How to make a root file system

1 Preparation:

Download the newest busybox from the following website

http://www.busybox.net/downloads/

Currently, we have **busybox-1.20.1.tar.bz2**

The cross compiler is **arm-linux-gcc-4.3.2.tgz**

mkyaffs2image-2k.tar.bz2

2 TODO: mkdir busybox

3 Copy the 【busybox-1.20.1.tar.bz2】 to the 【busybox】directory

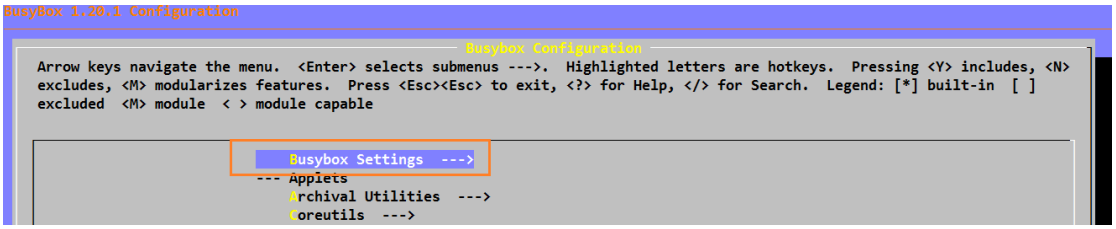
cp busybox-1.20.1.tar.bz2 busybox

4 **TODO: tar xjf busybox-1.20.1.tar.bz2**

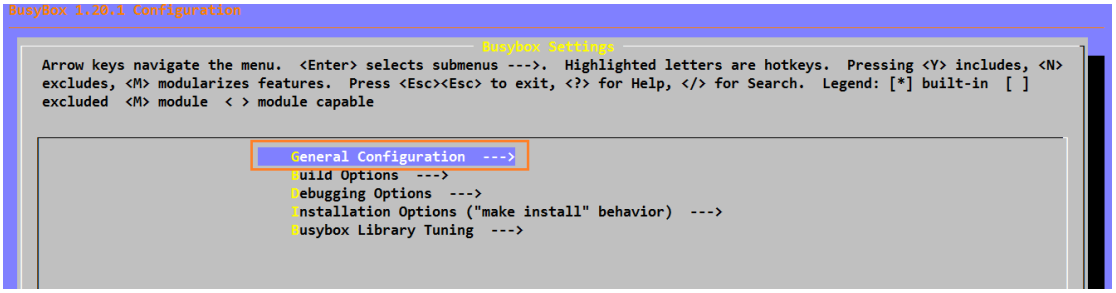
5 **TODO: cd busybox-1.20.1**

6 TODO: make menuconfig

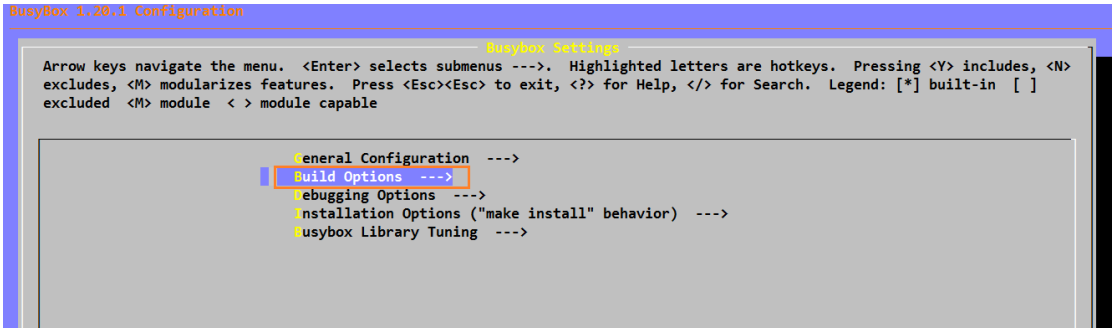
6.1 Choose Busybox Settings --->

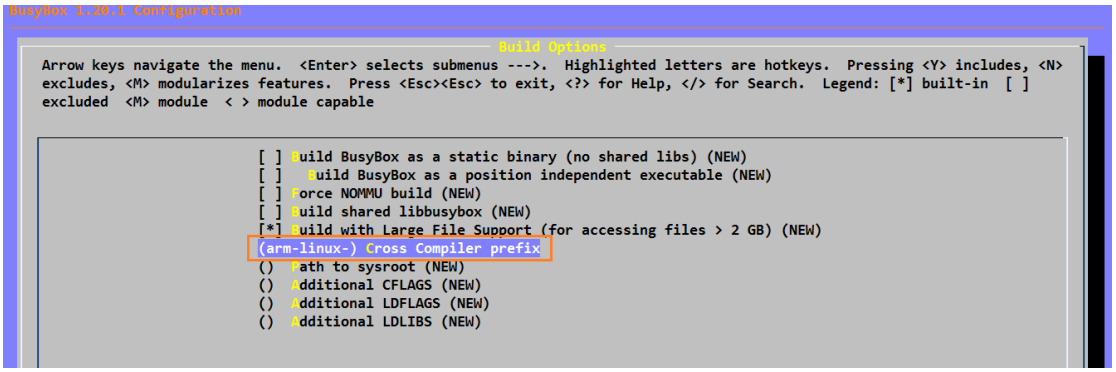


6.2 Choose General Configuration --->



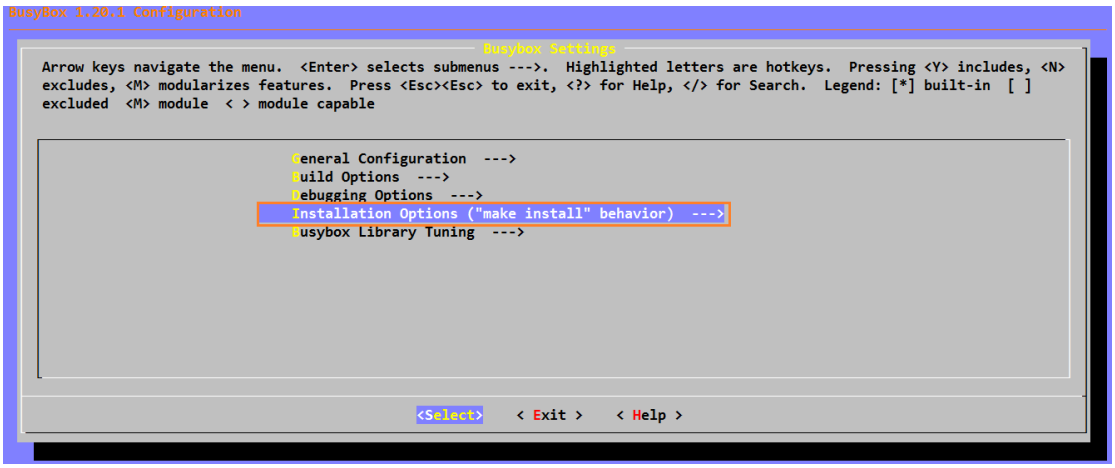
6.3 Choose Build Options --->





6.4 Specify the busybox installation directory

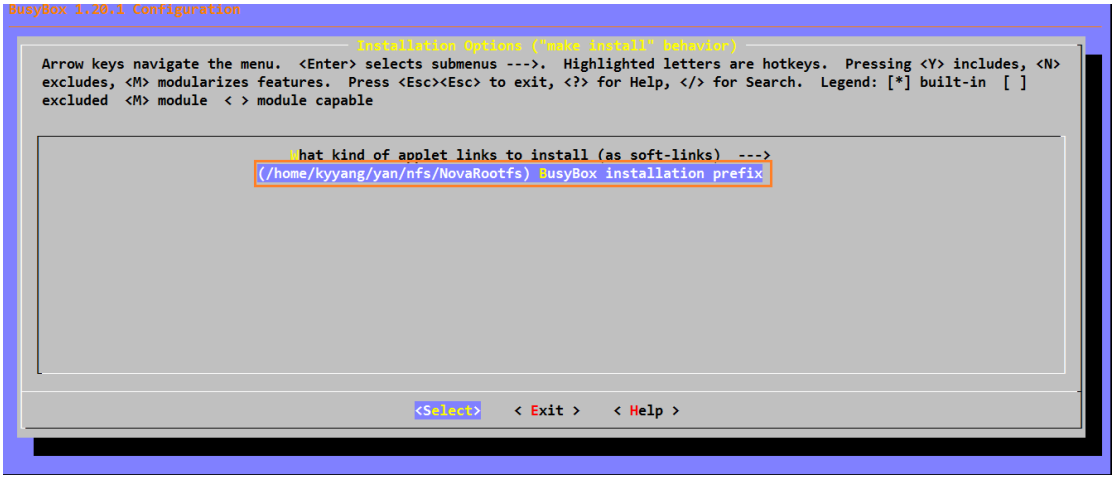
a) Choose the Installation Options ("make install" behavior) --->



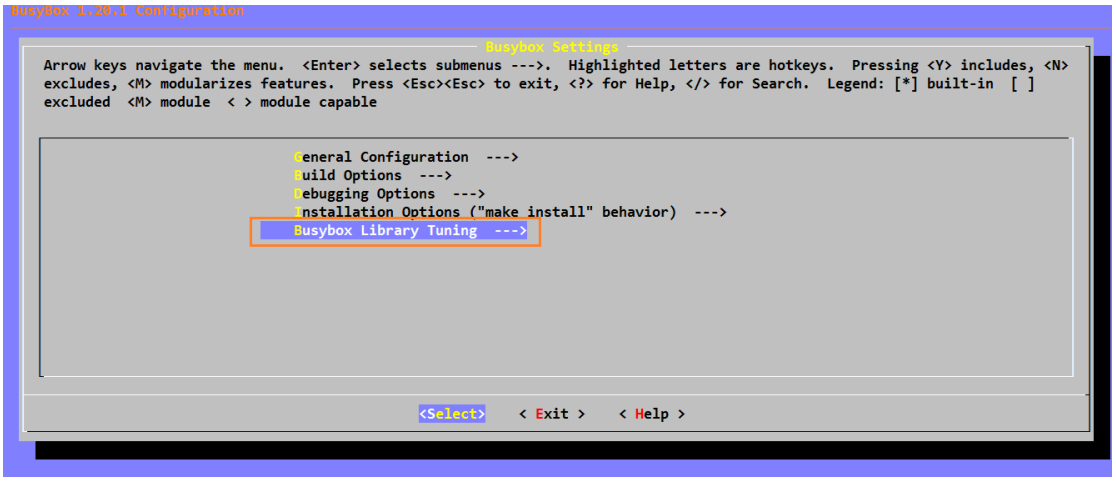
b) Enter the specific busybox installation directory.

In this case, the path is

【/home/kyyang/yan/nfs/NovaRootfs】



6.5 Choose the Busybox Library Tuning --->



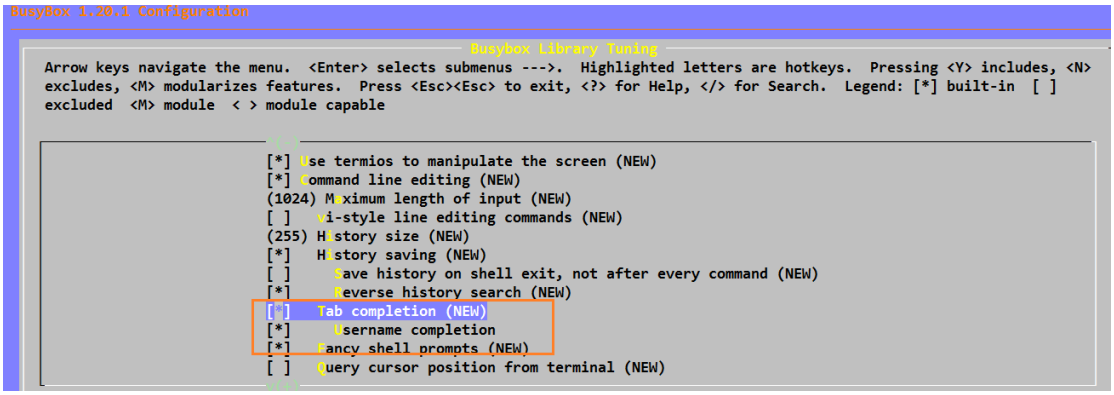
Then, Mark the following options if they are not selected:

TODO:

a) [*] Tab completion (NEW)

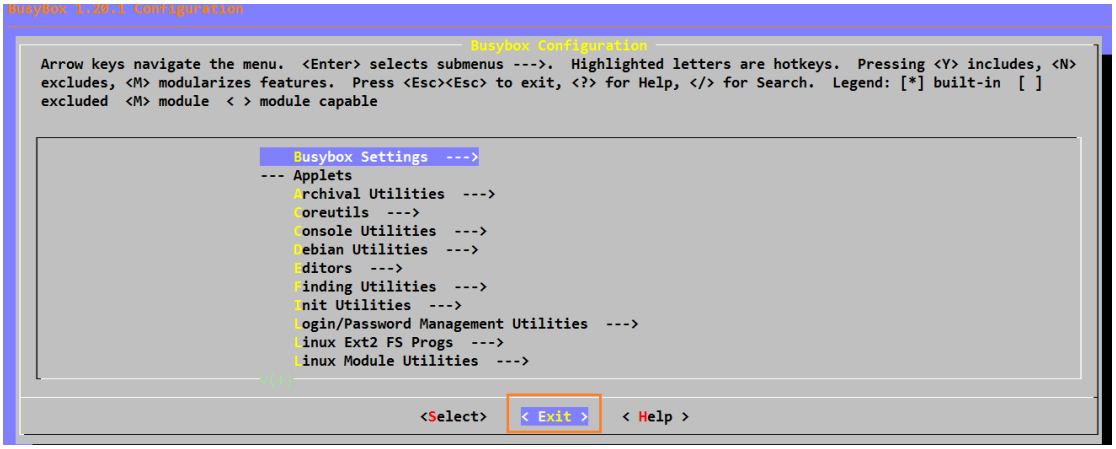
b) [*] Username completion

c) [*] Fancy shell prompts (NEW)

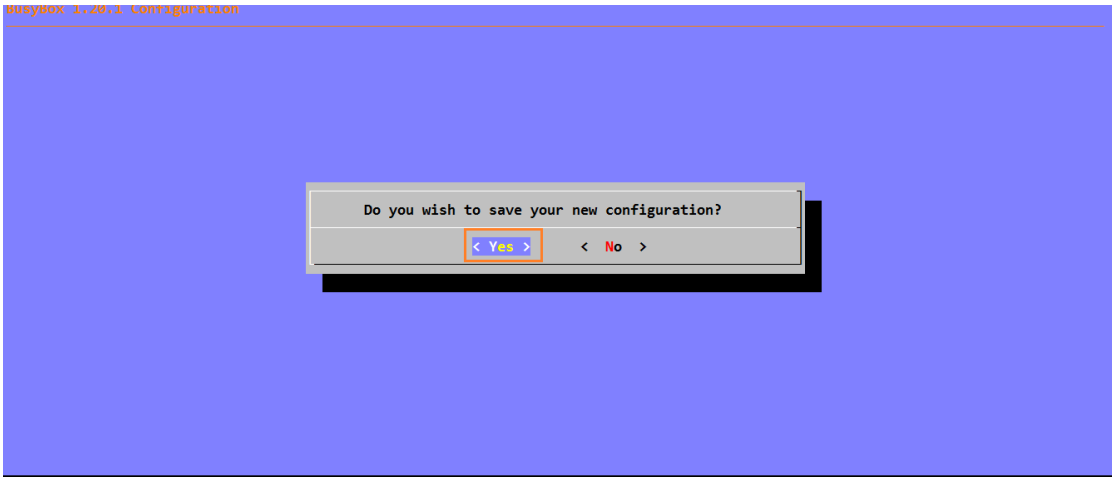


6.6 Save the new configurations and exit

Select Exit or press <Esc> to exit the busybox configuration menu.



Select < Yes > to save the new configuration.



7 Now, compile the busybox

TODO: make

8 Install the busybox to the specific directory【See 5.4 b)】

TODO: make install

(WARNING: Make sure to specify the installation directory, otherwise, the installation will crush the system).

9 Enter the /home/kyyang/yan/nfs/NovaRootfs directory

TODO:

a) cd /home/kyyang/yan/nfs/NovaRootfs

b) mkdir dev etc home lib mnt proc sys tmp root usr

10 Copy the shared libraries to /home/kyyang/yan/nfs/NovaRootfs/lib directory.

a) Assume the unzipped path for【arm-linux-gcc-4.3.2.tgz】is 【/home/kyyang/yan/cross_compiler/usr】

TODO:

To check what dynamic libraries we needed, enter the following:

arm-linux-readelf -a /home/kyyang/yan/busybox/busybox-1.20.1/busybox | grep "Shared"

```
0x00000001 (NEEDED)                     Shared library: [libm.so.6]
0x00000001 (NEEDED)                     Shared library: [libc.so.6]
```

//cd /home/kyyang/yan/nfs/NovaRootfs/lib

//cp -d /home/kyyang/yan/cross_compiler/usr/local/arm/4.3.2/arm-none-linux-gnueabi/libc/lib/*.so* .

//cp -d /home/kyyang/yan/cross_compiler/usr/local/arm/4.3.2/arm-none-linux-gnueabi/libc/usr/lib/*.so* .

//cp -d /home/kyyang/yan/cross_compiler/usr/local/arm/4.3.2/arm-none-linux-gnueabi/libc/armv4t/lib/*.so* .

//cp -d /home/kyyang/yan/cross_compiler/usr/local/arm/4.3.2/arm-none-linux-gnueabi/libc/armv4t/usr/lib/*.so* .

cd /home/kyyang/yan/nfs/NovaRootfs/lib

cp /home/kyyang/yan/cross_compiler/usr/local/arm/4.3.2/arm-none-linux-gnueabi/libc/armv4t/lib/*so* . -d

cd /home/kyyang/yan/nfs/NovaRootfs/usr/lib

cp /home/kyyang/yan/cross_compiler/usr/local/arm/4.3.2/arm-none-linux-gnueabi/libc/armv4t/usr/lib/*so* . –d

11 Create the basic device files under the /home/kyyang/yan/nfs/NovaRootfs/dev directory

TODO:

a) **cd /home/kyyang/yan/nfs/NovaRootfs/dev**

b) **sudo mknod console c 5 1**

c) **sudo mknod null c 1 3**

d) **sudo mknod ttySAC0 c 204 64**

e) **sudo mknod mtdblock0 b 31 0**

f) **sudo mknod mtdblock1 b 31 1**

g) **sudo mknod mtdblock2 b 31 2**

h) **sudo mknod mtdblock3 b 31 3**

12 Create the configuration file【rcS】under /home/kyyang/yan/nfs/NovaRootfs/etc/init.d directory

TODO:

a) **cd /home/kyyang/yan/nfs/NovaRootfs/etc**

b) **mkdir init.d**

c) **vi rcS**

d) In the file rcS, input the following content:

```
#! /bin/sh
/sbin/ifconfig lo 127.0.0.1
/sbin/ifconfig eth0 192.168.1.240 netmask 255.255.255.0 up

mount –a
mkdir /dev/pts
mount –t devpts devpts /dev/pts
echo /sbin/mdev > /proc/sys/kernel/hotplug
mdev -s
```

e) chmod +x rcS or sudo chmod +x rcS

13 Create the configuration file【fstab】under /home/kyyang/yan/nfs/NovaRootfs/etc directory

TODO:

a) cd /home/kyyang/yan/nfs/NovaRootfs/etc

b) vi fstab

c) In the file fstab, input the following content:

```
proc    /proc   proc    defaults    0 0
mdev    /dev    ramfs   defaults    0 0
sysfs   /sys    sysfs   defaults    0 0
tmpfs   /tmp    tmpfs   defaults    0 0
tmpfs   /dev    tmpfs   defaults    0 0
```

14 Create the configuration file【**inittab**】under /home/kyyang/yan/nfs/NovaRootfs/etc directory

TODO:

a) cd /home/kyyang/yan/nfs/NovaRootfs/etc

b) vi inittab

c) **In the file fstab, input the following content:**

```
::sysinit:/etc/init.d/rcS
console::askfirst:-/bin/sh
::restart:/sbin/init
::ctrlaltdel:/sbin/reboot
::shutdown:/bin/umount -a –r
::shutdown:/sbin/swapoff –a
```

15 Create the configuration file【**mdev.conf**】under /home/kyyang/yan/nfs/NovaRootfs/etc directory

TODO:

a) **cd /home/kyyang/yan/nfs/NovaRootfs/etc**

b) **touch > mdev.conf**

In order to use nfs to mount the rootfs, we need to do the following:

16 Under pc linux(such as: Ubuntu)

TODO:

sudo apt-get install nfs-kernel-server

17 Modify the /etc/exports file, adding the following content:

TODO:

a) **sudo vi /etc/exports**

b) **Input the content after the last line**

/home/kyyang/yan/nfs/NovaRootfs *(rw,sync,no_root_squash)

18 Restart the nfs server

TODO:

sudo service nfs-kernel-server restart

19 Take effect the above configurations

TODO:

sudo exportfs –a

20 Modify the【**bootargs**】parameter of the U-BOOT.

TODO:

a) **Reset the evaluation board, enter the U-BOOT shell prompt.**
b) **setenv bootargs "noinitrd console=ttySAC0,115200 mem=64M init=/linuxrc root=/dev/nfs rw nfsroot=192.168.1.103:/home/kyyang/yan/nfs/NovaRootfs ip=192.168.1.240:192.168.1.103:192.168.1.1:255.255.255.0:Nova:eth0:off"**
   (Where 192.168.1.103 is the IP of PC, 192.168.1.240 is the IP of the evaluation board, and the 192.168.1.1 is the gateway ip)
c) **save**

21 Now, restart the linux kernel, the rootfs will be successfully mounted via NFS protocol.

22 If you want to make a rootfs image file (yaffs), do the following:

TODO:

a) tar xjf mkyaffs2image-2k.tar.bz2 –C /

b) sudo chmod +x /usr/local/bin/mkyaffs2image

c) cd /home/kyyang/yan/nfs/

d) sudo mkyaffs2image NovaRootfs/ NovaRootfs.yaffs

e) Copy the NovaRootfs.yaffs to NFS directory

cp NovaRootfs.yaffs /home/kyyang/yan/nfs/nfsroot

23 Under U-BOOT shell prompt

Enter the following commands

a) **nfs 30008000 192.168.1.23:/home/kyyang/yan/nfs/nfsroot/NovaRootfs.yaffs (where 192.168.1.23 is the pc linux IP, /home/kyyang/yan/nfs/nfsroot is the NFS directory).**
b) **nand erase 0x02D60000 (where 0x02D60000 is the start address of the rootfs)**
c) **nand write.yaffs 0x30008000 0x02D60000 0x77b8c0**
d) **setenv bootargs "noinitrd root=/dev/mtdblock5 rw init=/linuxrc console=ttySAC0,115200 mem=0x4000000"**
e) **save**

24 Reset the evaluation board, the kernel will mount the rootfs from the nandflash.