Network Administration HW1

zswu

Purposes

❑ The goal is to build an intranet provides several services, which may include DHCP, NAT, VPN, DNS, LDAP, Mail, WWW, etc.

❑ Know what you should know about configuring and managing of these services.

HW1 Overview

❑ Create an intranet contains several VMs
- "Router" (Required)
  - ☐ The only VM which directly connects to outside world (Internet).
  - ☐ Provides NAT and DHCP.
  - ☐ Connects to all VMs inside your intranet.
  - ☐ Connects to VPN Server and the whole 10.113.0.0/16 intranet.
- "Agent" (Provided by TA)
  - ☐ Helps TA to verify your works.
- "ClientPC" (Optional)
  - ☐ Simulates a simple PC inside your subnet.
  - ☐ Helps you verify your results.

NA Intranet Schematic Diagram
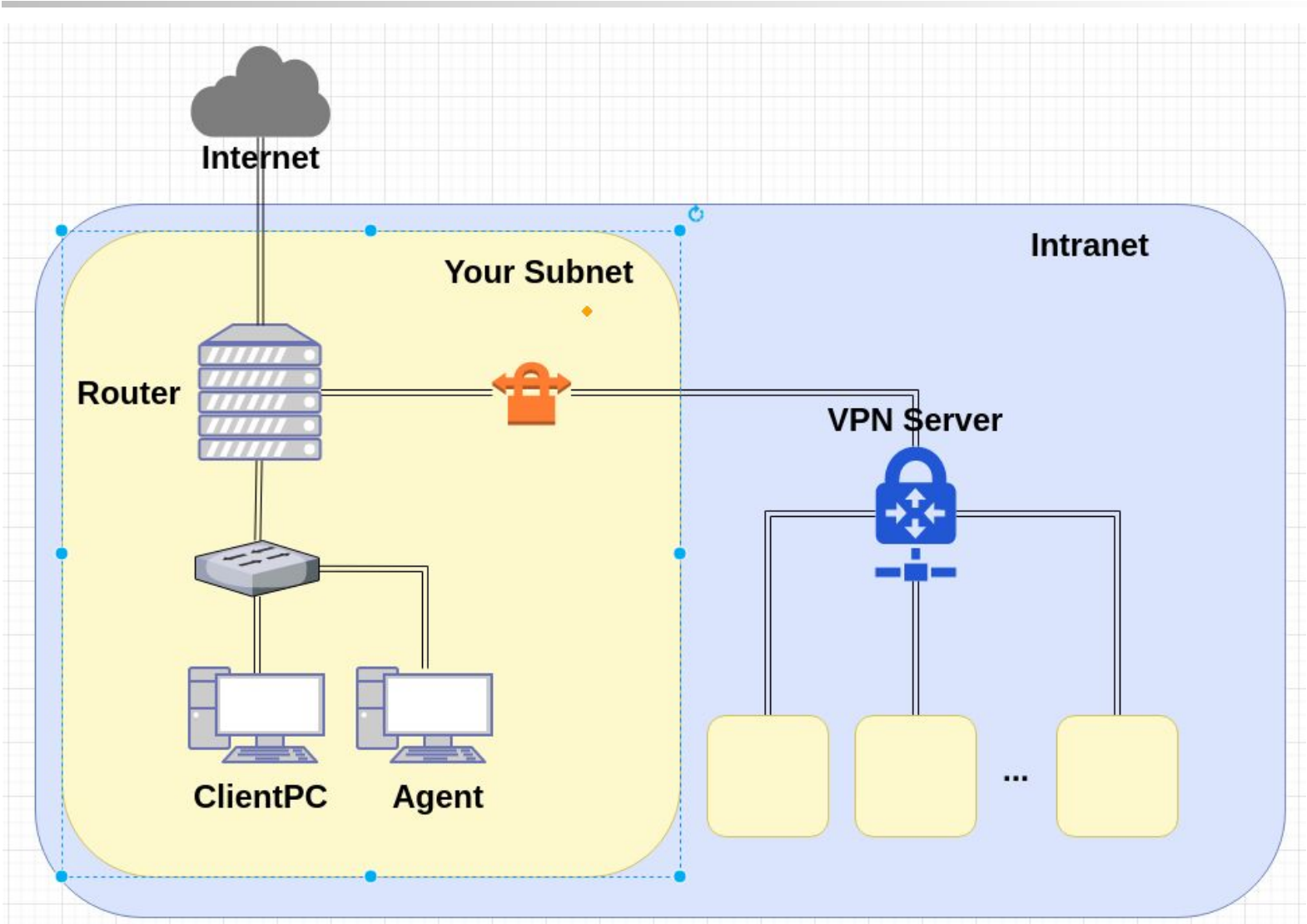
Definitions

❏ Internet
  - The ip addresses that is not in our intranet.
❏ Intranet
  - 10.113.0.0/16, a private network for you to do your homeworks.
❏ OJ
  - Online Judge System, https://nasa.nctu.me
❏ ID
  - See the profile page of OJ.
❏ Your subnet
  - 10.113.ID.0/24, a subnet of Intranet which is completely controlled by you.
❏ VPN Server
  - A wireguard server which connects subnets together.

Requirements (1/6)

❑ "Router"

- Router should have these network interfaces
  - ☐ Public : To Internet
    - Provides NAT on this interface. Packets from your subnet can go to Internet through this interface.
    - IP: Not limited.
  - ☐ Private : To your subnet (10.113.ID.0/24)
    - Provides DHCP on this interface. IP offered by DHCP should between 10.113.ID.100 and 10.113.ID.200
    - IP: 10.113.ID.254
  - ☐ Wireguard : To VPN Server and Intranet (10.113.0.0/16)
    - Connects to VPN Server.
    - Everyone in the Intranet can access your public services through this interface.
    - IP: 10.113.0.ID
- SSH service should be enabled on "Router"

Requirements (2/6)

❑ About VPN

- Wireguard (https://www.wireguard.com/)

  ◻ Try to completed HW0 if you don't know how to use Wireguard.

  ◻ You can test your work through 10.113.254.ID by connecting to VPN Server with another private key. See OJ for the details.

❑ About VM Network

- We assume that you use Virtualbox. You can choose other VM engines. However, the network structure should satisfy the requirements.

- About the network interfaces type (Virtualbox as example)

  ◻ You can use "NAT" for the public interface of "Router"; "Internal Network" for the private interface of "Router".

  ◻ For other VMs, you should only assign an interface with the type of "Internal Network". That is, all the network traffics from these VMs should go through the private interface of "Router".

Requirements (3/6)

❑ About OS
- Any UNIX-like OS is accepted. However, those services required by homeworks should be provided by your chosen OS.
  - CentOS, Archlinux, Ubuntu and FreeBSD should be fine
  - The OS of each VM need not to be the same.

Requirements (4/6)

❑ "Agent"

- **TA will provide the OVA for you, don't install this VM by yourself.**

- "Agent" should have an only network interface, which is connected to the private interface of "Router"

- "Agent" will try to get IP by DHCP. Configure your DHCP server to assign the IP of 10.113.ID.129 to it.

- Judge may SSH into "Agent" to test your network configuration.

Requirements (5/6)

❑ Routing

- All traffic from and to your subnet should go through "Router".
- Traffic to Internet go through the public interface of "Router" and should be NAT wrapped.
- Traffic to Intranet go through the VPN interface of "Router" and should not be NAT wrapped.
- Traffic to your subnet go through the private interface of "Router" and then go to its destination.

Requirements (6/6)

❑ Firewall
- Imagine that you are providing services to the Internet, so several firewall configurations must be taken for security.
- We suggest you to configure firewall rules on "Router".
- Rules:
  - ❑ By default, all connections from outside (include Intranet) to your subnet should be rejected.
  - ❑ By default, all services only trust the connections from your subnet (For example, you cannot SSH to "Router" from your test IP (10.113.254.ID) directly. Therefore, you may need to create a VM to help you "jump" into your subnet.)
  - ❑ SSH connections from anywhere to "Agent" are allowed.
  - ❑ ICMP connections from anywhere to anywhere are allowed.

Debugging

❑ "ClientPC" (Optional)
- A VM in your subnet for debugging.
- OS is not limited. GUI should be fine if you need it.

❑ Test IP (10.113.254.ID)
- With a different Wireguard private key, you can connect to Intranet with a test IP. This may help you debugging the firewall configurations or testing something cannot be tested from your subnet.

Hint

❑ How to check Internet is connected ?

- Ping 8.8.8.8 from different VMs.
- Ping www.google.com from different VMs.

❑ How to check Wireguard is connected ?

- Ping nasa.nctu.me (VPN server)
- Ping 10.113.0.254 (Intranet gateway)
- Ping from / to your test IP.
- **Try to copy your private key through SSH instead of type it by hand**.

DEMO

❑ Your works will be tested by our online judge system
- Submit a judge request when you are ready.
- You can submit multiple times. However, **the score of the last submission instead of the submission with the highest score,** will be taken.
- **Late submissions are not accepted**.
- Please check your score at OJ after judge completed.
- Rate-limit: 60 minutes cool-down

❑ Scoring start at : 2020/4/9 00:00

- You can test your works once the judge is prepared. However, **make sure to submit at least once after this time**, otherwise no score will be taken.

❑ Deadline: 2020/4/16 23:59

Help!

❑ https://groups.google.com/forum/#!forum/nctunasa

- You may send email to ta@nasa.cs.nctu.edu.tw for these reasons:
    - ❑ You got a weird result from OJ.
    - ❑ You have some personal issues that don't want to post to public.
    - ❑ You are in a special situation that need to contact us.
    - ❑ Your question is not "May I ask TAs a question?"
- Try to use the google groups first. We regret that we may not be able to reply every email. Thank you for understanding.
- How To Ask Questions The Smart Way
    - ❑ http://www.catb.org/~esr/faqs/smart-questions.html
      https://github.com/ryanhanwu/How-To-Ask-Questions-The-Smart-Way

❑ Office Hours:
- 3GH, EC 3F CSCC