BeagleBone Bringup and Compilation

1. Host & Target setup

Course repository:
https://github.com/niekiran/linux-device-driver-1 (Download Pre-built Images for BOOT.)

BeagleBone debian image (Install latest one)
https://beagleboard.org/latest-images (Debian Image for ROOTFS)

Linux source files:
https://github.com/beagleboard/linux/tree/5.10

Cross Compiler & Toolchain:
https://snapshots.linaro.org/gnu-toolchain/11.3-2022.06-1/arm-linux-gnueabihf/

Host packages Install:
sudo apt-get update
sudo apt-get install build-essential lzop u-boot-tools net-tools bison flex libssl-dev libncurses5-dev libncursesw5-dev unzip chrpath xz-utils minicom

2. SD Card Partitions

Make 2 Primary partitions for BOOT & ROOTFS.

/dev/sdb1	fat16	BOOT	256MB	boot, lba (flags)	—> BOOT
/dev/sdb2	ext4	ROOTFS	remaining MB		—-> ROOTFS

using **lsblk** command can check the partitions

Tool-chain PATH settings:

Open terminal & type this command

echo “export PATH=$PATH:/home/engineer/LDD/downloads/gcc-linaro-11.3.1-2022.06-x86_64_arm-linux-gnueabihf/bin” > ~/.bashrc

source .bashrc

vi .bashrc (check the tool-chain path settings)

3. **Copy BOOT & ROOTFS to SD card**

Change directory to pre-built images and type this command
cd /LDD/downloads/prebuilt_images/SD-card
cp -a * /media/username/BOOT/
sync

Extract and Open debian image with Disk Image Mounter (It'll open ROOTFS files)

Change directory to debian rootfs path & copy the contents by using
cd /media/username/rootfs
sudo cp -a * /media/username/ROOTFS
sync

Check the both BOOT & ROOTFS file size, proper copied or not

4. **Booting from SD-card interface**

1. Make sure BeagleBoard is not powered up.
2. Connect serial debug cable b/w Target & Host.
3. Insert SD-card to BeagleBoard
4. Check the ttyUSB connection by using "sudo dmesg"

Set configuration settings by using
sudo minicom -s
→ serial port setup
→ serial device: /dev/ttyUSB0
→ Baud-Rate: 115200 8N1
→ Hardware & Software control: No
Save set up as default & exit from Minicom

Type the "sudo minicom" and Give the power to BeagleBoard, it'll boot
And its shown
Beaglebone login: debian
password: temppwd

After login to debian it'll show like that → root@beaglebone:
Type this commands
root@beaglebone: sudo -s
root@beaglebone/home/debian#: mkdir /media/tmp1
cd /mnt/
cd /boot/
unmount /boot/

Type this command in root@beaglebone shell
dd if=/dev/mmcblk1 of=emmcboot.img bs=1M count=1
dd if=/dev/zero of=/dev/mmcblk1 bs=1M count=1

sudo -s
dd if=emmcboot.img of=/dev/mmcblk1 bs=1M count=1

5. Kernel Compilation Stages

Change directory to linux source path like that
cd /LDD/source/linux-5.10.145

Follow these steps:

1. make ARCH=arm distclean
2. make ARCH=arm bb.org_defconfig
3. make ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- menuconfig (optional settings)
4. make ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- uImage dtbs LOADADDR=0x80008000 -j8
5. make ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- modules -j8
6. sudo make ARCH=arm modules_install

6. Update New BOOT Image & modules in SD Card

Check the linux source kernel by using
cd /lib/modules
ls

Connect the SD card to Host
cd /LDD/source/linux-5.10.145/arch/arm/boot
Cp uImage /media/username/BOOT/

cd /lib/modules/
sudo cp -a 5.10.145/ /media/username/ROOTFS/lib/modules
sync

Connect the BeagleBoard to Host
sudo minicom

Power the BeagleBoard, it'll boot
Check the linux kernel version by using this command & it'll updated
uname -a
(It shows the linux kernel updated version and time)