

Introduction to Embedded Software

Practice #2

Kernel Configuration, Kernel Building

Dongkun Shin

Embedded Software Laboratory

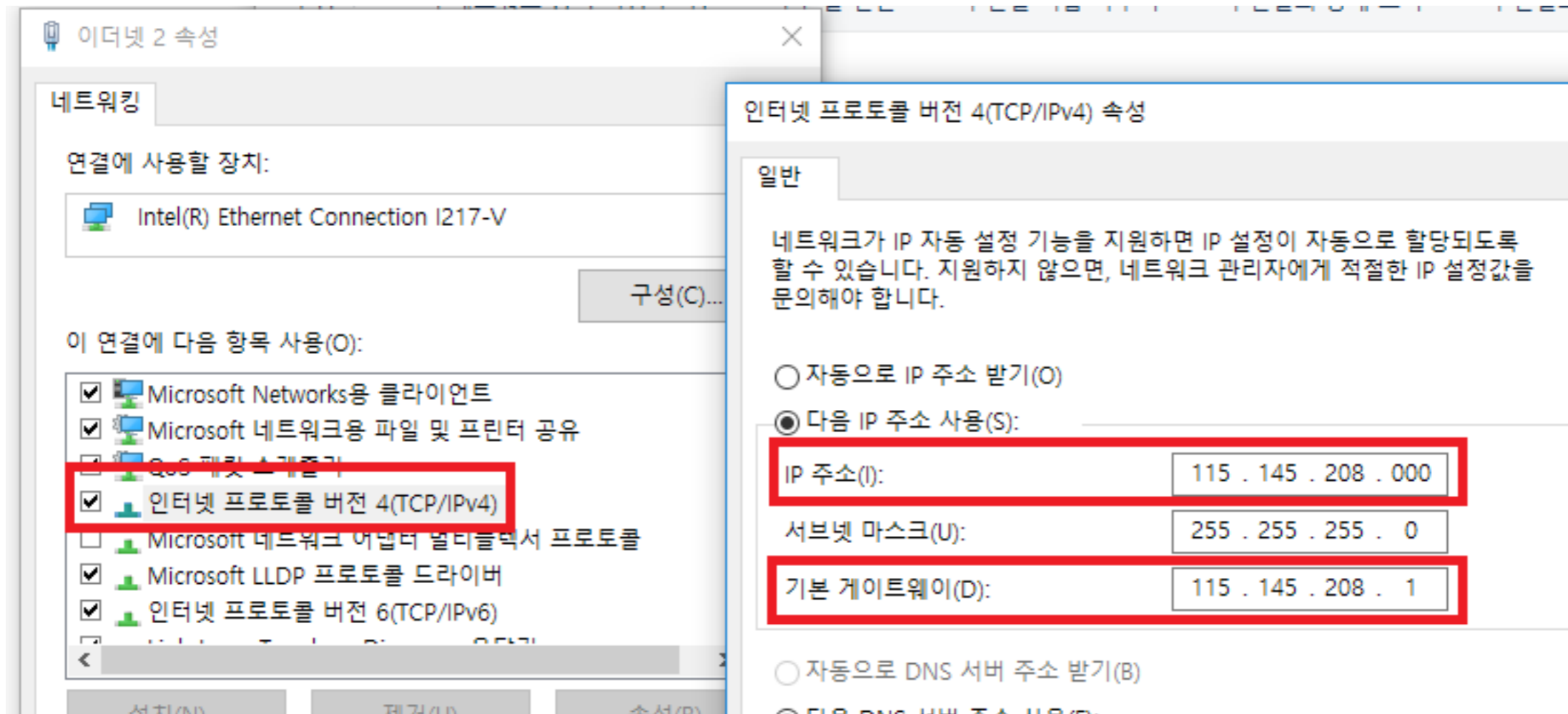
Sungkyunkwan University

<http://nyx.skku.ac.kr/>

ssh Connection

IP Check

- Check the IP assigned to your seat (use host PC)



Raspberry Pi IP Configuration

```
# Example static IP configuration:  
interface eth0  
static ip_address=115.145.208. (IP address)  
static routers=115.145.208.1  
static domain_name_servers=115.145.208.1
```

```
$ sudo vi /etc/dhcpd.conf
```

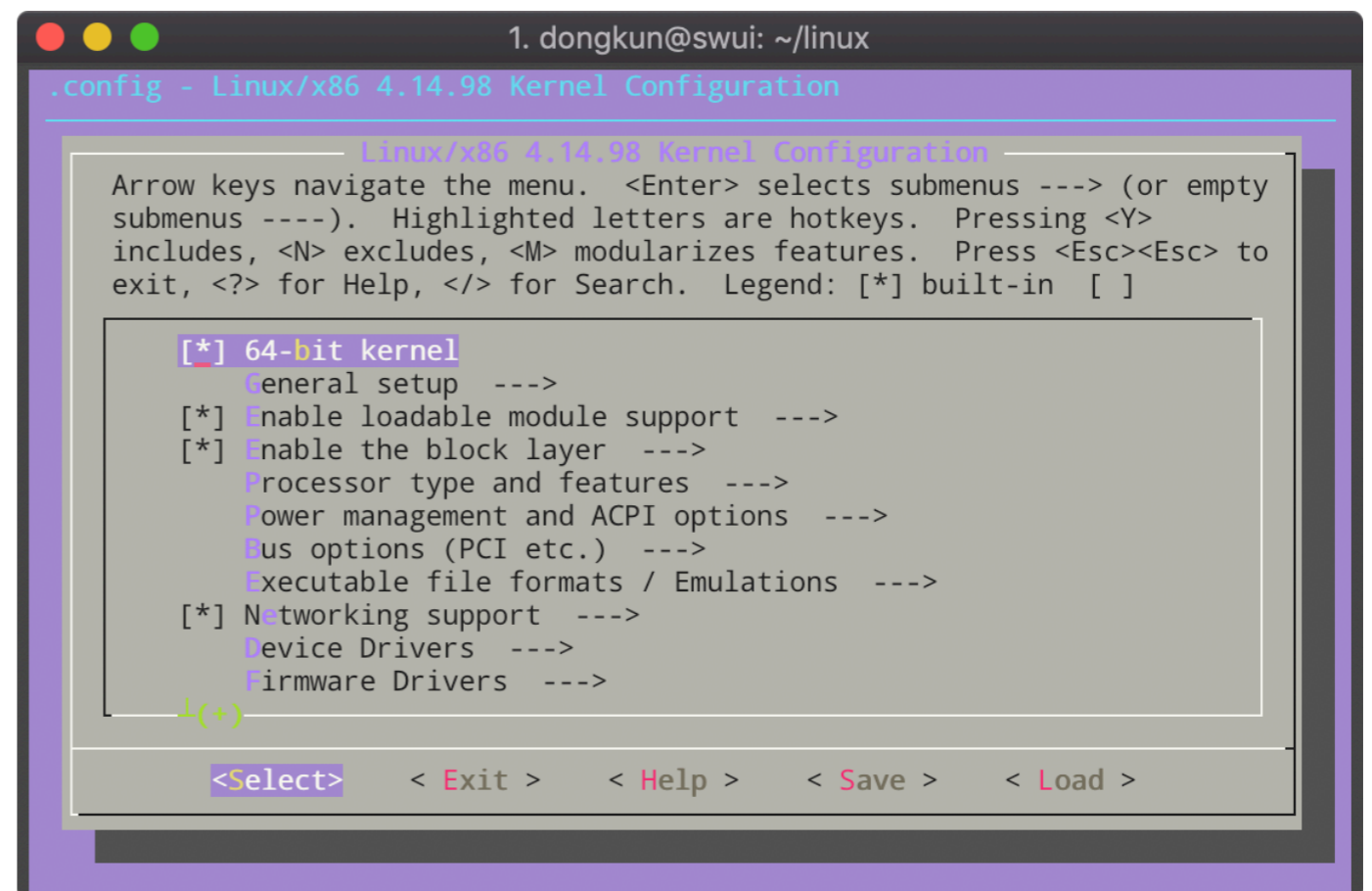
Kernel Configuration

menuconfig

```
$ make menuconfig
```

- **Simple keyboard navigation**

- Arrow keys to navigate, the Enter key to enter a submenu, Escape twice to go up a level or exit, the space bar to cycle the state of an option
- Press `h` for help



- **Configurations will be saved to the .config file**

Kernel Building

Cross-compiling

- **Ubuntu is a suitable Linux cross-compilation host**

- **Install toolchain**

- Download the toolchain to the home folder

```
$ git clone https://github.com/raspberrypi/tools ~/tools
```

- Update \$PATH environment variable

```
$ echo PATH=\$PATH:~/tools/arm-bcm2708/gcc-linaro-arm-  
linux-gnueabi-hf-raspbian-x64/bin >> ~/.bashrc  
$ source ~/.bashrc
```


Build Sources

- **Make sure you have the dependencies needed for cross-compilation**

```
$ sudo apt-get install git bison flex libssl-dev
```

- **Cross-compilation**

```
$ cd linux
$ KERNEL=kernel7
$ make ARCH=arm CROSS_COMPILE=arm-linux-
gnueabihf- bcm2709_defconfig
$ make ARCH=arm CROSS_COMPILE=arm-linux-
gnueabihf- menuconfig
// if you configured with menuconfig
$ make ARCH=arm CROSS_COMPILE=arm-linux-
gnueabihf- zImage modules dtbs
```

Install Onto the SD Card

- **sdb1: FAT (boot) partition**
sdb2: ext4 filesystem (root) partition

```
$ lsblk  
sdb  
  sdb1  
  sdb2
```

- **Mount process**

```
$ mkdir mnt  
$ mkdir mnt/fat32  
$ mkdir mnt/ext4  
$ sudo mount /dev/sdb1 mnt/fat32  
$ sudo mount /dev/sdb2 mnt/ext4
```

Install Onto the SD Card

- **Install the modules**

```
$ sudo make ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- INSTALL_MOD_PATH=mnt/ext4 modules_install
```

- **Copy the kernel and Device Tree blobs onto the SD card**

```
$ sudo cp mnt/fat32/$KERNEL.img mnt/fat32/$KERNEL-backup.img  
$ sudo cp arch/arm/boot/zImage mnt/fat32/$KERNEL.img  
$ sudo cp arch/arm/boot/dts/*.dtb mnt/fat32/  
$ sudo cp arch/arm/boot/dts/overlays/*.dtb* mnt/fat32/overlays/  
$ sudo cp arch/arm/boot/dts/overlays/README mnt/fat32/overlays/  
$ sudo umount mnt/fat32  
$ sudo umount mnt/ext4
```