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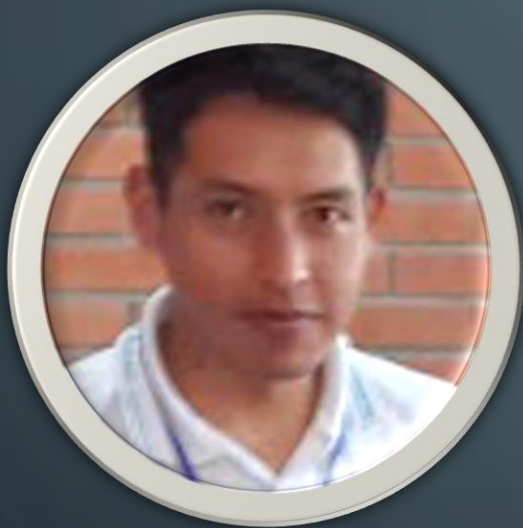
MikroTik User Meeting

BALANCEO DE CARGA DE USUARIOS
A SERVIDORES WEB CON DST-NAT



*Mikro***Tik**

SOBRE EL PRESENTADOR



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INTRODUCCIÓN

- Las instituciones que actualmente tienen servidores, donde día a día van accediendo los usuarios, esta cantidad de usuarios va en constante crecimiento.

PROBLEMÁTICA

- Estas instituciones por la creciente cantidad de usuarios que van accediendo a sus servidores web, van teniendo dificultades con su servidor, ya que el servidor puede soportar una cantidad limitada de usuarios conectados simultáneamente.

OBJETIVOS

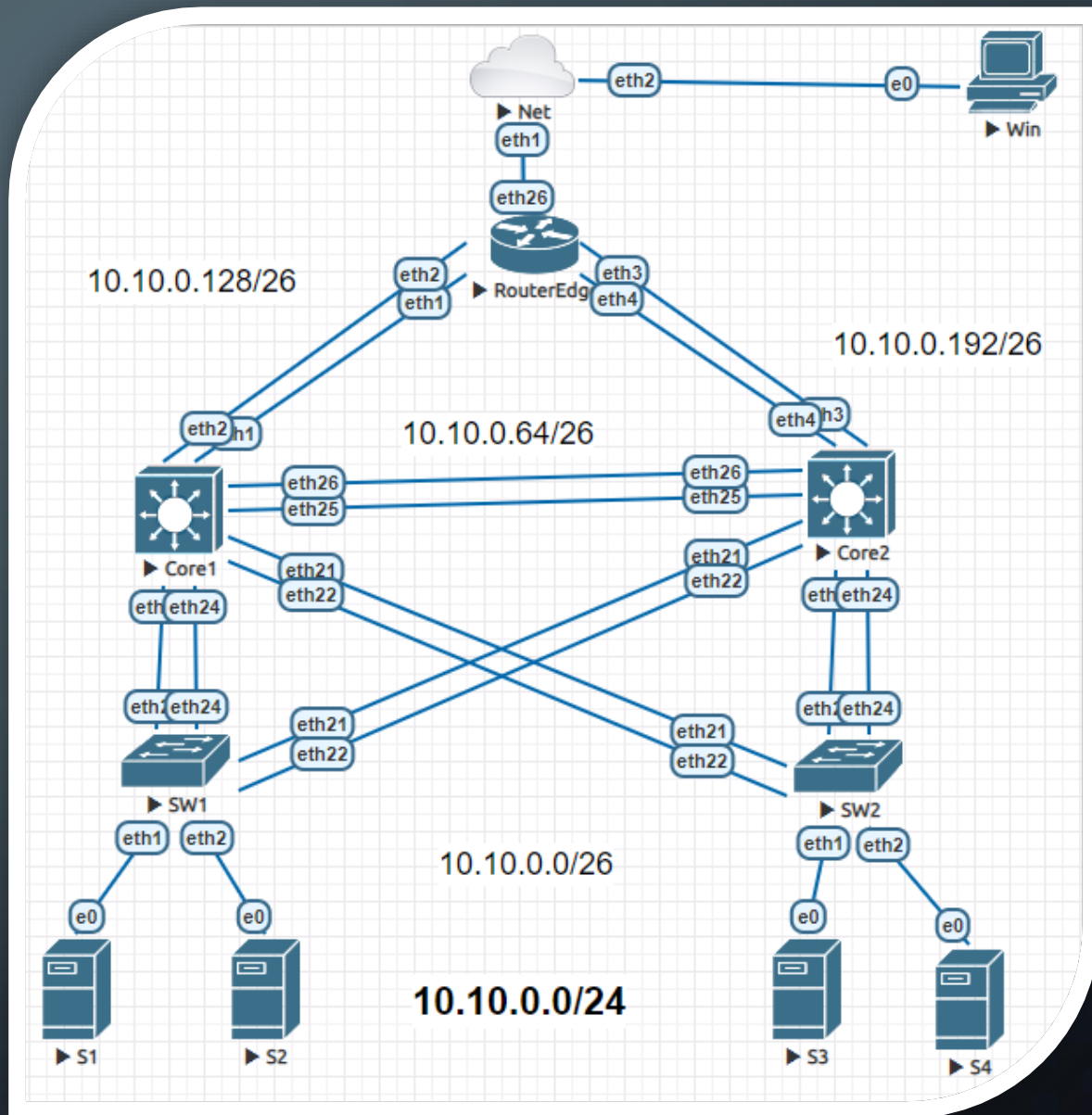
- Implementar el balanceo de solicitudes de múltiples usuarios a múltiples servidores utilizando RouterOS.

ANÁLISIS

- Se tiene una red de varios servidores web las cuales se encuentran en una DMZ, para permitir el acceso de varios usuario balanceados entre los múltiples servidores. (en este caso trabajaremos entre 4 servidores) y estos mismos servidores suelen esta conectados a una red de almacenamiento.

TOPOLOGIA DE LA RED

- Se tiene una pequeña red, la cual esta distribuida en 2 capas (Nucleo , Acceso). También se dispone de servidores a los cuales serán balanceados los usuarios.



ACTIVIDADES A REALIZAR

- CONFIGURACION DE DIRECCIONES IP
- CONFIGURACION DE ROUTING
- PREPARACION Y CONFIGURACION DE SERVIDORES
- MARCADO DE PAQUETES
- BALANCEO DE SOLICITUDES WEB
- PRUEBAS

CONFIGURACIÓN DE DIRECCIONES IP – ROUTER EDGE

Interface List		
Interface	Interface List	Ethernet
		
		
		
	Name	Type
R	 bonding4	Bonding
R	 bonding5	Bonding

Address List			
			
			
	Address	Network	Interface
	 1.1.1.1	1.1.1.1	loopback0
	 10.10.0.129/26	10.10.0.128	bonding5
	 10.10.0.193/26	10.10.0.192	bonding4
	 192.168.88.99...	192.168.88.0	ether26

Bridge		
Bridge	Ports	VLANs
		
		
		
	Name	Type
R	 Loopback0	Bridge

CONFIGURACIÓN DE DIRECCIONES IP – ROUTER EDGE

```
/interface bridge
add name=loopback0

/interface bonding
add name=bonding4 slaves=ether3,ether4
add name=bonding5 slaves=ether1,ether2

/ip address
add address=192.168.88.99/24 interface=ether26 network=192.168.88.0
add address=10.10.0.193/26 interface=bonding4 network=10.10.0.192
add address=10.10.0.129/26 interface=bonding5 network=10.10.0.128
add address=1.1.1.1 interface=loopback0 network=1.1.1.1
```

CONFIGURACIÓN DE DIRECCIONES IP – CORE1

Interface List		
Interface Interface List Ethernet		
+ - ✓ ✗ [icon] [icon]		
	Name	Type
RS	bonding1	Bonding
RS	bonding2	Bonding
R	bonding3	Bonding
R	bonding5	Bonding

Address List			
+ - ✓ ✗ [icon] [icon]			
	Address	Network	Interface
	10.10.0.65/26	10.10.0.64	bonding3
	10.10.0.130/26	10.10.0.128	bonding5
	10.10.0.2/26	10.10.0.0	bridge1
	2.2.2.2	2.2.2.2	loopback0

Bridge		
Bridge Ports VLANs MSTIs		
+ - ✓ ✗ [icon] [icon]		
	Name	Type
R	bridge1	Bridge
R	loopback0	Bridge

Bridge			
Bridge Ports VLANs MSTIs Port M			
+ - ✓ ✗ [icon] [icon]			
#	Interface	Bridge	
0	bonding1	bridge1	
1	bonding2	bridge1	

CONFIGURACIÓN DE DIRECCIONES IP – CORE1

```
/interface bonding
add name=bonding1 slaves=ether23,ether24
add name=bonding2 slaves=ether21,ether22
add name=bonding3 slaves=ether26,ether25
add name=bonding5 slaves=ether1,ether2

/interface bridge
add name=bridge1
add name=loopback0

/interface bridge port
add bridge=bridge1 interface=bonding1
add bridge=bridge1 interface=bonding2

/ip address
add address=10.10.0.130/26 interface=bonding5 network=10.10.0.128
add address=10.10.0.65/26 interface=bonding3 network=10.10.0.64
add address=2.2.2.2 interface=loopback0 network=2.2.2.2
add address=10.10.0.2/26 interface=bridge1 network=10.10.0.0
```

CONFIGURACIÓN DE DIRECCIONES IP – CORE2

Interface List		
Interface		
Interface List		
Ethern		
	Name	Type
RS	bonding1	Bonding
RS	bonding2	Bonding
R	bonding3	Bonding
R	bonding4	Bonding

Address List			
	Address	Network	Interface
	10.10.0.66/26	10.10.0.64	bonding3
	10.10.0.194/26	10.10.0.192	bonding4
	10.10.0.3/26	10.10.0.0	bridge1
	3.3.3.3	3.3.3.3	loopback0

Bridge		
Bridge		
Ports		
VLANs		
MSTIs		
	Name	Type
R	bridge1	Bridge
R	loopback0	Bridge

Bridge			
Bridge			
Ports			
VLANs			
MSTIs			
Port			
#	Interface	Bridge	
0	bonding1	bridge1	
1	bonding2	bridge1	

CONFIGURACIÓN DE DIRECCIONES IP – CORE2

```
/interface bonding
add name=bonding1 slaves=ether23,ether24
add name=bonding2 slaves=ether21,ether22
add name=bonding3 slaves=ether25,ether26
add name=bonding4 slaves=ether3,ether4

/interface bridge
add name=bridge1
add name=loopback0

/interface bridge port
add bridge=bridge1 interface=bonding1
add bridge=bridge1 interface=bonding2

/ip address
add address=10.10.0.194/26 interface=bonding4 network=10.10.0.192
add address=10.10.0.66/26 interface=bonding3 network=10.10.0.64
add address=3.3.3.3 interface=loopback0 network=3.3.3.3
add address=10.10.0.3/26 interface=bridge1 network=10.10.0.0
```

CONFIGURACIÓN DE DIRECCIONES IP – SW1

Interface List		
Interface	Interface List	Ethernet
	Name	Type
RS	bonding1	Bonding
RS	bonding2	Bonding
R	bridge1	Bridge
RS	ether1	Ethernet
RS	ether2	Ethernet

Bridge					
Bridge	Ports	VLANs	MSTIs		
					
	Name		Type		
R	 bridge1		Bridge		

Bridge					
Bridge	Ports	VLANs	MSTIs	Port M	
					
#		Interface	Bridge		
0		ether1	bridge1		
1		ether2	bridge1		
2		bonding1	bridge1		
3		bonding2	bridge1		
4		ether3	bridge1		

Address List			
	Address	Network	Interface
	10.10.0.4/26	10.10.0.0	bridge1

CONFIGURACIÓN DE DIRECCIONES IP – SW1

```
/interface bonding
add name=bonding1 slaves=ether23,ether24
add name=bonding2 slaves=ether21,ether22

/interface bridge
add name=bridge1

/interface bridge port
add bridge=bridge1 interface=ether1
add bridge=bridge1 interface=ether2
add bridge=bridge1 interface=bonding1
add bridge=bridge1 interface=bonding2
add bridge=bridge1 interface=ether3

/ip address
add address=10.10.0.4/26 interface=bridge1 network=10.10.0.0
```

CONFIGURACIÓN DE DIRECCIONES IP – SW2

Interface List		
Interface	Interface List	Ethernet
	     	
	Name	Type
RS	 bonding1	Bonding
RS	 bonding2	Bonding
R	 bridge1	Bridge
RS	 ether1	Ethernet
RS	 ether2	Ethernet

Bridge		
Bridge	Ports	VLANs
	     	
	Name	Type
R	 bridge1	Bridge

Bridge			
Bridge	Ports	VLANs	MSTIs
	     		
#	Interface	Bridge	Port
0	 bonding1	bridge1	
1	 bonding2	bridge1	
2	 ether1	bridge1	
3	 ether2	bridge1	
4	 ether3	bridge1	

Address List			
	     		
	Address	Network	Interface
	 10.10.0.5/26	10.10.0.0	bridge1

CONFIGURACIÓN DE DIRECCIONES IP – SW2

```
/interface bonding
add name=bonding1 slaves=ether23,ether24
add name=bonding2 slaves=ether21,ether22

/interface bridge
add name=bridge1

/interface bridge port
add bridge=bridge1 interface=bonding1
add bridge=bridge1 interface=bonding2
add bridge=bridge1 interface=ether1
add bridge=bridge1 interface=ether2
add bridge=bridge1 interface=ether3

/ip address
add address=10.10.0.5/26 interface=bridge1 network=10.10.0.0
```

CONFIGURACIÓN DE ROUTING - ROUTER EDGE

OSPF

Interfaces Instances Networks

+ - ✓ ✗ [icon] [icon]

Name	Router ID
* default	1.1.1.1

Route List

Routes Nexthops Rules VRF

+ - ✓ ✗ [icon] [icon]

	Dst. Address	Gateway
AS	0.0.0.0/0	192.168.88.1 reachable ether26

OSPF Instance <default>

General Metrics MPLS Status

Name: default

Router ID: 1.1.1.1

Redistribute Default Route: always (as type 2)

Redistribute Connected Routes: no

OK Cancel Apply Disable Comment

OSPF

Instances Networks Areas Area F

+ - ✓ ✗ [icon] [icon]

Network	Area
10.10.0.128/26	backbone
10.10.0.192/26	backbone

CONFIGURACIÓN DE ROUTING - ROUTER EDGE

```
/ip route
add distance=1 gateway=192.168.88.1

/routing ospf instance
set [ find default=yes ] distribute-default=always-as-type-2 router-id=1.1.1.1

/routing ospf network
add area=backbone network=10.10.0.192/26
add area=backbone network=10.10.0.128/26
```

CONFIGURACIÓN DE ROUTING –CORE1

OSPF

Interfaces Instances Networks

+ - ✓ ✕ [Add] [Filter]

	Name	Router ID
+	default	2.2.2.2

OSPF

Instances Networks Areas Area R

+ - ✓ ✕ [Add] [Filter]

	Network	Area
	10.10.0.0/26	backbone
	10.10.0.128/26	backbone
	10.10.0.192/26	backbone

OSPF Instance <default>

General Metrics MPLS Status

Name: default

Router ID: 2.2.2.2

Redistribute Default Route: never

Redistribute Connected Routes: no

OK Cancel Apply Disable Comment

CONFIGURACIÓN DE ROUTING –CORE1

```
/routing ospf instance
set [ find default=yes ] router-id=2.2.2.2

/routing ospf network
add area=backbone network=10.10.0.128/26
add area=backbone network=10.10.0.192/26
add area=backbone network=10.10.0.0/26
```

CONFIGURACIÓN DE ROUTING –CORE2

OSPF

Interfaces Instances Networks

+ - ✓ ✕ [icon] [icon]

Name	Router ID
* [icon] default	3.3.3.3

OSPF

Instances Networks Areas Area R

+ - ✓ ✕ [icon] [icon]

Network	Area
[icon] 10.10.0.0/26	backbone
[icon] 10.10.0.128/26	backbone
[icon] 10.10.0.192/26	backbone

OSPF Instance <default>

General Metrics MPLS Status

Name: default

Router ID: 3.3.3.3

Redistribute Default Route: never [icon]

Redistribute Connected Routes: no [icon]

OK Cancel Apply Disable Comment

CONFIGURACIÓN DE ROUTING –CORE2

```
/routing ospf instance
set [ find default=yes ] router-id=3.3.3.3

/routing ospf network
add area=backbone network=10.10.0.192/26
add area=backbone network=10.10.0.128/26
add area=backbone network=10.10.0.0/26
```

MARCADO DE PAQUETES –ROUTER EDGE

IP > FIREWALL > MANGLE

Mangle Rule <>

General Advanced Extra Action Statistics

Chain: prerouting

In. Interface: ☐ ether26

General Advanced Extra Action Statistics

Per Connection Classifier: ☐ both addresses and ports : 4 / 0

General Advanced Extra Action Statistics

Action: mark connection

New Connection Mark: conn1

☒ Passthrough

MARCADO DE PAQUETES –ROUTER EDGE

IP > FIREWALL > MANGLE

```
/ip firewall mangle
add action=mark-connection chain=prerouting in-interface=ether26 \
    new-connection-mark=conn1 passthrough=yes per-connection-classifier=\
    both-addresses-and-ports:4/0
add action=mark-connection chain=prerouting in-interface=ether26 \
    new-connection-mark=conn2 passthrough=yes per-connection-classifier=\
    both-addresses-and-ports:4/1
add action=mark-connection chain=prerouting in-interface=ether26 \
    new-connection-mark=conn3 passthrough=yes per-connection-classifier=\
    both-addresses-and-ports:4/2
add action=mark-connection chain=prerouting in-interface=ether26 \
    new-connection-mark=conn4 passthrough=yes per-connection-classifier=\
    both-addresses-and-ports:4/3
```

BALANCEO DE SOLICITUDES WEB – DSTNAT

IP > FIREWALL > NAT

NAT Rule <192.168.88.59:80>

General	Advanced	Extra	Action	Statistics
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Chain:

Dst. Address: ☐

Protocol: ☐

Dst. Port: ☐

In. Interface: ☐

Connection Mark: ☐

General	Advanced	Extra	Action	Statistics
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Action:

To Addresses:

To Ports:

BALANCEO DE SOLICITUDES WEB – DSTNAT

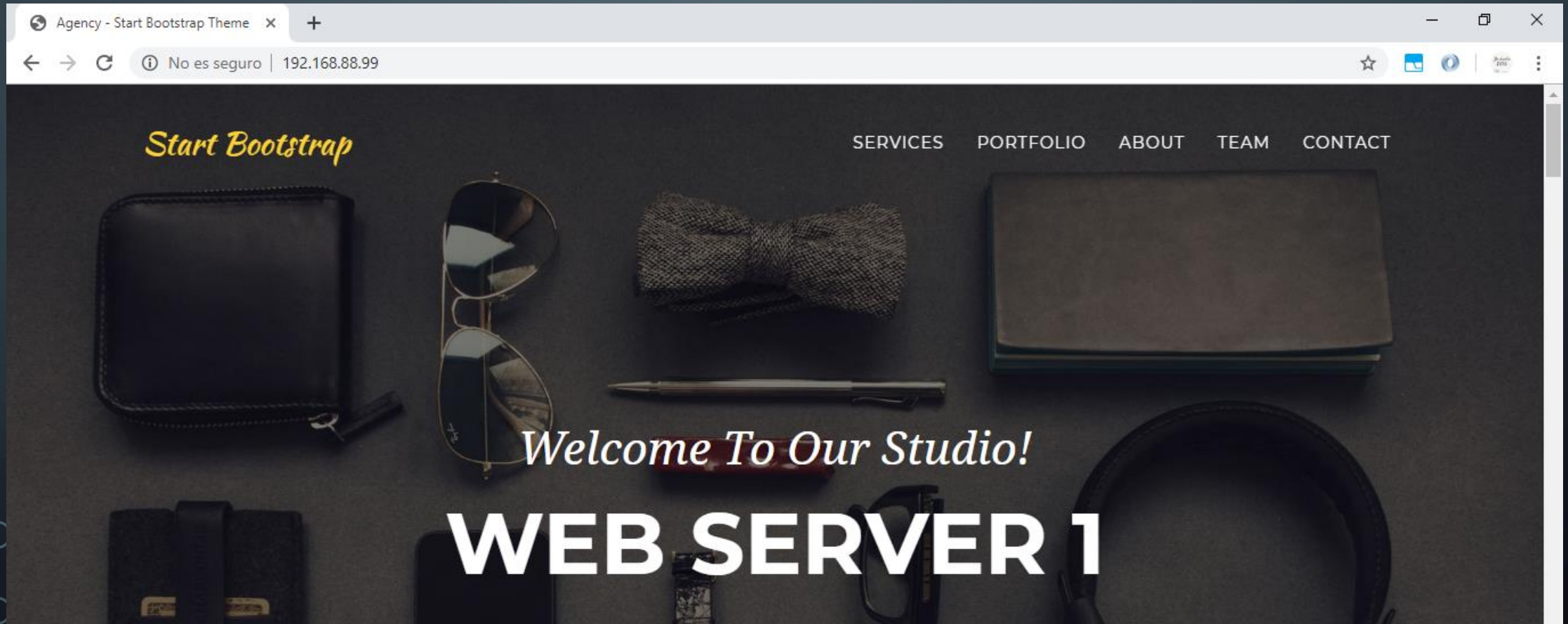
IP > FIREWALL > NAT

```
/ip firewall nat
add action=dst-nat chain=dstnat comment=DST-NAT-1 connection-mark=conn1 \
dst-port=80 protocol=tcp to-addresses=10.10.0.51 to-ports=80
add action=dst-nat chain=dstnat comment=DST-NAT-2 connection-mark=conn2 \
dst-port=80 protocol=tcp to-addresses=10.10.0.52 to-ports=80
add action=dst-nat chain=dstnat comment=DST-NAT-3 connection-mark=conn3 \
dst-port=80 protocol=tcp to-addresses=10.10.0.53 to-ports=80
add action=dst-nat chain=dstnat comment=DST-NAT-4 connection-mark=conn4 \
dst-port=80 protocol=tcp to-addresses=10.10.0.54 to-ports=80
add action=dst-nat chain=dstnat disabled=yes dst-address=192.168.88.92 \
in-interface=ether26 to-addresses=10.10.0.61
```

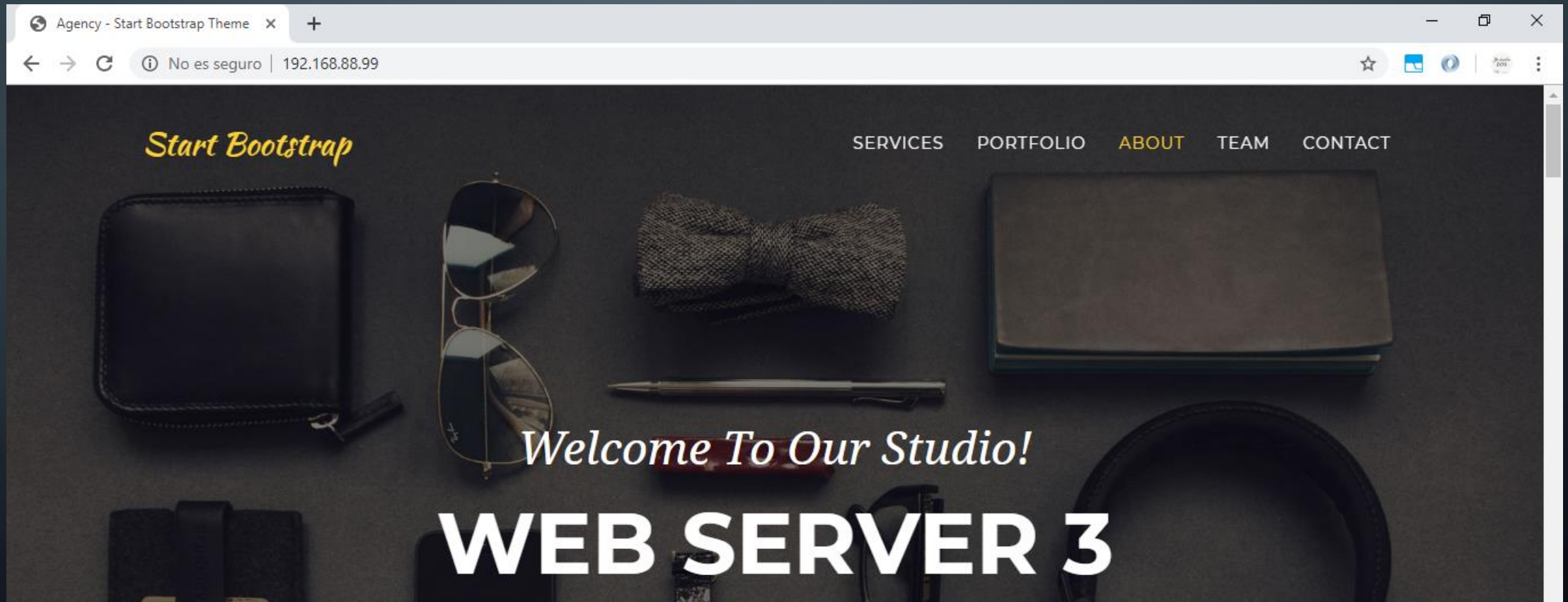
DIRECCIONES IP DE SERVIDORES

```
/ip dhcp-server lease
add address=10.10.0.52 client-id=\
    ff:b5:5e:67:ff:0:2:0:0:ab:11:bd:91:e9:61:4e:10:2b:c8 comment=S2 \
    mac-address=00:50:00:00:0B:00 server=dhcp1
add address=10.10.0.51 client-id=\
    ff:b5:5e:67:ff:0:2:0:0:ab:11:c5:2a:d9:30:93:b6:78:ea comment=S1 \
    mac-address=00:50:00:00:0A:00 server=dhcp1
add address=10.10.0.54 client-id=\
    ff:b5:5e:67:ff:0:2:0:0:ab:11:86:9b:7c:ed:7f:67:29:3c comment=S4 \
    mac-address=00:50:00:00:0D:00 server=dhcp1
add address=10.10.0.53 client-id=\
    ff:b5:5e:67:ff:0:2:0:0:ab:11:f7:24:37:38:3d:7:2a:c5 comment=S3 mac-address=\
    00:50:00:00:0C:00 server=dhcp1
```

PRUEBAS – REQUEST WEB TO 192.168.88.99

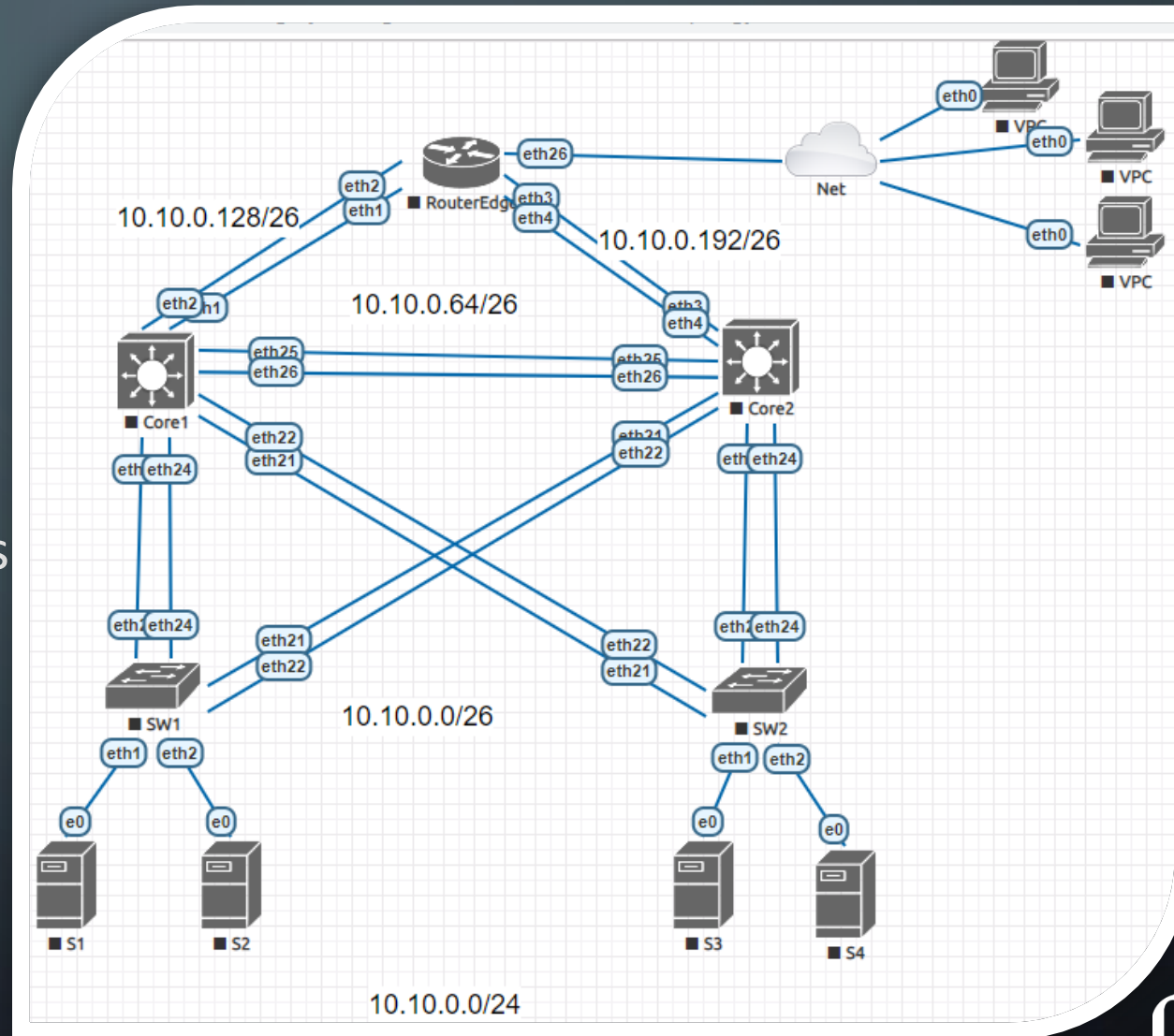


PRUEBAS – REQUEST WEB TO 192.168.88.99 DESDE OTRO DISPOSITIVO



RESULTADOS

- Varios usuarios que acceden a los servidores de manera balanceada a distintos servidores



BIBLIOGRAFIA

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- <https://wiki.mikrotik.com/wiki/Manual:Interface/VRRP>
- <https://wiki.mikrotik.com/wiki/Manual:IP/Firewall/Mangle>
- <https://wiki.mikrotik.com/wiki/Manual:IP/Firewall/NAT>
- <https://wiki.mikrotik.com/wiki/Manual:PCC>

PREGUNTAS?

GRACIAS

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