



JungWoo Univ

서버 운영체제 교체 보고

(Linux)

2024.06.11

Network team
김진환



Contents

01	_____	추진 개요
02	_____	세부 계획
03	_____	Web
04	_____	DNS
05	_____	Intranet
06	_____	DHCP
07	_____	FTP
08	_____	Email
09	_____	Firewalld

01 추진 개요

개요

- ◆ 추진 시기 : 2024. 7 ~ 8월
- ◆ 추진 사유 : 내부 서버의 안정적인 운영 및 정보보안 취약점 해결
- ◆ 구매 품목 : OS(Red Hat Enterprise Linux for SAP Solutions, Premium (Physical or Virtual Nodes))
- ◆ 구매 방법 : 수의계약
- ◆ 소요 예산 : 15,900천원

추진 방향

- ◆ 메인 홈페이지 및 인트라넷 홈페이지의 안정적인 운영
- ◆ 홈페이지 접속 장애 방지 및 학생 접근성 확보
- ◆ 최신버전의 OS 설치로 정보보안 취약점 해결

02 세부 계획

세부 계획

- ◆ 교체 시기 : 2024. 7 ~ 8월 (방학기간 중)
- ◆ 사전 홍보 : OS 교체작업 중, 홈페이지 접속 중단 안내
- ◆ 홍보 방법 : 홈페이지 메인 화면에 팝업창 개시
전 학생회에 안내 공문 발송
- ◆ 구축 장소 : 정우대학교 전산정보원 1층 서버실
- ◆ 구축 내용 : 내부 서버 운영체제 교체
(Windows 2012 ->
Red Hat Enterprise Linux)

문제점

- ◆ 내구연한 경과에 따른 서버 노후화로 서비스 품질 및 안정성 저하 (서버 내구연한 : 6년)
- ◆ 2024년 9월, 마이크로소프트사에서 'Windows 2012'에 대한 지원 중단 > 현재 사용중인 OS의 보안업데이트를 제공하지 않아 시스템 보안 취약

기대효과

- ◆ 서버 노후화에 따른 홈페이지 DB 유실 방지
- ◆ 최신 OS 설치 및 정기적인 업데이트로 보안 취약점 해결



03 Web (apache)

```
[root@Server3 /etc]# rpm -qa | egrep '^httpd|^mod_ssl'
httpd-tools-2.4.57-8.el9.x86_64
httpd-filesystem-2.4.57-8.el9.noarch
httpd-core-2.4.57-8.el9.x86_64
httpd-2.4.57-8.el9.x86_64
mod_ssl-2.4.57-8.el9.x86_64
[root@Server3 /etc]#
```

Apache, Apache HTTPS 패키지 설치

```
[root@Server3 /etc]# systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; vendor preset: enabled)
   Active: active (running) since Tue 2024-06-11 15:00:00 KST; 1min ago
     Docs: man:httpd.service(8)
   Main PID: 1099 (/usr/sbin/httpd)
    Status: "Total requests: 0; Idle/Busy workers: 0/0"
     Tasks: 177 (limit: 10756)
    Memory: 11.2M
       CPU: 15.721s
    CGroup: /system.slice/httpd.service
            └─1099 /usr/sbin/httpd -DFOREGROUND
               1621 /usr/sbin/httpd -DFOREGROUND
               1622 /usr/sbin/httpd -DFOREGROUND
               1623 /usr/sbin/httpd -DFOREGROUND
               1624 /usr/sbin/httpd -DFOREGROUND
```

```
fcbe 0 0 :::443 :::* LISTEN *
fcbe 0 0 :::80 :::* LISTEN *
[100f@261.1613 \6fc\pfffbq]# ufcf9f -ufjb | 81eb pfffbq
```

http 상태 확인

```
[root@Server3 /etc/httpd]# tree -L 2
.
├── conf
│   ├── httpd.conf
│   └── magic
├── conf.d
│   ├── README
│   ├── autoindex.conf
│   ├── perl.conf
│   ├── ssl.conf
│   ├── userdir.conf
│   ├── vhost.conf
│   └── welcome.conf
├── conf.modules.d
│   ├── 00-base.conf
│   ├── 00-brotli.conf
│   ├── 00-dav.conf
│   ├── 00-lua.conf
│   ├── 00-mpm.conf
│   ├── 00-optional.conf
│   ├── 00-proxy.conf
│   ├── 00-ssl.conf
│   ├── 00-systemd.conf
│   ├── 01-cgi.conf
│   ├── 02-perl.conf
│   ├── 10-h2.conf
│   ├── 10-proxy_h2.conf
│   └── README
├── logs -> ../../var/log/httpd
├── modules -> ../../usr/lib64/httpd/modules
├── run -> /run/httpd
└── state -> ../../var/lib/httpd
```

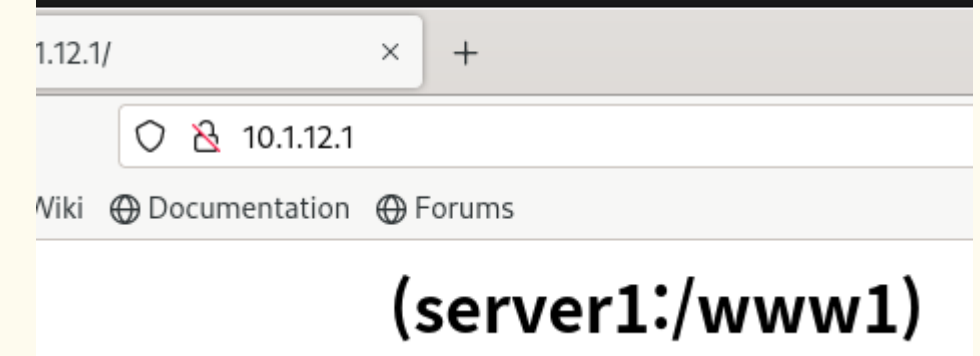
Apache 웹 서버 관련 디렉토리 구조

```
91 ServerAdmin root@JungwooUniv.com
92
93 #
94 # ServerName gives the name and port that the server uses to identify itself
95 # This can often be determined automatically, but we recommend you
96 # explicitly to prevent problems during startup.
97 #
98 # If your host doesn't have a registered DNS name, enter its IP address here.
99 #
100 ServerName www.JungwooUniv.com:80
```

```
356 #
357 # Load config files in the "/etc/httpd/conf.d" directory, which must exist!
358 IncludeOptional conf.d/*.conf
```

/etc/httpd/conf/httpd.conf 파일과
Include 옵션을 통한 conf.d/*.conf 파일을
참고하는 웹 서버 구성

```
[root@Client1 /root]# firefox http://10.1.12.1 &
[1] 5157
[root@Client1 /root]#
```



Test 웹페이지 연결 확인



04 DNS (1/2)

```
[root@Server3 /etc/httpd/conf]# rpm -qa bind
bind-9.16.23-15.el9.x86_64
```

Bind 패키지 설치

```
[root@Server3 /etc/httpd/conf]# systemctl status named
● named.service - Berkeley Internet Name Domain (DNS)
   Loaded: loaded (/usr/lib/systemd/system/named.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2024-06-11 09:44:34 KST; 1min 45s ago
     Process: 972 ExecStartPre=/bin/bash -c if [ ! "$DISABLE_ZONE" ]; then systemctl stop named; fi; && /usr/sbin/named -u named -c /etc/named.conf -o /etc/named.conf --fork --background & (code=0)
     Process: 1091 ExecStart=/usr/sbin/named -u named -c /etc/named.conf -o /etc/named.conf --fork --background & (code=0)
    Main PID: 1092 (named)
       Tasks: 8 (limit: 10756)
      Memory: 28.1M
         CPU: 21.712s
        CGroup: /system.slice/named.service
               └─1092 /usr/sbin/named -u named -c /etc/named.conf
```

named 상태 확인

```
named.conf (/etc) - VIM
//
options {
    listen-on port 53 { any; };
    #listen-on-v6 port 53 { ::1; };
    directory "/var/named";
    dump-file "/var/named/data/cache_dump.db";
    statistics-file "/var/named/data/named_stats.txt";
    memstatistics-file "/var/named/data/named_mem_stats.txt";
    secroots-file "/var/named/data/named.secroots";
    recursing-file "/var/named/data/named.recursing";
    allow-query { any; };
    forwarders { 168.126.63.1; };
}
```

named.conf 파일을 통한 기본 DNS 설정

```
include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";
```

Include 옵션을 통한 추가환경설정파일

```
47 zone "JungwooUniv.com" IN {
48     type master;
49     file "JungwooUniv.com.zone";
50     allow-update { none; };
51 };
52
53 zone "1.10.in-addr.arpa" IN {
54     type master;
55     file "10.1.rev";
56     allow-update { none; };
57 };
"/etc/named.rfc1912.zones" 57L, 1227B
```

/etc/named.rfc1912.zones 파일에 정방향&역방향 선언 및 파일 지정

```
Server3 /var/named]# ls -l
total 24
-r-----. 1 root named 483 2024-06-07 16:21 10.1.rev
-r-----. 1 root named 473 2024-06-07 16:08 JungwooUniv.com.zone
-rwx---. 2 named named 23 2024-06-07 10:37 data
```

/var/named 에 정방향 & 역방향 Zone 파일 생성

```
[root@Server3 /var/named]# cat JungwooUniv.com.zone
$TTL 3H
@      IN SOA  ns.JungwooUniv.com. root.JungwooUniv.com. (
                                0      ; serial
                                1D     ; refresh
                                1H     ; retry
                                1W     ; expire
                                3H )   ; minimum

JungwooUniv.com.      IN NS      ns.JungwooUniv.com.
ns.JungwooUniv.com.   IN A       10.1.12.1
JungwooUniv.com.      IN MX      10 mail.JungwooUniv.com.
mail                  IN A       10.1.13.1
www                   IN A       10.1.12.1
ftp                   IN A       10.1.11.1
intranet              IN A       10.1.14.1
blog                  IN CNAME   test
```

```
[root@Client1 /root]# nslookup www.JungwooUniv.com
Server:      10.1.12.1
Address:     10.1.12.1#53
```

```
Name:   www.JungwooUniv.com
Address: 10.1.12.1
```

```
[root@Client1 /root]# nslookup mail.JungwooUniv.com
Server:      10.1.12.1
Address:     10.1.12.1#53
```

```
Name:   mail.JungwooUniv.com
Address: 10.1.13.1
```

```
[root@Client1 /root]# nslookup intranet.JungwooUniv.com
Server:      10.1.12.1
Address:     10.1.12.1#53
```

```
Name:   intranet.JungwooUniv.com
Address: 10.1.14.1
```

정방향 파일 설정 및 테스트

04 DNS (2/2)

```
[root@Server3 /var/named]# cat 10.1.rev
$TTL 3H
@      IN SOA  ns.JungwooUniv.com. root.JungwooUniv.com. (
                                0      ; serial
                                1D     ; refresh
                                1H     ; retry
                                1W     ; expire
                                3H )   ; minimum

                                IN NS   ns.JungwooUniv.com.
                                IN MX 10 mail.JungwooUniv.com.
1.12   IN PTR  ns.JungwooUniv.com.
1.13   IN PTR  mail.JungwooUniv.com.
1.12   IN PTR  www.JungwooUniv.com.
1.11   IN PTR  ftp.JungwooUniv.com.
1.14   IN PTR  intranet.JungwooUniv.com.
```

```
[root@Client1 /root]# nslookup 10.1.11.1
1.11.1.10.in-addr.arpa name = ftp.JungwooUniv.com.

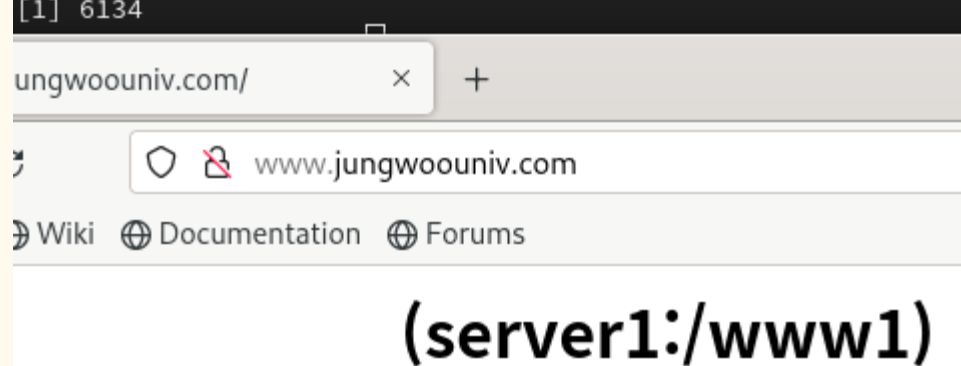
[root@Client1 /root]# nslookup 10.1.12.1
1.12.1.10.in-addr.arpa name = ns.JungwooUniv.com.
1.12.1.10.in-addr.arpa name = www.JungwooUniv.com.

[root@Client1 /root]# nslookup 10.1.13.1
1.13.1.10.in-addr.arpa name = mail.JungwooUniv.com.

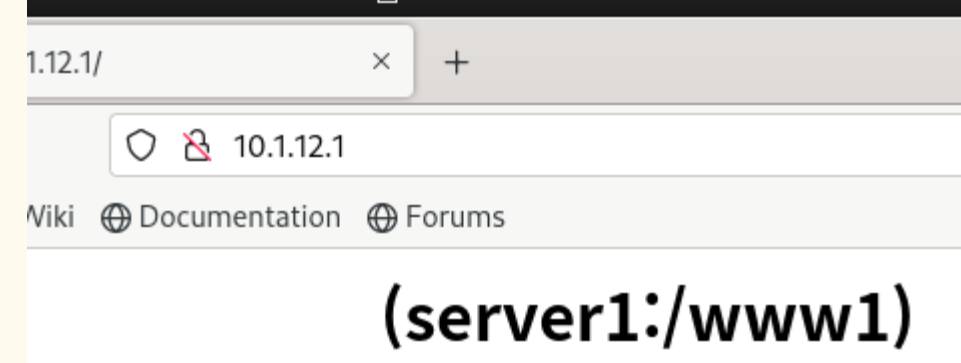
[root@Client1 /root]# nslookup 10.1.14.1
1.14.1.10.in-addr.arpa name = intranet.JungwooUniv.com.
```

역방향 파일 설정 및 테스트

```
[root@Client1 /root]# firefox http://www.JungwooUniv.com &
[1] 6134
```



```
[root@Client1 /root]# firefox http://10.1.12.1 &
[1] 5157
[root@Client1 /root]#
```



Domain, IP 주소로 접속 테스트

05 Intranet (nginx)

```
[root@Server1 /root]# rpm -qa | egrep nginx
nginx-filesystem-1.20.1-16.el9.noarch
nginx-core-1.20.1-16.el9.x86_64
nginx-1.20.1-16.el9.x86_64
```

Nginx 설치

```
[root@Server1 /root]# systemctl status nginx
● nginx.service - The nginx HTTP and reverse proxy server
   Loaded: loaded (/usr/lib/systemd/system/nginx.service;
   Active: active (running) since Tue 2024-06-11 12:10:53
   Process: 3459 ExecStartPre=/usr/bin/rm -f /run/nginx.pid
   Process: 3460 ExecStartPre=/usr/sbin/nginx -t (code=exi
   Process: 3461 ExecStart=/usr/sbin/nginx (code=exited, s
   Main PID: 3462 (nginx)
     Tasks: 3 (limit: 10756)
    Memory: 3.0M
       CPU: 281ms
    CGroup: /system.slice/nginx.service
            └─3462 "nginx: master process /usr/sbin/nginx"
              └─3463 "nginx: worker process"
                └─3464 "nginx: worker process"
```

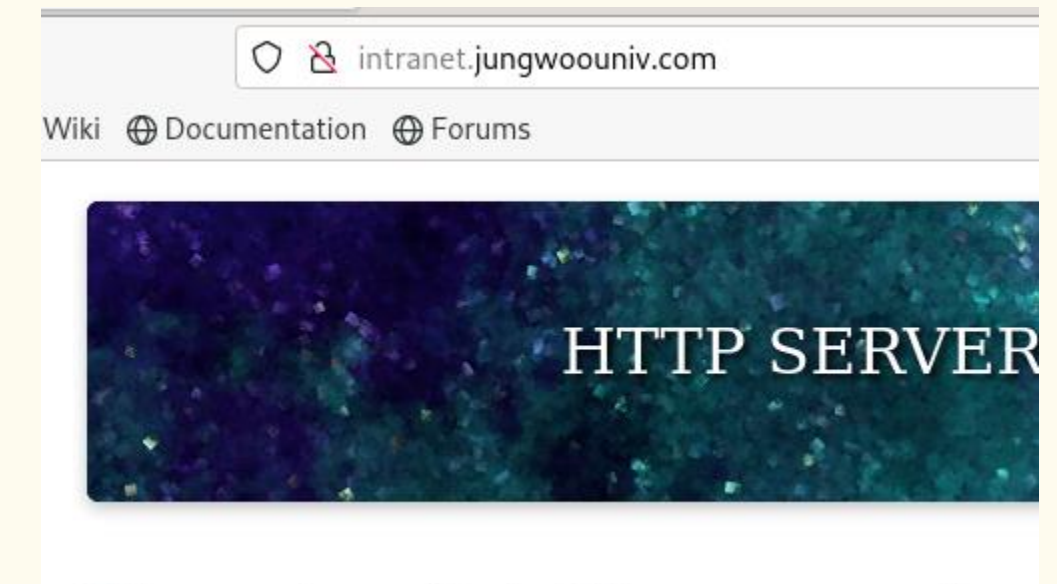
Nginx 상태 확인

```
5 user nginx;
6 worker_processes auto;
7 error_log /var/log/nginx/error.log;
8 pid /run/nginx.pid;
9
10 # Load dynamic modules. See /usr/share/doc/nginx/README.
11 include /usr/share/nginx/modules/*.conf;
12
13 events {
14     worker_connections 1024;
15 }
16
17 http {
18     log_format main '$remote_addr - $remote_user [$tim
19
18     log_format main '$remote_addr - $remote_user [$tim
19
20     log_format main '$remote_addr - $remote_user [$tim
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98     log_format main '$remote_addr - $remote_user [$tim
99     log_format main '$remote_addr - $remote_user [$tim
100    log_format main '$remote_addr - $remote_user [$tim
```

/etc/nginx/nginx.conf 환경설정
파일을 통해 Intranet 서버 구성

```
[root@Server1 /root]# ls /usr/share/nginx/html
404.html  icons      nginx-logo.png  system_noindex_logo.png
50x.html  index.html poweredby.png
```

/usr/share/nginx/html 디렉토리에
Index.html 등 intranet 서버
Web 파일 제작



Intranet Test 페이지 접속 확인

06 DHCP

```
[root@Server2 /root]# rpm -qa dhcp*
dhcp-common-4.4.2-19.b1.el9.noarch
dhcp-client-4.4.2-19.b1.el9.x86_64
dhcp-relay-4.4.2-19.b1.el9.x86_64
dhcp-server-4.4.2-19.b1.el9.x86_64
[root@Server2 /root]#
```

DHCP 설치

```
dhcpcd.conf (/etc/dhcp) - VIM
45
46 # A slightly different configuration for an internal
47 subnet 10.1.11.0 netmask 255.255.255.0 {
48     range 10.1.11.10 10.1.11.240;
49     option domain-name-servers 10.1.12.1;
50     option domain-name "JungwooUniv.com";
51     option routers 10.1.11.254;
52     option broadcast-address 10.1.11.255;
53     default-lease-time 600;
54     max-lease-time 7200;
55 }
56
57 subnet 10.1.12.0 netmask 255.255.255.0 {
58     range 10.1.12.10 10.1.12.240;
59     option domain-name-servers 10.1.12.1;
```

/etc/dhcp/dhpcd.conf 파일을 통해
Vlan11 ~ 20 각각의 DHCP 서버 설정

```
1 [connection]
2 id=ens33
3 uuid=65cb18c5-d40e-3087-8bc7-cc6cee0c79
4 type=ethernet
5 autoconnect-priority=-999
6 interface-name=ens33
7 timestamp=1717720733
8
9 [ethernet]
10
11 [ipv4]
12 #address1=10.1.15.1/24,10.1.15.254
13 #dns=10.1.12.1;
14 #dns-search=example.com;
15 method=auto
```

클라이언트에서 테스트
/etc/NetworkManager/system-
connections/ens33.nmconnection
파일을 통해 method 를 auto 설정
(나머지는 주석처리)

```
[root@Client1 /root]# vi /etc/NetworkManager/system-conn
on
[root@Client1 /root]#
[root@Client1 /root]#
[root@Client1 /root]# nmcli con up ens33
연결이 성공적으로 활성화되었습니다 (D-버스 활성 경로: /o
nager/ActiveConnection/4)
```

Ens33 재시작

재시작 명령어
systemctl restart NetworkManager
nmcli connection down ens33
nmcli connection up ens33

```
[root@Client1 /root]# nmcli con up ens33
연결이 성공적으로 활성화되었습니다 (D-버스 활성 경로: /org/f
nager/ActiveConnection/3)
[root@Client1 /root]# ifconfig ens33
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.15.10 netmask 255.255.255.0 broadcast 10
    inet6 fe80::20c:29ff:fe89:ae7d prefixlen 64 scopei
    ether 00:0c:29:89:ae:7d txqueuelen 1000 (Ethernet)
    RX packets 31726 bytes 44006017 (41.9 MiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 23318 bytes 1637828 (1.5 MiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collis
```

DHCP 로 IP 할당 받았는지 확인

07 FTP (vsftpd)

```
[root@Server2 /root]# rpm -qa vsftpd
vsftpd-3.0.5-5.el9.x86_64
[root@Server2 /root]#
```

vsftpd 설치

```
[root@Server2 /root]# systemctl status vsftpd.service
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; e
   Active: active (running) since Tue 2024-06-11 09:46:08 KS
   Process: 1068 ExecStart=/usr/sbin/vsftpd /etc/vsftpd/vsftp
   Main PID: 1088 (vsftpd)
     Tasks: 1 (limit: 10756)
    Memory: 928.0K
       CPU: 4ms
    CGroup: /system.slice/vsftpd.service
            └─1088 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf
```

Vsftpd 상태 확인

◆ 기능

- 가상 IP 설정(Virtual IP Configuration)
- 가상 유저 지원(Virtual Users)
- Stalolon 또는 inetd(xinetd) 지원
- 전송 대역폭 조절 기능(Bandwidth Throttling)
- 환경설정파일을 IP 별로 독립적인 지원(Per-source-IP Configurability)
- IP 별 제한 기능(Per-source-IP Limits)
- IPv6 지원
- SSL 을 사용한 암호화 지원(Encryption support through SSL integration)
- 배너 설정, chroot 기능 설정
- 접속 사용자수 제한
- 동일아이피 접속 제한
- 로그 저장

```
126 userlist_enable=YES
127
128
129 banner_file=/etc/vsftpd/banner.txt
130 chroot_local_user=YES
131 chroot_list_enable=YES
132 chroot_list_file=/etc/vsftpd/chroot_list
133 allow_writeable_chroot=YES
134 userlist_deny=YES
135 anonymous_enable=YES
136 anon_upload_enable=YES
137 chown_uploads=YES
138 chown_username=ftpupload
```

/etc/vsftpd/vsftpd.conf 파일을 통해 ftp 서버 설정

```
[root@Client1 /root]# ftp 10.1.11.1
Connected to 10.1.11.1 (10.1.11.1).
220-### FTP TEST Server ###
220-#### Jungwoo Univ ####
220
Name (10.1.11.1:root): user1
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```

FTP 접속 테스트

08 Email (1/2)

```
[root@Server1 /root]# rpm -qa sendmail
sendmail-8.16.1-11.el9.x86_64
```

Sendmail 설치

```
[root@Server1 /root]# systemctl status sendmail
● sendmail.service - Sendmail Mail Transport Agent
   Loaded: loaded (/usr/lib/systemd/system/sendmail.serv
   Active: active (running) since Tue 2024-06-11 09:47:24
   Process: 1077 ExecStartPre=/etc/mail/make (code=exited
   Process: 1080 ExecStartPre=/etc/mail/make aliases (code
   Process: 1087 ExecStart=/usr/sbin/sendmail -bd $SENDMAI
   Main PID: 1943 (sendmail)
     Tasks: 1 (limit: 10756)
    Memory: 4.1M
       CPU: 2.237s
   CGroup: /system.slice/sendmail.service
           └─1943 "sendmail: accepting connections"
```

Sendmail 상태 확인

```
85 CwJungwooUniv.com
86 # file containing names of hosts for which v
87 Fw/etc/mail/local-host-names
88
89 # my official domain name
90 # ... define this only if sendmail cannot a
    in
91 Djmail.JungwooUniv.com
92
```

메일 호스트 지정

```
9 # By default we allow relaying from localhost...
10 Connect:localhost.localdomain RELAY
11 Connect:localhost RELAY
12 Connect:127.0.0.1 RELAY
13 Connect:JungwooUniv.com RELAY
14 Connect:mail.JungwooUniv.com RELAY
15 Connec:10.1 RELAY
16
```

메일 릴레이 기능 설정

```
163 #####
164 # Options #
165 #####
166
167 # strip message body to 7 bits on input?
168 0 SevenBitInput=False
169
170 # 8-bit data handling
171 0 EightBitMode=pass8
172
173 # DSCP marking of traffic (IP_TOS)
174 #0 InetQoS=none
175
176 # wait for alias file rebuild (default units: minu
177 0 AliasWait=10
```

/etc/mail/sendmail.cf 파일을 통해 메일 옵션 설정

```
[root@Server1 /etc/mail]# rpm -qa dovecot
dovecot-2.3.16-11.el9.x86_64
```

Dovecot 설치

```
[root@Server1 /etc/mail]# systemctl status dovecot
● dovecot.service - Dovecot IMAP/POP3 email server
   Loaded: loaded (/usr/lib/systemd/system/dovecot.ser
   Active: active (running) since Tue 2024-06-11 09:46
   Docs: man:dovecot(1)
         https://doc.dovecot.org/
   Process: 1066 ExecStartPre=/usr/libexec/dovecot/pres
   Main PID: 1076 (dovecot)
     Status: "v2.3.16 (7e2e900c1a) running"
     Tasks: 4 (limit: 10756)
    Memory: 7.3M
       CPU: 102ms
   CGroup: /system.slice/dovecot.service
           └─1076 /usr/sbin/dovecot -F
             └─1553 dovecot/anvil
               └─1554 dovecot/log
                 └─1555 dovecot/config
```

Dovecot 상태 확인

```
24 protocols = imap pop3 lmtp submission
25
26 # A comma separated list of IPs or hosts where to l
27 # "*" listens in all IPv4 interfaces, ":::" listens
28 # If you want to specify non-default ports or anyth
29 # edit conf.d/master.conf.
30 listen = *, :::
31
```

/etc/dovecot/dovecot.conf 환경설정

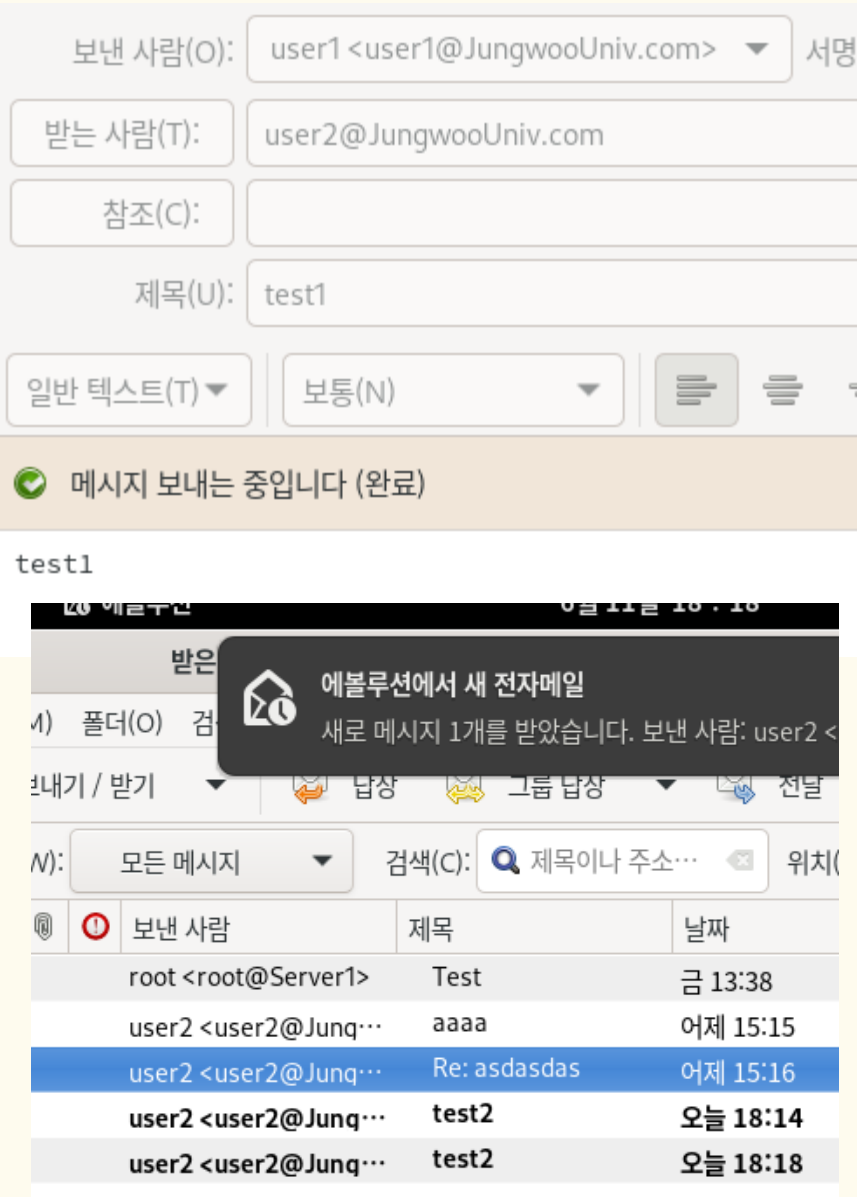
08 Email (2/2)

```
[root@Server1 /etc/dovecot]# cd conf.d
[root@Server1 /etc/dovecot/conf.d]# ls
10-auth.conf      20-imap.conf      auth-dict.conf.ext
10-director.conf  20-lmtp.conf      auth-ldap.conf.ext
10-logging.conf   20-pop3.conf      auth-master.conf.ext
10-mail.conf      20-submission.conf auth-passwdfile.conf.ext
10-master.conf    90-acl.conf        auth-sql.conf.ext
10-metrics.conf   90-plugin.conf     auth-static.conf.ext
10-ssl.conf        90-quota.conf      auth-system.conf.ext
15-lda.conf       auth-checkpassword.conf.ext
15-mailboxes.conf auth-deny.conf.ext
[root@Server1 /etc/dovecot/conf.d]#
```

/etc/dovecot/conf.d 디렉토리에 있는 .conf 로 끝나는 파일들로 기능 설정

```
[root@Server1 /root]# netstat -ntlp | egrep "sendmail|dovecot"
tcp        0      0 0.0.0.0:143        0.0.0.0:*          LISTEN
tcp        0      0 0.0.0.0:25         0.0.0.0:*          LISTEN
tcp        0      0 0.0.0.0:110        0.0.0.0:*          LISTEN
tcp        0      0 0.0.0.0:587        0.0.0.0:*          LISTEN
tcp6       0      0 :::143            :::*               LISTEN
tcp6       0      0 :::110            :::*               LISTEN
tcp6       0      0 :::587            :::*               LISTEN
```

SMTP , POP3 TCP 대기상태 확인



The screenshot shows the Evolution email client interface for user1. The composition window is open, showing the '보낸 사람(O):' (From) field as 'user1 <user1@JungwooUniv.com>' and the '받는 사람(T):' (To) field as 'user2@JungwooUniv.com'. The subject (제목(U)) is 'test1'. Below the composition window, a notification bubble indicates '메시지 보내는 중입니다 (완료)' (Sending message (done)). The inbox view shows a list of emails, with the selected email having the subject 'test1' and a time of '오늘 18:18' (Today 18:18).

Evolution 을 통한 계정생성 후 Email 서버 user1 테스트



The screenshot shows the Evolution email client interface for user2. The composition window is open, showing the '보낸 사람(O):' (From) field as 'user2 <user2@JungwooUniv.com>' and the '받는 사람(T):' (To) field as 'user1@JungwooUniv.com'. The subject (제목(U)) is 'test2'. Below the composition window, a notification bubble indicates '메시지 보내는 중입니다 (완료)' (Sending message (done)). The inbox view shows a list of emails, with the selected email having the subject 'test2' and a time of '오늘 18:16' (Today 18:16).

Evolution 을 통한 계정생성 후 Email 서버 user2 테스트

09 Firewall

```
[root@Server1 /root]# systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
   Loaded: loaded (/usr/lib/systemd/system/firewalld.service; vendor preset: enabled)
   Active: active (running) since Tue 2024-06-11 09:46:00 KST; 1min 45s ago
     Docs: man:firewalld(1)
   Main PID: 870 (firewalld)
    Tasks: 3 (limit: 10756)
   Memory: 44.2M
      CPU: 1.638s
   CGroup: /system.slice/firewalld.service
           └─870 /usr/bin/python3 -s /usr/sbin/firewalld
```

모든 서버 공통 Firewalld 상태 확인

◆ 다음의 명령어를 통해 각 서버에 방화벽 설정 및 적용 확인

- firewall-cmd --permanent --add-service={서비스이름}
- firewall-cmd --reload
- firewall-cmd --list-service
- nmap -sS 10.1.11.1
- nmap -sU -p (port번호) 10.1.11.1

Email 서버

```
[root@Server1 /root]# firewall-cmd --list-service
cockpit dhcpv6-client pop3 smtp ssh
[root@Server1 /root]#

[root@Client1 /root]# nmap -sS 10.1.13.1
Starting Nmap 7.92 ( https://nmap.org ) at 2024-06-11 14:05:00 KST
Nmap scan report for mail.JungwooUniv.com (10.1.13.1)
Host is up (0.011s latency).
Not shown: 988 filtered tcp ports (no-response), 8 filtered tcp ports (refused)
PORT      STATE SERVICE
22/tcp    open  ssh
25/tcp    open  smtp
110/tcp   open  pop3
9090/tcp  closed zeus-admin

Nmap done: 1 IP address (1 host up) scanned in 5.27 seconds
```

Intranet 서버

```
[root@Server1 /root]# firewall-cmd --list-service
cockpit dhcpv6-client http https ssh
[root@Server1 /root]#

[root@Client1 /root]# nmap -sS 10.1.14.1
Starting Nmap 7.92 ( https://nmap.org ) at 2024-06-11 14:05:00 KST
Nmap scan report for intranet.JungwooUniv.com (10.1.14.1)
Host is up (0.014s latency).
Not shown: 986 filtered tcp ports (no-response), 8 filtered tcp ports (refused)
PORT      STATE SERVICE
22/tcp    open  ssh
80/tcp    open  http
443/tcp   open  https
9090/tcp  closed zeus-admin
```

FTP / DHCP 서버

```
[root@Server2 /root]# firewall-cmd --list-service
cockpit dhcp dhcpv6 dhcpv6-client ftp ssh
[root@Server2 /root]#

[root@Client1 /root]# nmap -sS 10.1.11.1
Starting Nmap 7.92 ( https://nmap.org ) at 2024-06-11 14:05:00 KST
Nmap scan report for ftp.JungwooUniv.com (10.1.11.1)
Host is up (0.0083s latency).
Not shown: 988 filtered tcp ports (no-response), 8 filtered tcp ports (refused)
PORT      STATE SERVICE
20/tcp    closed ftp-data
21/tcp    open  ftp
22/tcp    open  ssh

[root@Client1 /root]# nmap -sU -p 67 10.1.11.1
Starting Nmap 7.92 ( https://nmap.org ) at 2024-06-11 14:05:00 KST
Nmap scan report for ftp.JungwooUniv.com (10.1.11.1)
Host is up (0.0033s latency).
PORT      STATE SERVICE
67/udp    open|filtered dhcps
```

Web / DNS 서버

```
[root@Server3 /root]# firewall-cmd --list-service
cockpit dhcpv6-client dns http https ssh
[root@Server3 /root]#

[root@Client1 /root]# nmap -sS 10.1.12.1
Starting Nmap 7.92 ( https://nmap.org ) at 2024-06-11 14:05:00 KST
Nmap scan report for ns.JungwooUniv.com (10.1.12.1)
Host is up (0.0038s latency).
Not shown: 985 filtered tcp ports (no-response), 8 filtered tcp ports (refused)
PORT      STATE SERVICE
22/tcp    open  ssh
53/tcp    open  domain
80/tcp    open  http
443/tcp   open  https
9090/tcp  closed zeus-admin
```



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