퀘스트 2/7 - Yocto 환경 구축 및 STM32MP157C-DK2 보드 실행 작성자 : zmflfto**

Install & Build the OpenSTLinux distribution

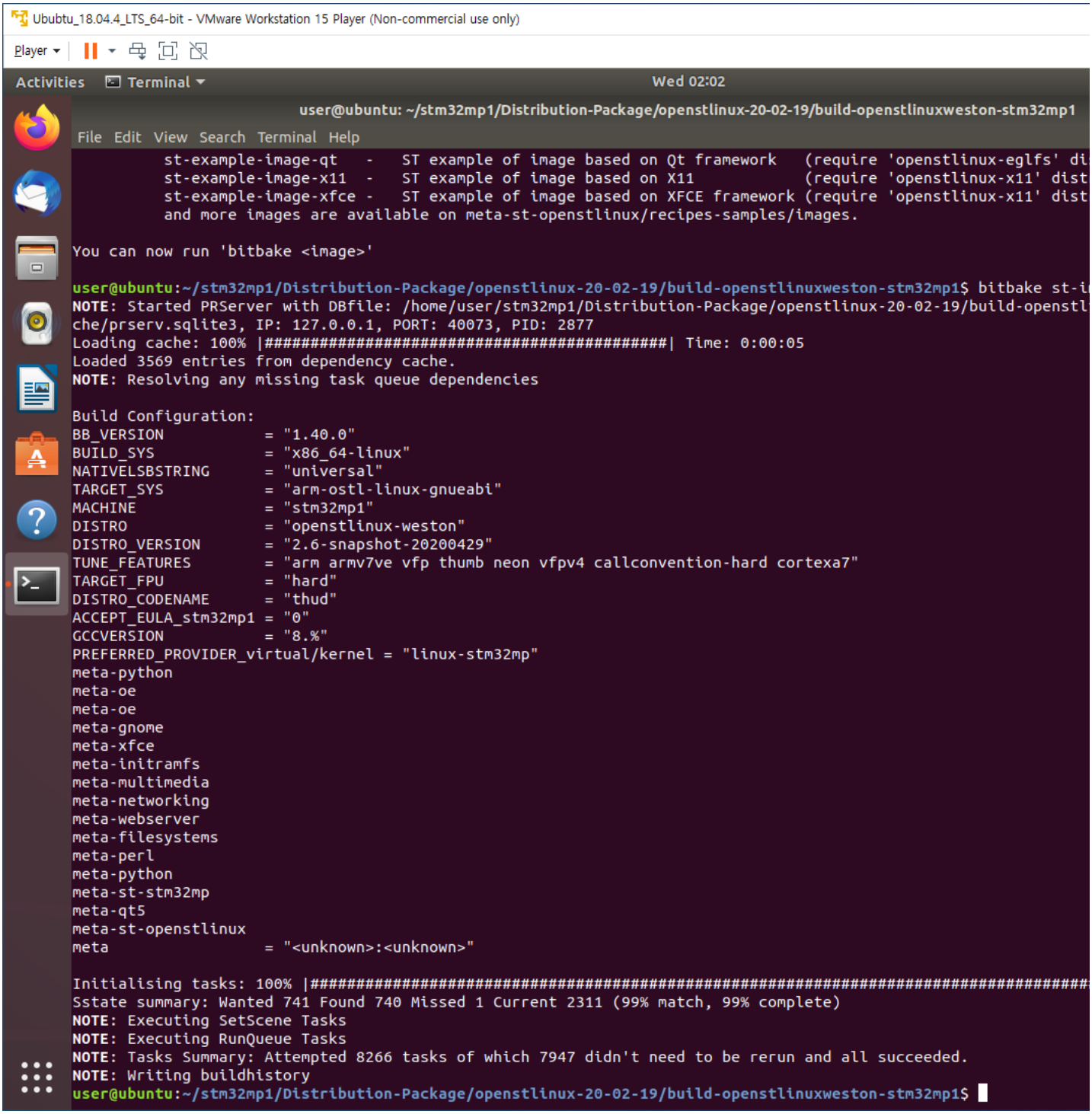
@ 아래 링크를 통해 OpenSTLinux distribution 를 받음
https://make.e4ds.com/make/dist/layers.tar.gz

@ \Distribution-Package\openstlinux-20-02-19 에 복사 후 압축해제
$ tar xvf layers.tar.gz

@ 환경변수 설정 후 bitbake 빌드
$ DISTRO=openstlinux-weston MACHINE=stm32mp1 source layers/meta-st/scripts/envsetup.sh
$ bitbake st-image-weston

% 약 6시간 40분 정도 소요되었음
% 저장공간 용량 부족으로 저장공간 확보 후 다시 빌드 진행. 여유공간 25GByte 정도 필요
% 빌드시 Warnning이 발생하였으나 재빌드시 성공함

```
user@ubuntu: ~/stm32mp1/Distribution-Package/openstlinux-20-02-19/build-openstlinuxweston-stm32mp1
File  Edit  View  Search  Terminal  Help

You can now run 'bitbake <image>'
user@ubuntu:~/stm32mp1/Distribution-Package/openstlinux-20-02-19/build-openstlinuser@ubuntu:~/stm32mp1/Distribution-Pac
ux-20-02-19/build-openstlinuxweston-stm32mp1$ bitbake st-image-weston
NOTE: Started PRServer with DBfile: /home/user/stm32mp1/Distribution-Package/openstlinux-20-02-19/build-openstlinuxwest
che/prserv.sqlite3, IP: 127.0.0.1, PORT: 34671, PID: 2457
Parsing recipes: 100% |##########################################################################################|
Parsing of 2524 .bb files complete (0 cached, 2524 parsed). 3569 targets, 84 skipped, 0 masked, 0 errors.
NOTE: Resolving any missing task queue dependencies

Build Configuration:
BB_VERSION           = "1.40.0"
BUILD_SYS            = "x86_64-linux"
NATIVELSBSTRING      = "ubuntu-18.04"
TARGET_SYS           = "arm-ostl-linux-gnueabi"
MACHINE              = "stm32mp1"
DISTRO               = "openstlinux-weston"
DISTRO_VERSION       = "2.6-snapshot-20200428"
TUNE_FEATURES        = "arm armv7ve vfp thumb neon vfpv4 callconvention-hard cortexa7"
TARGET_FPU           = "hard"
DISTRO_CODENAME      = "thud"
ACCEPT_EULA_stm32mp1 = "0"
GCCVERSION           = "8.%"
PREFERRED_PROVIDER_virtual/kernel = "linux-stm32mp"
meta-python
meta-oe
meta-oe
meta-gnome
meta-xfce
meta-initramfs
meta-multimedia
meta-networking
meta-webserver
meta-filesystems
meta-perl
meta-python
meta-st-stm32mp
meta-qt5
meta-st-openstlinux
meta                 = "<unknown>:<unknown>"

NOTE: Fetching uninative binary shim from http://downloads.yoctoproject.org/releases/uninative/2.7/x86_64-nativesdk-lib
6sum=9498d8bba047499999a7310ac2576d07964611849653 51a56f6d32c888a1f216
Initialising tasks: 100% |#######################################################################################|
Sstate summary: Wanted 3052 Found 0 Missed 3052 Current 0 (0% match, 0% complete)
NOTE: Executing SetScene Tasks
NOTE: Executing RunQueue Tasks
Currently  2 running tasks (210 of 8266)   2% |##
0: binutils-cross-arm-2.31.1-r0 do_fetch (pid 14332)  37% |########################
1: gmp-native-6.1.2-r0 do_compile - 20s (pid 43437)
```



@ 너무 오래 걸려서 기다리는 동안 Touch Panel에 보호필름을 붙여줌

Flashing the built Image

@ STM32CubeProgrammer 설치 전 필요한 Packages 설치 및 설정

$ sudo apt-get install openjdk-8-jre-headless

$ sudo update-alternatives --config java

Select the java-8-openjdk configuration

```
user@ubuntu: ~
File  Edit  View  Search  Terminal  Help
user@ubuntu:~$ sudo apt-get install openjdk-8-jre-headless
[sudo] password for user:
Reading package lists... Done
Building dependency tree
Reading state information... Done
openjdk-8-jre-headless is already the newest version (8u252-b09-1~18.04).
openjdk-8-jre-headless set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
user@ubuntu:~$ sudo update-alternatives --config java
There are 2 choices for the alternative java (providing /usr/bin/java).

  Selection    Path                                            Priority   Status
------------------------------------------------------------
* 0            /usr/lib/jvm/java-11-openjdk-amd64/bin/java      1111      auto m
ode
  1            /usr/lib/jvm/java-11-openjdk-amd64/bin/java      1111      manual
 mode
  2            /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/java   1081      manual
 mode

Press <enter> to keep the current choice[*], or type selection number: 2
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/java to pro
vide /usr/bin/java (java) in manual mode
user@ubuntu:~$ sudo apt purge openjfx
```

$ sudo apt purge openjfx

$ sudo apt install openjfx=8u161-b12-1ubuntu2 libopenjfx-jni=8u161-b12-1ubuntu2 libopenjfx-java=8u161-b12-1ubuntu2

$ sudo apt-mark hold openjfx libopenjfx-jni libopenjfx-java

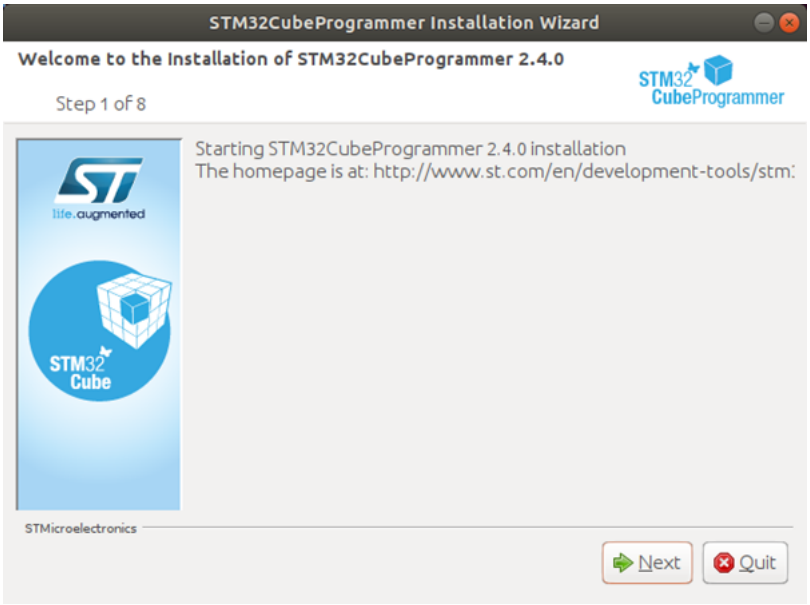
@ STM32CubeProgrammer 압축해제

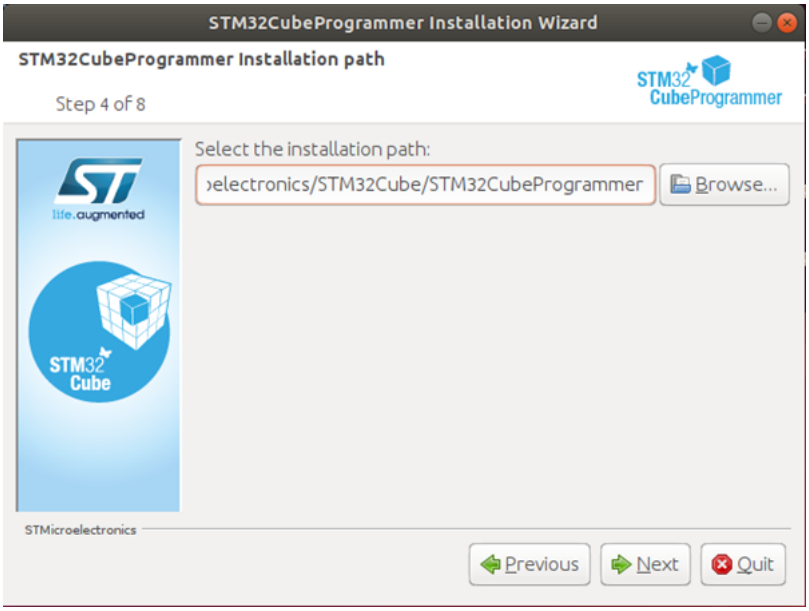
$ unzip en.stm32cubeprog_v2-4-0.zip -d stm32cubeprog_v2-4-0

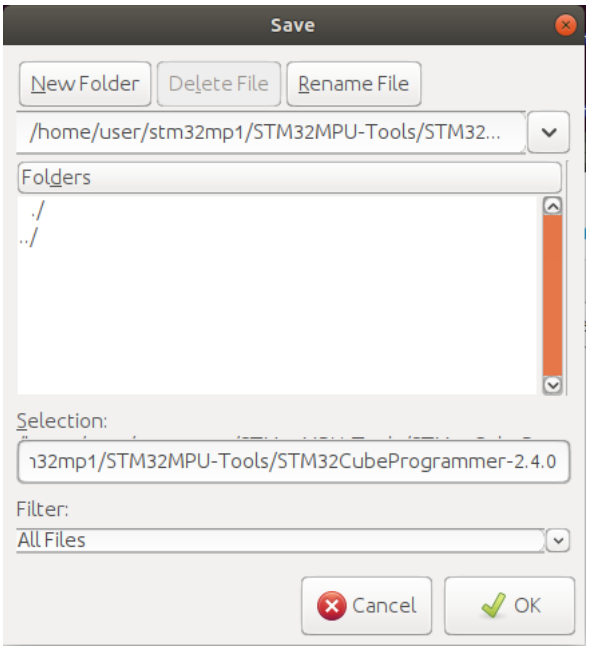
@ STM32CubeProgrammer 설치

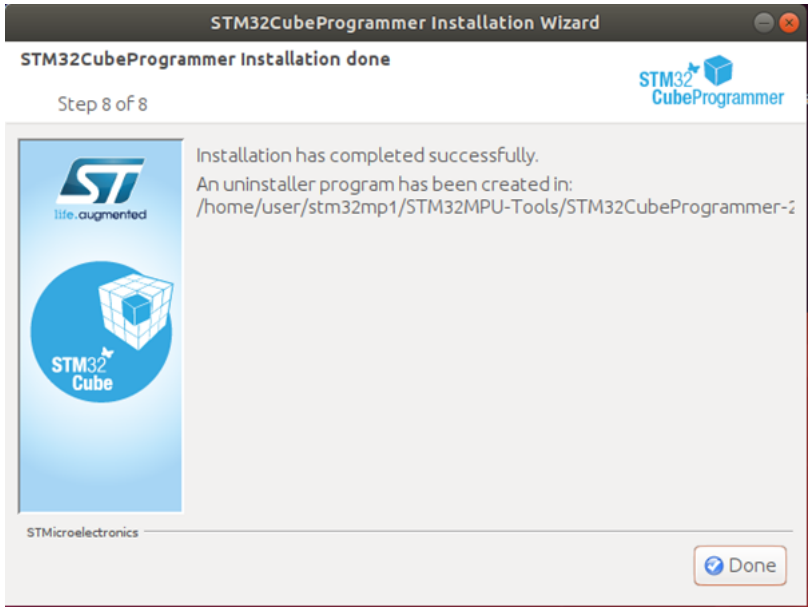
$ cd stm32cubeprog_v2-4-0

$ ./SetupSTM32CubeProgrammer-2.4.0.linux


STM32CubeProgrammer Installation Wizard
Welcome to the Installation of STM32CubeProgrammer 2.4.0
Step 1 of 8
STM32 CubeProgrammer
Starting STM32CubeProgrammer 2.4.0 installation
The homepage is at: http://www.st.com/en/development-tools/stm
life.augmented
STM32 Cube
STMicroelectronics
Next
Quit


STM32CubeProgrammer Installation Wizard
STM32CubeProgrammer Installation path
Step 4 of 8
STM32 CubeProgrammer
Select the installation path:
)electronics/STM32Cube/STM32CubeProgrammer
Browse...
life.augmented
STM32 Cube
STMicroelectronics
Previous
Next
Quit


Save
New Folder
Delete File
Rename File
/home/user/stm32mp1/STM32MPU-Tools/STM32...
Folders
./
../
Selection:
)32mp1/STM32MPU-Tools/STM32CubeProgrammer-2.4.0
Filter:
All Files
Cancel
OK



@ STM32_Programmer_CLI의 PATH 추가

$ export PATH=$HOME/stm32mp1/STM32MPU-Tools/STM32CubeProgrammer-2.4.0/bin:$PATH

@ STM32_Programmer_CLI 설치 확인

```
user@ubuntu:~/stm32mp1/download/stm32cubeprog_v2-4-0$ export PATH=$HOME/stm32mp1
/STM32MPU-Tools/STM32CubeProgrammer-2.4.0/bin:$PATH
user@ubuntu:~/stm32mp1/download/stm32cubeprog_v2-4-0$ STM32_Programmer_CLI --h
      -------------------------------------------------------------------
                        STM32CubeProgrammer v2.4.0
      -------------------------------------------------------------------

user@ubuntu:~/stm32mp1/download/stm32cubeprog_v2-4-0$
```

@ USB Driver 설치

$ sudo apt install libusb-1.0-0

$ cd /STM32MPU-Tools/STM32CubeProgrammer-2.4.0/Drivers/rules

$ sudo cp *.* /etc/udev/rules.d/

@ STM32MP157C-DK2 USB 확인

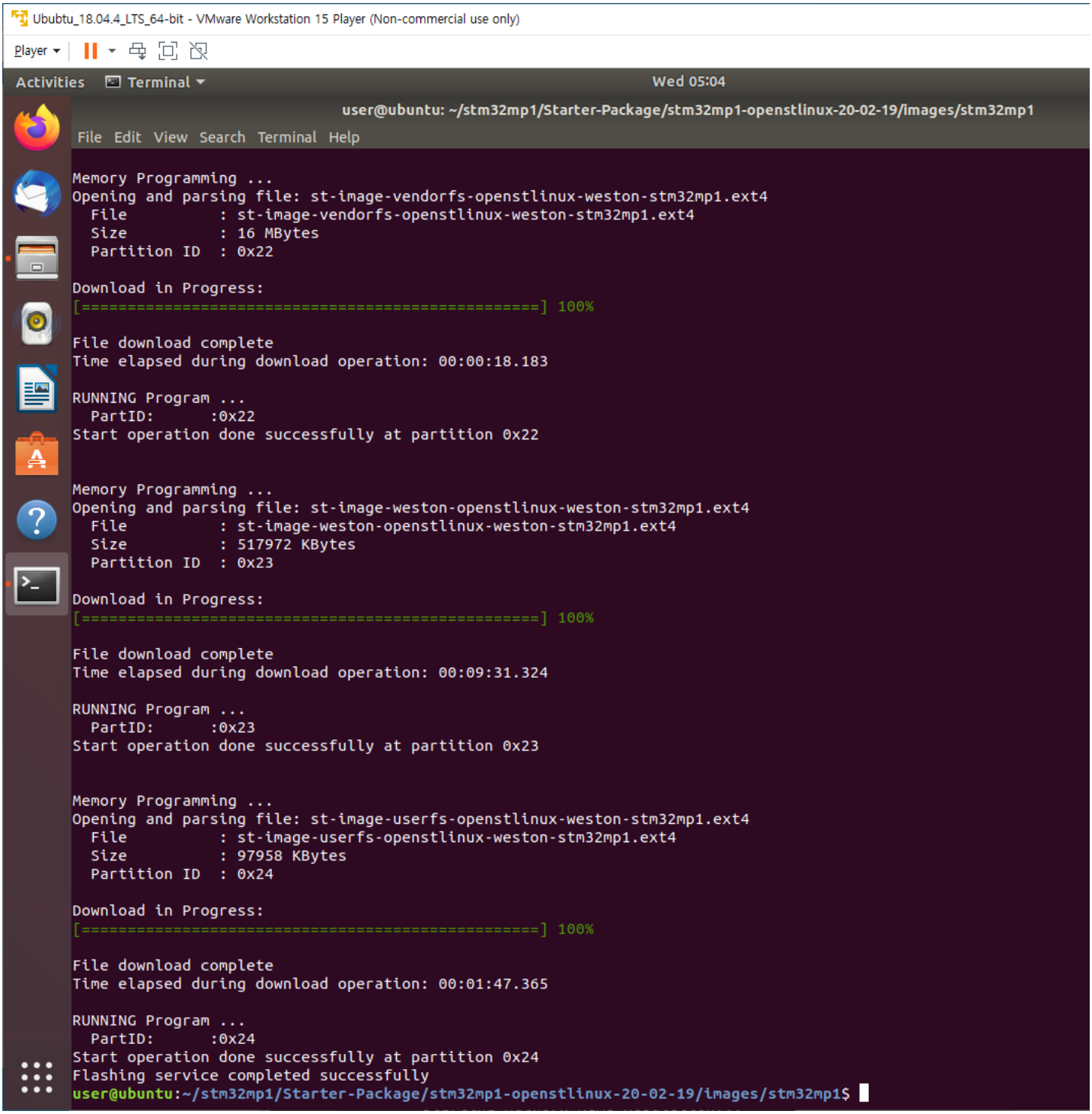
% 위는 Debug Mode

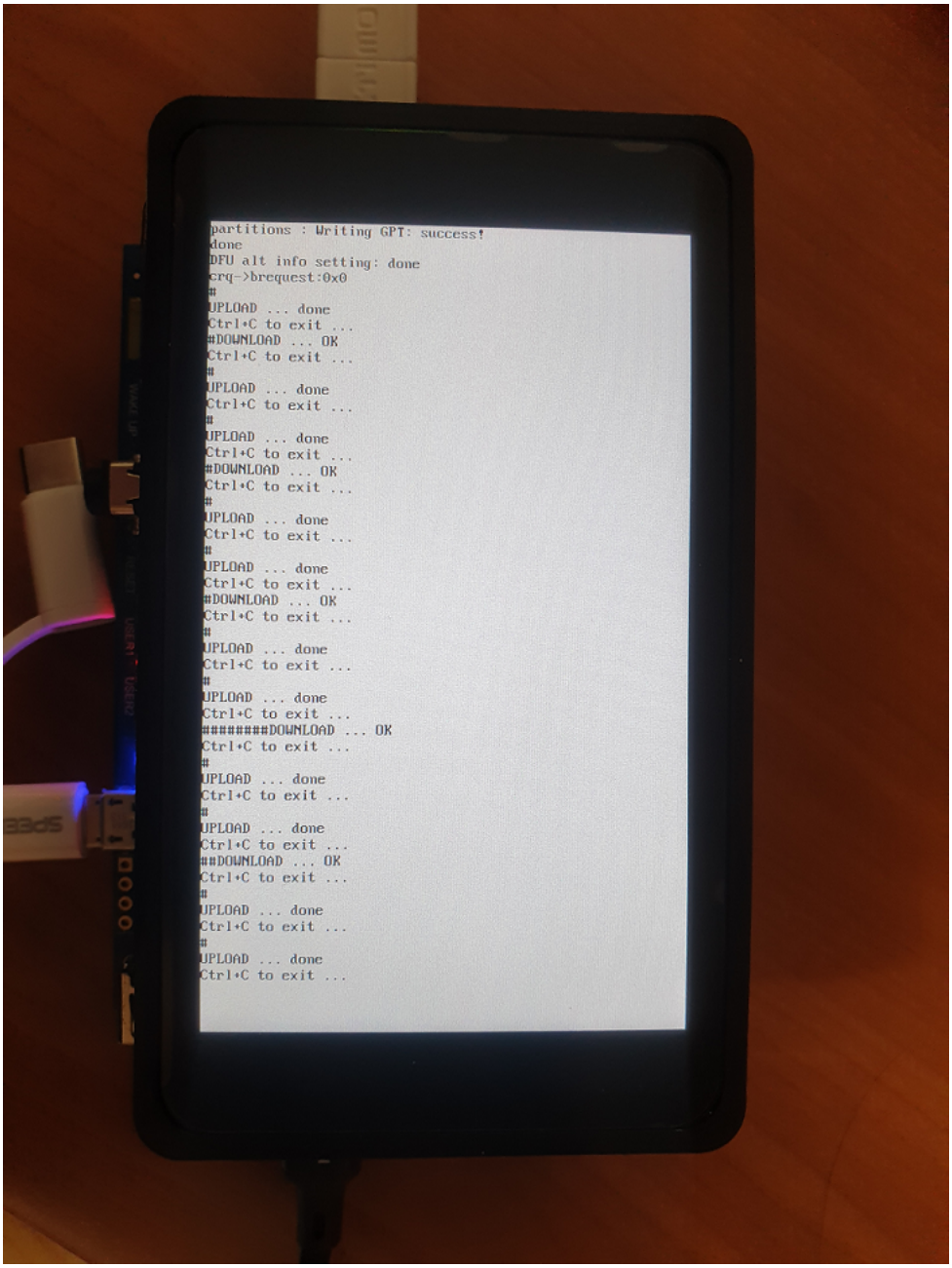
% 아래는 DFU Mode

```
user@ubuntu: ~/stm32mp1/Starter-Package/stm32mp1-openstlinux-20-02-19/images/stm32...
File  Edit  View  Search  Terminal  Help
user@ubuntu:~/stm32mp1/Starter-Package/stm32mp1-openstlinux-20-02-19/images/stm3
2mp1$ STM32_Programmer_CLI -l usb
      -------------------------------------------------------------------
                        STM32CubeProgrammer v2.4.0
      -------------------------------------------------------------------

=====  DFU Interface   =====

No STM32 device in DFU mode connected

user@ubuntu:~/stm32mp1/Starter-Package/stm32mp1-openstlinux-20-02-19/images/stm3
2mp1$ STM32_Programmer_CLI -l usb
      -------------------------------------------------------------------
                        STM32CubeProgrammer v2.4.0
      -------------------------------------------------------------------

=====  DFU Interface   =====

Total number of available STM32 device in DFU mode: 1

  Device Index           : USB1
  USB Bus Number         : 001
  USB Address Number     : 001
  Product ID             : DFU in HS Mode @Device ID /0x500, @Revision ID /0x000
0
  Serial number          : 002A004434385105383336 30
  Firmware version       : 0x0110
  Device ID              : 0x0500

user@ubuntu:~/stm32mp1/Starter-Package/stm32mp1-openstlinux-20-02-19/images/stm3
user@ubuntu:~/stm32mp1/Starter-Package/stm32mp1-openstlinux-20-02-19/images/stm3
[00m
```

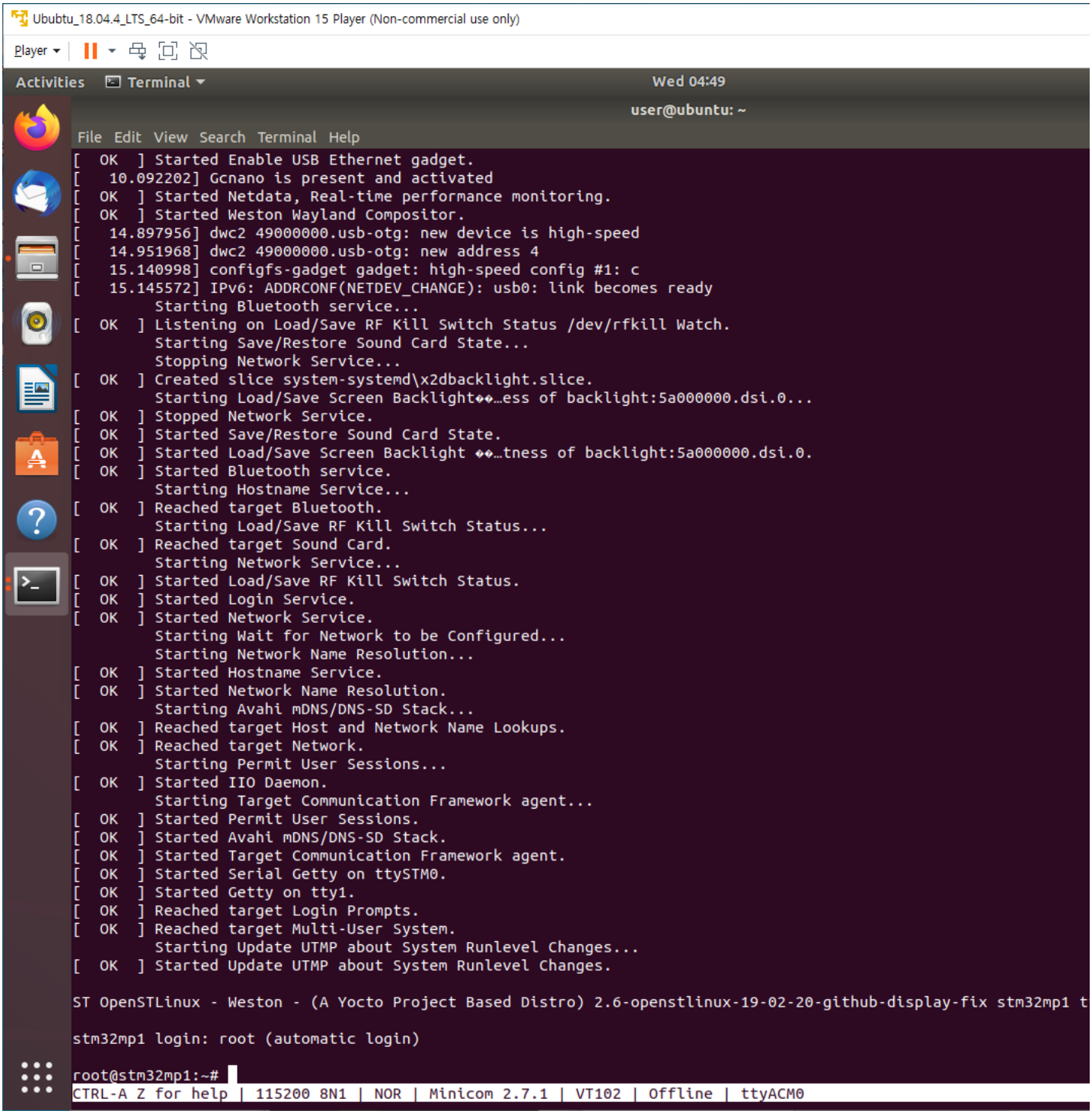
@ STM32_Programmer_CLI를 이용한 Flashing

$ STM32_Programmer_CLI -c port=usb1 -w flashlayout_st-image-weston/FlashLayout_sdcard_stm32mp157c-dk2-trusted.tsv

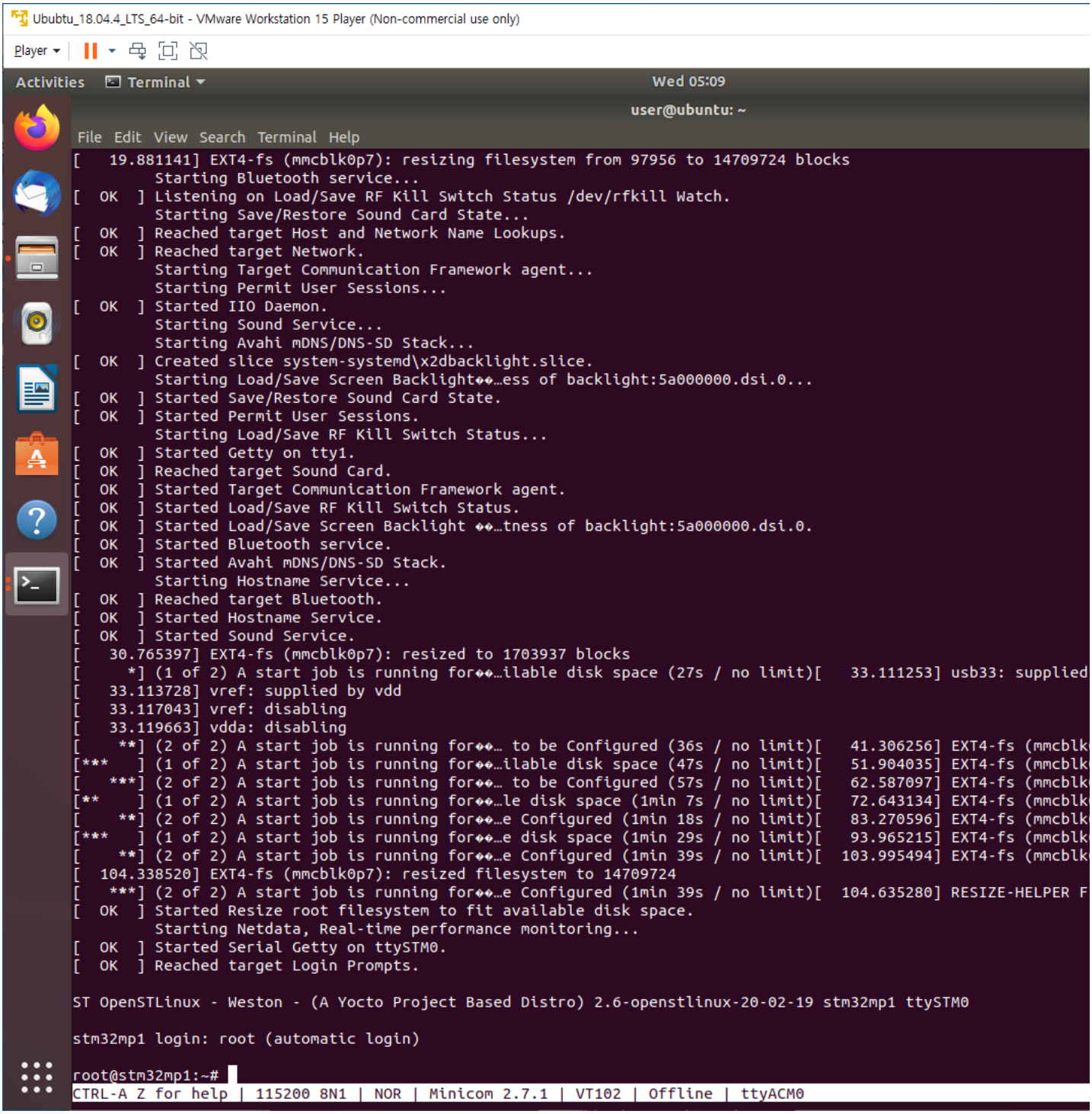

Ububtu_18.04.4_LTS_64-bit - VMware Workstation 15 Player (Non-commercial use only)
Player
Activities
Terminal
Wed 05:04
user@ubuntu: ~/stm32mp1/Starter-Package/stm32mp1-openstlinux-20-02-19/images/stm32mp1
File Edit View Search Terminal Help
Memory Programming ...
Opening and parsing file: st-image-vendorfs-openstlinux-weston-stm32mp1.ext4
File : st-image-vendorfs-openstlinux-weston-stm32mp1.ext4
Size : 16 MBytes
Partition ID : 0x22
Download in Progress:
[==========] 100%
File download complete
Time elapsed during download operation: 00:00:18.183
RUNNING Program ...
PartID: :0x22
Start operation done successfully at partition 0x22
Memory Programming ...
Opening and parsing file: st-image-weston-openstlinux-weston-stm32mp1.ext4
File : st-image-weston-openstlinux-weston-stm32mp1.ext4
Size : 517972 KBytes
Partition ID : 0x23
Download in Progress:
[==========] 100%
File download complete
Time elapsed during download operation: 00:09:31.324
RUNNING Program ...
PartID: :0x23
Start operation done successfully at partition 0x23
Memory Programming ...
Opening and parsing file: st-image-userfs-openstlinux-weston-stm32mp1.ext4
File : st-image-userfs-openstlinux-weston-stm32mp1.ext4
Size : 97958 KBytes
Partition ID : 0x24
Download in Progress:
[==========] 100%
File download complete
Time elapsed during download operation: 00:01:47.365
RUNNING Program ...
PartID: :0x24
Start operation done successfully at partition 0x24
Flashing service completed successfully
user@ubuntu:~/stm32mp1/Starter-Package/stm32mp1-openstlinux-20-02-19/images/stm32mp1$



% 새 이미지 Flashing 전 booting Message

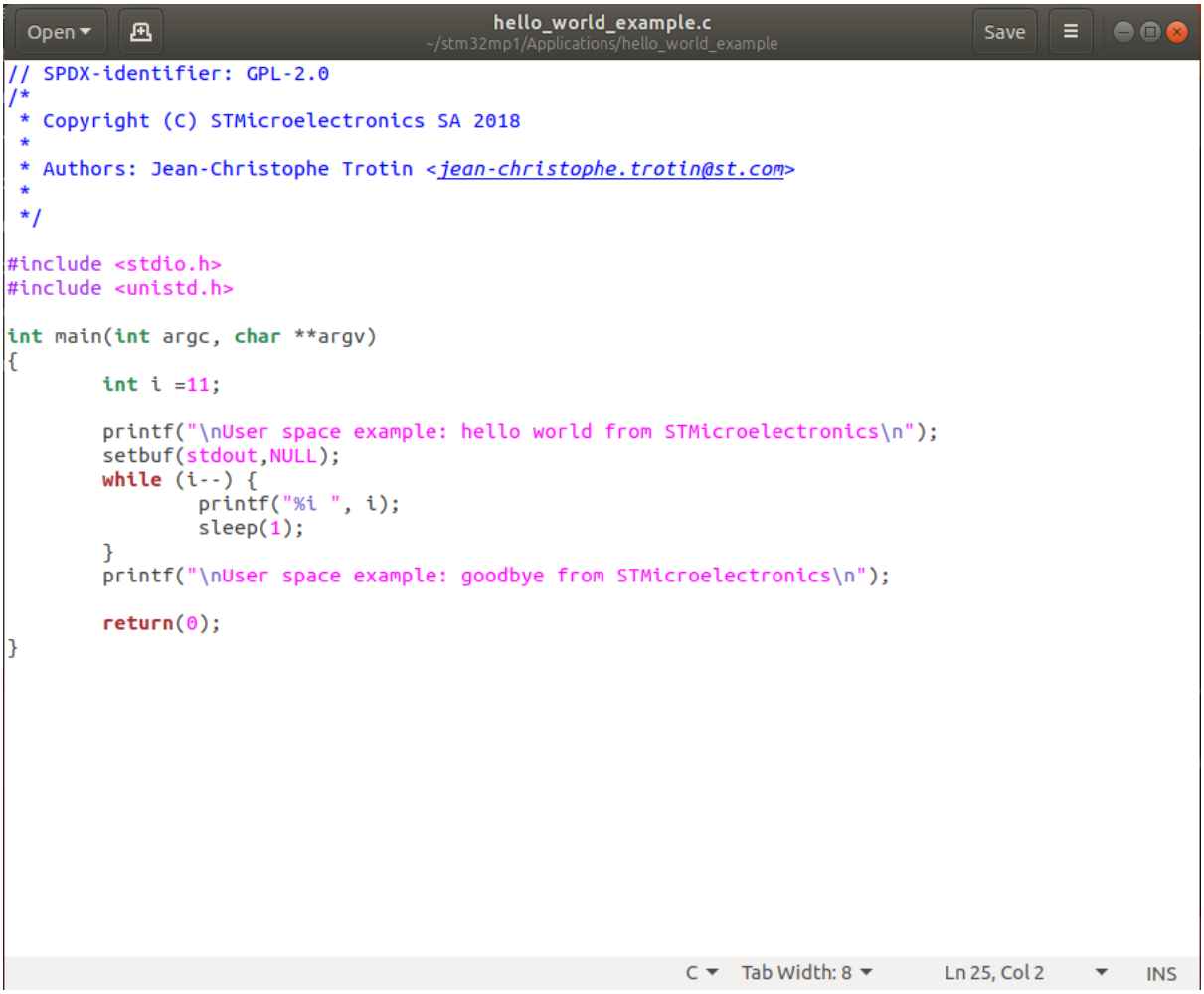


% 새 이미지 Flashing 이후 Booting Message



Hello world 어플리케이션 작성 예제

@ hello_world_example 예제 작성
$ mkdir hello_world_example
$ cd hello_world_example



@ devtool을 이용한 Bulild 및 배포

$ devtool add myhelloworld hello_world_example

$ devtool edit-recipe myhelloworld

Open ▾ myhelloworld.bb ~/stm32mp1/Distribution-Package/openstlinu...on-stm32mp1/workspace/recipes/myhelloworld Save

```
# Recipe created by recipetool
# This is the basis of a recipe and may need further editing in order to be fully functional.
# (Feel free to remove these comments when editing.)

# Unable to find any files that looked like license statements. Check the accompanying
# documentation and source headers and set LICENSE and LIC_FILES_CHKSUM accordingly.
#
# NOTE: LICENSE is being set to "CLOSED" to allow you to at least start building - if
# this is not accurate with respect to the licensing of the software being built (it
# will not be in most cases) you must specify the correct value before using this
# recipe for anything other than initial testing/development!
LICENSE = "CLOSED"
LIC_FILES_CHKSUM = ""

# No information for SRC_URI yet (only an external source tree was specified)
SRC_URI = ""

# NOTE: no Makefile found, unable to determine what needs to be done

do_configure () {
        # Specify any needed configure commands here
        :
}

do_compile () {
        # Specify compilation commands here
        cd ${S}
        ${CC} hello_world_example.c -o hello_world_example
}

do_install () {
        # Specify install commands here
        install -d ${D}${bindir}
        install -m 755 ${S}/hello_world_example  ${D}${bindir}/
}
```

Plain Text ▾ Tab Width: 8 ▾ Ln 34, Col 48 ▾ INS

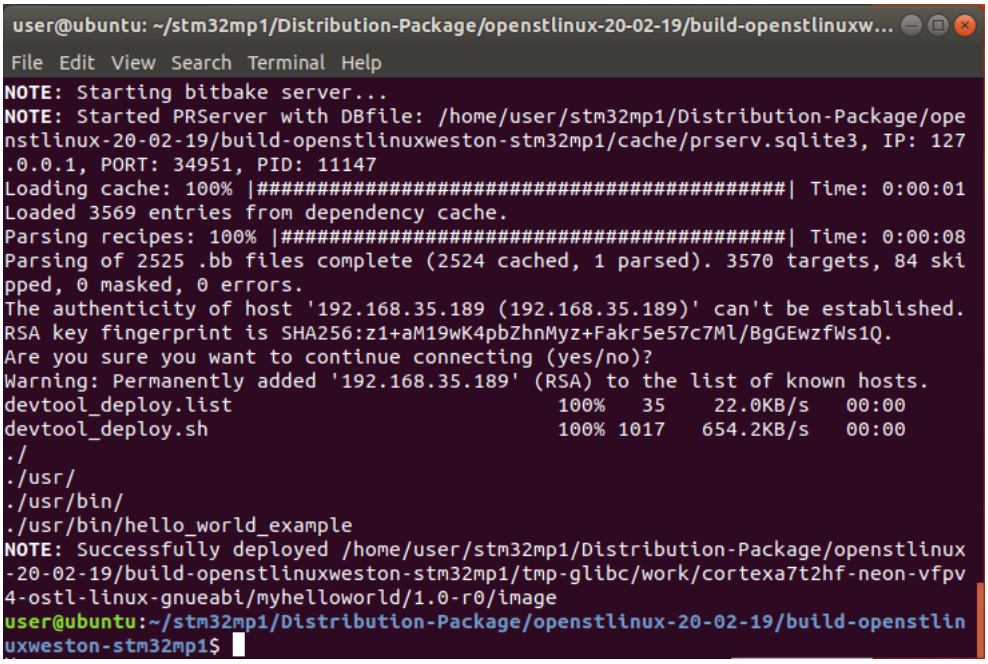
$ bitbake myhelloworld

user@ubuntu: ~/stm32mp1/Distribution-Package/openstlinux-20-02-19/build-openstlinuxw...

File Edit View Search Terminal Help

```
meta-xfce
meta-initramfs
meta-multimedia
meta-networking
meta-webserver
meta-filesystems
meta-perl
meta-python
meta-st-stm32mp
meta-qt5
meta-st-openstlinux
meta
workspace            = "<unknown>:<unknown>"

Initialising tasks: 100% |####################################| Time: 0:00:00
Sstate summary: Wanted 4 Found 4 Missed 0 Current 187 (100% match, 100% complete
)
NOTE: Executing SetScene Tasks
NOTE: Executing RunQueue Tasks
NOTE: Tasks Summary: Attempted 662 tasks of which 662 didn't need to be rerun an
d all succeeded.
NOTE: Writing buildhistory
user@ubuntu:~/stm32mp1/Distribution-Package/openstlinux-20-02-19/build-openstlin
uxweston-stm32mp1$
```

$ devtool deploy-target -s myhelloworld root@192.168.35.189



% **192.168.35.189** 는 STM32MP157C-DK2의 IP Address
% 호스트와 DK2 보드를 연결하여 터미널에서 ifconfig를 통해 IP Address 확인함

@ hello_world_example 실행
$ ./hello_world_example