Personal Firewalls - An Introduction to Firewall Administration

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Design Work

```
// variables to set ie…
// WWW_PORT='80,443'
// SSH_PORT='22'
// and so on...

# Flush the tables
// flush the rule sets
// flush any existing chains

# Set the default policies
// set default input policies to drop
// set default output policies to drop
// set default forward policies to drop

# User-Defined Chains
// create chains: ssh-traffic, www-traffic, noness-traffic
// activate the three chains made
// any input with protocol tcp and its source port is 22, send it to ssh-traffic chain
// any input with protocol tcp and its source port is 80 or 443, send it to www-traffic chain
// any input otherwise will be sent through noness-traffic chain

# Allow DNS traffic
// allow any input through noness-traffic with protocol udp and ports 53 to be accepted
// allow any output through noness-traffic with protocol udp and ports 53 to be accepted

# Allow DHCP traffic
// allow any input through noness-traffic with protocol udp and ports 67 to 68 to be accepted
// allow any output through noness-traffic with protocol udp and ports 67 to 68 to be accepted

# Drop all inbound traffic to HTTP from source ports less than 1024
// drop any traffic coming through www-traffic with protocol tcp and source port 0 to 1023, and
destination port 80 and 443

# Allow inbound and outbound HTTP packets
// allow any traffic coming through www-traffic with protocol tcp and destination port 80 or 443
that has a new or established state
// allow any traffic going out www-traffic with protocol tcp and source ports 80 or 443 with states
that are established
```

# Allow inbound and outbound SSH packets
// allow any traffic coming through ssh-traffic with protocol tcp and destination port 22 that has a new or established state
// allow any traffic going out ssh-traffic with protocol tcp and source ports 22 with states that are established

# Drop all incoming and outgoing packets to and from port 0
// drop all incoming packets with protocol tcp to destination port 0
// drop all incoming packets with protocol udp to destination port 0
// drop all outgoing packets with protocol tcp from source port 0
// drop all outgoing packets with protocol udp from source port 0

# Drop all inbound SYN packets
// drop anything coming in with protocol tcp and flagged as SYN with a new state

# Traffic Accounting Rules
// anything coming to port 80 or 443, send through chain www-traffic
// anything going from port 80 or 443, send it through chain www-traffic

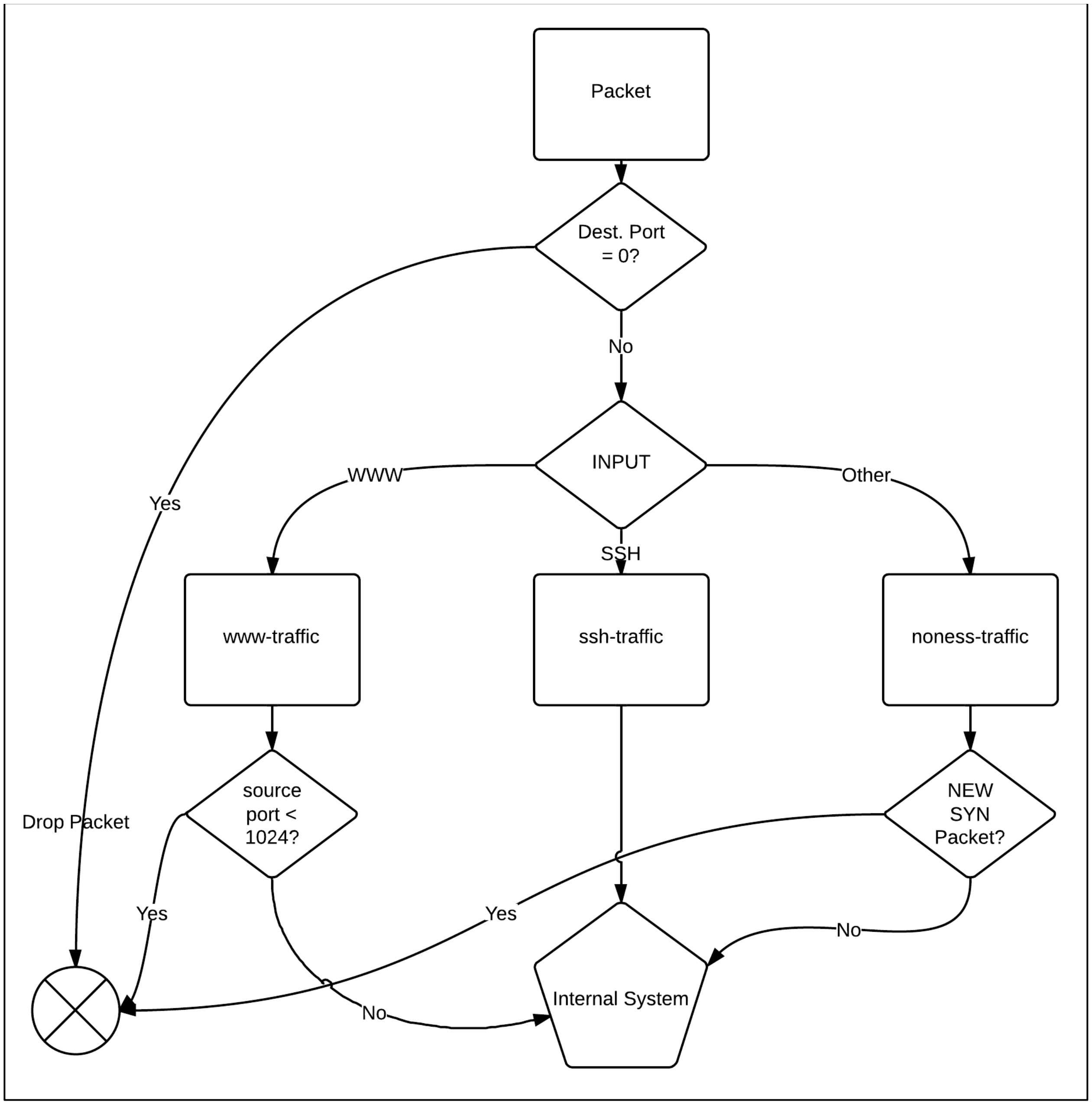
// anything coming to port 22, send through chain ssh-traffic
// anything going from port 22, send it through chain ssh-traffic

// anything coming to neither port 80, 443 and 22, and protocol is tcp, send through chain noness-traffic
// anything coming to neither port 80, 443 and 22, and protocol is udp, send through chain noness-traffic
// anything going from neither port 80, 443 and 22, and protocol is tcp, send through chain noness-traffic
// anything going from neither port 80, 443 and 22, and protocol is udp, send through chain noness-traffic

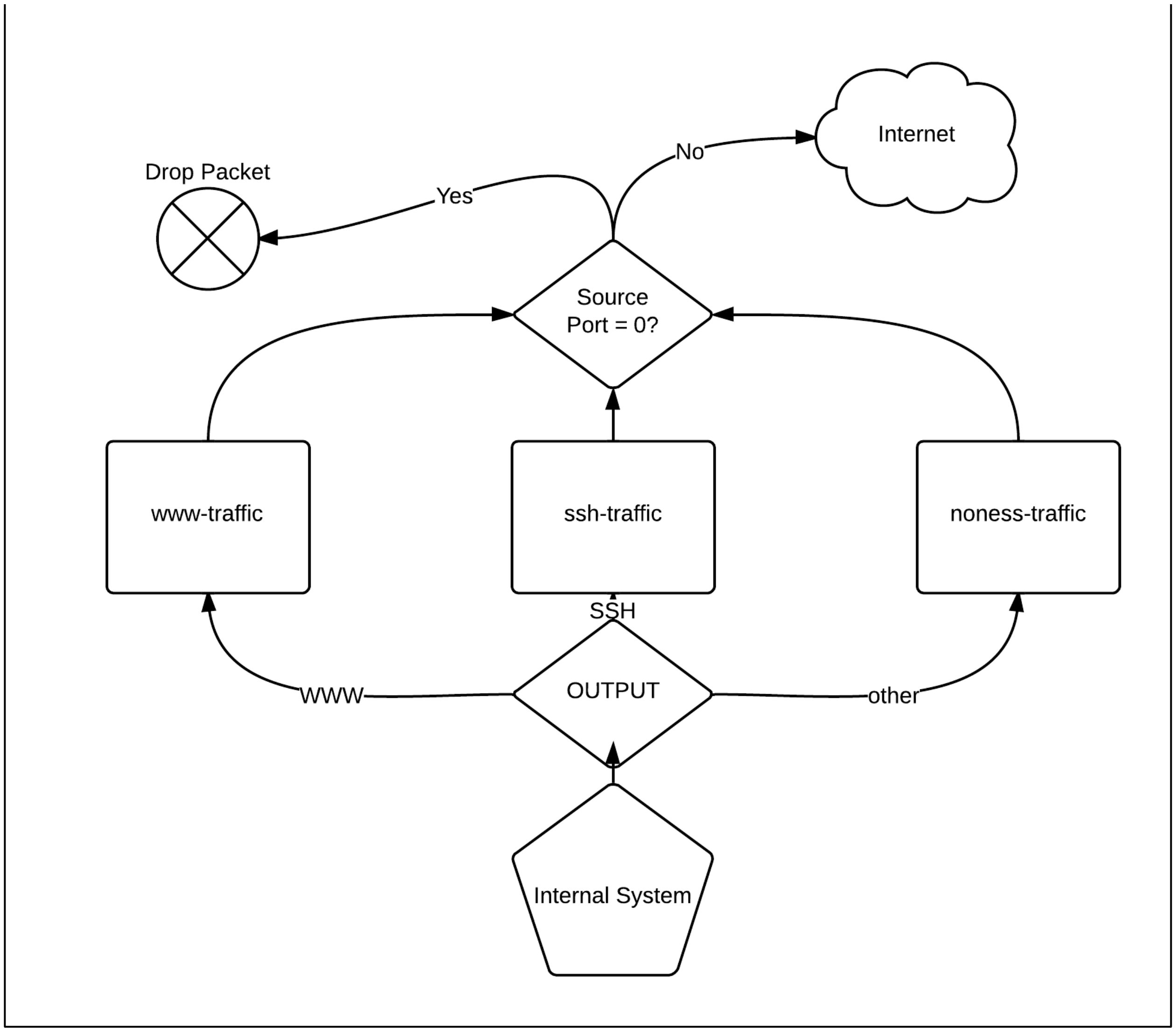
# Save, Restart and List the IP tables
// save the tables
// restart the daemon
// list them; they should be as we just described above

Flow-Chart Diagram

Input



Output

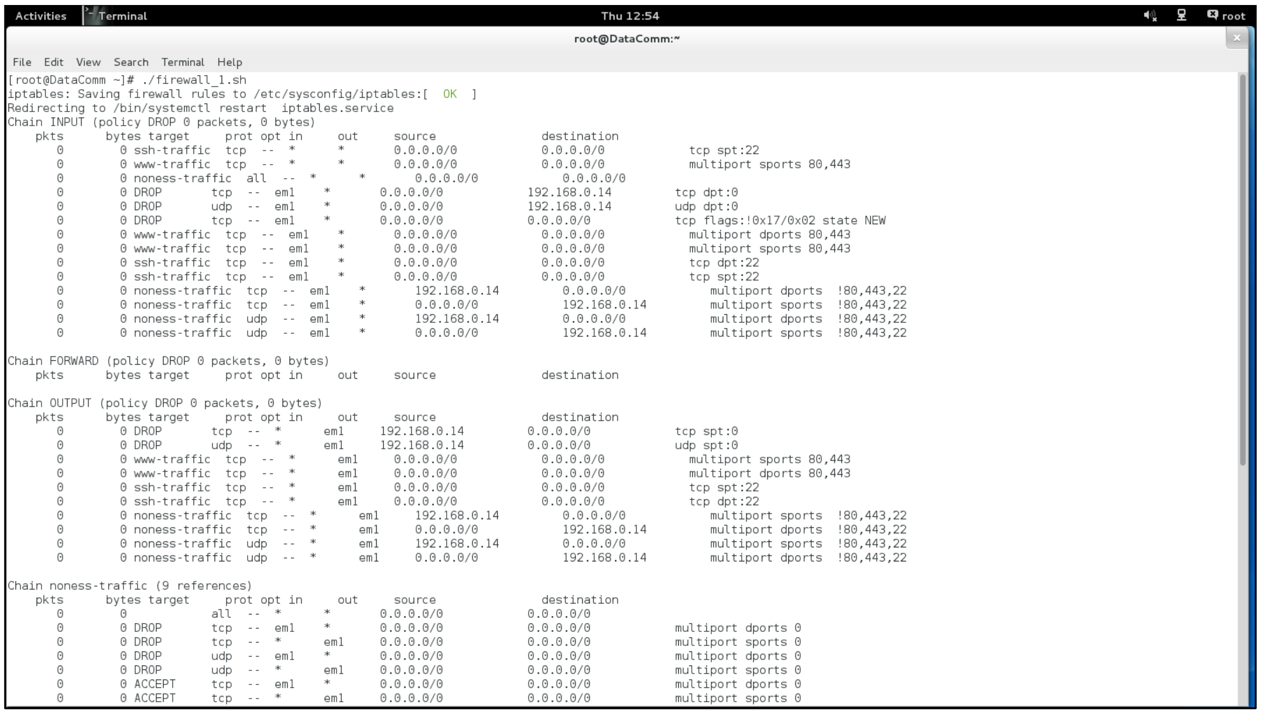

Drop Packet
Yes
No
Internet
Source Port = 0?
www-traffic
ssh-traffic
noness-traffic
SSH
WWW
OUTPUT
other
Internal System

Preliminary Testing

Running the firewall script takes no arguments. Any arguments given to the execution of the script will be ignored.

Test Case 1: Normal Input

Here is what happens when the file is executed with no arguments:



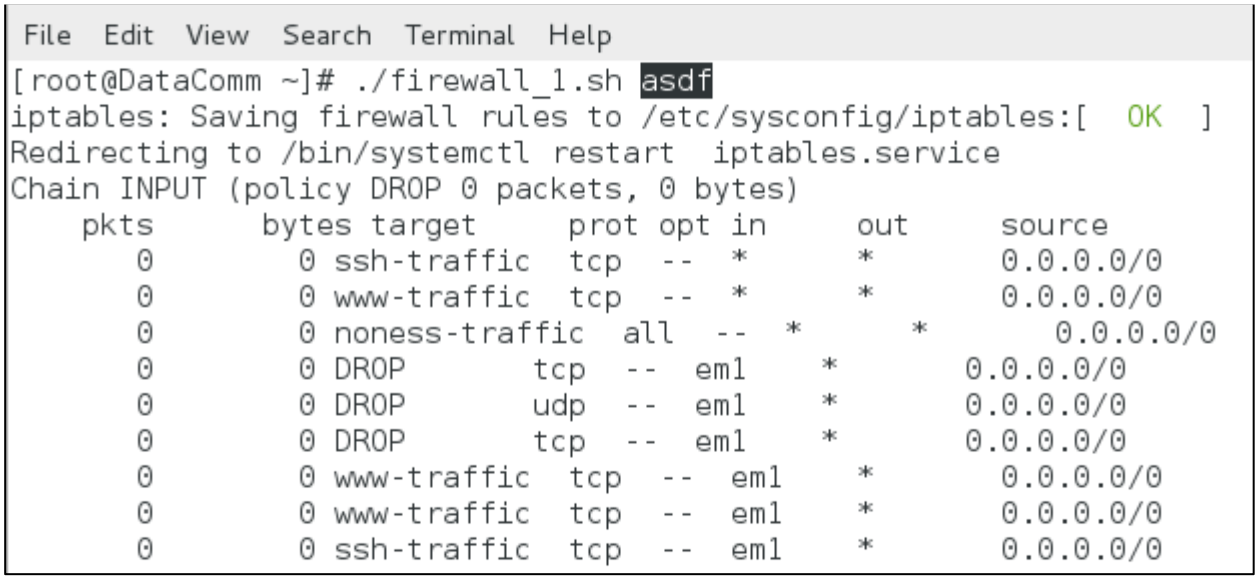
```
[root@DataComm ~]# ./firewall_1.sh
iptables: Saving firewall rules to /etc/sysconfig/iptables:[  OK  ]
Redirecting to /bin/systemctl restart  iptables.service
Chain INPUT (policy DROP 0 packets, 0 bytes)
    pkts      bytes target     prot opt in     out     source               destination
       0        0 ssh-traffic  tcp  --  *      *       0.0.0.0/0            0.0.0.0/0            tcp spt:22
       0        0 www-traffic  tcp  --  *      *       0.0.0.0/0            0.0.0.0/0            multiport sports 80,443
       0        0 noness-traffic  all  --  *      *       0.0.0.0/0            0.0.0.0/0
       0        0 DROP       tcp  --  em1    *       0.0.0.0/0            192.168.0.14         tcp dpt:0
       0        0 DROP       udp  --  em1    *       0.0.0.0/0            192.168.0.14         udp dpt:0
       0        0 DROP       tcp  --  em1    *       0.0.0.0/0            0.0.0.0/0            tcp flags:!0x17/0x02 state NEW
       0        0 www-traffic  tcp  --  em1    *       0.0.0.0/0            0.0.0.0/0            multiport dports 80,443
       0        0 www-traffic  tcp  --  em1    *       0.0.0.0/0            0.0.0.0/0            multiport sports 80,443
       0        0 ssh-traffic  tcp  --  em1    *       0.0.0.0/0            0.0.0.0/0            tcp dpt:22
       0        0 ssh-traffic  tcp  --  em1    *       0.0.0.0/0            0.0.0.0/0            tcp spt:22
       0        0 noness-traffic  tcp  --  em1    *       192.168.0.14         0.0.0.0/0            multiport dports  !80,443,22
       0        0 noness-traffic  tcp  --  em1    *       0.0.0.0/0            192.168.0.14         multiport sports  !80,443,22
       0        0 noness-traffic  udp  --  em1    *       192.168.0.14         0.0.0.0/0            multiport dports  !80,443,22
       0        0 noness-traffic  udp  --  em1    *       0.0.0.0/0            192.168.0.14         multiport sports  !80,443,22

Chain FORWARD (policy DROP 0 packets, 0 bytes)
    pkts      bytes target     prot opt in     out     source               destination

Chain OUTPUT (policy DROP 0 packets, 0 bytes)
    pkts      bytes target     prot opt in     out     source               destination
       0        0 DROP       tcp  --  *      em1     192.168.0.14         0.0.0.0/0            tcp spt:0
       0        0 DROP       udp  --  *      em1     192.168.0.14         0.0.0.0/0            udp spt:0
       0        0 www-traffic  tcp  --  *      em1     0.0.0.0/0            0.0.0.0/0            multiport sports 80,443
       0        0 www-traffic  tcp  --  *      em1     0.0.0.0/0            0.0.0.0/0            multiport dports 80,443
       0        0 ssh-traffic  tcp  --  *      em1     0.0.0.0/0            0.0.0.0/0            tcp spt:22
       0        0 ssh-traffic  tcp  --  *      em1     0.0.0.0/0            0.0.0.0/0            tcp dpt:22
       0        0 noness-traffic  tcp  --  *      em1     192.168.0.14         0.0.0.0/0            multiport sports  !80,443,22
       0        0 noness-traffic  tcp  --  *      em1     0.0.0.0/0            192.168.0.14         multiport dports  !80,443,22
       0        0 noness-traffic  udp  --  *      em1     192.168.0.14         0.0.0.0/0            multiport sports  !80,443,22
       0        0 noness-traffic  udp  --  *      em1     0.0.0.0/0            192.168.0.14         multiport dports  !80,443,22

Chain noness-traffic (9 references)
    pkts      bytes target     prot opt in     out     source               destination
       0        0            all  --  *      *       0.0.0.0/0            0.0.0.0/0
       0        0 DROP       tcp  --  em1    *       0.0.0.0/0            0.0.0.0/0            multiport dports 0
       0        0 DROP       tcp  --  *      em1     0.0.0.0/0            0.0.0.0/0            multiport sports 0
       0        0 DROP       udp  --  em1    *       0.0.0.0/0            0.0.0.0/0            multiport dports 0
       0        0 DROP       udp  --  *      em1     0.0.0.0/0            0.0.0.0/0            multiport sports 0
       0        0 ACCEPT     tcp  --  em1    *       0.0.0.0/0            0.0.0.0/0            multiport dports 0
       0        0 ACCEPT     tcp  --  *      em1     0.0.0.0/0            0.0.0.0/0            multiport sports 0
```

There are no errors or warnings.

RESULT: PASSED

Test Case 2: Input followed by (an unnecessary) argument

Here is what happens when the file is executed with an unnecessary argument:



```
[root@DataComm ~]# ./firewall_1.sh asdf
iptables: Saving firewall rules to /etc/sysconfig/iptables:[  OK  ]
Redirecting to /bin/systemctl restart  iptables.service
Chain INPUT (policy DROP 0 packets, 0 bytes)
    pkts      bytes target     prot opt in     out     source
       0        0 ssh-traffic  tcp  --  *      *       0.0.0.0/0
       0        0 www-traffic  tcp  --  *      *       0.0.0.0/0
       0        0 noness-traffic  all  --  *      *       0.0.0.0/0
       0        0 DROP       tcp  --  em1    *       0.0.0.0/0
       0        0 DROP       udp  --  em1    *       0.0.0.0/0
       0        0 DROP       tcp  --  em1    *       0.0.0.0/0
       0        0 www-traffic  tcp  --  em1    *       0.0.0.0/0
       0        0 www-traffic  tcp  --  em1    *       0.0.0.0/0
       0        0 ssh-traffic  tcp  --  em1    *       0.0.0.0/0
```

Note the highlighted “argument”. As you can see, no errors are displayed and the highlighted argument is simply ignored.

RESULT: PASSED