🌐 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-SRV**]

```
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
```

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

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

```
vim /etc/hosts
```

```
  127.0.1.1   DONG-SRV.donghyun.net     DONG-SRV
```

```
hostnamectl set-hostname DONG-SRV
reboot
```

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

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2. DNS 서비스 구성 (DNS Service Configuration)

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

< *Configuration* >

- [**DONG-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; };
   allow-recursion { any; };
   recursion yes;
   dnssec-validation no;
};

zone "donghyun.net" {
   type master;
   file "donghyun.zone";
   allow-update { 192.168.1.254; };
};

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

```
cp /etc/bind/db.0 /var/cache/bind/donghyun.zone
chown bind:bind -R /var/cache/bind/
```

```
sed -i "s/localhost/DONG-SRV.donghyun.net/g" /var/cache/bind/donghyun.zone
```

```
vim /var/cache/bind/donghyun.zone
```

```
DONG-SRV    IN  A   192.168.1.1
www         IN  CNAME   DONG-SRV
```

```
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; };
   allow-recursion { any; };
   recursion yes;
   dnssec-validation no;
};

view int {
   match-clients { 192.168.1.0/24; 172.16.1.0/24; localhost; };
   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; };
   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
ftp        IN  CNAME   DAE-SRV
```

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

```
DAE-SRV    IN  A   117.121.35.150
www        IN  CNAME   DAE-SRV
ftp        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;
}

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. Site-to-Site VPN 구성 (Site-to-Site VPN Configuration)

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

< *Configuration* >

- [**DONG-R**]

```
apt install strongswan -y
```

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

```
conn S2S-VPN
   left=117.121.35.100
   lefgsubnet=192.168.1.0/24
   right=117.121.35.150
   rightsubnet=172.16.1.0/24
   type=tunnel
   authby=secret
   keyexchange=ikev2
   auto=start
```

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

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

- [**DAE-R**]

```
apt install strongswan -y
```

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

```
conn S2S-VPN
   left=117.121.35.150
   lefgsubnet=172.16.1.0/24
   right=117.121.35.100
   rightsubnet=192.168.1.0/24
   type=tunnel
   authby=secret
   keyexchange=ikev2
   auto=start
```

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

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

---

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
```

```
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(CommonName)=DONG-CA
```

```
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
```

```
dn: uid=user101,ou=users,dc=donghyun,dc=net
uid: user101
cn: user101
objectClass: account
objectClass: posixAccount
objectClass: top
objectClass: shadowAccount
userPassword: {crypt}$y$j9T$l3EBg6Czv15FznpAKTNOm.$GRFYBzTUUZqKlhOjQzzEJ8CpL4uRaAmWAV3hmJIGtKC
shadowLastChange: 20469
shadowMax: 99999
shadowWarning: 7
loginShell: /bin/bash
uidNumber: 1001
gidNumber: 1001
homeDirectory: /home/user101
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.

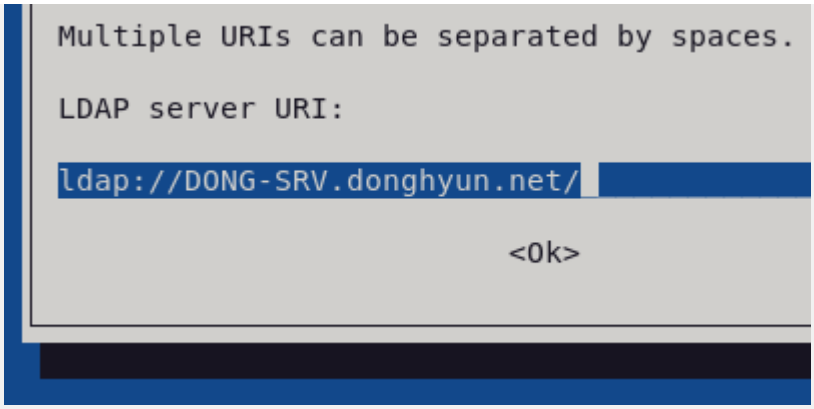
```
vim /root/users.sh
```

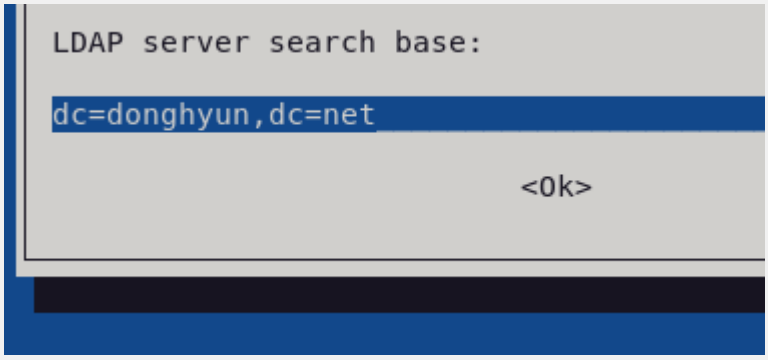
```
#!/bin/bash
for i in {01..05}
do
   # echo -e "Skill39\nSkill39" | adduser --gecos "" --uid 10$i user1$i
   userdel -r user1$i
done
```

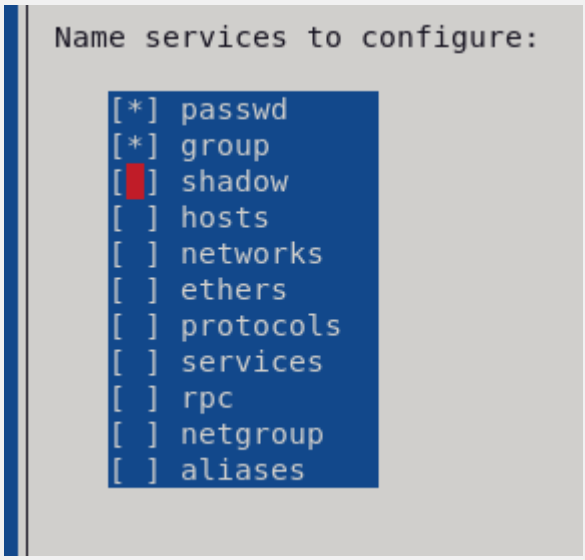
```
bash /root/users.sh
```

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

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







☑ 사진대로 설정

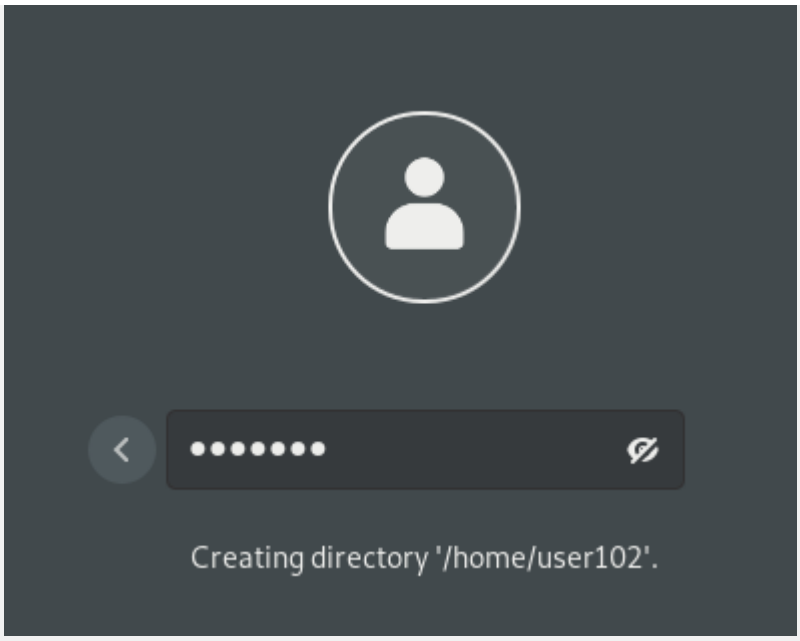
```
vim /etc/ldap/ldap.conf
```

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

```
vim /etc/pam.d/common-session
```

```
session optional pam_mkhomedir.so
```

```
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>";
>
```

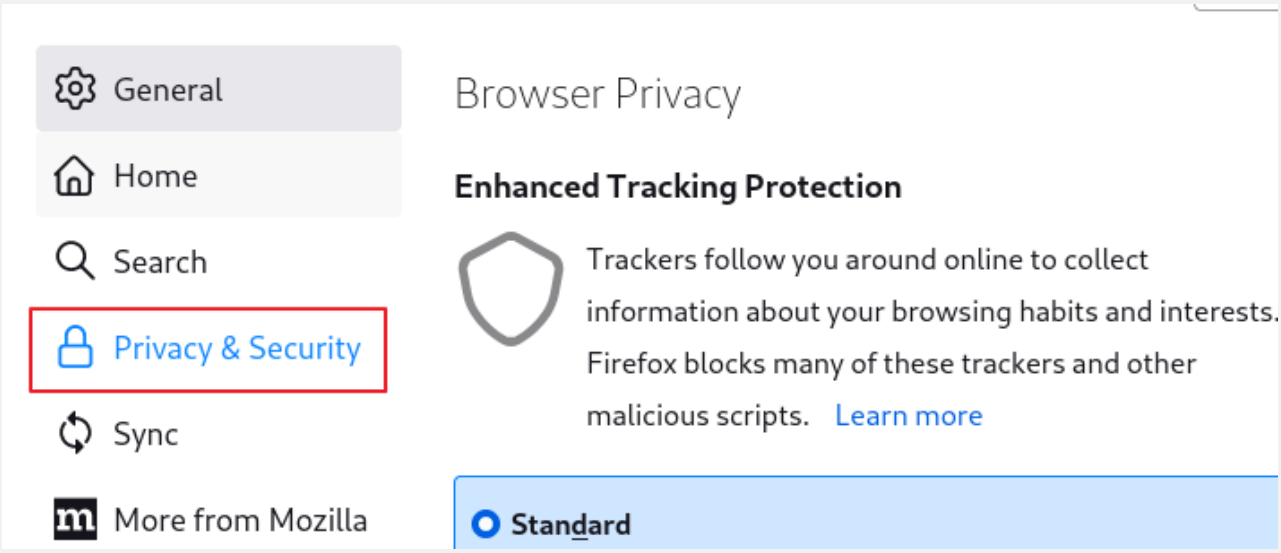
```
1 <?php
2         $username = $_SERVER['REMOTE_USER'];
3         echo "<center><h2>Welcome to Linux Env, $username</h2></center>";
4 ?>
```

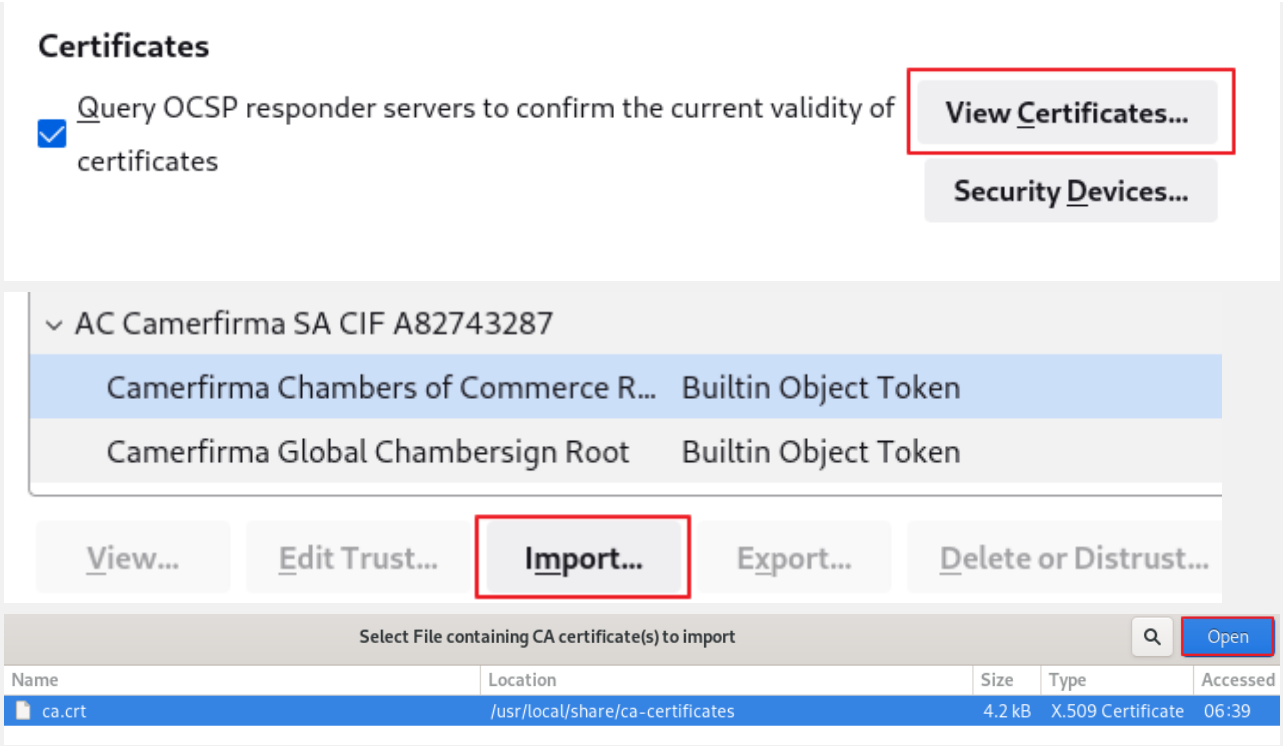
```
a2enmod ssl authnz_ldap
systemctl restart apache2
```

- *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
```

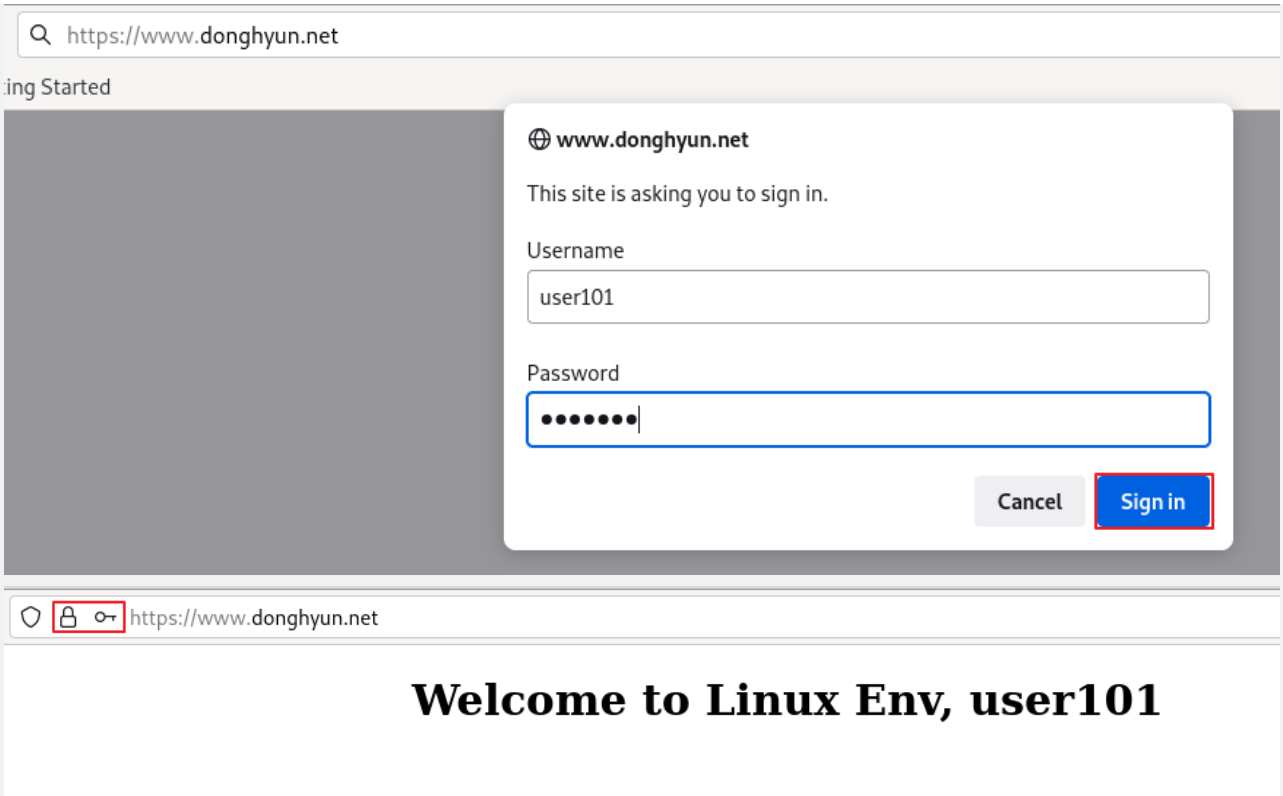
Open Firefox





☑ 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
```
