



12/26 SSH

≡ 제목

SSH(Secure-Shell)

- 네트워크 상에 연결된 다른 컴퓨터에 로그인을 하거나 원격 시스템에 명령을 실행하기 위해 사용하는 응용 프로그램 또는 프로토콜
- 기존 telnet 을 대체하기 위해 설계되었으며, 강력한 인증을 통해 네트워크 상에서도 안전하게 통신을 할 수 있는 기능을 제공
- TCP22번 포트를 사용하며, 암호화된 문자로 통신을 하기 때문에 보안이 더 강화됨.

GUI 사용하지 않고 CUI 만 사용한다

(ssh client)

(open ssh server)

SSH CLIENT

SSH SERVER

→→→→→→→→→→→→→→→→
<—<—<—<—<—<—<—<—<—<—<—

```
Microsoft Windows [Version 10.0.19045.3803]
(c) Microsoft Corporation. All rights reserved.

C:\Users\user>ssh
usage: ssh [-46AaCfGgKkMnqsTtVvXxYy] [-B bind_interface]
          [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]
          [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]
          [-i identity_file] [-J [user@]host[:port]] [-L address]
          [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-p port]
          [-Q query_option] [-R address] [-S ctl_path] [-W host:port]
          [-w local_tun[:remote_tun]] destination [command]
```

ssh 말고 putty 사용해도 됨

```
ubuntu@UbuntuDesk:~$ sudo apt-get install openssh-server
[sudo] password for ubuntu:
패키지 목록을 읽는 중입니다... 완료
의존성 트리를 만드는 중입니다... 완료
상태 정보를 읽는 중입니다... 완료
The following additional packages will be installed:
  ncurses-term openssh-client openssh-sftp-server ssh-import-id
제안하는 패키지:
```

우분투에도 이런 식으로 설치

```
ubuntu@UbuntuDesk:~$ systemctl status sshd
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2023-12-26 09:27:28 KST; 1min 26s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
   Main PID: 2938 (sshd)
    Tasks: 1 (limit: 2262)
   Memory: 1.8M
      CPU: 15ms
   CGroup: /system.slice/ssh.service
           └─2938 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"
```

active running 상태이면 된다

```
ubuntu@UbuntuDesk:~$ ss -tuna | grep ":22"
tcp    LISTEN  0      128          0.0.0.0:22      0.0.0.0:*
tcp    LISTEN  0      128          [::]:22      [::]:*

ubuntu@UbuntuDesk:~$
```

```

ubuntu@UbuntuDesk:~$ sudo systemctl stop sshd
ubuntu@UbuntuDesk:~$ systemctl status sshd
○ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: en>
   Active: inactive (dead) since Tue 2023-12-26 09:39:52 KST; 5s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
   Process: 2938 ExecStart=/usr/sbin/sshd -D $SSHD_OPTS (code=exited, status=0>
   Main PID: 2938 (code=exited, status=0/SUCCESS)
      CPU: 16ms
lines 1-8/8 (END)

```

→ 멈추기 → inactive

```

ubuntu@UbuntuDesk:~$ sudo systemctl start sshd
ubuntu@UbuntuDesk:~$ systemctl status sshd
●ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: en>
   Active: active (running) since Tue 2023-12-26 09:40:31 KST; 2s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
   Process: 3814 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 3815 (sshd)
     Tasks: 1 (limit: 2262)
    Memory: 1.7M
       CPU: 14ms
    CGroup: /system.slice/ssh.service
           └─3815 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"
lines 1-12/12 (END)

```

→ 다시켜기

```

ubuntu@UbuntuDesk:~$ sudo systemctl disable sshd
Removed /etc/systemd/system/multi-user.target.wants/ssh.service.
Removed /etc/systemd/system/sshd.service.
ubuntu@UbuntuDesk:~$ sudo systemctl enable ssh.service

```

OpenSSH 서버를 비활성화하고, 시스템이 다시 부팅될 때 자동으로 시작되지 않도록 설정합니다.

→ 다시 활성화

```
C:\Users\user>ssh ubuntu@192.168.250.11
```

계정명 @ 서버주소

```
C:\Users\user>ssh ubuntu@192.168.250.11
The authenticity of host '192.168.250.11 (192.168.250.11)' can't be established.
ECDSA key fingerprint is SHA256:fdyFmtgMZJsiorHy/Xs6C8dLvkch53Ar1e4egsKsKQU.
Are you sure you want to continue connecting (yes/no/[fingerprint])? y
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added '192.168.250.11' (ECDSA) to the list of known hosts.
ubuntu@192.168.250.11's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-39-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

Expanded Security Maintenance for Applications is not enabled.

167 updates can be applied immediately.
128 of these updates are standard security updates.
[?] [?] [?] [?] [?] [?] [?] [?] [?] apt list --upgradable [?] [?] [?] [?] [?] .

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ubuntu@UbuntuDesk:~$
```



우분투 원격 접속

```
ubuntu@UbuntuDesk:~$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:e3:54:0f brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 85830sec preferred_lft 85830sec
    inet6 fe80::191d:2b95:bbb2:1236/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:30:00:af brd ff:ff:ff:ff:ff:ff
    inet 192.168.250.20/24 brd 192.168.250.255 scope global noprefixroute enp0s8
        valid_lft forever preferred_lft forever
    inet 192.168.250.11/24 brd 192.168.250.255 scope global secondary noprefixroute enp0s8
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe30:af/64 scope link
        valid_lft forever preferred_lft forever
```

1. lo (Loopback):

- 인터페이스 이름: lo
- 타입: 루프백 (Loopback)
- IPv4 주소: 127.0.0.1/8

1. enpos3:

- 인터페이스 이름: enpos3
- 타입: 이더넷 (Ethernet)
- 맥 주소 (MAC address): 08:00:27:e3:54:0f

1. enpos8:

- 인터페이스 이름: enpos8
- 타입: 이더넷 (Ethernet)
- 맥 주소 (MAC address): 08:00:27:30:00:af

- IPv6 주소: ::1/128
- 상태: UP (활성화)
- IPv4 주소: 10.0.2.15/24
- IPv6 주소: fe80::191d:2b95:bbb2:1236/64
- 상태: UP (활성화)
- IPv4 주소: 192.168.250.20/24 (기본 주소)
- IPv4 주소: 192.168.250.11/24 (보조 주소)
- IPv6 주소: fe80::a00:27ff:fe30:af/c
- 상태: UP (활성화)

어댑터 브릿지로 변경 후

```
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
  ethernets:
    enp0s8:
      dhcp4: yes
      #addresses: [192.168.250.20/24,192.168.250.11/24]
      #gateway4: 192.168.250.1
      #nameservers:
      #addresses: [8.8.8.8,8.8.4.4]
```

```

ubuntu@UbuntuDesk:~$ sudo netplan apply
ubuntu@UbuntuDesk:~$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:e3:54:0f brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86385sec preferred_lft 86385sec
    inet6 fe80::191d:2b95:bbb2:1236/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:30:00:af brd ff:ff:ff:ff:ff:ff
    inet 10.174.220.11/8 brd 10.255.255.255 scope global dynamic noprefixroute enp0s8
        valid_lft 86385sec preferred_lft 86385sec
    inet6 fe80::a00:27ff:fe30:af/64 scope link
        valid_lft forever preferred_lft forever
ubuntu@UbuntuDesk:~$ sudo netplan apply
ubuntu@UbuntuDesk:~$ sudo netplan apply
ubuntu@UbuntuDesk:~$ sudo vi /etc/netplan/01-network-manager-all.yaml
ubuntu@UbuntuDesk:~$

```

브릿지 연결이 뭔지 ?

→ 호스트 온리 → 내 PC 에 생성되어 있는

무선 LAN 어댑터 Wi-Fi :

```

연결별 DNS 접미사 . . . . . :
링크-로컬 IPv6 주소 . . . . . : fe80::859c:beb1:c50:f13b%8
IPv4 주소 . . . . . : 10.180.115.217
서브넷 마스크 . . . . . : 255.0.0.0
기본 게이트웨이 . . . . . : 10.128.128.128

```

→ 내 pc 에 있는 거. 가상머신 아니고 내 pc

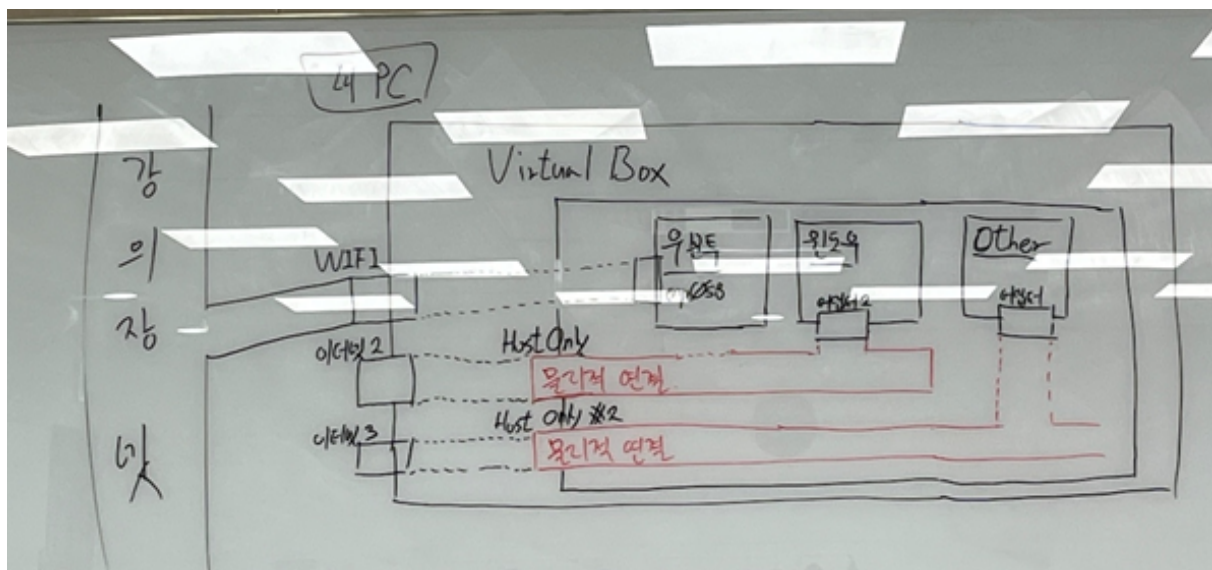
여기서 무선 lan 어댑터 WIFI : 10.180.11.217

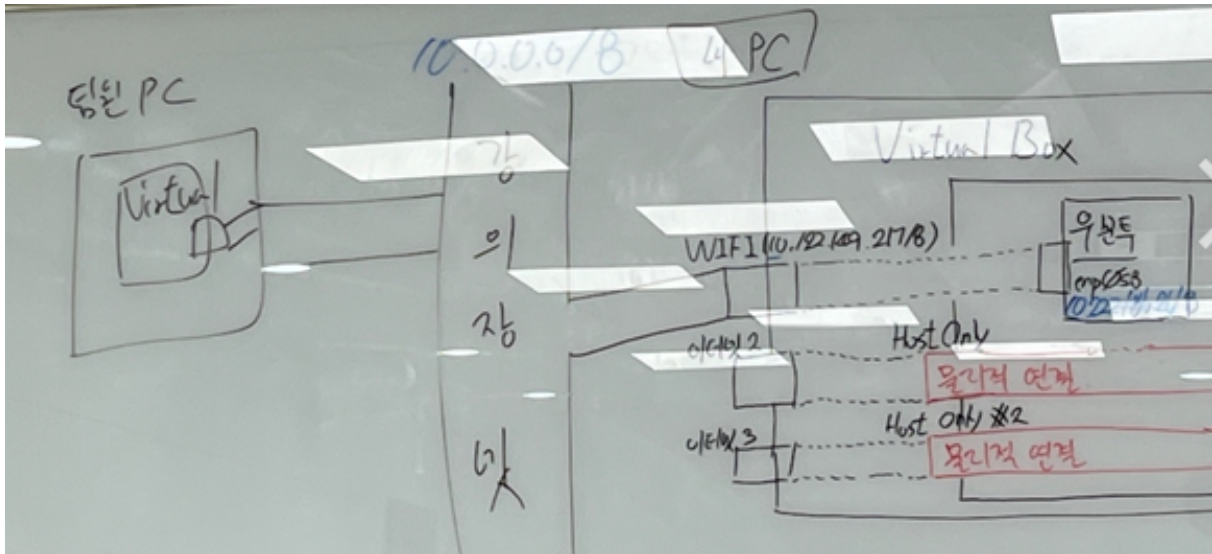
→ 서브넷 마스크 255.0.0.0 이라서 앞자리 10번만 같으면 되다는 거다

그래서 우분투를 확인해보면

```
ubuntu@UbuntuDesk:~$ ip addr
```

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group def
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP
    link/ether 08:00:27:e3:54:0f brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86385sec preferred_lft 86385sec
    inet6 fe80::191d:2b95:bbb2:1236/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP
    link/ether 08:00:27:30:00:af brd ff:ff:ff:ff:ff:ff
    inet 10.174.220.11/8 brd 10.255.255.255 scope global dynamic noprefixroute enp0s8
        valid_lft 86385sec preferred_lft 86385sec
    inet6 fe80::a00:27ff:fe30:af/64 scope link
        valid_lft forever preferred_lft forever
```





강의실 WIFI : 10.122.149.217/8

1. 호스트 전용 네트워크 (Host-Only Network):

- **개요:** 호스트 전용 네트워크는 가상 머신과 호스트 컴퓨터 사이에만 통신을 허용하는 네트워크입니다.
- **특징:**
 - 게스트 간 통신은 허용되지만, 외부 네트워크 또는 인터넷과의 통신은 차단됩니다.
 - 호스트 전용 네트워크는 보안적으로 격리된 환경을 제공하여 가상 머신 간의 내부 통신을 가능케 합니다.
 - 주로 개발 및 테스트 환경에서 사용되며, 외부와의 연결이 필요하지 않은 경우에 적합합니다.

1. 이더넷 브리지 (Ethernet Bridge):

- **개요:** 이더넷 브리지는 물리적인 네트워크와 가상 머신이나 컨테이너 등 가상 환경 간에 네트워크 통신을 중계하는 역할을 하는 장치 또는 소프트웨어입니다.
- **특징:**
 - 이더넷 브리지를 사용하면 가상 환경에서 실행 중인 여러 시스템이 물리적인 네트워크와 통신할 수 있습니다.
 - 브리지는 가상 네트워크와 물리적 네트워크 간에 패킷을 전달하여 가상 환경을 외부 네트워크와 연결합니다.
 - 주로 가상 환경을 물리적인 네트워크에 연결하여 외부에서 가상 시스템에 접근할 수 있도록 하는데 사용됩니다.

따라서 호스트 전용 네트워크는 주로 내부 통신에 중점을 둔 가상 네트워크이며, 이더넷 브리지는 가상 환경과 물리적인 네트워크 간의 통신을 가능케 하는 연결장치 또는 소프트웨어입니다.

14, 38, 41 주석 없애고

```
ubuntu@UbuntuDesk:~$ sudo vim /etc/ssh/sshd_config
```

```
ubuntu@UbuntuDesk:~$ sudo systemctl restart sshd
ubuntu@UbuntuDesk:~$
```

설정 바꾸고 난 후 재시동 해줘야해

```
Closing}
ubuntu@UbuntuDesk:~$ ss -tuna | grep ":22"
tcp    LISTEN 0      128          0.0.0.0:22      0.0.0.0:*
tcp    LISTEN 0      128          [::]:22       [::]:*
ubuntu@UbuntuDesk:~$
```

ssh 에서 사용할 키 만들어야 해

→

```
ubuntu@UbuntuDesk:~$
ubuntu@UbuntuDesk:~$ ssh-keygen
■ Generating public/private rsa key pair.
■ Enter file in which to save the key (/home/ubuntu/.ssh/id_rsa):
```

```
ubuntu@ubuntu:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key
```

공개키 개인키

public 이 있고 private 있다

공개키, 개인키 라고 보면 된다

공개키: 공유가 되어야 하는 키

개인키: 공유 x, 개인이 가지고 있어야 함, 개인이 관리해야해

```
ubuntu@ubuntu:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ubun
```

공개키 개인키

서버에 등록 개인이 보관 후 서버에 접속할 사용

```
pair.
Enter file in which to save the key (/home/ubun
```

← 개인키

id_rsa

id_rsa.pub

사용 공개키

```
ubuntu@UbuntuDesk:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ubuntu/.ssh/id_rsa):
Created directory '/home/ubuntu/.ssh'.
Enter passphrase (empty for no passphrase):
```

```
ubuntu@UbuntuDesk:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ubuntu/.ssh/id_rsa):
Created directory '/home/ubuntu/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/ubuntu/.ssh/id_rsa
Your public key has been saved in /home/ubuntu/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:dqUqNtFK0vW2F5iwqxr7E/ORjcqkc1XJtHn7DmiwJDE ubuntu@UbuntuDesk
The key's randomart image is:
+---[RSA 3072]-----+
|
|      .
|    E  o +  .
|    o..*  .o
|    . *BS+o.
|    +**B++o
|    .+o**o*  .o
|    oo=oo=  ....
|    o=oo   .. ..
+----[SHA256]-----+
ubuntu@UbuntuDesk:~$
```

```
ubuntu@UbuntuDesk:~/.ssh$ ls -la
total 16
drwx----- 2 ubuntu ubuntu 4096 12월 26 10:57 .
drwxr-x--- 15 ubuntu ubuntu 4096 12월 26 10:56 ..
-rw----- 1 ubuntu ubuntu 2602 12월 26 10:57 id_rsa
-rw-r--r-- 1 ubuntu ubuntu 571 12월 26 10:57 id_rsa.pub
ubuntu@UbuntuDesk:~/.ssh$
```

id_rsa : 개인키

id_rsa.pub : 공개키

```
ubuntu@UbuntuDesk:~/.ssh$ head -n 5 id_rsa
-----BEGIN OPENSSH PRIVATE KEY-----
b3BlbnNzaC1rZXktdjEAAAABG5vbmUAAAAEbm9uZQAAAAAAAAABAAABlwAAAAAdzc2gtcn
NhAAAAAwEAAQAAAYEAu1D3+utrvdBDpAPN+GiXWUdIhwwugix/SlsR0R+qWR0H3P5tBVK5
4QIG2icHWM0Fubuxk0yPvN3tXy+v7i10khF0o+jqziGuS2kZag0fsP5snI0vkvWf80aL
uyerHdLT0wW3oBFYppB/3WqYvj86LbR9JEB4zVKw/oTZbJ3d6Q/Y2/UyHrg31abCkiw0/e
ubuntu@UbuntuDesk:~/.ssh$ tail -n 5 id_rsa
QQJ2g8f1EPJ4CfE7bm1kvAymE1w0QQumVDBahS+b0n0290pDLm2NA1MA2oWmp/vVfGASC5
6SYh0fTS8KX955osyJIbjWzYweYH1CwLCK5WxbgFkak4IfroTm2SQWPvCHNr30/K0u3HWj
aWT4tK5tGZ6DxoHyPrpcGEla/Asi6KnyYS0cL6uZNKKQjvJtVv2/0rCXFZSh095liwyWtN
DqJW4ayghCGclnAAAAEXvidW50dUBVYnVudHVEZXNrAQ==
-----END OPENSSH PRIVATE KEY-----
```

개인키 처음, 끝에 5줄 확인해보기

이 KEY 파일 복사해서 등록해주세요 라는 과정이 있을 때 전부 다 복사해서 붙여넣어주기

퍼블릭 열어보면?

→

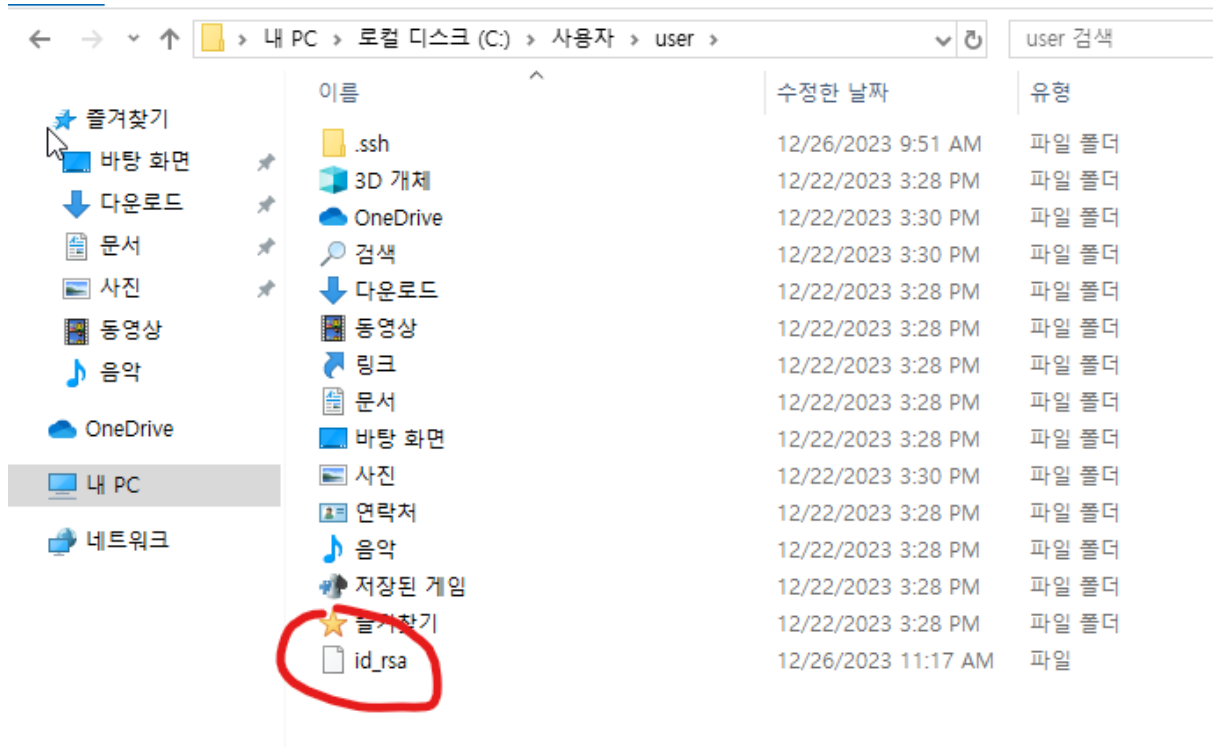
```
ubuntu@UbuntuDesk: ~/.ssh$ head -n 5 id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGC7UPf662u90E0kA834aJdZR0iHDC6CLH9KVJHRH6pZHQfc/m0FurnhAgbaJ
wdYzQVRu7GTTI+83e1fL6/uLXSSEU6j60r0Ia5LaRlqDR+w/mycjS+Sm+9Z/zRqW7J6sd2VPTBbegEVImkH/dapi+PzottH0k
QHjNURd+hNlsnd3pD9jb9TieuDfVpsKSLDT94DzYqe1kH6hvpnPxcm44r1CsF2ZqJMfcYlIxa0X5dBSC4tMX50F0NugG+b5j9
4z1LWZbqwo3vjhP9VVVIl0aRFvGw4NyZrZj6TrDqldwiz9ELWAZyTBXndKvtqBWjxkoDvTvo1rP6IGDb7DlmbU73wGz9kgHp
vvK+ar531UT4mKYtnFbVyw2vfqs2JgUypo2If/T70ojPj7mdmkJU14i7JqR6hwy+2WiCgVU8my28m10GuCUXMMW0FQsFLoPnL
z7kvXLzfN85H2ToyzXNzvj2Ryt30+syQb74vq1tqcywpBipDNZAbt9DBcekq6FsIm0= ubuntu@UbuntuDesk
ubuntu@UbuntuDesk: ~/.ssh$ tail -n 5 id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGC7UPf662u90E0kA834aJdZR0iHDC6CLH9KVJHRH6pZHQfc/m0FurnhAgbaJ
wdYzQVRu7GTTI+83e1fL6/uLXSSEU6j60r0Ia5LaRlqDR+w/mycjS+Sm+9Z/zRqW7J6sd2VPTBbegEVImkH/dapi+PzottH0k
QHjNURd+hNlsnd3pD9jb9TieuDfVpsKSLDT94DzYqe1kH6hvpnPxcm44r1CsF2ZqJMfcYlIxa0X5dBSC4tMX50F0NugG+b5j9
4z1LWZbqwo3vjhP9VVVIl0aRFvGw4NyZrZj6TrDqldwiz9ELWAZyTBXndKvtqBWjxkoDvTvo1rP6IGDb7DlmbU73wGz9kgHp
vvK+ar531UT4mKYtnFbVyw2vfqs2JgUypo2If/T70ojPj7mdmkJU14i7JqR6hwy+2WiCgVU8my28m10GuCUXMMW0FQsFLoPnL
z7kvXLzfN85H2ToyzXNzvj2Ryt30+syQb74vq1tqcywpBipDNZAbt9DBcekq6FsIm0= ubuntu@UbuntuDesk
ubuntu@UbuntuDesk: ~/.ssh$
```

```
C:\Users\user>scp <source> <target>
< was unexpected at this time.
```

<SOURCE> 는 복사할 파일 또는 디렉토리의 경로를 나타내며, <TARGET> 은 파일이나 디렉토리를 복사할 목적지의 경로를 나타냅니다.

```
C:\Users\user>scp ubuntu@192.168.56.101:~/.ssh/id_rsa ./
The authenticity of host '192.168.56.101 (192.168.56.101)' can't be established.
ECDSA key fingerprint is SHA256:fdyFmTGZjsiorHy/Xs6C8dLvkcH53Ar1e4egsKsKQU.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
Warning: Permanently added '192.168.56.101' (ECDSA) to the list of known hosts.
ubuntu@192.168.56.101's password:
id_rsa
100% 2602
C:\Users\user>
```

id_rsa 를 현재 위치로 가져오겠다



authorized_keys 파일 만들기

```
ubuntu@UbuntuDesk:~$ cd .ssh
ubuntu@UbuntuDesk:~/.ssh$ ls
id_rsa  id_rsa.pub
ubuntu@UbuntuDesk:~/.ssh$ touch authorized_keys
ubuntu@UbuntuDesk:~/.ssh$
```

```
ubuntu@UbuntuDesk:~/.ssh$ touch authorized_keys
ubuntu@UbuntuDesk:~/.ssh$ cat id_rsa.pub >> authorized_keys
```

>
=>

>> 마지막 줄에 추가

= redirection

```
ubuntu@UbuntuDesk:~/.ssh$ cat id_rsa.pub >> authorized_keys
ubuntu@UbuntuDesk:~/.ssh$ cat authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGC7UPf662u90E0kA834aJdZR0iHDC6CLH9KVJHRH6pZHQfc/
m0FurnhAgbaJwdYzQVRu7GTTI+83e1fL6/uLXSSEU6j60r0Ia5LaRlqDR+w/mycjS+Sm+9Z/zRqW7J6sd2VPT
BbegEVinkH/dapi+PzottH0kQHjNURd+hNlsnd3pD9jb9TIeuDfVpsKSLDT94DzYqe1kH6hvpnPxcm44r1CsF
2ZqJMfcYlIxa0X5dBSC4tMX50F0NugG+b5j94z1LWZbqwo3vjhp9VvVIl0aRFvGw4NyZrZj6TrDqldw1z9ElW
AyzTBXndKvtqBWjxkoDvTVo1rP6IGDb7Dlmbu73wGz9kgHpvvK+ar531UT4mKYtnFbVyw2vfqs2JgUypo2If
/T70ojPj7mdmkJU14i7JqR6hwy+2WiCgVU8my28m10GuCUXMMW0FQsFLoPnLz7kvXLzfN85H2ToyzXNzvj2Ry
t30+syQb74vq1tqcywpBipDNZAbt9DBcekq6FsIm0= ubuntu@UbuntuDesk
ubuntu@UbuntuDesk:~/.ssh$
```



```

-rw-rw-r-- 1 ubuntu ubuntu 571 12월 26 11:38 authorized_keys
-r----- 1 ubuntu ubuntu 2602 12월 26 10:57 id_rsa
-rw-r--r-- 1 ubuntu ubuntu 571 12월 26 10:57 id_rsa.pub
ubuntu@UbuntuDesk:~/ssh$

```

이렇게 키랑 비밀번호 설정해서 두 번 물어본거임

```
# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication yes
#PermitEmptyPasswords no
AuthenticationMethods publickey,password
```

```

ubuntu@UbuntuDesk:~$ ssh -i id_Rsa ubuntu@192.168.56.101
Warning: Identity file id_Rsa not accessible: No such file or directory.
ubuntu@192.168.56.101's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-39-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

Expanded Security Maintenance for Applications is not enabled.

167 updates can be applied immediately.
128 of these updates are standard security updates.
□ □ □ □ □ □ □ □ □ □ □ apt list --upgradable □ □ □ □ □ .

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Tue Dec 26 11:59:18 2023 from 192.168.56.101
ubuntu@UbuntuDesk:~$

```

ssh-keygen 은 SSH(Secure Shell) 프로토콜을 사용하여 인증하는 데 사용되는 키 쌍을 생성하는 명령어입니다. 이 명령어를 사용하면 공개키와 개인키를 생성하고, 이를 통해 안전하게 원격

서버에 로그인할 수 있습니다.

```
ubuntu@UbuntuDesk:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ubuntu/.ssh/id_rsa):
```

비번 입력 ㄴ체

```
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in ubuntu_rsa
Your public key has been saved in ubuntu_rsa.pub
The key fingerprint is:
SHA256:Ujyhef/RQl9D/A1gCiJ8mhNMyIwp2TyFwtY1ANIA5QY ubuntu@UbuntuDesk
The key's randomart image is:
+---[RSA 3072]-----+
|E&+0*o. o  o...|
|B=X.+o= o o o.|
|o.o. =o = . . o+|
|. + o o . o .+|
|.. S . o o|
|. . o|
|. |
```

ssh

서버에 등록

→ scp

```
.../ubuntu_rsa.pub - no such file or directory
C:\Users\User>scp -i id_rsa ubuntu_rsa.pub ubuntu@192.168.56.101:~/.ssh/
ubuntu@192.168.56.101's password:
ubuntu_rsa.pub                                100% 570    41.5KB/s   00:00
C:\Users\User>
```

```
42 updates can be applied immediately.
추가 업데이트를 확인하려면 apt list --upgradable 을 실행하세요.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Tue Dec 26 13:07:57 2023 from 192.168.56.102
ubuntu@UbuntuDesk:~$ cd .ssh
ubuntu@UbuntuDesk:~/.ssh$ ls -la
total 24
drwx----- 2 ubuntu ubuntu 4096 12월 26 13:12 .
drwxr-x--- 18 ubuntu ubuntu 4096 12월 26 13:06 ..
-rw-rw-r-- 1 ubuntu ubuntu 571 12월 26 11:38 authorized_keys
-r----- 1 ubuntu ubuntu 2602 12월 26 10:57 id_rsa
-rw-r--r-- 1 ubuntu ubuntu 571 12월 26 10:57 id_rsa.pub
-rw-rw-r-- 1 ubuntu ubuntu 570 12월 26 13:12 ubuntu_rsa.pub
ubuntu@UbuntuDesk:~/.ssh$
```

```
drwx----- 2 ubuntu ubuntu 4096 12월 26 13:12 .
drwxr-x--- 18 ubuntu ubuntu 4096 12월 26 13:06 ..
-rw-rw-r-- 1 ubuntu ubuntu 571 12월 26 11:38 authorized_keys
-r----- 1 ubuntu ubuntu 2602 12월 26 10:57 id_rsa
-rw-r--r-- 1 ubuntu ubuntu 571 12월 26 10:57 id_rsa.pub
-rw-rw-r-- 1 ubuntu ubuntu 570 12월 26 13:12 ubuntu_rsa.pub
ubuntu@UbuntuDesk:~/.ssh$ cat ubuntu_rsa.pub >>

```

Windows 정동 안
[실정]으로 이동하여 Win

17개 항목 2개 항목 선택됨 3.14KB

```
Last login: Tue Dec 26 13:07:57 2023 from 192.168.56.102
ubuntu@UbuntuDesk:~$ cd .ssh
ubuntu@UbuntuDesk:~/.ssh$ ls -la
total 24
drwx----- 2 ubuntu ubuntu 4096 12월 26 13:12 .
drwxr-x--- 18 ubuntu ubuntu 4096 12월 26 13:06 ..
-rw-rw-r-- 1 ubuntu ubuntu 571 12월 26 11:38 authorized_keys
-r----- 1 ubuntu ubuntu 2602 12월 26 10:57 id_rsa
-rw-r--r-- 1 ubuntu ubuntu 571 12월 26 10:57 id_rsa.pub
-rw-rw-r-- 1 ubuntu ubuntu 570 12월 26 13:12 ubuntu_rsa.pub
ubuntu@UbuntuDesk:~/.ssh$ cat ubuntu_rsa.pub >> authorized_keys
ubuntu@UbuntuDesk:~/.ssh$ cat authorized_keys
```

다시 :

이번에 한 건 뭐냐면 아까 했던 건 우분투에서 키를 만들고 등록시켜서 접근 할 수 있었던 건데 지금은 윈도우에서 키값을 만들어서 이걸 우분투에 복사시켜 놓고 (이 이유는 아까는 우분투에서 직접 만들었으니까 접속이 가능한데 윈도우에서 마음대로 만들면 문제가 되기 때문에 authorized_keys에 복사해 놓은 것)

윈도우에서 우분투로 접속하는 걸 해본거다.

```
C:\Users\user>ssh-keygen
'ssh-keygen' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\user>ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (C:\Users\user\.ssh\id_rsa): ubuntu_rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in ubuntu_rsa.
Your public key has been saved in ubuntu_rsa.pub.
The key fingerprint is:
SHA256:Zeoe6hEIUiNaq9EfFi4DTmApo+xtz8XZR8YCwLZQQuI user@WindowDesk
The key's randomart image is:
+---[RSA 3072]-----+
| =+*o+o. |
| OB.=.+ . |
| BE* * . . + |
```

윈도우에서 ubuntu_rsa 만들고

```
C:\Users\user>scp -i id_rsa ubuntu_rsa.pub ubuntu@192.168.56.101:~/.ssh
ubuntu@192.168.56.101's password:
ubuntu_rsa.pub 100% 570 0.6KB/s

C:\Users\user>cd .ssh
C:\Users\user\.ssh>ls -al
```

우분투에 복사해

```
C:\Users\user>ssh -i id_rsa ubuntu@192.168.56.101
ubuntu@192.168.56.101's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-39-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

Expanded Security Maintenance for Applications is not enabled.

167 updates can be applied immediately.
128 of these updates are standard security updates.
[[[[]]]] apt list --upgradable [[[]]] .
```

그리고 우분투 접속해

ssh

```
Last login: Tue Dec 26 13:36:10 2023 from 192.168.56.1
ubuntu@UbuntuDesk:~$ cd .ssh
ubuntu@UbuntuDesk:~/\.ssh$ cat ubuntu_rsa.pub >> authorized_keys
ubuntu@UbuntuDesk:~/\.ssh$ exit
logout
Connection to 192.168.56.101 closed.

C:\Users\user>ssh -i ubuntu_rsa ubuntu@192.168.56.101
Enter passphrase for key 'ubuntu_rsa':
Enter passphrase for key 'ubuntu_rsa':
ubuntu@192.168.56.101's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-39-generic x86_64)

* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/advantage
```

그리고 우분투 .ssh 이동해가지고 ubuntu rsa.pub을 authorized keys 에 복사하고 나가

그리고

```
C:\Users\user>scp -i id_rsa ubuntu_rsa.pub ubuntu@192.168.56.101:~/ssh
ubuntu@192.168.56.101's password:
ubuntu_rsa.pub 100% 570 0.6KB/s
C:\Users\user>cd .ssh
C:\Users\user\.ssh>ls -al
```

```
C:\Users\user>ssh -i ubuntu_rsa ubuntu@192.168.56.101
Enter passphrase for key 'ubuntu_rsa':
Enter passphrase for key 'ubuntu_rsa':
ubuntu@192.168.56.101's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-39-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

Expanded Security Maintenance for Applications is not enabled.

167 updates can be applied immediately.
128 of these updates are standard security updates.
□ □  □ □ □ □ □  □ □ □ □ □  apt list --upgradable □  □ □ □ □ □ .

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Tue Dec 26 13:40:57 2023 from 192.168.56.1
ubuntu@UbuntuDesk:~$
```

ubuntu_rsa로 들어와보기

ssh config 파일을 사용하여 연결하는 방법

 config (~#.ssh) - VIM

```
Host myserver
    HostName 192.168.56.101
    User ubuntu
    Port 22
    IdentityFile C:\Users\user\id_rsa
```

~

~

일단 윈도우의 .ssh 에 config 파일을 만들고

→ ssh myserver

```
C:\Users\user\.ssh>ssh minserver
ubuntu@192.168.56.101's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-39-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

Expanded Security Maintenance for Applications is not enabled.

167 updates can be applied immediately.
128 of these updates are standard security updates.
[?] [?] [?] [?] [?] [?] [?] [?] [?] [?] [?] apt list --upgradable [?] [?] [?] [?] [?] .

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Tue Dec 26 15:01:46 2023 from 192.168.56.1
ubuntu@UbuntuDesk:~$
```



```

C:\Users\user>ssh minserver "ls -la"
ubuntu@192.168.56.101's password:
total 104
drwxr-x--- 15 ubuntu ubuntu 4096 12 26 15:04 .
drwxr-xr-x  4 root    root   4096 12 22 11:01 ..
-rw-r----- 1 ubuntu ubuntu 2759 12 26 15:38 .bash_history
-rw-r--r--  1 ubuntu ubuntu  220 12 22 10:49 .bash_logout
-rw-r--r--  1 ubuntu ubuntu 3771 12 22 10:49 .bashrc
drwx----- 10 ubuntu ubuntu 4096 12 26 09:51 .cache
drwx----- 11 ubuntu ubuntu 4096 12 22 11:01 .config
-rw-----  1 ubuntu ubuntu   20 12 26 09:41 .lessht
drwx-----  3 ubuntu ubuntu 4096 12 22 10:57 .local
-rw-r--r--  1 ubuntu ubuntu  354 12 22 10:57 .pam_environment
-rw-r--r--  1 ubuntu ubuntu  807 12 22 10:49 .profile
drwx-----  2 ubuntu ubuntu 4096 12 26 15:04 .ssh
-rw-----  1 ubuntu ubuntu 1023 12 26 15:04 .viminfo
-rw-rw-r--  1 ubuntu ubuntu    0 12 22 13:49 10.txt
-rw-rw-r--  1 ubuntu ubuntu    6 12 22 13:45 file.txt
-rw-rw-r--  1 ubuntu ubuntu   50 12 22 13:33 mylog
drwx-----  3 ubuntu ubuntu 4096 12 22 10:57 snap
-rw-----  1 ubuntu ubuntu 2655 12 26 13:28 ubuntu_rsa
-rw-r--r--  1 ubuntu ubuntu  571 12 26 13:28 ubuntu_rsa.pub
drwxr-xr-x  2 ubuntu ubuntu 4096 12 22 10:58 0
drwxr-xr-x  2 ubuntu ubuntu 4096 12 22 10:58 0 0 0 0
drwxr-xr-x  2 ubuntu ubuntu 4096 12 22 10:58 0 0
drwxr-xr-x  2 ubuntu ubuntu 4096 12 22 10:58 0 0 0 0
drwxr-xr-x  2 ubuntu ubuntu 4096 12 22 10:58 0 0
drwxr-xr-x  2 ubuntu ubuntu 4096 12 22 10:58 0 0
drwxr-xr-x  2 ubuntu ubuntu 4096 12 22 10:58 0 0
drwxr-xr-x  2 ubuntu ubuntu 4096 12 22 10:58 0 0 0
C:\Users\user>_

```

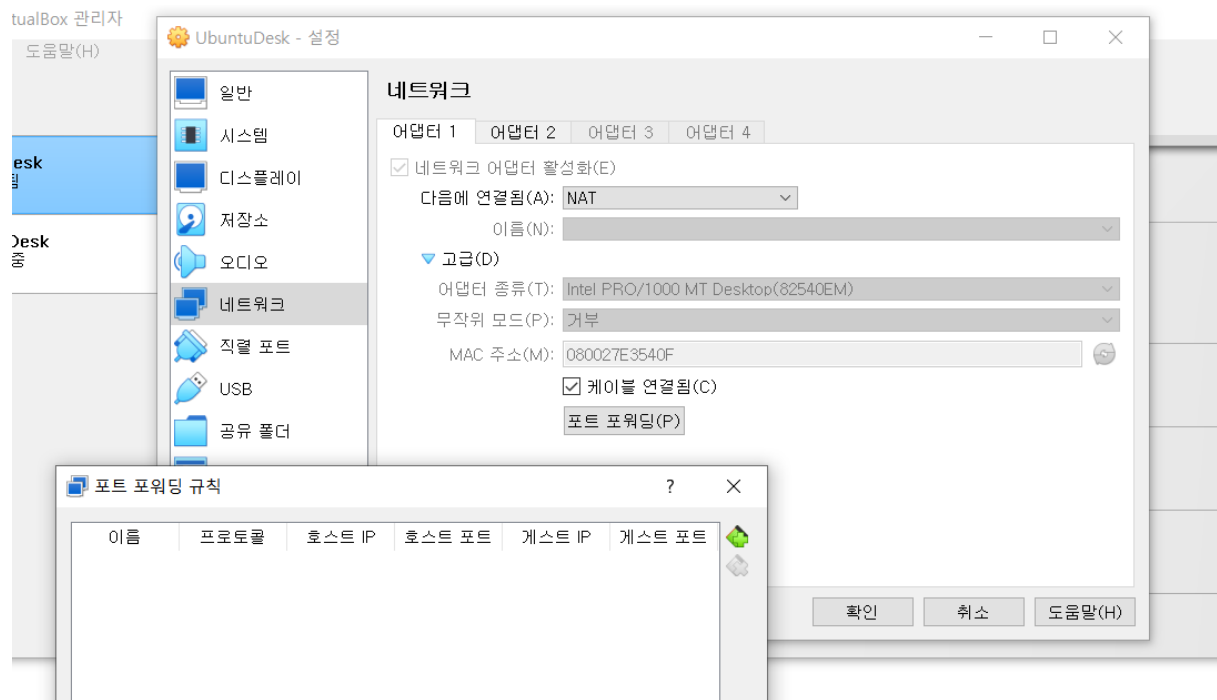
"ls -la" 명령은 Unix/Linux 계열 운영 체제에서 디렉토리 내의 파일 및 디렉토리 리스트를 표시하는 명령어

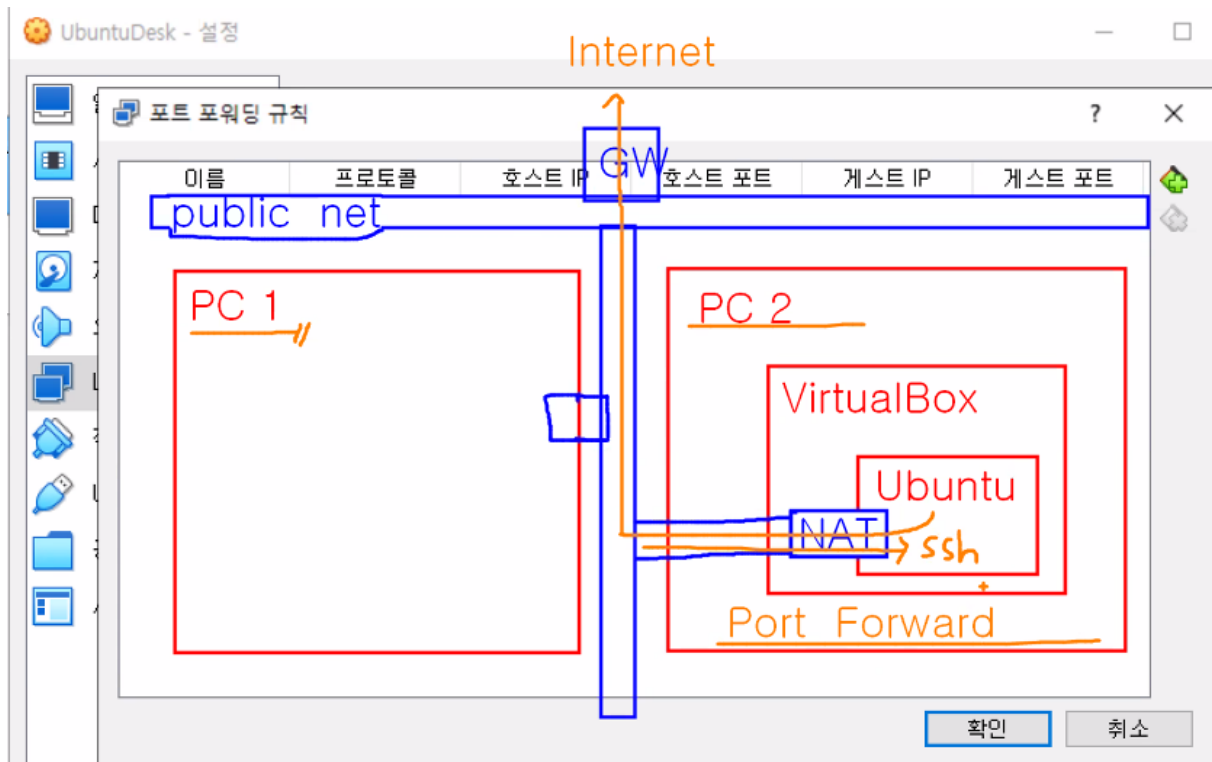
*제목 없음 - Windows 메모장
파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)

```
scp -i c:\Users\user\id_rsa <Source> <Target>
```

로컬에서 -> 원격지 ./file ubuntu@192.168.56.102:~/
원격지에서 -> 로컬 ubuntu@192.168.56.102:~/file ./

L 포트포워딩





포트 포워딩 규칙

이름	프로토콜	호스트 IP	호스트 포트	게스트 IP	게스트 포트
SSH	TCP	10.180.115.217	22	10.0.2.15	22

확인 취소

이렇게 포트 포워딩 설정해주고

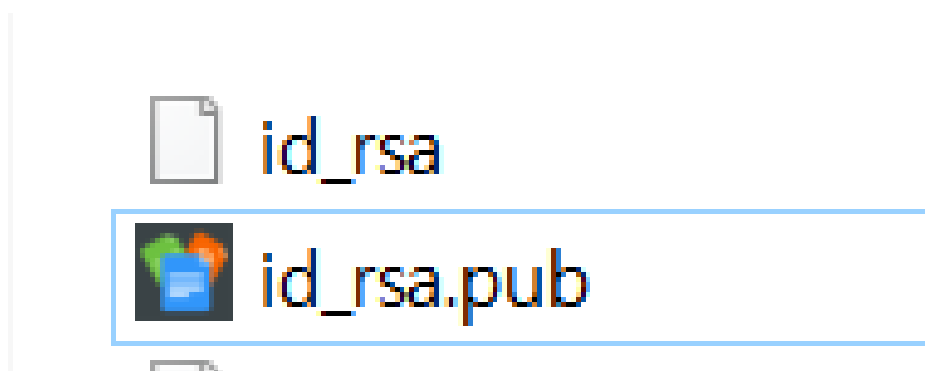
```

C:\Users\mzc>ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (C:\Users\mzc\.ssh/id_rsa):
Created directory 'C:\Users\mzc\.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in C:\Users\mzc\.ssh/id_rsa.
Your public key has been saved in C:\Users\mzc\.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:i0zoismID4RMtKezJdq0gao02Hm0kb2rjVU+4QkF5Xk mzc@DESKTOP-E682AC4
The key's randomart image is:
+---[RSA 3072]---+
| . . . |
| . . o . |
| o . + E |
|+.o. o o |
|o*o.+ + S |
|+=0 = o |
|*.0 = = |
|*+ 0 . . |
|X=*. =. |
+---[SHA256]---+

C:\Users\mzc>systemctl status ssh
'systemctl' is not recognized as an internal or external command,

```

로컬에서 key-gen 만들어주고



이거 복붙한 걸

→ 우분투에 가서

vi .ssh/auth~

```
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQgQDu6VQVKH6LVNJUVIXeuJX9CxGJZQJtiP8BNMD86z4XtbQGk6dcWN9fb
n3IhmK75vJkFTWBo0PCiy0neMIG7bPWTgyIz93vFgWCJLYblNcoZCIC0kNn10sDtZgM91A25ietZ4CtIm2/Kq2GWV/hh
C7lStN01t0iV0h8i07E4fDG49ekpk+R/vcjoUFAOJ3GfLkC5QjLMq0JyWo0biH6TLmd3Yy2e2W525MmknKafXI+JwKcf2
ngoRzqeF2cUmi4YJk7Cs6JrC2Dfft7zT5bzimJVKeqBvZFhyUpQNTGSF6yJJhKAgLBmEAiD3iiJkTsBC2XxMbuZC+I0F
opA1gqAYt3xAWLKDX3cy4iCfTEkLLpFHBqHTKcQJ8Efvc0Act8BqXoy6ACXf5Nx3HtHvGkvZtbjNNshyaXke1xGo/2YgW
td3/1qTjNoQNB9ez53Ek17gIGXd6LbX5X4j3o1gTZR2qvxnL5cevjbK3MS6Dfo6ZxA2zDoJ2tS9GQHwKouce6M= user@
WindowDesk
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQgQD8pg1qsvkj6VRPy8RFvkP6Sjvh4UeUCRRGdlCwu4V3/k9+HyQIQZUYC
zzxHwFspA6Wg08+4pachhTLkISqgBffsi5ij817T6QopFj2aGN9EWB4WIZPj2hXMJNP6lrD1bN9/QU9nMwofl9R7diNJ
aKy/XNFoAEYpVSECX32M8bFgzpVjQyyZXvbxZ5L+Gro86eupBIvp30fQLd1A+4Jb2Vy4w9zAbGjUYUowf1WR5i4fpgnHi
JicLxXmxfgvXLPjCHLNCC6Rh0V3rnG5pjo0TtLZ9ft/69kZ0AtrSyDew1dFS4feGLgYVNz39f8LdFkAvsIegGi6wPxQu
fIJ4b25EWKgYV2hk630UBvvbjEXwc6HSVSsczrofm0XKwwxp1pz5jnMon2E1gkWPzRiAV4IUjzoqjzj2p5uSbK69M/Esq
mw3nUzohLkq1YNao95eB7k31I6g/NWRT+6BCIjJswwiJmxs9D4BY+E2+vv3PRTmuejAfLFENyaRL88Wt4D6GjU= mzc@D
ESKTOP-E682AC4
```

겨우 복붙해주고~

다시 로컬로 돌아와서

```
C:\Users\mzc>ssh ubuntu@10.180.115.217
The authenticity of host '10.180.115.217 (10.180.115.217)' can't be established.
ECDSA key fingerprint is SHA256:fdyFmtgMZJsiorHy/Xs6C8dLvkh53Arie4egsKsKQU.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.180.115.217' (ECDSA) to the list of known hosts.
ubuntu@10.180.115.217's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-39-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

Expanded Security Maintenance for Applications is not enabled.

167 updates can be applied immediately.
128 of these updates are standard security updates.
추가 업데이트를 확인하려면 apt list --upgradable 을 실행하세요.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Tue Dec 26 16:49:32 2023 from 192.168.56.1
ubuntu@UbuntuDesk:~$
```

이렇게 하면 접속 완료