



Linux BSP for Aries SBC

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**FOR TECHNICAL SUPPORT
PLEASE CONTACT:**

support@diamondsystems.com

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Diamond Systems Corporation
555 Ellis Street
Mountain View, CA 94043 USA
Tel 1-650-810-2500

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1. INTRODUCTION

This document describes the steps involved in using the Linux BSP with Diamond Systems' Aries single board computer and how to use Aries' Linux bootable SATA-DOM disk.

For support please visit following website: <http://www.diamondsystems.com/contact>

1.1 Warranty / Disclaimer

1.2 Linux License and Support Information

Ubuntu is a collection of thousands of computer programs and documents created by a range of individuals, teams and companies, each of these programs may come under a different license, find the licensing details from the following web site.

<http://www.ubuntu.com/about/about-ubuntu/licensing>

The Aries BSP uses the Ubuntu-14.04 LTS OS. LTS is an abbreviation for "Long Term Support" and this OS has support till 2019. For more details visit following site: <https://wiki.ubuntu.com/LTS>

Generic forum for Linux users:

<http://www.linuxforums.org/>

Distribution-specific help websites:

<https://wiki.ubuntu.com/LTS>

<https://wiki.ubuntu.com/Releases>

<https://help.ubuntu.com/14.04/index.html>

<https://help.ubuntu.com/14.04/ubuntu-help/index.html>

<https://help.ubuntu.com/community>

<http://community.ubuntu.com/help-information/finding-help/support/>

Official Ubuntu forum:

<http://ubuntuforums.org/>

2. SOFTWARE DEVELOPMENT KIT CONTENTS

The Aries Software Development Kit contains the user manual, a SATA-DOM disk pre-programmable with a bootable Linux image, and a backup copy of the Linux image on DVD.

2.1 User Manual

This user manual contains details about using the Linux BSP. For the Aries SBC hardware user manual visit following website: <http://www.diamondsystems.com/products/aries>

2.2 SATA-DOM disk

The SATA-DOM disk includes a bootable runtime Linux Ubuntu-14.04 OS image. In addition to demonstrating Linux operation, the OS image also contains programs that can be used for demonstrating and validating many of Aries' hardware capabilities. Functions exercised by the bootable Linux OS image include:

- Ethernet support
- Audio support
- DHCP, SSH, FTP,HTTP server support
- USB mouse and keyboard support
- USB 2.0 and 3.0 ports
- Serial ports RS-232/422/485
- SATA storage devices
- Diamond Systems' Universal Driver 7.00 for Linux 3.16

2.3 Backup copy on DVD with image

The SATA-DOM has a bootable Linux image on it. The same Linux image is provided on a DVD as a backup copy. The user can flash the image on one more SATA-DOM if required, or can flash it on same SATA-DOM if the existing image becomes corrupted.

3. QUICK START GUIDE

Connect the SATA-DOM in the SATA socket of Aries board. The slot is shown in following picture. Then power on the SBC. It directly boots to Ubuntu Desktop since the automatic login feature is enabled in the OS.

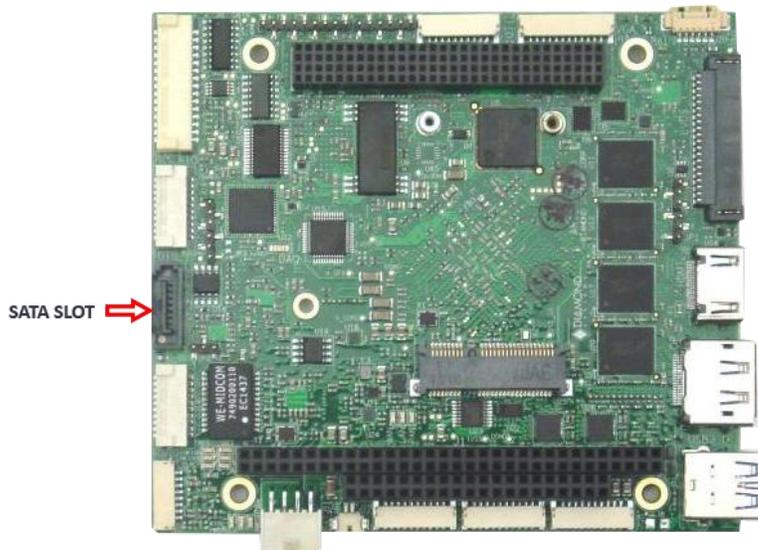


Figure 1: SATA Socket in Aries Board

Note: To provide power to the SATA-DOM, a jumper must be placed on pins 1 and 2 in Jumper Block JP2.

The Ubuntu-14.04 OS has the following user credentials:

User Name	Password
dscguest	dscguest
diamond	diamond
root	welcome

The board specific demo applications are placed in desktop folder and the Diamond Systems Universal Driver is placed in the /usr/local/ directory.

4. LINUX FEATURES

4.1 Baseline Linux Distribution

This BSP has an Ubuntu-14.04.2 Linux OS with kernel version 3.16.0-30, Linux headers 3.16.0-30, gcc version 4.8.2 and GNU make version 3.81.

For more information visit following website: <https://wiki.ubuntu.com/TrustyTahr/ReleaseNotes/14.04>

4.2 Installed Applications

The following applications are installed in the OS

- minicom
- yum
- gcc
- g++
- gdb
- ddd
- eclipse
- wine
- gparted
- myunity

4.3 Gnome Unity and Classic GUI view

There are two GUI interfaces available for Linux users; Gnome Unity and Gnome Classic.

Gnome Unity is a desktop environment bundles together a variety of X clients to provide common graphical user interface elements such as icons, toolbars, wallpapers, and desktop widgets. Additionally, most desktop environments include a set of integrated applications and utilities. The following picture shows the Gnome Unity GUI interface.

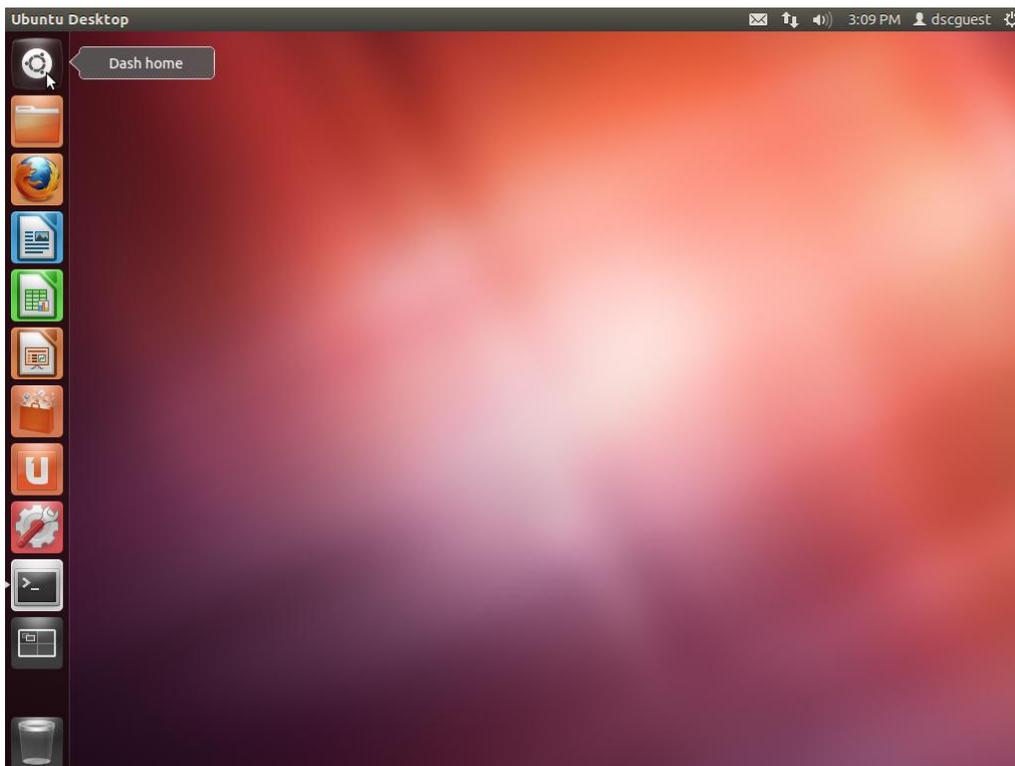


Figure 2: Ubuntu GUI Desktop

Gnome Classic is a completely menu based interface. The following picture shows gnome classic GUI interface.

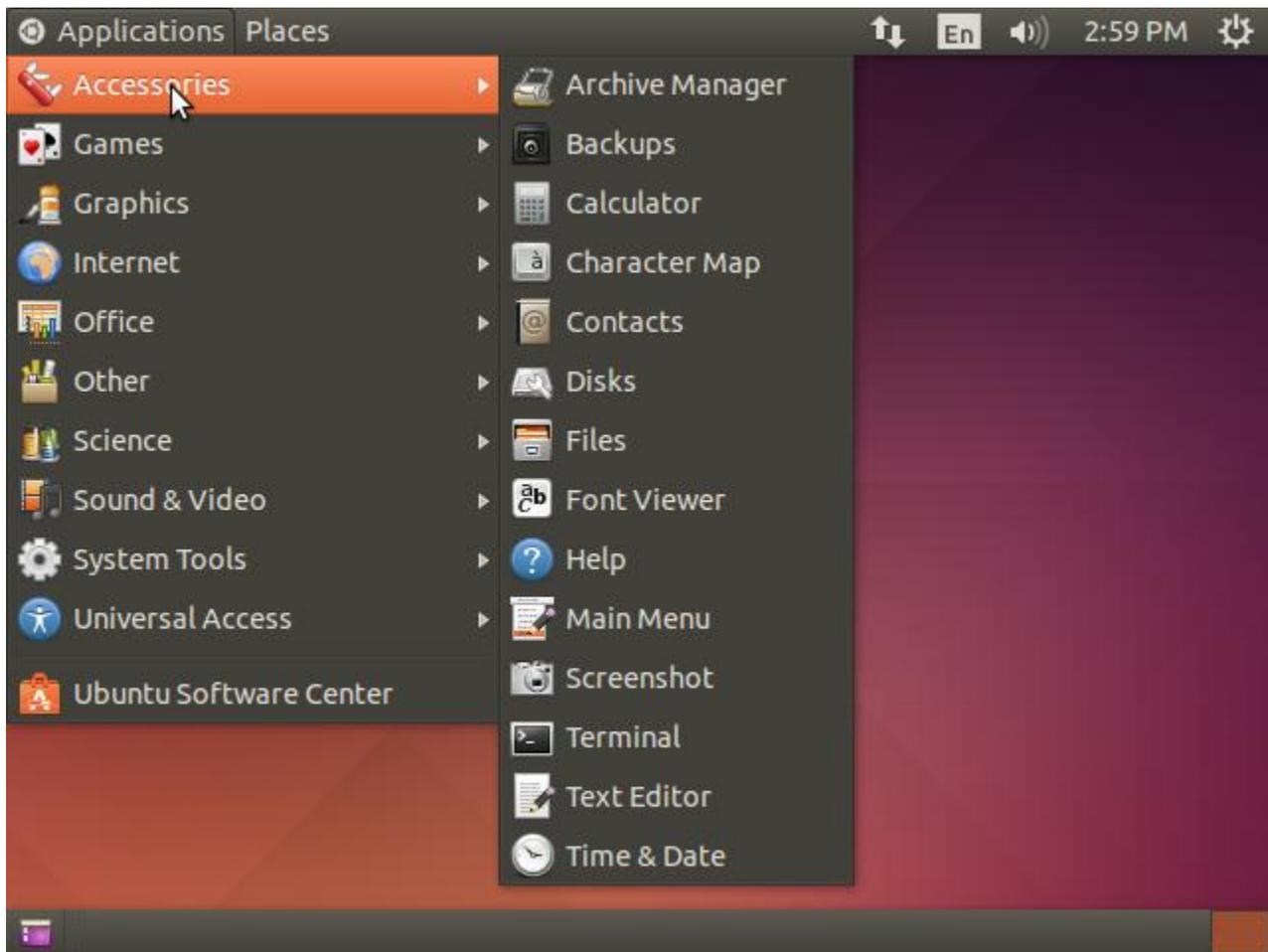


Figure 3: Accessories

The Ubuntu-14.04 uses Gnome Unity by default. This BSP also offers the Gnome Classic GUI interface. To switch between Gnome unity and Gnome classic Refer [Appendix L](#)

4.4 Application / Feature Configuration

Refer to [Appendix K](#)

4.5 FTP Server Enable Instructions

Refer to [Appendix B](#)

4.6 HTTP Server Enable Instructions

Refer to [Appendix C](#)

5. UNIVERSAL DRIVER

5.1 Overview

Universal Driver is a software toolkit that provides a C language interface capability for Diamond Systems' I/O boards. It is provided free with all of Diamond Systems' hardware products and may also be downloaded free from [the Diamond Systems website \(http://www.diamondsystems.com/products/ud70\)](http://www.diamondsystems.com/products/ud70). It supports all the data acquisition features of Diamond Systems' products, plus support for the watchdog timers on Diamond Systems' SBCs.

The Linux DSCUD-7.00 installation differs entirely from Windows. For interrupt features and PCI devices (i.e., PC/104-Plus, PCI-104, and PCIe MiniCards), the Universal Driver kernel module must be compiled on the target system before installing the driver because the Linux kernel version varies based on the Linux OS chosen.

Instructions If You Don't Need Interrupt Features

This kernel module is required to support high speed processing of interrupts from the data acquisition boards, and PCI devices require the module to operate. However, if the user doesn't intend to use interrupts from the board, or if using a PC/104 board, there is no need to install this kernel module. Examples of interrupt functions are: RMM1616UserInterruptSet () and RMM1616UserInterruptStop (). Simple functions like RMM1616DAConvert () and digital I/O operations do not require interrupts.

If the application does not need interrupts, simply extract the driver files, link to the driver library (libdscud-7.00.a) with application program and do not run the compile.sh or install.sh shell scripts or do anything with kernel source code, or create a kernel module.

Things to Do Before You Install

The driver uses a Linux kernel module developed by Diamond Systems to handle interrupt processing. If the application will use any interrupt related functions of the driver, this kernel module is required.

To build a Linux kernel module you must have the kernel header source code in your system (and applicable C/C++ compiler). Additionally, kernel modules are built for a specific version of the kernel, so if you build the module for one version and then attempt to load the module under another version, errors or unexpected results may occur. Most likely, the Linux will reject the kernel module as being in an invalid module format if from an incompatible system.

This BSP has all the necessary build environment elements for kernel module compilation like kernel headers, gcc compiler and GNU make utility.

5.2 Steps to Compile Universal Driver

- Change the directory where Diamond Systems' Universal Driver resides to: **cd /usr/local/dscud-7.00**
- Run **./compile.sh**

EXAMPLE:

```
linux:/usr/local/dscud # ./compile.sh
```

```
Diamond Systems Universal Driver Installer
```

```
-----
```

This installer compiles a kernel module which supports interrupt driven data acquisition features of Diamond Systems' products.

If you are not using the interrupt driven features of the board you do not need to run this installer.

Online documentation for this driver is available at <http://docs.diamondsystems.com/dscud/>

Hit CONTROL-C at any time to exit this installer.

```
[[HIT ENTER TO CONTINUE]]
```

```
Step One: Locate Kernel Source Code
```

```
-----
```

The installer will now scan your system looking for Linux kernel source code. The /usr/src directory and the /lib/modules directory will be scanned.

Select a Linux kernel version below that you will run on your TARGET system. Type the number next to the selection and hit ENTER.

```
0) Kernel 3.16.7 (/lib/modules/3.16.0-30-generic-pae/build)
```

```
1) Kernel 3.16.7 (/usr/src/linux-headers-3.16.0-30-generic-pae)
```

For example type 1

```
Step Two: Compile Kernel Module
```

```
-----
```

The installer is now ready to compile the Linux kernel module. If errors occur see the README file in this directory as well as the online DSCUD documentation for help.

This kernel module will only load under the exact Linux kernel version which you have installed in the directory /usr/src/linux-headers-3.16.0-30-generic-pae.

```
[[HIT ENTER TO CONTINUE]]
```

```
--> Compiling kernel module for your system <--
```

```
rm -f dscudkp.ko dscudkp.o dscudkp.mod.*
```

```
make-C/usr/src/linux-headers-3.16.0-30-generic-pae SUBDIRS=/home/ami/Desktop/delete/dscud-7.00 modules
```

```
make [1]: Entering directory `/usr/src/linux-headers-3.16.0-30-generic-pae'
```

```
CC [M] /home/ami/Desktop/delete/dscud-7.00/dscudkp.o
```

```
Building modules, stage 2.
```

```
MODPOST 1 modules
```

```
CC /home/ami/Desktop/delete/dscud-7.00/dscudkp.mod.o
```

```
LD [M] /home/ami/Desktop/delete/dscud-7.00/dscudkp.ko
make [1]: Leaving directory `/usr/src/linux-headers-3.2.0-29-generic-pae'
--> Installing module dscudkp.o in /lib/modules/misc <--
mkdir -p /lib/modules/misc
cp dscudkp.ko /lib/modules/misc/
```

Step Three: Final Instructions

The dscudkp kernel module has been installed in /lib/modules/misc/. You must copy this file to the same location on your target system.

The install.sh script will load the kernel module so that it can be used by the driver. You must run this script each time the Linux system boots. See the README file for help with this.

Driver compilation complete.

- In the example above, the dscudkp.ko was compiled to be used on the system that has Linux-3.16.17. If User has completed all the steps in development PC, copy /lib/modules/misc/dscudkp.ko and /usr/local/dscud-7.00 directory to target board Using identical respective locations.
- Once copying the files to target system is done, change directory to the dscud-7.00 Folder and run the command to install the driver.

5.3 Steps to install Universal Driver

- Change to the directory `cd /usr/local/dscud-7.00`
- Run - `./install.sh`

This script file loads the universal driver kernel module and creates file as /dev/dscud

To confirm the driver loaded successfully run the following command

```
$lsmod | grep dscudkp
```

 which will show the driver name filtered from the list of loaded drivers.

Installing and setting up Universal Driver support on our target system is done.

5.4 Steps to Install Universal Driver at Boot Time

Refer to [Appendix I](#)

5.5 Steps to Uninstall Universal Driver

Run the following command to uninstall the driver

```
$. /uninstall.sh
```

5.6 Steps to Compile Test/demo Application

To compile demo applications, go to demo application source directory and run make command in terminal, it compiles the demo application and creates executable in the current directory.

- To compile demo application
- ```
$ make
```
- To run built executable
- ```
$ ./Executable_name ( ex. $./ARIESLED )
```

6. REIMAGING A CORRUPT FLASHDISK

If the Ubuntu OS does not boot with SATA-DOM, then try the steps given in [troubleshooting](#) section. If the issue persists, reflash the SATA-DOM with the backup image provided in DVD.

To re-flash the SATA-DOM refer to Step 3 in [Appendix G](#).

7. REINSTALLING LINUX

7.1 Basic Linux Installation

This section details how to develop an Ubuntu-14.04 Linux image for the Aries SBC on a SATA-DOM drive.

- Install Ubuntu-14.04 OS on SATA-DOM disk
 - Refer to [Appendix A](#)

7.2 Configuring Linux to Match the Runtime Image

- Install additional utilities on the Ubuntu image
 - The user may require utilities like Eclipse IDE, partition manager, minicom etc. The freshly installed Ubuntu-OS will not have those utilities by default. To install required additional utilities refer to [Appendix K](#).
- Configure HTTP, FTP and SSH server
 - Refer to [Appendix B](#), [C](#) and [D](#) respectively
- Create new user and password if required
 - Refer to [Appendix H](#)
- Install Gnome Classic GUI Desktop interface
 - The Ubuntu-14.04 OS has Gnome Unity interface by default, to change to the Gnome Classic desktop interface, refer to [Appendix L](#).
- Enable automatic login option if required

- Refer to [Appendix M](#)
- Place the current Diamond Systems' Universal Driver at /usr/local directory
- Compile Universal Driver
 - In general under Linux system, kernel modules are built for a specific version of the kernel, so if modules are built for one kernel version and then in an attempt to load the module under another kernel version, errors or unexpected results may occur. Most likely, the Linux will reject the kernel module as being in an invalid module format if from an incompatible system. Therefore the Universal Driver must be compiled on and installed on the Ubuntu-14.04 OS. Follow Section 5, steps 3 and 4.
- Place required board specific demo applications at Desktop directory.
- Load Universal Driver at start up
 - To load Universal Driver at OS boot time, refer to [Appendix I](#).
- The Ubuntu-14.04 kernel version 3.16.0-30 has required drivers to support all the peripherals present on the Aries SBC.
- The next step is to make a copy of the Aries Linux image, refer to [Appendix G](#)

8. LINUX PASSWORDS

The Ubuntu-14.04 OS has following user credentials:

User name	Password
dscguest	dscguest
diamond	diamond
root	welcome

To create new user or change root user password

- Refer to [Appendix H](#)

9. TROUBLESHOOTING

9.1 Using Built-in 'fsck' to Fix Disk

fsck is used to check and optionally repair one or more Linux file systems. The file system can be a device name (e.g. /dev/hdc1, /dev/sdb2), a mount point (e.g. /, /usr, /home). If the SATA-DOM is booted to terminal, then type the following command.

```
$fsck /dev/sdxxx
```

The exit code returned by fsck is the sum of the following conditions:

- 0 - No errors
- 1 - File system errors corrected
- 2 - System should be rebooted
- 4 - File system errors left uncorrected
- 8 - Operational error
- 16 - Usage or syntax error
- 32 - Fck canceled by user request
- 128 - Shared library error

If file system errors are not corrected then re-flash the image on the SATA-DOM using the backup in DVD. To re-flash, please refer to step 3 in [Appendix G](#)

9.2 Using SSD on Separate Desktop PC to Recover Files or Perform File-System Check 'fsck'

To find out the SATA-DOM device name, connect the SATA-DOM on a separate PC which has the same Linux OS version and type the following command in the PC terminal with root user permission:

```
$fdisk -l
```

The above command will list storage devices names connected to the PC, locate the SATA-DOM based on size from the displayed list. If one or more storage media has same size, then remove the SATA-DOM and try the same command. Check which device name is not displayed when compared with the previous list.

Once the SATA-DOM device name is found (e.g /dev/sdc) then type the following command in terminal:

```
$ fsck /dev/sdc
```

9.3 Checking BIOS to Ensure BSP Disk is Selected in Boot Disk Priority

The BIOS setup screen may be entered during startup by pressing the Delete key on an attached keyboard. Press the key repeatedly right after power-on or reset until the BIOS screen appears. After a certain amount of time during startup, the BIOS will ignore the Delete key. If you wait too long and the system does not respond, simply reset the system (or power down) and try again.

During SBC startup, press Delete key to enter BIOS setup screen.

```

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
Main Advanced Chipset Security Boot Save & Exit
-----
| BIOS Information | Choose the system
| BIOS Vendor      | American Megatrends *| default language
| Core Version     | 5.010                *|
| Compliancy       | UEFI 2.4; PI 1.3    *|
| Project Version  | 0.43-00 - 22-Jun-2015 *|
|                  |                      *|
| CPU Configuration |                      *|
| Microcode Patch  | 324                  *|
| BayTrail SoC    | B3 Stepping         *|
|                  |                      *|
| FPGA Information |                      *|>: Select Screen
| FPGA is Detected | Address(0x280) ID(0x0F01) *| ↑↓/Click: Select Item
| FPGA REVISION    | 4                    *| Enter/Dbl Click: Select
|                  |                      *| +/-: Change Opt.
| System Information |                      *| F1: General Help
| Product Name     | ARIES                *| F2: Previous Values
| Motherboard Info | Diamond Systems      *| F3: Optimized Defaults
| Ethernet 1 MAC   | 00-A0-C9-00-00-00   *| F4: Save & Exit
| Ethernet 2 MAC   | 00-A0-C9-00-00-00   *| ESC/Right Click: Exit
|                  |                      *|
-----
Version 2.17.1246. Copyright (C) 2015 American Megatrends, Inc.

```

Figure 4: BIOS Setup Screen

- Use the mouse or right/left arrow key to select Advanced-> Miscellaneous Configuration And press Enter

```

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
Main Advanced Chipset Security Boot Save & Exit
-----
| + ACPI Settings | Enable\Disable Misc.
| + Intel(R) Smart Connect Technology | *| Features
| + Serial Port Console Redirection | *|
| + CPU Configuration | *|
| + PPM Configuration | *|
| + Thermal Configuration | *|
| + IDE Configuration | *|
| + Miscellaneous Configuration | *|
| + LPSS Configuration | *|
| + System Component | *|
| + Network Stack Configuration | *|>: Select Screen
| + CSM Configuration | *| ↑↓/Click: Select Item
| + Display Devices | *| Enter/Dbl Click: Select
| + USB Configuration | *| +/-: Change Opt.
| + Platform Trust Technology | *| F1: General Help
| + Security Configuration | *| F2: Previous Values
| + WatchDog Timer | *| F3: Optimized Defaults
| + Serial Port Configuration | *| F4: Save & Exit
| | | *| ESC/Right Click: Exit
| | | *|
-----
Version 2.17.1246. Copyright (C) 2015 American Megatrends, Inc.

```

Figure 5: Select Miscellaneous Configuration

- Select OS type as Linux

```

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
  Advanced
-----
| Miscellaneous Configuration | OS Selection
| High Precision Timer      | [Enabled]
| Boot Timer with HPET     | [Disabled]
| PCI Express Dynamic C    | [Disabled]
| OS Selection              | [Linux]
|
| +---- OS Selection ----+
| | Linux
| |
| +-----+
|
| ><: Select Screen
| ↑↓/Click: Select Item
| Enter/Dbl Click: Select
| +/-: Change Opt.
| F1: General Help
| F2: Previous Values
| F3: Optimized Defaults
| F4: Save & Exit
| ESC/Right Click: Exit
|
-----
Version 2.17.1246. Copyright (C) 2015 American Megatrends, Inc.

```

Figure 6: OS Selection

- Make sure the SATA-DOM is selected as first boot device
- The following picture shows that the first boot device is another device
- Select Hard Drive BBS Priorities

```

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
Main  Advanced  Chipset  Security  Boot  Save & Exit
-----
| Boot Configuration        | Set the order of the
| Setup Prompt Timeout     | 1 | legacy devices in this
| Bootup NumLock State     | [On] | group
|
| Quiet Boot               | [Enabled]
| Fast Boot                | [Disabled]
|
| Boot Option Priorities
| Boot Option #1           | [UEFI: SanDisk Cruze...]
| Boot Option #2           | [P1: ST500DM002-1BD1...]
| Boot Option #3           | [UEFI: Built-in EFI ...]
|
| Hard Drive BBS Priorities
|
| ><: Select Screen
| ↑↓/Click: Select Item
| Enter/Dbl Click: Select
| +/-: Change Opt.
| F1: General Help
| F2: Previous Values
| F3: Optimized Defaults
| F4: Save & Exit
| ESC/Right Click: Exit
|
-----
Version 2.17.1246. Copyright (C) 2015 American Megatrends, Inc.

```

Figure 7: Hard Drive BBS Priorities


```

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
Main  Advanced  Chipset  Security  Boot  Save & Exit
-----
Boot Configuration                                |Sets the system boot
Setup Prompt Timeout      1                       |order
Bootup NumLock State      [On]
Quiet Boot                 [Enabled]
Fast Boot                  [Disabled]

Boot Option Priorities
Boot Option #1             [P1: ST500DM002-1BD1...]
Boot Option #2             [UEFI: SanDisk Cruze...]
Boot Option #3             [UEFI: Built-in EFI ...]

Hard Drive BBS Priorities

|><: Select Screen
|↑↓/Click: Select Item
|Enter/Dbl Click: Select
|+/-: Change Opt.
|F1: General Help
|F2: Previous Values
|F3: Optimized Defaults
|F4: Save & Exit
|ESC/Right Click: Exit

Version 2.17.1246. Copyright (C) 2015 American Megatrends, Inc.

```

Figure 10: set System Boot Order

- Go to “Save & Exit Setup” and select “Save Changes and Exit “ option then press the enter key

```

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
Main  Advanced  Chipset  Security  Boot  Save & Exit
-----
Save Changes and Exit                               |Exit system setup after
Discard Changes and Exit                           *|saving the changes.
Save Changes and Reset                             *|
Discard Changes and Reset                           *|
Save Options                                        +----- Save & Exit Setup -----+
Save Changes                                       | Save configuration and exit? |
Discard Changes                                   |                               |
Restore Defaults                                  +-----+
Save as User Defaults| Yes |
Restore User Defaults+-----+
Boot Override                                       *|+/-: Change Opt.
UEFI: Built-in EFI Shell                           *|F1: General Help
UEFI: SanDisk Cruzer Blade 1.27                   *|F2: Previous Values
P1: ST500DM002-1BD142                             *|F3: Optimized Defaults
RTC Clear Settings                                *|F4: Save & Exit
                                                    |ESC/Right Click: Exit

Version 2.17.1246. Copyright (C) 2015 American Megatrends, Inc.

```

Figure 11: Save Changes and Exit

9.4 Resetting BIOS Options to Defaults

In order to load the default BIOS settings, enter the BIOS settings and select **Save and Exit** menu. Then select Restore Defaults, and save/exit. This will restore the BIOS to the default state.

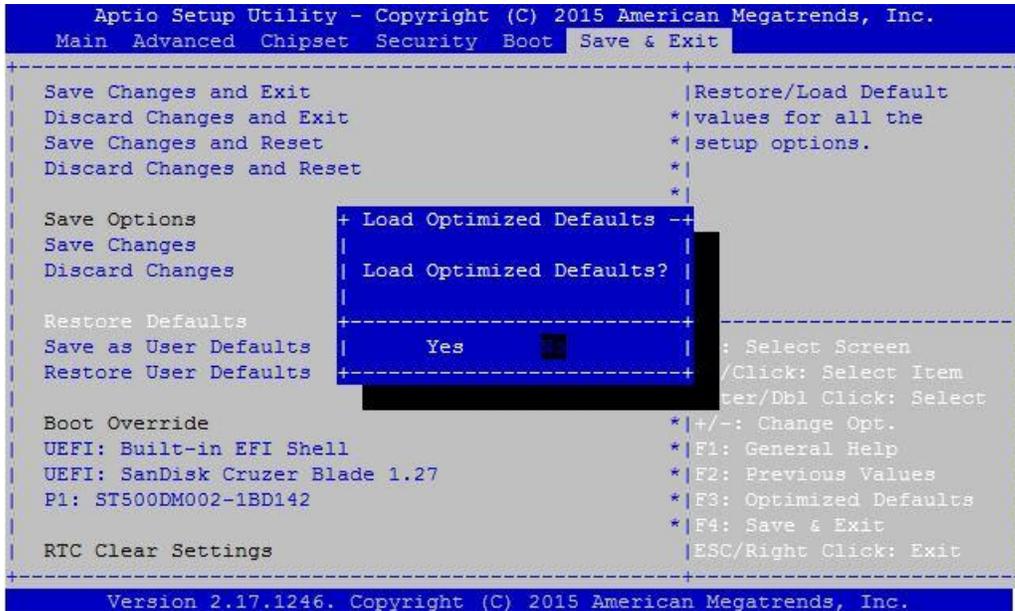


Figure 12: Load Optimized Defaults

9.5 Connecting VGA monitor

If a VGA display is desired, connect it to the Aries SBC as follows. See the Aries User Manual for more information.

1. Obtain a VGA cable



Figure 13: VGA Cable

2. Connect one end of the VGA cable to the VGA connector on the Aries SBC.
3. Connect other end of the VGA cable to the VGA connector of a desktop monitor.



Figure 14: VGA Connector

APPENDIX A: UBUNTU 14.04 INSTALLATION STEPS

The chapter shows the steps to install the Ubuntu 14.04 operating system.

Step 1: Boot the SBA from Live CD

Load the Ubuntu 14.04 Live CD into the CD or DVD drive, and switch on the SBC with the disc still in the drive. Watch the initial BIOS screen for a prompt that indicates which key to use for either:

- a boot menu, or
- the BIOS setup utility

The boot menu option is preferable. If you cannot see such a prompt, on many systems, the required key will be **F2** or **Delete**. Change the boot priority option to boot from drive.

Select the Install Ubuntu button:

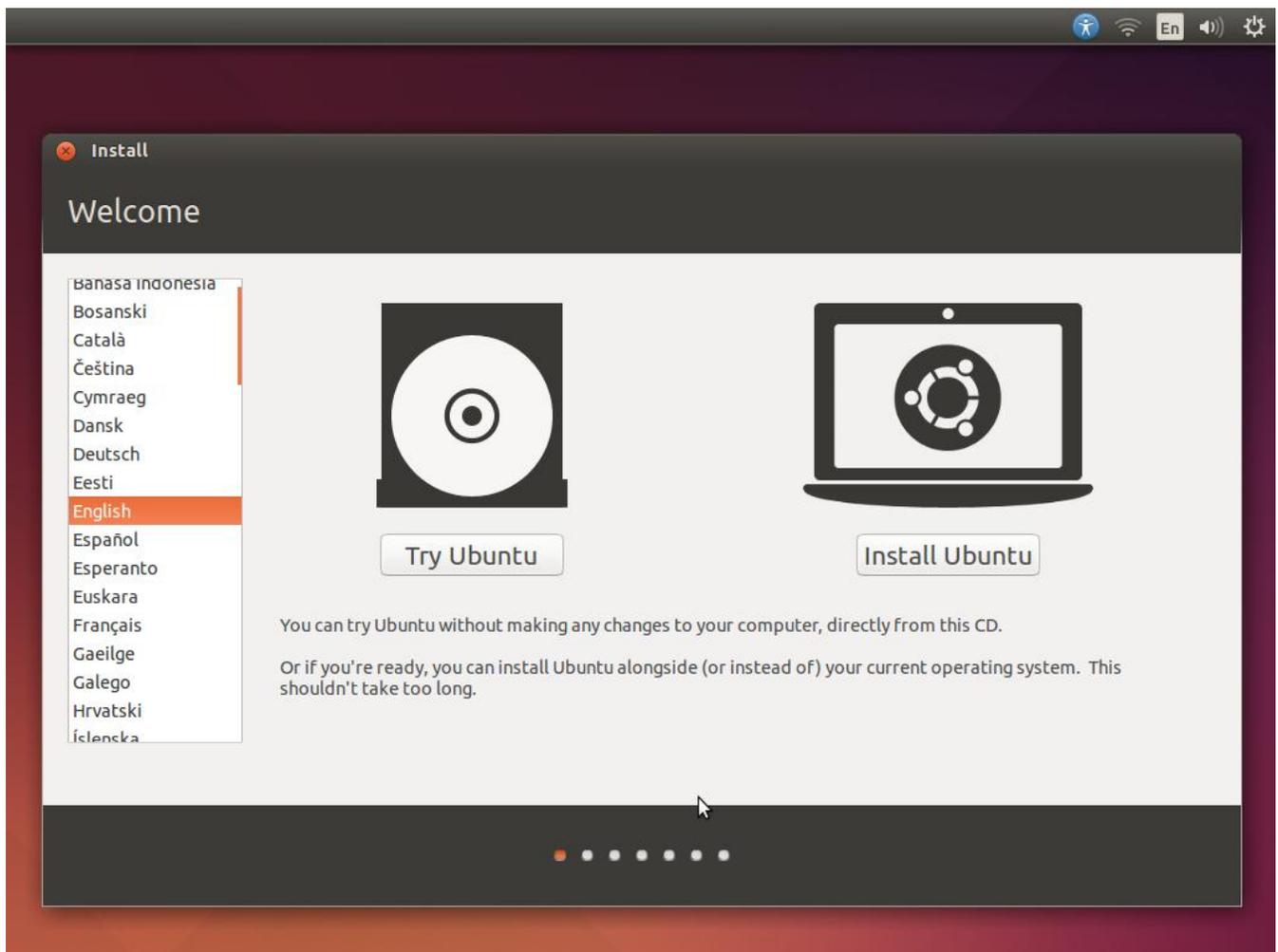


Figure 15: Install Ubuntu

Step 2: Uncheck Options

Uncheck “Download updates while updating” and “Install this third party section” if they are checked.

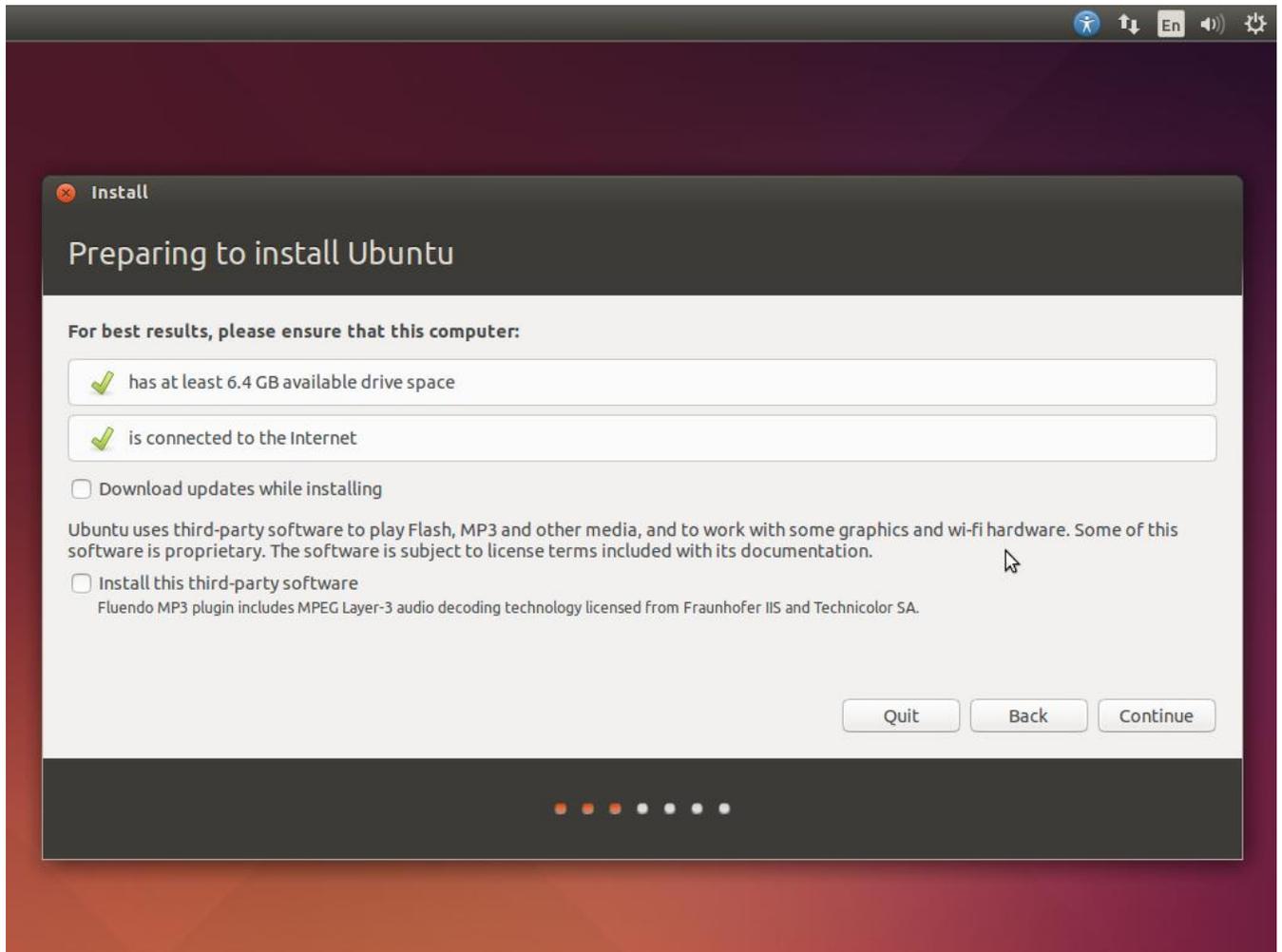


Figure 16: Uncheck Download Updates

Step 3: Installation Type Selection

Select “Something else” option and click continue.

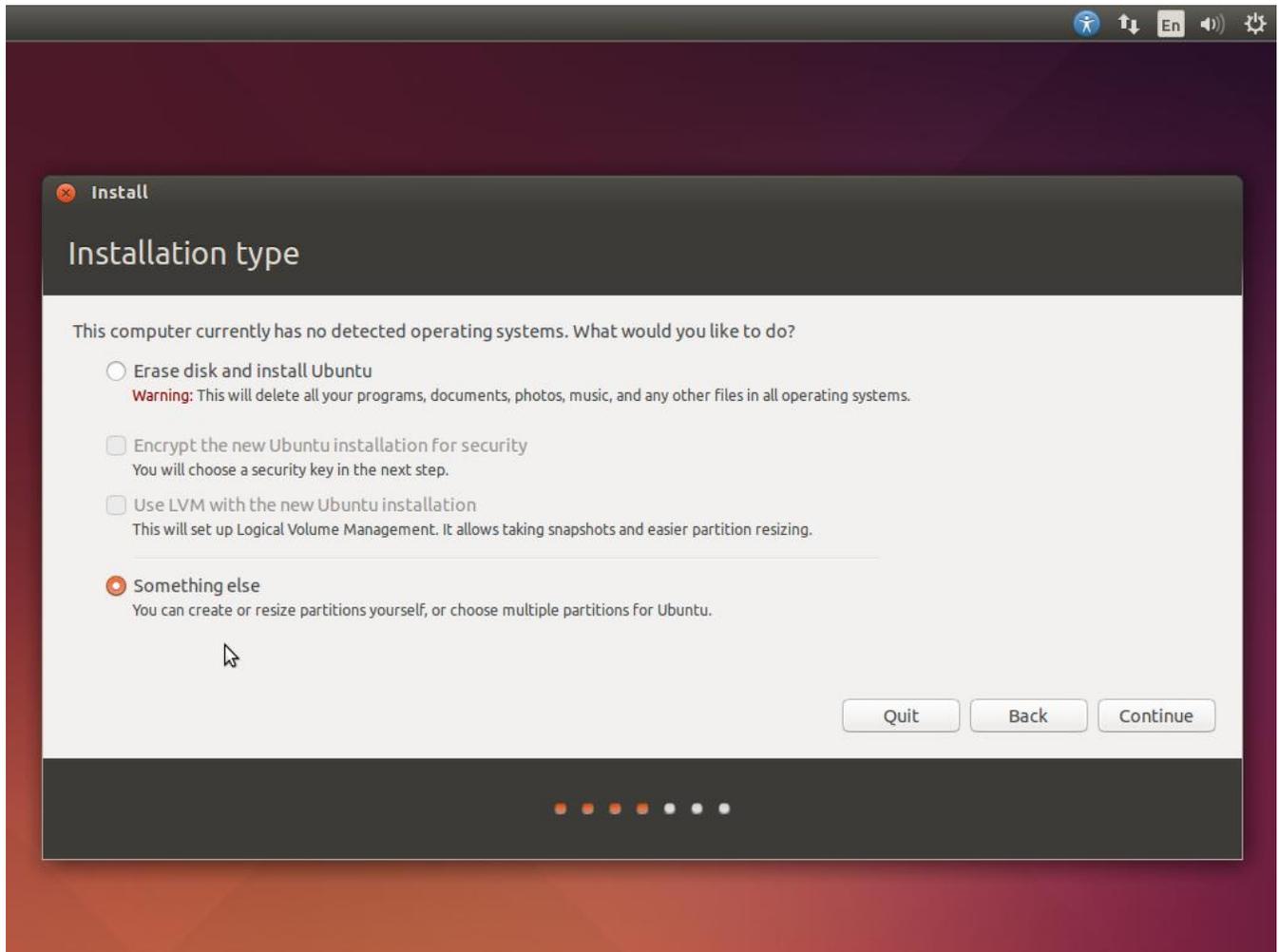


Figure 17: Installation Type Selection

Step 4: Creating New Empty Partition Table

Click the “New Partition Table” and Click “continue”.

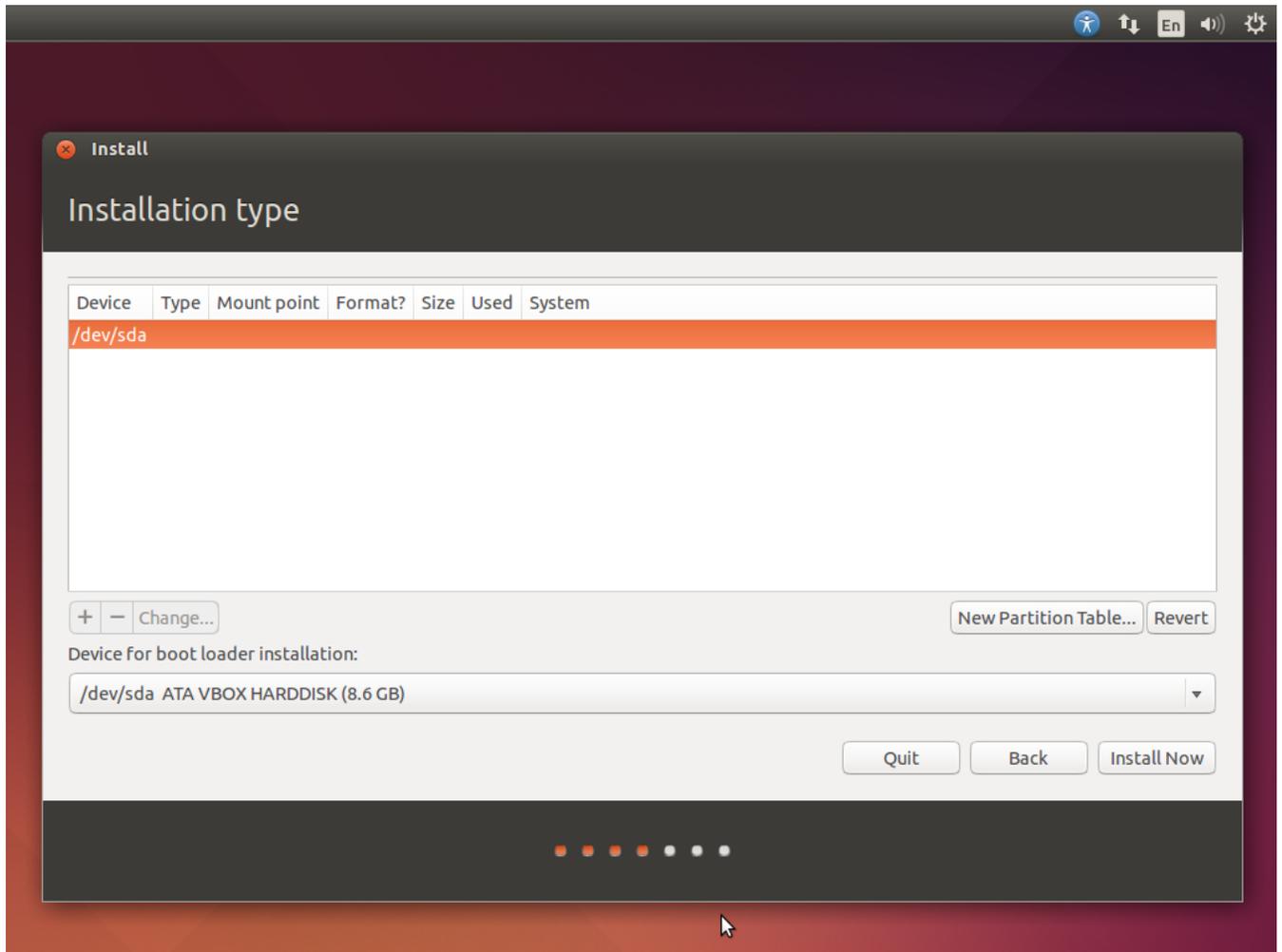


Figure 18: Creating new empty partition table

Select the "free space" and click the "+" button

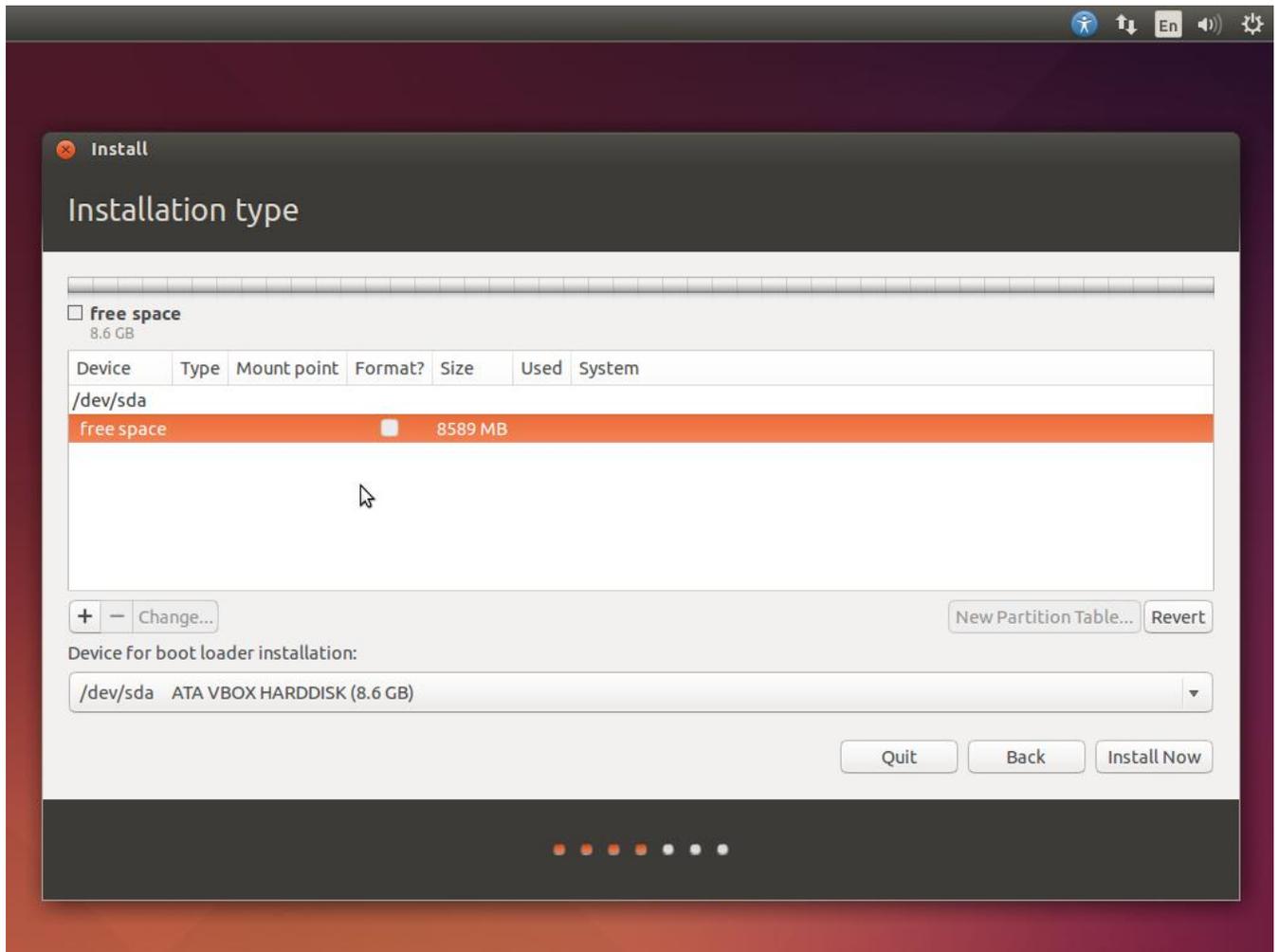


Figure 19: Select Free space

Select "Ext4 journaling file system" option

Select "/" for the Mount point and click Ok

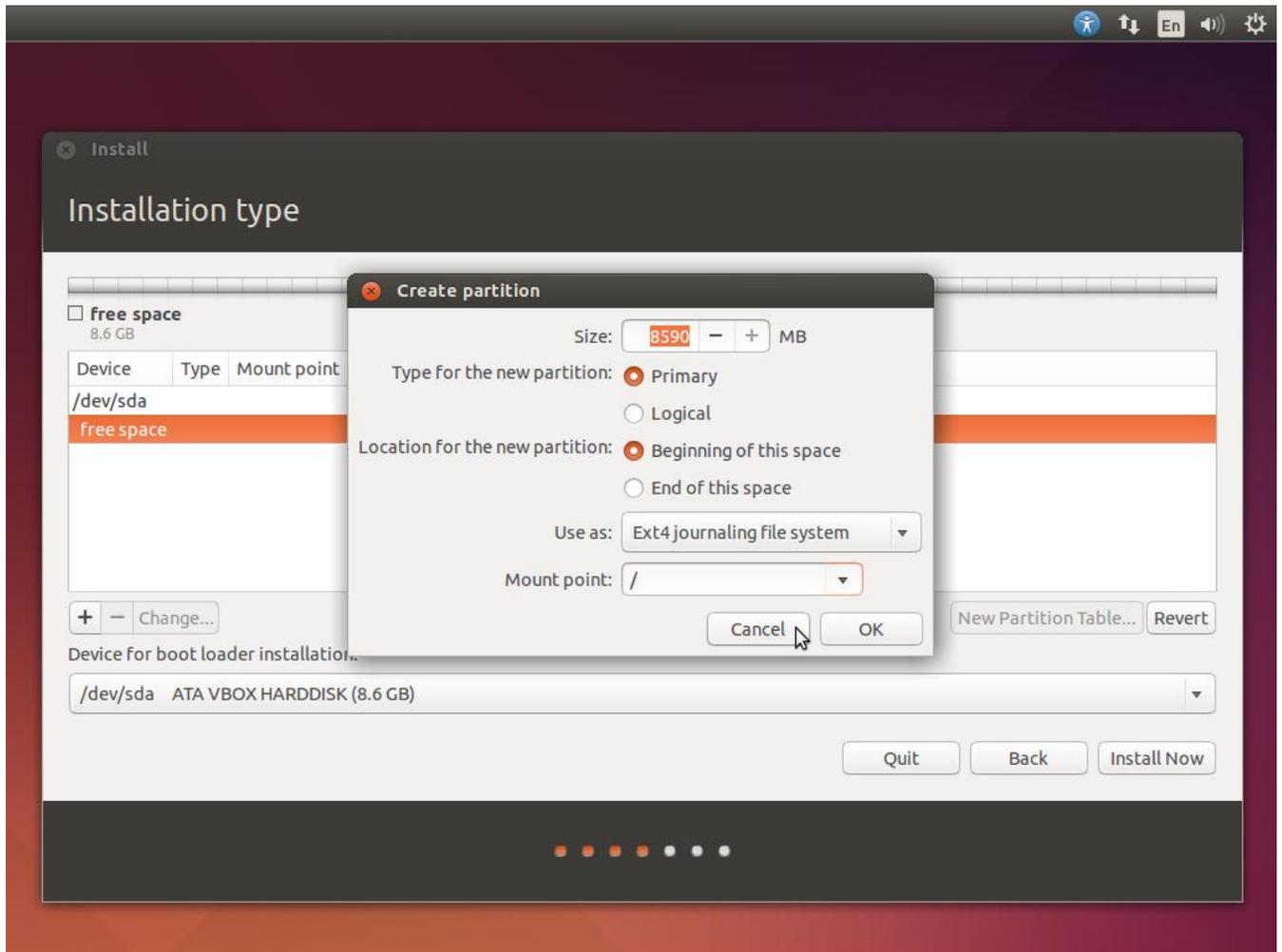


Figure 20: Select Ext4

Click Install now

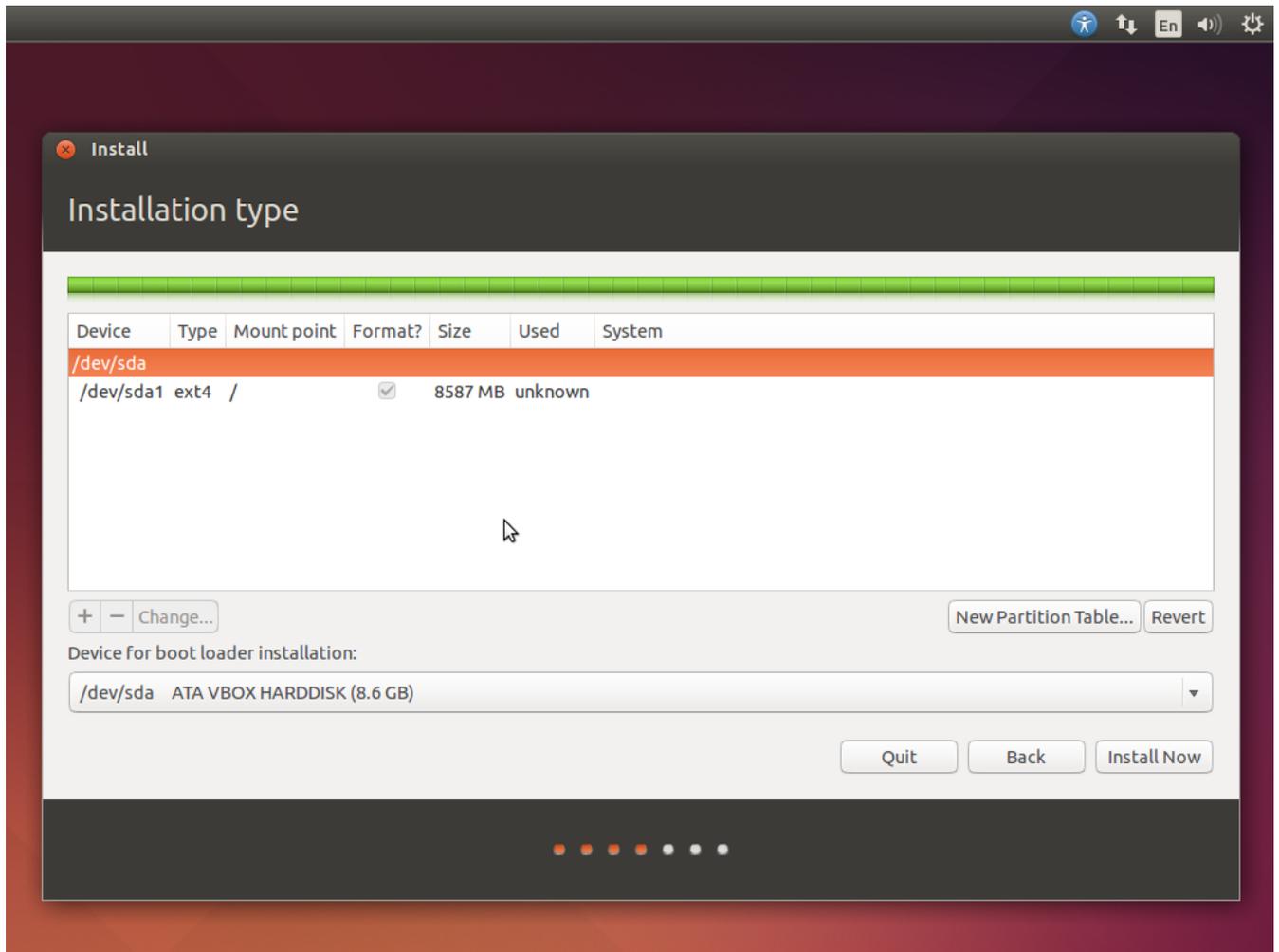


Figure 21: Click Install Now

Step 5: Not Selecting a Partition for Use of Swap Space

To increase life-span of SATA-DOM flashdisk, it is better to not use swap space because the Linux OS accesses swap space frequently. The Aries SBC has 2GB or 4GB soldered SDRAM which is enough. Click “Continue” to avoid allocating a partition for swap space.

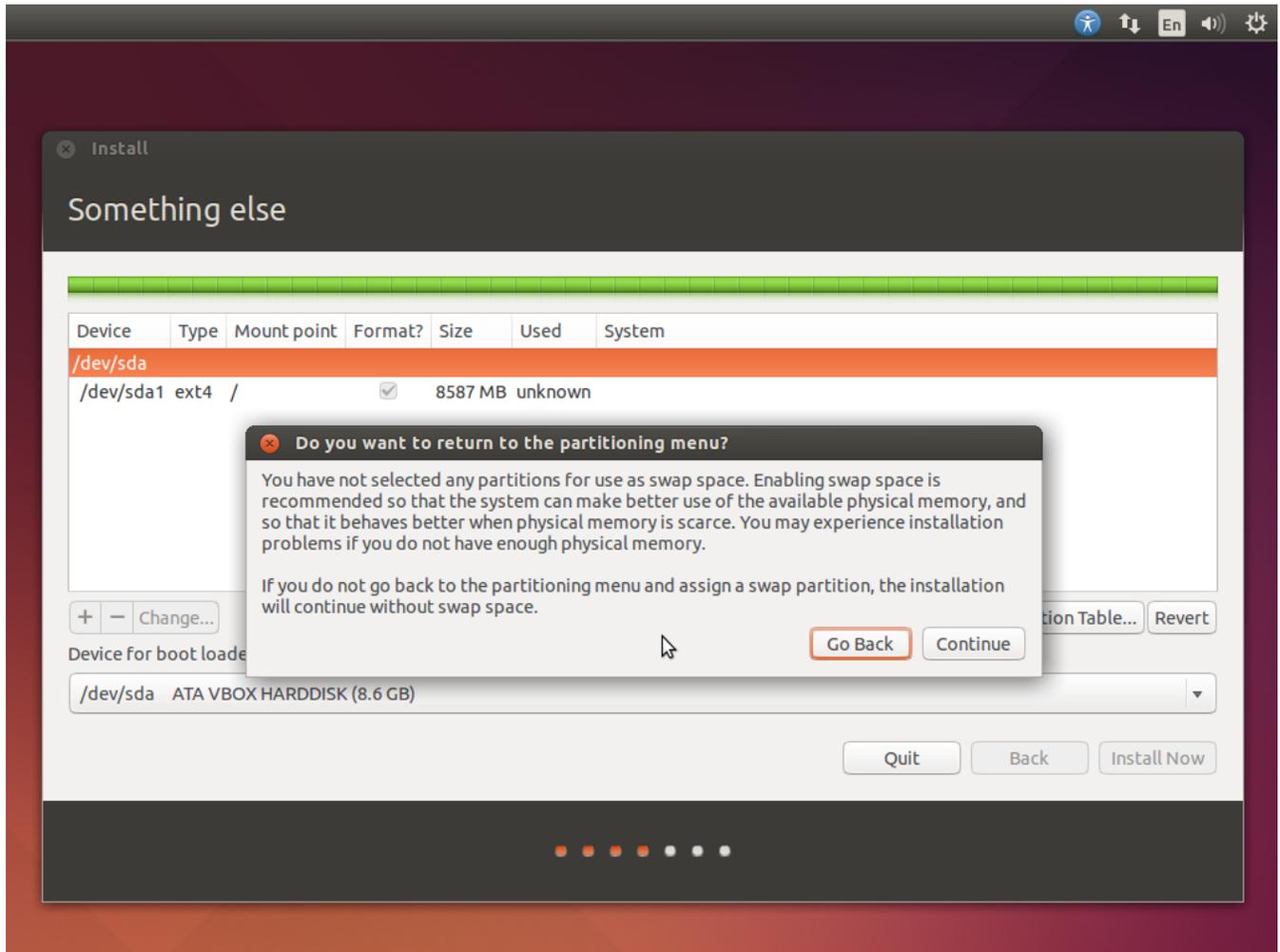


Figure 22: Installation without Swap Space

Step 6: Time Zone Configuration

Select the country by moving around the World map.

After selecting the country, press Continue.

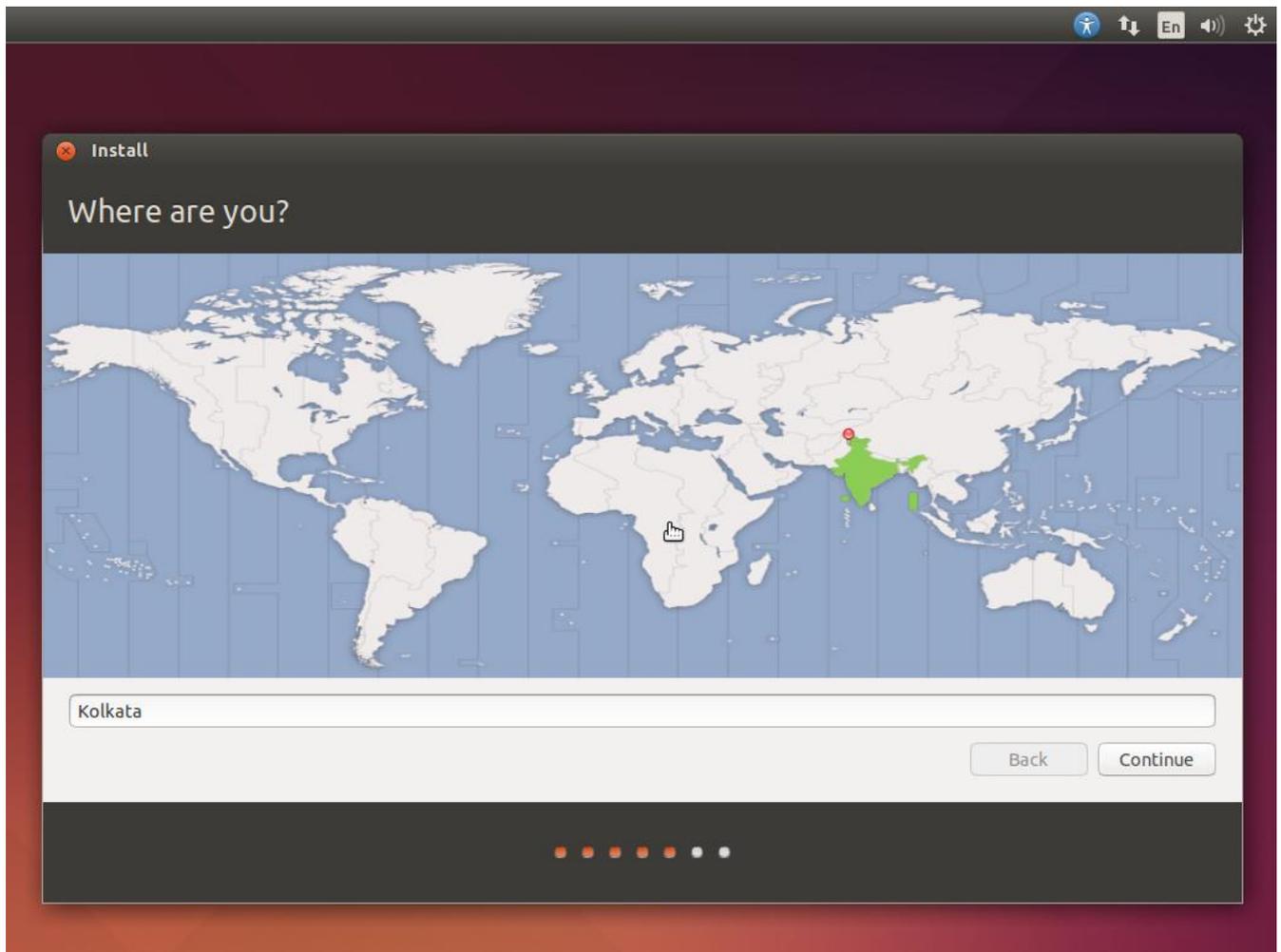


Figure 23: Time Zone Configuration

Step 7: Language Selection

Select the language and press continue.

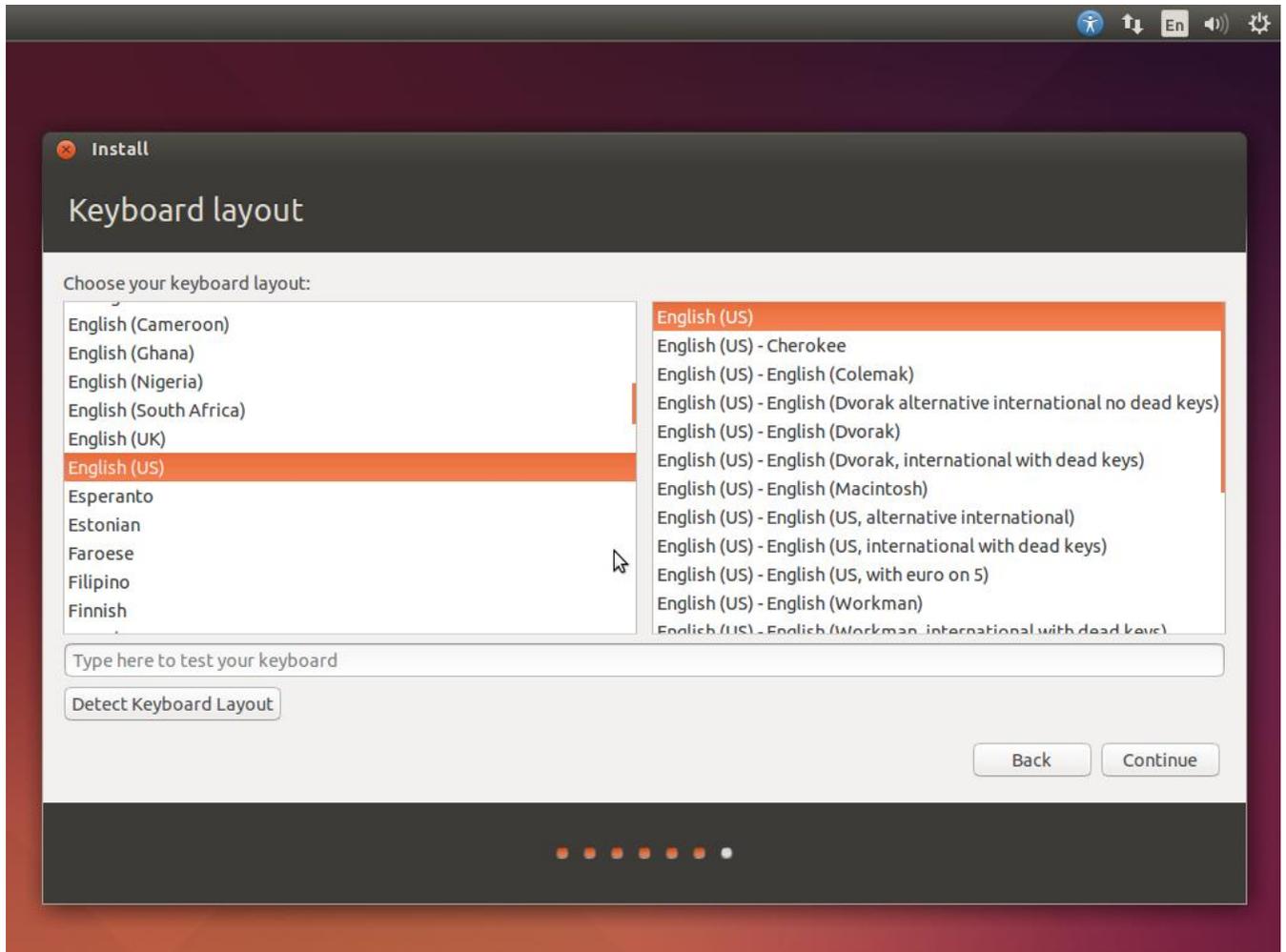


Figure 24: Select Language

Step 8: Set the User Name

Provide the user name and password.

For example user name is dscguest, type the user name in the 'Your name' section.

For example password is dscguest, type the password in 'Choose a password' section.

The given Your name becomes the user account name for the system and also serves as the administrator

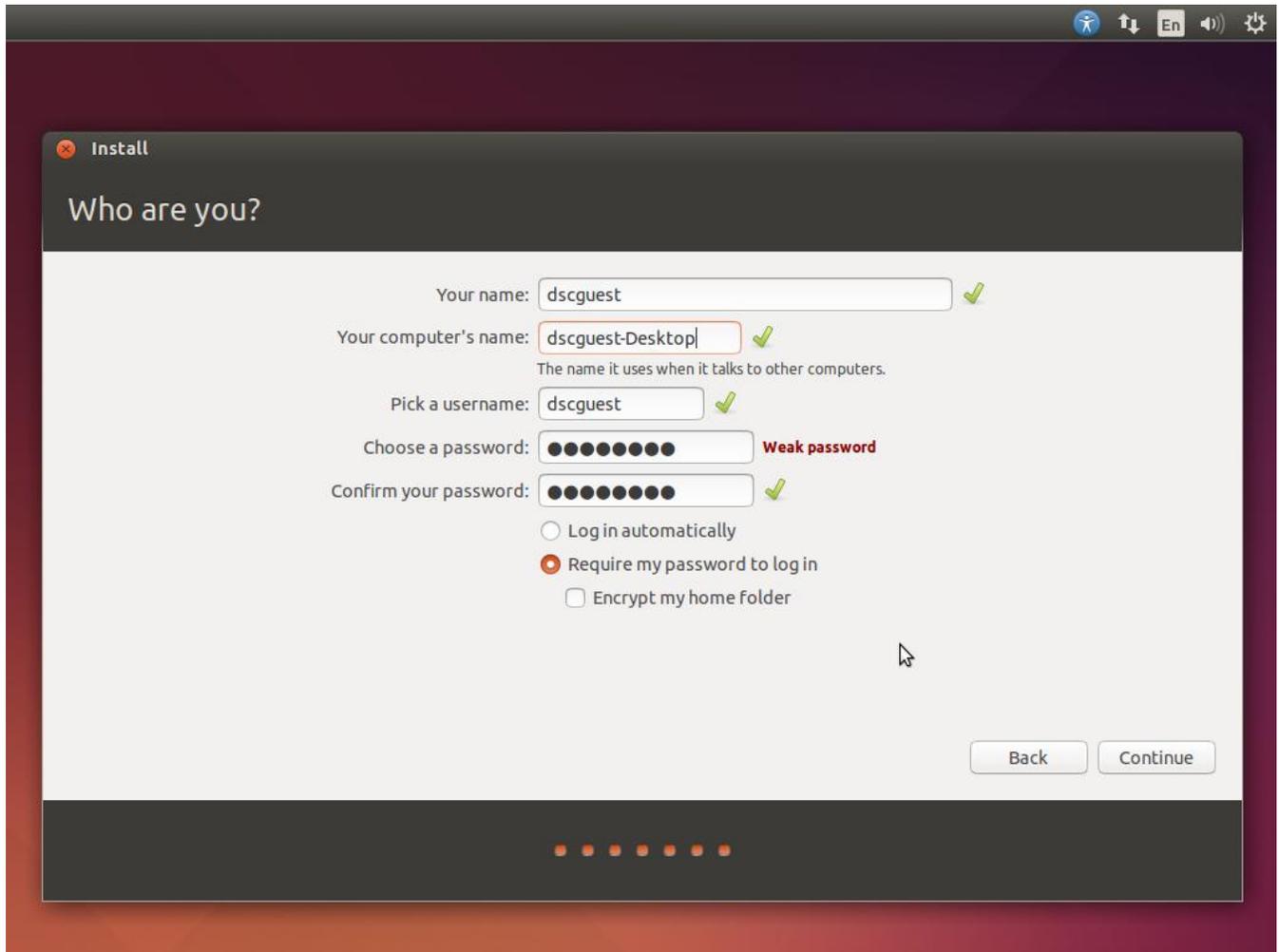


Figure 25: User name and password

Step 9: Welcome Screen

The following screen will be appear and the system will install the OS.

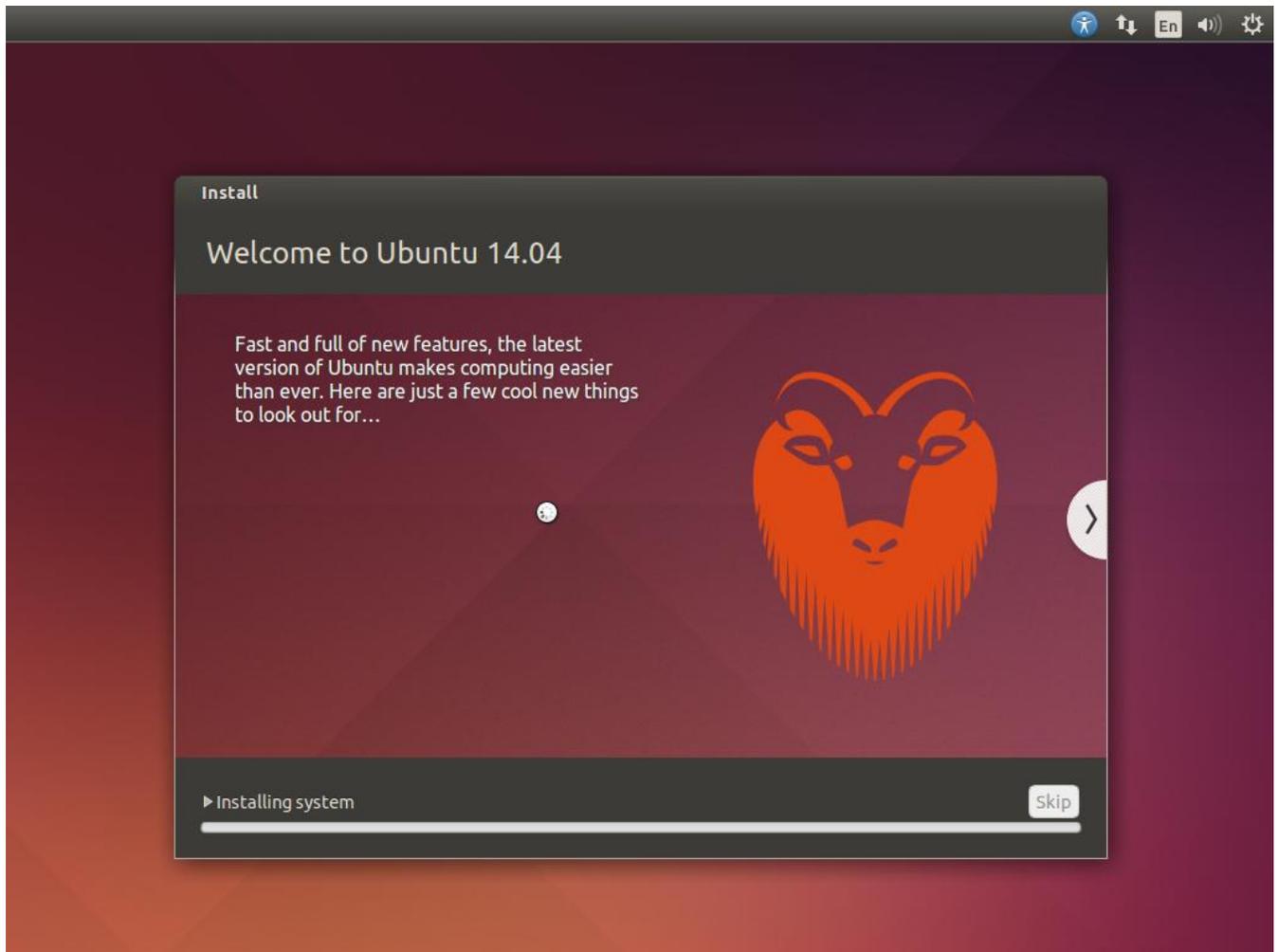


Figure 26: Installing System

Step 10: Restart

Restart the system to complete the Ubuntu 14.04 OS installation once the following window appears.

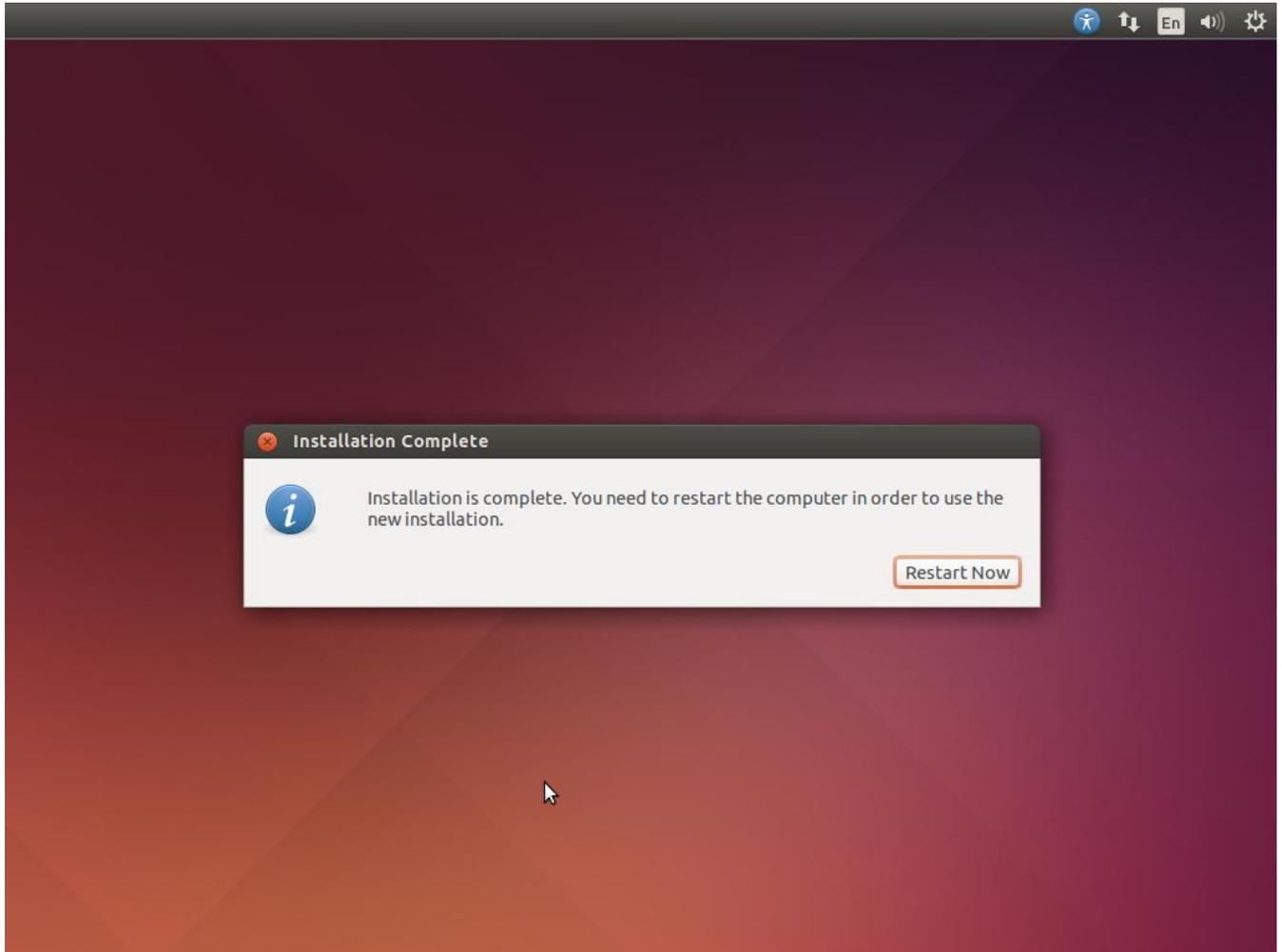


Figure 27: Restart Now

APPENDIX B: CONFIGURATION OF FTP SERVER

The chapter shows the steps to install an FTP server installation in the Ubuntu 14.04 operating system.

Step 1: Installing the FTP Server on Ubuntu

Switch to root user.

```
$ su root
```

```
$ enter the root login password
```

```
$ apt-get install vsftpd
```

Open vsftpd.conf file, the file is present in /etc path.

```
$ vi /etc/vsftpd.conf
```

Edit vsftpd.conf file to enable to upload and download files from the ftp server.

Uncomment the below mentioned lines in the file.

```
listen=YES
```

```
anonymous_enable=YES
```

```
local_enable=YES
```

```
write_enable=YES
```

```
local_umask=077 (Changing the mask value)
```

```
anon_upload_enable=YES
```

```
anon_mkdir_write_enable=YES
```

Step 2: Create a Directory to Upload and Download the FTP Server

```
$ setfacl -d -m g::rwx /srv/ftp
```

```
$ setfacl -d -m o::rwx /srv/ftp
```

```
$ mkdir -p /srv/ftp/upload
```

```
$ mkdir -p /srv/ftp/download
```

```
$ chown ftp:ftp /srv/ftp/upload
```

```
$ chown ftp:ftp /srv/ftp/download
```

Step 3: Testing the FTP Server

Open a web browser in development PC or target board or FTP client like Filezilla Type the following in address space.

<ftp://<IP address of Aries board>> example <ftp://10.0.3.104>

Note: To learn the IP address assigned to the Aries SBC, type following command in terminal:

```
$ifconfig
```

APPENDIX C: CONFIGURATION OF HTTP SERVER

The chapter shows the steps to install an Http server installation in the Ubuntu 14.04 live operating system.

Step 1: Installing the HTTP Web Server

Open the terminal.

Switch to root user.

```
$ su root
```

```
$ enter the root login password
```

Type the command.

```
$ apt-get install apache2
```

Step 2: Create and Serve Webpages to User

Copy the desired html files to the following directory:

```
$ cp example.html /var/www/html/
```

For example to view the Diamond Systems' homepage, copy the Diamond System homepage url to the above mentioned directory.

```
$ cp Diamond.html /var/www/html/
```

Step 3: Testing the HTTP Server

To confirm that HTTP server works properly, type the following in the web browser address space.

<http://<IP address of Aries board >> example <http://10.0.0.1>

A window with a message "It Works !" appears as shown on the following page.

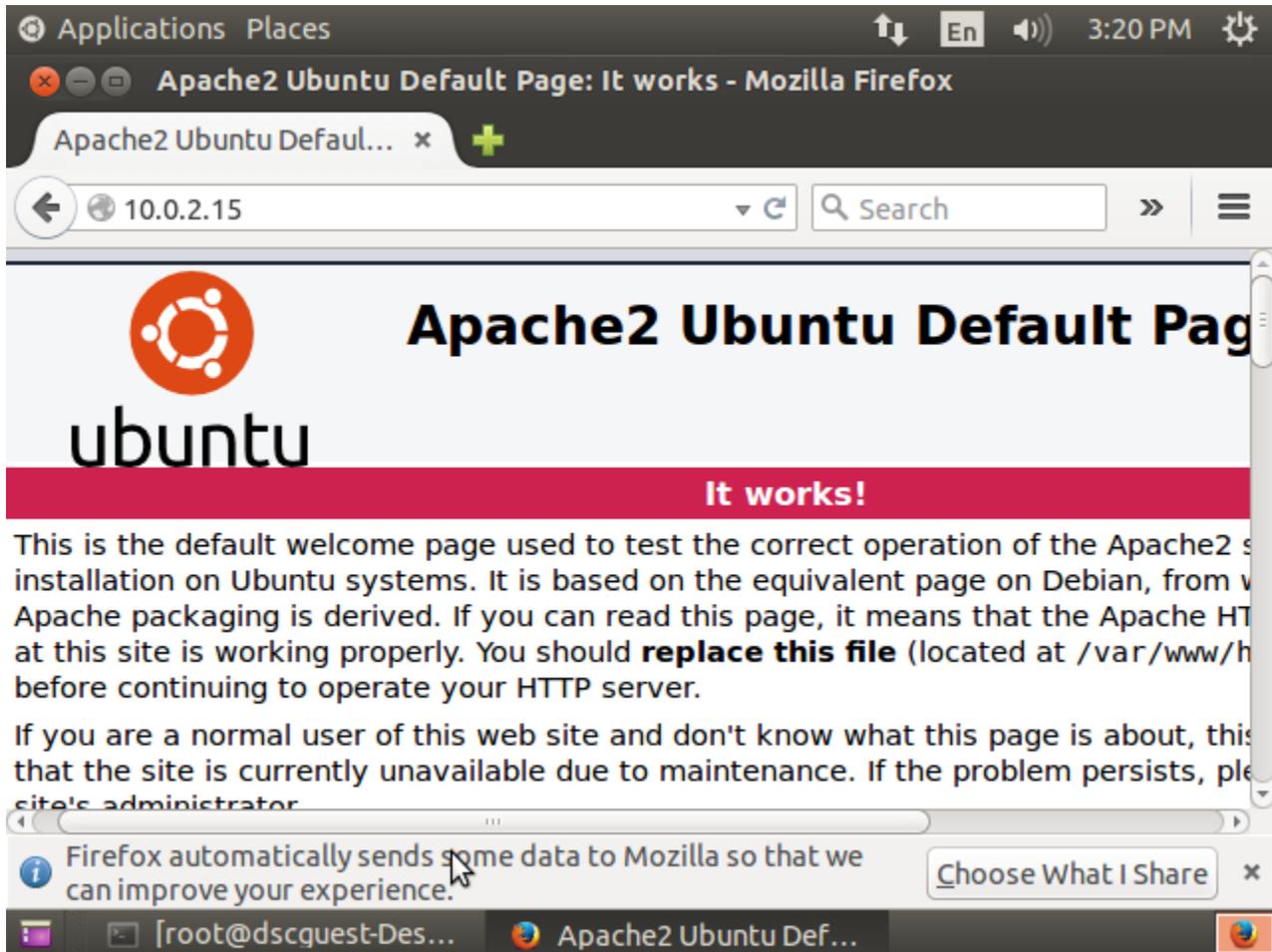


Figure 28: It Works

To view desired html files in the web browser, example to view the Diamond Systems' homepage, type the following in web browser address space:

<http://<ipaddress> of target board/ Diamond.html> > (ex: <http://10.0.0.1/> Diamond.html)

Note: To learn the IP address assigned to the Aries SBC, type following command in terminal:

```
$ifconfig
```

APPENDIX D: CONFIGURATION OF SSH SERVER

Step 1: Installing the SSH Server

The section shows the steps of the basic setup of a ssh server in the Ubuntu 14.04 operating system.

Switch to root user.

```
$ su root
```

```
$ enter the root login password
```

Type the command.

```
$ apt-get install openssh-server
```

Step 2: Testing the SSH Server

The Aries SBC is now a SSH server. You can browse your folders and files from a remote machine. Type ssh username@<IP address of Aries SBC> in remote machine and provide user password of your machine.

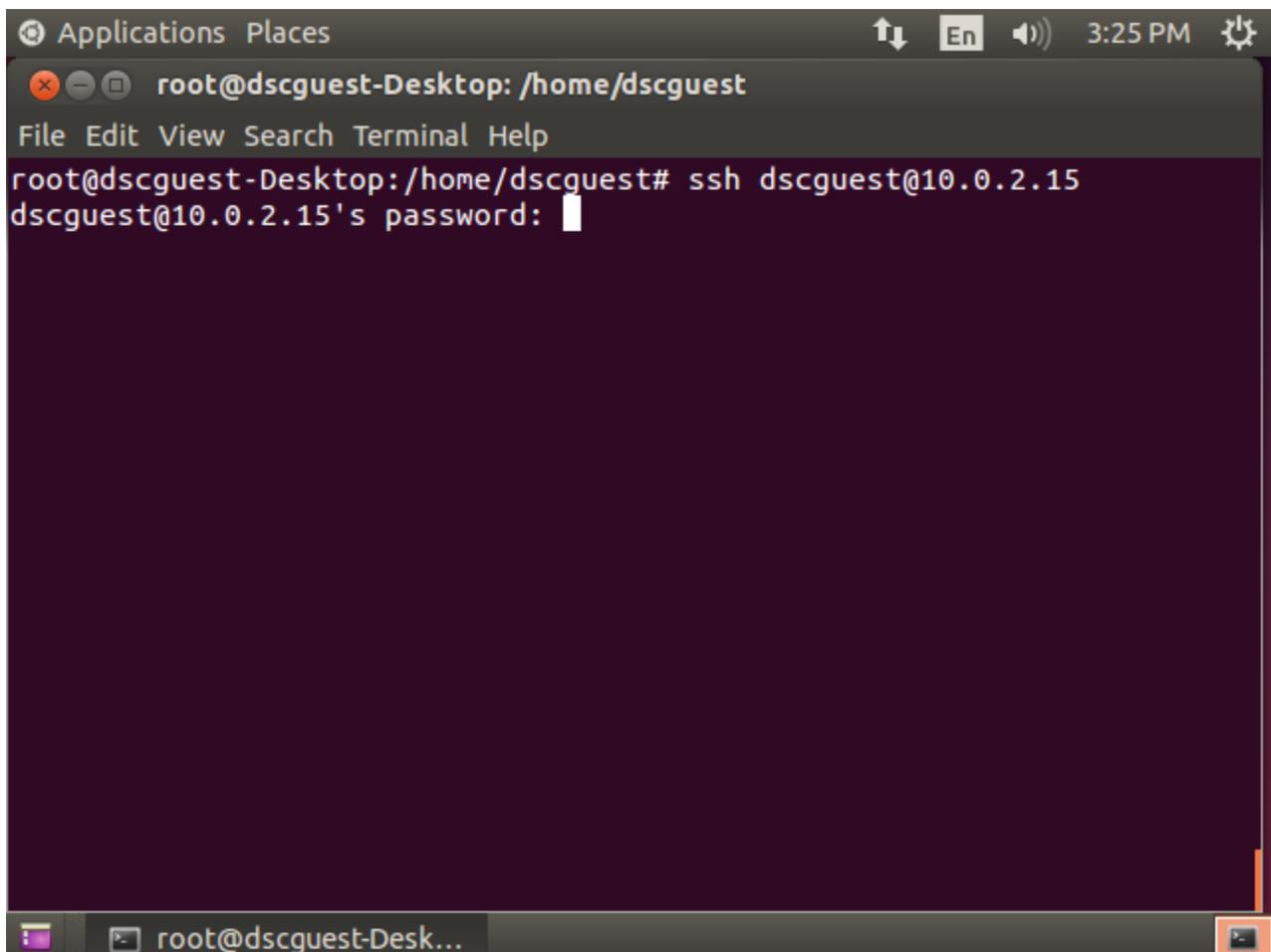


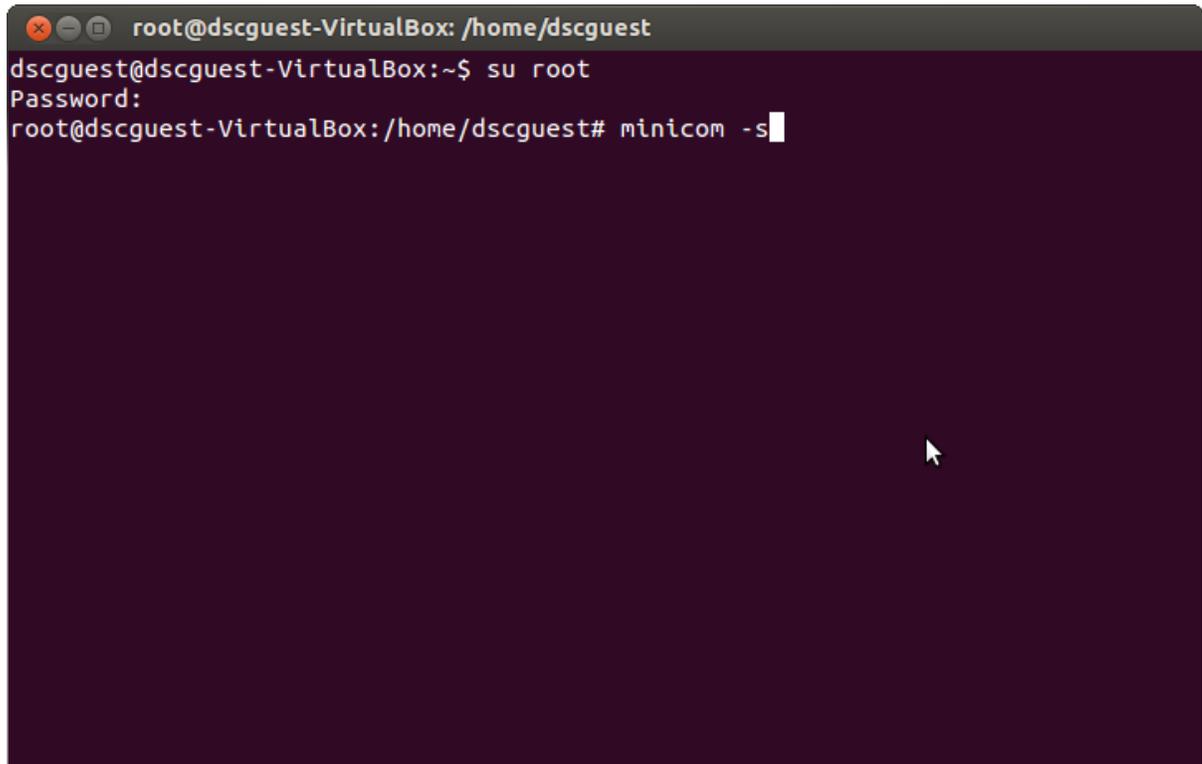
Figure 29: Testing SSH Server

APPENDIX E: FILE TRANSFER THROUGH MINICOM

Step 1: Serial Port Configuration

- First, set yourself as root user and start minicom in configuration mode with the following command:

```
$ minicom -s
```



```
root@dscguest-VirtualBox: /home/dscguest
dscguest@dscguest-VirtualBox:~$ su root
Password:
root@dscguest-VirtualBox:/home/dscguest# minicom -s
```

Figure 30: Start minicom

The following window appears:

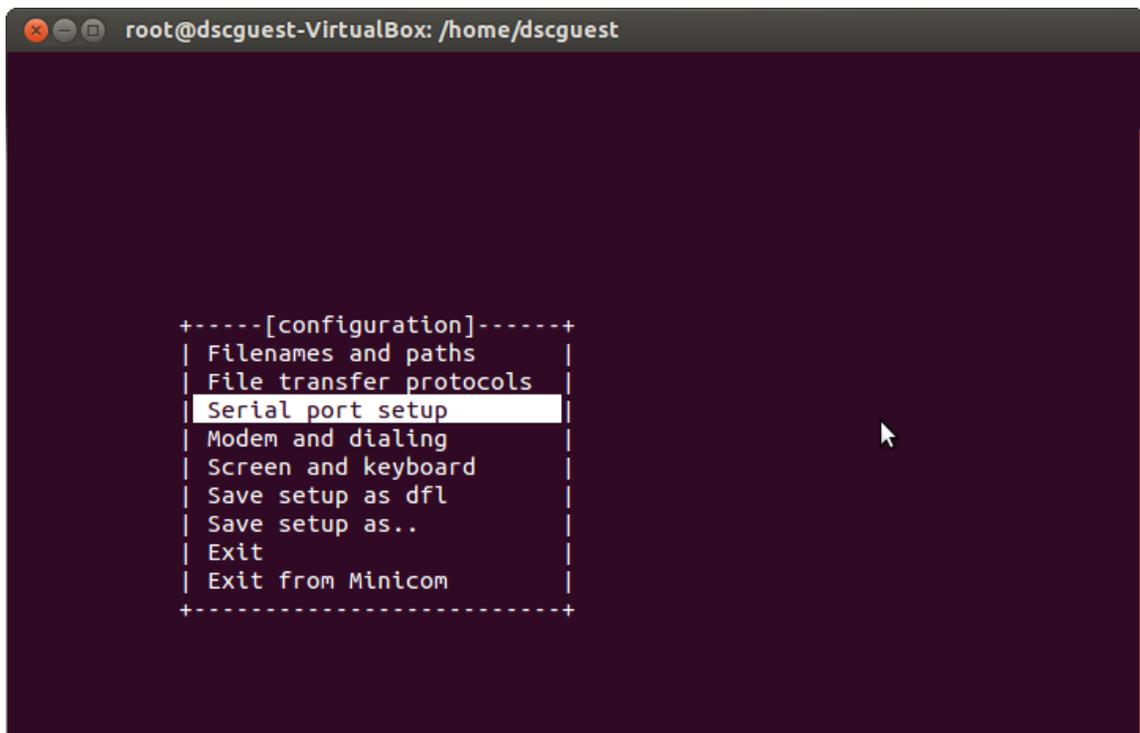


Figure 31: minicom configuration

- Move to the Serial port setup and press enter to continue. The following window appears:

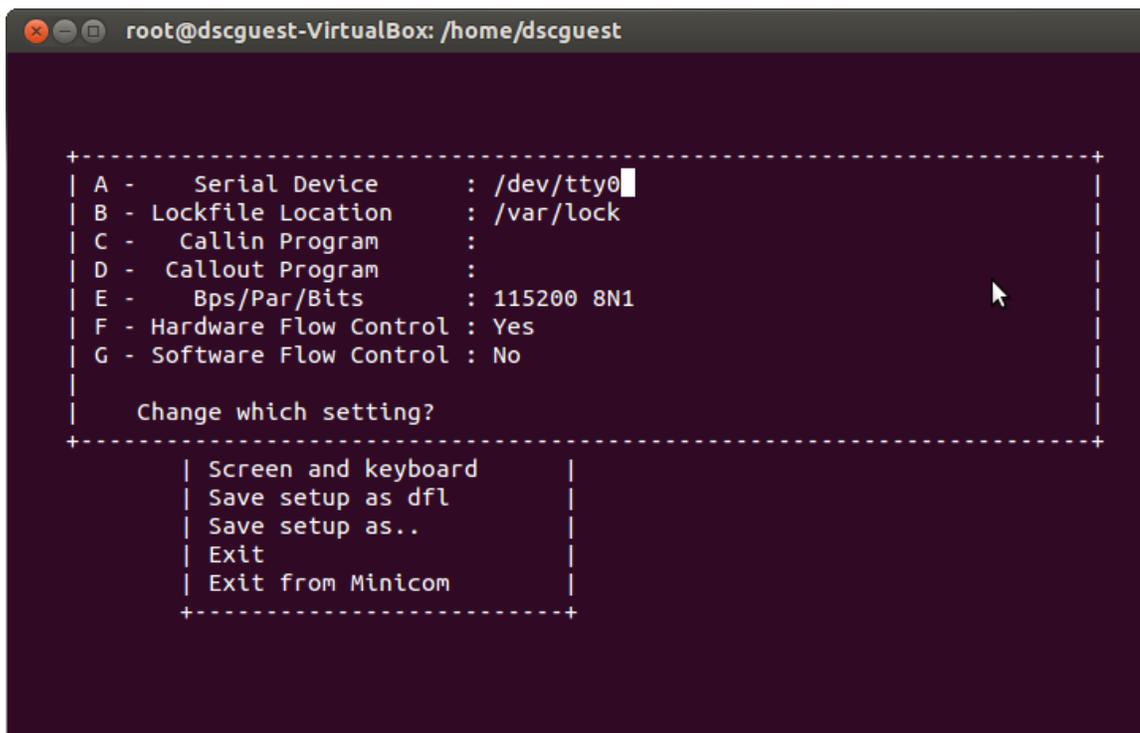


Figure 32: Serial Port Setup

- Type A to change serial device, here /dev/ttyS0 means for serial port 1 and change S0 to S1 or S2 based on the requirement.
- Type E to change baud rate, here 115200 8N1 means 115200 baud rate, 8 bit, no parity and 1 stop bit.
- Once the setting is done press enter to continue. The following window appears:

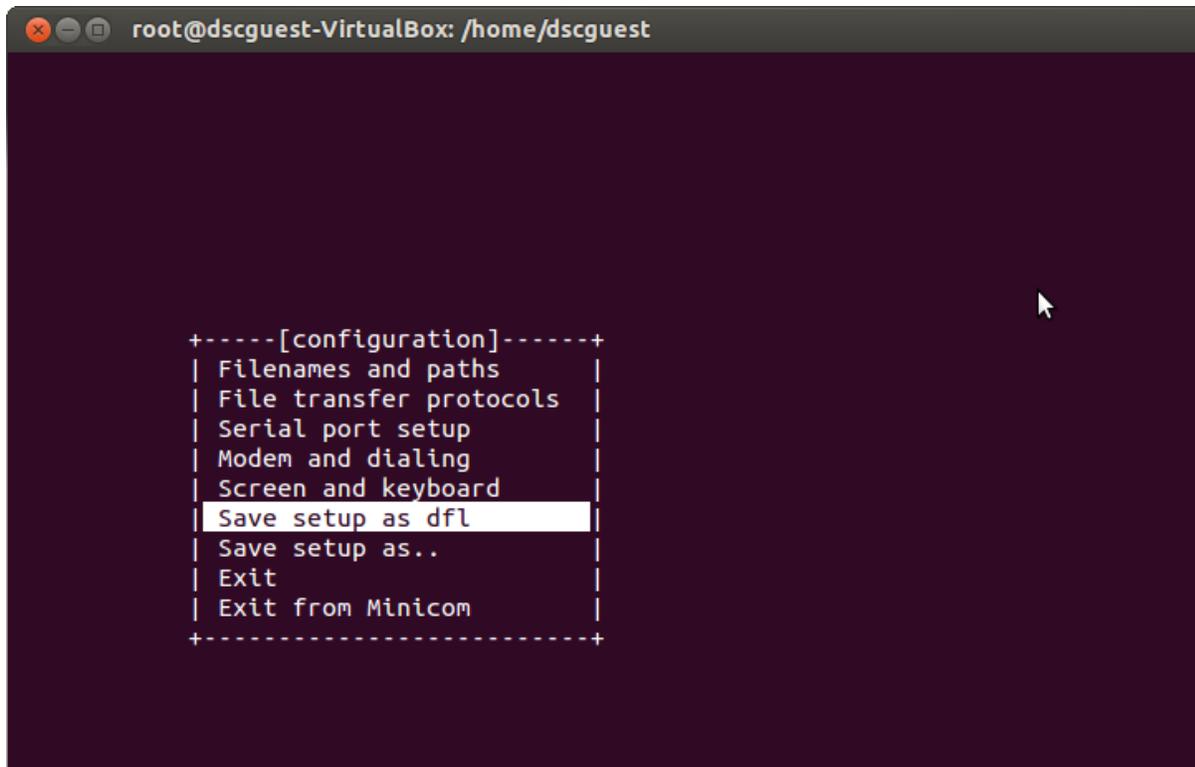


Figure 33: Save setup as dfl

- Select save setup as dfl and press enter to save the setup, then press exit to proceed further. It will display initializing modem.

- Press s to send files , it will show the following window:

```

root@dscguest-VirtualBox: /home/dscguest

Welcome to minicom 2.5

OPTIONS: I18n
Compiled on May  2 2011, 00:39:27.
Port /dev/tty8

Press CTRL-A Z for help on sp| +-[Upload]--+
                               | zmodem       |
                               | ymodem       |
                               | xmodem       |
                               | kermit       |
                               | ascii       |
                               +-----+
CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.5 | VT102 | Offline

```

Figure 35: Press S to send file

- Select any of the file transfer protocol, but in the reception side the same file transfer protocol must be selected. After selecting press enter to continue, the following window will appear:

```

root@dscguest-VirtualBox: /home/dscguest

We+-----[Select a file for upload]-----+
|Directory: /root
OP| [..]
Co| [.cache]
Po| [.config]
  | [.dbus]
Pr| [.pulse]
  | [.ssh]
  | .bash_history
  | .bashrc
  | .profile
  | .pulse-cookie
  | .viminfo
  | Desktop
  | minicom.log
  |
  | ( Escape to exit, Space to tag )
+-----+
[Goto] [Prev] [Show] [Tag] [Untag] [Okay]
CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.5 | VT102 | Offline

```

Figure 36: Select file to transfer


```

root@dscguest-VirtualBox: /home/dscguest

Welcome to minicom 2.5

OPTIONS: I18n
Compiled on May  2 2011, 00:39:27.
Port /dev/tty8
+-----[xmodem upload - Press CTRL-C to quit]-----+
Press CTRL|Sending diamond_file_sample.txt, 0 blocks: Give your local XM|
|ODEM receive command now.
|
|
+-----+

CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.5 | VT102 | Offline

```

Figure 39: Sending files

APPENDIX F: FILE RECEPTION THROUGH MINICOM

Step 1: Serial Port Configuration

Follow the Appendix E step 1 for serial port configuration.

Step 2: File Reception

Follow the Appendix E step 2 for file reception. Instead of pressing s for sending file, press r for receiving file. The systems will ask the user to select the file transfer protocol. Select and press enter to receive file. The file will be received and stored in current directory.

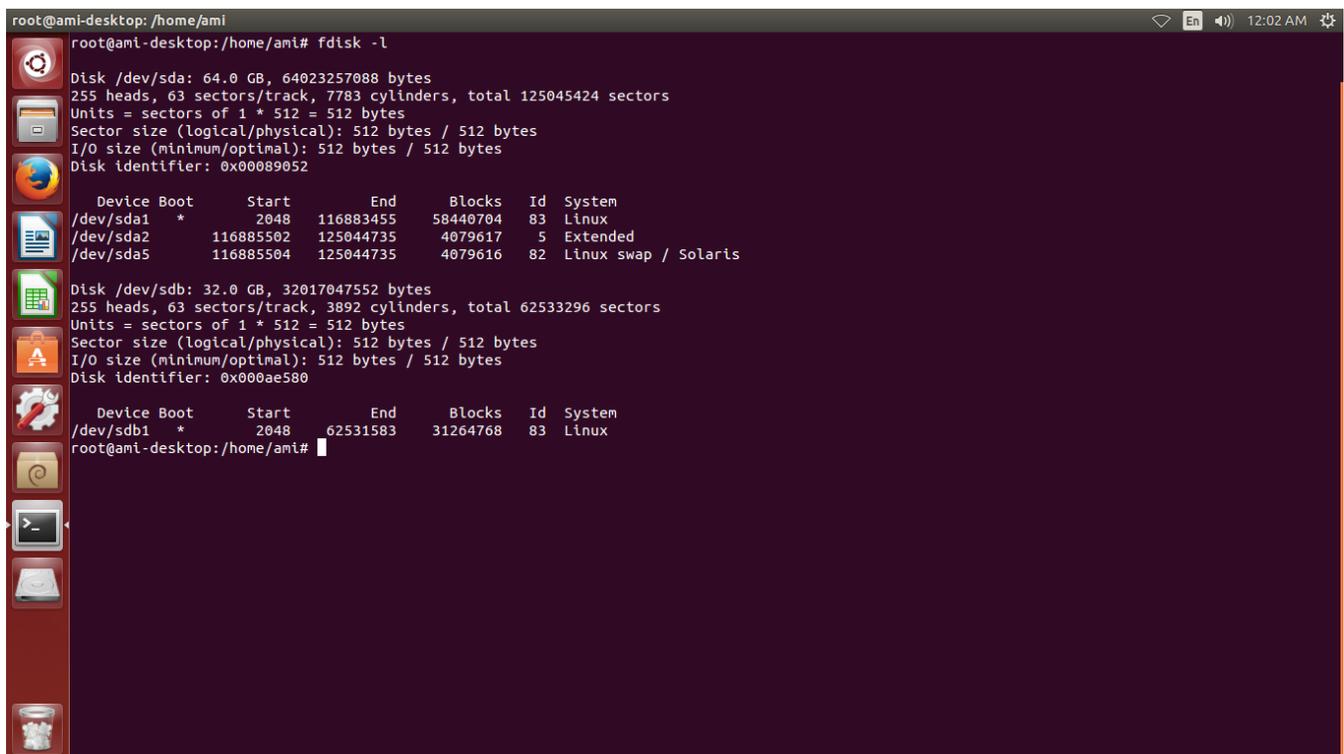
APPENDIX G: DD COMMAND FOR IMAGE BACKUP

Step 1: Introduction

There are several ways to back up a Linux system. This section provides practical examples on using the dd command to back up the Linux system. dd is a powerful UNIX utility. It can also be used to copy data. Only a super user can execute the dd command.

Step 2: Image Backup

- Connect the SATA drive in a development PC by using SATA-DOM to USB cable or if you don't have the cable, boot the target board with some other hard disk (m-SATA port) where the SATA-DOM drive will be detected as external memory card.
- Become a root user and enter following command in terminal
- `$fdisk -l`
- The screen appears as follows:



```

root@ami-desktop: /home/ami# fdisk -l
Disk /dev/sda: 64.0 GB, 64023257088 bytes
255 heads, 63 sectors/track, 7783 cylinders, total 125045424 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00089052

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1  *            2048        116883455   58440704   83  Linux
/dev/sda2                116885502   125044735    4079617    5  Extended
/dev/sda5                116885504   125044735    4079616    82  Linux swap / Solaris

Disk /dev/sdb: 32.0 GB, 32017047552 bytes
255 heads, 63 sectors/track, 3892 cylinders, total 62533296 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000ae580

   Device Boot      Start         End      Blocks   Id  System
/dev/sdb1  *            2048        62531583   31264768   83  Linux
root@ami-desktop: /home/ami#

```

Figure 40: image backup

- From the above window, it is clear that /dev/sdb is the SATA-DOM drive (32.0GB).
- Use the following command to make a Linux image backup:

```
$ dd if=/dev/sdb of=Linux_Backup_image.img
```

Where if is input file, of is output file

- It will take a minimum of 15 minutes and the img file will be saved in current directory.

Step 3: Image Restore

- The image restoring medium must have same size as original medium.
- Insert the restoring medium formatted in the FAT format.
- Use fdisk -l command to learn about the restoring medium. Ex /dev/sdb or /dev/sdc
- Once you found the device, use the following command to restore the image
- Change your directory where the img file saved and run the following command
\$ dd if= Linux_Backup_image.img of=/dev/sdb
- It will take a minimum of 15 minutes to restore the image. Once done, the medium is ready to boot the OS.

APPENDIX H: CREATE AND CHANGE ROOT USER PASSWORD, UBUNTU NEW USER CREATION

Step 1: Steps to Create Root User Password

```
dscgust@dscgust-VirtualBox:~$ sudo passwd root
[sudo] password for dscgust:
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
dscgust@dscgust-VirtualBox:~$
```

Figure 41: Steps to create root user password

- Open terminal
\$sudo passwd root
\$enter dscgust password
- It will ask you for a new password and to reenter the same password when it asks for reconfirmation.
\$enter new password for root
\$re-enter password for root.
- It will show updated password successfully.

Step 2: Steps to Change Root User Password

```
dscguest@dscguest-VirtualBox:~$ su root
Password:
root@dscguest-VirtualBox:/home/dscguest# passwd
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
root@dscguest-VirtualBox:/home/dscguest#
```

Figure 42: Steps to Change Root user password

- Switch to root user
 - \$su root
 - \$enter the existing root user password
- To change the root password, type as
 - \$passwd
- It will ask you for a new password and then to reenter the same password when it asks for reconfirmation.
- It will show updated password successfully.

Step 3: Steps to Add a New User

```
dscgquest@dscgquest-VirtualBox:~$ su root
Password:
root@dscgquest-VirtualBox:/home/dscgquest# adduser diamond
Adding user `diamond' ...
Adding new group `diamond' (1002) ...
Adding new user `diamond' (1002) with group `diamond' ...
Creating home directory `/home/diamond' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for diamond
Enter the new value, or press ENTER for the default
  Full Name []:
  Room Number []:
  Work Phone []:
  Home Phone []:
  Other []:
Is the information correct? [Y/n] y
root@dscgquest-VirtualBox:/home/dscgquest#
```

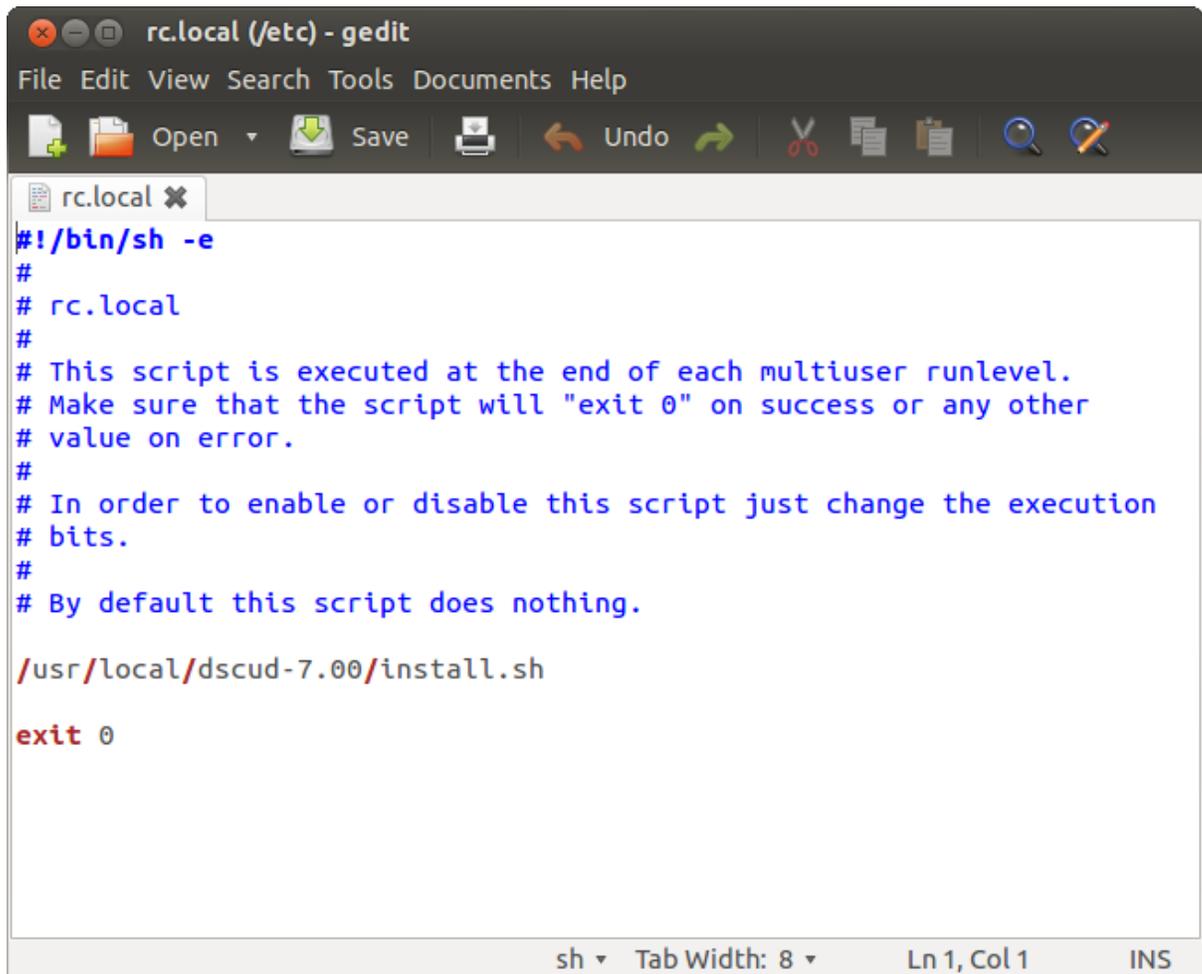
Figure 43: Steps to add new user

- Become root user
\$su root
- Once you become root user , enter " adduser username" command in
\$adduser diamond
- It will ask you for a password and then to reenter the same password when it asks for reconfirmation.
- It will ask “Enter new value or Press enter for default”, press enter.
- It will ask “Is the information correct”, enter ‘y’.

APPENDIX I: LOAD UNIVERSAL DRIVER AT STARTUP

To load the Universal Driver software (dscudkp.ko) at OS boot time, the install.sh file must be executed by the OS from /usr/local/dscud-7.00 directory. In order to run this script automatically by OS, It can call the script from /etc/rc.local which is the correct place for custom scripts to run at boot time. Add the script file path in /etc/rc.local file as follows:

- Become root user
\$su root
- Open rc.local file and add script file path
\$gedit /etc/rc.local



```
#!/bin/sh -e
#
# rc.local
#
# This script is executed at the end of each multiuser runlevel.
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script does nothing.
#
/usr/local/dscud-7.00/install.sh
exit 0
```

Figure 44: Load Universal Driver at Startup

APPENDIX J: DISABLE CHECK FOR UPDATES

To turn off auto-update via Ubuntu Software Center, open the Ubuntu Software Center and go to Edit --> Software Sources. Choose "Never" for "Automatically check for updates".

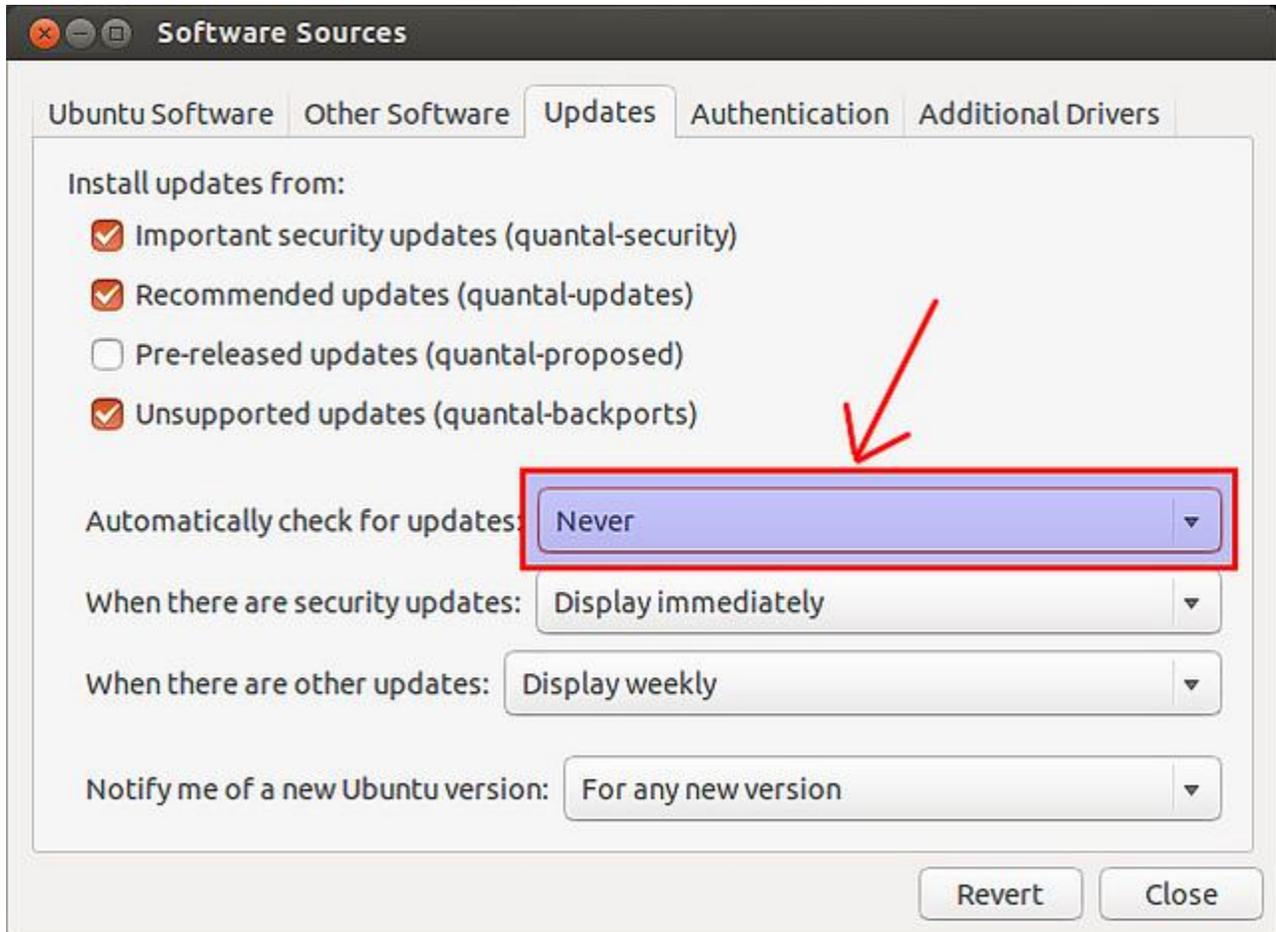


Figure 45: Disable Check for updates

APPENDIX K: INSTALL ADDITIONAL UTILITIES

To install additional utilities like minicom, eclipse, g++ etc, type the following commands in terminal

```
$apt-get install minicom // Com port Utility
$apt-get install g++ // C++ compiler
$apt-get install gdb // C program debugger
$apt-get install ddd // Graphical front-end for command-line debuggers
$apt-get install eclipse // Eclipse IDE
$apt-get install wine // Allows Linux users to run Windows programs
$apt-get install parted // Gnome-based partition manager
$apt-get install eclipse-cdt // C/C++ plug-in tools for Eclipse
$apt-get install myunity // Allows modification of GNOME Desktop Classic and
// Unity interfaces options in GUI

$ apt-get autoremove appmenu-gtk appmenu-gtk3 appmenu-qt // Removes
// annoying top-of-the-screen menus for all windows
```

APPENDIX L: SWITCH BETWEEN GNOME UNITY AND CLASSIC DESKTOP GUI

The Ubuntu 14.04 uses the Gnome Unity interface. To install the Gnome Classic interface, follow these steps:

- To install the Gnome Classic interface


```
$apt-get install gnome-session-fallback
```
- Once the above installation is completed , log out, and the following login screen appears:

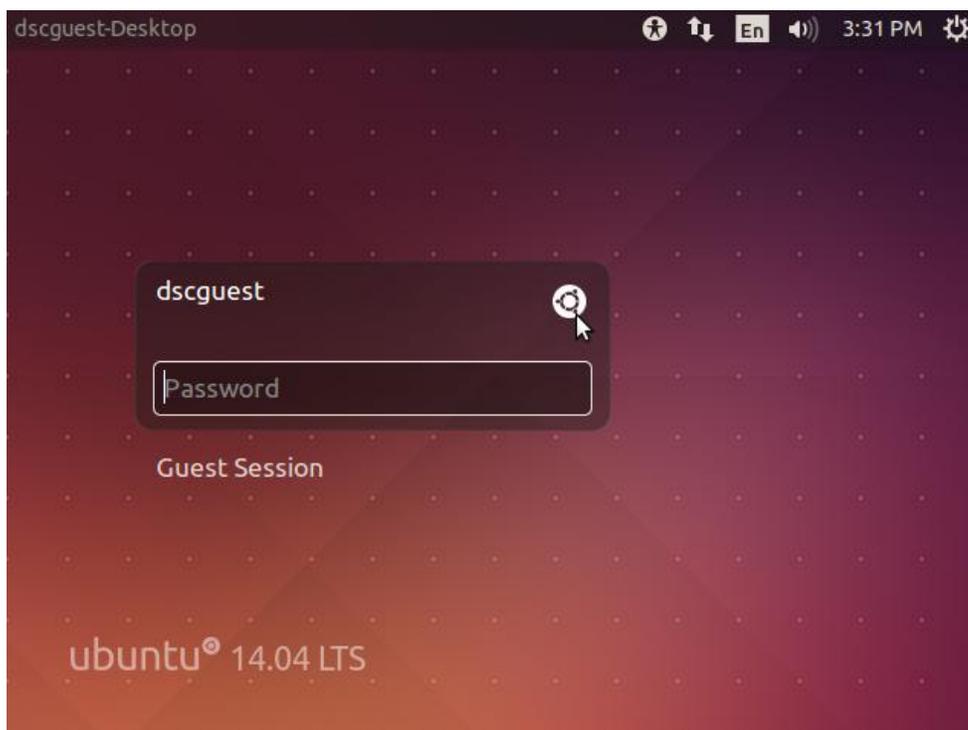


Figure 46: Classic Desktop GUI

- To choose Gnome Classic, click the Gnome symbol which is indicated in Figure 46 by the mouse pointer.
- Select Gnome flash back and do login as unusual. It will login to Gnome Classic interface as follows:

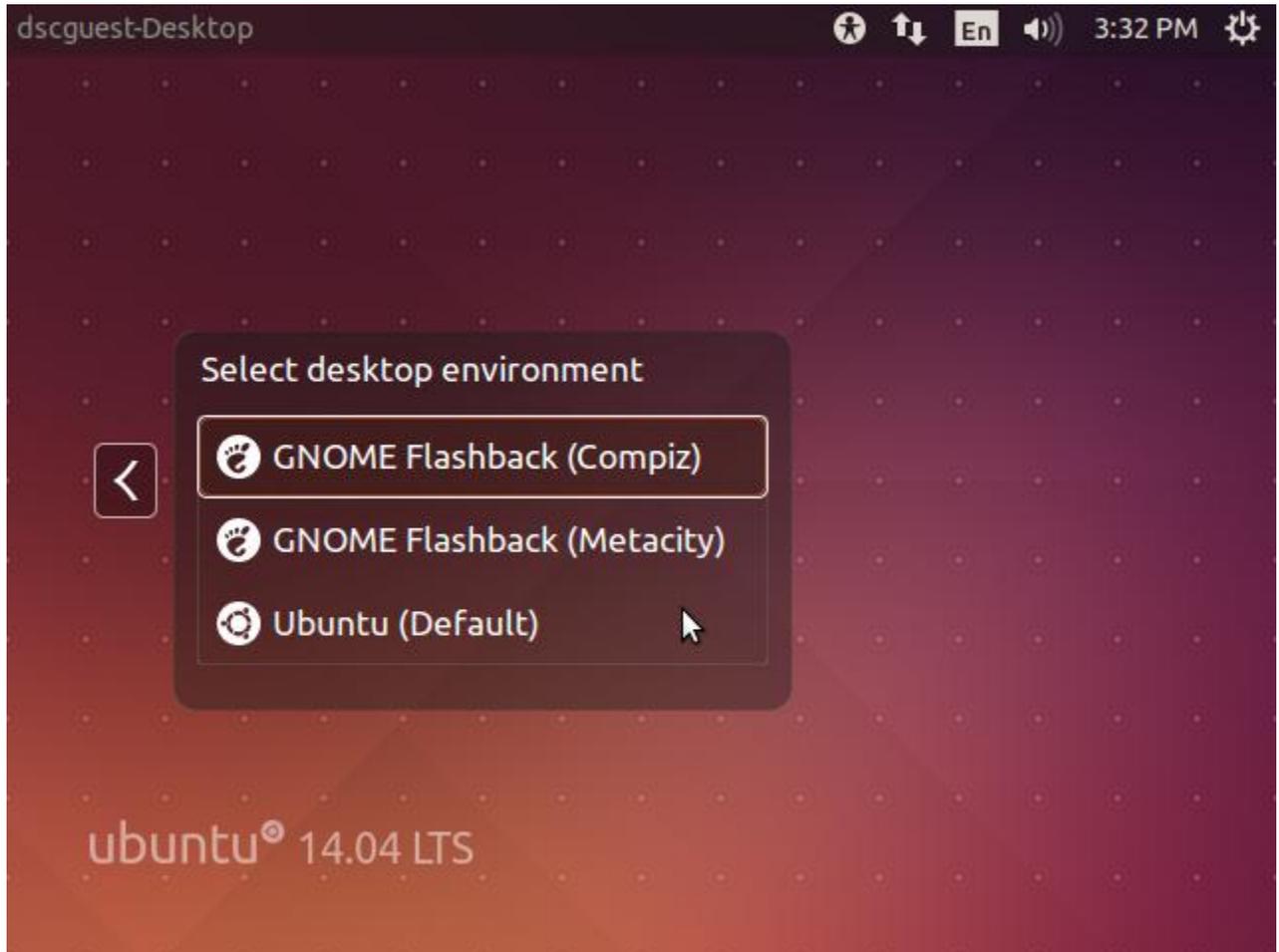


Figure 47: Select desktop environment



Figure 48: Select Accessories

Step 2: Type user accounts as shown in following picture and select the user accounts icon.

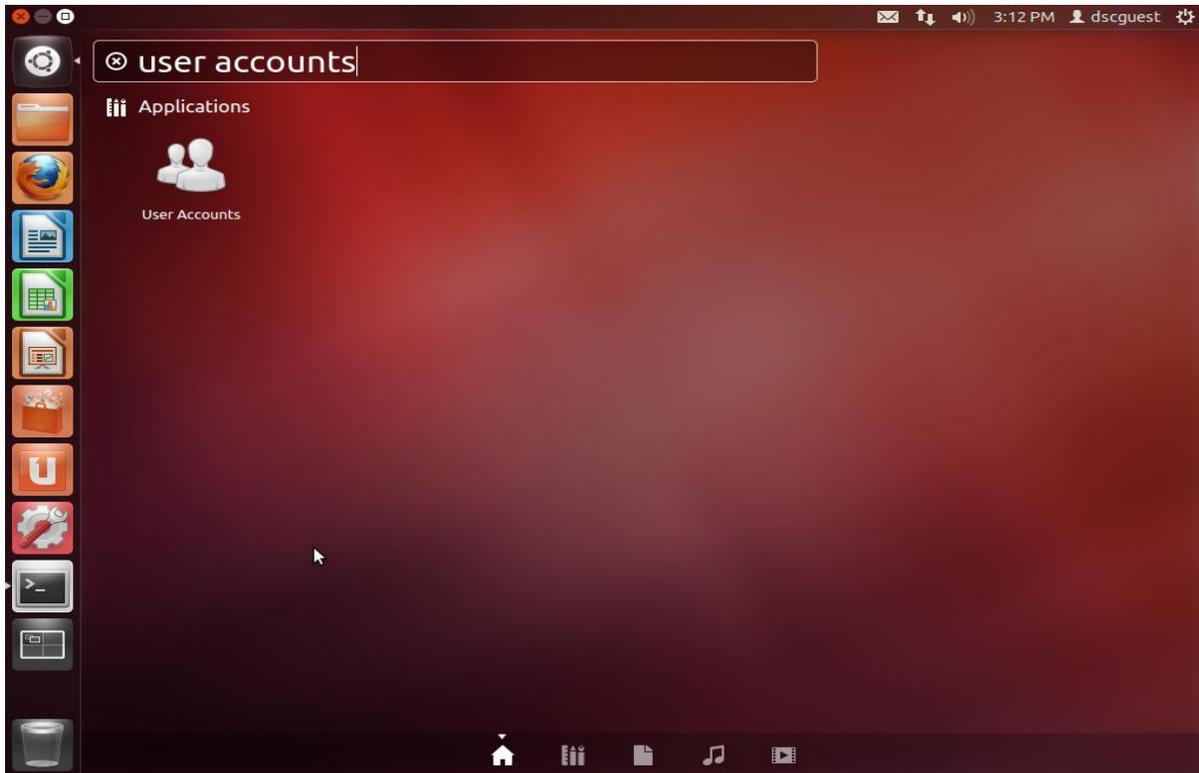


Figure 50: Select User Accounts

Step 3: Click the unlock option and provide dscguest's password as shown in following picture.

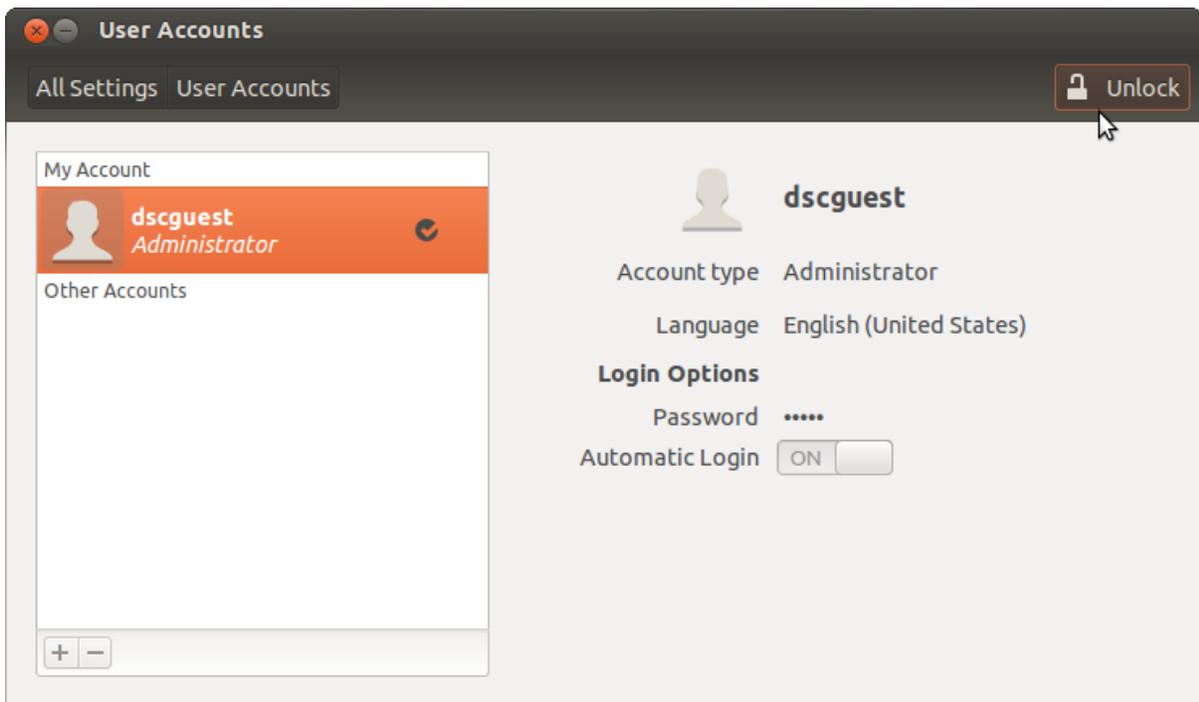


Figure 51: Click Unlock and provide password

Step 4: Click Automatic login off button, it will be changed to the on position as shown in following picture.

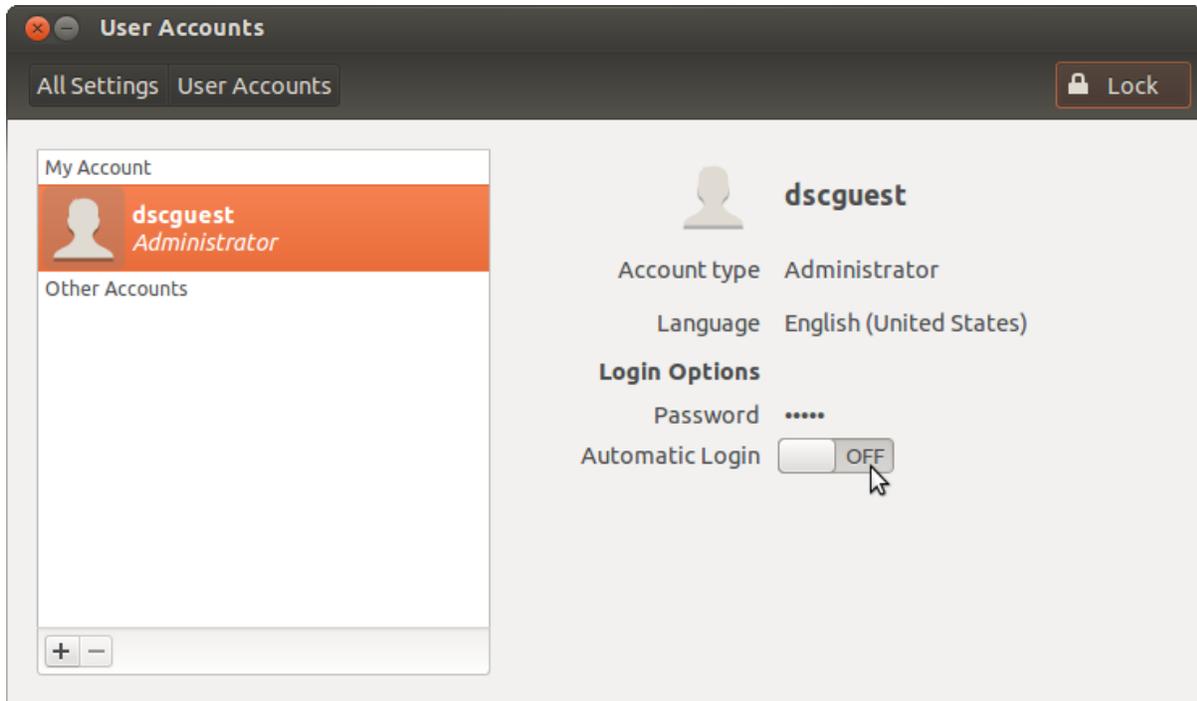


Figure 52: Click Automatic Login

APPENDIX N: SOUND RECORDING

The GUI base sound recorder utility is broken in Ubuntu-14.04 OS, so the Ubuntu community suggests using the command line application to record sound from MIC In or Line In port. Prior to recording sound, the user has to select the sound input from Line In or MIC input port.

To select Mic In input port, select Microphone option as shown in following picture.

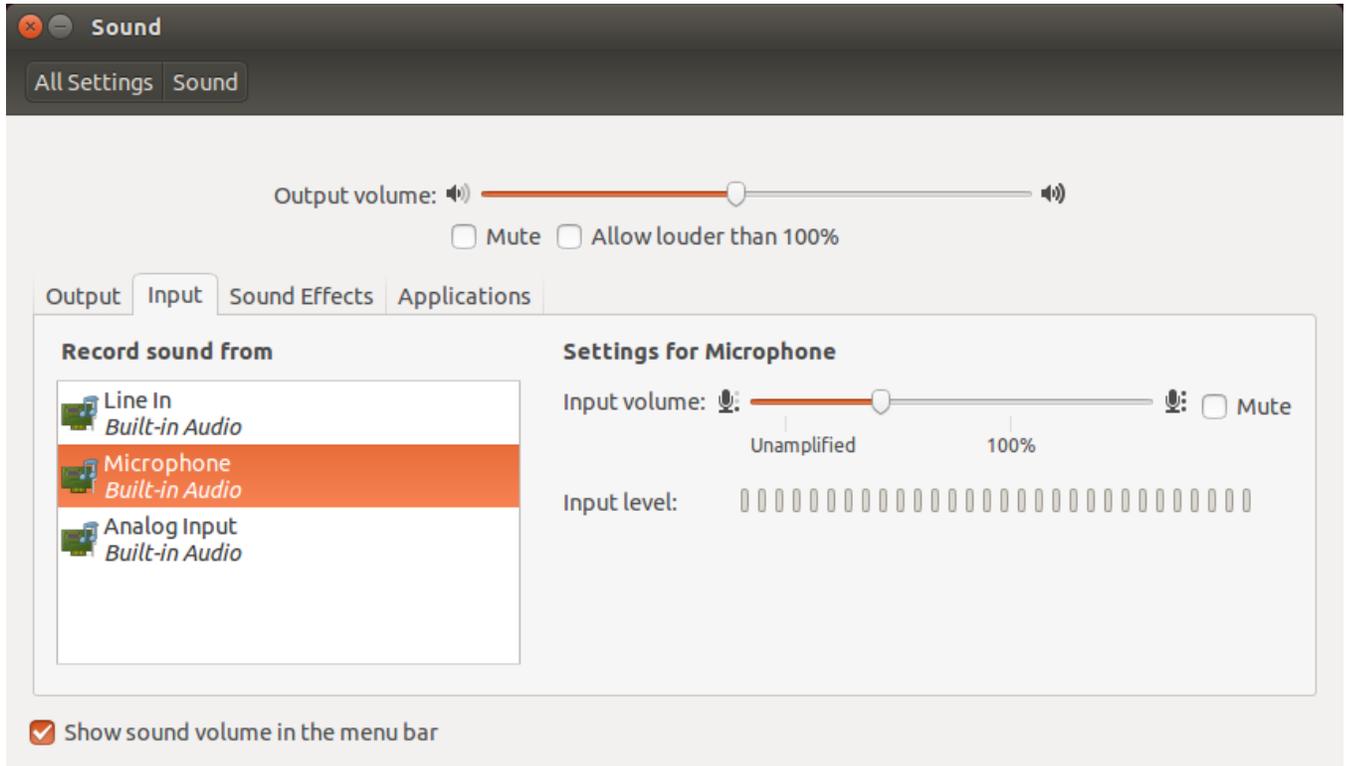


Figure 53: Select Microphone Option

To select Line In input port, select Line In option as shown in following picture.

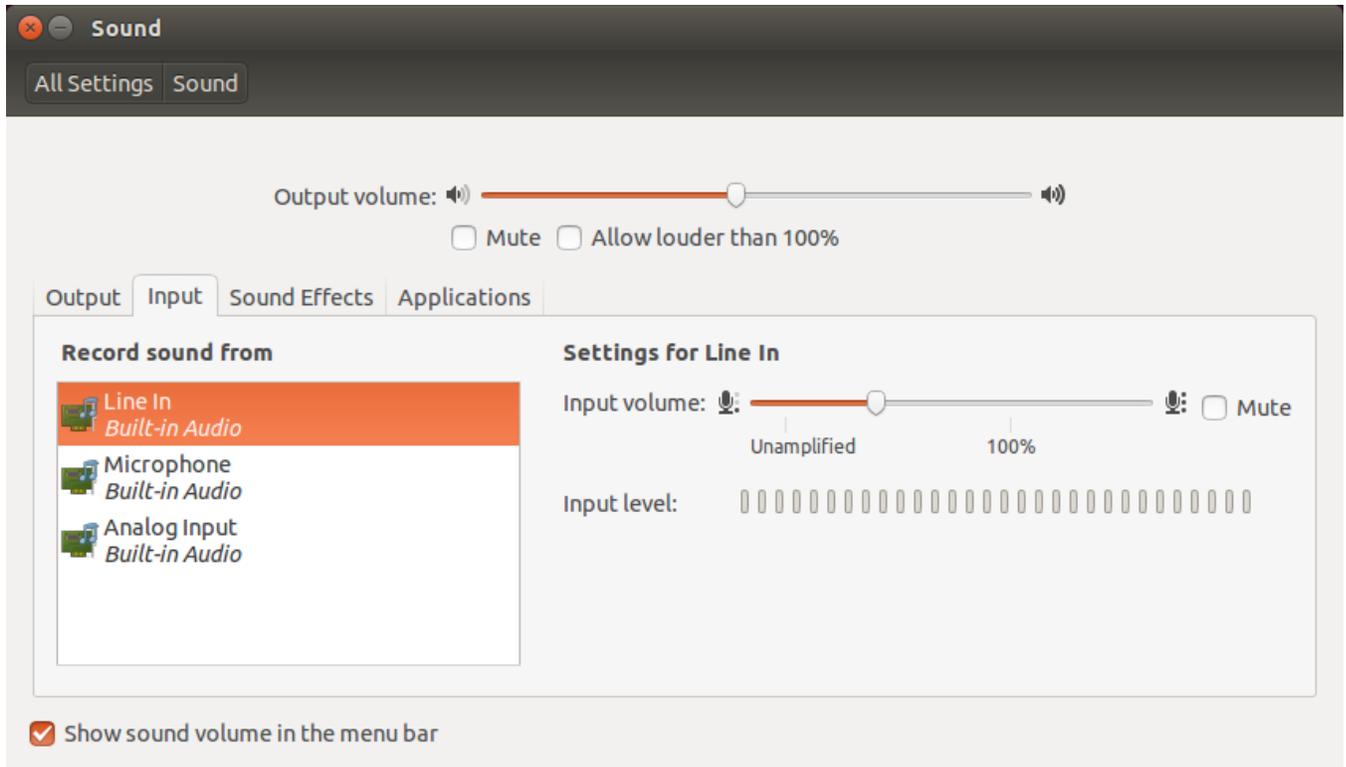


Figure 54: Select LineIn Option

To record the sound from selected input port, run the following command in terminal, to stop recording press Ctrl+C. The recorded file will be stored in current directory.

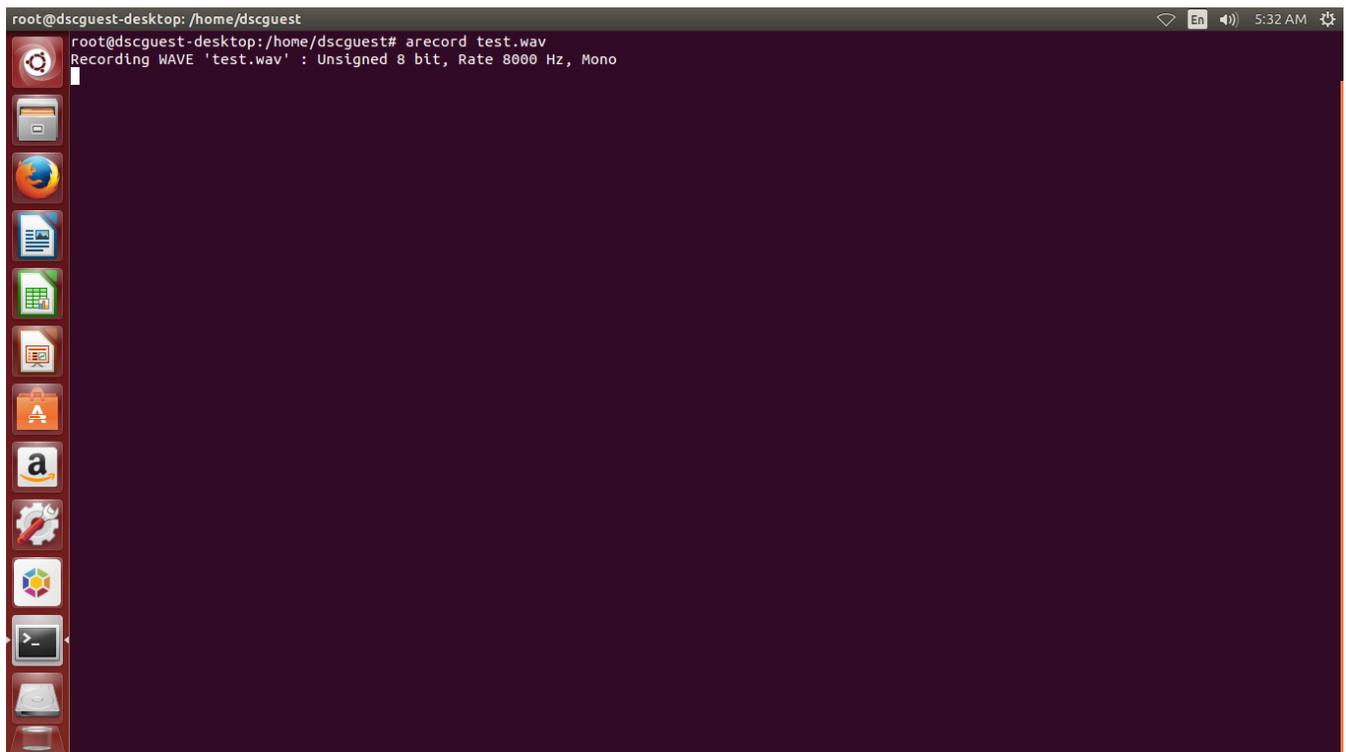


Figure 55: Stop Recording

APPENDIX O: LINUX IMAGE RE-FLASHING

If the SATA-DOM becomes corrupted, follow the steps given in the Troubleshooting section to recover the Linux OS.

If the Linux OS cannot be recovered, follow this section to re-flash the Linux image. The following files are present on the DVD which received along with the Aries Software Development Kit.

Files required

- Linux BSP files
 Aries_Ubuntu_Image.img.7z.001
 Aries_Ubuntu_Image.img.7z.002
 Aries_Ubuntu_Image.img.7z.003
 Aries_Ubuntu_Image.img.7z.004
 Aries_Ubuntu_Image.img.7z.005
 Aries_Ubuntu_Image.img.7z.006
- Tool to merge all Linux BSP files

hjsplit.exe

Setup Requirements

- SATA-DOM power adapter - To provide power to SATA-DOM
- SATA to USB cable – To connect SATA-DOM to Linux PC via USB interface
- SATA-DOM of 32GB – Target media
- A development PC with Linux OS – To re-flash Linux image
- A development PC with windows 7 OS – To merge Linux BSP files

Merge Linux BSP files

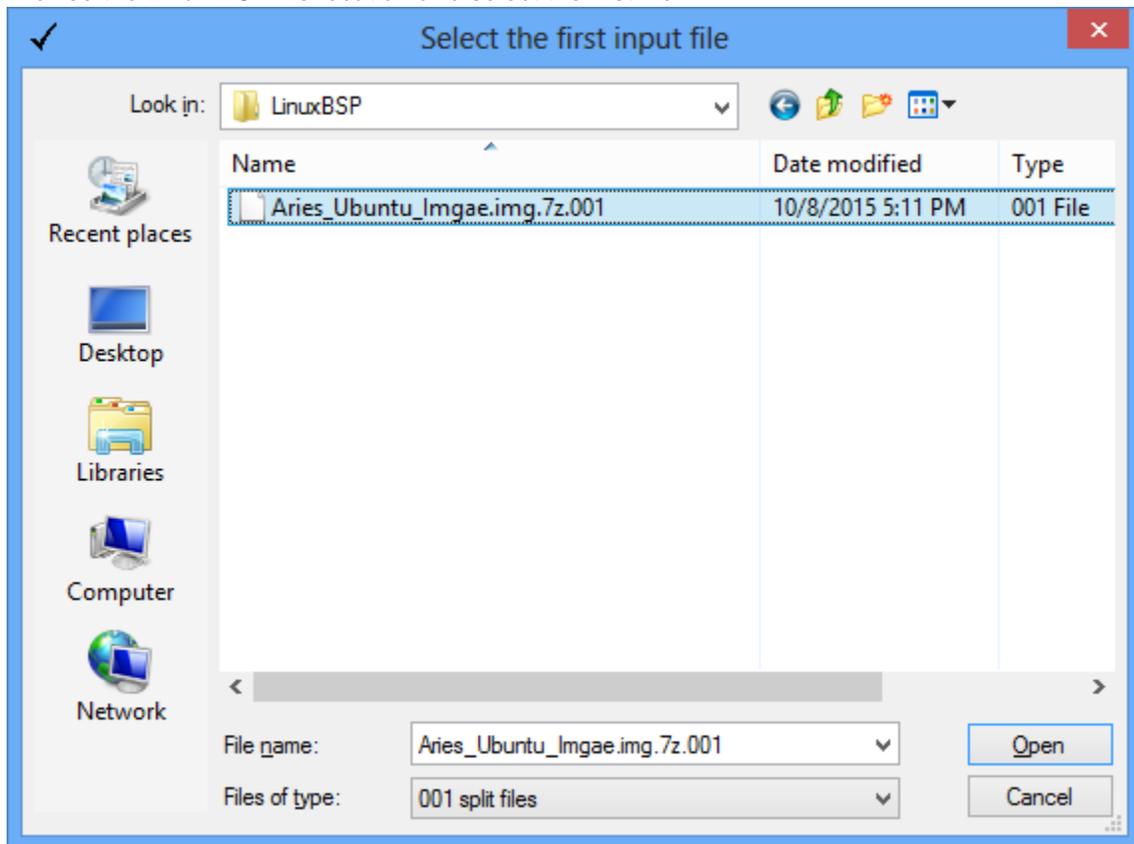
- Run hjsplit.exe in windows PC and select Join option



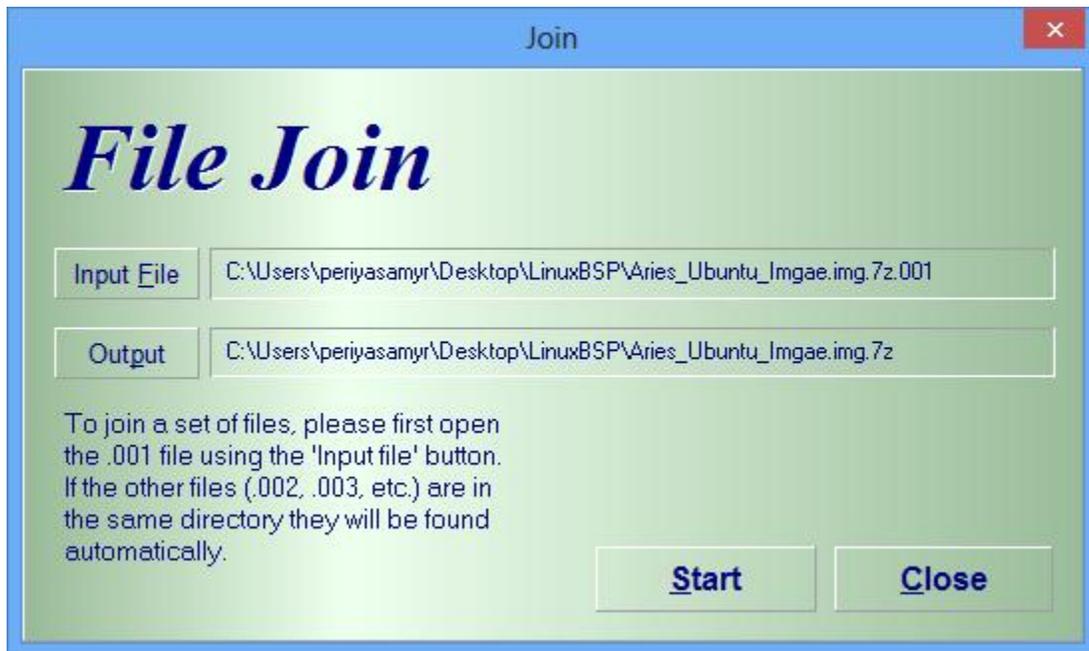
- Select Input file



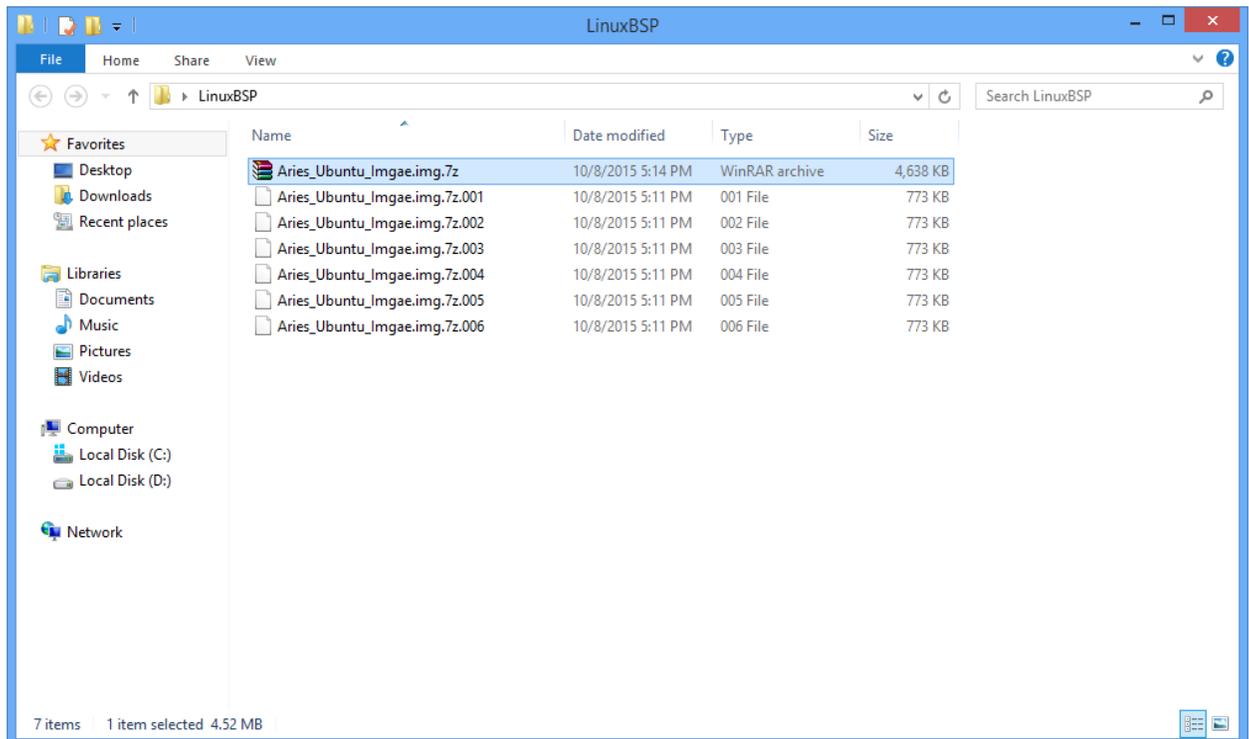
- Browse the Linux BSP file location and select the first file



- Then select start button



- It will create Aries_Ubuntu_Image.img.7z file in current directory of Linux BSP files.



Store Linux BSP image to SATA-DOM

- Boot to Ubuntu -12.04 or any Linux OS. The SATA-DOM should be connected to the same PC through USB slot using SATA-USB convertor, the SATA-DOM should be powered using the power adapter board.
- Once the OS boots, copy the Aries_Ubuntu_Image.img.7z to a folder, right click and extract the file.
- Use fdisk -l command to know identify the restoring medium. Example /dev/sdb or /dev/sdc by seeing the size of the SATA-DOM

```

root@ami-desktop: /home/ami
root@ami-desktop: /home/ami# fdisk -l
Disk /dev/sda: 64.0 GB, 64023257088 bytes
255 heads, 63 sectors/track, 7783 cylinders, total 125045424 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00089052

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1 *         2048       116883455   58440704   83  Linux
/dev/sda2           116885502  125044735    4079617    5  Extended
/dev/sda5           116885504  125044735    4079616    82  Linux swap / Solaris

Disk /dev/sdb: 32.0 GB, 32017047552 bytes
255 heads, 63 sectors/track, 3892 cylinders, total 62533296 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000ae580

   Device Boot      Start         End      Blocks   Id  System
/dev/sdb1 *         2048       62531583   31264768   83  Linux
root@ami-desktop: /home/ami#

```

- Once you find your device, use the following command to restore the image.
- Change to the directory where the img file is saved and run the following command
\$ dd if= Aries_Ubuntu_Image.img of=/dev/sdb
- It will take a minimum of 45 minutes. Once done, the medium is ready to boot the OS.