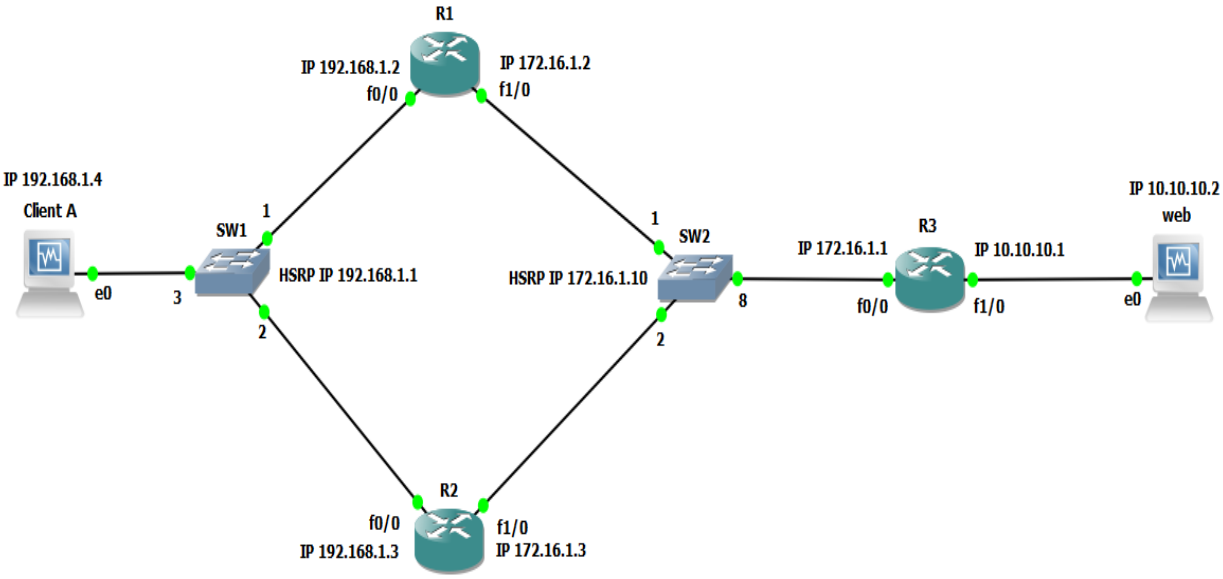
Basic Network Troubleshooting

There is HSRP configuration on R1 and R2 routers. Left side HSRP VIP is 192.168.1.1 and right side VIP is 172.16.1.10. Dynamic routing protocol (OSPF) is used all routers in topology. Web server secured by ACL on R3 router. Only web (TCP port: 80) access granted to Web server IP (10.10.10.2) address from ClientA IP address (192.168.1.4).

ClientA (192.168.1.4) cannot open web site on Web Server (10.10.10.2).

Our purpose show troubleshooting steps to resolve this problem.

Network topology below:



Firstly we will use **ping**, **traceroute** and **telnet** command.

```
root@ClientA ~# ping -c 4 10.10.10.2
PING 10.10.10.2 (10.10.10.2) 56(84) bytes of data.
From 172.16.1.1 icmp_seq=1 Packet filtered
From 172.16.1.1 icmp_seq=2 Packet filtered
From 172.16.1.1 icmp_seq=3 Packet filtered
From 172.16.1.1 icmp_seq=4 Packet filtered
--- 10.10.10.2 ping statistics ---
4 packets transmitted, 0 received, +4 errors, 100% packet loss, time 4010ms

root@ClientA ~# traceroute 10.10.10.2
traceroute to 10.10.10.2 (10.10.10.2), 30 hops max, 60 byte packets
 1  192.168.1.3 (192.168.1.3)  2.768 ms  1.895 ms  1.875 ms
```

```
 2  172.16.1.1 (172.16.1.1)  11.986 ms  11.972 ms  12.038 ms
 3  172.16.1.1 (172.16.1.1)  11.991 ms !X  11.968 ms !X  12.006 ms !X
```

Note: **traceroute** command output shows us problem exist after closest router (R3). But we will continue troubleshooting. Because our purpose is to show troubleshooting methods.

```
root@ClientA ~# telnet 10.10.10.2 80
Trying 10.10.10.2...
telnet: connect to address 10.10.10.2: Connection refused
```

Second step is to check routing and CEF (Cisco Express Forwarding) table HSRP Active member.

Determines active or standby member of HSRP

```
R2#sh standby
FastEthernet0/0 - Group 0
  State is Active
    2 state changes, last state change 00:21:54
  Virtual IP address is 192.168.1.1
  Active virtual MAC address is 0000.0c07.ac00
    Local virtual MAC address is 0000.0c07.ac00 (v1 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 0.624 secs
  Preemption disabled
  Active router is local
  Standby router is 192.168.1.2, priority 100 (expires in 10.128 sec)
  Priority 200 (configured 200)
  Group name is "hsrp-Fa0/0-0" (default)
FastEthernet1/0 - Group 1
  State is Active
    2 state changes, last state change 00:21:56
  Virtual IP address is 172.16.1.10
  Active virtual MAC address is 0000.0c07.ac01
    Local virtual MAC address is 0000.0c07.ac01 (v1 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 1.472 secs
  Preemption disabled
  Active router is local
  Standby router is 172.16.1.2, priority 100 (expires in 10.944 sec)
  Priority 100 (default 100)
  Group name is "hsrp-Fa1/0-1" (default)
```

Checks OSPF configuration on R2

```
R2#show running-config | section ospf
router ospf 100
 router-id 2.2.2.2
 network 172.16.1.0 0.0.0.255 area 0
 network 192.168.1.0 0.0.0.255 area 0
```

Checks routing table of specific network or host address.

```
R2#sh ip route  10.10.10.2
Routing entry for 10.10.10.0/24
  Known via "ospf 100", distance 110, metric 2, type intra area
  Last update from 172.16.1.1 on FastEthernet1/0, 00:21:43 ago
  Routing Descriptor Blocks:
  * 172.16.1.1, from 3.3.3.3, 00:21:43 ago, via FastEthernet1/0
      Route metric is 2, traffic share count is 1
```

Checks CEF (Cisco Express Forwarding) table of specific network or host address.

```
R2#sh ip cef 10.10.10.2
10.10.10.0/24
  nexthop 172.16.1.1 FastEthernet1/0
```

Continuing troubleshooting on R3 router.

Shows ARP (Address Resolution Protocol) table of router

```
R3#sh arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.10.10.1               -   ca03.0c94.001c  ARPA   FastEthernet1/0
Internet  10.10.10.2              10   0800.27f0.75f2  ARPA   FastEthernet1/0
Internet  172.16.1.1               -   ca03.0c94.0000  ARPA   FastEthernet0/0
Internet  172.16.1.2              33   ca01.14fc.001c  ARPA   FastEthernet0/0
Internet  172.16.1.3              33   ca02.13b8.001c  ARPA   FastEthernet0/0
R3#
```

Shows mac address table of switch. If there is switch between R3 router and Web server.

```
SW#show mac address-table dynamic interface GigabitEthernet 0/10
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
   1    0800.27f0.75f2    DYNAMIC     Gi0/10
Total Mac Addresses for this criterion: 1
```

If the destination address exists in the ARP table, then better way to check ACL.

Shows name and direction of access-list applied to interface

```
R3#sh run in fa 1/0
interface FastEthernet1/0
 ip address 10.10.10.1 255.255.255.0
 ip access-group web-srv out
 duplex auto
 speed auto
```

```
end

Shows defined  access-lists
R3#sh ip access-lists web-srv
Extended IP access list web-srv
    10 permit tcp host 192.168.1.4 host 10.10.10.2 eq www (5 matches)
```

ACL match count exactly shows us the problem is in Server side. But anyway we are going to show a few troubleshooting steps on R3.

Firstly ping to the to the Web Server using source IP address of R3 router.

```
R3#ping 10.10.10.2 source 10.10.10.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.2, timeout is 2 seconds:
Packet sent with a source address of 10.10.10.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/8/12 ms
```

Secondly telnet to Web Server tcp port 80 using source interface of R3 router.

```
R3#telnet 10.10.10.2 80 /source-interface fa1/0
Trying 10.10.10.2, 80 ...
% Connection refused by remote host
```

We found out that problem is in the Web Server.

```
[root@Web ~]# service httpd status
httpd is stopped

[root@web ~]# service httpd start
Starting httpd:                                            [  OK  ]
```

At the end telnet to Web Server again from ClientA.

```
[root@ClientA ~]# telnet 10.10.10.2 80
Trying 10.10.10.2...
Connected to 10.10.10.2.
Escape character is '^]'.
```