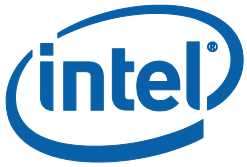
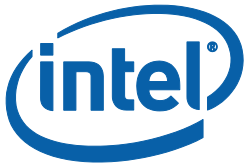


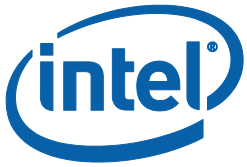
BKM: Installing Ubuntu* OS on the DE2i-150* Board

Intelligent Systems with Intel® Atom™ Processors

4 December 2013



BKM: Installing Ubuntu OS on the DE2i-150 Board



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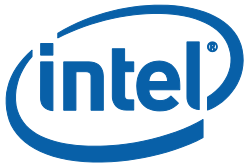

1 Introduction

This is a quick guide or "Best Known Method" (BKM) on how to install Ubuntu* images for the **INTEL®** Atom™ processor N2600 on the DE2i-150* board. The Intel Embedded University Program does not provide technical support for the Ubuntu OS. The information in this document is not intended to be a complete guide to using Ubuntu images on the DE2i-150 board.

This approach was developed during the initial debug of the DE2i-150 board. There may be alternative methods or simpler approaches for your given configuration. Please use this document as a resource and do not assume that this is the best approach for your needs.

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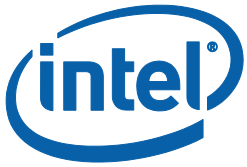
1.1 Revision History

Date	Revision	Description
7/3/2013	0.1	Initial Release
9/19/2013	1.0	Fix typos and formatting, add descriptive text.
10/9/2013	1.1	Fix typos, add descriptions.
12/4/2013	1.2	Minor text and grammatical fixes.



2 Ubuntu Installation

Users have been able to install several versions of Linux on the DE2i-150 board. The Ubuntu OS has been a popular choice of many users.

More details about Ubuntu can be found at the following web site:

http://www.ubuntu.com/

There are many ways to install Ubuntu on a given system, as described on this web site:

https://help.ubuntu.com/community/Installation

For those who might not have a SATA based drive, there are web sites that describe how to load a USB flash drive device with an image[1], and then install that image:

https://help.ubuntu.com/community/Installation/FromUSBStick

You will need the items listed in the Requirements section. Then use the steps listed in the Procedure section to install the Ubuntu image onto the **INTEL®** Atom™ processor N2600 on the DE2i-150 board. This is a simple process, and it's easy to make simple mistakes, so please read through the Procedure section completely before trying it out.

At the end of the document, the process used to install some of the Linux drivers is also provided.

2.1 Requirements

- An external hard drive (an optical hard drive was used) large enough to hold the Ubuntu image.

[1] An example installation using a flash drive is also provided in the appendix.

Note: For this procedure, the OS image was first loaded onto an optical drive. This external drive was then attached to the SATA port using the SATA power port and SATA port (shown in Figure 2 SATA Connections Used for External Drive).

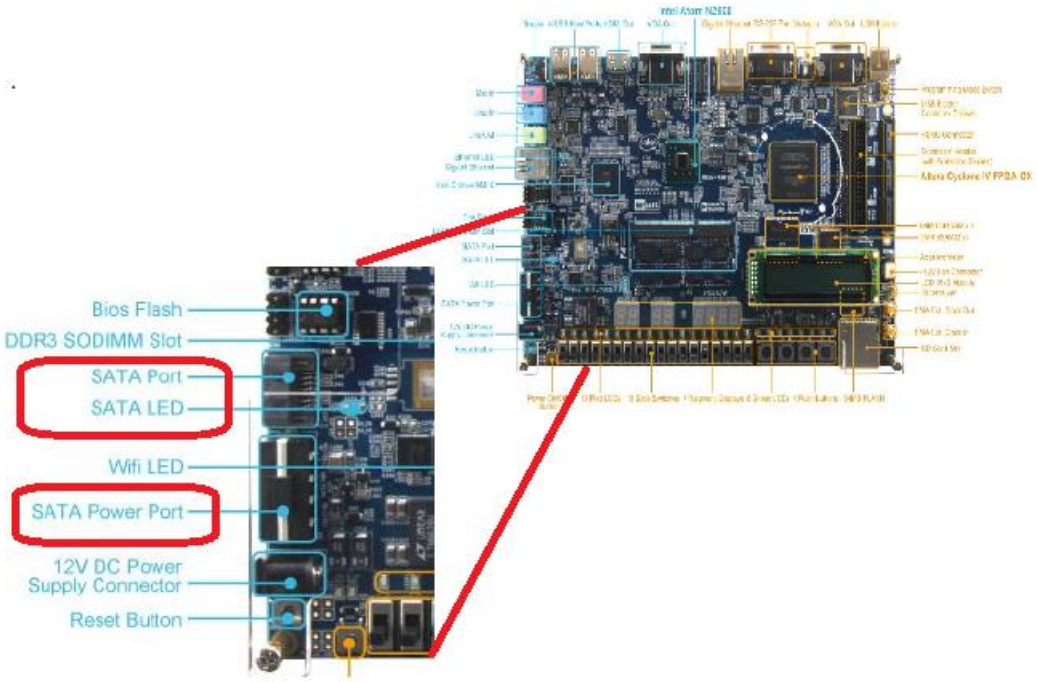


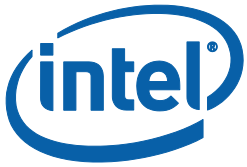
Figure 2 SATA Connections Used for External Drive

2.2 Procedure

Steps to load an Ubuntu Desktop image onto the DE2i-150 board

1) Configure your BIOS to boot first from your optical drive, then boot from your Ubuntu disc
2) Select "Install Ubuntu"
3) Select whether you want third party software
4) Select whether you want to connect to wifi
5) Select your installation type
6) Select your drive
7) Select your time zone, and language
8) Restart the system

The Ubuntu OS image is now installed. Your should be able to boot the **INTEL®** Atom™ processor N2600 on the DE2i-150 board using the Ubuntu image on the SSD.



For the DE2i-150 board, you also need to install a driver to communicate between the **INTEL®** Atom™ processor N2600 and the FPGA, through the PCIe port. See the section on "Installing Linux Drivers on Ubuntu" for more information.

2.3 Graphical Install

The graphical install is described on the following web page:

https://help.ubuntu.com/community/Installation#Standard_installation

You should check out the minimum system requirements for using the Graphical Install.

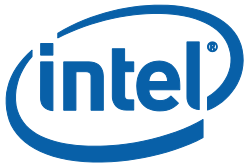
https://help.ubuntu.com/community/Installation/SystemRequirements

which include the following:

- 700 MHz processor (about Intel Celeron or better)
- 512 MiB RAM (system memory)
- 5 GB of hard-drive space (or USB stick, memory card or external drive but see LiveCD for an alternative approach)
- VGA capable of 1024x768 screen resolution
- Either a CD/DVD drive or a USB port for the installer media
- Internet access is helpful

If you do not have an Ethernet connection to the DE2i-150 board, you may need to use a 2nd machine to download packages for the Ubuntu installation.

https://help.ubuntu.com/community/Synaptic/PackageDownloadScript



3 Installing Linux Drivers on Ubuntu

3.1 Overview

This section discusses how to install some basic Linux (software) drivers on the DE2i-150 board. [2] If you discover that a particular driver is not available on the Ubuntu version that you are using, the information in this section should help you load the drivers you need onto your DE2i-150 system.

3.2 Where to Find a Driver

Many drivers needed for the DE2i-150 board are pre-installed in the Ubuntu kernel. This may include the Ethernet drivers, the WiFi drivers and the usbserial drivers.

Depending on the release, these packages can often be simply activated under the desktop menu:

System > Administration > Hardware/Additional Drivers or

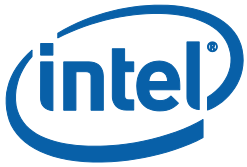
System > Hardware/Additional Drivers

Note: Please use the appropriate linux commands *(some examples are provided in the FAQ section of the appendix)* to check whether a driver is installed, before trying to install a particular driver.

3.2.1 Ethernet Driver

The Intel® 82583V Gigabit Ethernet Controller on the DE2i-150 uses the e1000e driver from the Intel download website. For the latest versions of Ubuntu, the driver should already be included in the kernel.

[2] There is also a sample Ubuntu Flash Drive installation process (that includes valuable information about how to install drivers) provided in the appendix.



3.2.2 usbserial Driver

For Linux systems the USB serial driver currently supports a number of different USB to serial converter products, as well as some devices that use a serial interface from userspace to talk to the device.

All available USB-Serial drivers have already been built as modules. If you have a problem using one of these drivers, you may wish to see an example of how to load the driver provided on the following askubuntu.com page:

http://askubuntu.com/questions/302583/how-can-i-install-a-driver-for-a-usb-to-serial-adapter

3.2.3 WiFi Driver

For the WiFi drivers on Ubuntu some cards (including the Intel WiFi card) should work out-of-the-box, while other WiFi cards may need packages (downloading from an install CD or using an existing Internet connection e.g. Ethernet).

The Intel® Centrino® Advanced-N 6205 and Intel® Centrino® Wireless-N 135 are listed as being supported by the iwlwifi package
http://www.intellinuxwireless.org/

Note: The WiFi capabilities of the Intel® Centrino® Advanced-N 6205 and the Bluetooth and WiFi capabilities of the Intel® Centrino® Wireless-N 135 were tested using Ubuntu 12.04.1 LTS.

3.2.4 PCIe Driver

You may also need to install a driver for the PCIe port between the Intel® NM10 Express Chipset and the Altera Cyclone IV*FPGA. A Linux PCIe driver is available from Terasic.
http://www.terasic.com.tw/cgi-bin/page/archive.pl?Language=English&CategoryNo=11&No=529

The Linux version of the PCIe driver can be found in the linux directory as shown in **Error! Reference source not found.**.

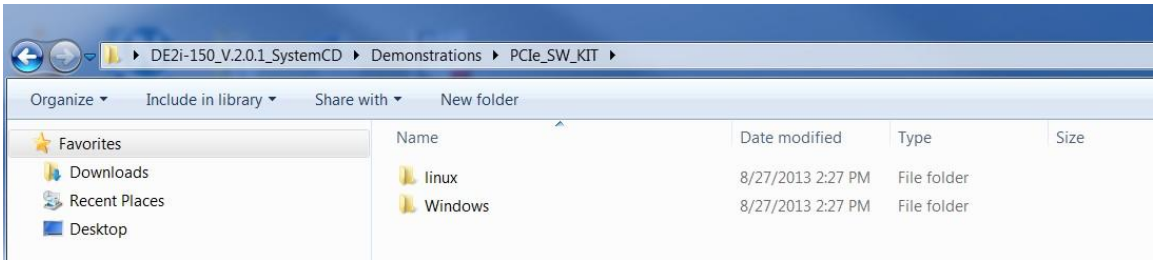
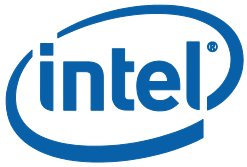


Figure 3 Terasic DE2i-150 System CD

This Linux PCIe driver can be loaded and installed onto the DE2i-150 board as described in the Terasic documentation.

3.2.5 Specialized Driver for Your Application

Specialized application areas may require that different Linux drivers also be installed on the board. Please consult the web sites and any FAQs devoted to these specialized application areas for information on how to install drivers not discussed in this section.



4 Appendix

Some additional examples and information are provided in this appendix.

4.1 An Example Installation Using a Flash Drive

This procedure was used during the 2013 Cornell Cup competition by one of the teams. Since Ubuntu is constantly being improved, some information may not be current.

If you have any problems using a Flash Drive in the USB port, you might want to check out the following information about Ubuntu:

https://help.ubuntu.com/community/Mount/USB

4.1.1 Version Information

The following process has been used to successfully install Ubuntu 12.04.1 LTS successfully on the DE2i-150 board.

Notes:

Ubuntu 12.04.2 or 12.10 was not recommended at the time of the 2013 Cornell Cup. You may want to check whether a later version of Ubuntu can be used.

You will also need a linux based PCIe-FPGA driver compatible with Unbuntu. [The PCIE-FPGA driver is pre-installed on the Yocto image provided on the DE2i-150 board.]

4.1.2 Step by Step Instructions

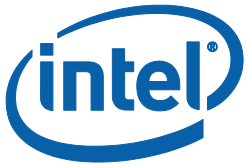
Download the Ubuntu 12.04.1 LTS 32-bit image from here:

http://old-releases.ubuntu.com/releases/12.04.1/

You will retrieve a file named:

ubuntu-12.04.1-desktop-i386.iso

Install this .iso file to a USB stick. Boot with the USB stick inserted into the DE2i-150 board.



At the main screen, select “Install”.

You will need to hit the “tab” key to adjust the load.

Remove splash –

Add video=LVDS-1:d

Install the Ubuntu image and reboot the DE2i-150 board.

4.1.3 Setting Up the Image

After rebooting the board (with the Ubuntu OS), make the following modifications to the installed image.

Add the following to the file /etc/default/grub.

> GRUB_CMDLINE_LINUX_DEFAULT="vmalloc=256MB video=LVDS-1:d mem=4GB"
>
> sudo update-grub

Next, run the Software Update Manager to update Ubuntu (~350MB+ of files).

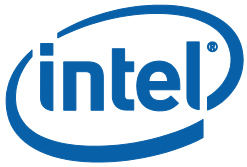
From the terminal window install the ssh server using the following commands:

> Prompt> sudo apt-get install openssh-server (you may not need this command)
>
> Prompt> reboot the board

You should have a new kernel 3.2.0-39-generic-pae

4.1.4 Installing Drivers

Now the following MUST BE DONE from either a tty window (ie, Ctrl+Alt+F2) or an ssh session to install drivers on the Ubuntu OS.



From a tty window or ssh session, type:

```
Prompt> sudo apt-get install cedarview-drm cedarview-graphics-drivers libva-
cedarview-vaapi-driver libva-glx1 libva-tpi1 vainfo libva-dev freeglut3 freeglut3-
dev binutils-gold libXi-dev libXfont-dev libXext-dev libdrm-dev libpciaccess-dev
libXfixes-dev libXv-dev libXpm-dev libX11-dev libXres-dev libXrender-dev
libdmx-dev libxkbfile-dev libXinerama-dev libXdamage-dev libXxf86vm-dev
mesa-utils libtool autoconf
```

The Ubuntu OS image and Linux drivers are now installed. Your should be able to boot the **INTEL®** Atom™ processor N2600 on the DE2i-150 board using the Ubuntu image on the SSD and the drivers should be working.

Note: If you try to install the driver through the graphical interface the monitor will go to a black screen and never come back, although the system is still alive.

4.2 FAQs

These Questions and Answers are provided for checking whether a particular driver has been installed correctly.

4.2.1 Ethernet Driver Q&A

Question:

How do I tell whether the Ethernet is connected on the DE2i-150 board?

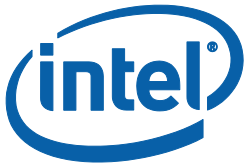
Answer:

Boot the Ubuntu OS on the DE2i-150 board, open the DASH home, go to a terminal window and type "ifconfig". This will list the ethernet interface. You should be able to see if the MAC address matches the MAC address label on the white sticker on the bottom side of the board.

To display info on all network interfaces, active or inactive, type:

```
Prompt> ifconfig -a
```

To view the network settings on a particular adapter, type the command followed by the assigned name for that adapter. For example, for the first Ethernet adapter installed in the computer, type:



Prompt> ifconfig eth0

This command should display the Ethernet network settings.

4.2.2 WiFi Driver Q&A

Question: How do I tell whether the wireless drivers are installed on the DE2i-150 board?

Answer:

Boot the Ubuntu OS on the DE2i-150 board, open the DASH home, go to a terminal window and type:

Prompt> iwconfig

You should see be able to see an entry for "wlanN" where N[3] is a number if the WiFi drivers are installed.

4.2.3 Bluetooth Q&A

Question: How do you check whether a Bluetooth device is connected on Ubuntu?

Answer:

Check to see whether the Bluetooth driver is already installed on your distribution, by typing:

Prompt> hciconfig –a

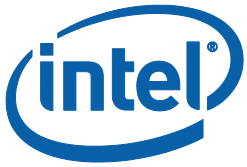
The hciconfig command prints the name and basic information about all the Bluetooth devices installed in the system.

Note: If no device is listed, you may need to check whether you have Bluetooth installed on your system.

For more information on this command, check out the following website:

http://www.linuxcommand.org/man_pages/hciconfig8.html

[3] for example "wlan0" or "wlan1"



Question: How do you setup Bluetooth on Ubuntu?

Answer:

Taken from the following webpage:
http://crunchbang.org/forums/viewtopic.php?id=742

Open a terminal window and type:

```
Prompt> sudo apt-get install bluez-gnome Bluetooth gnome-bluetooth
```

Once installed, you will need to add the tray icon to your autostart.sh file.

(sleep 5s && Bluetooth-applet) &

Once the applet is up and running, the icon should appear and you should be able to use the Bluetooth connection (if you have Bluetooth hardware in your DE2i-150 kit).

4.2.4 PCIe Driver Q&A

Question:

How do I tell whether the PCIe driver is installed on the DE2i-150 board?

Answer:

Boot the Ubuntu OS on the DE2i-150 board, open the DASH home, go to a terminal window and type:

```
Prompt> modprobe terasic-qsys-pcie
```

You can see all the PCI devices recognized by the Ubuntu OS by typing:

```
Prompt> lspci
```

You should see many entries for the system peripherals; the FPGA should be listed as "Altera Non-VGA device" (or something along those lines).