Homework 2
Network Administration

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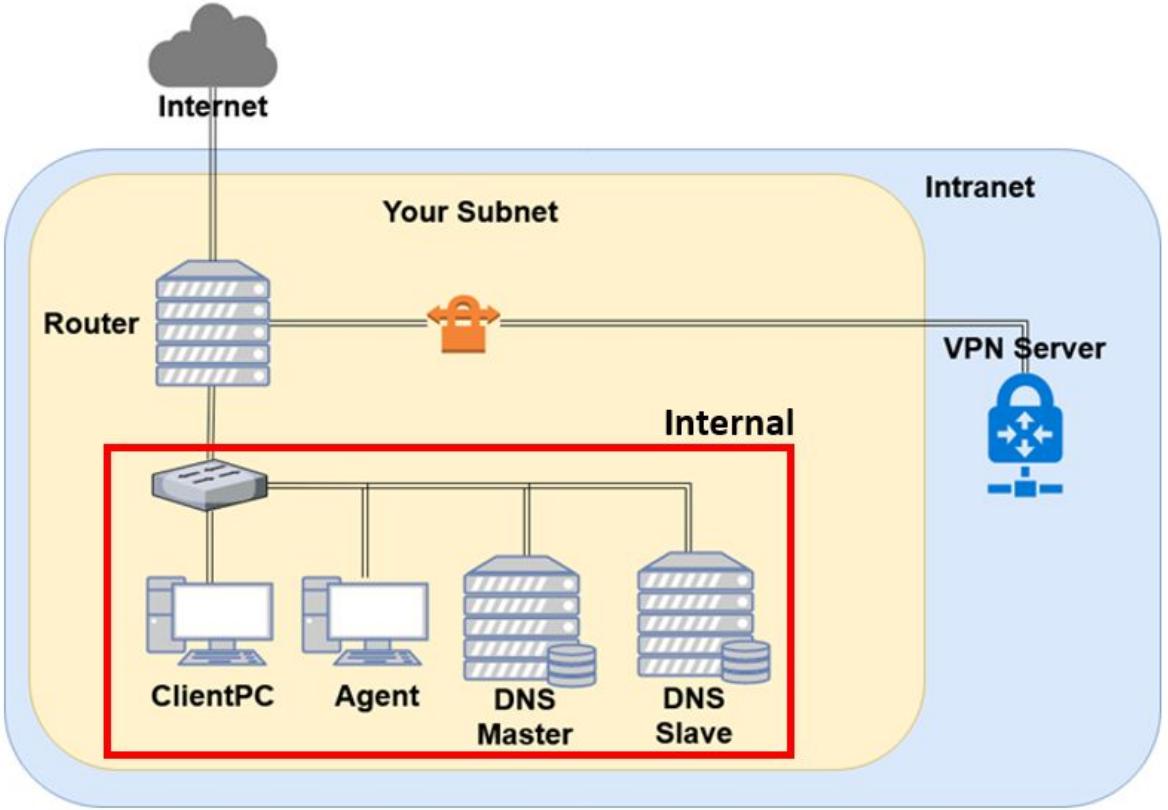
DNS

Purpose

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

Overview - DNS



Overview (Cont.)

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

Requirements (1/6)

- Setup a DNS servers with BIND.
  - ns1.{ID}.nasa.
  - Serve your own domain.
    - {ID}.nasa.
  - Be able to query from the intranet. (10.113.0.0/16)
- Setup another DNS server with BIND
  - ns2.{ID}.nasa.
  - Slave zone for "{ID}.nasa." synchronized from ns1.
  - Updates should be synchronized
    - SOA must have same Serial number

Requirements (2/6)

- DHCP
  - You have to configure the DHCP server to suggest the clients to use your internal DNS as the primary DNS.
  - Set nameserver to your internal DNS.
  - Set search domain to your domain.
- Properly query for "{ID}.nasa.".
- Security
  - Only allow zone transfer from Slave and Agent.
  - Only allow recursion from Agent.

Requirements (3/6)

- Add A records for the machines.
  - router
  - ns1 (DNS Master)
  - ns2 (DNS Slave)
  - agent (Agent)
- Add CNAME records
  - 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 (4/6)

- VIEW
  - Add A record for view.{your_domain}.
    - For queries from 10.113.13.x/24
      - 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 servers.

Requirements (5/6)

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

Requirements (6/6)

- DNSSEC
  - nasa. → {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.nycucs.org/ for the DNSSEC.
    - It has a 1-day cooldown on the OJ.
  - You must use NSEC3 to implement it.

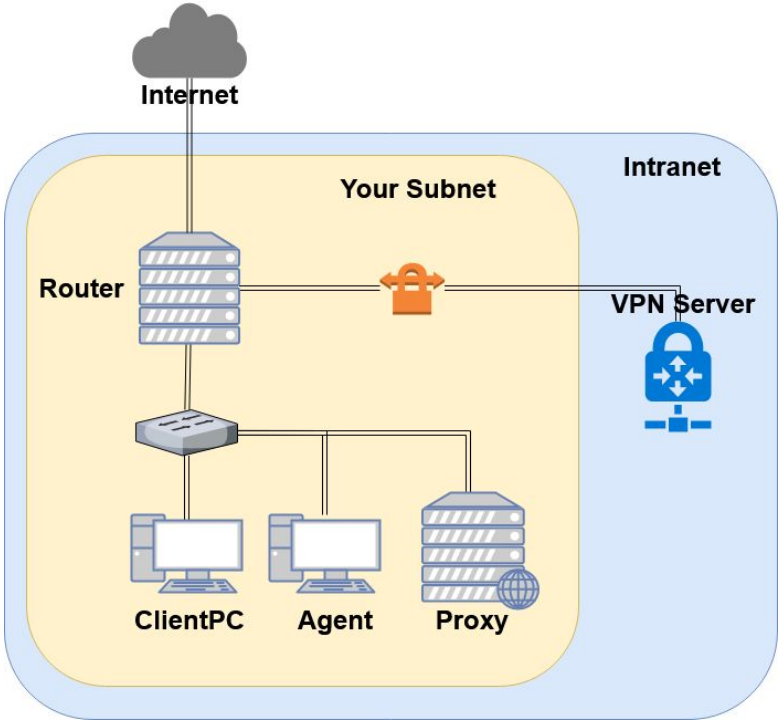
Server Load Balancer

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 (Link here).
- Reverse proxy
  - Make a reverse proxy under http://$yourdomain/reverse/
    - Round-robin
      - 10.113.ID.123:8001
      - 10.113.ID.123:8002
  - Make a reverse proxy under http://$yourdomain/ip/
    - 10.113.ID.123:8003
    - Pass non-standard HTTP headers to the backend.
      - "X-Forwarded-For"
      - "X-Real-IP": The real client IP.

Necessary Condition of 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 allow the connections from your subnet.
    - SSH connections from anywhere to "Agent" are allowed.
    - ICMP connections from anywhere to anywhere are allowed.
  - New rules.
    - SSH connections from "Agent" to 10.113.13.123 and 10.113.14.123 are allowed.
    - All connections from "Router" to your proxy server is allowed.
  - You won't get any points for this part, but you will lose some points for incorrect firewall settings.

Submission

- 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.
- Scoring start at : 2020/4/02 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 counted.
- Deadline: 2020/4/16 00:00

Help

- TA office hours: W78 (15:30~17:20 Wed.) at EC 324 (PC Lab).
  - We do not allow walk-ins except TA office hours or e-mail appointments.
- Questions about this homework.
  1. Make sure you have studied through lecture slides and the HW spec.
  2. Clarify your problems and search it to find out solutions first.
  3. Ask them on https://groups.google.com/g/nctunasa .
     - Be sure to include all the information you think others would need.

Good Luck!