

热备份路由选择协议Hot Standby Routing Protocol

HSRP------Cisco私有协议

HSRP成员 活跃[优先级], 备份, 虚拟 路由器, 其它 路由器

MS1[105] MS2[100] \*.\*.\*.254网关

STP Spanning Tree Protocol生成树协议

网桥BID值最小的交换机 是网络中的根网桥

默认值32768

网桥优先级取值范围0 ~ 65535

PVST 实现网络的负载分担

NAT Network Address Translation 网络地址转换

私有IP地址10.0.0.0-10.255.255.254

172.16.0.0-176.31.255.254

192.168.0.0-192.168.255.254

===========================R1------------

R1(config)#line console 0

R1(config-line)#exec-timeout 0 0

R1(config-line)#logging synchronous

R1(config)#interface gigabitEthernet 0/0

R1(config-if)#ip address 192.168.50.1 255.255.255.0

R1(config-if)#no shutdown

R1(config)#interface gigabitEthernet 0/1

R1(config-if)#ip address 192.168.70.1 255.255.255.0

R1(config-if)#no shutdown

R1(config)#interface gigabitEthernet 0/2

R1(config-if)#ip address 100.0.0.1 255.0.0.0

R1(config-if)#no shutdown

R1(config)#ip route 0.0.0.0 0.0.0.0 100.0.0.10

R1(config)#router ospf 1

R1(config-router)#network 192.168.50.0 0.0.0.255 area 0

R1(config-router)#network 192.168.70.0 0.0.0.255 area 0

#添加默认路由 到RIP路由协议中

R1(config-router)#default-information originate

#添加默认路由 到RIP路由协议中default-information originate

#静态NAT的配置(静态转换static translation)建立静态地址转换

R1(config)#ip nat inside source static 192.168.40.1 100.0.0.3

R1(config)#interface gigabitEthernet 0/2

R1(config-if)#ip nat outside

R1(config)#interface range gigabitEthernet 0/0-1

R1(config-if-range)#ip nat inside

SERVER>ping 100.0.0.3

Ping statistics for 100.0.0.3:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

============================R2--------------

Router(config)#hostname R2

R2(config)#line console 0

R2(config-line)#exec-timeout 0 0

R2(config-line)#logging synchronous

R2(config)#interface gigabitEthernet 0/0

R2(config-if)#ip address 192.168.60.1 255.255.255.0

R2(config-if)#no shutdown

R2(config)#interface gigabitEthernet 0/1

R2(config-if)#ip address 192.168.80.1 255.255.255.0

R2(config-if)#no shutdown

R2(config)#interface gigabitEthernet 0/2

R2(config-if)#ip address 100.0.0.2 255.0.0.0

R2(config-if)#no shutdown

R2(config)#ip route 0.0.0.0 0.0.0.0 100.0.0.10

R2(config)#router ospf 1

R2(config-router)#network 192.168.60.0 0.0.0.255 area 0

R2(config-router)#network 192.168.80.0 0.0.0.255 area 0

#####添加默认路由 到RIP路由协议中

R2(config-router)#default-information originate

#静态NAT的配置(静态转换static translation)建立静态地址转换

R2(config)#ip nat inside source static 192.168.20.1 100.0.0.4

R2(config)#interface gigabitEthernet 0/2

R2(config-if)#ip nat outside

R2(config)#interface range gigabitEthernet 0/0-1

R2(config-if-range)#ip nat inside

SERVER>ping 100.0.0.4

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

===================MS1---------------

Switch(config)#hostname MS1

MS1(config)#line console 0

MS1(config-line)#exec-timeout 0 0

MS1(config-line)#logging synchronous

MS1#write

MS1#reload

Proceed with reload? [confirm]y

MS1(config)#interface range fastEthernet 0/1-2

MS1(config-if-range)#channel-group 1 mode on

MS1(config)#interface range fastEthernet 0/3-4

MS1(config-if-range)#channel-group 2 mode on

MS1(config)#interface range fastEthernet 0/5-6

MS1(config-if-range)#channel-group 3 mode on

MS1(config)#interface range fastEthernet 0/7-8

MS1(config-if-range)#channel-group 4 mode on

MS1(config)#interface range fastEthernet 0/9-10

MS1(config-if-range)#channel-group 5 mode on

MS1#show etherchannel summary

1 Po1(SU) - Fa0/1(P) Fa0/2(P)

2 Po2(SU) - Fa0/3(P) Fa0/4(P)

3 Po3(SU) - Fa0/5(P) Fa0/6(P)

4 Po4(SU) - Fa0/7(P) Fa0/8(P)

5 Po5(SU) - Fa0/9(P) Fa0/10(P)

MS1(config)#vlan 10

MS1(config)#vlan 20

MS1(config)#vlan 30

MS1(config)#vlan 40

MS1#show vlan brief

1 default active

10 VLAN0010 active

20 VLAN0020 active

30 VLAN0030 active

40 VLAN0040 active

MS1(config)#interface port-channel 1

MS1(config-if)#switchport trunk encapsulation dot1q

MS1(config-if)#switchport mode trunk

MS1(config)#interface port-channel 2

MS1(config-if)#switchport trunk encapsulation dot1q

MS1(config-if)#switchport mode trunk

MS1(config)#interface port-channel 3

MS1(config-if)#switchport trunk encapsulation dot1q

MS1(config-if)#switchport mode trunk

MS1(config)#interface port-channel 4

MS1(config-if)#switchport trunk encapsulation dot1q

MS1(config-if)#switchport mode trunk

MS1(config)#interface port-channel 5

MS1(config-if)#switchport trunk encapsulation dot1q

MS1(config-if)#switchport mode trunk

MS1#show interfaces fastEthernet 0/10 switchport

Name: Fa0/10

Switchport: Enabled

Administrative Mode: trunk

Operational Mode: trunk

Administrative Trunking Encapsulation: dot1q

Operational Trunking Encapsulation: dot1q

MS1/VLAN10 192.168.10.252

/VLAN20 192.168.20.252

/VLAN30 192.168.30.252

/VLAN40 192.168.40.252

MS1(config)#interface vlan 10

MS1(config-if)#ip address 192.168.10.252 255.255.255.0

MS1(config-if)#no shutdown

MS1(config)#interface vlan 20

MS1(config-if)#ip address 192.168.20.252 255.255.255.0

MS1(config-if)#no shutdown

MS1(config)#interface vlan 30

MS1(config-if)#ip address 192.168.30.252 255.255.255.0

MS1(config-if)#no shutdown

MS1(config)#interface vlan 40

MS1(config-if)#ip address 192.168.40.252 255.255.255.0

MS1(config-if)#no shutdown

配置生成树协议，产生负载均衡效果。

MS1配置PVST+ 使其成为vlan10、20的主根

vlan30、40的次根

#--启用生成树命令spanning-tree vlan 10并且

指定根网桥root primary

MS1(config)#spanning-tree vlan 10 root primary

MS1(config)#spanning-tree vlan 20 root primary

MS1(config)#spanning-tree vlan 30 root secondary

MS1(config)#spanning-tree vlan 40 root secondary

#--查看生成树的配置

MS1#show spanning-tree

配置热备份路由协议，完善负载均衡效果。

MS1配置HSRP 使其成为vlan10、20的活跃路由器

vlan30、40的备份路由器

MS1(config)#interface vlan 10

#配置为HSRP 的成员 HSRP备份组号 ip 虚拟网关地址

MS1(config-if)#standby 10 ip 192.168.10.254

#配置HSRP成员--组号10 的优先级

{范围[0-255],默认[100],数值越大,优先级越高}

MS1(config-if)#standby 10 priority 105

#HSRP 组号10的成员 占先权配置(允许优先占有权preempt)

MS1(config-if)#standby 10 preempt

MS1(config)#interface vlan 20

MS1(config-if)#standby 20 ip 192.168.20.254

MS1(config-if)#standby 20 priority 105

#HSRP占先权配置(允许优先占有权preempt)

MS1(config-if)#standby 20 preempt

MS1(config)#interface vlan 30

MS1(config-if)#standby 30 ip 192.168.30.254

MS1(config-if)#exit

MS1(config)#interface vlan 40

MS1(config-if)#standby 40 ip 192.168.40.254

#查看HSRP摘要信息

MS1#show standby brief

Interface Grp Pri P State Active Standby Virtual IP

Vl10 10 105 P Active local 192.168.10.253 192.168.10.254

Vl20 20 105 P Active local 192.168.20.253 192.168.20.254

Vl30 30 100 Standby 192.168.30.253 local 192.168.30.254

Vl40 40 100 Standby 192.168.40.253 local 192.168.40.254 192.168.40.252 192.168.40.254

开启两台三层交换机的路由功能，

并设置每个服务器所在vlan的网关

MS1(config)#ip routing

MS1#write

MS1#reload

MS1(config)#interface fastEthernet 0/11

MS1(config-if)#no switchport

MS1(config-if)#ip address 192.168.50.2 255.255.255.0

MS1(config-if)#no shutdown

MS1(config)#interface fastEthernet 0/12

MS1(config-if)#no switchport

MS1(config-if)#ip address 192.168.60.2 255.255.255.0

MS1(config-if)#no shutdown

MS1#show ip route

MS1(config)#route ospf 1

MS1(config-router)#network 192.168.10.0 0.0.0.255 area 0

MS1(config-router)#network 192.168.20.0 0.0.0.255 area 0

MS1(config-router)#network 192.168.30.0 0.0.0.255 area 0

MS1(config-router)#network 192.168.40.0 0.0.0.255 area 0

MS1(config-router)#network 192.168.50.0 0.0.0.255 area 0

MS1(config-router)#network 192.168.60.0 0.0.0.255 area 0

=====================MS2-----------------

Switch(config)#hostname MS2

MS2(config)#line console 0

MS2(config-line)#exec-timeout 0 0

MS2(config-line)#logging synchronous

MS2(config)#interface range fastEthernet 0/1-2

MS2(config-if-range)#channel-group 1 mode on

MS2(config)#interface range fastEthernet 0/3-4

MS2(config-if-range)#channel-group 2 mode on

MS2(config)#interface range fastEthernet 0/5-6

MS2(config-if-range)#channel-group 3 mode on

MS2(config)#interface range fastEthernet 0/7-8

MS2(config-if-range)#channel-group 4 mode on

MS2(config)#interface range fastEthernet 0/9-10

MS2(config-if-range)#channel-group 5 mode on

MS2#show etherchannel summary

1 Po1(SU) - Fa0/1(P) Fa0/2(P)

2 Po2(SU) - Fa0/3(P) Fa0/4(P)

3 Po3(SU) - Fa0/5(P) Fa0/6(P)

4 Po4(SU) - Fa0/7(P) Fa0/8(P)

5 Po5(SU) - Fa0/9(P) Fa0/10(P)

MS2(config)#vlan 10

MS2(config-vlan)#vlan 20

MS2(config-vlan)#vlan 30

MS2(config-vlan)#vlan 40

MS2#show vlan brief

1 default active

10 VLAN0010 active

20 VLAN0020 active

30 VLAN0030 active

40 VLAN0040 active

MS2(config)#interface port-channel 1

MS2(config-if)#switchport trunk encapsulation dot1q

MS2(config-if)#switchport mode trunk

MS2(config)#interface port-channel 2

MS2(config-if)#switchport trunk encapsulation dot1q

MS2(config-if)#switchport mode trunk

MS2(config)#interface port-channel 3

MS2(config-if)#switchport trunk encapsulation dot1q

MS2(config-if)#switchport mode trunk

MS2(config)#interface port-channel 4

MS2(config-if)#switchport trunk encapsulation dot1q

MS2(config-if)#switchport mode trunk

MS2(config)#interface port-channel 5

MS2(config-if)#switchport trunk encapsulation dot1q

MS2(config-if)#switchport mode trunk

MS2#show interfaces fastEthernet 0/1 switchport

Administrative Mode: trunk

Operational Mode: trunk

Administrative Trunking Encapsulation: dot1q

Operational Trunking Encapsulation: dot1q

MS2(config)#interface vlan 10

MS2(config-if)#ip address 192.168.10.253 255.255.255.0

MS2(config-if)#no shutdown

MS2(config)#interface vlan 20

MS2(config-if)#ip address 192.168.20.253 255.255.255.0

MS2(config-if)#no shutdown

MS2(config)#interface vlan 30

MS2(config-if)#ip address 192.168.30.253 255.255.255.0

MS2(config-if)#no shutdown

MS2(config)#interface vlan 40

MS2(config-if)#ip address 192.168.40.253 255.255.255.0

MS2(config-if)#no shutdown

配置生成树协议，产生负载均衡效果。

MS2配置PVST+ 使其成为vlan30、40的主根

vlan10、20的次根

MS2(config)#spanning-tree vlan 10 root secondary

MS2(config)#spanning-tree vlan 20 root secondary

MS2(config)#spanning-tree vlan 30 root primary

MS2(config)#spanning-tree vlan 40 root primary

MS2配置HSRP 使其成为vlan30、40的活跃路由器

vlan10、20的备份路由器

MS2(config)#interface vlan 10

MS2(config-if)#standby 10 ip 192.168.10.254

MS2(config)#interface vlan 20

MS2(config-if)#standby 20 ip 192.168.20.254

MS2(config)#interface vlan 30

MS2(config-if)#standby 30 ip 192.168.30.254

MS2(config-if)#standby 30 priority 105

MS2(config-if)#standby 30 preempt

MS2(config)#interface vlan 40

MS2(config-if)#standby 40 ip 192.168.40.254

MS2(config-if)#standby 40 priority 105

MS2(config-if)#standby 40 preempt

MS2#show standby brief

Interface Grp Pri P State Active Standby Virtual IP

Vl10 10 100 Standby 192.168.10.252 local 192.168.10.254

Vl20 20 100 Standby 192.168.20.252 local 192.168.20.254

Vl30 30 105 P Active local 192.168.30.252 192.168.30.254

Vl40 40 105 P Active local 192.168.40.252 192.168.40.254

开启两台三层交换机的路由功能，

并设置每个服务器所在vlan的网关

MS2(config)#ip routing

MS2#write

MS2#reload

MS2(config)#interface fastEthernet 0/11

MS2(config-if)#no switchport

MS2(config-if)#ip address 192.168.70.2 255.255.255.0

MS2(config-if)#no shutdown

MS2(config)#interface fastEthernet 0/12

MS2(config-if)#no switchport

MS2(config-if)#ip address 192.168.80.2 255.255.255.0

MS2(config-if)#no shutdown

MS2#show ip route

MS2(config)#route ospf 1

MS2(config-router)#network 192.168.10.0 0.0.0.255 area 0

MS2(config-router)#network 192.168.20.0 0.0.0.255 area 0

MS2(config-router)#network 192.168.30.0 0.0.0.255 area 0

MS2(config-router)#network 192.168.40.0 0.0.0.255 area 0

MS2(config-router)#network 192.168.70.0 0.0.0.255 area 0

MS2(config-router)#network 192.168.80.0 0.0.0.255 area 0

===================SW1--------------

Switch(config)#hostname SW1

SW1(config)#line console 0

SW1(config-line)#exec-timeout 0 0

SW1(config-line)#logging synchronous

SW1(config-line)#exit

SW1(config)#interface fastEthernet 0/5

SW1(config-if)#switchport access vlan 10

SW1(config)#interface range fastEthernet 0/1-2

SW1(config-if-range)#channel-group 1 mode on

SW1(config-if-range)#

Creating a port-channel interface Port-channel 1

SW1(config)#interface range fastEthernet 0/3-4

SW1(config-if-range)#channel-group 1 mode on

SW1(config)#interface range fastEthernet 0/3-4

SW1(config-if-range)#no channel-group 1

SW1(config)#interface range fastEthernet 0/3-4

SW1(config-if-range)#channel-group 2 mode on

SW1(config-if-range)#

Creating a port-channel interface Port-channel 2

SW1#show etherchannel summary

1 Po1(SU) - Fa0/1(P) Fa0/2(P)

2 Po2(SU) - Fa0/3(P) Fa0/4(P)

SW1(config)#interface port-channel 1

SW1(config-if)#switchport mode trunk

SW1(config)#interface Port-channel 2

SW1(config-if)#switchport mode trunk

SW1#show interfaces fastEthernet 0/4 switchport

Name: Fa0/4

Switchport: Enabled

Administrative Mode: trunk

Operational Mode: trunk

Administrative Trunking Encapsulation: dot1q

Operational Trunking Encapsulation: dot1q

#--查看vlan 10 生成树的详细信息

S1#show spanning-tree vlan 10

===========================SW2-----------------

Switch(config)#hostname SW2

SW2(config)#line console 0

SW2(config-line)#exec-timeout 0 0

SW2(config-line)#logging synchronous

SW2(config-line)#exit

SW2(config)#interface fastEthernet 0/5

SW2(config-if)#switchport access vlan 20

% Access VLAN does not exist. Creating vlan 20

SW2(config)#interface range fastEthernet 0/1-2

SW2(config-if-range)#channel-group 1 mode on

SW2(config)#interface range fastEthernet 0/3-4

SW2(config-if-range)#channel-group 2 mode on

SW2#show etherchannel summary

1 Po1(SU) - Fa0/1(P) Fa0/2(P)

2 Po2(SU) - Fa0/3(P) Fa0/4(P)

SW2(config)#interface Port-channel 1

SW2(config-if)#switchport mode trunk

SW2(config)#interface Port-channel 2

SW2(config-if)#switchport mode trunk

SW2#show interfaces fastEthernet 0/1 switchport

S2# show spanning-tree vlan 20

===================SW3---------------------------

Switch(config)#hostname SW3

SW3(config)#line console 0

SW3(config-line)#exec-timeout 0 0

SW3(config-line)#logging synchronous

SW3(config-line)#exit

SW3(config)#interface fastEthernet 0/5

SW3(config-if)#switchport access vlan 30

% Access VLAN does not exist. Creating vlan 30

SW3(config)#interface range fastEthernet 0/1-2

SW3(config-if-range)#channel-group 1 mode on

Creating a port-channel interface Port-channel 1

SW3(config)#interface range fastEthernet 0/3-4

SW3(config-if-range)#channel-group 2 mode on

Creating a port-channel interface Port-channel 2

SW3#show etherchannel summary

SW3(config)#interface Port-channel 1

SW3(config-if)#switchport mode trunk

SW3(config)#interface Port-channel 2

SW3(config-if)#switchport mode trunk

SW3#show interfaces fastEthernet 0/1 switchport

=========================SW4----------------------

Switch(config)#hostname SW4

SW4(config)#line console 0

SW4(config-line)#exec-timeout 0 0

SW4(config-line)#logging synchronous

SW4(config-line)#exit

SW4(config)#interface fastEthernet 0/5

SW4(config-if)#switchport access vlan 40

% Access VLAN does not exist. Creating vlan 40

SW4(config)#interface range fastEthernet 0/6-7

SW4(config-if-range)#switchport access vlan 40

SW4(config)#interface range fastEthernet 0/1-2

SW4(config-if-range)#channel-group 1 mode on

Creating a port-channel interface Port-channel 1

SW4(config)#interface range fastEthernet 0/3-4

SW4(config-if-range)#channel-group 2 mode on

SW4(config-if-range)#

Creating a port-channel interface Port-channel 2

###查看以太通道汇总信息

SW4#show etherchannel summary

1 Po1(SU) - Fa0/1(P) Fa0/2(P)

2 Po2(SU) - Fa0/3(P) Fa0/4(P)

SW4(config)#interface Port-channel 1

SW4(config-if)#switchport mode trunk

SW4(config)#interface Port-channel 2

SW4(config-if)#switchport mode trunk

SW4#show interfaces fastEthernet 0/1 switchport

S4# show spanning-tree vlan 40

MS1/VLAN10 192.168.10.252

/VLAN20 192.168.20.252

/VLAN30 192.168.30.252

/VLAN40 192.168.40.252

MS2/VLAN10 192.168.10.253

/VLAN20 192.168.20.253

/VLAN30 192.168.30.253

/VLAN40 192.168.40.253

----------------V10------------

vlan 10 192.168.10.1/192.168.10.254

----------------V20 ------------

vlan 10 192.168.20.1/192.168.20.254

----------------V30 ------------

vlan 10 192.168.30.1/192.168.30.254

----------------V40-1 ------------

vlan 10 192.168.40.1/192.168.40.254

----------------V40-2 ------------

vlan 10 192.168.40.2/192.168.40.254

----------------V40-3 ------------

vlan 10 192.168.40.3/192.168.40.254