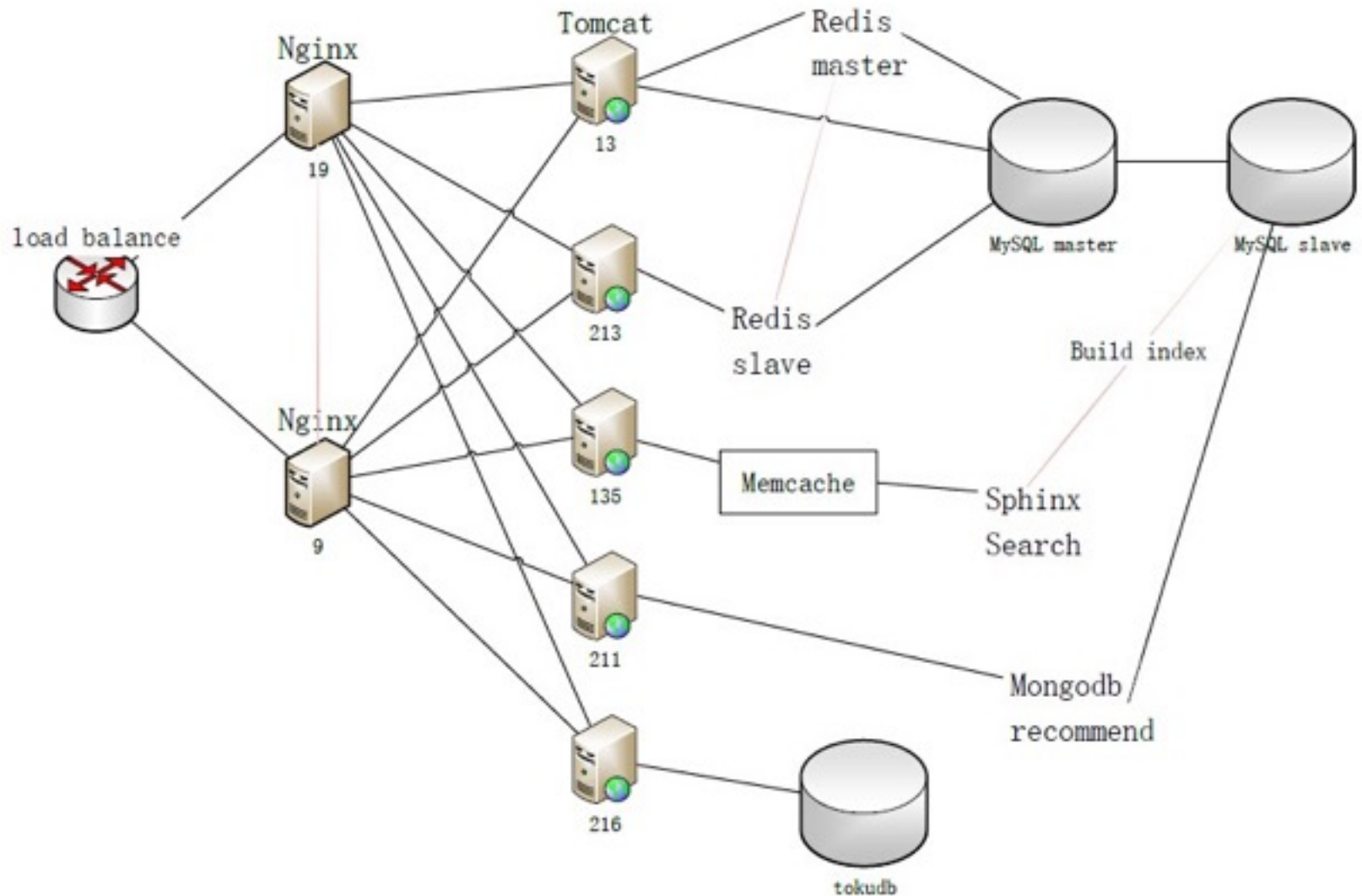
slave2 开启aof



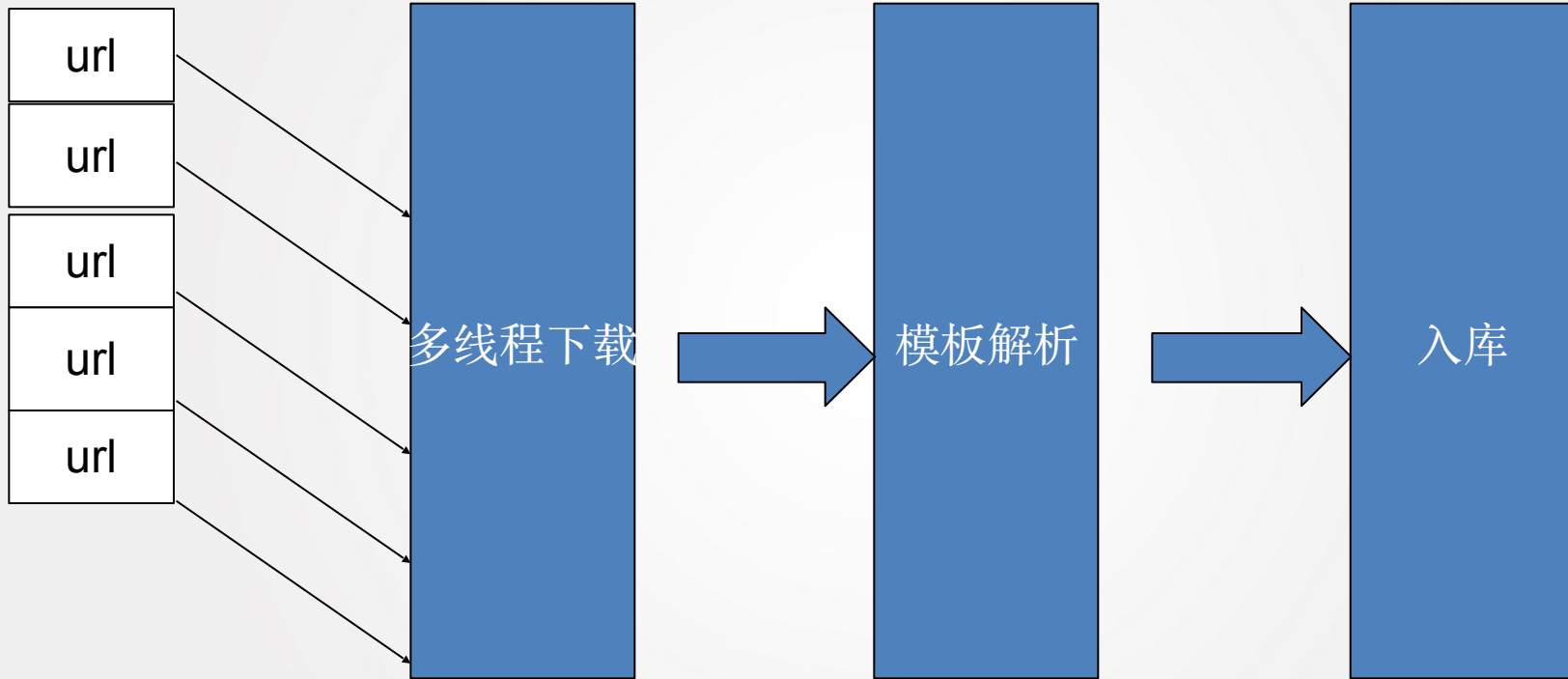
初始



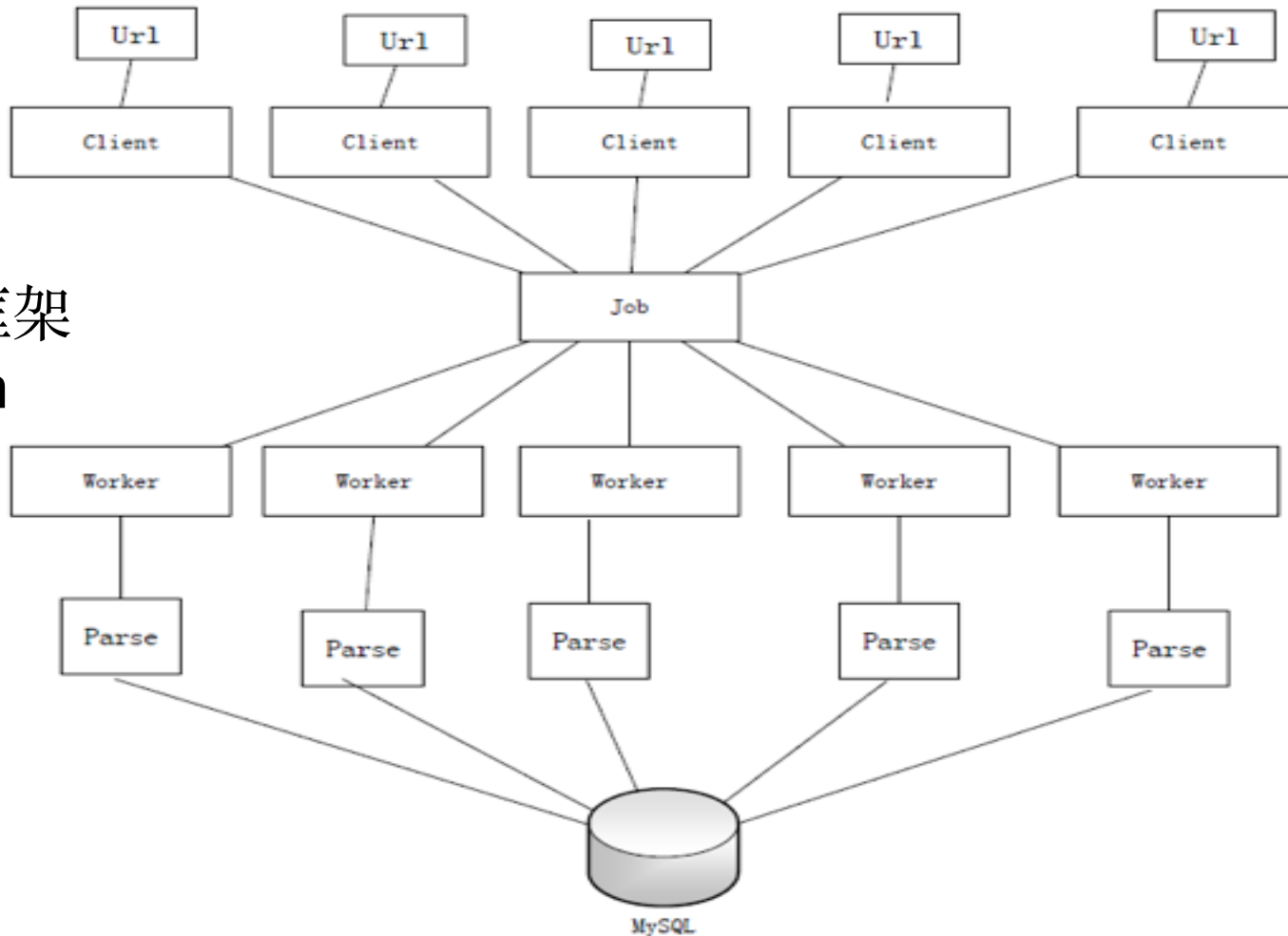
按业务切分



简单爬虫



分布式爬虫



分布式框架
gearman

im

openfire 优点：简单部署。 缺点：不支持分布式，同时在线撑不过10w

ejabberd 优点：erlang并发性，插件化，支持分布式。缺点：代码维护难，Mnesia数据库不稳定，离线消息偶尔丢失

单机8核16g内存能撑10w长链接

推送系统

gopush

go语言, comet

高并发

分布式

单机8核16g内存最高能撑20w长链接

内核参数优化

```
net.ipv4.ip_forward = 0
net.ipv4.conf.default.rp_filter = 1
net.ipv4.conf.default.accept_source_route = 0
kernel.sysrq = 0
kernel.core_uses_pid = 1
net.ipv4.tcp_syncookies = 1
kernel.msgmnb = 65536
kernel.msgmax = 65536
kernel.shmmax = 68719476736
kernel.shmall = 4294967296
net.ipv4.tcp_max_tw_buckets = 6000
net.ipv4.tcp_sack = 1
net.ipv4.tcp_window_scaling = 1
net.ipv4.tcp_rmem = 4096      87380  4194304
net.ipv4.tcp_wmem = 4096      16384  4194304
net.core.wmem_default = 8388608
```

内核参数优化

```
net.core.rmem_default = 8388608
net.core.rmem_max = 16777216
net.core.wmem_max = 16777216
net.core.netdev_max_backlog = 262144
net.core.somaxconn = 262144
net.ipv4.tcp_max_orphans = 3276800
net.ipv4.tcp_max_syn_backlog = 262144
net.ipv4.tcp_timestamps = 0
net.ipv4.tcp_synack_retries = 1
net.ipv4.tcp_syn_retries = 1
net.ipv4.tcp_tw_recycle = 0
net.ipv4.tcp_tw_reuse = 1
net.ipv4.tcp_mem = 94500000 915000000 927000000
net.ipv4.tcp_fin_timeout = 30
net.ipv4.tcp_keepalive_time = 30
net.ipv4.ip_local_port_range = 1024 65000
fs.file-max = 1024000
```


dns

国内运营商跨网计费的原因，导致经常出现局部省份dns被劫持，重灾区四川，武汉等地

解决方案:

1.预埋客户端多ip+域名解析

2. HttpDNS 将dns协议转换成http



jvm

线程池模型

GC 优化

老年代空间大小不应该小于活跃数据大小的**1.5**倍

新生代空间至少应为**java**堆大小的**10%**

增大**java**堆时，注意不要超过**jvm**可用物理内存

```
JAVA_OPTS="-Xms1024m -Xmx1024m -Xmn555m"  
JAVA_OPTS="-XX:PermSize=96m -XX:MaxPermSize=96m"  
[ ] JAVA_OPTS="$JAVA_OPTS -verbose:gc"  
JAVA_OPTS="$JAVA_OPTS -XX:+PrintGCDetails"  
JAVA_OPTS="$JAVA_OPTS -XX:+UnlockExperimentalVMOptions -XX:+UseG1GC"  
JAVA_OPTS="$JAVA_OPTS -Xloggc:/mnt/super/logs/tomcat/gc_new.log"
```

jvm/gc

G1

cms

```
[root@AY1309101309131841d5Z bin]# jstat -gcutil 6924 1000 30
```

SO	S1	E	O	P	YGC	YGCT	FGC	FGCT	GCT
0.00	100.00	39.20	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	44.00	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	48.80	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	52.40	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	56.40	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	61.20	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	65.20	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	69.60	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	73.60	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	77.20	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	81.20	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	85.20	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	88.00	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	92.00	79.65	50.79	7064	164.749	0	0.000	164.749
0.00	100.00	0.40	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	4.80	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	8.80	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	12.80	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	16.80	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	21.60	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	26.00	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	30.40	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	35.60	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	40.00	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	44.00	79.87	50.79	7065	164.780	0	0.000	164.780
0.00	100.00	48.40	79.87	50.79	7065	164.780	0	0.000	164.780

```
[root@i223nuwpg9Z ~]# jstat -gcutil 32726 1000 30
```

SO	S1	E	O	P	YGC	YGCT	FGC	FGCT	GCT
0.00	10.08	11.61	76.57	62.71	816	20.557	2	1.818	22.375
0.00	10.08	40.41	76.57	62.71	816	20.557	2	1.818	22.375
0.00	10.08	50.55	76.57	62.71	816	20.557	2	1.818	22.375
0.00	10.08	77.37	76.57	62.71	816	20.557	2	1.818	22.375
0.00	10.08	87.37	76.57	62.71	816	20.557	2	1.818	22.375
17.94	0.00	0.41	76.61	62.71	817	20.573	2	1.818	22.391
17.94	0.00	11.27	76.61	62.71	817	20.573	2	1.818	22.391
17.94	0.00	31.88	76.61	62.71	817	20.573	2	1.818	22.391
17.94	0.00	44.03	76.61	62.71	817	20.573	2	1.818	22.391
17.94	0.00	69.76	76.61	62.71	817	20.573	2	1.818	22.391
17.94	0.00	88.71	76.61	62.71	817	20.573	2	1.818	22.391
0.00	22.67	5.93	76.67	62.71	818	20.591	2	1.818	22.409
0.00	22.67	27.07	76.67	62.71	818	20.591	2	1.818	22.409
0.00	22.67	44.41	76.67	62.71	818	20.591	2	1.818	22.409
0.00	22.67	60.93	76.67	62.71	818	20.591	2	1.818	22.409
0.00	22.67	76.53	76.67	62.71	818	20.591	2	1.818	22.409
0.00	22.67	99.38	76.67	62.71	818	20.591	2	1.818	22.409
29.44	0.00	13.41	76.72	62.71	819	20.614	2	1.818	22.432
29.44	0.00	27.42	76.72	62.71	819	20.614	2	1.818	22.432
29.44	0.00	52.30	76.72	62.71	819	20.614	2	1.818	22.432
29.44	0.00	72.21	76.72	62.71	819	20.614	2	1.818	22.432

谢谢观赏

联系方式：
@fengyuncrawl

