企业大型生产 *WEB* 架构实践

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文档信息

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文档约定

[绿色背景]　知识重点
[红色背景]　错误警告
[黄色背景]　注意事项

执行命令

一、架构词汇

1.1、PV

PV（page view）网站页面浏览量，即网站页面浏览量或点击量，是衡量一个网站或网页访问量。具体的说，PV 值就是所有访问者在 24 小时（0 点到 24 点）内看了某个网站多少个页面或某个网页多少次。PV 是指页面刷新的次数，每一次页面刷新或者打开新的页面，就算做一次 PV 流量。

度量方法就是从浏览器发出一个对网络服务器的请求（Request），网络服务器接到这个请求后，会将该请求对应的一个网页（Page）发送给浏览器，从而产生了一个 PV。那么在这里只要是这个请求发送给了浏览器，无论这个页面是否完全打开（下载完成），那么都是应当计为 1 个 PV。

PV 是用于网站分析相关的术语，用以衡量网站用户访问的网页的数量。对于广告主机来说，PV 值可预先了解它可以带来多少广告收入。

1.2、UV

UV（unique visitor）独立访客数，指访问某个站点或点击某个网页的不同 IP 地址的人数。在同一天内，UV 只记录第一次进入网站的具有独立 IP 的访问者，在同一天内再次访问该网站则不计数。UV 提供了一定时间内不同观众数量的统计指标，而没有反应出网站的全面活动。可以通过两种方式即 IP 和 cookie（一般以 cookie 为准）来判断 UV 值。

Cookie 分析 UV 值

当客户端第一次访问某个网站服务器的时候，网站服务器会给这个客户端的电脑发出一个 Cookie，通常放在这个客户端电脑的 C 盘当中。在这个 Cookie 中会分配一个独一无二的编号（session id），这其中会记录一些访问服务器的信息，如访问时间，访问了哪些页面等等。当你下次再访问这个服务器的时候，服务器就可以直接从你的电脑中找到上一次放进去的 Cookie 文件，并且对其进行一些更新，但那个独一无二的编号是不会变的。

1.3、IP

IP 可以理解为独立 IP 的访问用户，指 1 天内使用不同 IP 地址的用户访问网站的数量，同一 IP 无论访问了几个页面，独立 IP 数均为 1。但是假如说两台机器访问而使用的是同一个公网 IP，那么只能算是一个 IP 的访问。

IP 和 UV 之间的数据不会有太大的差异，通常 UV 量和比 IP 量高出一点，每个 UV 相对于每个 IP 更准确地对应一个实际的浏览者。

UV 大于 IP

这种情况就是在网吧、学校、公司等，公用相同 IP 的场所中不同的用户，或者多种不同浏览器访问网站，那么 UV 数会大于 IP 数。

UV 小于 IP

在家庭中大多数电脑使用 ADSL 拨号上网，所以同一个用户在家里不同时间访问网站时，IP 可能会不同，因为它会根据时间变动 IP，即动态的 IP 地址，但是实际访客数唯一，便会出现 UV 数小于 IP 数。

1.4、VV

VV 即 Visit View，访客的访问次数，用以记录所有访客 1 天内访问了多少次您的网站。当访客完成所有浏览并最终关掉该网站的所有页面时便完成了一次访问，同一访客 1 天内可能有多次访问行为，访问次数累计；

1.5、案例分析

亮哥家里用的是 ADSL 拨号上网，早上 10 点访问了 www.crushlinux.com 下的 2 个页面，下午 2 点又访问了 www.crushlinux.com 下的 3 个页面。那么从 www.crushlinux.com 网站角度分析，今天的 PV、UV、VV、IP 各项指标该如何计算呢？

- **PV-5**

5 PV 指浏览量，因此 PV 指等于上午浏览的 2 个页面和下午浏览的 3 个页面之和；

- **UV-1**

1 UV 指独立访客数，因此一天内同一访客的多次访问只计为 1 个 UV；

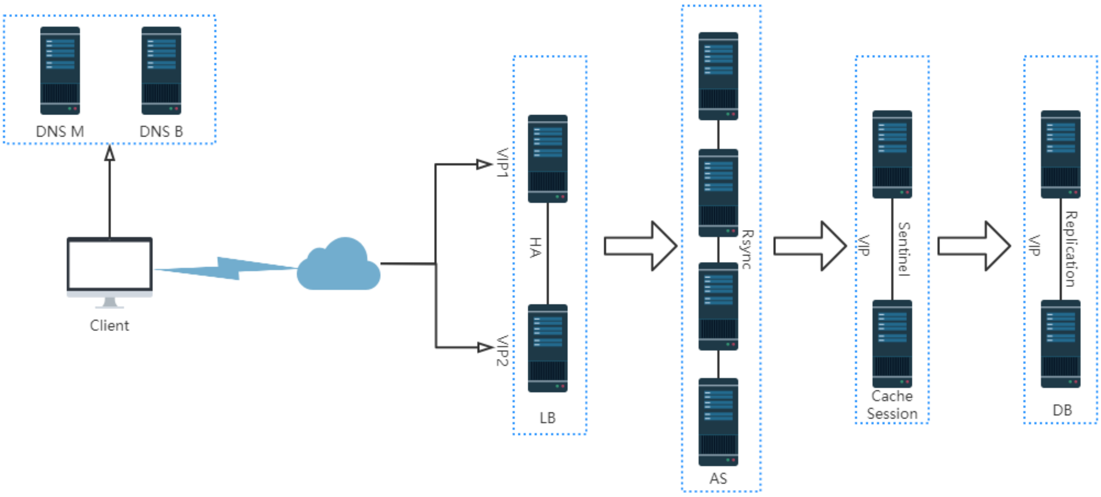
- **VV-2**

2 VV 指访客的访问次数，上午和下午分别有一次访问行为，因此 VV 为 2

- **IP-2**

IP 为独立 IP 数，由于 ADSL 拨号上网每次都 IP 不同，因此独立 IP 数位 2；

二、架构拓扑



三、架构规划

角色	IP 地址	主机名	VIP 地址
调度器 1	192.168.200.111	LB1	192.168.200.254
调度器 2	192.168.200.112	LB2	192.168.200.253
应用服务器 1	192.168.200.111	AS1	-
应用服务器 2	192.168.200.112	AS2	-
应用服务器 3	192.168.200.113	AS3	-
应用服务器 4	192.168.200.114	AS4	-
Redis 服务 1	192.168.200.115	redis1	192.168.200.251
Redis 服务 2	192.168.200.116	redis2	-
数据库服务 1	192.168.200.113	DB1	192.168.200.252
数据库服务 2	192.168.200.114	DB2	-
DNS 服务 1	192.168.200.111	DNS1	-

DNS 服务 2	192.168.200.112	DNS2	-

四、架构说明

4.1、DNS 层

DNS 层采用两台主机通过 Bind 服务实现的主从集群，针对 www 配置负载均衡解析为 192.168.200.254 和 192.168.200.253 两个集群入口的 VIP 地址，用户可通过域名访问 WEB 架构，确保集群调度器都可以接受任务，保证了架构的高并发高负载场景。生产中也可使用域名运营商提供的 DNS 方案。

常见软件：

- Dnsmasq
- Bind

4.2、调度器层

调度器层采用两台主机通过 Nginx 和 keepalived 服务实现的高可用负载均衡 7 层方案，并通过双 VIP 地址保障了集群架构的高并发和高负载，Nginx 的 upstream 中配置的 WEB 节点的健康状态检查功能，确保用户请求能分配到有效的应用服务器上。

负载均衡方案：

- LVS4 层+Nginx7 层
- Nginx7 层或 4 层
- Haproxy7 层或 4 层
- 阿里云 SLB 产品
- 硬件 F5 Big-IP 等

高可用方案：

- Keepalived
- Heartbeat

4.3、应用服务层

应用服务层采用 4 台服务部署了 Tomcat 服务及应用商城系统、可更换为 Jar 包或者 PHP 类应用。

```
java -jar –httport=8080 xxx.jar
```

4.4、代码更新

针对后续的代码上线配置了 rsync 服务，运维人员更新代码时只需要更新 AS1 服务器后，直接运行/opt/as_rsync.sh 脚本便可将变更代码推送到其余所有服务器上，可自行修改脚本

中的推送文件或目录。

4.5、Session 层

Session 信息是通过 redis 服务器来解决的，所有 AS 服务器均通过 redis 集群进行 Session 信息的存取，保证 Session 可靠性的同时，增加了 Session 读取的速度。

常见方案：

- Session 复制集群
- 基于 Memcached 服务器
- 基于 Redis 服务器

4.6、缓存层

缓存层是通过 Redis 主从+Sentinel+keepalived 来实现的高可用集群，缓存层可将数据库中的热点访问数据，进行 hash 转换后预热到缓存集群中，当用户访问数据时可从缓存中读取，可极大的缓解数据库端的压力。

常见方案：

- Memcached 主从复制集群
- Memcached 分布式集群
- Redis Sentinel+高可用集群
- Redis Cluster

4.7、数据库层

数据库层采用的是 MySQL 双主复制+keepalived 实现，通过奇偶数解决主键冲突问题，并通过 keepalived 实现了高可用方案。为应用商城存储相关数据信息。

常见方案：

- MySQL 双主+keepalived
- MySQL+DRBD+Heartbeat
- MySQL MMM
- MySQL MHA
- MySQL 读写分离
- InnoDB Cluster
- Percona XtraDB Cluster

4.8、组件优化

由于本架构案例主要目的是为了让学员掌握整个架构的设计及各组件关联方案，因此更注重的是部署架构，未涉及各组件的性能优化及主机的安全优化，需要配置可参考亮哥往期课程。

五、架构部署

5.1、所有主机初始化

所有主机关闭防火墙和 selinux 并配置时间同步

```
[root@localhost ~]# iptables -F
[root@localhost ~]# setenforce 0
[root@localhost ~]# systemctl stop firewalld
[root@LB1 ~]# ntpdate pool.ntp.org
```

5.2、部署高可用调度器

LB 两台主机安装 nginx 和 Keepalived 软件

```
[root@LB1 ~]# rpm -ivh http://nginx.org/packages/centos/7/noarch/RPMS/nginx-release-
centos-7-0.el7.ngx.noarch.rpm
[root@LB1 ~]# yum -y install nginx keepalived
```

LB1 与 LB2 的 nginx 配置一样

```
[root@LB1 ~]# vim /etc/nginx/conf.d/default.conf
upstream tomcat {
        server 192.168.200.111:8080 weight=1 max_fails=3 fail_timeout=5s;
        server 192.168.200.112:8080 weight=1 max_fails=3 fail_timeout=5s;
        server 192.168.200.113:8080 weight=1 max_fails=3 fail_timeout=5s;
        server 192.168.200.114:8080 weight=1 max_fails=3 fail_timeout=5s;
}

        location / {
                root      /usr/share/nginx/html;
                index     index.html index.htm;
                proxy_pass http://tomcat;
                proxy_set_header X-Real-IP $remote_addr;
        }
[root@LB1 ~]# nginx -t
nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
nginx: configuration file /etc/nginx/nginx.conf test is successful
[root@LB1 ~]# systemctl start nginx
```

LB1 的 keepalived 配置双 VIP 实例

```
[root@LB1 ~]# vim /etc/keepalived/keepalived.conf
! Configuration File for keepalived

global_defs {
    notification_email {
      crushlinux@163.com
    }
    notification_email_from crushlinux@163.com
    smtp_server 192.168.200.1
    smtp_connect_timeout 30
    router_id LVS_M
}

vrrp_script check_nginx {
    script "/opt/check_nginx.sh"
    interval 2
    weight -5
    fall 2
    rise 1
}

vrrp_instance VI_1 {
        state MASTER
        interface ens33
        virtual_router_id 51
        priority 100
        advert_int 1
        authentication {
                auth_type PASS
                auth_pass 1111
        }
        track_script {
        check_nginx
        }
        virtual_ipaddress {
                192.168.200.254
        }
}

vrrp_instance VI_2 {
        state BACKUP
        interface ens33
        virtual_router_id 52
        priority 99
        advert_int 1
        authentication {
                auth_type PASS
                auth_pass 1111
        }
        track_script {
                check_nginx
        }
        virtual_ipaddress {
                192.168.200.253
        }
}
```

LB1 配置 nginx 健康检查脚本

```
[root@LB1 ~]# vim /opt/check_nginx.sh
#!/bin/bash
counter=$(ps -C nginx --no-header|wc -l)
if [ "${counter}" = "0" ]; then
        systemctl start nginx
        sleep 2
        counter=$(ps -C nginx --no-header|wc -l)
        if [ "${counter}" = "0" ]; then
                systemctl stop keepalived
        fi
fi
[root@LB1 ~]# chmod +x /opt/check_nginx.sh
[root@LB1 ~]# systemctl start keepalived
[root@LB1 ~]# ip a | grep ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group
default qlen 1000
        inet 192.168.200.111/24 brd 192.168.200.255 scope global noprefixroute ens33
        inet 192.168.200.254/32 scope global ens33
```

LB2 的 keepalived 配置配置双 VIP 实例

```
[root@LB2 ~]# vim /etc/keepalived/keepalived.conf
! Configuration File for keepalived

global_defs {
      notification_email {
        crushlinux@163.com
      }
      notification_email_from crushlinux@163.com
      smtp_server 192.168.200.1
      smtp_connect_timeout 30
      router_id LVS_B
}

vrrp_script check_nginx {
      script "/opt/check_nginx.sh"
```

```
    interval 2
    weight -5
    fall 2
    rise 1
}

vrrp_instance VI_1 {
        state BACKUP
        interface ens33
        virtual_router_id 51
        priority 99
        advert_int 1
        authentication {
                auth_type PASS
                auth_pass 1111
        }
        track_script {
        check_nginx
        }
        virtual_ipaddress {
                192.168.200.254
        }
}

vrrp_instance VI_2 {
        state MASTER
        interface ens33
        virtual_router_id 52
        priority 100
        advert_int 1
        authentication {
                auth_type PASS
                auth_pass 1111
        }
        track_script {
                check_nginx
        }
        virtual_ipaddress {
                192.168.200.253
        }
}
```

LB1 配置 nginx 健康检查脚本

```
[root@LB2 ~]# cat /opt/check_nginx.sh
#!/bin/bash
```

```
counter=$(ps -C nginx --no-header|wc -l)
if [ "${counter}" = "0" ]; then
        systemctl start nginx
        sleep 2
        counter=$(ps -C nginx --no-header|wc -l)
        if [ "${counter}" = "0" ]; then
                systemctl stop keepalived
        fi
fi
[root@LB2 ~]# systemctl start keepalived
[root@LB2 ~]# ip a | grep ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group
default qlen 1000
        inet 192.168.200.112/24 brd 192.168.200.255 scope global noprefixroute ens33
        inet 192.168.200.253/32 scope global ens33
```

调度器高可用测试

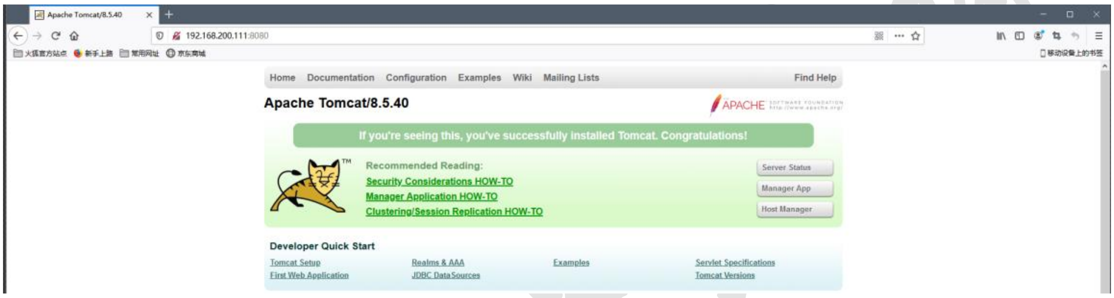
```
[root@LB1 ~]# echo ">" >> /etc/nginx/conf.d/default.conf
[root@LB1 ~]# systemctl stop nginx

[root@LB2 ~]# ip a | grep ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group
default qlen 1000
        inet 192.168.200.112/24 brd 192.168.200.255 scope global noprefixroute ens33
        inet 192.168.200.253/32 scope global ens33
        inet 192.168.200.254/32 scope global ens33

[root@LB1 ~]# vim /etc/nginx/conf.d/default.conf     #删除多余的符号
[root@LB1 ~]# ip a | grep ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group
default qlen 1000
        inet 192.168.200.111/24 brd 192.168.200.255 scope global noprefixroute ens33
        inet 192.168.200.254/32 scope global ens33
```

5.3、部署 WEB 服务及应用

四台 AS 主机部署 WEB 服务

```
[root@AS1 ~]# tar xf apache-tomcat-8.5.40.tar.gz
[root@AS1 ~]# mv apache-tomcat-8.5.40 /usr/local/tomcat
[root@AS1 ~]# /usr/local/tomcat/bin/startup.sh
Using CATALINA_BASE:     /usr/local/tomcat
Using CATALINA_HOME:     /usr/local/tomcat
Using CATALINA_TMPDIR: /usr/local/tomcat/temp
Using JRE_HOME:        /usr
Using CLASSPATH:       /usr/local/tomcat/bin/bootstrap.jar:/usr/local/tomcat/bin/tomcat-juli.jar
Tomcat started.
[root@AS1 ~]# netstat -lnpt | grep java
tcp6       0      0 127.0.0.1:8005          :::*                    LISTEN      1714/java
tcp6       0      0 :::8009                 :::*                    LISTEN      1714/java
tcp6       0      0 :::8080                 :::*                    LISTEN      1714/java
```

浏览器访问测试：http://192.168.200.111:8080　　#可更换 IP 测试



Apache Tomcat/8.5.40

If you're seeing this, you've successfully installed Tomcat. Congratulations!

四台 AS 主机编写测试页

```
[root@AS1 ~]# vim /usr/local/tomcat/conf/server.xml
150         <Context docBase="/web/webapps/" path="" reloadable="flase" >
151         </Context>
[root@AS1 ~]# mkdir /web/webapps -p
[root@AS1 ~]# echo "Application Server1" > /web/webapps/test.jsp
#不同 AS 主机页面不同
[root@AS1 ~]# /usr/local/tomcat/bin/shutdown.sh
[root@AS1 ~]# /usr/local/tomcat/bin/startup.sh
```

浏览器访问 VIP 测试

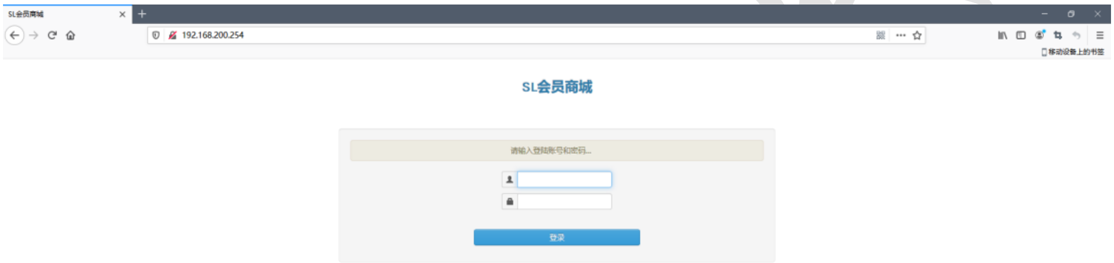
```
[root@LB1 ~]# elinks --dump http://192.168.200.254/test.jsp
   Application Server1
[root@LB1 ~]# elinks --dump http://192.168.200.254/test.jsp
   Application Server2
[root@LB1 ~]# elinks --dump http://192.168.200.254/test.jsp
   Application Server3
[root@LB1 ~]# elinks --dump http://192.168.200.254/test.jsp
   Application Server4

[root@LB1 ~]# elinks --dump http://192.168.200.253/test.jsp
   Application Server1
[root@LB1 ~]# elinks --dump http://192.168.200.253/test.jsp
```

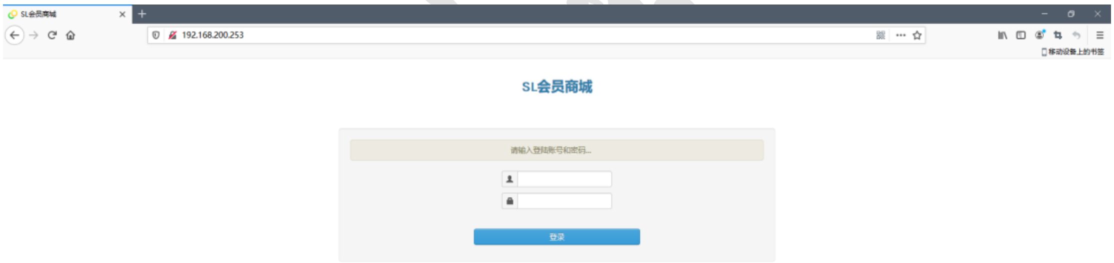
```
    Application Server2
[root@LB1 ~]# elinks --dump http://192.168.200.253/test.jsp
    Application Server3
[root@LB1 ~]# elinks --dump http://192.168.200.253/test.jsp
    Application Server4
```

四台 AS 主机部署项目代码

```
[root@LB1 ~]# tar xf SLSaleSystem.tar.gz -C /web/webapps/
[root@LB1 ~]# vim /usr/local/tomcat/conf/server.xml
        <Context docBase="/web/webapps/SLSaleSystem" path="" reloadable="flase" >
        </Context>
[root@LB1 ~]# /usr/local/tomcat/bin/shutdown.sh
[root@LB1 ~]# /usr/local/tomcat/bin/startup.sh
```

浏览器访问 VIP 测试





5.4、DB 服务器配置

安装 MariaDB 数据库并配置主主复制

MariaDB 主服务器配置

```
[root@DB1 ~]# yum -y install mariadb mariadb-devel mariadb-server
[root@DB1 ~]# vim /etc/my.cnf
[mysqld]
server-id=1
log-bin=mysql-binlog
log-slave-updates=true
max_binlog_size=1024M
auto_increment_offset = 1
auto_increment_increment = 2
```

```
replicate-ignore-db = information_schema
replicate-ignore-db = performance_schema
replicate-ignore-db = test
replicate-ignore-db = mysql

max_connections = 3000
max_connect_errors = 30

skip-character-set-client-handshake
init-connect='SET NAMES utf8'
character-set-server=utf8
wait_timeout=1800
interactive_timeout=1800
sql_mode=NO_ENGINE_SUBSTITUTION,STRICT_TRANS_TABLES

relay-log=relay-log-bin
relay-log-index=slave-relay-bin.index

[root@DB1 ~]# systemctl start mariadb
[root@DB1 ~]# mysql
MariaDB [(none)]> grant replication slave on *.* to 'repl'@'192.168.200.114' identified by
'123456';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> show master status;
+---------------------+----------+--------------+------------------+
| File                | Position | Binlog_Do_DB | Binlog_Ignore_DB |
+---------------------+----------+--------------+------------------+
| mysql-binlog.000001 |      486 |              |                  |
+---------------------+----------+--------------+------------------+
1 row in set (0.00 sec)
```

MariaDB 从服务器配置

```
[root@DB2 ~]# yum -y install mariadb mariadb-devel mariadb-server
[root@DB2 ~]# vim /etc/my.cnf
[mysqld]
server-id       = 2
log-bin=mysql-binlog
log-slave-updates=true
max_binlog_size=1024M
auto_increment_offset = 2
```

```
auto_increment_increment = 2

replicate-ignore-db = information_schema
replicate-ignore-db = performance_schema
replicate-ignore-db = test
replicate-ignore-db = mysql

max_connections = 3000
max_connect_errors = 30

skip-character-set-client-handshake
init-connect='SET NAMES utf8'
character-set-server=utf8
wait_timeout=1800
interactive_timeout=1800
sql_mode=NO_ENGINE_SUBSTITUTION,STRICT_TRANS_TABLES

relay-log=relay-log-bin
relay-log-index=slave-relay-bin.index
[root@DB2 ~]# systemctl start mariadb
[root@DB2 ~]# mysql
MariaDB [(none)]> grant replication slave on *.* to 'repl'@'192.168.200.113' identified by
'123456';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> show master status;
+---------------------+----------+--------------+------------------+
| File                | Position | Binlog_Do_DB | Binlog_Ignore_DB |
+---------------------+----------+--------------+------------------+
| mysql-binlog.000001 |      486 |              |                  |
+---------------------+----------+--------------+------------------+
1 row in set (0.00 sec)
```

MariaDB 主服务器配置

```
[root@DB1 ~]# mysql
MariaDB [(none)]> stop slave;
Query OK, 0 rows affected, 1 warning (0.00 sec)

MariaDB [(none)]> change master to \
master_host='192.168.200.114',master_port=3306, \
master_user='repl',master_password='123456', \
master_log_file='mysql-binlog.000001',master_log_pos=486;
```

```
Query OK, 0 rows affected (0.01 sec)

MariaDB [(none)]> start slave;
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> show slave status\G
*************************** 1. row ***************************
               Slave_IO_State: Waiting for master to send event
                  Master_Host: 192.168.200.114
                  Master_User: repl
                  Master_Port: 3306
                Connect_Retry: 60
              Master_Log_File: mysql-binlog.000001
          Read_Master_Log_Pos: 486
               Relay_Log_File: relay-log-bin.000002
                Relay_Log_Pos: 532
        Relay_Master_Log_File: mysql-binlog.000001
             Slave_IO_Running: Yes
            Slave_SQL_Running: Yes
              Replicate_Do_DB: 
          Replicate_Ignore_DB: information_schema,performance_schema,test,mysql
           Replicate_Do_Table: 
       Replicate_Ignore_Table: 
      Replicate_Wild_Do_Table: 
  Replicate_Wild_Ignore_Table: 
                   Last_Errno: 0
                   Last_Error: 
                 Skip_Counter: 0
          Exec_Master_Log_Pos: 486
              Relay_Log_Space: 824
              Until_Condition: None
               Until_Log_File: 
                Until_Log_Pos: 0
           Master_SSL_Allowed: No
           Master_SSL_CA_File: 
           Master_SSL_CA_Path: 
              Master_SSL_Cert: 
            Master_SSL_Cipher: 
               Master_SSL_Key: 
        Seconds_Behind_Master: 0
Master_SSL_Verify_Server_Cert: No
                Last_IO_Errno: 0
                Last_IO_Error: 
               Last_SQL_Errno: 0
               Last_SQL_Error:
  Replicate_Ignore_Server_Ids:
             Master_Server_Id: 2
1 row in set (0.00 sec)
```

MariaDB 从服务器配置

```
[root@DB2 ~]# mysql
MariaDB [(none)]> start slave;
Query OK, 0 rows affected (0.01 sec)

MariaDB [(none)]> change master to    master_host='192.168.200.113',master_port=3306,
master_user='repl',master_password='123456',    master_log_file='mysql-binlog.000001',mas
ter_log_pos=486;Query OK, 0 rows affected (0.01 sec)

MariaDB [(none)]> start slave;
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> show slave status\G
*************************** 1. row ***************************
               Slave_IO_State: Waiting for master to send event
                  Master_Host: 192.168.200.113
                  Master_User: repl
                  Master_Port: 3306
                Connect_Retry: 60
              Master_Log_File: mysql-binlog.000001
          Read_Master_Log_Pos: 486
               Relay_Log_File: relay-log-bin.000002
                Relay_Log_Pos: 532
        Relay_Master_Log_File: mysql-binlog.000001
             Slave_IO_Running: Yes
            Slave_SQL_Running: Yes
              Replicate_Do_DB:
          Replicate_Ignore_DB: information_schema,performance_schema,test,mysql
           Replicate_Do_Table:
       Replicate_Ignore_Table:
      Replicate_Wild_Do_Table:
  Replicate_Wild_Ignore_Table:
                   Last_Errno: 0
                   Last_Error:
                 Skip_Counter: 0
          Exec_Master_Log_Pos: 486
              Relay_Log_Space: 824
              Until_Condition: None
               Until_Log_File:
                Until_Log_Pos: 0
           Master_SSL_Allowed: No
           Master_SSL_CA_File:
           Master_SSL_CA_Path:
              Master_SSL_Cert:
            Master_SSL_Cipher:
               Master_SSL_Key:
        Seconds_Behind_Master: 0
Master_SSL_Verify_Server_Cert: No
                Last_IO_Errno: 0
                Last_IO_Error:
               Last_SQL_Errno: 0
               Last_SQL_Error:
  Replicate_Ignore_Server_Ids:
             Master_Server_Id: 1
1 row in set (0.00 sec)
```

MariaDB 主服务器配置

```
MariaDB [(none)]> create database test01;
Query OK, 1 row affected (0.01 sec)
```

MariaDB 从服务器配置

```
MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| test               |
| test01             |
+--------------------+
5 rows in set (0.00 sec)

MariaDB [(none)]> create database test02;
Query OK, 1 row affected (0.00 sec)
```

MariaDB 从服务器配置

```
MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| test               |
| test01             |
| test02             |
+--------------------+
6 rows in set (0.00 sec)
```

配置 Mairadb 高可用环境

MariaDB 主服务器配置

```
[root@DB1 ~]# yum -y install keepalived
[root@DB1 ~]# cat /etc/keepalived/keepalived.conf
! Configuration File for keepalived

global_defs {
   notification_email {
     crushlinux@163.com
   }
   notification_email_from crushlinux@163.com
   smtp_server 192.168.200.1
   smtp_connect_timeout 30
   router_id LVS_M
}

vrrp_script check_mysql {
   script "/opt/check_mysql.sh"
   interval 2
   weight -5
   fall 2
   rise 1
}

vrrp_instance VI_3 {
    state BACKUP
    interface ens33
    virtual_router_id 53
    priority 100
    nopreempt
    advert_int 1
    authentication {
        auth_type PASS
        auth_pass 1111
    }
    track_script {
    check_mysql
```

```
        }
        virtual_ipaddress {
                192.168.200.252
        }
}
[root@DB1 ~]# vim /opt/check_mysql.sh
#!/bin/bash
counter=$(ps -C mysqld --no-header|wc -l)
if [ "${counter}" = "0" ]; then
        systemctl start mariadb
        sleep 2
        counter=$(ps -C mysqld --no-header|wc -l)
        if [ "${counter}" = "0" ]; then
                systemctl stop keepalived
        fi
fi
[root@DB1 ~]# chmod +x /opt/check_mysql.sh
[root@DB1 ~]# systemctl start keepalived
[root@DB1 ~]# ip a | grep ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group
default qlen 1000
        inet 192.168.200.113/24 brd 192.168.200.255 scope global noprefixroute ens33
        inet 192.168.200.252/32 scope global ens33
```

MariaDB 从服务器配置

```
[root@DB2 ~]# cat /etc/keepalived/keepalived.conf
! Configuration File for keepalived

global_defs {
    notification_email {
      crushlinux@163.com
    }
    notification_email_from crushlinux@163.com
    smtp_server 192.168.200.1
    smtp_connect_timeout 30
    router_id LVS_B
}

vrrp_script check_mysql {
    script "/opt/check_mysql.sh"
    interval 2
    weight -5
    fall 2
    rise 1
}

vrrp_instance VI_3 {
      state BACKUP
      interface ens33
      virtual_router_id 53
      priority 99
      advert_int 1
      authentication {
              auth_type PASS
              auth_pass 1111
      }
      track_script {
      check_mysql
      }
      virtual_ipaddress {
              192.168.200.252
      }
}
[root@DB2 ~]# cat /opt/mysql.sh
#!/bin/bash
counter=$(ps -C mysqld --no-header|wc -l)
if [ "${counter}" = "0" ]; then
      systemctl start mariadb
      sleep 2
      counter=$(ps -C mysqld --no-header|wc -l)
      if [ "${counter}" = "0" ]; then
              systemctl stop keepalived
      fi
fi
[root@DB2 ~]# chmod +x /opt/check_mysql.sh
[root@DB2 ~]# systemctl start keepalived
```

1、 测试 VIP 转移

MariaDB 主服务器配置

```
[root@DB1 ~]# systemctl stop keepalived
```

MariaDB 从服务器配置

```
[root@DB2 ~]# ip a | grep ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
        inet 192.168.200.114/24 brd 192.168.200.255 scope global noprefixroute ens33
        inet 192.168.200.252/32 scope global ens33
```

2、 在远程客户端测试

DB1 和 DB2 服务器创建库并授权

```
[root@DB1 ~]# mysql
MariaDB [(none)]> create database slsaledb;
Query OK, 1 row affected (0.00 sec)

MariaDB [(none)]> grant all on slsaledb.* to admin@'%' identified by '123456';
Query OK, 0 rows affected (0.01 sec)

MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.00 sec)

[root@DB2 ~]# mysql
MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| slsaledb           |
| test               |
| test01             |
| test02             |
+--------------------+
7 rows in set (0.00 sec)

MariaDB [(none)]> grant all on slsaledb.* to admin@'%' identified by '123456';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> flush privileges;
[root@DB2 ~]# mysql < slsaledb-2014-4-10.sql
[root@DB2 ~]# mysql -e 'use slsaledb; show tables;'
+-------------------------+
| Tables_in_slsaledb      |
+-------------------------+
| BASICS_PARAMETER        |
| INFO_ANNEXES            |
| INVENTORY               |
| MULTI_LAN               |
| ORDER_INFO              |
| ORDER_LIST              |
| USER_ACCOUNT_201312     |
| USER_ACCOUNT_201404     |
| USER_ACCOUNT_LOG_201404 |
| USER_BUY                |
| USER_BUY_BONUS          |
| USER_CASH               |
| USER_PAIR_201312        |
| USER_PLACE              |
| USER_POINT              |
| USER_POINT_GOODS        |
| USER_RECHARGE           |
| USER_REFER              |
| affiche                 |
| au_authority            |
| au_function             |
| au_role                 |
| au_user                 |
| data_dictionary         |
| goods_info              |
| goods_pack              |
| goods_pack_affiliated   |
| information             |
| leave_message           |
| reply                   |
| uploadtemp              |
+-------------------------+
```

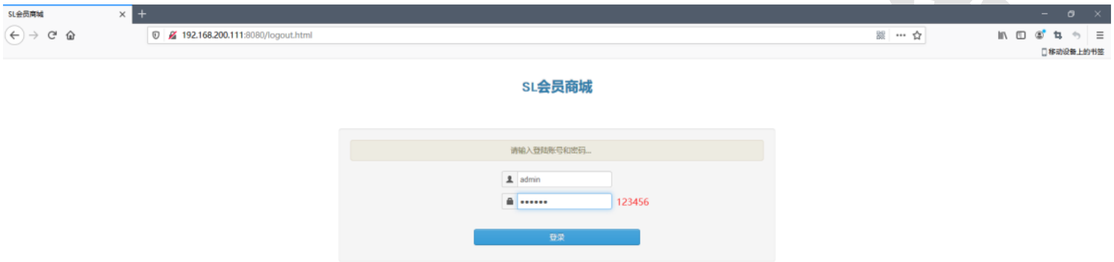
5.5、应用连接数据库

AS 四台主机连接 DB 服务器 VIP 地址

```
[root@LB1 ~]# mysql -uroot -p123456 -h 192.168.200.252
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 39
Server version: 5.5.64-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> exit
Bye
[root@LB1 ~]# yum -y install mariadb
[root@LB1 ~]# vim /web/webapps/SLSaleSystem/WEB-INF/classes/jdbc.properties
driverClassName=com.mysql.jdbc.Driver
url=jdbc\:mysql\://192.168.200.252\:3306/slsaledb?useUnicode\=true&characterEncoding\=UTF-8
uname=root
```

```
password=123456
minIdle=10
maxIdle=50
initialSize=5
maxActive=100
maxWait=100
removeAbandonedTimeout=180
removeAbandoned=true

[root@LB1 ~]# /usr/local/tomcat/bin/shutdown.sh
[root@LB1 ~]# /usr/local/tomcat/bin/startup.sh
```

应用服务器登录测试



SL会员商城

请输入登陆账号和密码...

admin

•••••• 123456

5.6、配置缓存服务

配置主 Redis 服务器

```
[root@redis1 ~]# yum -y install epel-release
[root@redis1 ~]# yum -y install redis
[root@redis1 ~]# vim /etc/redis.conf
  61 bind 0.0.0.0
  80 protected-mode no
128 daemonize yes
480 requirepass 123456
430 min-slaves-to-write 1
431 min-slaves-max-lag 10
272 masterauth 123456
[root@redis1 ~]# systemctl start redis
[root@redis1 ~]# netstat -lnpt | grep redis-server
tcp          0        0 0.0.0.0:6379              0.0.0.0:*                LISTEN
2190/redis-server 0
```

配置从 Redis 服务器

```
[root@redis2 ~]# yum -y install epel-release
[root@redis2 ~]# yum -y install redis
[root@redis2 ~]# vim /etc/redis.conf
  61 bind 0.0.0.0
```

```
 80 protected-mode no
128 daemonize yes
480 requirepass 123456
265 slaveof 192.168.200.115 6379
272 masterauth 123456
[root@redis2 ~]# systemctl start redis
[root@redis2 ~]# netstat -lnpt | grep redis-server
tcp        0      0 0.0.0.0:6379            0.0.0.0:*               LISTEN
2226/redis-server 0
```

验证缓存主从配置

```
[root@redis1 ~]# redis-cli -h 192.168.200.115 -p 6379 -a 123456 info replication
# Replication
role:master
connected_slaves:1
min_slaves_good_slaves:1
slave0:ip=192.168.200.116,port=6379,state=online,offset=57,lag=0
master_repl_offset:57
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:2
repl_backlog_histlen:56
[root@redis1 ~]# redis-cli -h 192.168.200.115 -p 6379 -a 123456
192.168.200.115:6379> set name crushlinux
OK
192.168.200.115:6379> get name
"crushlinux"
192.168.200.115:6379> exit

[root@redis2 ~]# redis-cli -h 192.168.200.116 -p 6379 -a 123456 info replication
# Replication
role:slave
master_host:192.168.200.115
master_port:6379
master_link_status:up
master_last_io_seconds_ago:6
master_sync_in_progress:0
slave_repl_offset:190
slave_priority:100
slave_read_only:1
connected_slaves:0
master_repl_offset:0
repl_backlog_active:0
repl_backlog_size:1048576
```

```
repl_backlog_first_byte_offset:0
repl_backlog_histlen:0
[root@redis2 ~]# redis-cli -h 192.168.200.116 -p 6379 -a 123456
192.168.200.116:6379> get name
"crushlinux"
192.168.200.116:6379> exit
```

配置哨兵

```
[root@redis1 ~]# vim /etc/redis-sentinel.conf
 17 protected-mode no
 69 sentinel monitor mymaster 192.168.200.115 6379 1
 71 sentinel auth-pass mymaster 123456

[root@redis1 ~]# systemctl start redis-sentinel
[root@redis1 ~]# netstat -lnpt | grep redis-sentinel
tcp        0      0 0.0.0.0:26379           0.0.0.0:*               LISTEN
2981/redis-sentinel
tcp6       0      0 :::26379                :::*                    LISTEN
2981/redis-sentinel

[root@redis1 ~]# redis-cli -h 192.168.200.115 -p 26379 info Sentinel
# Sentinel
sentinel_masters:1
sentinel_tilt:0
sentinel_running_scripts:0
sentinel_scripts_queue_length:0
sentinel_simulate_failure_flags:0
master0:name=mymaster,status=ok,address=192.168.200.115:6379,slaves=1,sentinels=1
```

模拟故障测试

```
[root@redis1 ~]# redis-cli -h 192.168.200.115 -p 6379 -a 123456 shutdown
[root@redis1 ~]# redis-cli -h 192.168.200.115 -p 26379 info Sentinel
# Sentinel
sentinel_masters:1
sentinel_tilt:0
sentinel_running_scripts:0
sentinel_scripts_queue_length:0
sentinel_simulate_failure_flags:0
master0:name=mymaster,status=ok,address=192.168.200.116:6379,slaves=1,sentinels=1
[root@redis2 ~]# redis-cli -h 192.168.200.116 -p 6379 -a 123456 info replication
# Replication
role:master
connected_slaves:0
master_repl_offset:0
repl_backlog_active:0
```

```
repl_backlog_size:1048576
repl_backlog_first_byte_offset:0
repl_backlog_histlen:0
```

查看集群状态

```
[root@redis1 ~]# netstat -lnpt | grep redis-server
[root@redis1 ~]# systemctl start redis
[root@redis1 ~]# netstat -lnpt | grep redis-server
tcp        0      0 0.0.0.0:6379            0.0.0.0:*               LISTEN
2287/redis-server 0
[root@redis1 ~]# systemctl restart redis
[root@redis1 ~]# redis-cli -h 192.168.200.115 -p 26379 info Sentinel
[root@redis1 ~]# redis-cli -h 192.168.200.115 -p 26379 info Sentinel
# Sentinel
sentinel_masters:1
sentinel_tilt:0
sentinel_running_scripts:0
sentinel_scripts_queue_length:0
sentinel_simulate_failure_flags:0
master0:name=mymaster,status=ok,address=192.168.200.116:6379,slaves=1,sentinels=1
[root@redis2 ~]# redis-cli -h 192.168.200.116 -p 6379 -a 123456 info replication
# Replication
role:master
connected_slaves:1
slave0:ip=192.168.200.115,port=6379,state=online,offset=4168,lag=1
master_repl_offset:4313
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:2
repl_backlog_histlen:4312
```

配置高可用

配置主 Redis 服务器

```
[root@redis1 ~]# yum -y install keepalived
[root@redis1 ~]# vim /etc/keepalived/keepalived.conf
! Configuration File for keepalived

global_defs {
   notification_email {
     crushlinux@163.com
   }
   notification_email_from crushlinux@163.com
   smtp_server 192.168.200.1
   smtp_connect_timeout 30
```

```
    router_id LVS_M
}

vrrp_instance VI_4 {
        state MASTER
        interface ens33
        virtual_router_id 54
        priority 100
        advert_int 1
        authentication {
                auth_type PASS
                auth_pass 1111
        }
        virtual_ipaddress {
                192.168.200.251
        }
}
[root@redis1 ~]# vim /opt/check_redis.sh
#!/bin/bash
IP=$(ifconfig ens33 | awk '/inet /{print $2}')
MIP=$(redis-cli -h 192.168.200.115 -p 26379 info sentinel | awk -F'[=:]+' '/^master0/{print $5}')

while true
do
        if [ $IP = $MIP ]
        then
                systemctl start keepalived
        else
                systemctl stop keepalived
        fi
        sleep 2
done
[root@redis1 ~]# chmod +x /opt/check_redis.sh
[root@redis1 ~]# nohup /opt/check_redis.sh &
```

配置从 Redis 服务器

```
[root@redis2 ~]# yum -y install keepalived
[root@redis2 ~]# vim /etc/keepalived/keepalived.conf
! Configuration File for keepalived

global_defs {
    notification_email {
      crushlinux@163.com
    }
    notification_email_from crushlinux@163.com
    smtp_server 192.168.200.1
    smtp_connect_timeout 30
    router_id LVS_B
}

vrrp_instance VI_4 {
    state BACKUP
    interface ens33
    virtual_router_id 54
    priority 99
    advert_int 1
    authentication {
        auth_type PASS
        auth_pass 1111
    }
    virtual_ipaddress {
        192.168.200.251
    }
}
[root@redis2 ~]# vim /opt/check_redis.sh
#!/bin/bash
IP=$(ifconfig ens33 | awk '/inet /{print $2}')
MIP=$(redis-cli -h 192.168.200.115 -p 26379 info sentinel | awk -F'[=:]+' '/^master0/{print $5}')

while true
do
    if [ $IP = $MIP ]
    then
        systemctl start keepalived
    else
        systemctl stop keepalived
    fi
    sleep 2
done
[root@redis2 ~]# chmod +x /opt/check_redis.sh
[root@redis2 ~]# nohup /opt/check_redis.sh &
[root@redis2 ~]# ip a | grep ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group
default qlen 1000
    inet 192.168.200.116/24 brd 192.168.200.255 scope global noprefixroute ens33
inet 192.168.200.251/32 scope global ens33

[root@redis1 ~]# redis-cli -h 192.168.200.251 -p 6379 -a 123456
```

```
192.168.200.251:6379> set address beijing
OK
192.168.200.251:6379> get name
"crushlinux"
```

5.7、应用连接缓存服务器

所有 AS 服务器做同样配置

```
[root@LB1 ~]# vim /web/webapps/SLSaleSystem/WEB-INF/classes/applicationContext-
mybatis.xml
47                              <constructor-arg value="192.168.200.251"/>
48                              <constructor-arg value="6379"/>

[root@LB1 ~]# /usr/local/tomcat/bin/shutdown.sh
[root@LB1 ~]# /usr/local/tomcat/bin/startup.sh
[root@redis1 ~]# redis-cli -h 192.168.200.251 -p 6379 -a 123456
192.168.200.251:6379> info stats
# Stats
total_connections_received:434
total_commands_processed:19538
instantaneous_ops_per_sec:2
total_net_input_bytes:983899
total_net_output_bytes:3064438
instantaneous_input_kbps:0.14
instantaneous_output_kbps:1.56
rejected_connections:0
sync_full:1
sync_partial_ok:0
sync_partial_err:0
expired_keys:0
evicted_keys:0
keyspace_hits:2
keyspace_misses:0
pubsub_channels:1
pubsub_patterns:0
latest_fork_usec:2962
migrate_cached_sockets:0
```

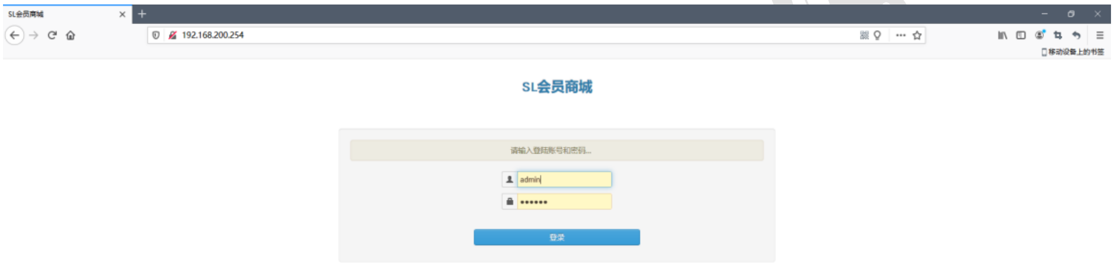
5.8、配置 Session 服务

所有 AS 服务器都作配置

```
[root@LB1 ~]# mkdir redis-jar
[root@LB1 ~]# cd redis-jar     #将 jar 包上传至此目录
```

```
[root@LB1 redis-jar]# cp * /usr/local/tomcat/lib/

[root@LB1 redis-jar]# vim /usr/local/tomcat/conf/context.xml
<Valve className="com.orangefunction.tomcat.redissessions.RedisSessionHandlerValve" />
<Manager className="com.orangefunction.tomcat.redissessions.RedisSessionManager"
host="192.168.200.251"
port="6379"
password="123456"
database="1"
maxInactiveInterval="60" />

[root@LB1 ~]# /usr/local/tomcat/bin/shutdown.sh
[root@LB1 ~]# /usr/local/tomcat/bin/startup.sh
```

浏览器访问 VIP 进行测试，当浏览器提示记住密码时，点击保存，刷新后密码是已填写状态。



192.168.200.254

SL会员商城

请输入登陆账号和密码...

admin

••••••

5.9、DNS 服务器配置

DNS 主服务器配置及测试

```
[root@DNS1 ~]# yum -y install bind
[root@DNS1 ~]# vim /etc/named.conf
options {
        directory       "/var/named";
};
zone "crushlinux.com" IN {
        type master;
        file "crushlinux.zheng";
        allow-transfer { 192.168.200.112; };
};
[root@DNS1 ~]# vim /var/named/crushlinux.zheng
$TTL 86400
@       SOA     crushlinux.com. admin.crushlinux.com.   (
                20200502
                3H
                15M
                1W
```

```
                    1D
)
          IN        NS         ns1.crushlinux.com.
          IN        NS         ns2.crushlinux.com.
ns1       IN        A          192.168.200.111
ns2       IN        A          192.168.200.112
www         IN        A          192.168.200.254
www         IN        A          192.168.200.253
[root@DNS1 ~]# chgrp named /var/named/crushlinux.zheng
[root@DNS1 ~]# systemctl start named

[root@DNS1 ~]# nslookup www.crushlinux.com 192.168.200.111
Server:         192.168.200.111
Address:  192.168.200.111#53

Name:     www.crushlinux.com
Address: 192.168.200.253
Name:     www.crushlinux.com
Address: 192.168.200.254

[root@DNS1 ~]# nslookup www.crushlinux.com 192.168.200.111
Server:         192.168.200.111
Address:  192.168.200.111#53

Name:     www.crushlinux.com
Address: 192.168.200.254
Name:     www.crushlinux.com
Address: 192.168.200.253
```

DNS 从服务器配置及测试

```
[root@DNS2 ~]# yum -y install bind
[root@DNS2 ~]# vim /etc/named.conf
options {
          directory           "/var/named";
};
zone "crushlinux.com" IN {
          type slave;
          file "slaves/crushlinux.zheng";
          masters { 192.168.200.111; };
};
[root@DNS2 ~]# systemctl start named
[root@DNS2 ~]# ls /var/named/slaves/
crushlinux.zheng
[root@DNS2 ~]# nslookup www.crushlinux.com 192.168.200.112
```

```
Server:         192.168.200.112
Address:  192.168.200.112#53

Name:     www.crushlinux.com
Address: 192.168.200.254
Name:     www.crushlinux.com
Address: 192.168.200.253

[root@DNS2 ~]# nslookup www.crushlinux.com 192.168.200.112
Server:         192.168.200.112
Address:  192.168.200.112#53

Name:     www.crushlinux.com
Address: 192.168.200.253
Name:     www.crushlinux.com
Address: 192.168.200.254
```

5.10、Rsync 服务配置

AS2、AS3、AS4 三台主机配置 rsync 服务端

```
[root@AS2 ~]# yum -y install rsync
[root@AS2 ~]# vim /etc/rsyncd.conf
uid = nobody
gid = nobody
use chroot = yes
fake super = yes
address = 192.168.200.112    #不同主机 IP 需要更换
port = 873
log file = /var/log/rsyncd.log
pid file = /var/run/rsyncd.pid
hosts allow = 192.168.200.0/24
[wwwroot]
        path = /web/webapps
        comment = Document Root os www.crushlinux.com
        read only = no
        dont compress = *.gz *.bz2 *.tgz *.zip *.rar *.z
        auth users = backuper
        secrets file = /etc/rsyncd_users.db
[root@AS2 ~]# rsync --daemon
[root@AS2 ~]# netstat -anpt |grep rsync
tcp        0      0 192.168.200.112:873     0.0.0.0:*               LISTEN
110590/rsync
[root@AS2 ~]# chown nobody:nobody /web/webapps/
```

```
[root@AS2 ~]# echo "backuper:pwd123" > /etc/rsyncd_users.db
[root@AS2 ~]# chmod 600 /etc/rsyncd_users.db
```

AS1 主机作为发起端测试

```
[root@AS1 ~]# yum -y install rsync
[root@AS1 ~]# echo "pwd123" > /etc/server.pass
[root@AS1 ~]# chmod 600 /etc/server.pass
[root@AS1 ~]# chown nobody:nobody /web/webapps/

[root@AS1 ~]# touch /web/webapps/test.txt
[root@AS1 ~]# rsync -azH --password-file=/etc/server.pass /web/webapps/test.txt rsync://
backuper@192.168.200.112/wwwroot
```

```
[root@AS1 ~]# vim /opt/as_rsync.sh
#!/bin/bash

for ip in 192.168.200.{112..114}
do
        rsync -azH --password-file=/etc/server.pass /web/webapps/test.txt
rsync://backuper@$ip/wwwroot
        [ $? -eq 0 ] && echo "Host $ip File Transfer Successful"
done

[root@AS1 ~]# bash /opt/as_rsync.sh
Host 192.168.200.112 File Transfer Successful
Host 192.168.200.113 File Transfer Successful
Host 192.168.200.114 File Transfer Successful
```