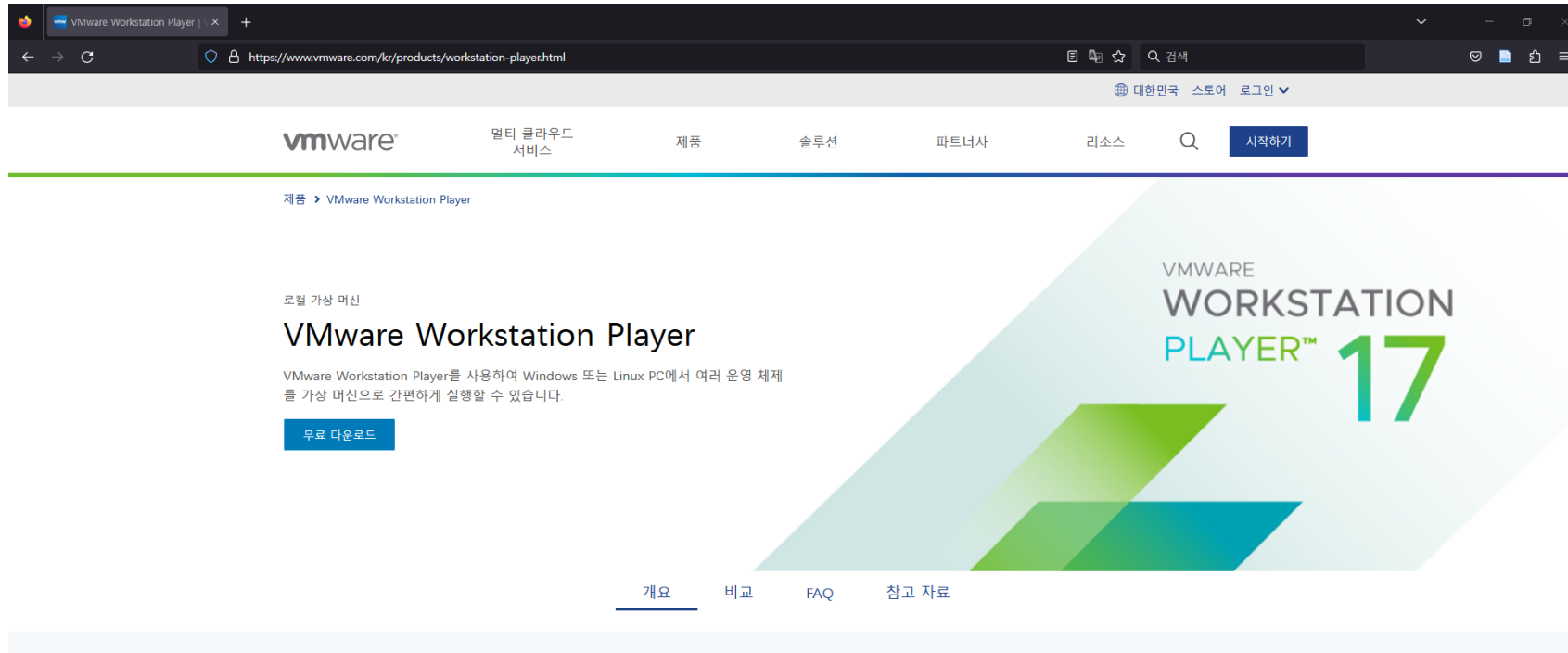


과제1 참고자료

1. 가상 머신 설치하기 (VMware)



<https://www.vmware.com/kr/products/workstation-player.html>

1. 가상 머신 설치하기 (VirtualBox)



VirtualBox

search...

로그인 설정
시작 페이지 페이지 색인 이력

Download VirtualBox

Here you will find links to VirtualBox binaries and its source code.

VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

If you're looking for the latest VirtualBox 6.1 packages, see [VirtualBox 6.1 builds](#). Version 6.1 will remain supported until December 2023.

VirtualBox 7.0.10 platform packages

- [Windows hosts](#)
- [macOS / Intel hosts](#)
- [Linux distributions](#)
- [Solaris hosts](#)
- [Solaris 11 IPS hosts](#)

The binaries are released under the terms of the GPL version 3.

See the [changelog](#) for what has changed.

You might want to compare the checksums to verify the integrity of downloaded packages. *The SHA256 checksums should be favored as the MD5 algorithm must be treated as insecure!*

- [SHA256 checksums](#), [MD5 checksums](#)

Note: After upgrading VirtualBox it is recommended to upgrade the guest additions as well.

VirtualBox 7.0.10 Oracle VM VirtualBox Extension Pack

<https://www.virtualbox.org/wiki/Downloads>

2. Ubuntu 설치하기

ubuntu releases

Ubuntu 20.04.6 LTS (Focal Fossa)

Select an image

Ubuntu is distributed on three types of images described below.

Desktop image

The desktop image allows you to try Ubuntu without changing your computer at all, and at your option to install it permanently later. This type of image is what most people will want to use. You will need at least 1024MiB of RAM to install from this image.

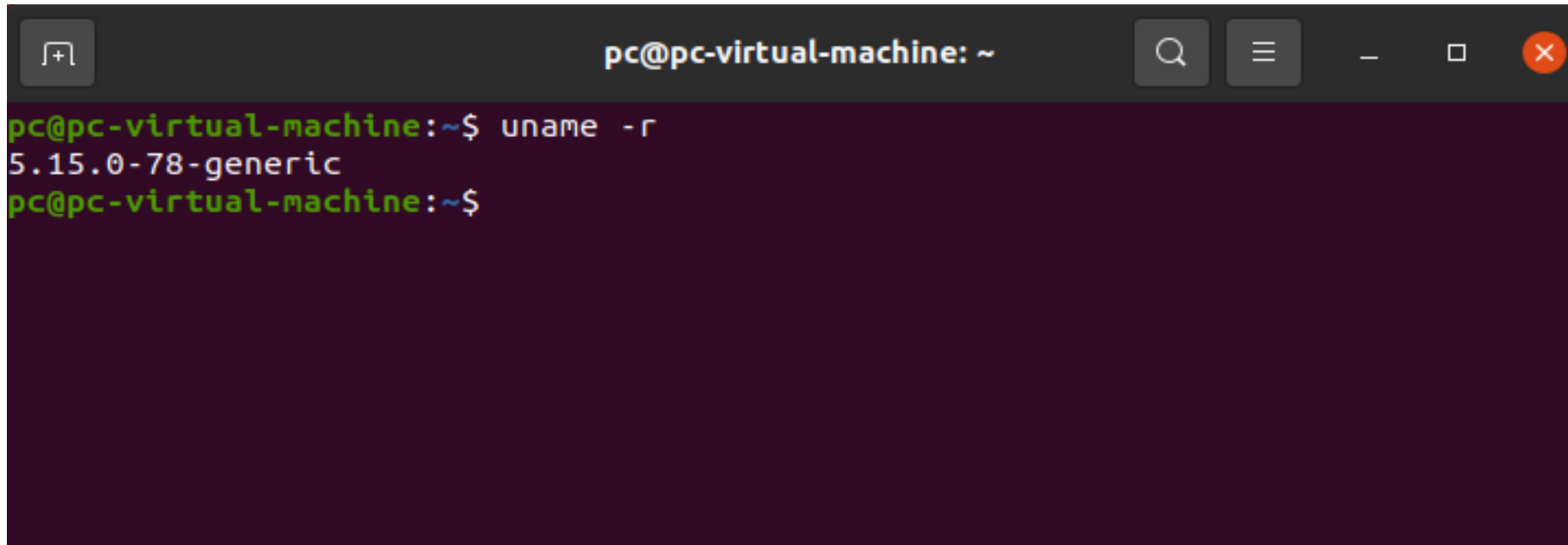
64-bit PC (AMD64) desktop image

Choose this if you have a computer based on the AMD64 or EM64T architecture (e.g., Athlon64, Opteron, EM64T Xeon, Core 2). Choose this if you are at all unsure.

<https://releases.ubuntu.com/20.04.6/> 설치 권장

- 가상 하드디스크 용량을 설정 시 60GB 이상 설정 권장 (리눅스 커널 컴파일 시 35GB 정도 사용)
- 설치 후 최신 버전의 Ubuntu로 업그레이드 금지

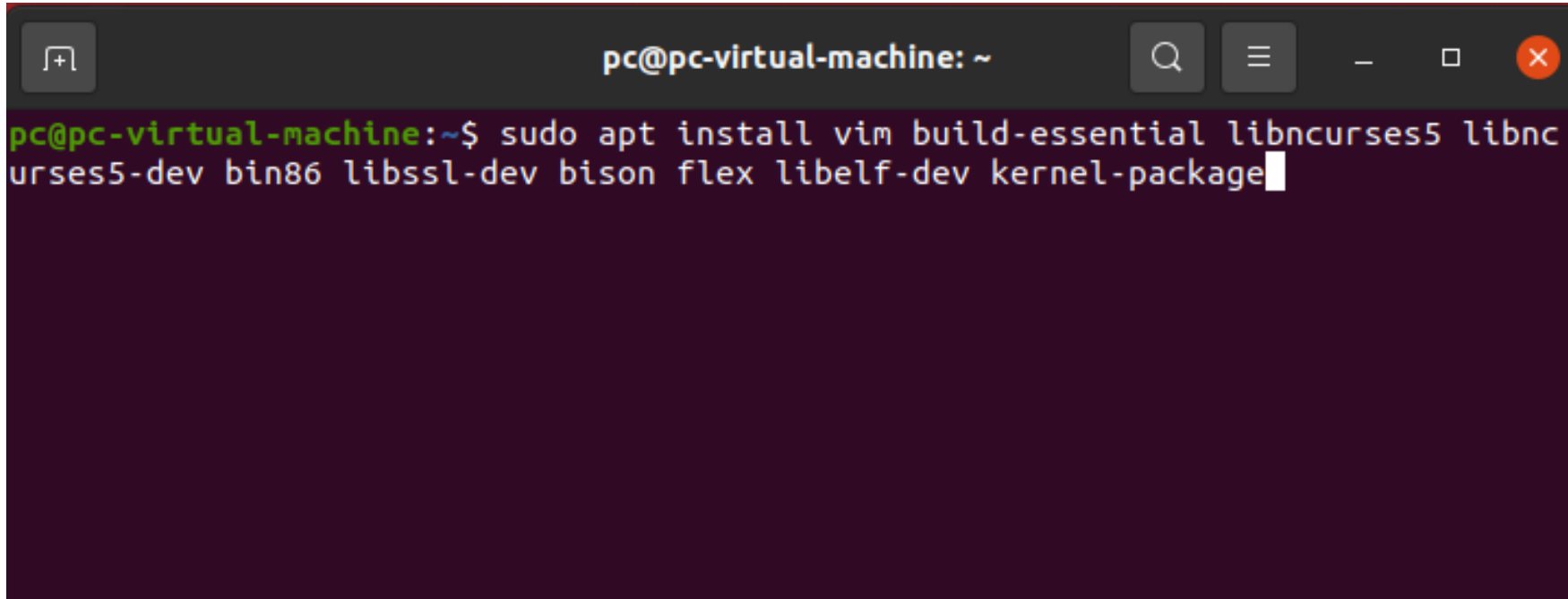
3. Linux 커널 설치하기

A terminal window with a dark purple background. The title bar at the top reads 'pc@pc-virtual-machine: ~'. On the left of the title bar is a window icon, and on the right are search, menu, and window control icons. The terminal content shows a command 'uname -r' being executed, resulting in the output '5.15.0-78-generic'. The prompt 'pc@pc-virtual-machine:~\$' is visible at the end of the line.

```
pc@pc-virtual-machine:~$ uname -r
5.15.0-78-generic
pc@pc-virtual-machine:~$
```

터미널에서 현재 커널 버전 확인

3. Linux 커널 설치하기



```
pc@pc-virtual-machine: ~  
pc@pc-virtual-machine:~$ sudo apt install vim build-essential libncurses5 libncurses5-dev bin86 libssl-dev bison flex libelf-dev kernel-package
```

sudo apt install vim build-essential libncurses5 libncurses5-dev bin86 libssl-dev bison flex libelf-dev kernel-package

3. Linux 커널 설치하기

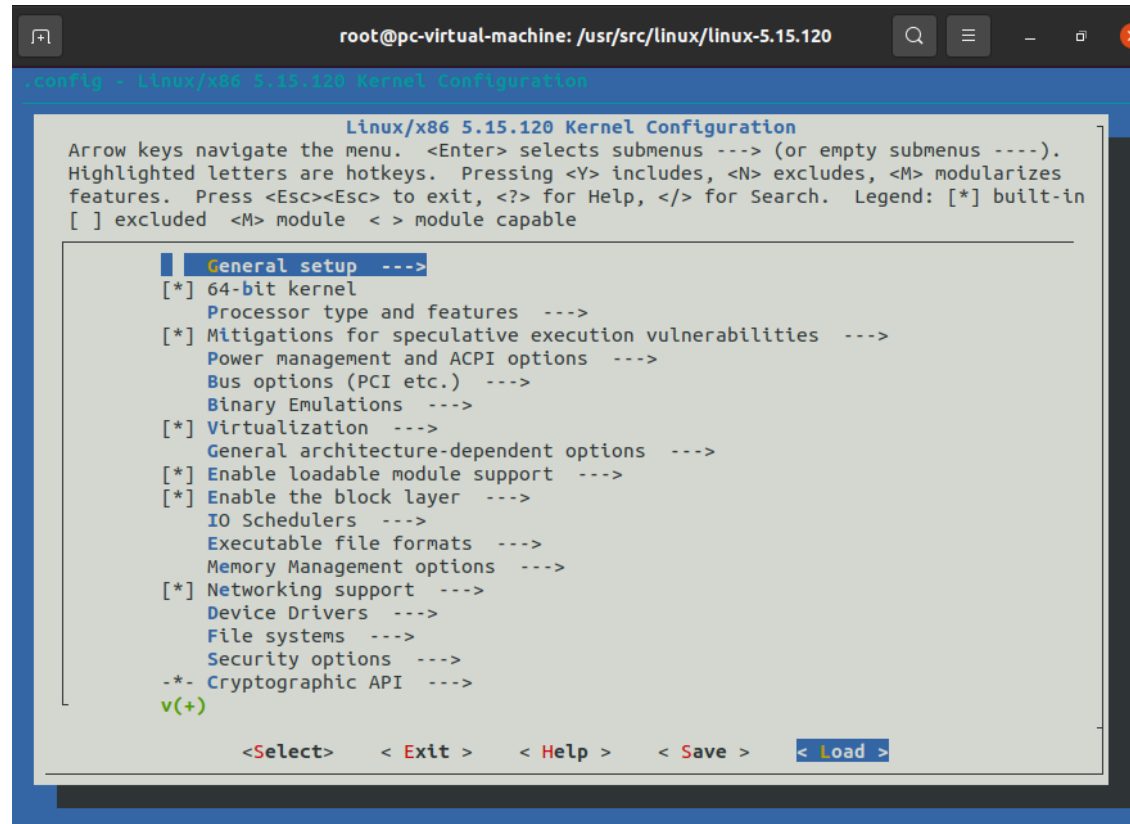
```
pc@pc-virtual-machine: ~  
pc@pc-virtual-machine:~$ wget https://www.kernel.org/pub/linux/kernel/v5.x/linux-5.15.120.tar.xz  
--2023-08-03 17:41:14-- https://www.kernel.org/pub/linux/kernel/v5.x/linux-5.15.120.tar.xz  
www.kernel.org (www.kernel.org) 해석 중... 145.40.73.55, 2604:1380:40e1:4800::1  
다음으로 연결 중: www.kernel.org (www.kernel.org)|145.40.73.55|:443... 연결했습니다.  
HTTP 요청을 보냈습니다. 응답 기다리는 중... 301 Moved Permanently  
위치: https://mirrors.edge.kernel.org/pub/linux/kernel/v5.x/linux-5.15.120.tar.xz [따라감]  
--2023-08-03 17:41:15-- https://mirrors.edge.kernel.org/pub/linux/kernel/v5.x/linux-5.15.120.tar.xz  
mirrors.edge.kernel.org (mirrors.edge.kernel.org) 해석 중... 147.75.48.161, 2604:1380:40f1:3f00::1  
다음으로 연결 중: mirrors.edge.kernel.org (mirrors.edge.kernel.org)|147.75.48.161|:443... 연결했습니다.  
HTTP 요청을 보냈습니다. 응답 기다리는 중... 200 OK  
길이: 126492316 (121M) [application/x-xz]  
저장 위치: `linux-5.15.120.tar.xz'  
  
linux-5.15.120.tar. 2%[ ] 2.82M 850KB/s 약 2m 15s
```

wget https://www.kernel.org/pub/linux/kernel/v5.x/linux-5.15.120.tar.xz

3. Linux 커널 설치하기

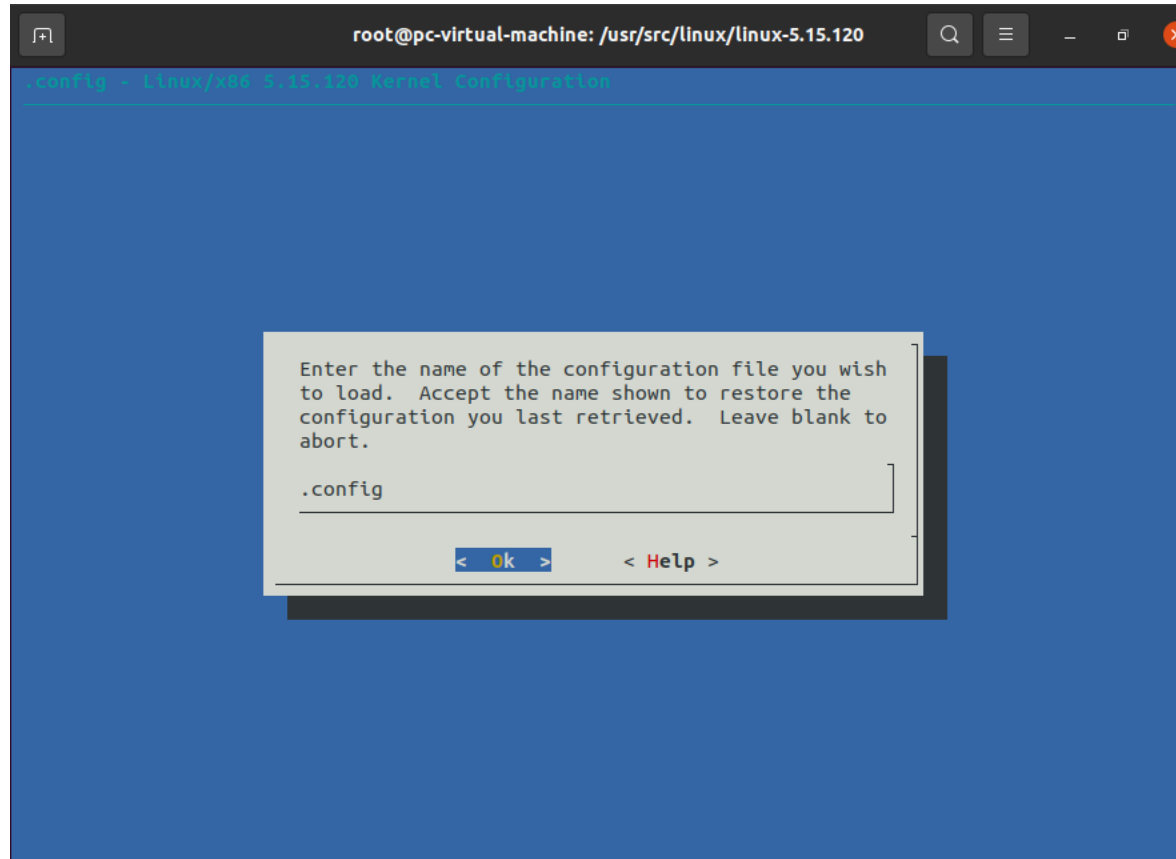
```
root@pc-virtual-machine: /usr/src/linux/linux-5.15.120
pc@pc-virtual-machine:/$ sudo -s
[sudo] pc 암호:
root@pc-virtual-machine:/# mkdir /usr/src/linux
root@pc-virtual-machine:/# cp /home/pc/linux-5.15.120.tar.xz /usr/src/linux
root@pc-virtual-machine:/# cd /usr/src/linux
root@pc-virtual-machine:/usr/src/linux# ls
linux-5.15.120.tar.xz
root@pc-virtual-machine:/usr/src/linux# tar -xf linux-5.15.120.tar.xz
root@pc-virtual-machine:/usr/src/linux# ls
linux-5.15.120 linux-5.15.120.tar.xz
root@pc-virtual-machine:/usr/src/linux# uname
Linux
root@pc-virtual-machine:/usr/src/linux# uname -r
5.15.0-78-generic
root@pc-virtual-machine:/usr/src/linux# cd linux-5.15.120
root@pc-virtual-machine:/usr/src/linux/linux-5.15.120# cp /boot/config-5.15.0-78-generic ./.config
root@pc-virtual-machine:/usr/src/linux/linux-5.15.120# make menuconfig
```


3. Linux 커널 설치하기



“make menuconfig” 명령어를 실행시키면 위와 같은 창이 출력됨
좌우 방향키를 이용하여 Load 탭으로 이동 후 엔터를 눌러 진행함

3. Linux 커널 설치하기



위와 같이 .config를 입력 후 Ok를 눌러 이전의 화면으로 돌아감
이후 Save 메뉴도 동일하게 진행한 뒤 Exit 탭을 통해 종료함

4. Linux 커널 컴파일하기

```
root@pc-virtual-machine:/usr/src/linux/linux-5.15.120# scripts/config --disable SYSTEM_TRUSTED_KEYS
root@pc-virtual-machine:/usr/src/linux/linux-5.15.120# scripts/config --disable SYSTEM_REVOCATION_KEYS
root@pc-virtual-machine:/usr/src/linux/linux-5.15.120# make-kpkg --initrd --revision=1.0 kernel_image
```

- 이후 터미널에

```
scripts/config --disable SYSTEM_TRUSTED_KEYS
```

```
scripts/config --disable SYSTEM_REVOCATION_KEYS
```

입력한 후,

- `make-kpkg --initrd --revision=1.0 kernel_image`

명령어를 입력해 커널을 컴파일하여 이미지 파일을 생성함

컴파일 과정은 사용 환경에 따라 30분에서 몇 시간 정도 소요됨

- 컴파일 완료 후

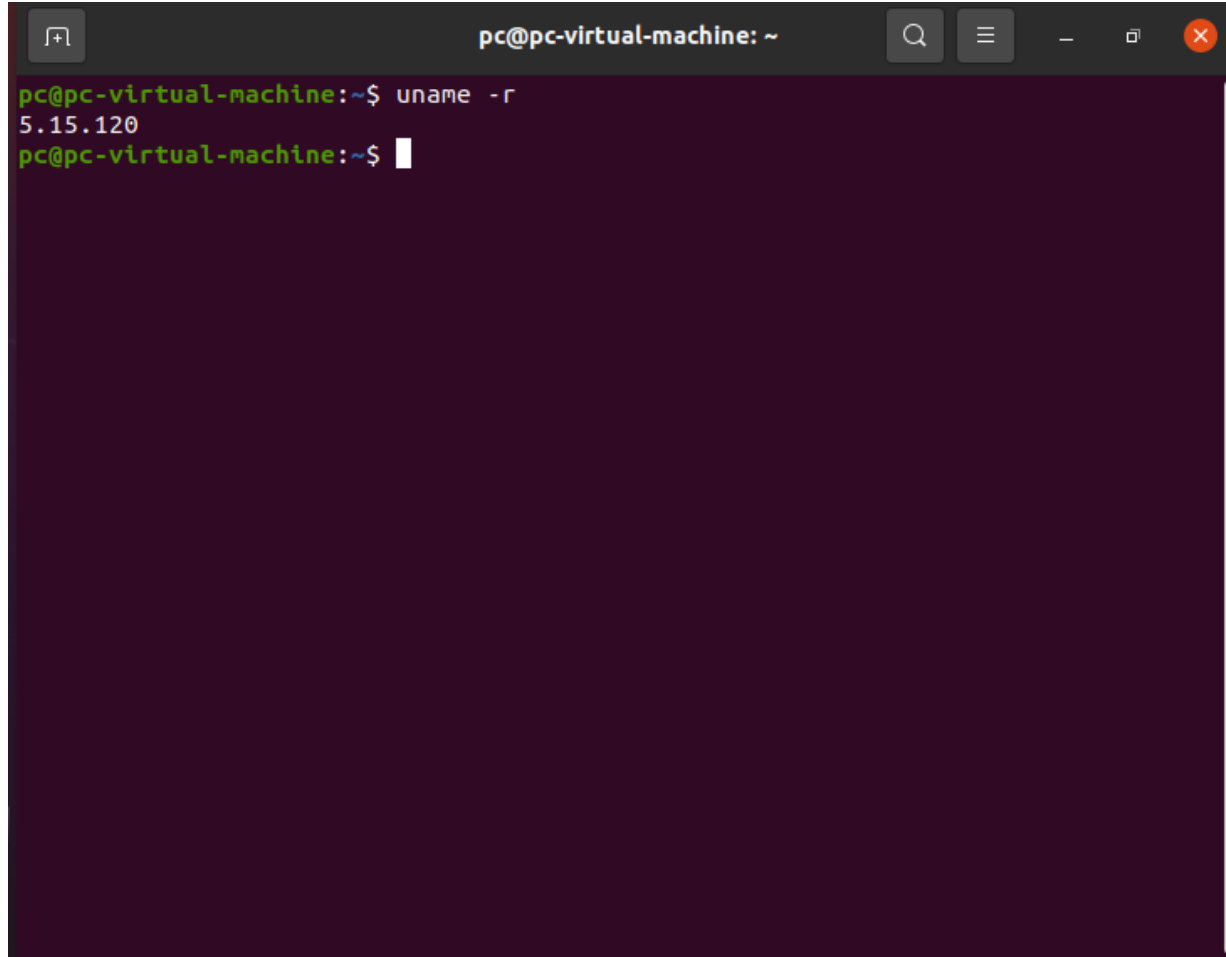
```
cd ../
```

```
dpkg -i linux-image-5.15.120_1.0_amd64.deb
```

입력 후 reboot

BTF: .tmp_vmlinux.btf: pahole (pahole) is not available 오류 시 `sudo apt install dwarves`
zstd 관련 오류 시 `sudo apt install zstd`

4. Linux 커널 컴파일하기

A terminal window titled 'pc@pc-virtual-machine: ~' with a dark purple background. The prompt is 'pc@pc-virtual-machine:~\$'. The command 'uname -r' has been entered, and the output '5.15.120' is displayed on the next line. The prompt is now 'pc@pc-virtual-machine:~\$' with a cursor.

```
pc@pc-virtual-machine:~$ uname -r
5.15.120
pc@pc-virtual-machine:~$
```

재부팅 후 터미널에서 `uname -r`
명령어로 확인해 보면 새로 설치한
커널 버전을 확인할 수 있음