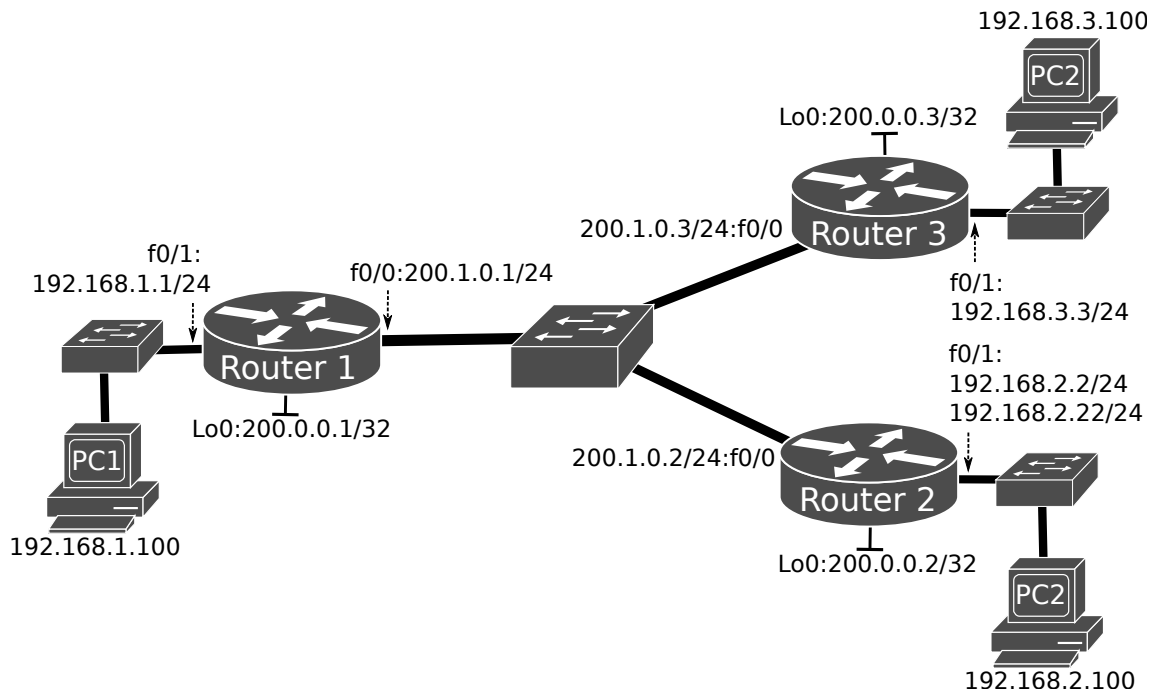# ARQUITETURA DE REDES

LABORATORY GUIDE

Objectives

- Study of the route maps mechanisms to implement Policy Based Routing

PBR with Route-Maps

1. Set up the above depicted network. Configure the IP addresses of the router interfaces (including the *loopback* interfaces). To configure the *loopback* interfaces use the following commands:

```
Router1(config)# interface loopback 0
Router1(config-if)# ip address 200.0.0.1 255.255.255.255
```
To configure two Ipv4 address in interface f0/1 of Router 2:
```
Router2(config)# interface f0/1
Router2(config-if)# ip address 192.168.2.2 255.255.255.0
Router2(config-if)# ip address 192.168.2.22 255.255.255.0 secondary
```
Activate OSPF in <u>all interface routers</u> (all in area 0):
```
Router*(config)# interface loopback 0
Router*(config-if)# ip ospf 1 area 0
```
Verify the routing tables in all routers. Start a capture in networks 200.1.0.0/24. From PC1 ping PC2 and PC3. Analyze the captured packets and verify that the capture agrees with the content of the routing table from Router1.

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2. Define in Router1 a Policy-Based Routing route-map to (i) force all traffic to network 192.168.2.0/24 to go via Router3. First, configure the rule (access-list) that defines which traffic will be processed by each branch of the route-map:

```
Router1(config)# access-list 101 permit ip any 192.168.2.0 0.0.0.255
```
Then, define the route-map that will change the next-hops (to be RouterA or RouterB) for the traffic defined in the access list 101:
```
Router1(config)# route-map ForceRouting permit 10
Router1(config-route-map)# match ip address 101
Router1(config-route-map)# set ip next-hop 200.1.0.3
```
The underlined part of the commands are user defined names/strings (i.e. the name of the route-map) and the numeric values (10 and 20) defines the order of processing when multiple rules are present in a route-map. Apply the route-map to Router1 interface f0/1 (receiving interface):
```
Router1(config)# interface f0/1
Router1(config-if)# ip policy route-map ForceRouting
```
This will make all traffic entering Router1 from network 192.168.1.0/24 to be tested by the route-map. Re-verify the routing tables in all routers. Start a capture in network 200.1.0.0/24 (between the Switch and Router 3). From PC1 ping PC2 and PC3, and Router 2's addresses 192.168.2.2 and 192.168.2.22. Analyze the captured packets and verify the correct operation of the route-map.

3. Configure another rule (access-list 102) that identifies all traffic to IP address 192.168.2.22:

```
Router1(config)# access-list 102 permit ip any host 192.168.2.22
```

Then, define another rule in route-map (with higher order of processing: **20**) that will change the next-hop (to be Router2) for the traffic defined in the access list 102 (traffic to 192.168.2.22):

```
Router1(config)# route-map ForceRouting permit 20
Router1(config-route-map)# match ip address 102
Router1(config-route-map)# set ip next-hop 200.1.0.2
```

Start a capture in network 200.1.0.0/24. From PC1 ping PC2 and PC3, and Router 2's addresses 192.168.2.2 and 192.168.2.22. Analyze the captured packets and verify if the route-map is operating as desired.

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4. Erase the last rule and define another rule in the original route-map (with lower order of processing: **5**) that will change the next-hop (to be Router2) for the traffic defined in the access list 102 (traffic to 192.168.2.22):

```
Router1(config)# no route-map ForceRouting permit 20
Router1(config)# route-map ForceRouting permit 5
Router1(config-route-map)# match ip address 102
Router1(config-route-map)# set ip next-hop 200.1.0.2
```

Start a capture in network 200.1.0.0/24. From PC1 ping PC2 and PC3, and Router 2's addresses 192.168.2.2 and 192.168.2.22. Analyze the captured packets and verify the correct operation of all rules of the route-map, based on the order of processing value of the rules.