Linux BSP for Aries SBC

DSC Document Number 748074x
Revision A.00

Revision A.00 October 2015

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.00</td>
<td>10/28/2015</td>
<td>Initial release</td>
</tr>
</tbody>
</table>

FOR TECHNICAL SUPPORT
PLEASE CONTACT:
support@diamondsystems.com
CONTENTS

1. Introduction ......................................................................................................................... 3
  1.1 Warranty / Disclaimer ....................................................................................................... 3
  1.2 Linux License and Support Information ........................................................................ 3

2. Software Development Kit Contents .................................................................................. 4
  2.1 User Manual ..................................................................................................................... 4
  2.2 SATA-DOM disk .............................................................................................................. 4
  2.3 Backup copy on DVD with image .................................................................................... 4

3. Quick Start Guide ................................................................................................................ 5

4. Linux Features ................................................................................................................... 6
  4.1 Baseline Linux Distribution ............................................................................................ 6
  4.2 Installed Applications ...................................................................................................... 6
  4.3 Gnome Unity and Classic GUI view ................................................................................ 6
  4.4 Application / Feature Configuration .............................................................................. 7
  4.5 FTP Server Enable Instructions ..................................................................................... 7
  4.6 HTTP Server Enable Instructions .................................................................................. 7

5. Universal Driver .................................................................................................................. 8
  5.1 Overview ........................................................................................................................ 8
  5.2 Steps to Compile Universal Driver ................................................................................ 9
  5.3 Steps to install Universal Driver ................................................................................... 10
  5.4 Steps to Install Universal Driver at Boot Time .............................................................. 10
  5.5 Steps to Uninstall Universal Driver .............................................................................. 10
  5.6 Steps to Compile Test/demo Application ....................................................................... 11

6. Reimaging a Corrupt Flashdisk ........................................................................................... 11

7. Reinstalling Linux ............................................................................................................... 11
  7.1 Basic Linux Installation .................................................................................................. 11
  7.2 Configuring Linux to Match the Runtime Image ............................................................ 11

8. Linux Passwords .................................................................................................................. 12

9. Troubleshooting .................................................................................................................. 13
  9.1 Using Built-in ‘fsck’ to Fix Disk ..................................................................................... 13
  9.2 Using SSD on Separate Desktop PC to Recover Files or Perform File-System Check ‘fsck’ ................................................................. 13
  9.3 Checking BIOS to Ensure BSP Disk is Selected in Boot Disk Priority ......................... 14
  9.4 Resetting BIOS Options to Defaults ............................................................................ 18
  9.5 Connecting VGA monitor .............................................................................................. 19

Appendix A: Ubuntu 14.04 Installation Steps ........................................................................... 20
Appendix B: Configuration of FTP Server ............................................................................. 33
Appendix C: Configuration of HTTP server .......................................................................... 34
Appendix D: Configuration of SSH server ............................................................................ 36
Appendix E: File Transfer through minicom ......................................................................... 37
Appendix F: File Reception through minicom ........................................................................ 43
Appendix G: DD command for image Backup ....................................................................... 44
Appendix H: create and Change Root User Password, Ubuntu New User Creation .............. 45
Appendix I: Load Universal Driver at Startup ....................................................................... 48
Appendix J: Disable check for updates .................................................................................. 49
Appendix K: Install additional utilities .................................................................................. 50
Appendix L: Switch between Gnome Unity and Classic Desktop GUI .................................. 50
Appendix M: Automatic login option .................................................................................... 53
Appendix N: Sound recording ............................................................................................... 55
Appendix O: Linux Image RE-flashing .................................................................................... 58
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/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](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.

![SATA Slot in Aries Board](image)

**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:

<table>
<thead>
<tr>
<th>User Name</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>dscguest</td>
<td>dscguest</td>
</tr>
<tr>
<td>diamond</td>
<td>diamond</td>
</tr>
<tr>
<td>root</td>
<td>welcome</td>
</tr>
</tbody>
</table>

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.

![Gnome Classic GUI Interface](image)

**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 classicRefer 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). 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
```
Step Three: Final Instructions

The dscudp 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 dscudp.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/dscudp.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 dscudp 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:

<table>
<thead>
<tr>
<th>User name</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>dscguest</td>
<td>dscguest</td>
</tr>
<tr>
<td>diamond</td>
<td>diamond</td>
</tr>
<tr>
<td>root</td>
<td>welcome</td>
</tr>
</tbody>
</table>

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 - Fsck 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.

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

- Select OS type as Linux
- 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
- Select desired as hard disk as first boot device (SATA-DOM)

**Figure 8: First boot Device**

- Select Boot option #1. Choose first boot device as SATA-DOM.

**Figure 9: Select Boot Option #1**
Go to “Save & Exit Setup” and select “Save Changes and Exit “ option then press the enter key.
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.

![Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.](image)

*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

![VGA Cable](image1.png)

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.

![VGA Connector](image2.png)

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

![Installation type window](image)

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](image-url)
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](image-url)
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 appear and the system will install the OS.

![Installing System](image)

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


**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

![Screenshot of minicom configuration](image)

**Figure 30: Start minicom**
The following window appears:

![Figure 31: minicom configuration](image)

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

![Figure 32: Serial Port Setup](image)
- 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](image)

- Select save setup as dfl and press enter to save the setup, then press exit to proceed further. It will display initializing modem.
Step 2: File Transfer

- Press `ctrl+A` then `Z` for `mincom`'s various option and the following window will appear:

![Minicom Command Summary](image)

Figure 34: Minicom Command Summary
• Press s to send files, it will show the following window:

![Figure 35: Press S to send file](image)

• 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:

![Figure 36: Select file to transfer](image)
Select the Goto option:

- Enter file name like `diamond_file_sample.txt`. If the file is not present in current directory, enter full file path name in the box.
- The file receiving side must be waiting to receive the file, and then go for the next step.
- Press enter to send the file.
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:

![Image of fdisk output]

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:

```bash
$ 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
  $ 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

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

Figure 41: Steps to create root user password
```

- Open terminal
  
  $sudo passwd root
  
  $enter dscguest 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

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.

Figure 42: Steps to Change Root user password
Step 3: Steps to Add a New User

```bash
dscguest@dscguest-VirtualBox:~$ su root
Password:
root@dscguest-VirtualBox:/home/dscguest# 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:
pwd: 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@dscguest-VirtualBox:/home/dscguest#
```

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

![Figure 44: Load Universal Driver at Startup](image)

```bash
#!/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 gparted // Gnome-based partition manager

$ apt-get install eclipse-ctd // 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 GNOOME 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:

![Classic Desktop GUI](image-url)

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
APPENDIX M: AUTOMATIC LOGIN OPTION

The Ubuntu-14.04 OS provides the option to automatically login. To enable the automatic login option, follow these steps.

Step 1: Select Dash home as shown in following picture.

![Automatic Login Option](image)

Figure 49: Automatic Login Option
Step 2: Type user accounts as shown in following picture and select the user accounts icon.

![Select User Accounts](image)

**Figure 50: Select User Accounts**

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

![Unlock and provide password](image)

**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.

![Select Microphone Option](image)

**Figure 53: Select Microphone Option**
To select Line In input port, select Line In option as shown in following picture.

![Select Line In Option](image)

**Figure 54: Select Line In 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.

```
root@dsquest-desktop:~# arecord test.wav
```

![Stop Recording](image)

**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

![HJ-Split](https://www.hjsplit.org)
- Select Input file

![File Join Window]

To join a set of files, please first open the .001 file using the 'Input file' button. If the other files (.002, .003, etc.) are in the same directory they will be found automatically.

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

![Select First Input File Window]
Then select start button

It will create Aries_Ubuntu_Imgae.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

![Image of fdisk output]

• 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.