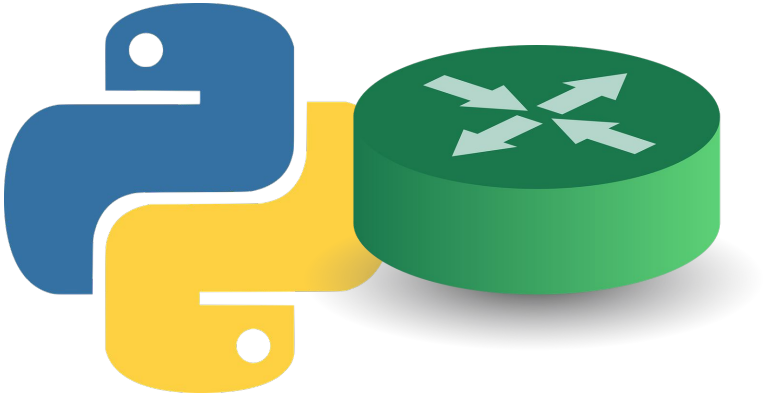


# Network Programming For Network Enginner

# My Profile

Nama = Alan Adi Prastyo (087783879960)

Karir =
1. Openstack & SDN Enginner (Btech) - 2017
2. Linux Enginner (Infinys System Indonesia) - 2017
3. Consultant Cloud & Opensources (I3) - Now

Penulis =
1. Routecloud Network
2. Technical Writer di Cloud kilat

# Agenda Kelas GLiB

- Introduction Python Programming
- Introduction Router Cisco IOS
- Introduction GNS3
- Introduction Network Programmability

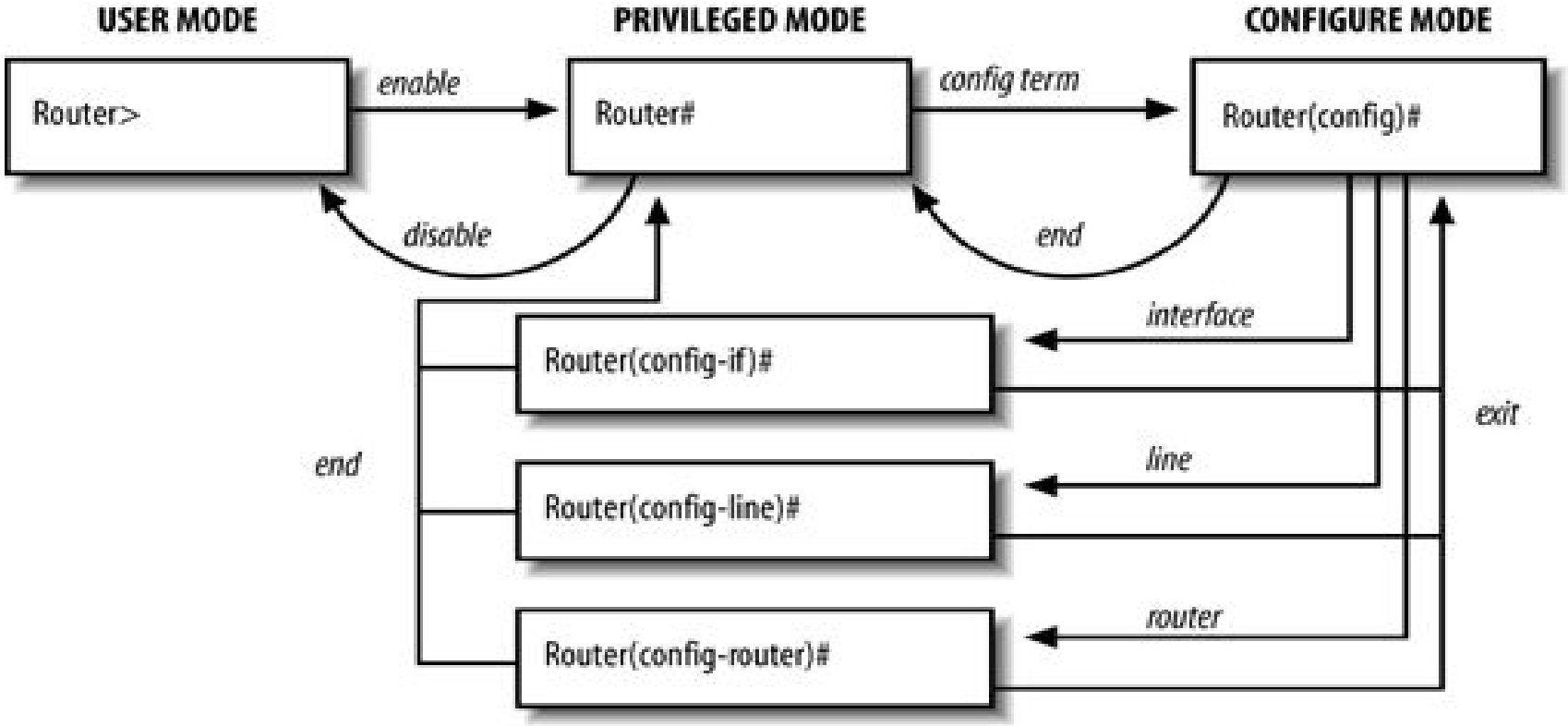
# Apa itu Python ?

**Python** is an interpreted high-level programming language for general-purpose programming. Created by Guido van Rossum and first released in 1991.

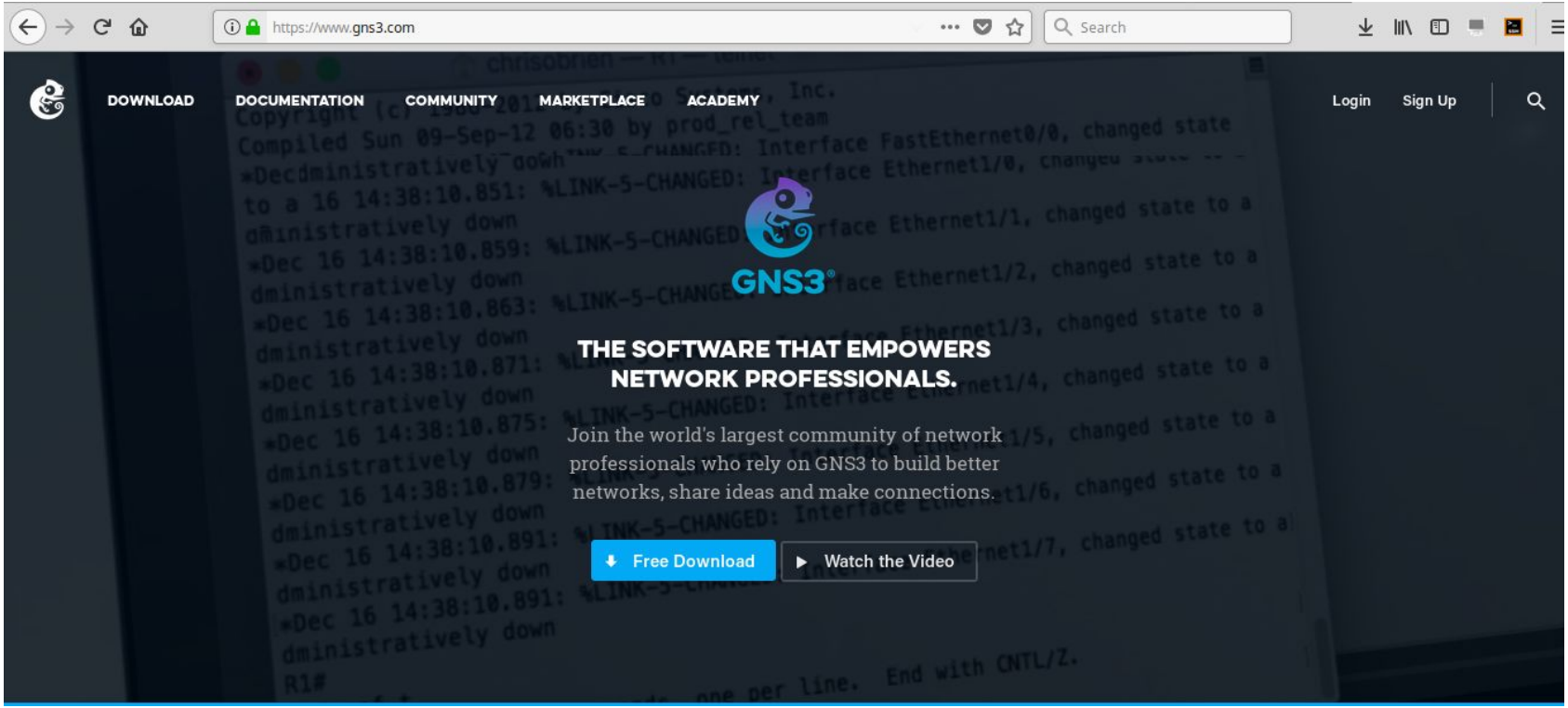
# Karakteristik Python ?

- Interpreted
- Portable
- Readable
- Object Oriented
- Extensible
- Embeddable
- Easy to learn

# Router Cisco IOS



# GNS3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# Network Programmability

Network programmability is a set of tools to deploy, manage, and troubleshoot a network device. A programmability-enabled network is driven by intelligent software that can deal with a single node or a group of nodes or even or address the network a single unified element.

# Network Programmability [2]

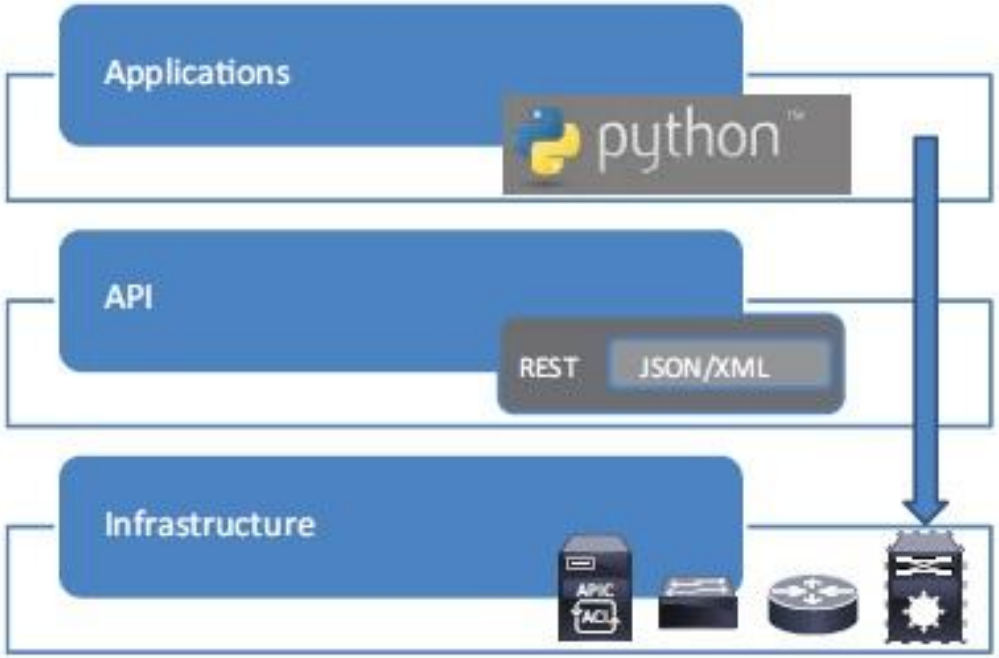



**Figure 1-2** *What is network programmability?*

# Network Programmability Benefits

- Time and money cost savings
- Customization
- Reduction of human error
- Innovation

# Network Inovation with Programmability

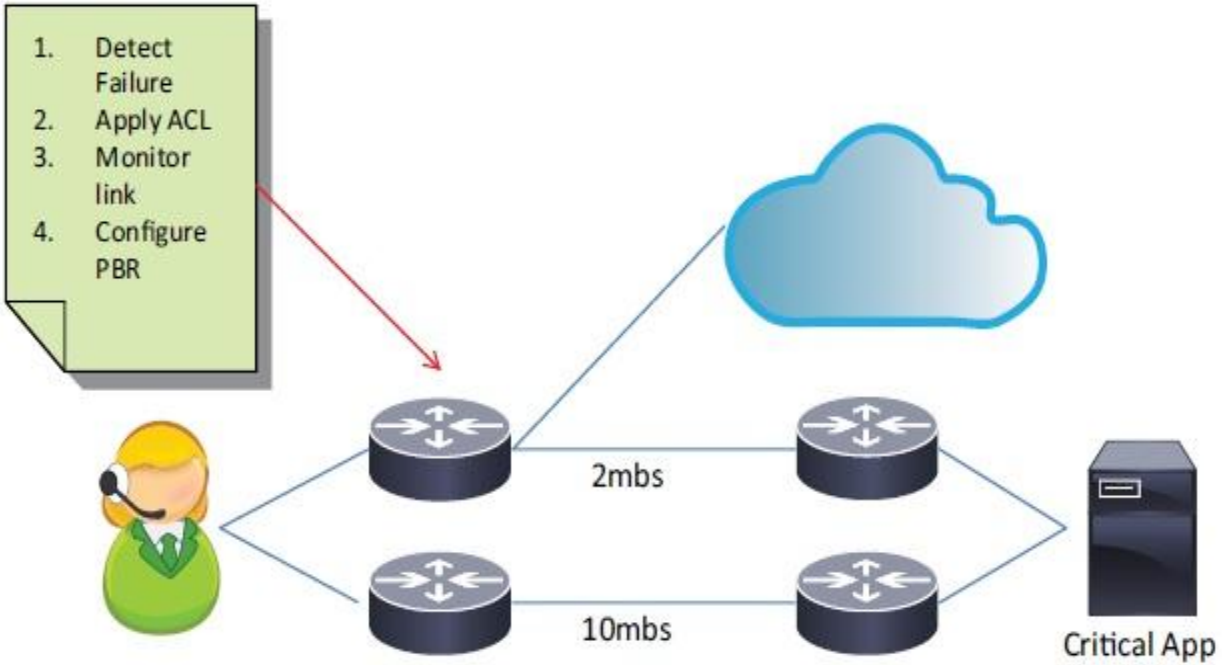



**Figure 1-3** *Network innovation during WAN failure*

# Network Inovation with Programmability [2]

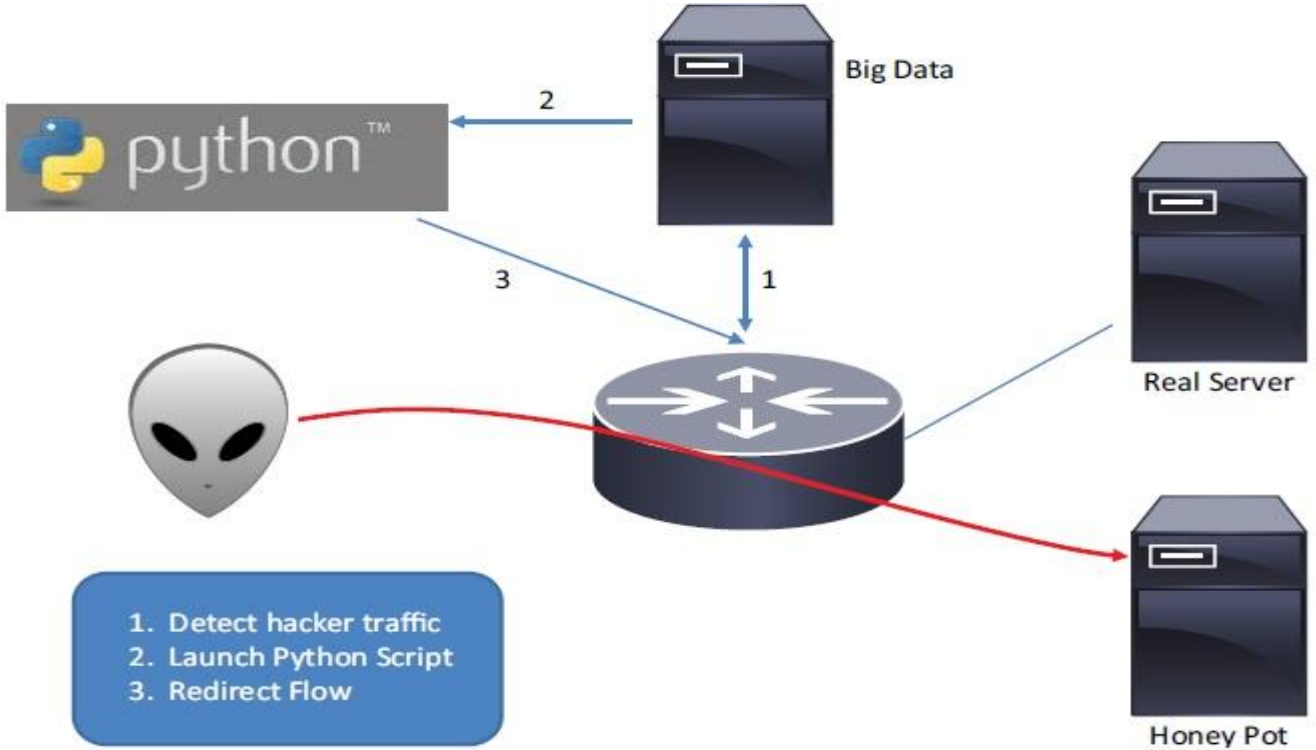



**Figure 1-4** *Combined analytics and network programmability*

# SDN ?

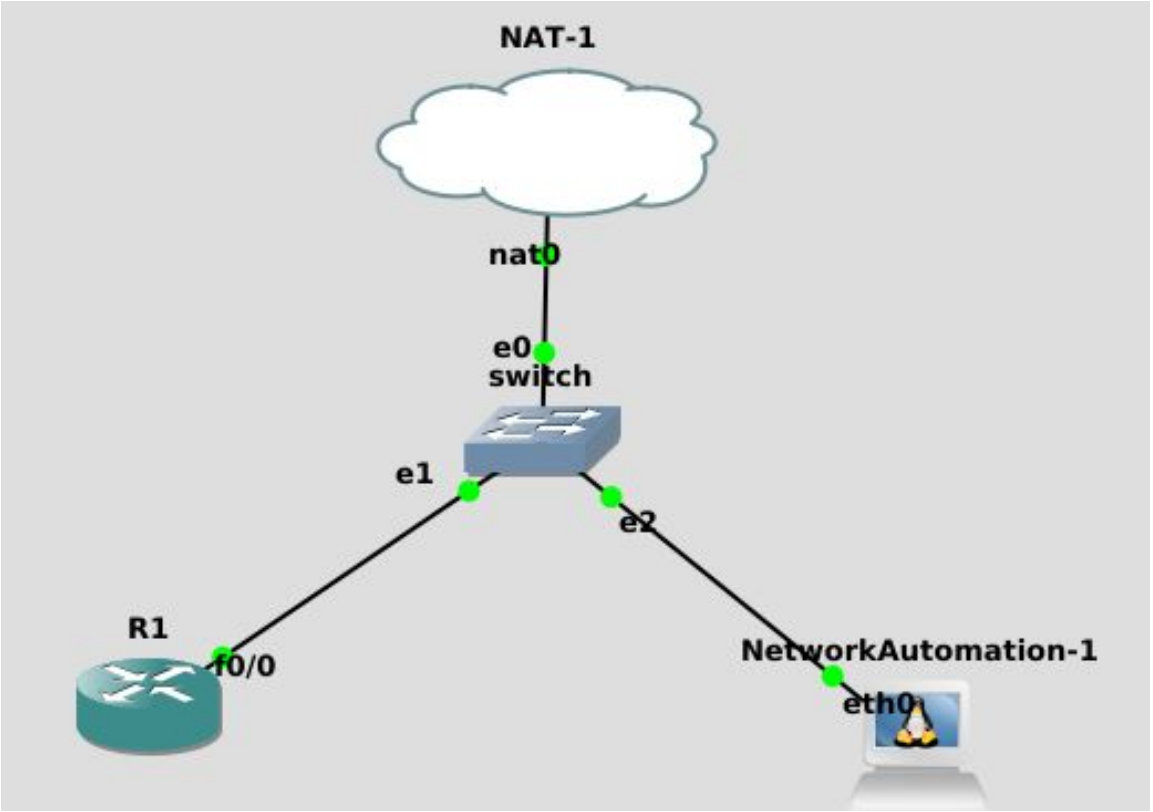
Software Defined Network (SDN) adalah istilah yang merujuk pada konsep/paradigma baru dalam mendisain, mengelola dan mengimplementasikan jaringan, terutama untuk mendukung kebutuhan dan inovasi di bidang ini yg semakin lama semakin kompleks

# Mengapa SDN ?

1. Virtualisasi dan Cloud
2. Orchestration dan Scalability
3. Programmability dan Automation
4. Visibility
5. Kinerja

# Waktunya Ngelab :)

# Topologi Lab 1 [Telnet]



# Config IP Router R1

#conf terminal
#enable password cisco
#username alan password cisco
#user alan privilege 15
#line vty 0 4
#login local
#transport input all
#int fa0/0
#no sh
#ip address 192.168.122.10 255.255.255.0
#do sh ip int br

# Install Python di Server

```
sudo apt-get update
sudo apt-get install python
sudo apt-get install build-essential libssl-dev libffi-dev
sudo apt-get install python-pip
sudo pip install cryptography
sudo pip install paramiko
sudo pip install netmiko
```

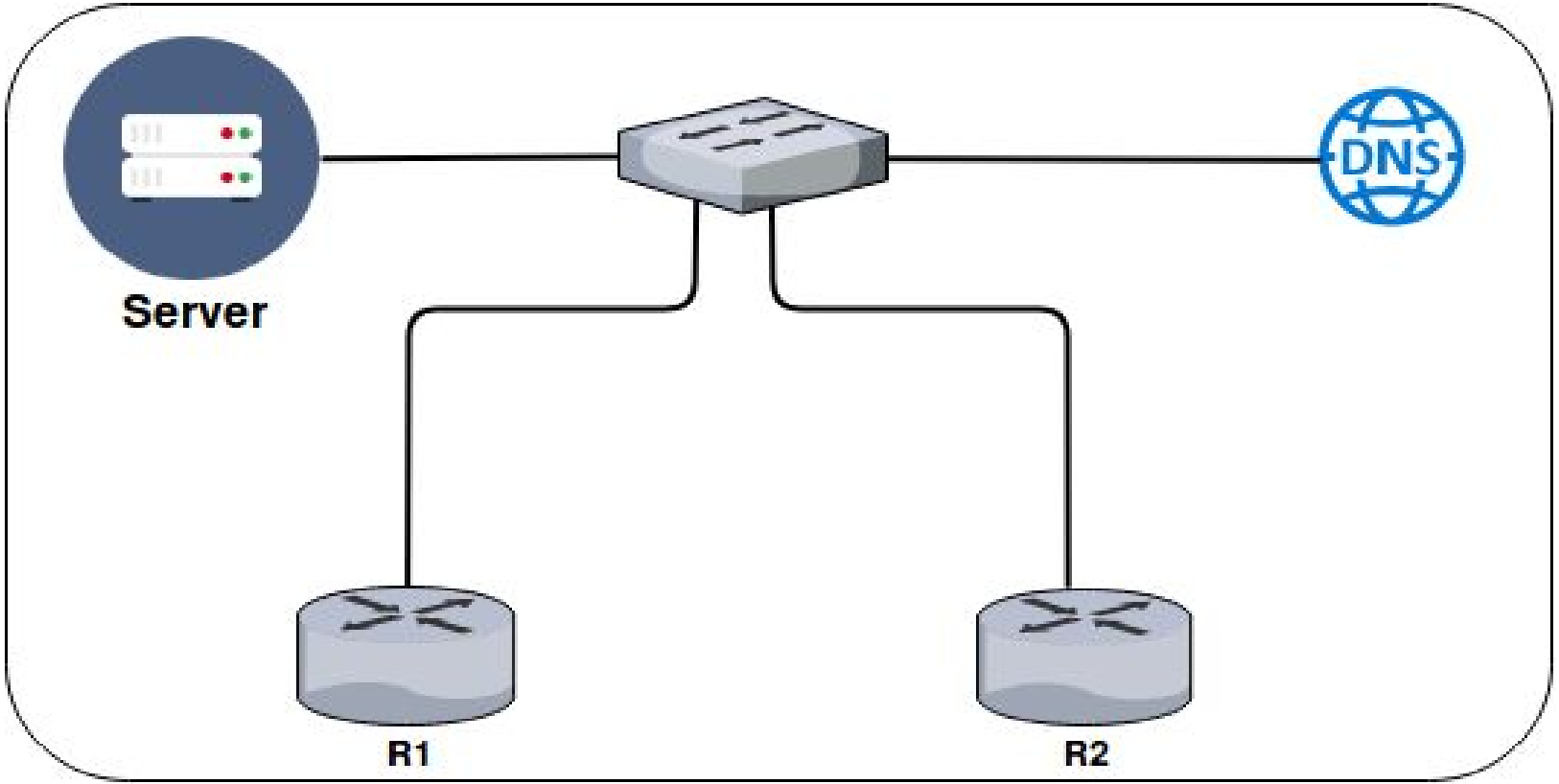
# Buat Script telnet-r1.py

```
#!/usr/bin/env python
import getpass
import sys
import telnetlib

host = "ip-address-r1"
user = raw_input("Enter your telnet username : ")
password = getpass.getpass()
tn = telnetlib.Telnet(host)
tn.read_until("Username: ")
tn.write(user + "\n")
if password:
   tn.read_until("Password: ")
   tn.write(password + "\n")
tn.write("enable\n")
tn.write("cisco\n")
tn.write("conf t\n")
tn.write("int loop 0\n")
tn.write("ip address 1.1.1.1 255.255.255.255\n")
tn.write("end\n")
tn.write("exit\n")

print tn.read_all()
```

# Buat Script Perulangan untuk R1

```
#!/usr/bin/env python

import getpass
import sys
import telnetlib

host = "192.168.122.205"
user = raw_input("Enter your telnet username : ")
password = getpass.getpass()

tn = telnetlib.Telnet(host)

tn.read_until("Username: ")
tn.write(user + "\n")

if password:
   tn.read_until("Password: ")
   tn.write(password + "\n")

tn.write("conf t\n")
#perulangan
for n in range(0,5):
      tn.write("int loop " + str(n) + "\n")
      tn.write("ip address 1.1.1." + str(n+1) + "
255.255.255.255" + "\n")


tn.write("end\n")
tn.write("exit\n")

print tn.read_all()
```

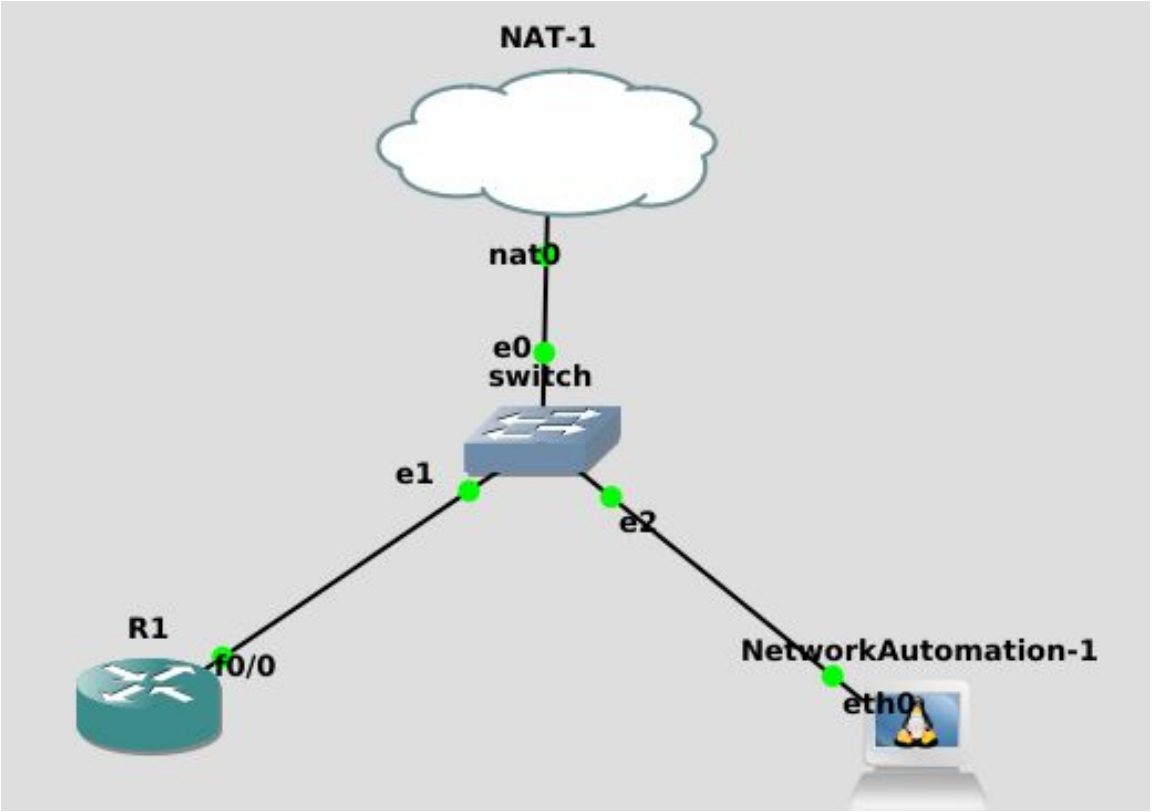
# Topologi Lab 2



# Buat Script Loop File

```
#!/usr/bin/env python

import getpass
import sys
import telnetlib

user = raw_input("Enter your telnet username : ")
password = getpass.getpass()
f = open('pool-ip.txt')

for line in f:
   print ("Configure Router ") + (line)
   host = line

   tn = telnetlib.Telnet(host)
   tn.read_until("Username: ")
   tn.write(user + "\n")
   if password:
      tn.read_until("Password: ")
      tn.write(password + "\n")

   tn.write("conf t\n")

   #perulangan
   for n in range(0,5):
      tn.write("no int loop " + str(n) + "\n")
      tn.write("ip address 1.1.1." + str(n+1) + "
   255.255.255.255" + "\n")


   tn.write("end\n")
   tn.write("exit\n")

   print tn.read_all()
```

# SSH (Paramiko & Netmiko)



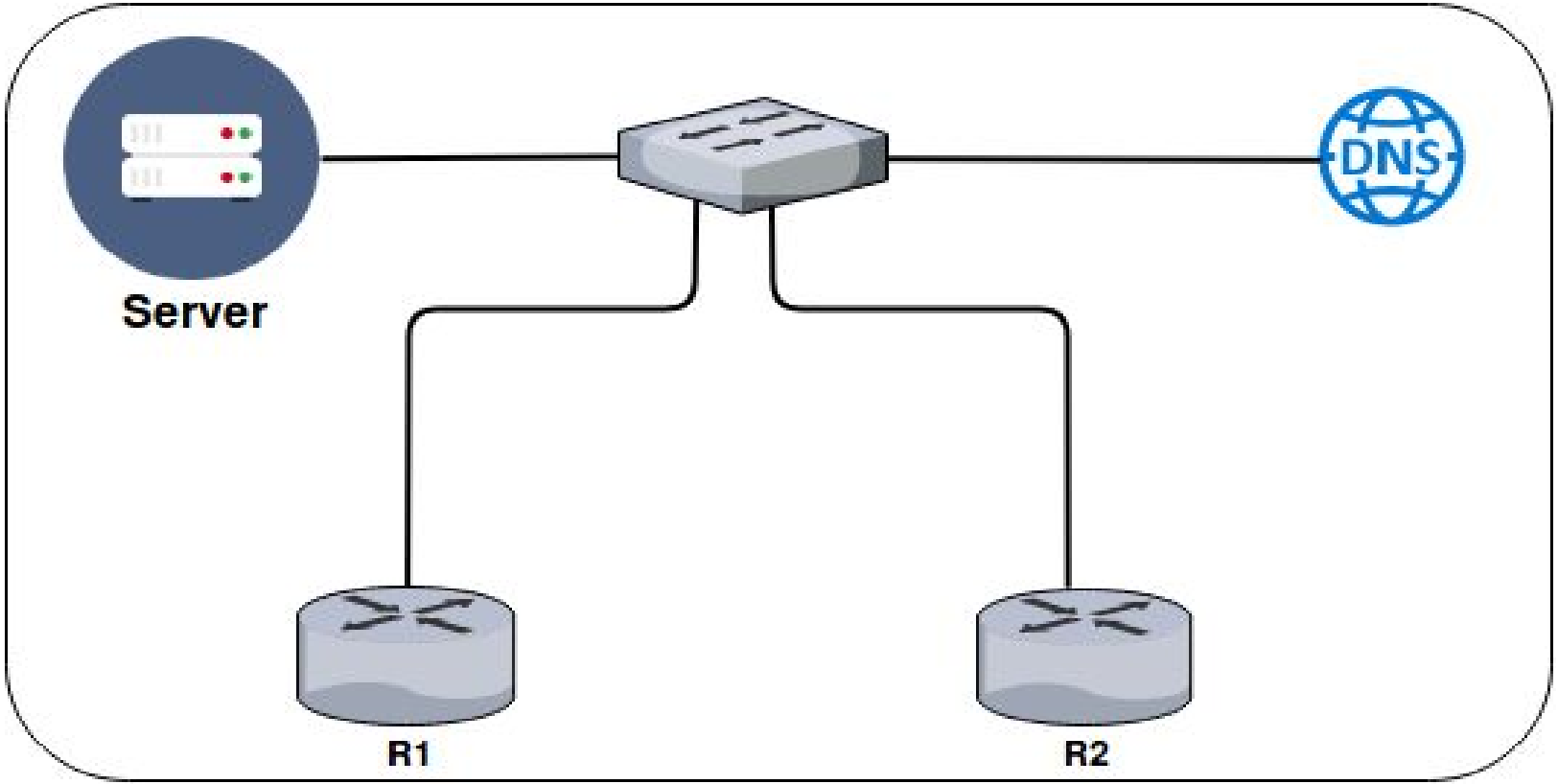
# Config SSH Router R1/R2

#conf t
#ip domain-name routecloud.net
#crypto key generate rsa
#1024

# Script Paramiko

```
import paramiko
import time

ip_address = "ip-router-1"
username = "username"
password = "password"

ssh_client = paramiko.SSHClient()
ssh_client.set_missing_host_key_policy(paramiko.AutoAddPolicy())
ssh_client.connect(hostname=ip_address,username=username,password=password)

print "Successful Connection ", ip_address

remote_connection = ssh_client.invoke_shell()

remote_connection.send("configure terminal\n")
remote_connection.send("int loop 0\n")
remote_connection.send("ip address 1.1.1.1 255.255.255.255\n")
remote_connection.send("end\n")

time.sleep(1)
output = remote_connection.recv(65535)
print output
ssh_client.close()
```

# LAB Netmiko



# Single Router => Netmiko

```
#!/usr/bin/env python

from netmiko import ConnectHandler

ios_r1 = {
   'device_type': 'cisco_ios',
   'ip': '192.168.122.205',
   'username': 'alan',
   'password': 'cisco',
}
net_connect = ConnectHandler(**ios_r1)
output = net_connect.send_command('show ip int br')
print output
```

```
config_commands = ['int loop 0', 'ip address 1.1.1.1 255.255.255.0']
output = net_connect.send_config_set(config_commands)
print output
```

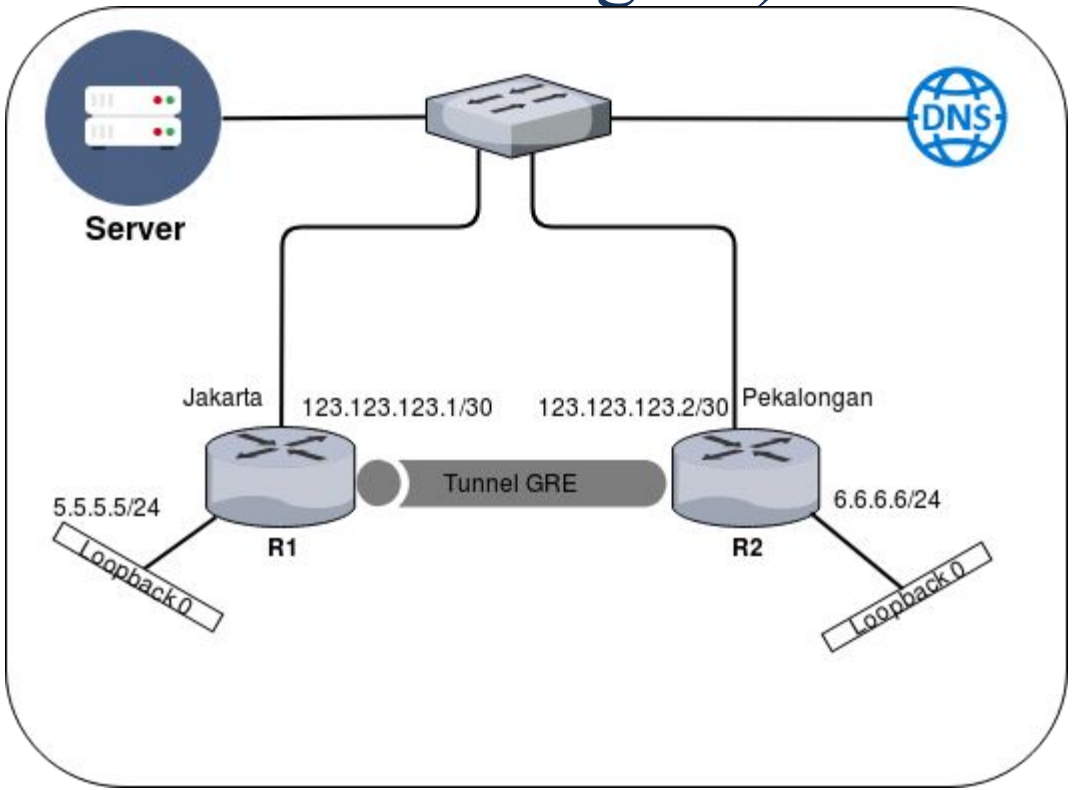
# dual Router => Netmiko

```
#!/usr/bin/env python

from netmiko import ConnectHandler
ios_r1 = {
    'device_type': 'cisco_ios',
    'ip': '192.168.122.205',
    'username': 'alan',
    'password': 'cisco',
}
ios_r2 = {
    'device_type': 'cisco_ios',
    'ip': '192.168.122.221',
    'username': 'alan',
    'password': 'cisco',
}
```

```
net_connect = ConnectHandler(**ios_r1)
config_commands = ['int fa0/1', 'ip address
10.10.10.1 255.255.255.252', 'no sh']
output =
net_connect.send_config_set(config_commands)
print output

net_connect = ConnectHandler(**ios_r2)
config_commands = ['int fa0/1', 'ip address
10.10.10.2 255.255.255.252', 'no sh']
output =
net_connect.send_config_set(config_commands)
print output
```

# Any Question ?

# Time to Challenges :)




**Note**

1. buat interface tunnel pada kedua router
2. buat interface loopback
3. setting eigrp pada kedua router

Goal :

antar interface loopback dapat terkoneksi