

제04장

SSH 서버 접속

DevOps

학습목표

1. SSH에 대해서 이해할 수 있다.
2. PuTTY를 설치할 수 있다.
3. 포트 포워딩을 이해하고 설정할 수 있다.
4. PuTTY를 이용해 접속할 수 있다.
5. MobaXterm을 설치할 수 있다.
6. MobaXterm을 이용해 접속할 수 있다.

```
each: function(e, t, n) {  
    i = 0,  
    o = e.length,  
    a = M(e);  
    if (n) {  
        if (a) {  
            for (; o > i; i++)  
                if (r = t.apply(e[i], n), r ===  
            ) else  
                for (i in e)  
                    if (r = t.apply(e[i], n), r ===  
        ) else if (a) {  
            for (; o > i; i++)  
                if (r = t.call(e[i], i, e[i])  
            ) else  
                for (i in e)  
                    if (r = t.call(e[i], i, e[i])  
        ) return e  
    },  
    trim: b && !b.call("\uffff\u00a0") ?  
        return null == e ? "" : b.call(  
    } : function(e) {  
        return null == e ? "" : (e +  
    },  
    makeArray: function(e, t) {  
        var n = t || [];  
        return null != e && (M(Ob  
    },  
    isArray: function(e, t, n) {  
        var r;  
        if (t) {  
            if (m) return m.c  
            for (n = t.length  
                if (n in t  
        )  
    }
```

목차

1. SSH
2. PuTTY 설치
3. 포트 포워딩
4. PuTTY 접속
5. MobaXterm 설치
6. MobaXterm 접속

```

each: function(e, t, n) {
  var r, i = 0,
      o = e.length,
      a = M(e);
  if (n) {
    if (a) {
      for (; o > i; i++)
        if (r = t.apply(e[i], n), r === !1) break;
    } else
      for (i in e)
        if (r = t.apply(e[i], n), r === !1) break;
  } else if (a) {
    for (; o > i; i++)
      if (r = t.call(e[i], e[i]), r === !1) break;
  } else
    for (i in e)
      if (r = t.call(e[i], e[i]), r === !1) break;
  return e;
},
trim: b && !b.call("\uffff\u00a0") ? function(e) {
  return null == e ? "" : b.call(e);
} : function(e) {
  return null == e ? "" : (e + "").replace(C, "");
},
makeArray: function(e, t) {
  var n = t || [];
  return null != e && (M(Object(e)) ? x.merge(n, "string"
),
isArray: function(e, t, n) {
  var r;
  if (t) {
    if (n) return m.call(t, e, n);
    for (r = t.length, r = r ? 0 > n ? Math.max(0, r + n) : n : 0; r < n; r++)
      if (n in t && t[r] === e) return r;
  }
}

```

01. SSH

■ SSH

- Secure Shell
- 네트워크 상의 다른 컴퓨터에 접속하기 위해 사용하는 네트워크 프로토콜 또는 터미널 프로그램을 의미함
- 기존의 Telnet을 대체한 보안 접속 프로토콜
- 기본 포트 번호 22번을 사용함
- 주요 기능
 - 터미널(TTY: TeleTYpewriter) 기능
 - 파일 복사 및 전송(SCP/SFTP) 기능
 - 터널링 구현 기능

SSH 서버 구축

■ SSH 서버 구축 과정

1. 패키지 설치
 - 대표적으로 OpenSSH
2. 접속 테스트
 - ssh 명령
 - 클라이언트 프로그램 이용 (PuTTY, MobaXterm 등)
3. 공개키/개인키 쌍을 생성하여 비밀번호 대체
 - ssh-keygen 명령
 - 클라이언트 프로그램 이용 (예 : puttygen.exe)
 - AWS Keypair 생성
4. OpenSSH 호스트 설정
 - sshd_config 파일 설정

OpenSSH

■ OpenSSH

- SSH 서버를 구현하기 위한 패키지 중 하나
- 가장 널리 사용되는 무료 패키지
- Windows 운영체제의 경우 선택적 기능 추가를 통해 추가 가능
- Linux 운영체제의 경우 운영체제 설치 과정에서 선택하여 설치하거나 이미 설치되어 있는 경우가 있음

■ RSA

- Rivest-Shamir-Adlema
- 1977년 알고리즘을 개발한 리베스트-샤미르-애들먼의 이름을 따서 지은 이름
- 공개키 암호화 방식 중 하나
- 호스트에 특정 계정이 접속할 때 클라이언트의 자격 증명을 상호 보유한 키 쌍의 매칭 여부로 판단하는 암호화 방식

공개키와 개인키

■ 공개키와 개인키 생성

- 셸에서 ssh-keygen 명령을 이용해 공개키와 개인키 쌍을 생성함
- 형식
 - ssh-keygen -t <암호화 알고리즘> -b <암호화 비트>
 - <암호화 알고리즘> : rsa / dsa / ecdsa / ed25519 등
 - <암호화 비트> : 2048 / 4096 등

ssh-keygen 명령 예시

■ \$ ssh-keygen -t rsa -b 2048

Generating public/private rsa key pair.

Enter file in which to save the key (<홈 디렉터리>/ssh/id_rsa):

Created directory '<홈 디렉터리>/ssh'.

Enter passphrase (empty for no passphrase):

Enter same passphrase again:

Your identification has been saved in <홈 디렉터리>/ssh/id_rsa

Your public key has been saved in <홈 디렉터리>/ssh/id_rsa.pub

The key fingerprint is:

SHA256:<SHA256해시값> <계정명>@<계정생성한호스트명>

The key's randomart image is:

```
+---[RSA 2048]-----+
|           . o .           |
|           B o             |
|        .ooo B .           |
|        ++00+ o            |
|        . +S .             |
|        =.*0. .            |
|        + /++0+            |
|        oX+=oEo.           |
|        .*0..0..           |
+-----[SHA256]-----+
```

← 기본값 그대로 사용

← 개인키 유출을 대비해 비밀번호 생성

← 비밀번호 재입력

← 개인키 파일

← 공개키 파일 (파일명을 OpenSSH에서 사용하는 authorized_keys로 변경하고 호스트의 <홈 디렉터리> 하위에 있는 .ssh 디렉터리에 복사)

← 암호화 알고리즘

← 생성된 키를 표현하는 텍스트 이미지

← 해시알고리즘

SSH 서버에 접속하기

■ ssh 명령 이용하기

- 셸에서 ssh 명령을 이용하여 접속
- 형식
 - `ssh <호스트계정>@<호스트IP> -p <접속 포트> -i <개인키경로>/<개인키파일명>`

■ SSH 전용 클라이언트 프로그램 이용하기

- 클라이언트 프로그램을 이용하여 SSH 접속 가능
- 주요 클라이언트 프로그램
 - PuTTY
 - MobaXterm
 - FileZilla
 - Visual Studio Code 등 IDE 내의 확장 기능 활용

```

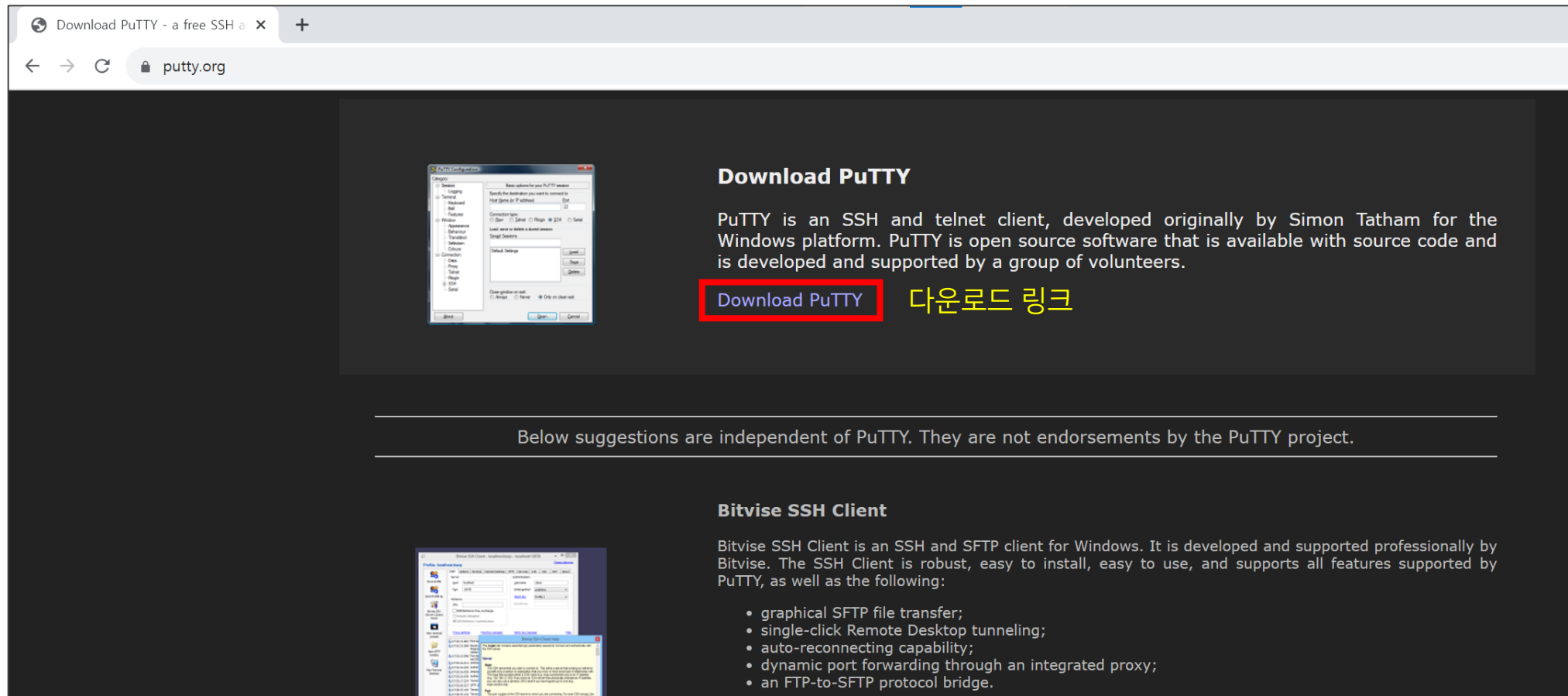
each: function(e, t, n) {
    var r, i = 0,
        o = e.length,
        a = M(e);
    if (n) {
        if (a) {
            for (; o > i; i++)
                if (r = t.apply(e[i], n), r === !1) break;
        } else
            for (i in e)
                if (r = t.apply(e[i], n), r === !1) break;
    } else if (a) {
        for (; o > i; i++)
            if (r = t.call(e[i], e[i]), r === !1) break;
    } else
        for (i in e)
            if (r = t.call(e[i], e[i]), r === !1) break;
    return e;
},
trim: b && !b.call("\uffff\u00a0") ? function(e) {
    return null == e ? "" : b.call(e);
} : function(e) {
    return null == e ? "" : (e + "").replace(C, "");
},
makeArray: function(e, t) {
    var n = t || [];
    return null != e && (M(Object(e)) ? x.merge(n, "string"
    );
inArray: function(e, t, n) {
    var r;
    if (t) {
        if (n) return m.call(t, e, n);
        for (r = t.length, r = r ? 0 > n ? Math.max(0, r + n) : n; r < t.length; r++)
            if (n in t && t[n] === e) return n;
    }
}

```

02. PuTTY 설치

■ PuTTY

- 리눅스 운영체제가 설치된 가상 머신과 통신할 무료 터미널 프로그램 중 하나
- <https://putty.org>



The screenshot shows the PuTTY website with a dark theme. At the top, there's a browser tab titled 'Download PuTTY - a free SSH' and the address bar shows 'putty.org'. The main content area features a 'Download PuTTY' section with a small image of the PuTTY configuration window. To the right of the image, the text describes PuTTY as an SSH and telnet client developed by Simon Tatham. Below this, a red box highlights the 'Download PuTTY' link, followed by the Korean text '다운로드 링크'. A horizontal line separates this section from the 'Bitvise SSH Client' section below. The Bitvise section includes a small image of the Bitvise SSH Client interface and a list of features it supports.

Download PuTTY

PuTTY is an SSH and telnet client, developed originally by Simon Tatham for the Windows platform. PuTTY is open source software that is available with source code and is developed and supported by a group of volunteers.

[Download PuTTY](#) 다운로드 링크

Below suggestions are independent of PuTTY. They are not endorsements by the PuTTY project.

Bitvise SSH Client

Bitvise SSH Client is an SSH and SFTP client for Windows. It is developed and supported professionally by Bitvise. The SSH Client is robust, easy to install, easy to use, and supports all features supported by PuTTY, as well as the following:

- graphical SFTP file transfer;
- single-click Remote Desktop tunneling;
- auto-reconnecting capability;
- dynamic port forwarding through an integrated proxy;
- an FTP-to-SFTP protocol bridge.

사용 방식 선택

■ 2가지 사용 방식 지원

1. installer 받아서 설치하기
2. 독립 실행 파일 받아서 설치 안하고 사용하기

1. putty.exe
(installer)



2. putty.zip
(독립 실행 파일)



The screenshot shows the 'Download PuTTY: latest release' page. The browser address bar shows 'chiark.greenend.org.uk/~sgtatham/putty/latest.html'. The page has a green header 'Alternative binary files'. Below it, text explains that installer packages provide versions of all files except PuTTYtel and pterm, but standalone versions are available. A note asks if the user wants the 32-bit or 64-bit version, referring to a FAQ entry. The page lists download links for 'putty.exe (the SSH and Telnet client itself)' and 'pscp.exe (an SCP client, i.e. command-line secure file copy)'. For each, there are links for 64-bit x86, 64-bit Arm, and 32-bit x86, each with a signature link. Below these, there are links for 'putty.zip (a .ZIP archive of all the above except PuTTYtel and pterm)' in the same three architectures, also with signature links. A red box highlights the 'putty.exe' links, and another red box highlights the 'putty.zip' links. A red arrow points from the '1. putty.exe (installer)' text to the first red box. Another red arrow points from the '2. putty.zip (독립 실행 파일)' text to the second red box. To the right of the 'putty.zip' links, there is a box listing other executables: PAGEANT.EXE, PLINK.EXE, PSCP.EXE, PSFTP.EXE, PUTTY.EXE, and PUTTYGEN.EXE. The page also has a 'Documentation' section at the bottom.

Download PuTTY: latest release x +

chiark.greenend.org.uk/~sgtatham/putty/latest.html

Alternative binary files

The installer packages above will provide versions of all of these (except PuTTYtel and pterm), but you can download standalone one if you prefer.

(Not sure whether you want the 32-bit or the 64-bit version? Read the [FAQ entry](#).)

putty.exe (the SSH and Telnet client itself)

64-bit x86: [putty.exe](#) [\(signature\)](#)

64-bit Arm: [putty.exe](#) [\(signature\)](#)

32-bit x86: [putty.exe](#) [\(signature\)](#)

pscp.exe (an SCP client, i.e. command-line secure file copy)

64-bit x86: [pscp.exe](#) [\(signature\)](#)

64-bit Arm: [pterm.exe](#) [\(signature\)](#)

32-bit x86: [pterm.exe](#) [\(signature\)](#)

putty.zip (a .ZIP archive of all the above except PuTTYtel and pterm)

64-bit x86: [putty.zip](#) [\(signature\)](#)

64-bit Arm: [putty.zip](#) [\(signature\)](#)

32-bit x86: [putty.zip](#) [\(signature\)](#)

PAGEANT.EXE

PLINK.EXE

PSCP.EXE

PSFTP.EXE

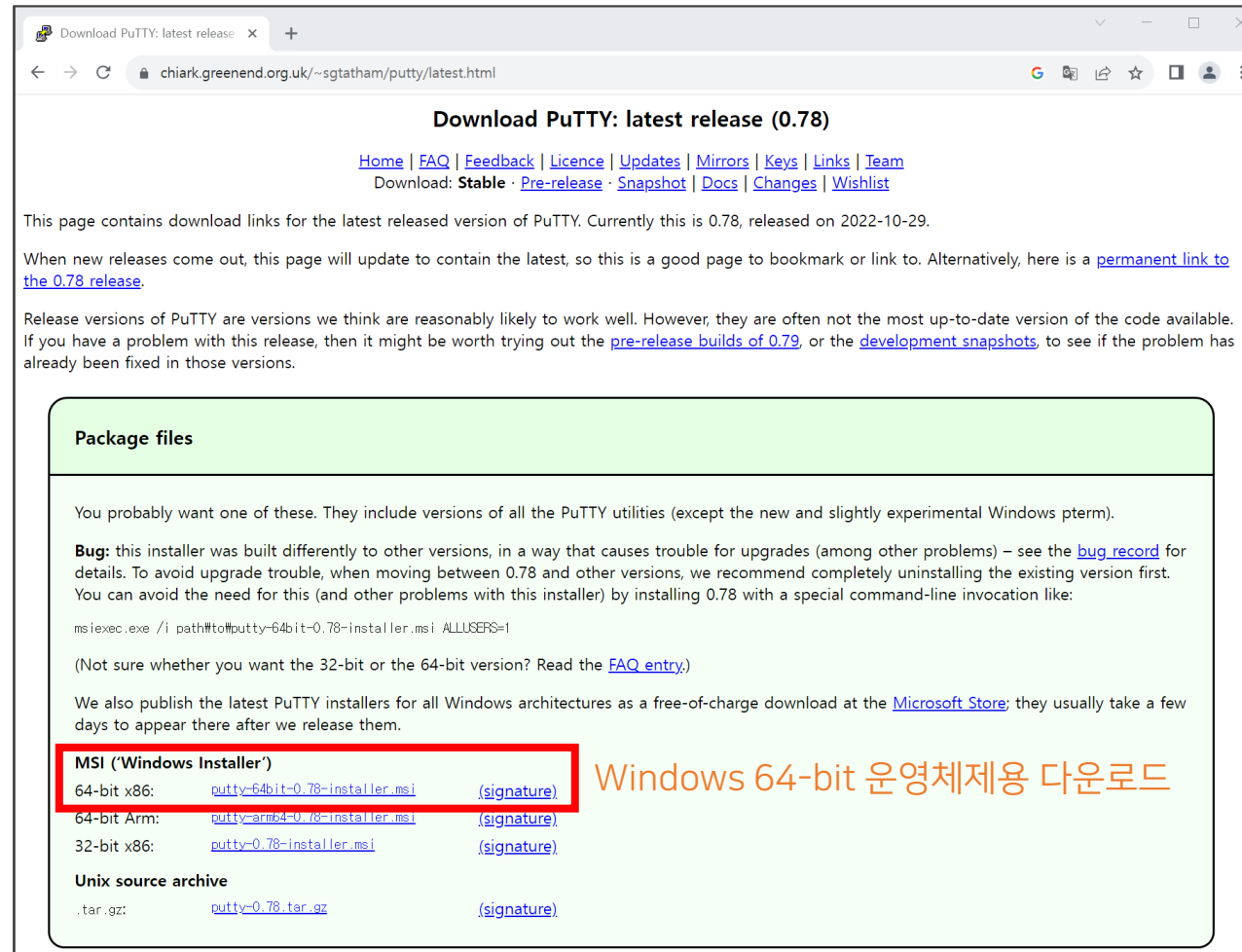
PUTTY.EXE

PUTTYGEN.EXE

Documentation

Installer를 이용한 설치

■ Package files - MSI (Windows Installer) 다운로드



The screenshot shows the 'Download PuTTY: latest release (0.78)' page. It includes navigation links, a description of the page's purpose, and a section titled 'Package files'. Within this section, the 'MSI (Windows Installer)' subsection is highlighted with a red box, listing download links for 64-bit x86, 64-bit Arm, and 32-bit x86 versions, each with a signature link. To the right of this box, the text 'Windows 64-bit 운영체제용 다운로드' is displayed.

Download PuTTY: latest release (0.78)

[Home](#) | [FAQ](#) | [Feedback](#) | [Licence](#) | [Updates](#) | [Mirrors](#) | [Keys](#) | [Links](#) | [Team](#)
Download: [Stable](#) · [Pre-release](#) · [Snapshot](#) | [Docs](#) | [Changes](#) | [Wishlist](#)

This page contains download links for the latest released version of PuTTY. Currently this is 0.78, released on 2022-10-29.

When new releases come out, this page will update to contain the latest, so this is a good page to bookmark or link to. Alternatively, here is a [permanent link to the 0.78 release](#).

Release versions of PuTTY are versions we think are reasonably likely to work well. However, they are often not the most up-to-date version of the code available. If you have a problem with this release, then it might be worth trying out the [pre-release builds of 0.79](#), or the [development snapshots](#), to see if the problem has already been fixed in those versions.

Package files

You probably want one of these. They include versions of all the PuTTY utilities (except the new and slightly experimental Windows pterm).

Bug: this installer was built differently to other versions, in a way that causes trouble for upgrades (among other problems) – see the [bug record](#) for details. To avoid upgrade trouble, when moving between 0.78 and other versions, we recommend completely uninstalling the existing version first. You can avoid the need for this (and other problems with this installer) by installing 0.78 with a special command-line invocation like:

```
msiexec.exe /i path\to\putty-64bit-0.78-installer.msi ALLUSERS=1
```

(Not sure whether you want the 32-bit or the 64-bit version? Read the [FAQ entry](#).)

We also publish the latest PuTTY installers for all Windows architectures as a free-of-charge download at the [Microsoft Store](#); they usually take a few days to appear there after we release them.

MSI (Windows Installer)

64-bit x86:	putty-64bit-0.78-installer.msi	(signature)
64-bit Arm:	putty-arm64-0.78-installer.msi	(signature)
32-bit x86:	putty-0.78-installer.msi	(signature)

Unix source archive

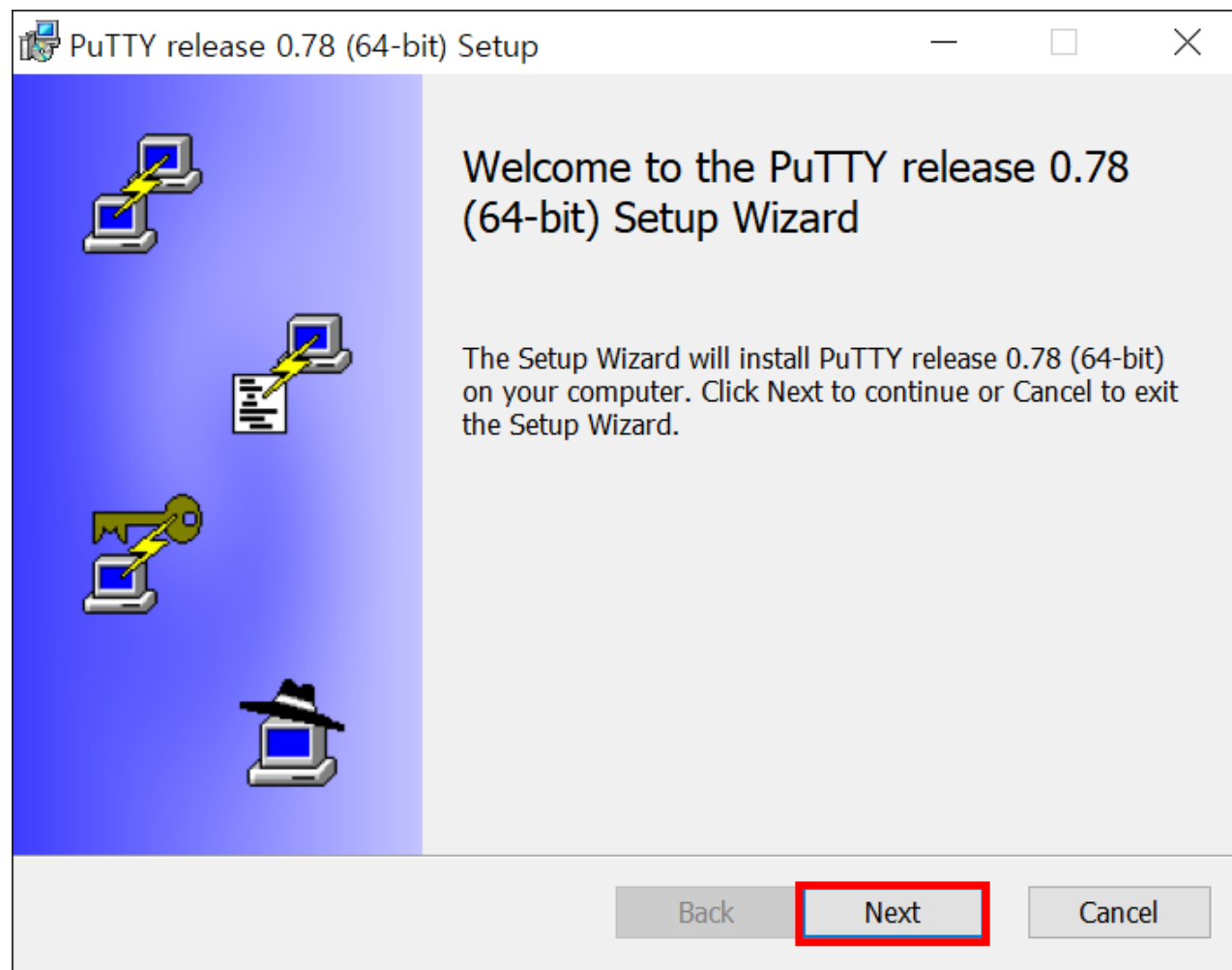
.tar.gz:	putty-0.78.tar.gz	(signature)
----------	-----------------------------------	-----------------------------

Windows 64-bit 운영체제용 다운로드

PuTTY 설치

■ PuTTY 설치 시작

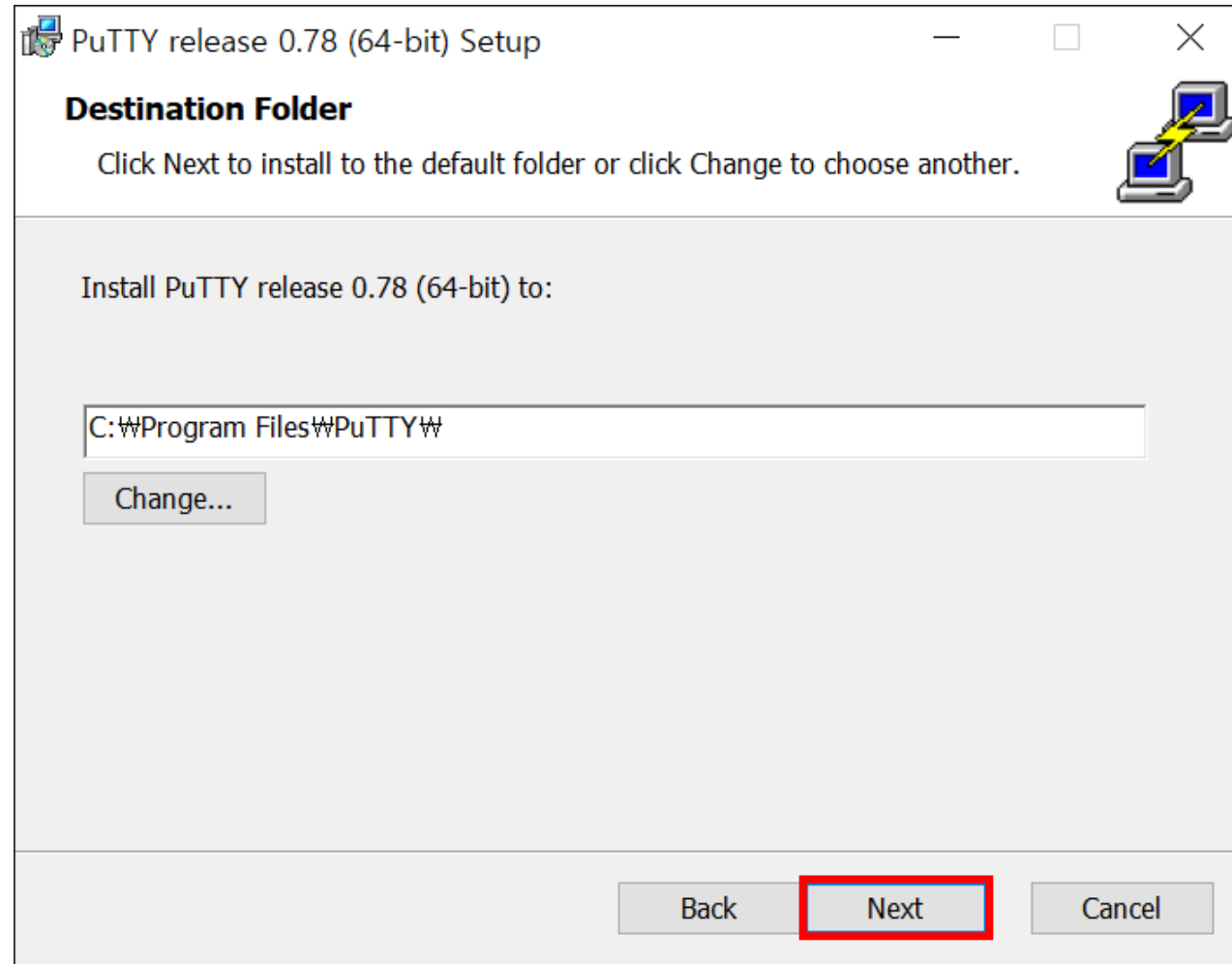
- 다운로드 받은 installer를 실행해서 설치 시작



PuTTY 설치

■ PuTTY 설치 경로

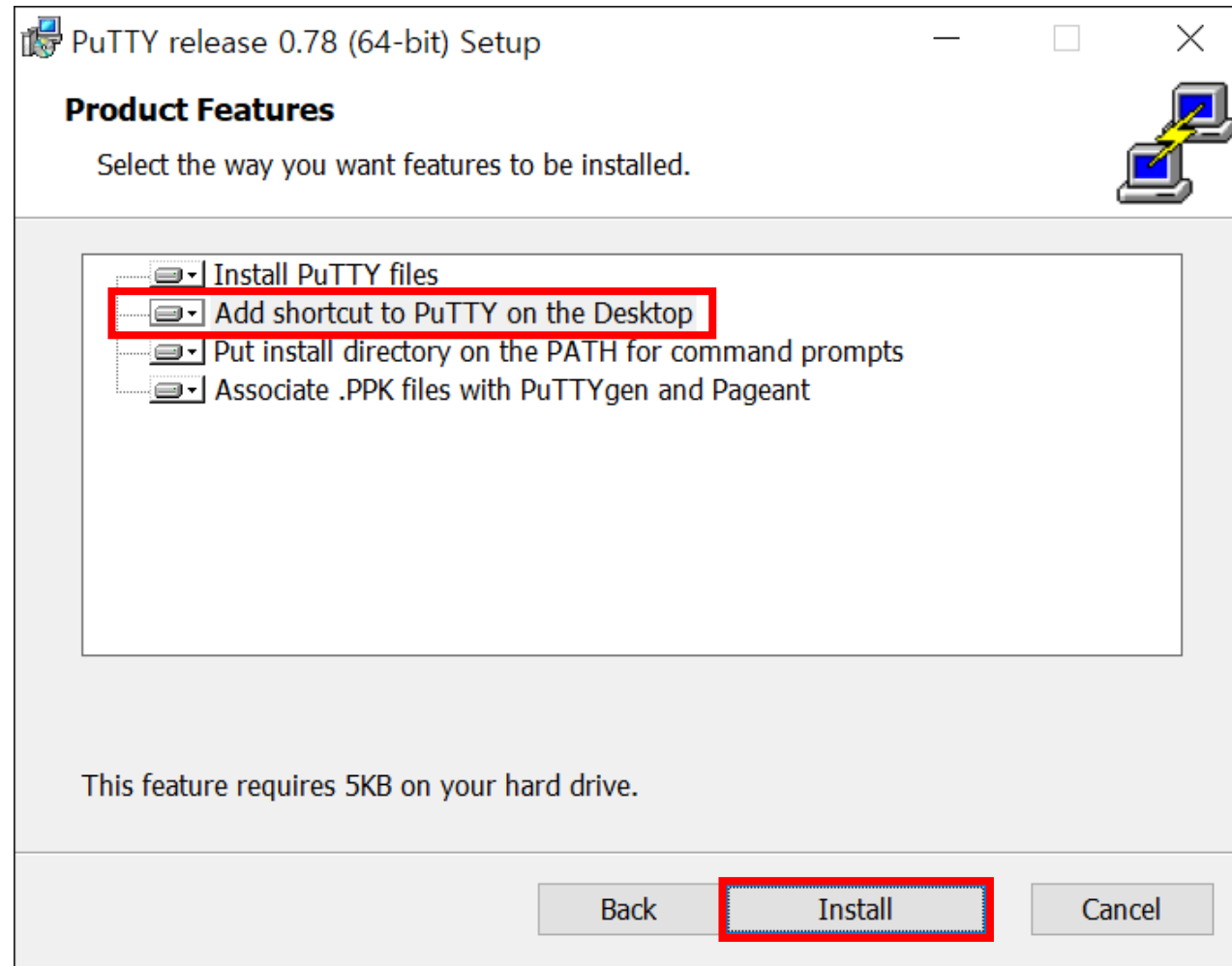
- 기본 설치 경로 *C:\Program Files\PuTTY*를 그대로 유지함



PuTTY 설치

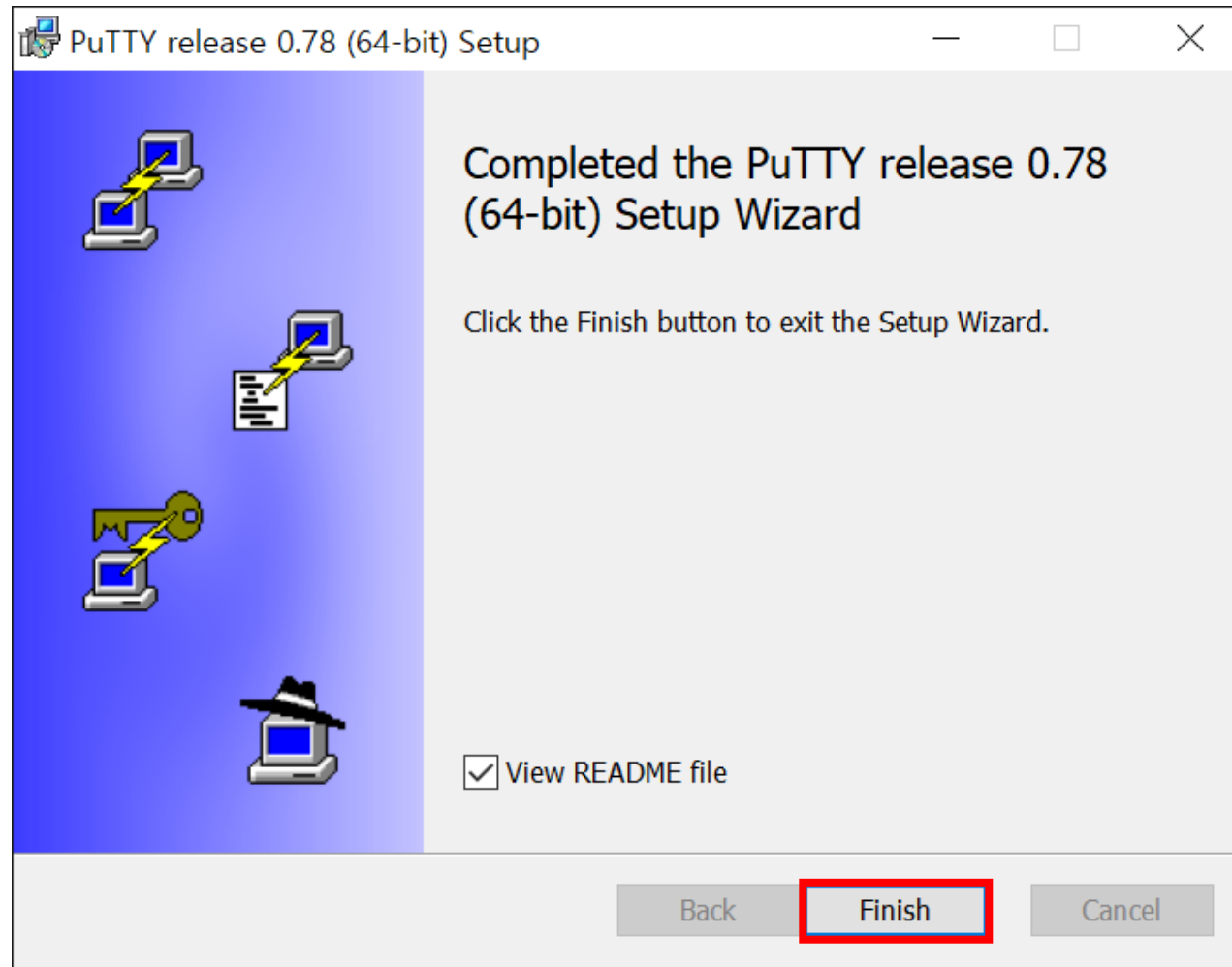
■ Product Features

- Add shortcut to PuTTY on the Desktop : 바탕화면에 바로 가기 만들기



PuTTY 설치

■ 설치 완료



```

each: function(e, t, n) {
    var r, i = 0,
        o = e.length,
        a = M(e);
    if (n) {
        if (a) {
            for (; o > i; i++)
                if (r = t.apply(e[i], n), r === !1) break;
        } else
            for (i in e)
                if (r = t.apply(e[i], n), r === !1) break;
    } else if (a) {
        for (; o > i; i++)
            if (r = t.call(e[i], e[i]), r === !1) break;
    } else
        for (i in e)
            if (r = t.call(e[i], e[i]), r === !1) break;
    return e;
},
trim: b && !b.call("\uffeff\u00a0") ? function(e) {
    return null == e ? "" : b.call(e);
} : function(e) {
    return null == e ? "" : (e + "").replace(C, "");
},
makeArray: function(e, t) {
    var n = t || [];
    return null != e && (M(Object(e)) ? x.merge(n, "string"
),
isArray: function(e, t, n) {
    var r;
    if (t) {
        if (n) return m.call(t, e, n);
        for (r = t.length, r = r ? 0 > n ? Math.max(0, r + n) : n; n in t && t[n] === e) return n;
    }
}

```

03. 포트 포워딩

포트 포워딩

- **호스트 컴퓨터**

- 실제 물리적 컴퓨터를 의미함

- **게스트 컴퓨터**

- VirtualBox를 이용해서 생성한 가상 머신을 의미함

- **게스트 컴퓨터에 접속하기 위해서는 포트 포워딩이 필요함**

- 호스트 컴퓨터로 접속 → 포트 포워딩 → 게스트 컴퓨터로 접속

게스트 컴퓨터의 IP 확인

■ 게스트 컴퓨터 켜기

- VirtualBox 이용해 가상 머신 시작



게스트 컴퓨터의 IP 확인

- 게스트 컴퓨터 접속
 - 비밀번호 입력 후 로그인

```
server1 login: mgt
Password:
Welcome to Ubuntu 22.04.2 LTS (GNU/Linux 5.15.0-78-generic x86_64)

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

System information as of Sun Aug  6 03:18:12 AM UTC 2023

System load:  0.0               Processes:            99
Usage of /:   44.8% of 11.21GB   Users logged in:     0
Memory usage: 5%                IPv4 address for enp0s3: 10.0.2.15
Swap usage:   0%

* Introducing Expanded Security Maintenance for Applications.
  Receive updates to over 25,000 software packages with your
  Ubuntu Pro subscription. Free for personal use.

  https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.

64 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

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

Last login: Mon Jul 31 13:16:25 UTC 2023 on tty1
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

mgt@server1:~$ _
```

게스트 컴퓨터의 IP 확인

■ 게스트 컴퓨터의 IP 주소 확인

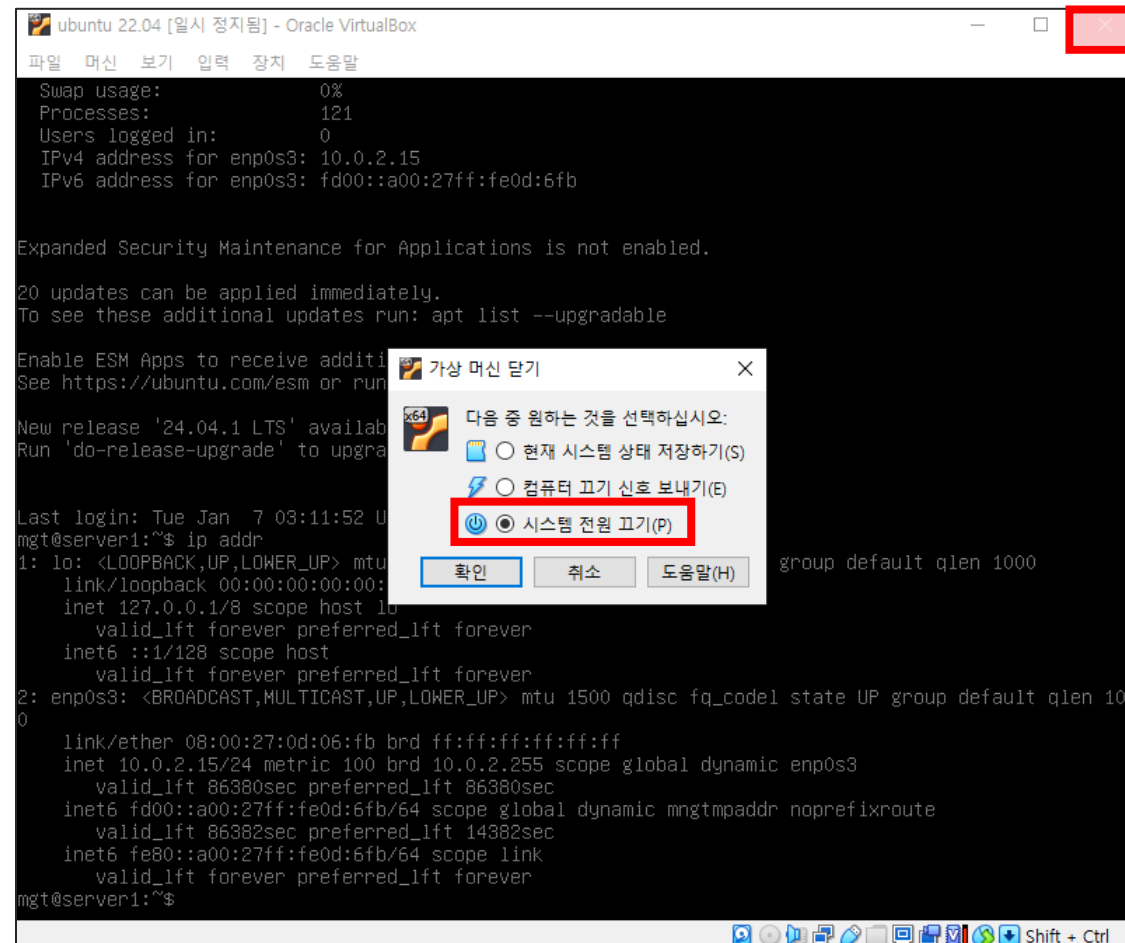
- "ip addr" 명령 입력 후 2번째 항목을 이용해 ip 주소 확인

10.0.2.15

```
mgt@server1:~$ 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 08:00:27:0d:06:fb brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 metric 100 brd 10.0.2.255 scope global dynamic enp0s3
        valid_lft 86380sec preferred_lft 86380sec
    inet6 fd00::a00:27ff:fe0d:6fb/64 scope global dynamic mngtmpaddr noprefixroute
        valid_lft 86382sec preferred_lft 14382sec
    inet6 fe80::a00:27ff:fe0d:6fb/64 scope link
        valid_lft forever preferred_lft forever
mgt@server1:~$ _
```


게스트 컴퓨터 종료

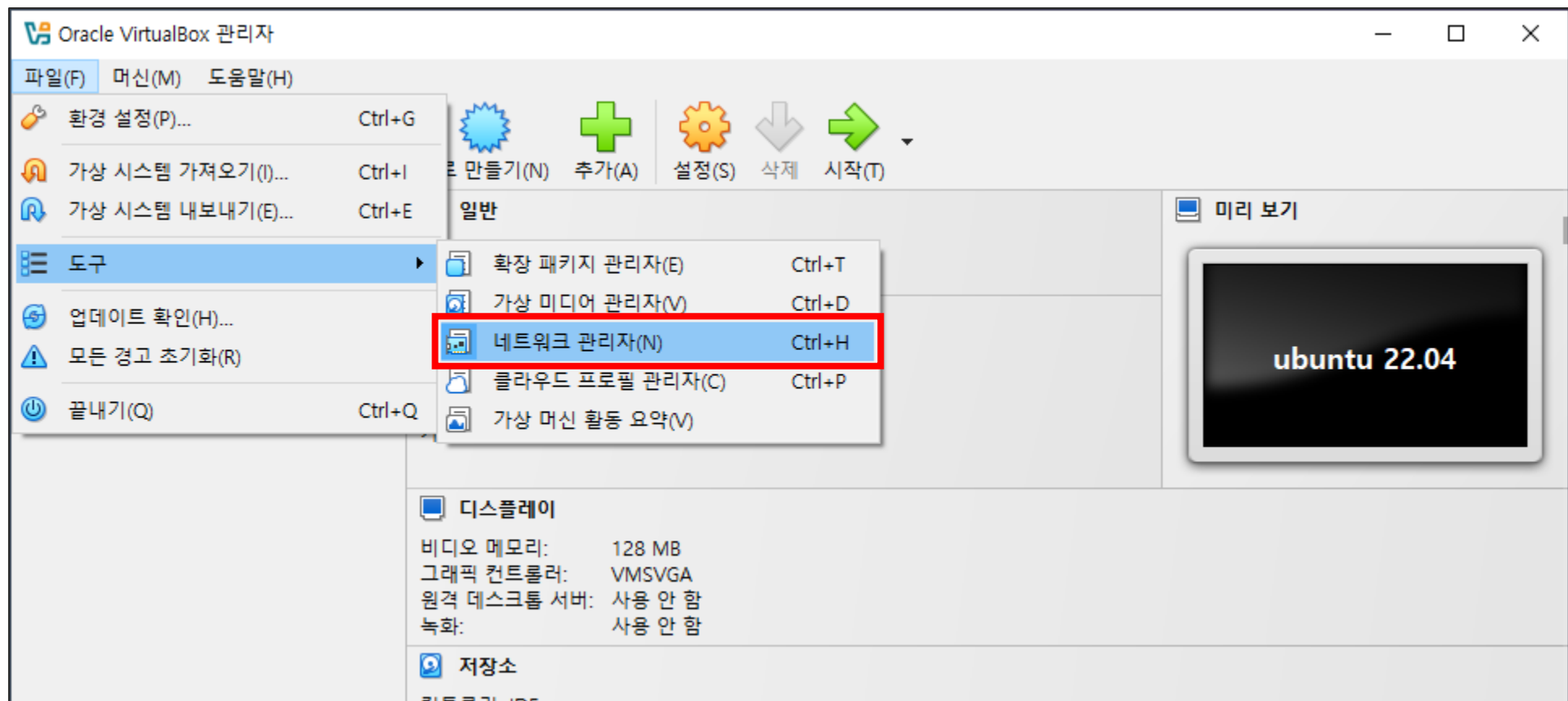
■ 게스트 컴퓨터 종료



호스트 컴퓨터의 IP 확인

■ VirtualBox 실행

- [파일] - [도구] - [네트워크 관리자]



호스트 컴퓨터의 IP 확인

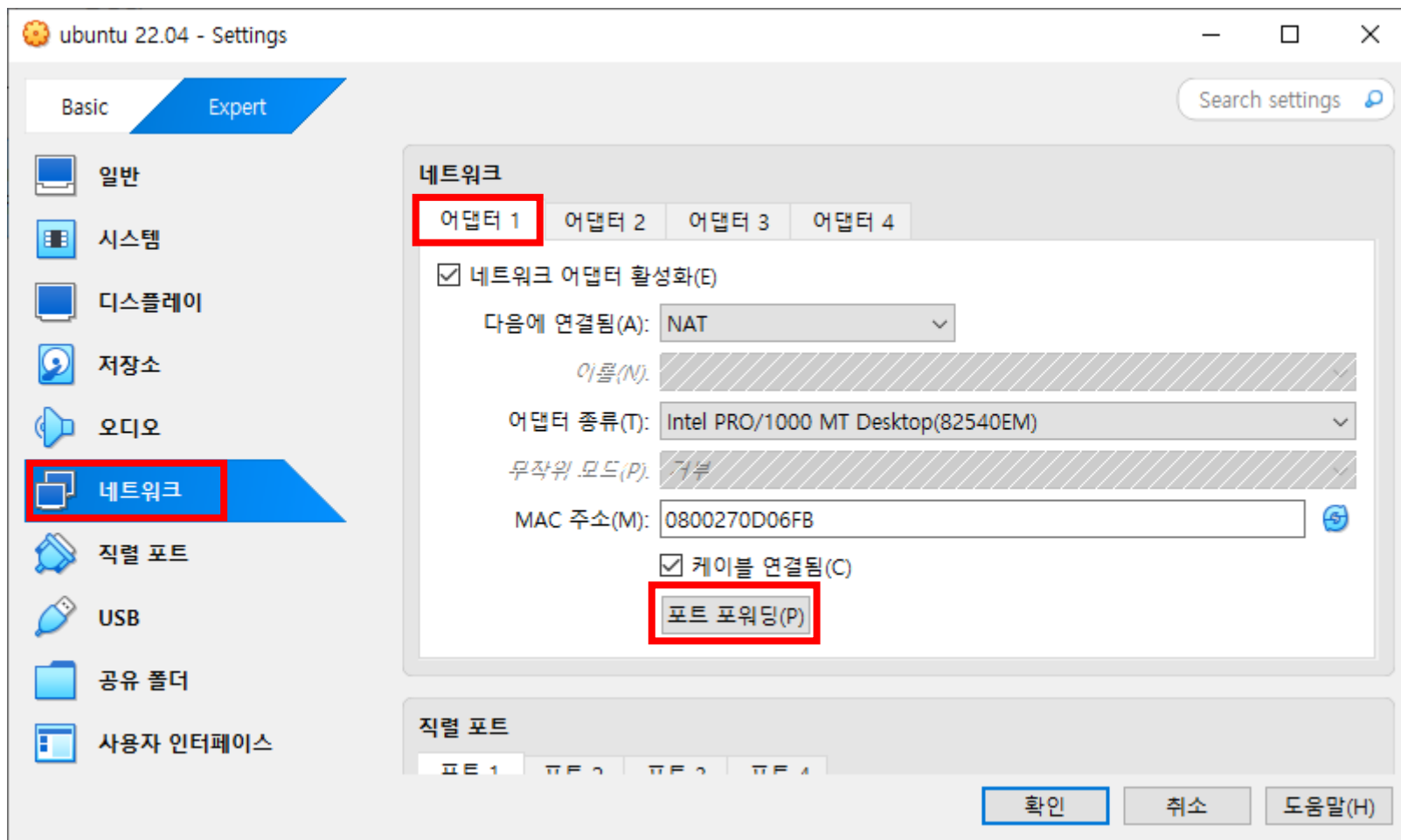
- 호스트 컴퓨터의 IP 주소 확인
 - [속성] - [IPv4 주소] 확인



포트 포워딩

■ 포트 포워딩 설정하기

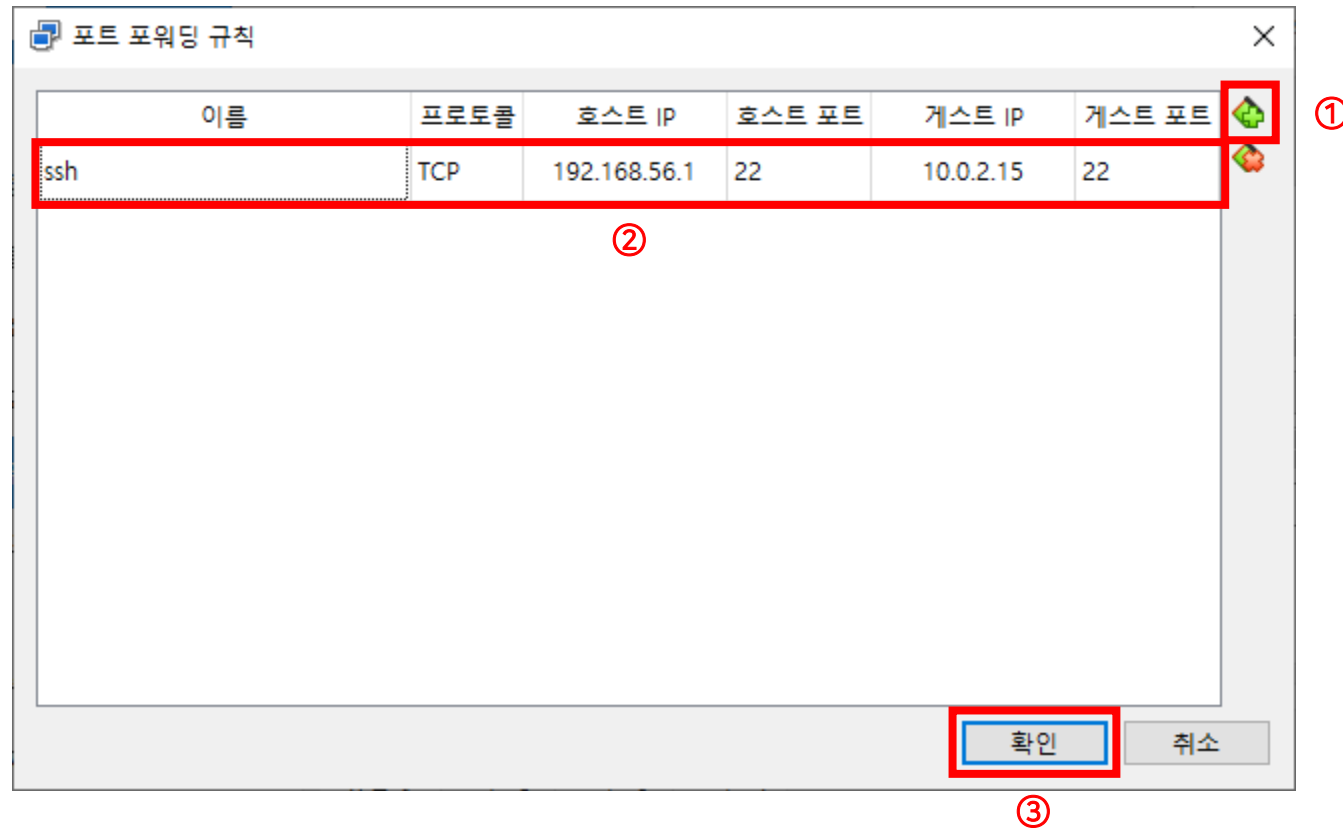
- [머신] - [설정] - [네트워크] - [어댑터 1] 선택 후 "포트 포워딩" 버튼 클릭



포트 포워딩 규칙

■ 포트 포워딩 규칙 추가

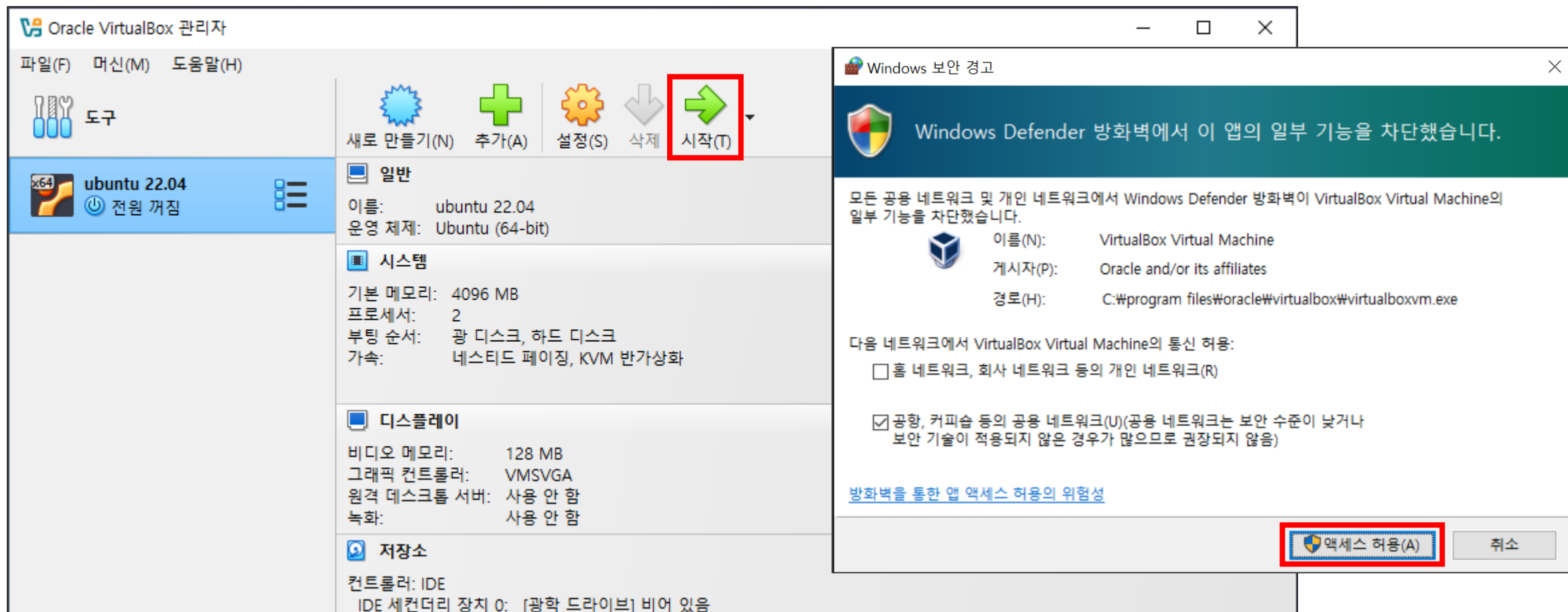
- 호스트 IP, 호스트 포트, 게스트 IP, 게스트 포트 설정



게스트 컴퓨터 켜기

■ 게스트 컴퓨터 켜기

- 방화벽 설정이 나오면 "허용"



```

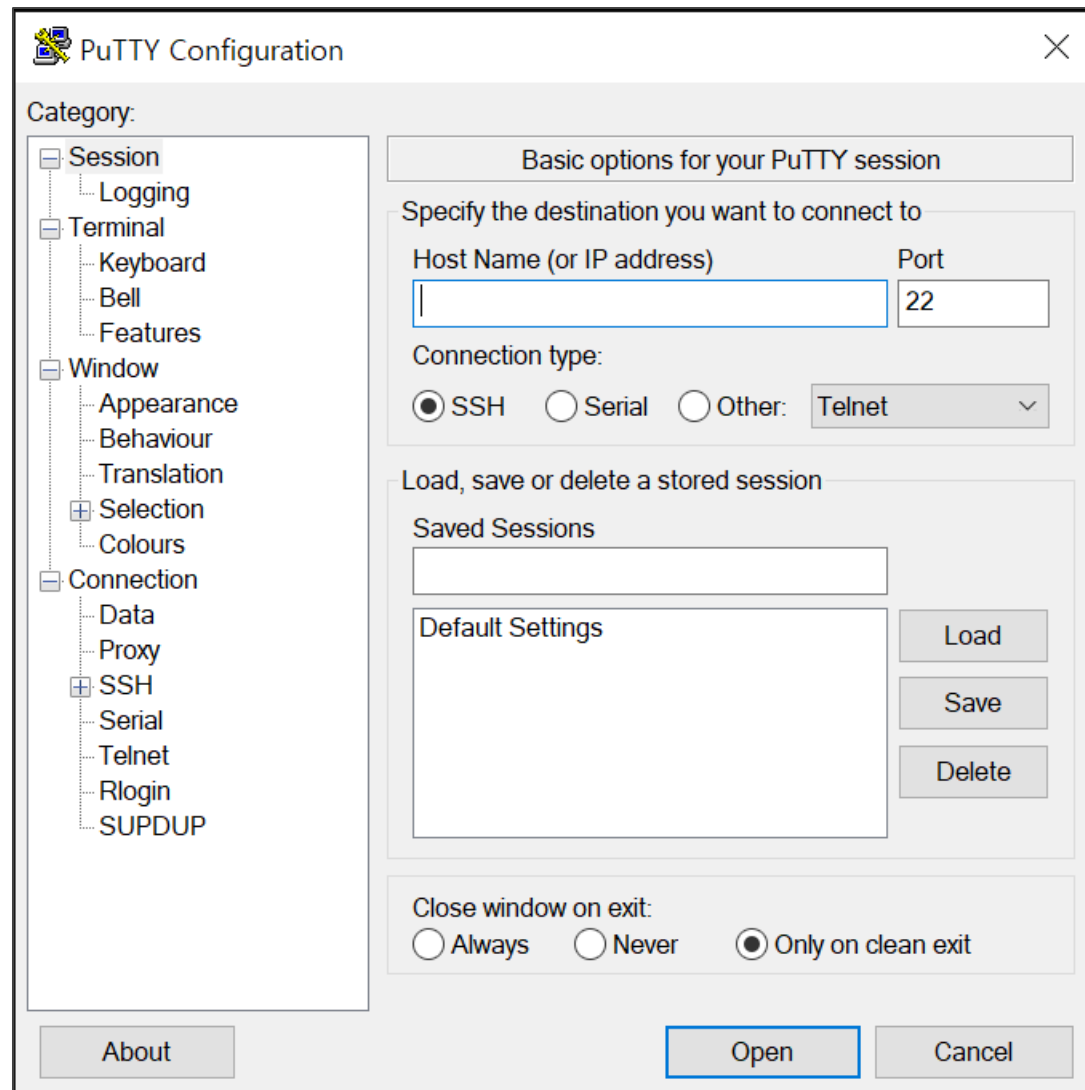
each: function(e, t, n) {
    var r, i = 0,
        o = e.length,
        a = M(e);
    if (n) {
        if (a) {
            for (; o > i; i++)
                if (r = t.apply(e[i], n), r === !1) break;
        } else
            for (i in e)
                if (r = t.apply(e[i], n), r === !1) break;
    } else if (a) {
        for (; o > i; i++)
            if (r = t.call(e[i], e[i]), r === !1) break;
    } else
        for (i in e)
            if (r = t.call(e[i], e[i]), r === !1) break;
    return e;
},
trim: b && !b.call("\uffff\u00a0") ? function(e) {
    return null == e ? "" : b.call(e);
} : function(e) {
    return null == e ? "" : (e + "").replace(C, "");
},
makeArray: function(e, t) {
    var n = t || [];
    return null != e && (M(Object(e)) ? x.merge(n, "string"
    );
inArray: function(e, t, n) {
    var r;
    if (t) {
        if (n) return m.call(t, e, n);
        for (r = t.length, r = r ? 0 > n ? Math.max(0, r + n) : n; r < t.length; r++)
            if (n in t && t[r] === e) return r;
    }
}

```

04. PuTTY 접속

PuTTY로 게스트 컴퓨터에 접속하기

■ PuTTY 실행



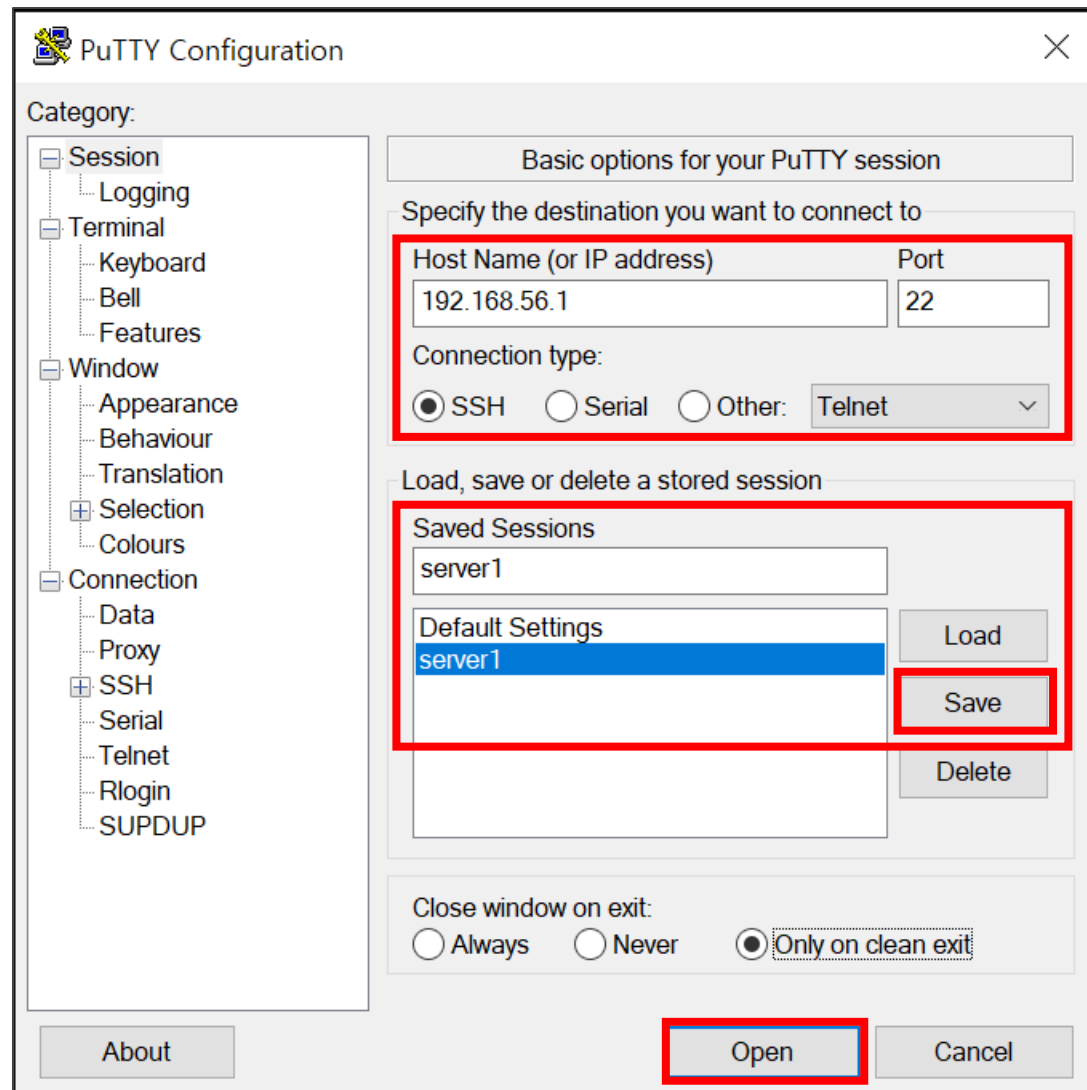
PuTTY로 게스트 컴퓨터에 접속하기

■ 접속 정보 입력

- Host Name : 호스트 컴퓨터의 IP 주소
- Port : 22
- Connection type : SSH

■ 접속 세션 저장

- Saved Sessions : 저장할 세션의 이름



①

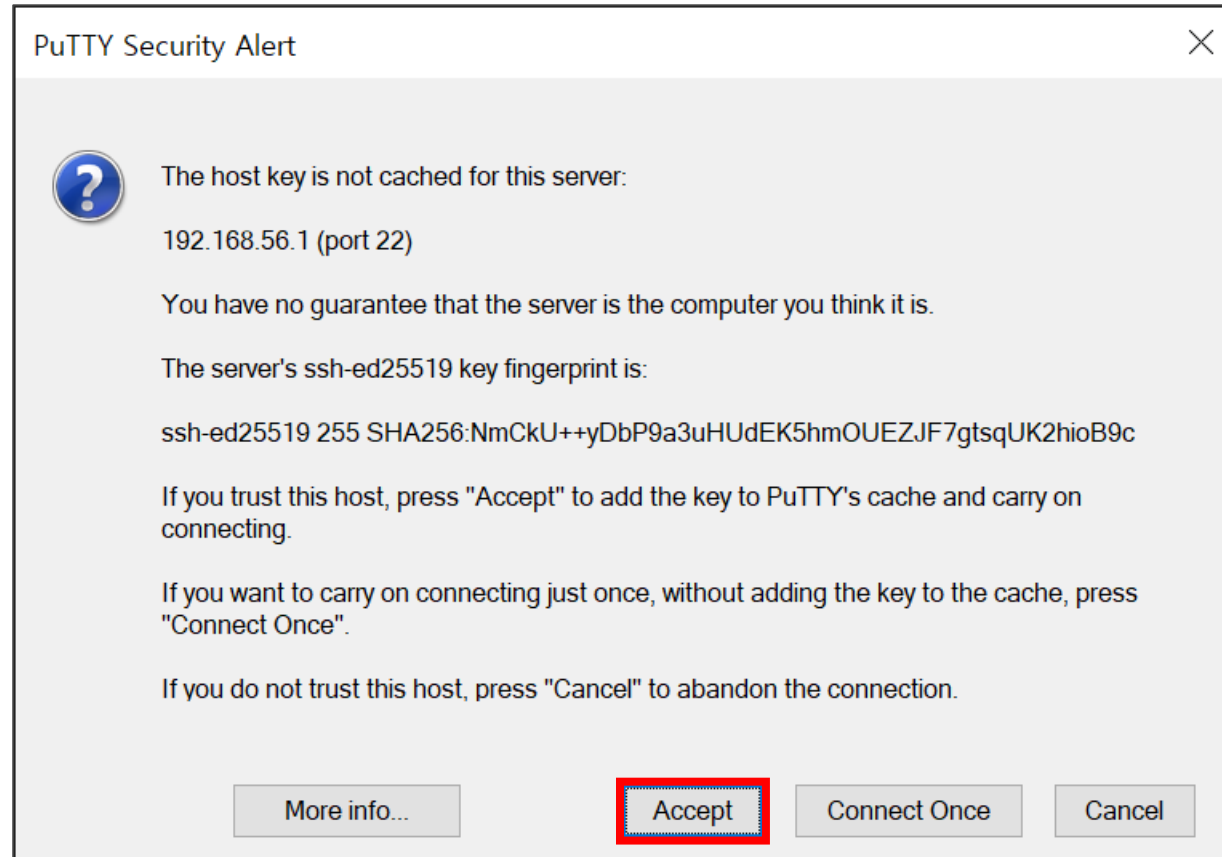
②

③

PuTTY로 게스트 컴퓨터에 접속하기

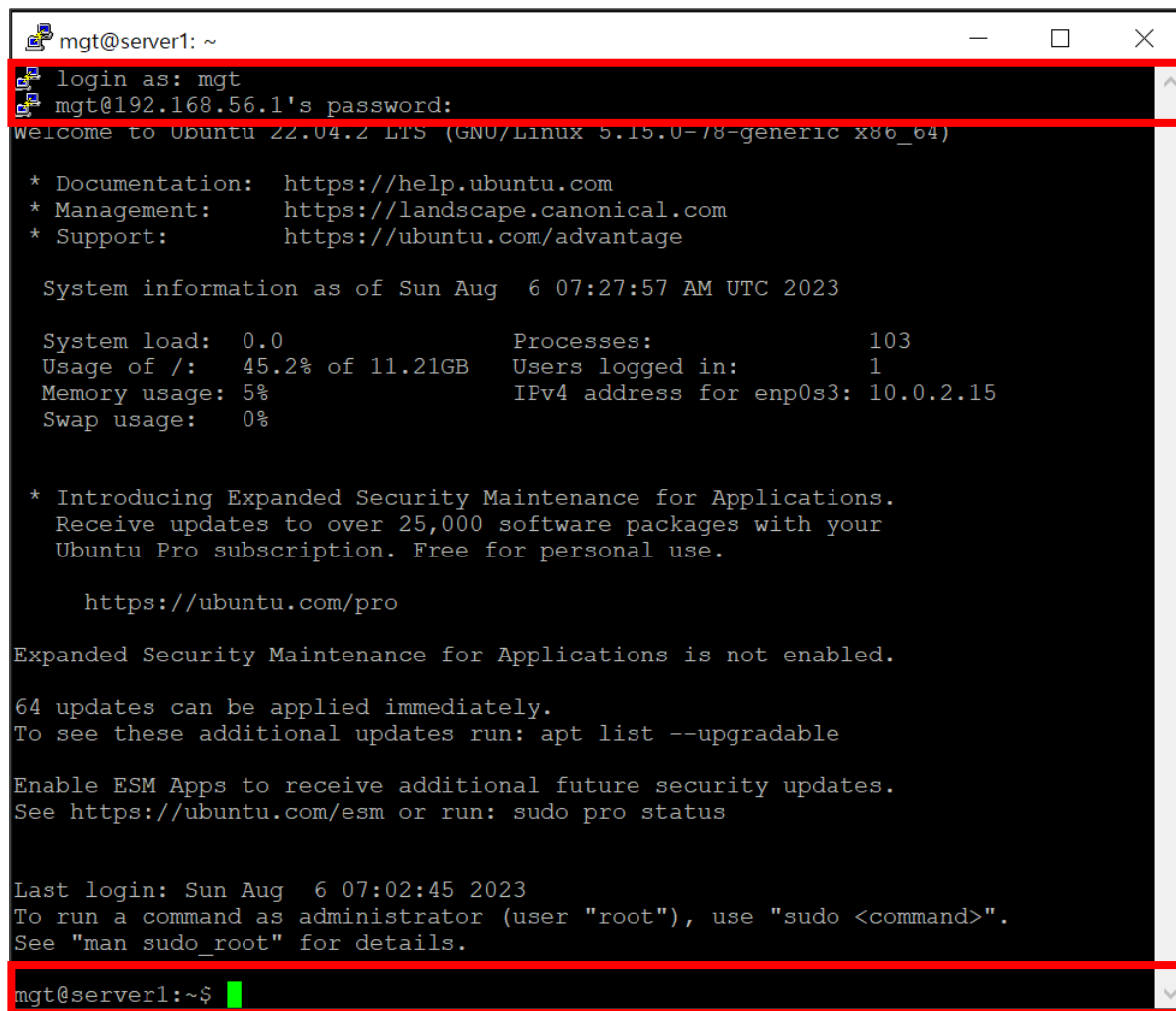
■ 최초 접속 시 호스트 키 발급 필요

- Accept을 선택하면 호스트에 접속할 때 필요한 호스트 키가 PuTTY 캐시에 저장되어 접속할때마다 사용됨



PuTTY로 게스트 컴퓨터에 접속하기

■ 로그인 성공 여부 확인



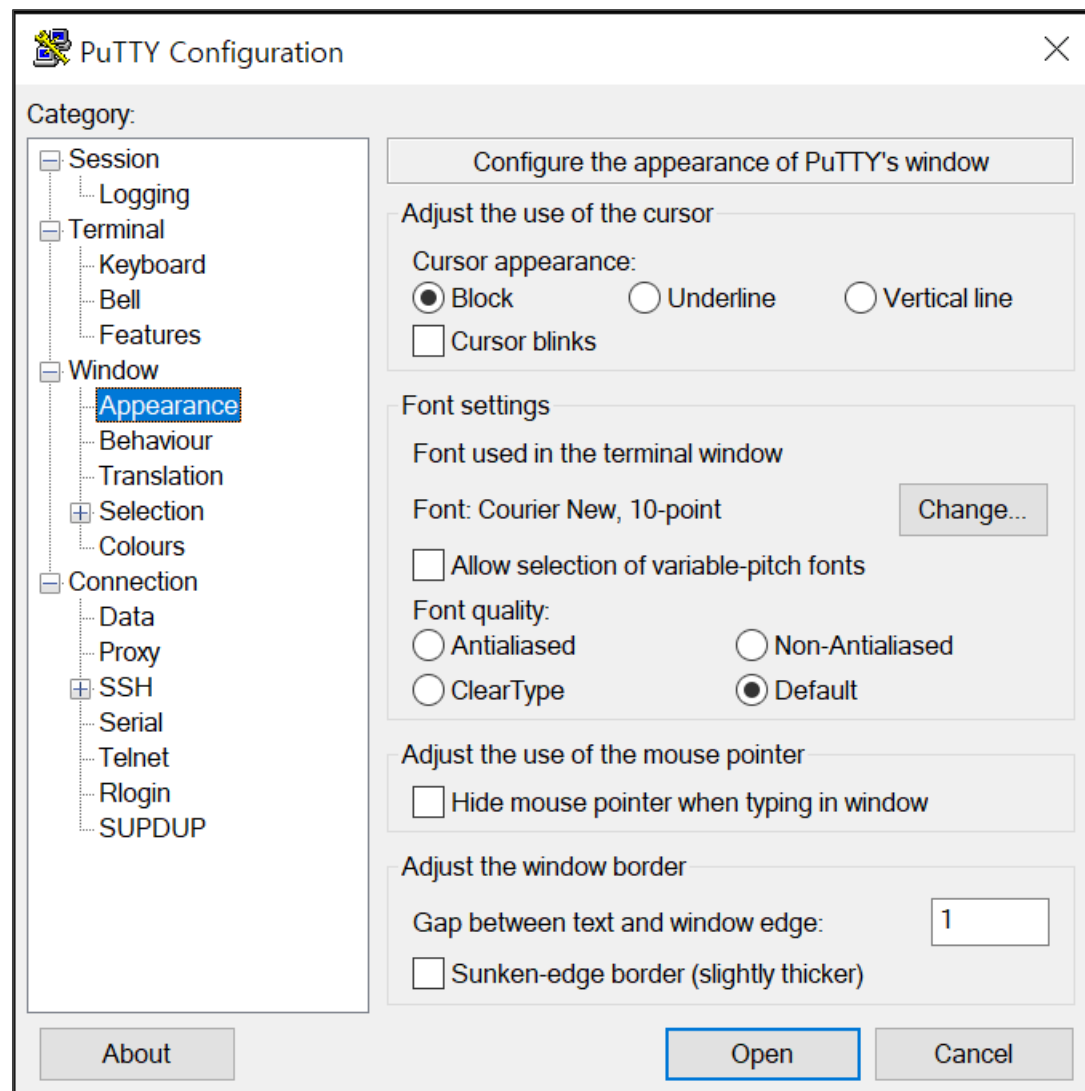
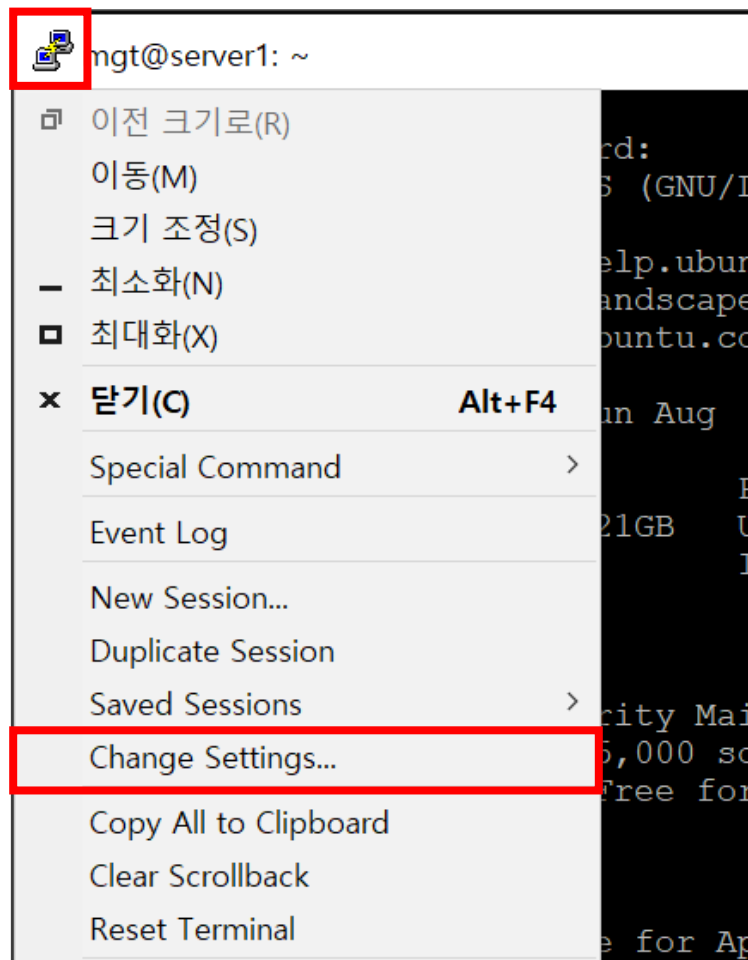
The screenshot shows a PuTTY terminal window titled 'mgt@server1: ~'. The terminal output indicates a successful login for the user 'mgt' on the IP address '192.168.56.1'. The system is Ubuntu 22.04.2 LTS. The terminal displays system information, including system load, memory usage, and the number of processes and users. It also provides links for documentation, management, and support, and mentions the availability of expanded security maintenance for applications.

```
mgt@server1: ~  
login as: mgt  
mgt@192.168.56.1's password:  
Welcome to Ubuntu 22.04.2 LTS (GNU/Linux 5.15.0-78-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/advantage  
  
System information as of Sun Aug  6 07:27:57 AM UTC 2023  
  
System load:  0.0           Processes:            103  
Usage of /:   45.2% of 11.21GB Users logged in:       1  
Memory usage: 5%           IPv4 address for enp0s3: 10.0.2.15  
Swap usage:   0%  
  
* Introducing Expanded Security Maintenance for Applications.  
  Receive updates to over 25,000 software packages with your  
  Ubuntu Pro subscription. Free for personal use.  
  
  https://ubuntu.com/pro  
  
Expanded Security Maintenance for Applications is not enabled.  
  
64 updates can be applied immediately.  
To see these additional updates run: apt list --upgradable  
  
Enable ESM Apps to receive additional future security updates.  
See https://ubuntu.com/esm or run: sudo pro status  
  
Last login: Sun Aug  6 07:02:45 2023  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
mgt@server1:~$
```

PuTTY로 게스트 컴퓨터에 접속하기

■ 환경 설정

- [아이콘] - [Change Settings]



```

each: function(e, t, n) {
    var r, i = 0,
        o = e.length,
        a = M(e);
    if (n) {
        if (a) {
            for (; o > i; i++)
                if (r = t.apply(e[i], n), r === !1) break;
        } else
            for (i in e)
                if (r = t.apply(e[i], n), r === !1) break;
    } else if (a) {
        for (; o > i; i++)
            if (r = t.call(e[i], e[i]), r === !1) break;
    } else
        for (i in e)
            if (r = t.call(e[i], e[i]), r === !1) break;
    return e;
},
trim: b && !b.call("\uffff\u00a0") ? function(e) {
    return null == e ? "" : b.call(e);
} : function(e) {
    return null == e ? "" : (e + "").replace(C, "");
},
makeArray: function(e, t) {
    var n = t || [];
    return null != e && (M(Object(e)) ? x.merge(n, "string"
),
isArray: function(e, t, n) {
    var r;
    if (t) {
        if (n) return m.call(t, e, n);
        for (r = t.length, r = r ? 0 > n ? Math.max(0, r + n) : n; r--;)
            if (n in t && t[n] === e) return n;
    }
}

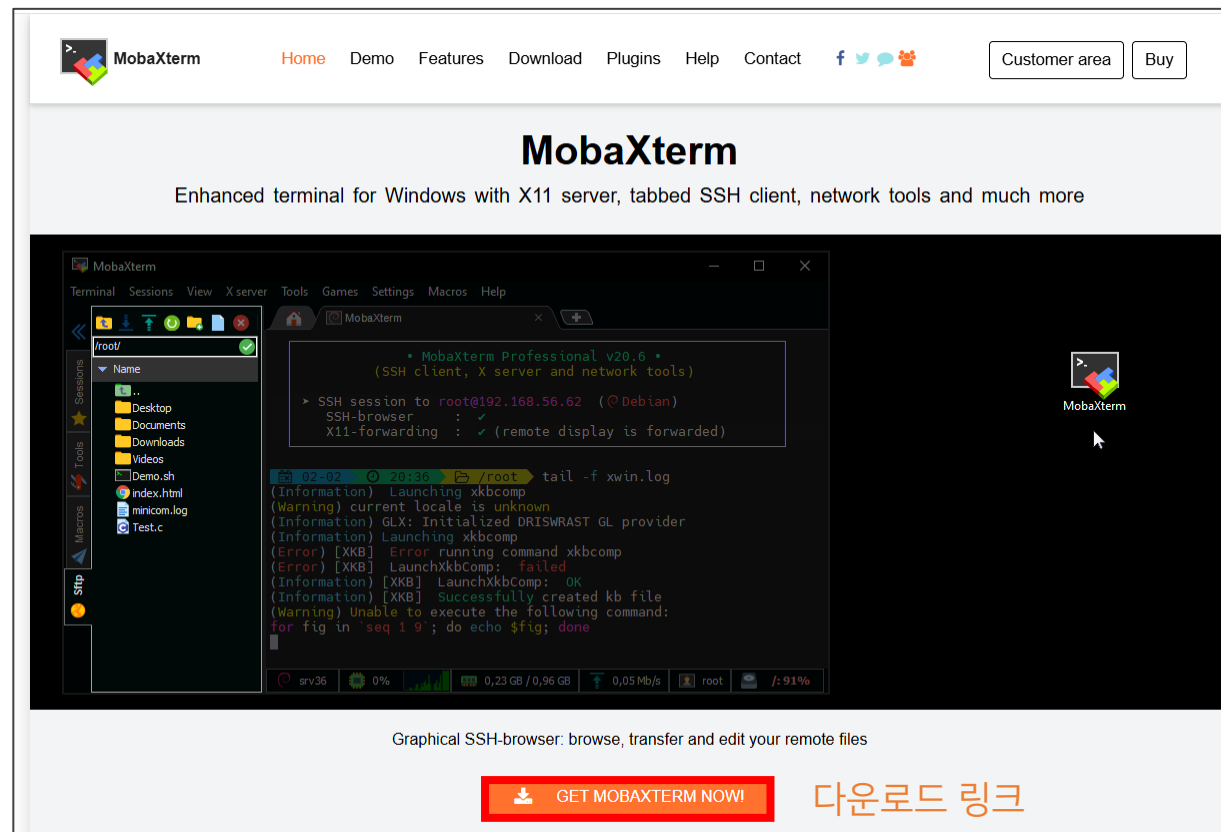
```

05. MobaXterm 설치

MobaXterm

■ MobaXterm

- 무료 터미널 프로그램 중 하나
- 다양한 원격 네트워크 기능과 도구 지원
- <https://mobaxterm.mobatek.net/>



MobaXterm 다운로드

■ Home Edition 다운로드 (무료 버전)

The screenshot shows the MobaXterm website's download page. The browser address bar indicates the URL is `mobaxterm.mobatek.net/download.html`. The website has a navigation bar with links for Home, Demo, Features, Download (highlighted), Plugins, Help, and Contact. There are also buttons for 'Customer area' and 'Buy'. The main content area features two columns: 'Home Edition' and 'Professional Edition'. The 'Home Edition' column is labeled 'Free' and lists features such as Full X server and SSH support, Remote desktop (RDP, VNC, Xdmcp), Remote terminal (SSH, telnet, rlogin, Mosh), X11-Forwarding, Automatic SFTP browser, Master password protection, Plugins support, Portable and installer versions, Full documentation, Max. 12 sessions, Max. 2 SSH tunnels, Max. 4 macros, and Max. 360 seconds for Tftp, Nfs and Cron. A 'Download now' button is at the bottom of this column. The 'Professional Edition' column is labeled '\$69 / 49€ per user*' and lists features including 'Every feature from Home Edition +', Customizable startup message and logo, Modify profile script, Remove unwanted games, screensaver or tools, Unlimited number of sessions, Unlimited number of tunnels and macros, Unlimited run time for network daemons, Enhanced security settings, 12-months updates included, Deployment inside company, and Lifetime right to use. A 'Subscribe online / Get a quote' button is at the bottom of this column. The footer contains links for 'About us', 'Home License', 'Pro License', 'Terms&Conditions', and 'Export rules', along with copyright information for 2008-2025 Mobatek and social media icons for Facebook, Twitter, and LinkedIn.

MobaXterm Xserver with SSH

mobaxterm.mobatek.net/download.html

MobaXterm Home Demo Features **Download** Plugins Help Contact

Customer area Buy

Home Edition

Free

- Full **X server** and **SSH** support
- Remote desktop (RDP, VNC, Xdmcp)
- Remote terminal (SSH, telnet, rlogin, Mosh)
- X11-Forwarding
- Automatic SFTP browser
- Master password protection
- Plugins support
- Portable and installer versions
- Full documentation
- Max. **12** sessions
- Max. **2** SSH tunnels
- Max. **4** macros
- Max. **360** seconds for Tftp, Nfs and Cron

Download now

Professional Edition

\$69 / 49€ per user*

* Excluding tax. Volume discounts [available](#)

- Every feature from Home Edition +**
- Customize your startup message and logo
- Modify your profile script
- Remove unwanted games, screensaver or tools
- Unlimited number of sessions
- Unlimited number of tunnels and macros
- Unlimited run time for network daemons
- Enhanced security settings
- 12-months updates included
- Deployment inside company
- Lifetime right to use

Subscribe online / Get a quote

About us | Home License | Pro License | © 2008 - 2025 Mobatek. MobaXterm® is a registered trademark of Mobatek Terms&Conditions | Export rules

사용 방식 선택

■ 2가지 사용 방식 지원

1. Portable edition : 독립 실행 파일 받아서 설치 안하고 사용하기
2. Installer edition : installer 받아서 설치하기

The screenshot shows the MobaXterm website's download page. The URL in the browser is `mobaxterm.mobatek.net/download-home-edition.html`. The page title is "MobaXterm Home Edition". Under the heading "Download MobaXterm Home Edition (current version):", there are two download options:

- Portable edition:** MobaXterm Home Edition v24.4 (Portable edition). This option is highlighted with a red box. A red arrow points from this box to a list of files on the left: `CygUtils.plugin`, `CygUtils64.plugin`, and `MobaXterm_Personal_24.4.exe`.
- Installer edition:** MobaXterm Home Edition v24.4 (Installer edition). This option is highlighted with a red box. A red arrow points from this box to a list of files on the right: `MobaXterm_installer.dat` and `MobaXterm_installer_24.4.msi`.

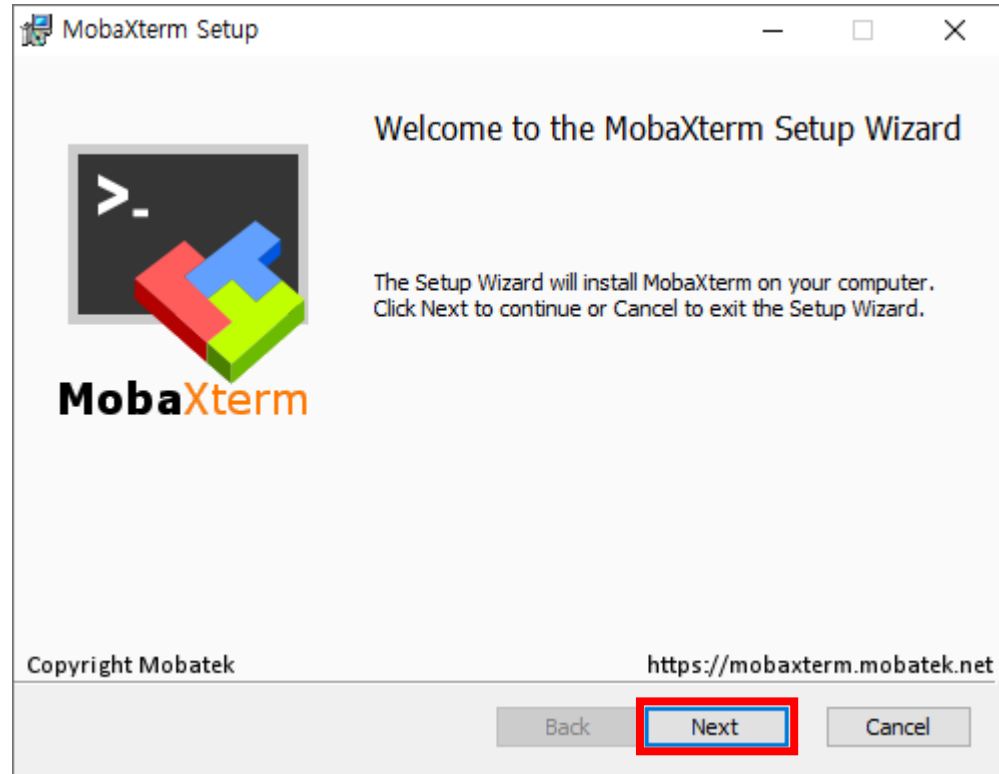
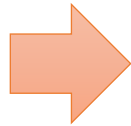
Text in the center of the page reads: "본 PPT에서 사용하는 방식" (The method used in this PPT).

Below the download options, there are links for "Download previous stable version: [MobaXterm Portable v24.3](#) [MobaXterm Installer v24.3](#)", a link for "MobaXterm Preview Version", and a link for "MobaXterm terms and conditions".

At the bottom, there is a notice: "If you use MobaXterm inside your company, you should consider subscribing to [MobaXterm Professional Edition](#): your subscription will give you access to professional support and to the 'Customizer' software. This customizer will allow you to generate personalized versions of MobaXterm including your own logo, your default settings and your welcome message. Please [contact us](#) for more information."

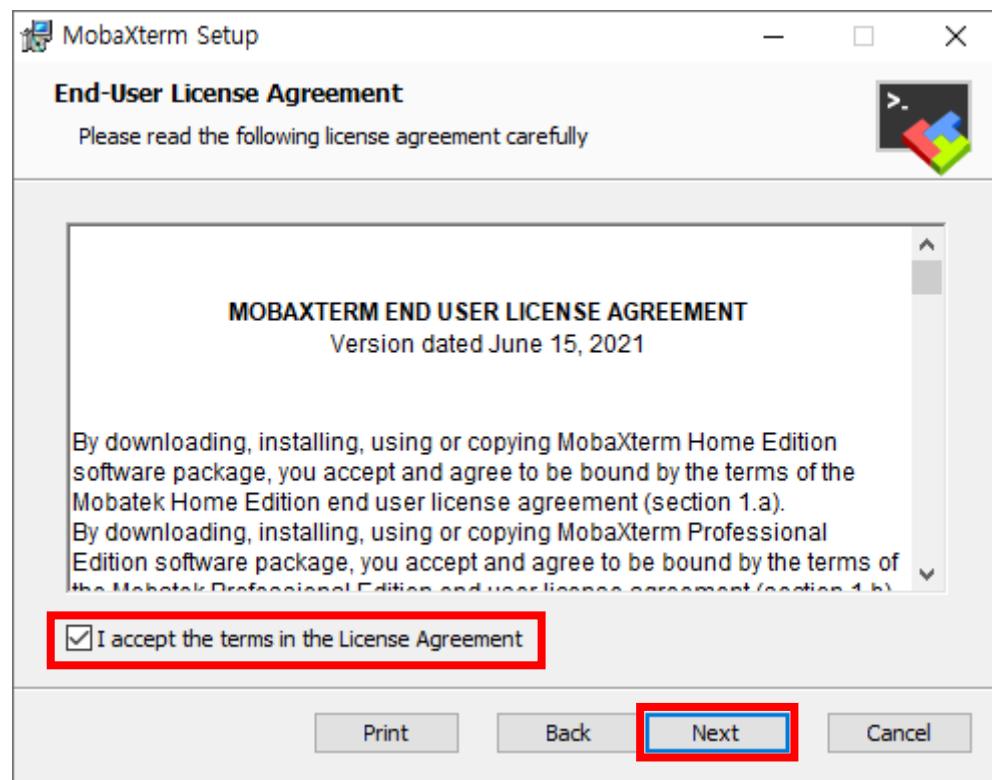
Installer를 이용한 설치

- 다운로드 받은 Installer 실행



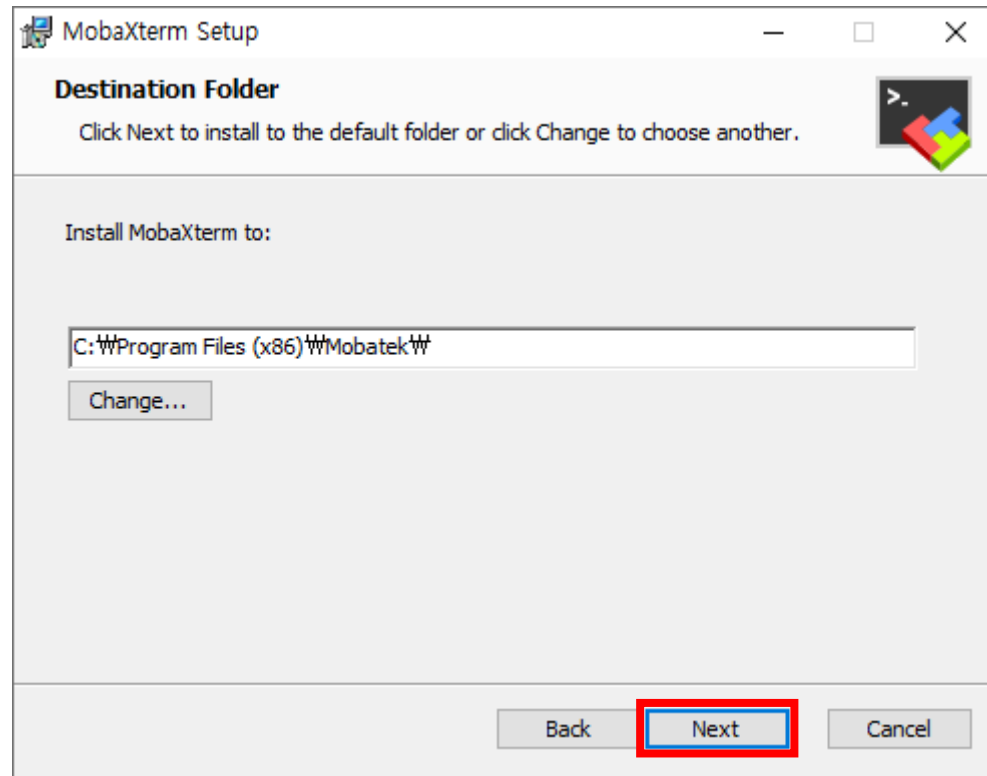
MobaXterm 설치

- End-User License Agreement - 약관 동의 체크



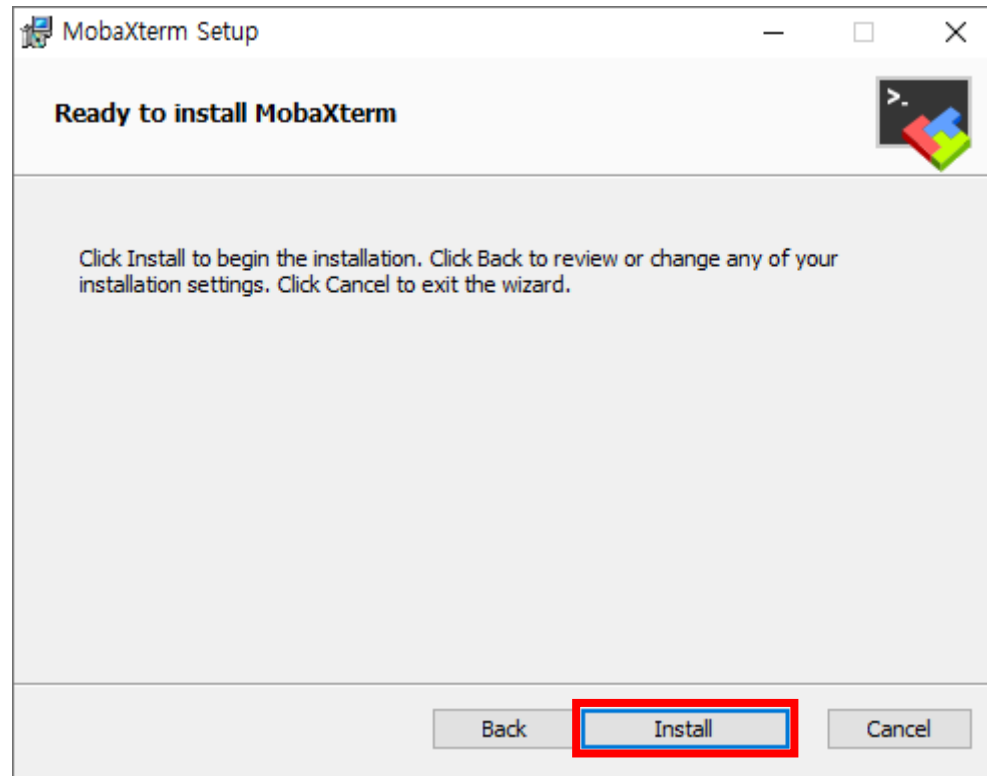
MobaXterm 설치

- Destination Folder - 기본값 사용



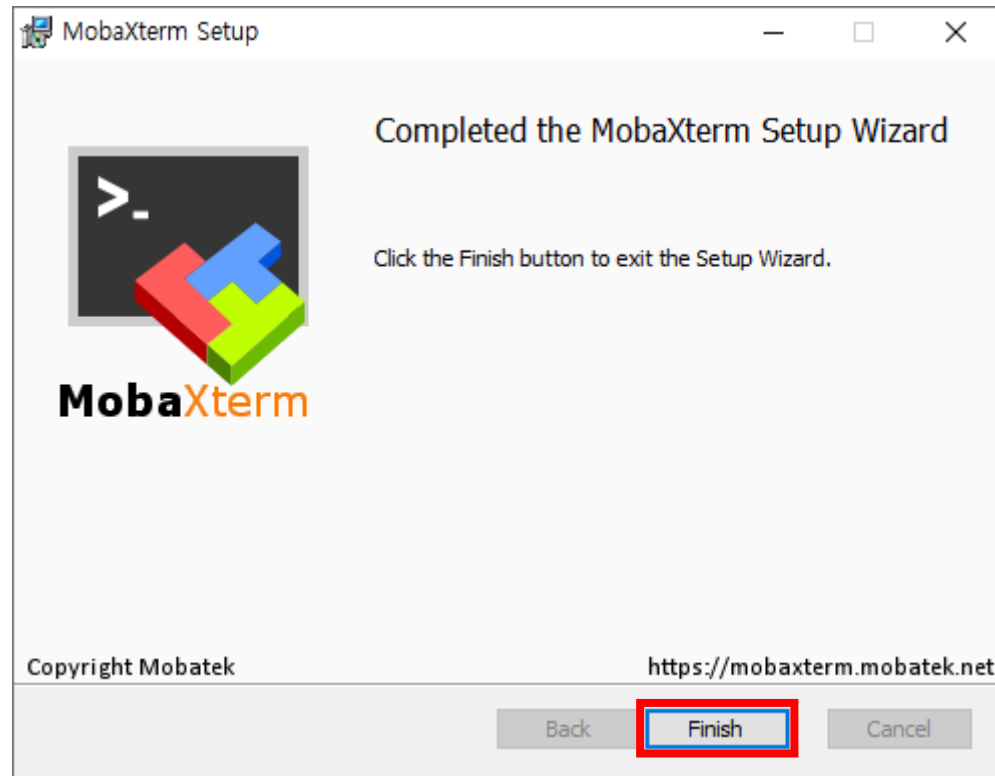
MobaXterm 설치

- Ready to install MobaXterm



MobaXterm 설치 완료

■ 설치 완료



```

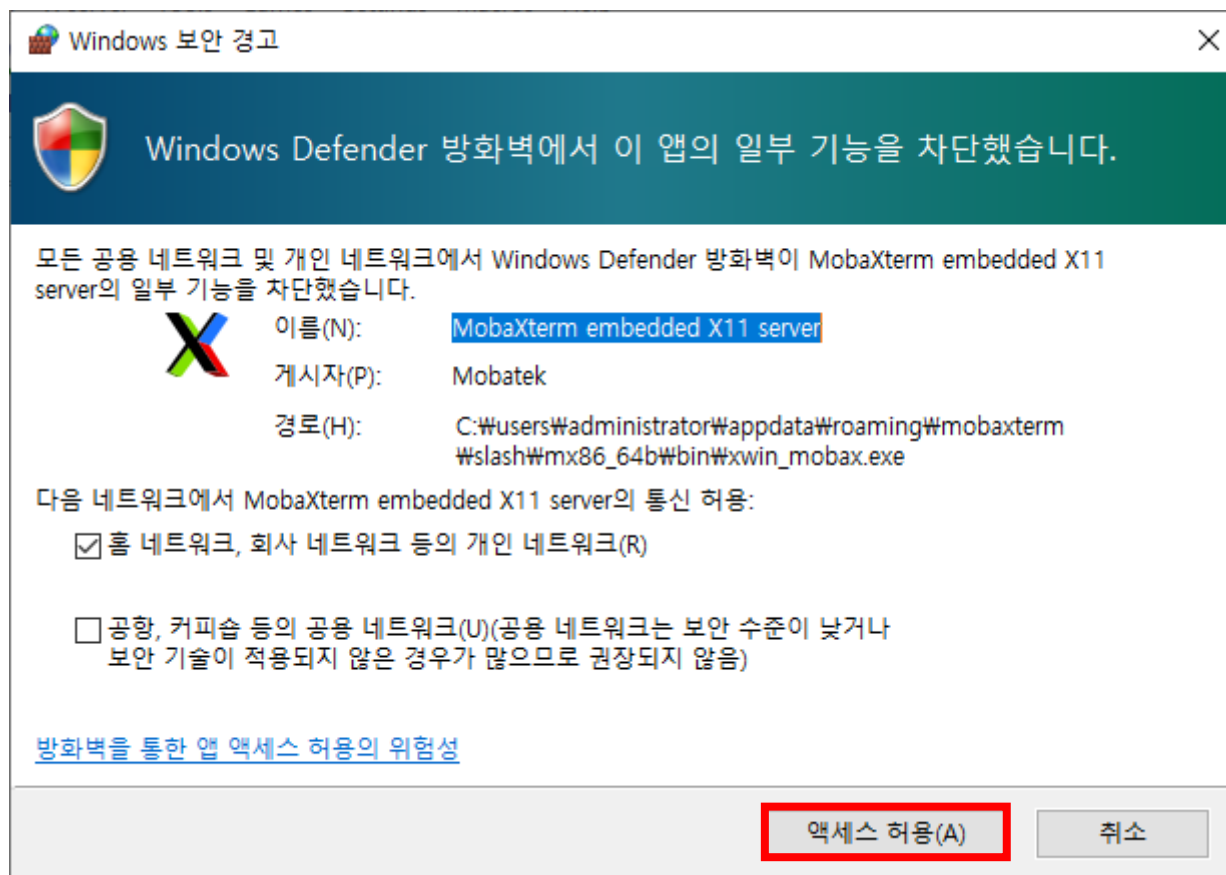
each: function(e, t, n) {
    var r, i = 0,
        o = e.length,
        a = M(e);
    if (n) {
        if (a) {
            for (; o > i; i++)
                if (r = t.apply(e[i], n), r === !1) break;
        } else
            for (i in e)
                if (r = t.apply(e[i], n), r === !1) break;
    } else if (a) {
        for (; o > i; i++)
            if (r = t.call(e[i], e[i]), r === !1) break;
    } else
        for (i in e)
            if (r = t.call(e[i], e[i]), r === !1) break;
    return e;
},
trim: b && !b.call("\uffff\u00a0") ? function(e) {
    return null == e ? "" : b.call(e);
} : function(e) {
    return null == e ? "" : (e + "").replace(C, "");
},
makeArray: function(e, t) {
    var n = t || [];
    return null != e && (M(Object(e)) ? x.merge(n, "string"
    ),
inArray: function(e, t, n) {
    var r;
    if (t) {
        if (n) return m.call(t, e, n);
        for (r = t.length, r = r ? 0 > n ? Math.max(0, r + n) : n; r < t.length; r++)
            if (n in t && t[n] === e) return n;
    }
}

```

06. MobaXterm 접속

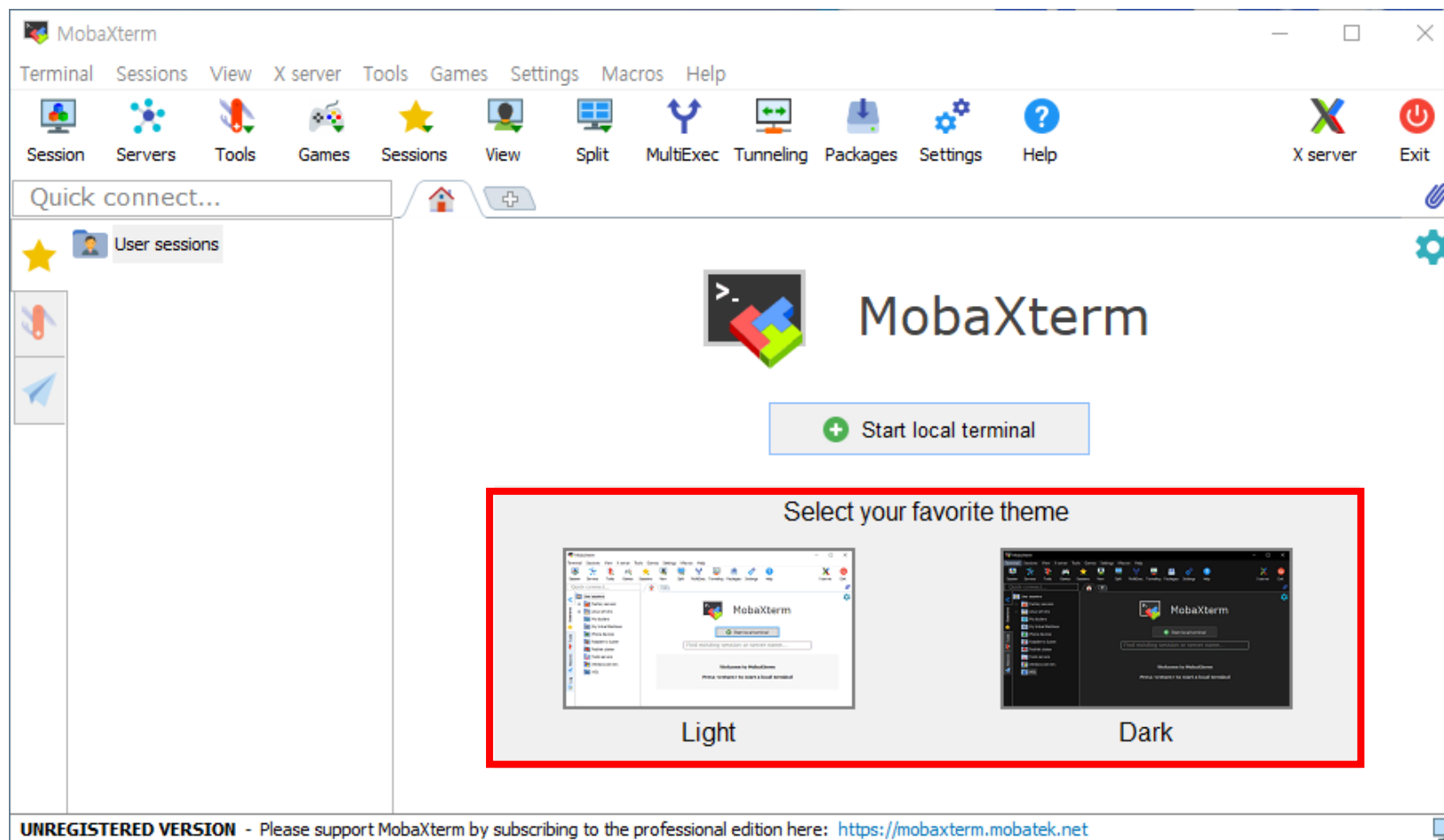
MobaXterm 실행

- 최초 실행 시 방화벽 설정 여부 선택
 - "액세스 허용" 선택



MobaXterm 실행

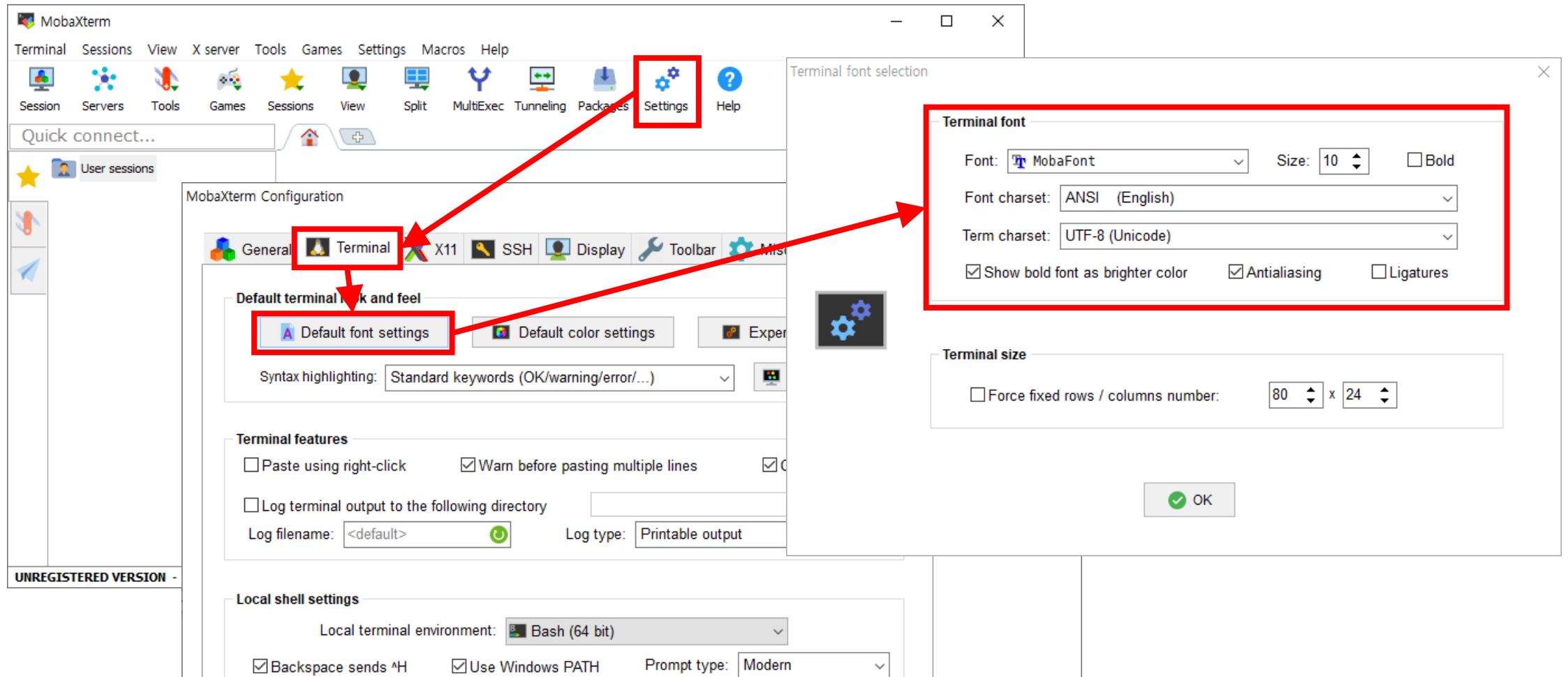
- 테마 선택
 - Light 또는 Dark



MobaXterm 설정

■ 글꼴 및 UTF-8 인코딩 설정

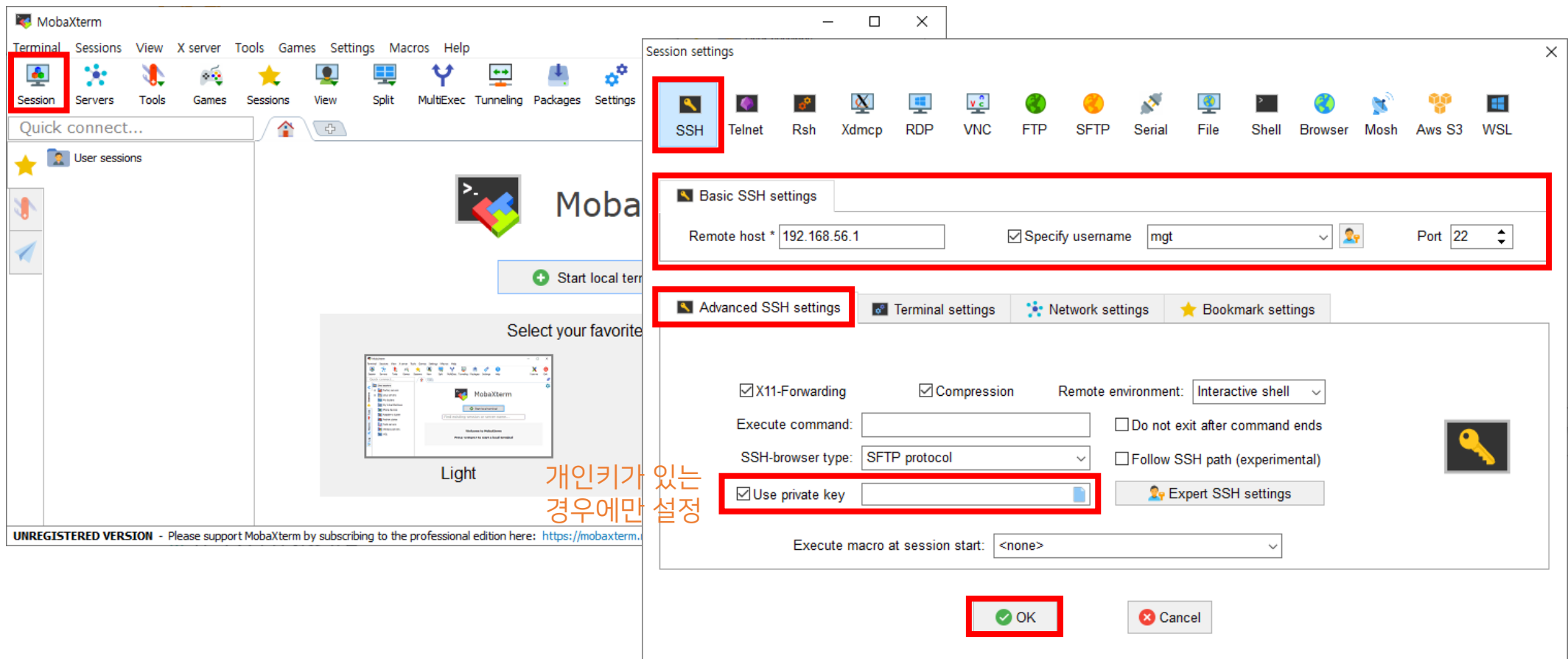
- [Settings] - [Terminal 탭] - [Default terminal font settings]



Session 설정

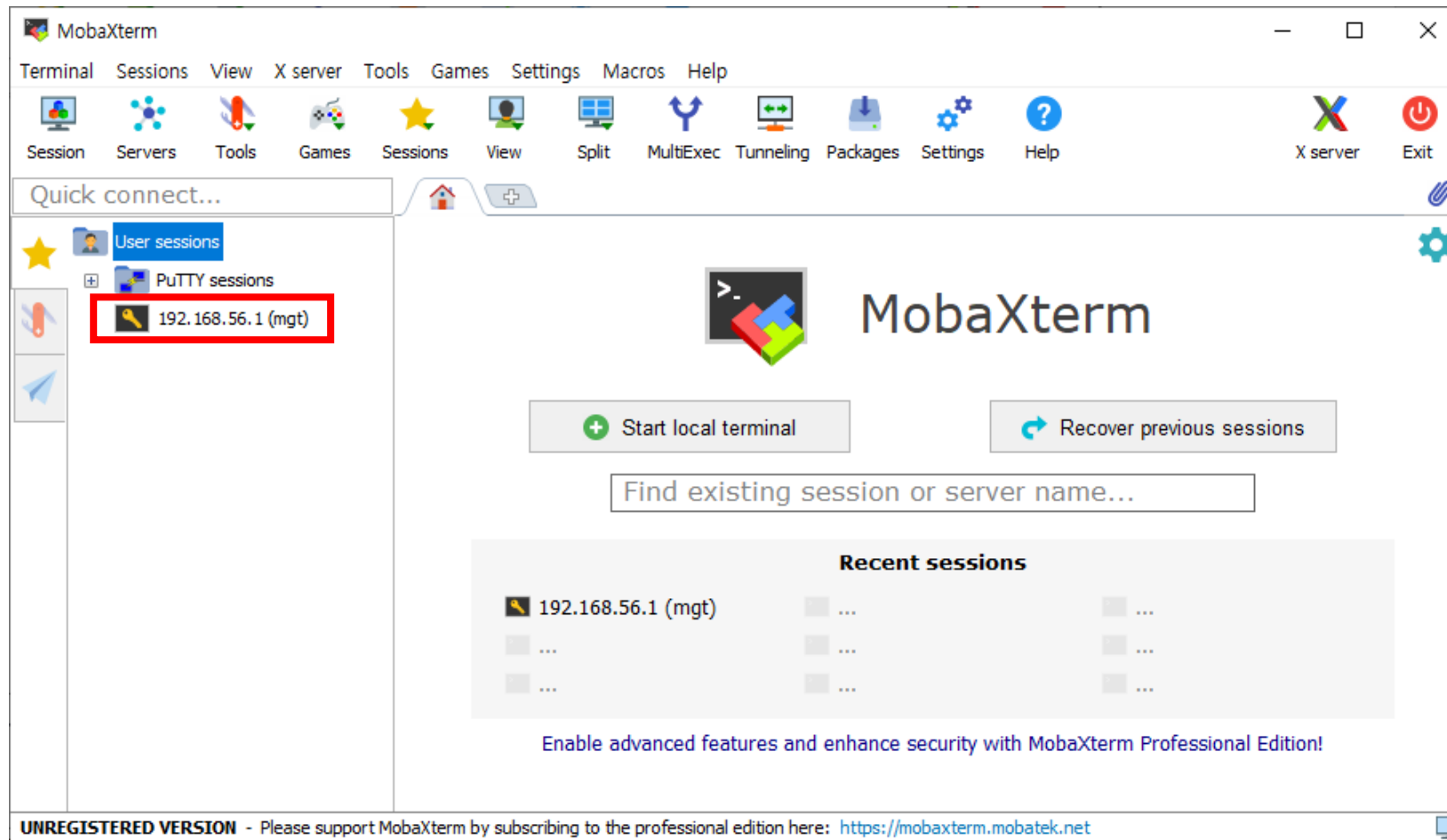
■ SSH 서버 접속을 위한 Session 정보 등록

- [Sessions] - [SSH] - [Basic SSH settings] : Remote host, Specify username, Port
- [Sessions] - [SSH] - [Advanced SSH settings] : Use private key



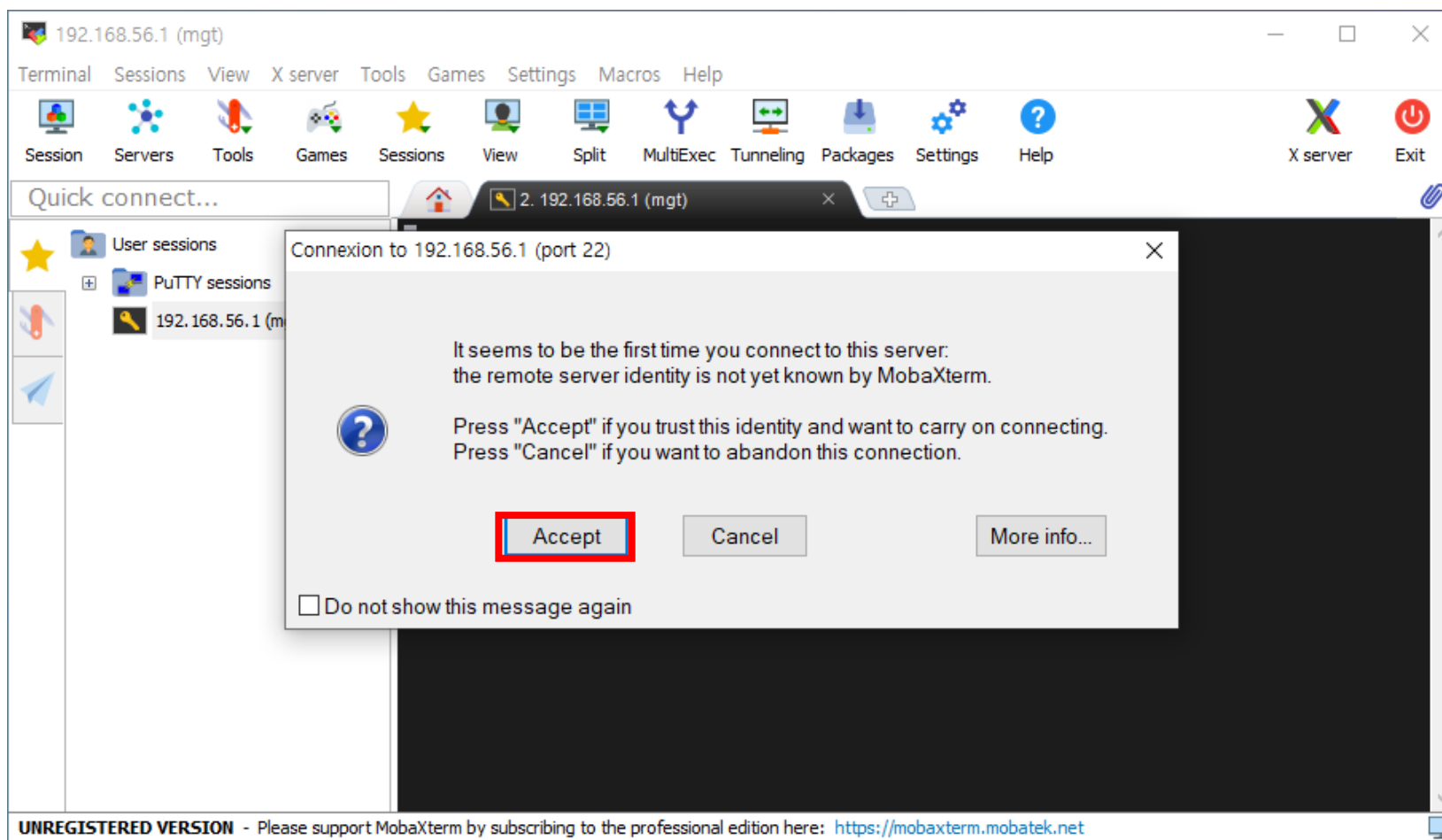
Session을 이용한 접속

- 등록된 Session 정보 확인
 - 해당 session 더블 클릭하면 접속 시작



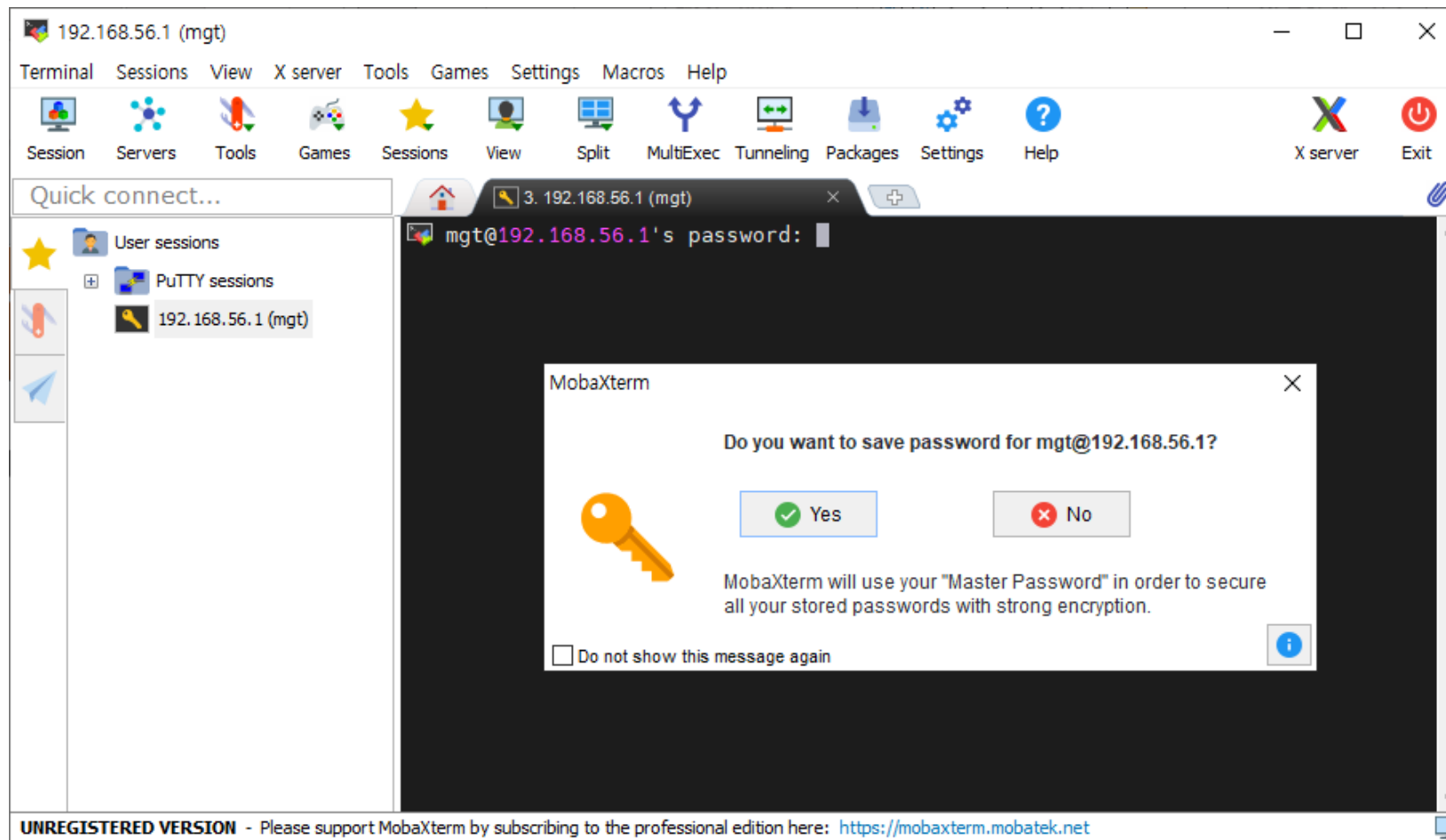
최초 접속

- 최초 접속 시 접속 허용 여부 선택
 - Accept 선택



■ 비밀번호 입력

- 비밀번호 저장 여부를 묻으면 Yes 또는 No 상관 없이 알아서 선택



접속 성공

■ 접속 성공 화면

- 프롬프트 \$가 나타나면 성공

192.168.56.1 (mgt)

Terminal Sessions View X server Tools Games Settings Macros Help

Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help X server Exit

Quick connect...

/home/mgt/

Name

- ..
- .cache
- .ssh
- .bash_history
- .bash_logout
- .bashrc
- .lessht
- .profile
- .sudo_as_admin_successful
- .viminfo
- .Xauthority
- myapp.war

Remote monitoring

☐ Follow terminal folder

```
System load:          0.0
Usage of /:           46.0% of 11.21GB
Memory usage:         6%
Swap usage:           0%
Processes:            118
Users logged in:      1
IPv4 address for enp0s3: 10.0.2.15
IPv6 address for enp0s3: fd00::a00:27ff:fe0d:6fb

Expanded Security Maintenance for Applications is not enabled.

20 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

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

New release '24.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Tue Jan  7 08:24:06 2025 from 192.168.56.1
mgt@server1:~$
```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>