# Network Administration HW2

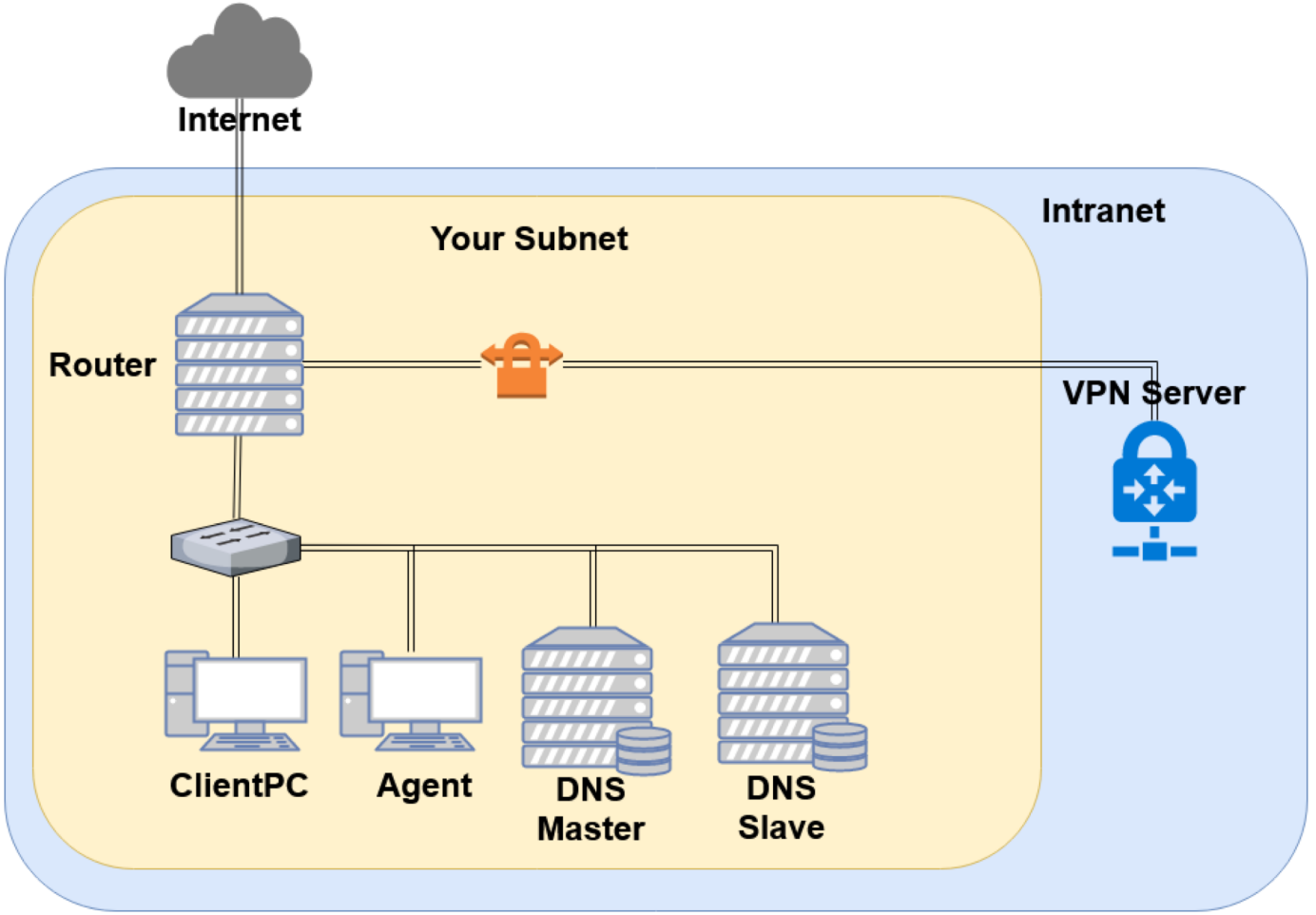
yca

# Part 1: DNS

# Purpose

- Knowing the basic usage of DNS.
- Knowing the basic configuration of BIND.

# Overview - DNS



# Overview (Cont.)

- Use "{student_ID}.nasa." as your domain name.
- ns1.{student_ID}.nasa.
  - IP: 10.113.ID.1
  - Master zone
    - {student_ID}.nasa.
- ns2.{student_ID}.nasa.
  - IP: 10.113.ID.2
  - Slave zone
    - {student_ID}.nasa.

# Requirements

- Setup a DNS servers with BIND.
  - ns1.{student_ID}.nasa.
  - Serve your own domain.
    - {student_ID}.nasa.
  - Be able to query from the intranet. (10.113.x.x/16)
- Setup another DNS server with BIND
  - ns2.{student_ID}.nasa.
  - Slave zone for "{student_ID}.nasa." synchronized from ns1.
  - Updates should be synchronized
    - SOA must have same Serial number
- Properly query for "{other_student_ID}.nasa.".
- Security
  - Only allow zone transfer from Slave and Agent.
  - No open recursion.

# Requirements (Cont.)

- Add A record for the machines.
  - router
  - ns1 (DNS Master)
  - ns2 (DNS Slave)
  - agent (Agent)
- Add CNAME record
  - nasa => nasa.cs.nctu.edu.tw.
  - web => agent
- Confuse your BIND version number.
  - `$ dig version.bind txt chaos @server`
  - For ns1, use "Name Server 1".
  - For ns2, use "Name Server 2".
  - Only allow queries from your internal network.

# Requirements (Cont.)

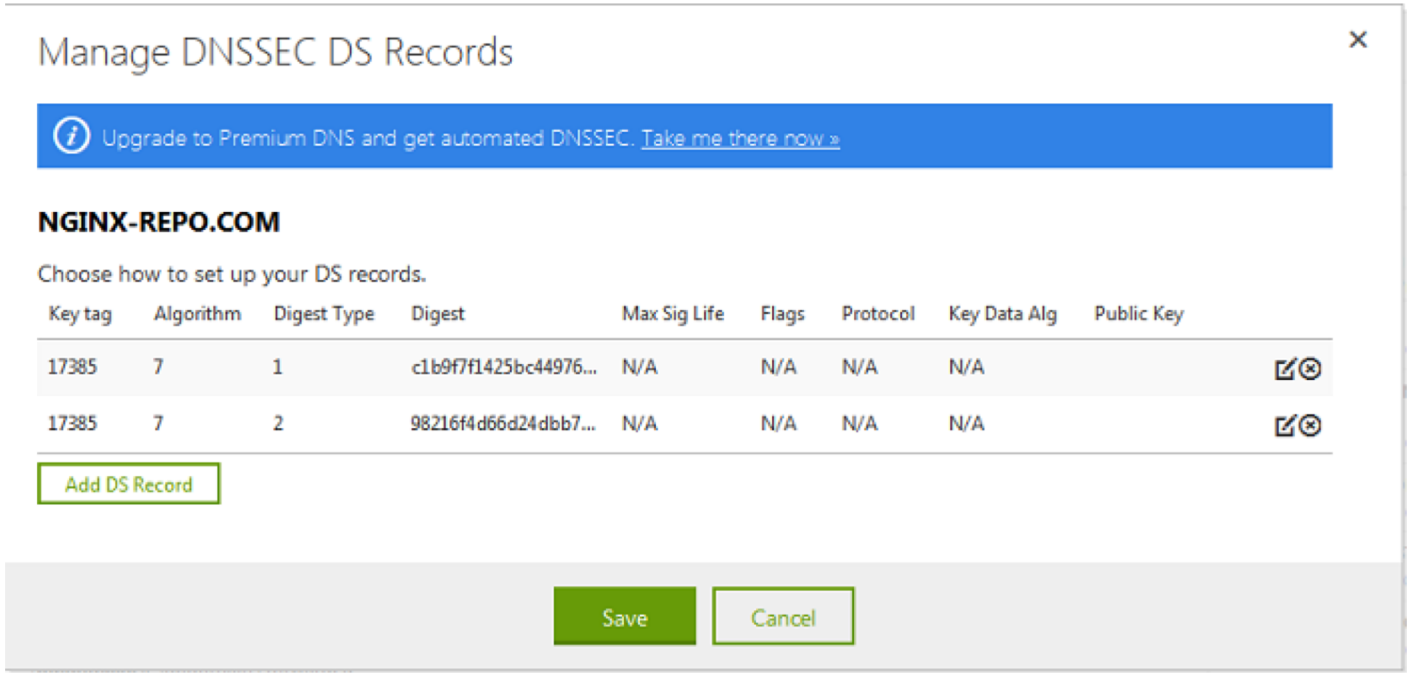
- VIEW
  - Add A record for view.{your_domain}.
    - For queries from 10.113.1.x/25
      - Answer 140.113.235.131
    - For queries from 10.113.ID.x/24
      - Answer 140.113.235.151
    - For other queries
      - Answer 10.113.ID.87
  - You have to set up VIEW for both the master and the slave server.
    - Is there any elegant way to do it?

# Requirements (Cont.)

- Allow reverse lookup from the intranet.
  - The answers should be forward-confirmed.
  - Return NXDOMAIN if there is no corresponding A record.
- Add SSHFP record of your machines' ssh key fingerprint.
  - For the following machines
    - router
    - ns1 (DNS Master)
    - ns2 (DNS Slave)
    - agent (agent)
  - The algorithm ECDSA and ED25519 should be implement.
  - The hash type SHA-256 should be implement.

# Requirements (Cont.)

- DNSSEC
  - Normally, after you registered a domain name and set up a DNS to serve the subdomain. If you want DNSSEC to secure your records, it's necessary to publish the DS record to the nameserver of the top-level domain.



# Requirements (Cont.)

- DNSSEC
  - nasa. → {student_ID}.nasa.
    - In this scenario we are serving a private TLD which is not delegated from root DNS server, thus the trust chain from root will be broken.
  - You need to manage the DS record on https://nasa.nctu.me/ for the DNSSEC.
    - It has a 1-day cooldown on the OJ.
  - You must use NSEC3 to implement it.
  - Tool for you to check the trust chain.
    - https://github.com/dnsviz/dnsviz
- DHCP
  - Set nameserver to your internal DNS.
  - Set search domain to your domain.

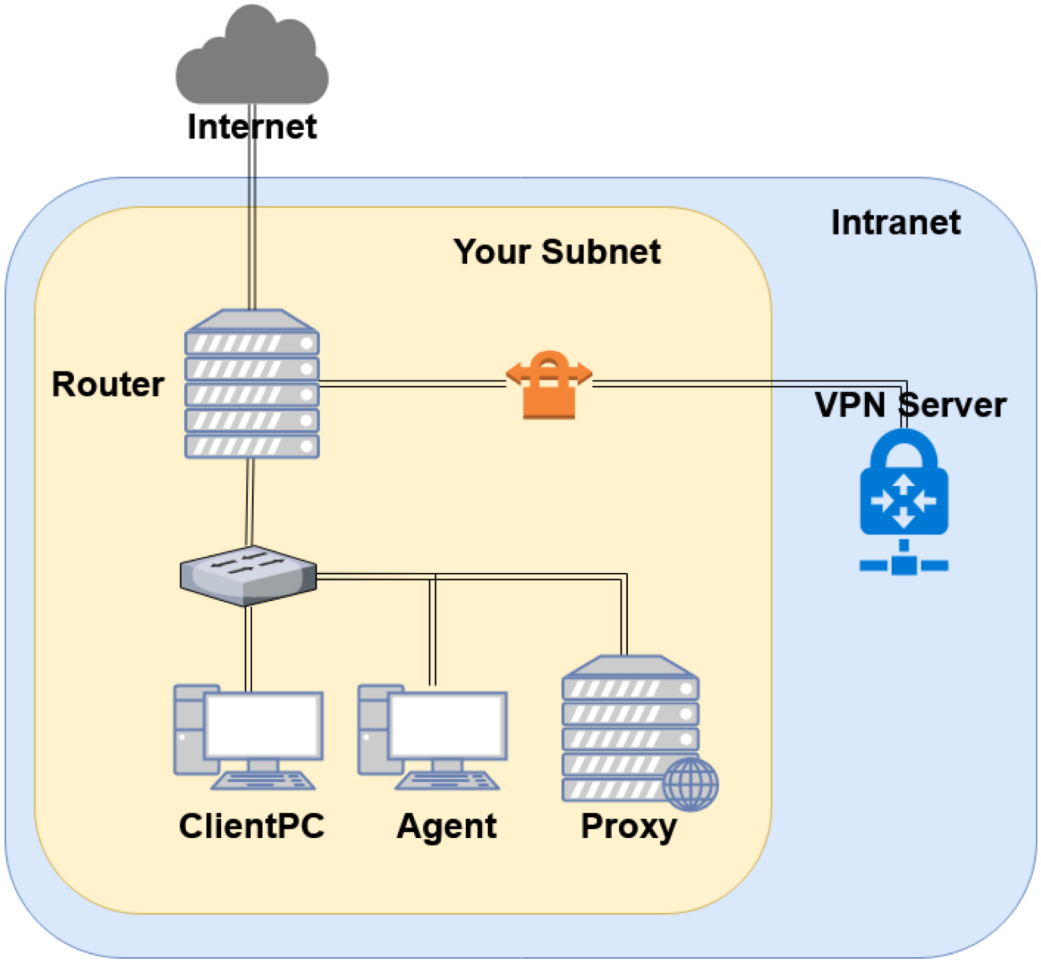
# Part 2. Server Load Balancer

# Purpose

- Knowing the basic usage of a load balancer.
- Knowing the basic concept of the reverse proxy.

# Overview - Server Load Balancer

- You may have several service on one machine.



# Requirements

- You have to re-deploy your "Agent" by downloading the new file from OJ.
- Reverse proxy
  - Make a reverse proxy under http://$yourdomain/reverse/
    - Round-robin
      - 10.113.ID.129:8001
      - 10.113.ID.129:8002
  - Make a reverse proxy under http://$yourdomain/ip/
    - 10.113.ID.129:8003
    - Pass non-standard HTTP headers to the backend.
      - "X-Forwarded-For"
      - "X-Real-IP": The real client IP.

# Requirements (Cont.)

- Prevent DDoS
  - Set timeout of HTTP request to be 5 seconds.
  - Each user can only have 10 connections opened.
  - Each user can only have 30 connections opened within 10 seconds.
  - If a user send over 20 HTTP requests within 5 seconds, then blacklist the user's IP.
    - Return 403 for any new request from this user.
    - Refuse any new connection from this user.
    - Until 10 seconds after they stop sending requests and establishing connections.

# Part 3: Firewall

- You have to properly adjust your firewall rules to let the new services in this homework run correctly.
- Recall the 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.
  - SSH connections from anywhere to “Agent” are allowed.
  - ICMP connections from anywhere to anywhere are allowed.
- You won’t get any points for this part, but you will get some points down for the incorrect firewall setting.

# DEMO

- Your work will be tested by our online judge system
  - Submit a judge request when you are ready.
  - You can submit request 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 : 2020/4/29 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: 2020/5/7 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 get a weird result from OJ.
    - You have some personal issues that don't want to post to the public.
    - You are in a special situation that needs 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