🌐 IT 네트워크 시스템 *IT Network Systems Administration* 🏵️

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✨ - Worldskills Korea ▫ Assessment Task (IT Network Systems) - 💫 [*Written by NullBins*]

- By default, the commands are executed as a root user.

[*Project-1*] < *Linux Environments*>

1. 네트워크 구성 (Network Configuration)

- 🎯 *서버 및 호스트 네트워크 IP 설정* 호스트네임 변경 및 IP 주소 지정.

< ***Configuration*** >

- [**DONG-R**]

```
ip link show            # 네트워크 이더넷 이름 확인 (ex. ens3X | ens32, ens33)
```

```
vim /etc/network/interfaces
```

```
auto ens32 ens33
iface ens32 inet static
  address 117.121.35.100/24
iface ens33 inet static
  address 192.168.1.254/24
  dns-nameservers 192.168.1.1
```

```
vim /etc/resolv.conf
```

```
nameserver 192.168.1.1
domain donghyun.net
search donghyun.net
```

```
vim /etc/hosts
```

```
  127.0.1.1   DONG-R.donghyun.net     DONG-R
```

```
hostnamectl set-hostname DONG-R
reboot
```

- [**DONG-SRV1**]

```
ip link show            # 네트워크 이더넷 이름 확인 (ex. ens3X | ens32)
```

```
vim /etc/network/interfaces
```

```
  auto ens32
  iface ens32 inet static
    address 192.168.1.1/24
    gateway 192.168.1.254
    dns-nameservers 192.168.1.1 192.168.1.2
```

```
vim /etc/resolv.conf
```

```
  nameserver 192.168.1.1
  nameserver 192.168.1.2
  domain donghyun.net
  search donghyun.net
```

```
vim /etc/hosts
```

```
  127.0.1.1   DONG-SRV1.donghyun.net     DONG-SRV1
```

```
hostnamectl set-hostname DONG-SRV1
reboot
```

- [**DONG-SRV2, DAE-R, DAE-SRV**] -> 과제지를 참고하여 위처럼 동일하게 설정.

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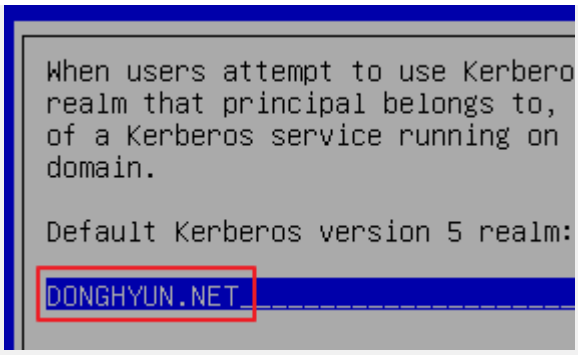
2. SAMBA AD 서비스 구성 (Samba Active Directory Service Configuration)

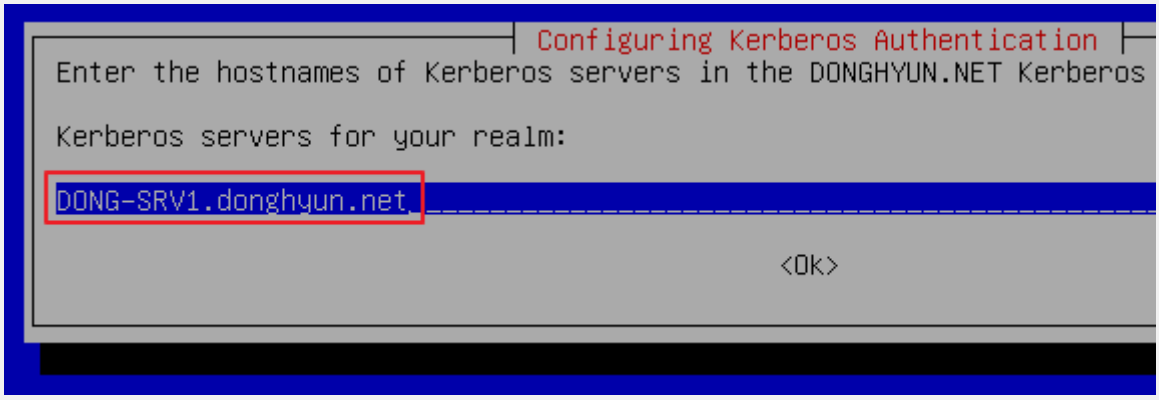
- *DONG-SRV1 에서 Samba Active Directory Service 구성* 구성 시 패키지 도구는 BIND9 및 SAMBA-AD-DC를 사용함.

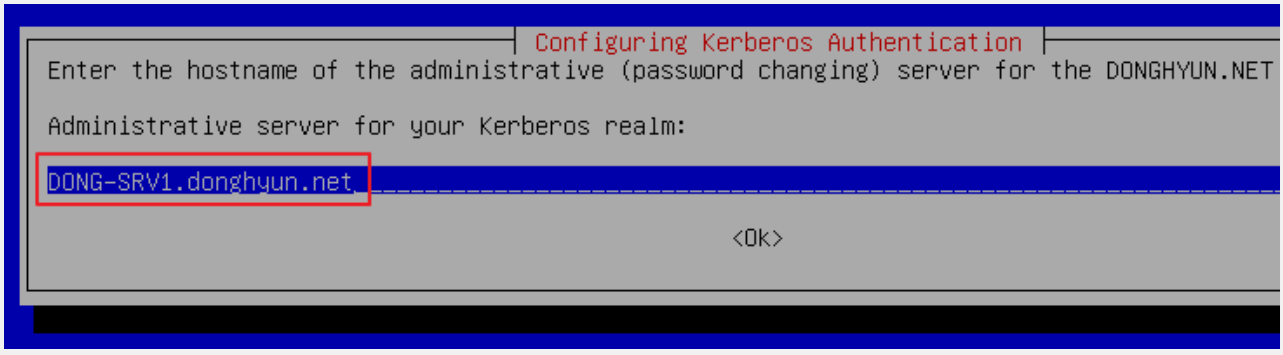
< *Configuration* >

- [**DONG-SRV1**]

```
apt install bind9 krb5-user krb5-config winbind samba smbclient migrationtools
ldb-tools -y
```







```
mv /etc/samba/smb.conf /etc/samba/smb.conf.bak
samba-tool domain provision --use-rfc2307 --interactive
```

```
root@DONG-SRV1:~# samba-tool domain provision --use-rfc2307 --interactive
Realm [DONGHYUN.NET]:
Domain [DONGHYUN]:
Server Role (dc, member, standalone) [dc]:
DNS backend (SAMBA_INTERNAL, BIND9_FLATFILE, BIND9_DLZ, NONE) [SAMBA_INTERNAL]: BIND9_DLZ
Administrator password:
Retype password:
```

```
cp /var/lib/samba/private/krb5.conf /etc/
```

```
vim /var/lib/samba/bind-dns/named.conf
```

```
dlz "donghyun.net" {
   database "dlopen /usr/lib/x86_64-linux-gnu/samba/bind9/dlz_bind9_16.so";
};
```

```
cat /var/lib/samba/bind-dns/named.txt | grep tkey >> /etc/bind/named.conf
```

```
vim /etc/bind/named.conf
```

```
// include "/etc/bind/named.conf.options";
// include "/etc/bind/named.conf.local";
include "/etc/bind/named.conf.default-zones";
include "/var/lib/samba/bind-dns/named.conf";

options {
   directory "/var/cache/bind";
   listen-on { any; };
   allow-query { any; };
   allow-update { 192.168.1.254; };
   dnssec-validation no;
   tkey-gssapi-keytab "/var/lib/samba/bind-dns/dns.keytab";
};

zone "1.168.192.in-addr.arpa" {
   type master;
   file "192.rev";
};
```

```
zone "daeseong.net" {
   type forward;
   forwarders { 172.16.1.1; };
};
```

```
systemctl restart bind9
systemctl stop smbd nmbd winbind
systemctl disable smbd nmbd winbind
systemctl unmask samba-ad-dc
systemctl enable samba-ad-dc
systemctl restart samba-ad-dc
kinit Administrator
cd /usr/share/migrationtools/
```

```
vim migrate_common.ph
```

```
$NAMINGCONTEXT{'passwd'}    = "ou=DONG";
$DEFAULT_MAIL_DOMAIN = "donghyun.net";
$DEFAULT_BASE = "dc=donghyun,dc=net";
```

```
cp migrate_common.ph /usr/share/perl5/
./migrate_common.pl > ou.ldif
```

```
vim ou.ldif
```

```
1 dn: ou=DONG,dc=donghyun,dc=net
2 ou: DONG
3 objectClass: top
4 objectClass: organizationalUnit
```

```
ldbadd -H /var/lib/samba/private/sam.ldb ou.ldif
```

```
vim /root/users.sh
```

```

```

```
#!/bin/bash
for i in {01..05}
do
   samba-tool user create user1$i Skill39 --userou=ou=DONG --uid-number=10$i
--gid-number=1000 --script-path=/bin/bash --home-directory=/home/user1$i
   samba-tool user create visitor1$i Skill39 --userou=ou=DONG --uid-
number=20$i --gid-number=2000 --script-path=/bin/bash --home-
directory=/home/visitor1$i
done
```

```
chmod +x /root/users.sh
bash /root/users.sh
```

```
kinit Administrator
klist
wbinfo -u
```

- [**DONG-SRV2**]

```
apt install krb5-user krb5-config winbind samba smbclient -y
mv /etc/samba/smb.conf /etc/samba/smb.conf.bak
scp DONG-SRV1:/etc/krb5.conf /etc/
kinit Administrator
samba-tool domain join donghyun.net DC -UAdministrator
systemctl stop smbd nmbd winbind
systemctl disable smbd nmbd winbind
systemctl unmask samba-ad-dc
systemctl enable samba-ad-dc
systemctl restart samba-ad-dc
```

---

2. DNS 서비스 구성 (DNS Service Configuration)

- *DONG-SRV 및 DAE-SRV, DNS 도메인 네임서버 구성* 구성 시 패키지 도구는 BIND9을 사용함.

< *Configuration* >

- [**DONG-SRV1**]

```
kinit Administrator
```

```
samba-tool dns add 192.168.1.1 donghyun.net www.donghyun.net CNAME DONG-
SRV1.donghyun.net
samba-tool dns add 192.168.1.1 donghyun.net mail.donghyun.net CNAME DONG-
SRV2.donghyun.net
samba-tool dns add 192.168.1.1 donghyun.net @ MX "mail.donghyun.net 10"
samba-tool dns query 192.168.1.1 donghyun.net @ ALL -U Administrator
```

```
cp /etc/bind/db.127 /var/cache/bind/192.rev
chown bind:bind -R /var/cache/bind/
sed -i "s/localhost/DONG-SRV1.donghyun.net/g" /var/cache/bind/192.rev
```

```
vim /var/cache/bind/192.rev
```

```
1       IN      PTR     DONG-SRV1.donghyun.net
2       IN      PTR     DONG-SRV2.donghyun.net
```

```
systemctl restart bind9
```

- [**DAE-SRV**]

```
apt install bind9 -y
```

```
vim /etc/bind/named.conf
```

```
// include "/etc/bind/named.conf.options";
// include "/etc/bind/named.conf.local";
// include "/etc/bind/named.conf.default-zones";

options {
   directory "/var/cache/bind";
   listen-on { any; };
   allow-query { any; };
   dnssec-validation no;
};

view int {
   match-clients { 192.168.1.0/24; 172.16.1.0/24; localhost; };
```

```
    include "/etc/bind/named.conf.default-zones";
    zone "daeseong.net" {
        type master;
        file "int-daeseong.zone";
        allow-update { 172.16.1.254; };
    };
    zone "donghyun.net" {
        type forward;
        forwarders { 192.168.1.1; };
    };
};

view ext {
    match-clients { 117.121.35.0/24; };
    include "/etc/bind/named.conf.default-zones";
    zone "daeseong.net" {
        type master;
        file "ext-daeseong.zone";
    };
};
```

```
cp /etc/bind/db.0 /var/cache/bind/int-daeseong.zone
cp /etc/bind/db.0 /var/cache/bind/ext-daeseong.zone
chown bind:bind -R /var/cache/bind/
sed -i "s/localhost/DAE-SRV.daeseong.net/g" /var/cache/bind/int-daeseong.zone
sed -i "s/localhost/DAE-SRV.daeseong.net/g" /var/cache/bind/ext-daeseong.zone
```

```
vim /var/cache/bind/int-daeseong.zone
```

```
DAE-SRV     IN  A   172.16.1.1
www         IN  CNAME   DAE-SRV
```

```
vim /var/cache/bind/ext-daeseong.zone
```

```
DAE-SRV     IN  A   117.121.35.150
www         IN  CNAME   DAE-SRV
```

```
systemctl restart bind9
```

3. DHCP 서버 구성 (DHCP Service Configuration)

- *DONG-R 및 DAE-R, DHCP 서버 구성* 구성 시 패키지 도구는 ISC-DHCP-SERVER를 사용함.

< *Configuration* >

- [**DONG-R**]

```
apt install isc-dhcp-server -y
```

```
vim /etc/default/isc-dhcp-server
```

```
INTERFACESv4="ens33"    # 해당 인터페이스는 내부망 이더넷으로 지정해야 함.
```

```
vim /etc/dhcp/dhcpd.conf
```

```
subnet 192.168.1.0 netmask 255.255.255.0 {
   range 192.168.1.150 192.168.1.200;
   option routers 192.168.1.254;
   option domain-name "donghyun.net";
   option domain-name-servers 192.168.1.1;
   default-lease-time 600;
   max-lease-time 7200;
}

zone donghyun.net {
primary 192.168.1.1;
}

zone 1.168.192.in-addr.arpa {
primary 192.168.1.1;
}

ddns-update-style standard;
```

```
systemctl restart isc-dhcp-server
```

- [**DAE-R**]

```
apt install isc-dhcp-server -y
```

```
vim /etc/default/isc-dhcp-server
```

```
INTERFACESv4="ens33"    # 해당 인터페이스는 내부망 이더넷으로 지정해야 함.
```

```
vim /etc/dhcp/dhcpd.conf
```

```
subnet 172.16.1.0 netmask 255.255.255.0 {
   range 172.16.1.150 172.16.1.200;
   option routers 172.16.1.254;
   option domain-name "daeseong.net";
   option domain-name-servers 172.16.1.1;
   default-lease-time 600;
   max-lease-time 7200;
}

zone daeseong.net {
primary 172.16.1.1;
}

ddns-update-style standard;
```

```
systemctl restart isc-dhcp-server
```

---

4. [S2S] GRE-over-IPsec VPN 구성 (GRE-over-IPsec VPN Configuration)

- 🎯 *DONG-R 및 DAE-R, VPN SITE 구성* 구성 시 패키지 도구는 STRONGSWAN을 사용함.

< *Configuration* >

- [**DONG-R**]

```
vim /etc/network/interfaces
```

```

```

```
auto tun0
iface tun0 inet tunnel
   address 10.0.0.1
   netmask 255.255.255.252
   dstaddr 10.0.0.2
   local 117.121.35.100
   endpoint 117.121.35.150
   mode gre
   ttl 255
   post-up ip route add 172.16.1.0/24 dev tun0
   pre-down ip route add 172.16.1.0/24 dev tun0
```

```
modprobe ip_gre
systemctl restart networking
```

```
apt install strongswan -y
```

```
vim /etc/ipsec.conf
```

```
conn GRE-IPSEC-VPN
   left=117.121.35.100
   leftprotoport=gre
   right=117.121.35.150
   rightprotoport=gre
   type=transport
   authby=secret
   keyexchange=ikev2
   auto=start
```

```
vim /etc/ipsec.secrets
```

```
117.121.35.150 117.121.35.100 : PSK "Skill39"
```

```
systemctl restart strongswan-starter
```

- [**DAE-R**]

```
vim /etc/network/interfaces
```

```
auto tun0
iface tun0 inet tunnel
   address 10.0.0.2
   netmask 255.255.255.252
   dstaddr 10.0.0.1
   local 117.121.35.150
   endpoint 117.121.35.100
   mode gre
   ttl 255
   post-up ip route add 192.168.1.0/24 dev tun0
   pre-down ip route add 192.168.1.0/24 dev tun0
```

```
modprobe ip_gre
systemctl restart networking
```

```
apt install strongswan -y
```

```
vim /etc/ipsec.conf
```

```
conn S2S-VPN
   left=117.121.35.100
   leftprotoport=gre
   right=117.121.35.150
   rightprotoport=gre
   type=transport
   authby=secret
   keyexchange=ikev2
   auto=start
```

```
vim /etc/ipsec.secrets
```

```
117.121.35.100 117.121.35.150 : PSK "Skill39"
```

```
systemctl restart strongswan-starter
```

---

4. Certificate Authority 구성 (Certificate Authority Configuration)

- *🎯 DONG-SRV 에서 DONG-CA 인증기관 설립* 구성 시 패키지 도구는 OPENSSL를 사용함.

< Configuration >

- [**DONG-SRV**]

```
apt install openssl -y
```

```
vim /etc/ssl/openssl.cnf
```

```
[ CA_default ]
dir             = /etc/ssl/DONG-CA
x509_extensions = v3_req
policy          = policy_anything

[ req_distinguished_name ]
countryName_default     = KR
#stateOrProvinceName_default       = Some-State
0.organizationName_default     = DONG
```

```
vim /usr/lib/ssl/misc/CA.pl
```

```
my $CADAYS = "-days 1825";      # 5년
my $CATOP = "/etc/ssl/DONG-CA";
```

```
/usr/lib/ssl/misc/CA.pl -newca        # CN=DONG-CA 설정
```

```
Common Name (e.g. server FQDN or YOUR name) []:DONG-CA
```

```
cp /etc/ssl/DONG-CA/cacert.pem /usr/local/share/ca-certificates/ca.crt
update-ca-certificates
```

4. LDAP 서버 구성 (LDAP Service Configuration)

- *🎯 DONG-SRV 및 DAE-SRV 에서 LDAP 서버 구성* 구성 시 패키지 도구는 SLAPD를 사용함.

< Configuration >

- [**DONG-SRV**]

```
apt install slapd migrationtools -y     # 설치시 비밀번호는 "Skill39"를 사용함.
```

```
vim /etc/ldap/ldap.conf
```

```
BASE    dc=donghyun,dc=net
URI     ldapi:///
```

```
systemctl restart slapd
ldapsearch -x       # dn: dc=donghyun,dc=net 확인
```

```
vim /root/users.sh
```

```
#!/bin/bash
for i in {01..05}
do
   echo -e "Skill39\nSkill39" | adduser --gecos "" --uid 10$i user1$i
done
```

```
chmod +x /root/users.sh
bash /root/users.sh
cd /usr/share/migrationtools/
```

```
vim migrate_common.ph
```

```

```

```
$NAMINGCONTEXT{'passwd'}    = "ou=users";
$DEFAULT_MAIL_DOMAIN = "donghyun.net";
$DEFAULT_BASE = "dc=donghyun,dc=net";
```

```
cp migrate_common.ph /usr/share/perl5/
./migrate_base.pl /etc/passwd > ou.ldif
```

```
vim ou.ldif     # ou=users 제외하고 전부 삭제
```

```
1 dn: ou=users,dc=donghyun,dc=net
2 ou: users
3 objectClass: top
4 objectClass: organizationalUnit
```

```
./migrate_passwd.pl /etc/passwd > passwd.ldif
```

```
vim passwd.ldif     # user101 ~ user105 제외하고 전부 삭제
```

```
 1 dn: uid=user101,ou=users,dc=donghyun,dc=net
 2 uid: user101
 3 cn: user101
 4 objectClass: account
 5 objectClass: posixAccount
 6 objectClass: top
 7 objectClass: shadowAccount
 8 userPassword: {crypt}$y$j9T$13EBg6Czv15FznpAKTNOm.$GRFYBzTUUZqK1hOjQzzEJ8CpL4uRaAmWAV3hmJIGtKC
 9 shadowLastChange: 20469
10 shadowMax: 99999
11 shadowWarning: 7
12 loginShell: /bin/bash
13 uidNumber: 1001
14 gidNumber: 1001
15 homeDirectory: /home/user101
16 gecos: ,,,
```

☑ 해당 사진처럼 user101 ~ user105 유저들만 남긴다.

```
ldapadd -cWD "cn=admin,dc=donghyun,dc=net" -f ou.ldif          # PW: Skill39
ldapadd -cWD "cn=admin,dc=donghyun,dc=net" -f passwd.ldif      # PW: Skill39
ldapsearch -x | grep dn
```

```
dn: dc=donghyun,dc=net
dn: ou=users,dc=donghyun,dc=net
dn: uid=user101,ou=users,dc=donghyun,dc=net
dn: uid=user102,ou=users,dc=donghyun,dc=net
dn: uid=user103,ou=users,dc=donghyun,dc=net
dn: uid=user104,ou=users,dc=donghyun,dc=net
dn: uid=user105,ou=users,dc=donghyun,dc=net
```

☑ 해당 사진처럼 출력되어야 한다.

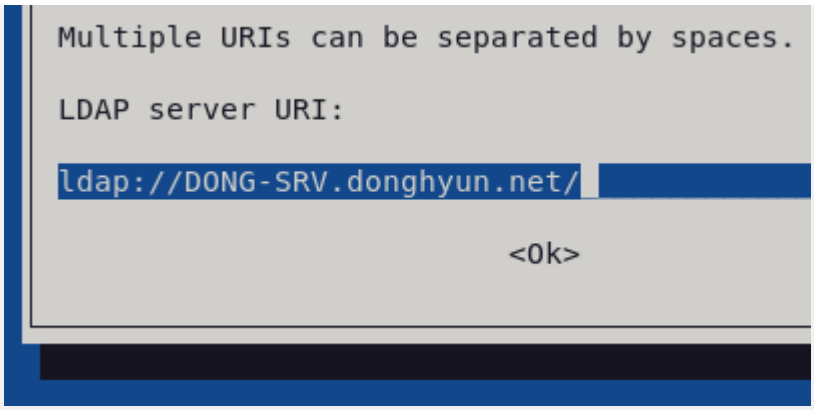
```
vim /root/users.sh
```

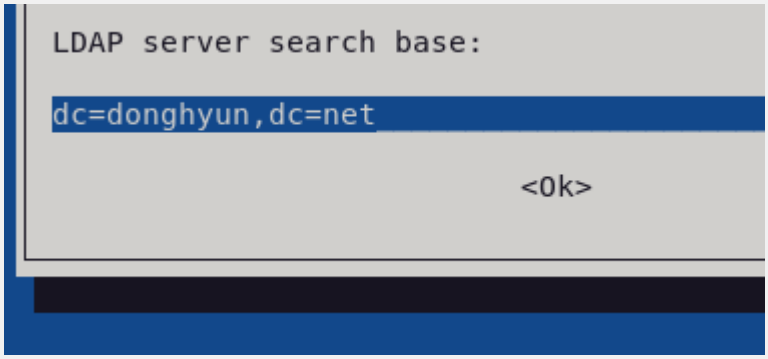
```
#!/bin/bash
for i in {01..05}
do
   # echo -e "Skill39\nSkill39" | adduser --gecos "" --uid 10$i user1$i
   userdel -r user1$i
done
```

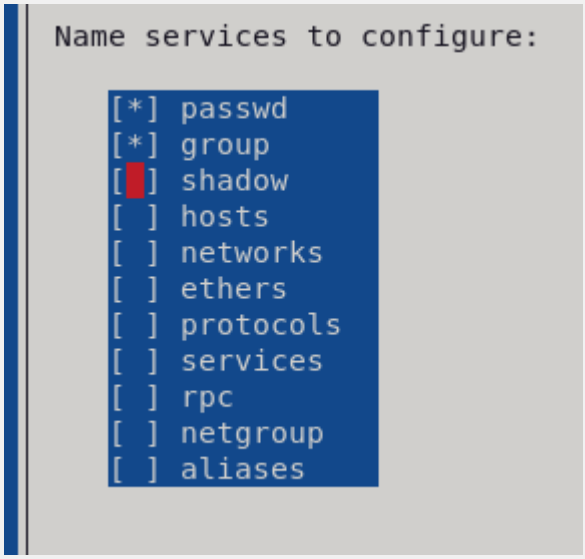
```
bash /root/users.sh
```

- 🎯 *DONG-CLI 및 DAE-CLI 에서 LDAP 서버 인증 설정* 구성 시 패키지 도구는 LIBNSS-LDAPD를 사용함.
- [**DONG-CLI**]

```
apt install libnss-ldapd -y
```





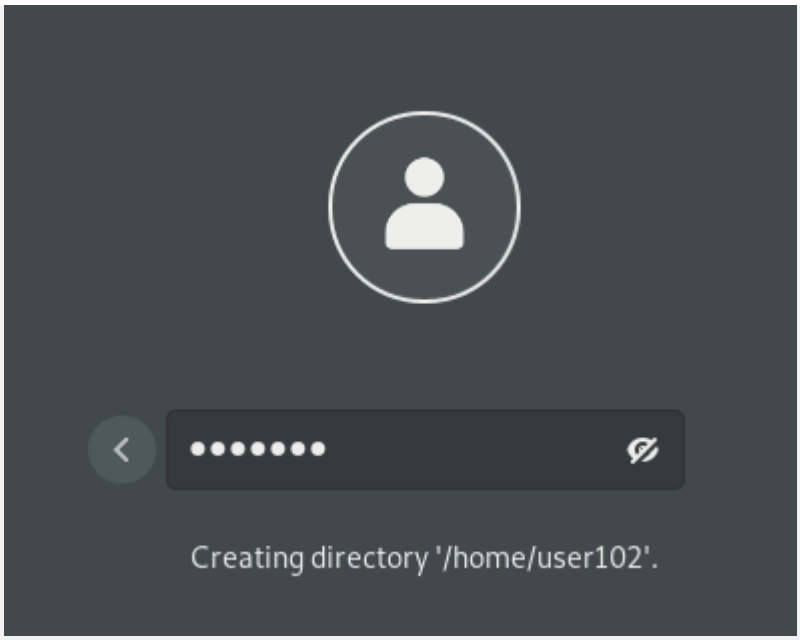


☑ 사진대로 설정

```
vim /etc/ldap/ldap.conf
```

```
BASE    dc=donghyun,dc=net
URI     ldap://DONG-SRV.donghyun.net/
```

```
echo "session optional pam_mkhomedir.so" >> /etc/pam.d/common-session
reboot
```



☑ 사진처럼 user101 ~ user105 유저로 로그인 되는지 확인

- [**DAE-SRV, DAE-CLI**] -> 과제지를 참고하여 위처럼 동일하게 LDAP Service 설정.

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4. Web 서버 구성 (Web Service Configuration)

- *DONG-SRV 및 DAE-SRV 에서 Web 서버 구성* 구성 시 패키지 도구는 APACHE2를 사용함.

< Configuration >

- [**DONG-SRV**]

```
apt install apache2 php libapache2-mod-php -y
```

```
cd /etc/ssl/DONG-CA/certs
openssl req -new -out www.req -newkey rsa:2048 -keyout www.key -nodes       #
CN=www.donghyun.net
```

```
vim san
```

```
subjectAltName = DNS:www.donghyun.net
```

```
openssl ca -in www.req -out www.crt -extfile san        # PW: Skill39
```

```
vim /etc/apache2/apache2.conf
```

```
<Directory /var/www/php>
   AuthType basic
   AuthName "ldap"
   AuthBasicProvider ldap
   AuthLDAPURL "ldap://DONG-SRV.donghyun.net/dc=donghyun,dc=net?uid"
   Require valid-user
</Directory>
```

```
vim /etc/apache2/sites-available/default-ssl.conf
```

```
<IfModule mod_ssl.c>
   <VirtualHost _default_:443>
       ServerName www.donghyun.net
       DocumentRoot /var/www/php

       SSLCertificateFile      /etc/ssl/DONG-CA/certs/www.crt
       SSLCertificateKeyFile   /etc/ssl/DONG-CA/certs/www.key

       SSLCACertificatePath    /etc/ssl/DONG-CA/
       SSLCACertificateFile    /etc/ssl/DONG-CA/cacert.pem
   </VirtualHost>
</IfModule>
```

```
mkdir -p /var/www/php
```

```
vim /var/www/php/index.php
```

```
<?php
   $username = $_SERVER['REMOTE_USER'];
   echo "<center><h2>Welcome to Linux Env, $username</h2></center>";
>
```

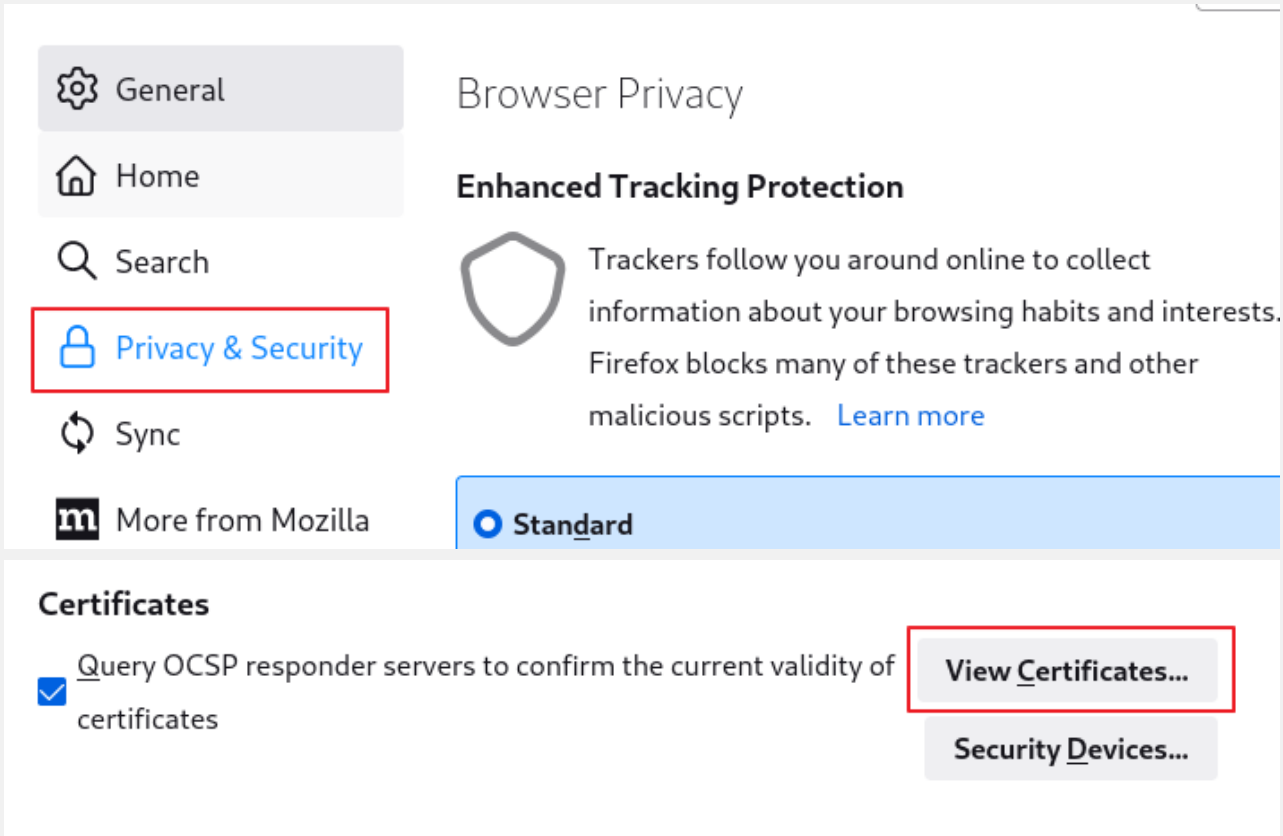
```php
<?php
        $username = $_SERVER['REMOTE_USER'];
        echo "<center><h2>Welcome to Linux Env, $username</h2></center>";
?>
```

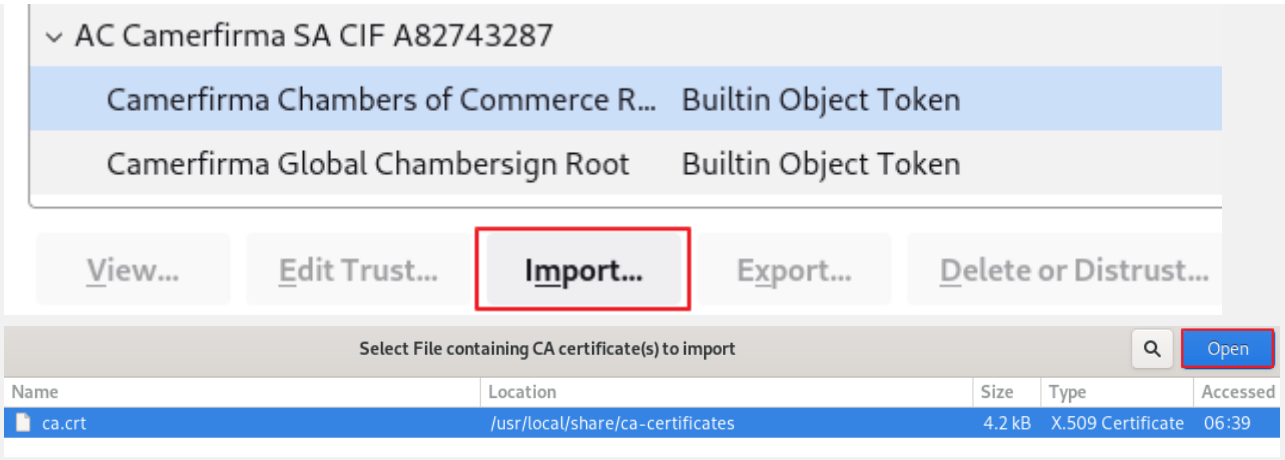
```
a2enmod ssl authnz_ldap
systemctl restart apache2
```

- *DONG-CLI 및 DAE-CLI 에서 Web 서버 인증 설정* DONG-CA에서 RootCA 인증서를 가져와 인증합니다.
- [**DONG-CLI**]

```
scp root@dong-srv.donghyun.net:/etc/ssl/DONG-CA/cacert.pem /usr/local/share/ca-certificates/ca.crt
update-ca-certificates
```

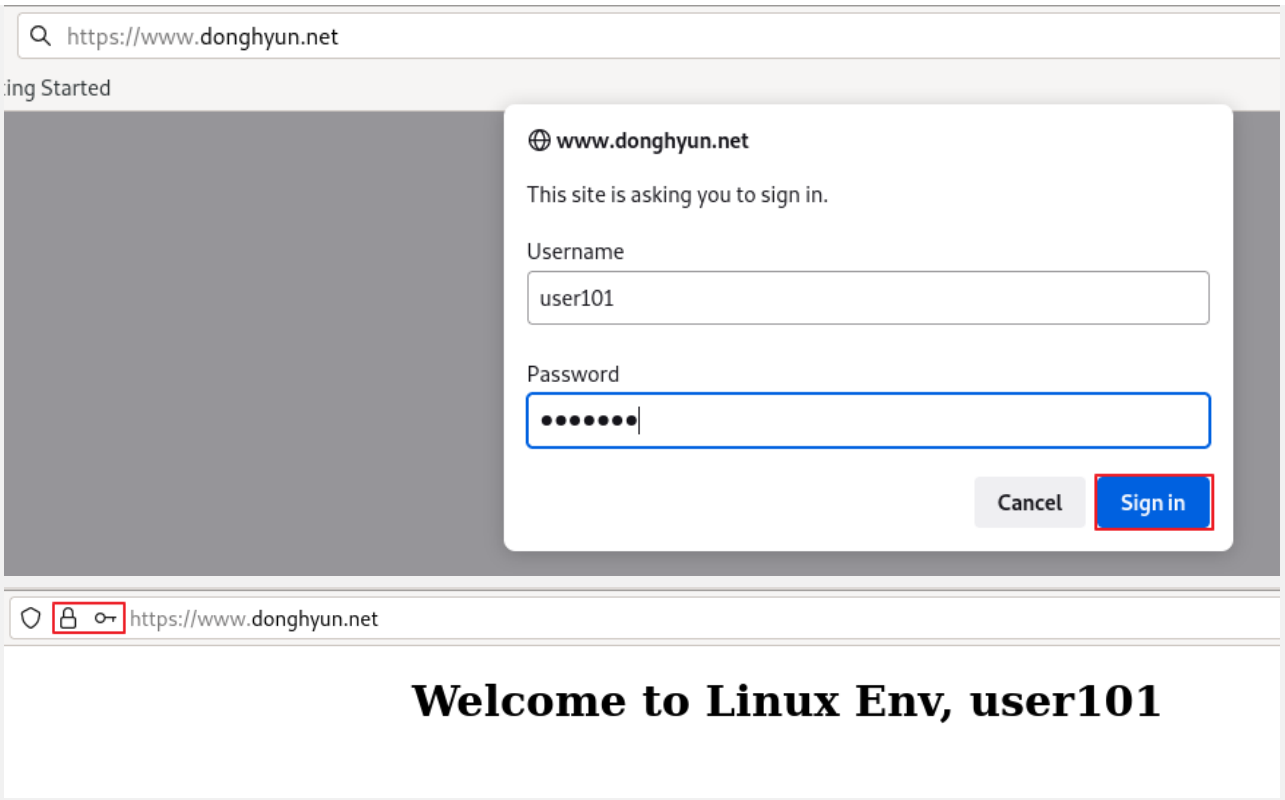
Open Firefox





☑ 위와 같이 설정합니다.

- *Web 서버 접속 테스트*



☑ 위와 같이 뜨면 성공입니다.

- [**DAE-SRV, DAE-CLI**] -> 과제지를 참고하여 위처럼 동일하게 Web Service 설정.

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5. Network 패킷 제어 (Network Packet Control)

- *DAE-R 및 DONG-R 에서 Destination NAT 및 Filtering 설정* 구성 시 패키지 도구는 IPTABLES를 사용함.

< ***Configuration*** >

- [**DAE-R**]

```
apt install iptables -y
```

```
vim /etc/network/interfaces
```

```
...

# 부가적으로 밑의 내용을 추가합니다.
up iptables -t nat -A PREROUTING -s 117.121.35.0/24 -d 117.121.35.150 -p tcp
--dport 443 -j DNAT --to 172.16.1.1
```

```
reboot
```

- [**DONG-R**]

```
apt install iptables -y
```

```
vim /etc/network/interfaces
```

```
...

# 부가적으로 밑의 내용을 추가합니다.
up iptables -A FORWARD -s 172.16.1.0/24 -d 192.168.1.1 -p tcp --dport 443 -j
DROP
```

```
reboot
```
