Procedure to Create and Duplicate Master LiveUSB Stick

A. Creating a Master LiveUSB stick using 64 GB USB Flash Drive
1. <u>Formatting USB stick having Linux partition (skip this step if you are using a new USB stick)</u>
    a. Connect the target USB Stick to the Ubuntu machine.
   b. Click the **Dash Home** (1), and type "disk "

    c. Select the "**Disk Utility"** (2) to format the USB Stick.
        1. Select your USB Device
        2. Unmount the volume(s) of the USB device one by one by selecting each volume
        3. Delete partition(s) of the unmounted volume(s)
           You should only see one volume
        4. Select the volume and click **Create Partition**
        5. Select type as *FAT* and give *petalinux* in the Name field, and click **Create**
        6. Close the Disk Utility program and remove the USB Device
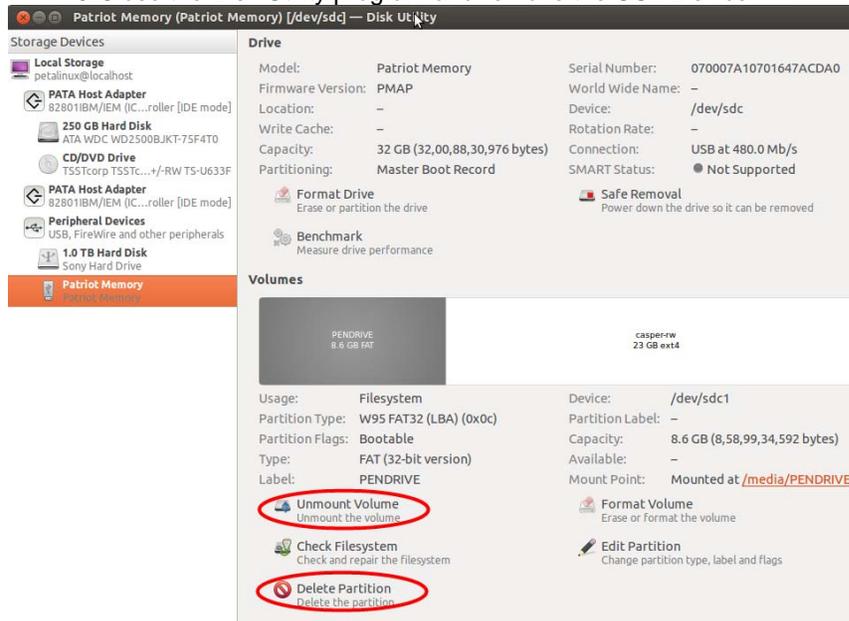
    d. Connect the USB Stick to the windows machine. The Windows OS will prompt for formatting the device. Click Format Disk. In case the OS does not prompt, you can check and format (if necessary) the device using the following method:
   **My Computer > Manage > Storage > Disk Management**

If it shows that the stick is formatted in FAT32, then go to the next step. If not, then right-click on the disk and select **Format**. Select **FAT32** as the format and click **OK**.
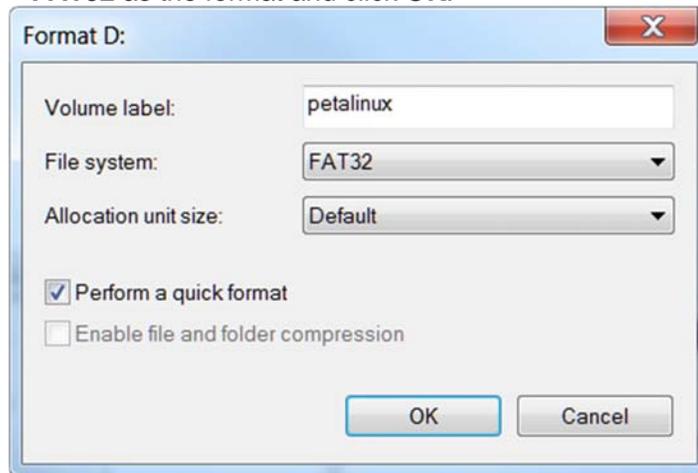
2. Use the Universal USB Installer exe to create LiveUSB
   a. Launch the tool **Universal-USB-Installer-1.9.6.3.exe** (Available in the LiveUSB_2015.4 folder)
   b. Step 1: Select **Ubuntu**
   c. Step 2: Select the iso image **ubuntu-14.04.2-desktop-amd64.iso** (Download the 64-bit image from the web)
   d. Step 3: Select your drive (leave the Format option unchecked)
   e. Step 4: Set the Persistent file to be the full size (about 4089 MB)
   f. Click **Create**
   g. **Click YES**
   This may take up to 10 minutes. Make sure that the procedure is complete. Wait for the close button to become available. When done eject the USB stick.
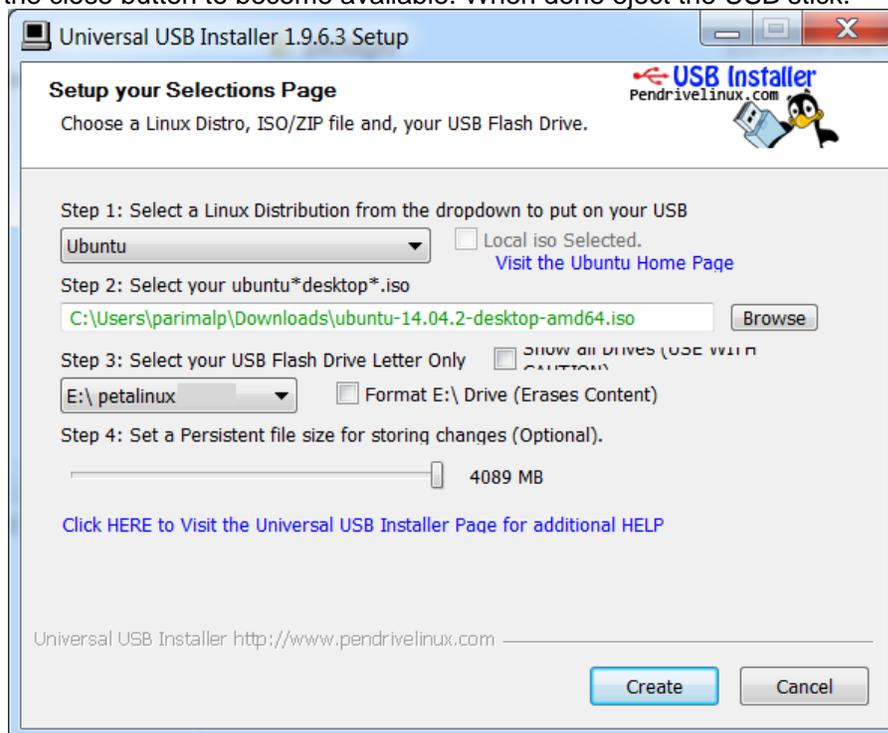
3. Change the persistent

From the above step we can only set a maximum of about 4 GB. We need to increase this size because Xilinx tools require more space for the installation

    a. Connect the USB Stick to the Ubuntu machine
    b. Delete the **"casper-rw"** file in the USB Stick using explorer
    c. Open a Terminal window and run the command
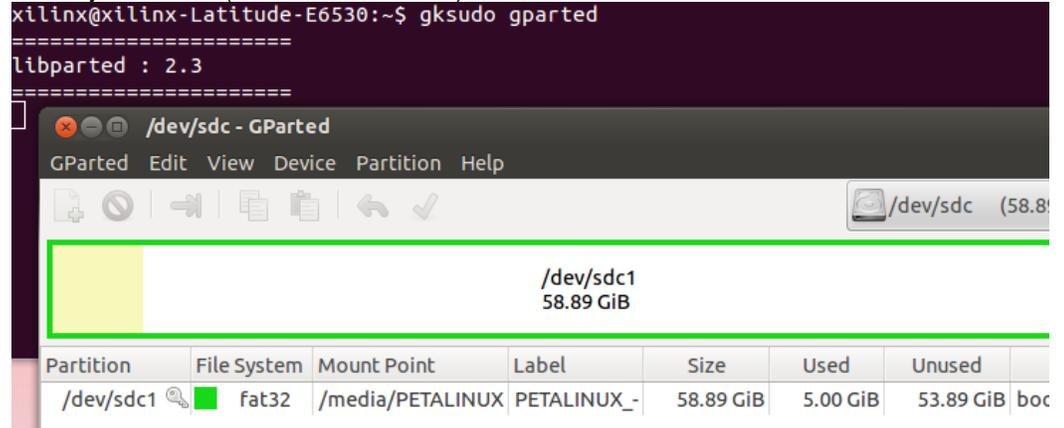   `gksudo gparted`
    It may ask for the administrator password. If it does, then enter the password.
    If gparted is not installed then download and install using
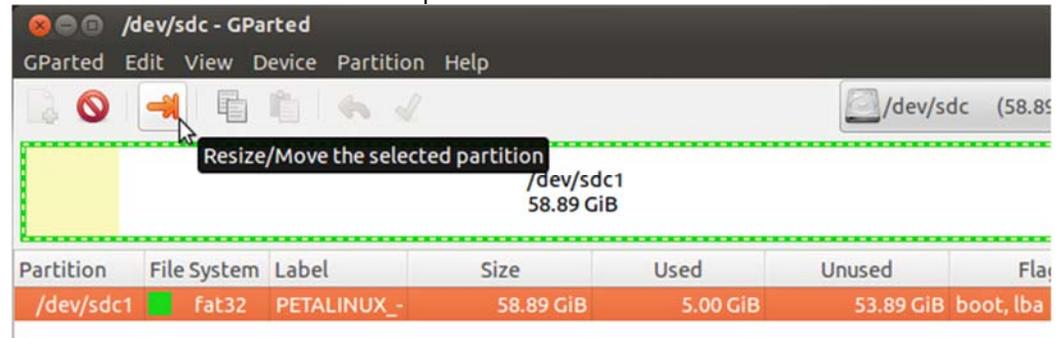   `sudo apt-get install gparted`

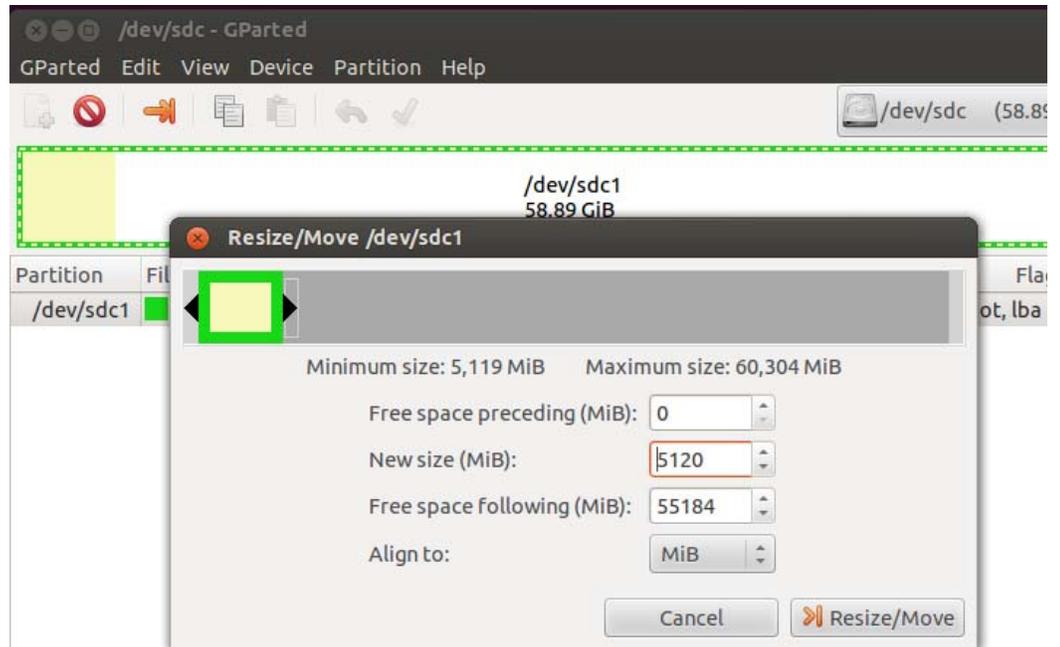1. Select your device (/dev/sdc in this case)

2. Right-click on the selected device and click Unmount
3. Select the Resize/Move the selected partition

4. Set the New Size as Minimum size (in this case 4814). Click in either *Free Space preceding* or *Free Space following* field to make the **Resize/Move** button visible.

5. Click **Resize/Move** button.
6. Right-click **unallocated** and select **New**

7. Select the File System – **ext4**
8. Label should be **"casper-rw"**
9. Click **Add**
10. Select **Edit** > **Apply All Operations**. Click **Apply**
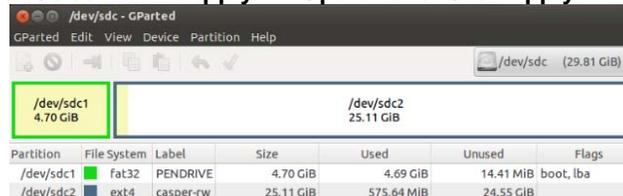
11. Click **Close** when the operation is completed.
12. Close the GParted application.

4. Boot a system using the created LiveUSB
5. Create a user name – *petalinux*
   a. Open a terminal window
   b. Become super user by executing the following command
      ```
      sudo su -
      ```
   c. Type the following command to add a new user
      ```
      adduser petalinux
      ```
   d. Set the password as `petalinux`
   e. Hit the **Enter** key to use the default user info (five times), and then type **Y** and the **Enter** key to accept
   f. Change the privilege of the new user (petalinux) as root
      ```
      gedit /etc/sudoers
      ```
      Add the line marked in yellow color as shown below, save the file and close the gedit program.

      # User privilege specification

```
root     ALL=(ALL:ALL) ALL
# Members of the admin group may gain root privileges
%admin ALL=(ALL) ALL
%petalinux ALL=(ALL)NOPASSWD: ALL
# Allow members of group sudo to execute any command
%sudo  ALL=(ALL:ALL) ALL
```

g. To enable the graphical login, use gedit, make changes, save the file and close gedit
`gedit /etc/lightdm/lightdm.conf`
Change the line:
    autologin-user=ubuntu
to
    autologin-user=
and add the following line at the end of the file to make the login greeter show up:
    greeter-show-manual-login=true

6. Reboot the system by typing the `reboot` command at the command prompt, and login as `petalinux`

7. Open a terminal window

8. Install the required packages for PetaLinux Tools

The following packages are required to run PetaLinux Tools. Follow the instructions given below to install the packages.

Tool/Library	YUM/RPM Package for RHEL/CentOS/Fedora	APT Package for Debian/Ubuntu	RPM Package for SuSE
dos2unix	dos2unix	tofrodos	dos2unix
ip	iproute	iproute	iproute2
gawk	gawk	gawk	gawk
gcc	gcc	gcc	gcc
git	git	git-core	git-core
make	gnutls-devel	make	make
netstat	net-tools	net-tools	net-tools
ncurses	ncurses-devel	ncurses-dev	ncurses-devel
tftp server	tftp-server	tftpd	tftp-server
zlib	zlib-devel	zlib1g-dev	zlib-devel
flex	flex	flex	flex
bison	bison	bison	bison
32bit libs	libstdc++-4.4.6-4.el6.i686 glibc.i686 libgcc.i686 libgomp.i386	ia32-libs lib32ncursesw5 lib32gomp1	32-bit runtime environment

Note: 32bit libs installation (the last entry in the table) is not required on a 32-bit machine. Also, some of the packages are already part of the installed Ubuntu version.

To check the package installed, execute the following command:
`dpkg -l | grep <package_name>`

a. Execute the following commands, using root access, to install the **packages** folder available in the provided **LiveUSB_2015.4** folder:

This packages folder contains all the necessary packages required to the run the PetaLinux tools.
`sudo su -`
`cd /opt`

```
mkdir pkg
cd pkg
cp -rf <source_path>/LiveUSB_2015.4/packages ./
cd packages
chmod 755 Install_pkgs_settings.sh
./Install_pkgs_settings.sh
```

This script will not only install the required packages but will also create/update the following necessary environment/setup files (see Appendix A to see what has been done).

Install the extended Internet daemon (xinetd)

Create /etc/xinetd.d/tftp file and update it with tftp service

Create the folder /tftpboot

Install the packages (libvte, libvite9, GtkTerm) for serial communication

Install and configure the DHCP server

Install and configure the NFS server

Fix the missing gmake file

Set the BASH as the default shell

Set up the static IP address

9. Install the PetaLinux 2015.4 tools
    a. Download the PetaLinux 2015.4 tools from the Xilinx website
    b. Make sure that you have root privilege
       ```
       sudo su –
       ```
    c. Change to the /opt/pkg folder
    d. Change the permission (chmod 755) of *petalinux-v2015.4-final-installer.run*
       ```
       chmod 755 petalinux-v2015.4-final-installer.run
       ```
    e. Run the following command to install PetaLinux in /opt/pkg directory.
       ```
       ./petalinux-v2015.4-final-installer.run /opt/pkg
       ```
    f. Change the permission (chmod 755) of *petalinux-v2015.4-final*
       ```
       chmod –R 755 /opt/pkg/petalinux-v2015.4-final
       ```
    g. Copy the BSP **ZedBoard_petalinux_v2015_4.bsp** from the LiveUSB_2015.4 folder into **/opt/pkg**.
       ```
       cp <source_path>/LiveUSB_2015.4/ZedBoard_petalinux_v2015_4.bsp
       /opt/pkg/.
       ```
    h. Change the permission (chmod 755) of *ZedBoard_petalinux_v2015_4.bsp*
       ```
       chmod –R 755 /opt/pkg/ZedBoard_petalinux_v2015_4.bsp
       ```
    i. Copy the ZYBO BSP **ZYBO_petalinux_v2015_4.bsp** from the LiveUSB_2015.4 folder into **/opt/pkg**
       ```
       cp <source_path>/LiveUSB_2015.4/ZYBO_petalinux_v2015_4.bsp
       /opt/pkg/.
       ```
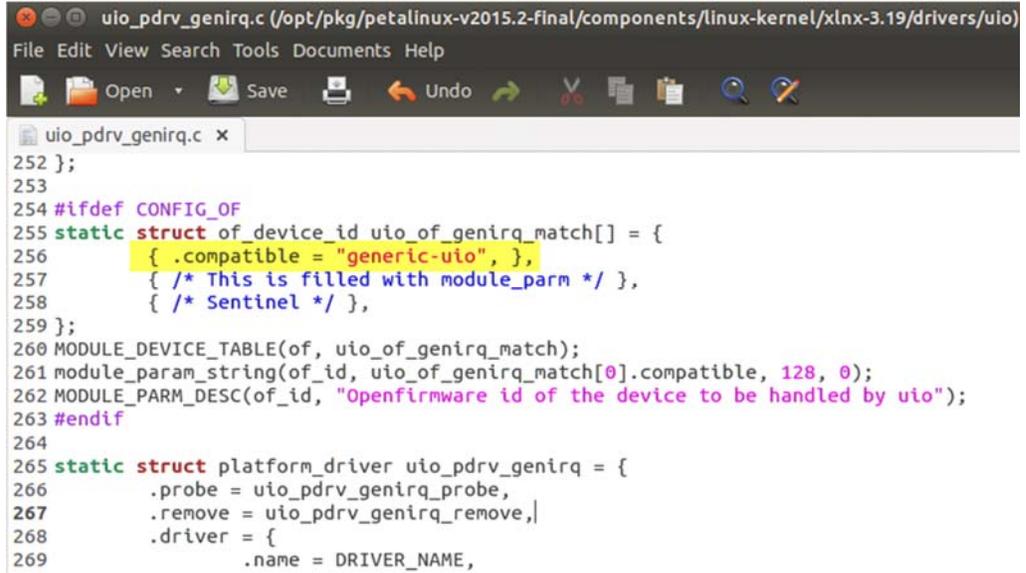   j. Change the permission (chmod 755) of *ZYBO_petalinux_v2015_4.bsp*
       ```
       chmod –R 755 /opt/pkg/ZYBO_petalinux_v2015_4.bsp
       ```

10. UIO setup compatible property missing in the **uio_pdrv_genirq.c** file.
    a. Change the directory to update the compatible property in the file **uio_pdrv_genirq.c**.
       ```
       cd /opt/pkg/petalinux-v2015.4-final/components/linux-
       kernel/xlnx-4.0/drivers/uio
       gedit uio_pdrv_genirq.c
       ```
```

**b.** Add the following property at line no. 256 as shown below and save the file:



```
252 };
253
254 #ifdef CONFIG_OF
255 static struct of_device_id uio_of_genirq_match[] = {
256          { .compatible = "generic-uio", },
257          { /* This is filled with module_parm */ },
258          { /* Sentinel */ },
259 };
260 MODULE_DEVICE_TABLE(of, uio_of_genirq_match);
261 module_param_string(of_id, uio_of_genirq_match[0].compatible, 128, 0);
262 MODULE_PARM_DESC(of_id, "Openfirmware id of the device to be handled by uio");
263 #endif
264
265 static struct platform_driver uio_pdrv_genirq = {
266          .probe = uio_pdrv_genirq_probe,
267          .remove = uio_pdrv_genirq_remove,
268          .driver = {
269                  .name = DRIVER_NAME,
```

11. Install the Vivado 2015.4 + SDK tools

    a. Download and extract the Vivado 2015.4 tool from the Xilinx website. Make sure that you select Viavdo+SDK

    b. Install Xilinx Vivado 2015.4

        1. Change the permission of the following files using `chmod 755` command

            1. `xsetup`

            2. `<Path_to _xilinx_install>/tps/lnx64/jre/bin/java`

        2. Install the Xilinx Vivado tool : `./xsetup` from the install directory

        If the machine is connected on network, you may be presented an option to download newer version tools if it is available. Click **No** as we want to use 2015.4 version tools.

            1. During the installation, make sure that you select the **System Edition** in the *Select Edition to Install* step, **Software Development Kit** option in the *Design Tools* category, uncheck **UltraScale** under the *Devices* category, check **Install Cable drivers**, and uncheck **Enable Webtalk…** under the *Installation Options* category of the *Vivado System Edition* window, and specify the Destination Directory as `/opt/pkg/Xilinx`

        Note: This will take about 30 minutes to install the Vivado tool.

            a. Once the Vivado tools are installed remove the copy of the Vivado installer files from the USB stick.

    c. Extract the provided **zybo.zip** (board files) under the /opt/pkg/xilinx/Vivado/2015.4/data/boards/board_parts/zynq/ using the following command

```
cd /opt/pkg/Xilinx/Vivado/2015.4/data/boards/board_parts/zynq/
unzip <source_path>/LiveUSB_2015.4/zybo.zip
```

12. Obtain and copy the License file for Vivado in the .Xilinx folder under /home/petalinux

13. Setup Terminal window and other environments

    a. Every time a new Terminal window is opened and during the login certain environment need to be setup. The above created file needs to be copied to the /etc/network/interfaces and network has to be restarted using the steps below ever.

```
gedit /home/petalinux/.bashrc
```

    At the end of the file add the following lines:

```
# copy the static IP information to /etc/network/interfaces
sudo cp /home/petalinux/interfaces /etc/network/interfaces
sudo /etc/init.d/networking stop
sudo /etc/init.d/networking restart
clear
# source the tools settings
source /opt/pkg/Xilinx/Vivado/2015.4/settings64.sh
source /opt/pkg/petalinux-v2015.4-final/settings.sh
```

c. Change the ownership of /opt/pkg directory by executing the following command:
```
chown -R petalinux:petalinux /opt/pkg
```

d. Setup the serial port
1. Set the baud rate as 115200 and port as ttyACM0 (for ZedBoard) or ttyUSB1 (for Zybo) by updating the /home/petalinux/.gtktermrc file. However .gtktermrc file will be generated only after launching the serial port terminal. Hence type the following command.
```
gtkterm
```
2. Open the .gtktermrc file using the command
```
gedit /home/petalinux/.gtktermrc
```
Update the following data for ZedBoard:
```
port = /dev/ttyACM0
speed = 115200
```
Update the following data for Zybo:
```
port = /dev/ttyUSB1
speed = 115200
```

e. Configuring the DHCP server
1. Open the /etc/default/isc-dhcp-server file.
```
gedit /etc/default/isc-dhcp-server
```
2. Edit the file as given below.
Find this line
```
INTERFACES=" "
```
REPLACE as shown below
```
INTERFACES="eth0"
```
NOTE: According to your PC id, please change to eth0/eth1...

3. Open the dhcpd.conf file.
```
gedit /etc/dhcp/dhcpd.conf
```
4. Look for the following lines
```
default-lease-time 600;
max-lease-time 7200;
```
Replace those lines and/or add the following lines shown in the red box:
```
# option definitions common to all supported networks...
option domain-name "example.org";
option domain-name-servers ns1.example.org, ns2.example.org;

default-lease-time 86400;
max-lease-time 604800;

option subnet-mask 255.255.255.0;
option broadcast-address 192.168.1.255;
option routers 192.168.1.254;
option domain-name-servers 192.168.1.10;

subnet 192.168.1.0 netmask 255.255.255.0 {range
192.168.1.1 192.168.1.200;
}
```

f. Configure for NSF

1. Open the file /etc/exports
   ```
   gedit /etc/exports
   ```
2. Add the following lines shown in the red box.

```
exports ✖
# /etc/exports: the access control list for filesystems which may be exported
#               to NFS clients.  See exports(5).
#
# Example for NFSv2 and NFSv3:
# /srv/homes       hostname1(rw,sync,no_subtree_check) hostname2(ro,sync,no_subtree_check)
#
# Example for NFSv4:
# /srv/nfs4        gss/krb5i(rw,sync,fsid=0,crossmnt,no_subtree_check)
# /srv/nfs4/homes  gss/krb5i(rw,sync,no_subtree_check)


/home/petalinux 192.168.*.*(rw,sync,no_root_squash,no_subtree_check)
```

g. Setup Static IP for LiveUSB

Since the labs uses a direct connection between the board and the host PC, the host PC needs to be configured with the static IP.

1. Edit the interfaces file.
   ```
   gedit /home/petalinux/interfaces
   ```
2. Add the below lines:
   ```
   auto lo
   iface lo inet loopback

   auto eth0
   iface eth0 inet static
   address 192.168.1.1
   netmask 255.255.255.0
   broadcast 192.168.1.255
   gateway 192.168.1.1
   ```

14. Restart the LiveUSB

B. Steps for Duplicating the LiveUSB stick

Note: Your existing Master LiveUSB and the new USB stick to be duplicated should be the same type and same size.

1. Before duplicating, make the changes to the master LiveUSB stick clearing any stale configuration lines (like eth0, eth1,..) if any, found in **/etc/udev/rules.d/70-persistant-net.rules** and propagating that change forward to the LiveUSB

2. Boot a desktop Ubuntu system
3. Insert the master LiveUSB stick in to the USB port.
4. Wait for about 30 seconds and then execute the following command in a terminal window
   ```
   dmesg | tail
   ```
   You should see something like /dev/sdc1 or /dev/sdc2 or some other letter /dev/sdxy. This indicates that the inserted USB stick (source) is mounted on /dev/sdc or /dev/sdxy
5. Insert the destination USB stick
6. Again, wait for 30 seconds and then execute the dmesg command and observe where it got mounted. For our example, let us say it got mounted on /dev/sdd
7. Type the following command to duplicate the Master LiveUSB stick.
   ```
   $ sudo dd if=<Master_LiveUSB_device_name> of=<New_USB_Stick> bs=4096
   conv=notrunc,noerror
   ```

   i.e., in this case
   ```
   [host]$ sudo dd if=/dev/sdc of=/dev/sdd bs=4096 conv=notrunc,noerror
   ```

   This will take approximately 30-45 minutes to duplicate the LiveUSB data.

Appendix

Do the following steps using root access:

Enable the proxy if required (if you are using proxy, then you need to do this step):

```
export http_proxy=http://proxy:8080
apt-get update
apt-get install tofrodos
apt-get install gawk
apt-get install git-core
apt-get install ncurses-dev
apt-get install zlib1g-dev
apt-get install flex
apt-get install bison
```

Install and run tftp server

Install the extended Internet daemon

```
apt-get install xinetd
```

Since tftpd package (tftpd_0.17-17ubuntu1_i386.deb) cannot be downloaded from the internet using LiveUSB stick, the package is available in the provided **LiveUSB_2015.4** directory.

```
dpkg -i tftpd_0.17-17ubuntu1_i386.deb
apt-get install tftpd
```

Create /etc/xinetd.d/tftp file and add the following entry

```
gedit /etc/xinetd.d/tftp
```

Add the below lines to the file and save it.

```
service tftp
{
protocol        = udp
port            = 69
socket_type     = dgram
wait            = yes
user            = nobody
server          = /usr/sbin/in.tftpd
server_args     = /tftpboot
disable         = no
}
```

Create the folder /tftpboot which was assigned to server_args.

```
mkdir /tftpboot
chmod -R 777 /tftpboot
chown -R nobody /tftpboot
```

Restart the xinetd service by typing the following command.

```
/etc/init.d/xinetd restart
```

Install Serial port

Install the following packages for serial communication

```
apt-get install libvte-common
apt-get install libvte9
```

Install the following packages (provided to you in LiveUSB_2015.4 folder) to install gtkterm：

```
dpkg -i libvte9_0.28.2-3ubuntu2_i386.deb
dpkg -i gtkterm_0.99.7~rc1-0ubuntu1_i386.deb
```

Install the DHCP Server functionality

Install the DHCP server

```
apt-get install dhcp3-server
```
Install NFS
Get nsf-kernel-server by executing the following command
```
apt-get install nfs-kernel-server
```
Fix missing gmake by typing the following command:
```
ln -s /usr/bin/make /usr/bin/gmake
```
verify by typing the following command
```
which make
```
this should show /usr/bin/make

Set BASH as default shell
Change the directory to /bin and enter the following commands:
```
mv sh sh_ori
ln -s /bin/bash sh
```