🌐 Network Lab: VLANs, Trunking, DHCP, and Inter-VLAN Routing

📝 Lab Goals

☑ Create two VLANs:

- VLAN 10 → IT → `192.168.1.0/24`
- VLAN 20 → HR → `192.168.2.0/24`

☑ Configure two switches with the VLANs.
☑ Connect the switches via trunk link.
☑ Connect a router-on-a-stick to route between VLANs.
☑ Provide DHCP for each VLAN via the router.

🧰 Topology

- 1 Router (with `GigabitEthernet 0/0`)
- 2 Switches
- 4 PCs:
  - PC1 & PC2 → IT VLAN
  - PC3 & PC4 → HR VLAN
- Connections:
  - Router `g0/0` ↔ Switch1 `f0/5` (Trunk)
  - Switch1 `f0/24` ↔ Switch2 `f0/24` (Trunk)

🔷 Step-by-Step Configuration

🚀 1️⃣ Create VLANs on Switch1

```
bash
CopyEdit
enable
configure terminal

vlan 10
```

```
name IT
exit

vlan 20
name HR
exit
```

Assign ports to VLANs:

```
bash
CopyEdit
interface range fa0/1 - 2
switchport mode access
switchport access vlan 10
exit

interface range fa0/3 - 4
switchport mode access
switchport access vlan 20
exit
```

🚀 2️⃣ Create VLANs on Switch2

Repeat the same steps as Switch1.

🚀 3️⃣ Configure Trunk Between Switches

On **Switch1**:

```
bash
CopyEdit
interface fa0/24
switchport mode trunk
exit
```

On **Switch2**:

```
bash
CopyEdit
interface fa0/24
switchport mode trunk
exit
```

🚀 4️⃣ Configure Trunk Between Router and Switch1

On **Switch1**, the port connected to the router (e.g., `fa0/5`):

```
bash
CopyEdit
interface fa0/5
switchport mode trunk
exit
```

🚀 5️⃣ Router-on-a-Stick

On the router:

```
bash
CopyEdit
enable
configure terminal

interface g0/0
no shutdown
exit
```

Configure sub-interfaces:

```
bash
CopyEdit
interface g0/0.10
encapsulation dot1Q 10
ip address 192.168.1.1 255.255.255.0
exit

interface g0/0.20
encapsulation dot1Q 20
ip address 192.168.2.1 255.255.255.0
exit
```

🚀 6️⃣ Configure DHCP on Router

```
bash
CopyEdit
ip dhcp excluded-address 192.168.1.1 192.168.1.10
ip dhcp excluded-address 192.168.2.1 192.168.2.10

ip dhcp pool IT
network 192.168.1.0 255.255.255.0
default-router 192.168.1.1
exit

ip dhcp pool HR
network 192.168.2.0 255.255.255.0
default-router 192.168.2.1
exit
```

🧪 Testing

- Connect PCs to the correct VLAN ports.
- Verify PCs in IT get IPs from `192.168.1.0/24`.
- Verify PCs in HR get IPs from `192.168.2.0/24`.
- Ping between PCs across VLANs → should succeed.

📌 Notes

- You can use `show vlan brief` to check VLANs.
- Use `show ip dhcp binding` on router to see DHCP clients.
- Use `ping` to test connectivity.