

BOSS MOOL GNU/Linux User Manual

Contents

Chapter 1	Introduction.....	3
1.1	What is BOSS MOOL GNU/Linux?.....	3
1.1.1	INSTALL.....	3
1.1.2	BOSS MOOL GNU/Linux Components	4
1.2	BOSS MOOL GNU/Linux Licensing.....	4
1.2.1	The BOSS MOOL Free & Open Source Software Guidelines	5
Chapter 2	InstallationSteps	6
2.1	Before You Begin.....	6
2.1.1	System Requirements.....	6
2.1.2	Overview of the Installation Process	7
2.1.3	Back Up Your Existing Data!	8
2.2	Beginning the Installation	8
2.3	Language Selection.....	9
2.4	Country Selection.....	10
2.5	Keyboard Configuration	10
2.6	Network Configuration.....	11
2.7	Set the Root Password	13
2.8	Create User Account	14
2.9	Disk Partitioning Setup	16
2.10	Installing the Base System	42
2.11	Softwar Selection	42
Chapter 3	Tutorial For BOSS MOOL C++ Device Driver	45
3.1	Introduction	45
3.1.1	Guide to write BOSS Mool Device Driver in C++	45
3.1.2	Steps to Compile & install the C++ driver.....	45
3.2	Writing first Module Hello World Program.....	46

1. Introduction

This user guide is meant as an introductory guide for a user to try BOSS MOOL GNU/Linux operating system. The main aim is to provide a self-learning guide on how to use a BOSS MOOL GNU/Linux desktop system. It assumes that the user has no prior knowledge of Linux or PC usage.

After going through the guide the reader should be in a position to start using a BOSS GNU/Linux for both personal and office use.

1.1 What is BOSS MOOL GNU/Linux?

Linux kernel is one of the most popular and widely used open source operation systems. It has been developed in a procedural manner with the primary focus on the system performance. As a side effect, there are maintainability issues arising due to high coupling in the kernel. The entire kernel source code can be divided into two parts : the core kernel and the device drivers. Given Linux kernel's popularity, it is deployed on a wide range of machines and supports numerous hardware devices. The device drivers constitute the majority of the kernel code and are also responsible for the majority of the kernel bugs that are found.

MOOL (Minimalistic Object Oriented Linux) aims at redesigning the Linux kernel to reduce coupling and increase maintainability by means of OO (Object Oriented) abstractions. Excessive common coupling prevails in existing kernel. Studies have shown that common coupling is increasing in successive versions of linux. This will make maintainability of Linux difficult in coming years. As a starting step we have tried to reduce the number of global variables of the kernel. Some global variables are used only by two or three kernel modules. These are passed as function arguments. The performance of the modified kernel is measured with the standard performance analysis tools. The modified kernel performs almost same as original. MOOL features a device driver framework to write drivers in C++ and insert them as loadable kernel modules.

DOS (Distributed and Object Systems) Lab at IIT Madras and CDAC Chennai have initiated the work on integrating the MOOL kernel into BOSS MOOL distribution. BOSS MOOL is intended to support C++ device drivers. This feature is a new offering of BOSS to the Linux community.

1.1.1 INSTALL

To install BOSS MOOL , you need to have a minimum of 5.0 GB of hard disk space, 512 MB of RAM and a DVD-ROM drive. Insert the BOSS MOOL GNU/Linux DVD into the drive, restart your computer and boot from DVD by editing the BIOS setup. The BOSS MOOL screen appears with three options:

- 1) Install BOSS MOOL-Graphical
- 2) Install BOSS MOOL-Text Mode

You can proceed with the default installation by clicking “*Install BOSS MOOL-Graphical*” or “*Install BOSS MOOL-Text Mode*”. The details about the installation options and screen shots can also be found at BOSS MOOL GNU/Linux website <http://www.bosslinux.in>

1.1.2 BOSS MOOL GNU/Linux Components

1. BOSS MOOL kernel 3.6.11+ and gcc mool compiler 4.4.5
2. Debian Kernel 2.6.32-5-686
3. Iceweasel Web Browser
4. Totem Movie Player
5. Sound recorder
6. Sound Juicer – An Audio CD Extractor
7. Graphics
8. Calculator
9. Root Terminal
10. Take Screenshot
11. Terminal
12. Text Editor
13. File roller – An Archive Manager

1.2 BOSS MOOL GNU/Linux Licensing

BOSS MOOL GNU/Linux is a collection of many computer programs and documents created by BOSS MOOL Team. Each of these works might come under a different license. Our License Policy describe the process that we follow in determining which software we will ship by default on the BOSS MOOL Install, Live and Utility.

The BOSS MOOL team is committed to Free and Open Source Software. The world is a better place if you have the source code to all the software on your computer, and the right to use that source code in constructive ways.

We would invite you to read more about our Free Software Philosophy and help to shape this policy further.

Categories of software in BOSS MOOL GNU/Linux

We organize the thousands of software packages available for BOSS MOOL GNU/Linux into three key components: main, contrib, non-free. Software is published in one of those components based on whether or not it meets our Free Software Philosophy, and the level of support we can provide for it. This policy really addresses the software that you will find in main and non-free. Those components contain software that is fully supported by the BOSS MOOL team and must comply with this policy.

All software in BOSS MOOL main and non-free must be licensed in a way that is compatible with our license policy. There are many definitions of "free" and free software so we have included our own set of guidelines, listed below.

BOSS MOOL GNU/Linux "main" Component License Policy

All application software included in the BOSS MOOL GNU/Linux main component:

Must include source code. The main component has a strict and non-negotiable requirement that application software included in it must come with full source code.

Must allow modification and distribution of modified copies under the same license. Just having the source code does not convey the same freedom as having the right to change it. Without the ability to modify software, the BOSS MOOL community cannot support software, fix bugs, translate it or improve it.

1.2.1 The BOSS MOOL Free & Open Source Software Guidelines

1.Free Redistribution

The license of a BOSS MOOL GNU/Linux component may not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license may not require a royalty or other fee for such sale.

2.Source Code

The program must include source code, and must allow distribution in source code as well as compiled form.

3.Derived Works

The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

4.Integrity of The Author's Source Code

The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software. (This is a compromise. The BOSS MOOL group encourages all authors not to restrict any files, source or binary, from being modified.)

5.No Discrimination Against Persons or Groups

The license must not discriminate against any person or group of persons.

6.No Discrimination Against Fields of Endeavor

The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

7.Distribution of License

The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

8.License Must Not Be Specific to BOSS MOOL GNU/Linux

The rights attached to the program must not depend on the program's being part of a BOSS

MOOL GNU/Linux system. If the program is extracted from BOSS MOOL GNU/Linux and used or distributed without BOSS MOOL GNU/Linux but otherwise within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the BOSS MOOL system.

9. License Must Not Contaminate Other Software

The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be free software.

10. Example Licenses

The "GPL", "BSD", and "Artistic" licenses are examples of licenses that we consider "free".

2. Installation Steps

This manual helps you to install BOSS MOOL GNU/Linux on desktops and laptops. The installation system is flexible enough to use even if you have no previous knowledge of Linux or computer networks. If you select default options, BOSS MOOL GNU/Linux provides a complete desktop operating system, including productivity applications, Internet utilities, and desktop tools.

This document does not detail all of the features of the installation system. If you want the complete details of the features during installation please check our BOSS MOOL website at <http://www.bosslinux.in/bossmool>

2.1 Before You Begin

2.1.1 System Requirements

BOSS MOOL GNU/Linux does not impose hardware requirements beyond the requirements of the Linux kernel and the GNU tool-sets. Therefore, any architecture or platform to which the Linux kernel, libc, gcc, etc. have been ported, can run BOSS MOOL GNU/Linux. To install BOSS MOOL GNU/Linux you need very minimum system configurations. The hardware requirement details are as follows:

- Hard Disk – 5.0 GB (unpartitioned space)
- RAM – 512 MB
- DVD-ROM drive

To install BOSS MOOL GNU/Linux from disc, you need the installation DVD, currently, BOSS MOOL GNU/Linux supports the i386, ppc, and x86_64 architectures. Mainly i386 architecture is described below:

i386

Intel x86-compatible processors, including Intel Pentium and Pentium-MMX, Pentium Pro, Pentium-II, Pentium-III, Celeron, Pentium 4, and Xeon; VIAC3/C3-m and Eden/Eden-N; and AMD Athlon, AthlonXP, Duron, AthlonMP, and Sempron

2.1.2 Overview of the Installation Process

First, just a note about re-installations. With BOSS MOOL GNU/Linux, a circumstance that will require a complete re-installation of your system is very rare; perhaps mechanical failure of the hard disk would be the most common case. Many common operating systems may require a complete installation to be performed when critical failures take place or for upgrades to new OS versions. Even if a completely new installation isn't required, often the programs you use must be re-installed to operate properly in the new OS. Under BOSS MOOL GNU/Linux, it is much more likely that your OS can be repaired rather than replaced if things go wrong. Upgrades never require a wholesale installation; you can always upgrade in-place. And the programs are almost always compatible with successive OS releases. If a new program version requires newer supporting software, the BOSS MOOL packaging

system ensures that all the necessary software is automatically identified and installed. The point is, much effort has been put into avoiding the need for re-installation, so think of it as your very last option. The installer is not designed to re-install over an existing system. Here's a road map for the steps you will take during the installation process.

1. Back up any existing data or documents on the hard disk where you plan to install.
2. Gather information about your computer and any needed documentation, before starting the installation.
3. Create partition-table space for BOSS MOOL on your hard disk.
4. Set up the first boot drive to DVD drive (through CMOS setup) and restart your system.
5. Insert the BOSS MOOL GNU/Linux DVD into the drive
6. Boot the installation system.
7. Select installation language.
8. Activate the ethernet network connection, if available.
9. Create and mount the partitions on which BOSS MOOL GNU/Linux will be installed.
10. Watch the automatic install/setup of the base system.
11. Installs additional software (tasks and/or packages), at your discretion.
12. Installs a boot loader which can start up BOSS MOOL GNU/Linux on your existing system.
13. Load the newly installed system for the first time, and make some initial system settings.
14. If you have problems during the installation, it helps to know which packages are involved in which steps.
15. Introducing the leading software actors in this installation drama: The installer software, `debian-installer`, is the primary concern of this manual. It detects hardware and loads appropriate drivers, uses `dhcpcd` to set up the network connection, and runs `debootstrap` to install the base system packages. Many more actors play smaller parts in this process, but `debian-installer` has completed its task when you load the new system for the first time. Upon loading the new base system, `base-config` supervises adding users, setting a time zone (via `tzsetup`), and setting up the package installation system (using `apt-setup`). It then launches `tasksel` which can be used to select large groups of related programs, and in turn can run `aptitude` which allows you to choose individual software packages.

2.1.3 Back Up Your Existing Data!

Before you start, make sure to back up every file that is now on your system. If this is the first time a non-native operating system has been installed on your computer, it's quite likely you will need to re-partition your disk to make room for BOSS MOOL GNU/Linux. Anytime you partition your disk, you should count on losing everything on the disk, no matter what program you use to do it. The programs used in installation are quite reliable and most have seen years of use; but they are also quite powerful and a false move can cost you.

Even after backing up be careful and think about your answers and actions. Two minutes of thinking can save hours of unnecessary work. If you are creating a multi-boot system, make sure that you have the distribution media of any other present operating systems on hand. Especially if you repartition your boot drive, you might find that you have to reinstall your operating system's boot loader, or in many cases the whole operating system itself and all files on the affected partitions.

2.2 Beginning the Installation

To begin installation of BOSS MOOL GNU/Linux, boot the computer from the boot media i.e from CD or DVD. The BIOS (Basic Input/Output System) on your computer must support the type of boot media you select. The BIOS controls access to some hardware devices during boot time. Any computer that meets the minimum recommended specification for BOSS MOOL GNU/Linux can boot from a CD or DVD drive with the first disc.

If you are not sure what capabilities your computer has, or how to configure the BIOS, consult the documentation provided by the manufacturer. Detailed information on hardware specifications and configuration is beyond the scope of this document.

Aborting the Installation

To abort the installation process at any time before the Installing Packages screen, either press Ctrl+Alt+Del or power off the computer with the power switch. BOSS MOOL GNU/Linux makes no changes to your computer until package installation begins. Booting from Disc

To boot your computer from disc:

1. Switch on the computer.
2. Insert the disc into the DVD drive.
3. A screen appears to ask for a booting option.,
 - 1) *Install BOSS MOOL-Graphical*
 - 2) *Install BOSS MOOL-Text Mode*
 - 3) *Advance options*
 - 4) *Help*

You can proceed with the default installation by clicking "*Install BOSS-Graphical*" or "*Install BOSS-Text Mode*".



Figure 2.2 Boot Screen.

2.3 Language Selection

The installation program displays a list of languages which are supported by BOSS MOOL GNU/Linux. Select the Language as “English” / “Tamil” / “Hindi” (or any other). Click “Continue” to proceed.



Figure 2.3 Language Selection Screen.

2.4 Country Selection

Next the country selection screen appears. Select the appropriate country from the list. Click “Continue” and proceed further

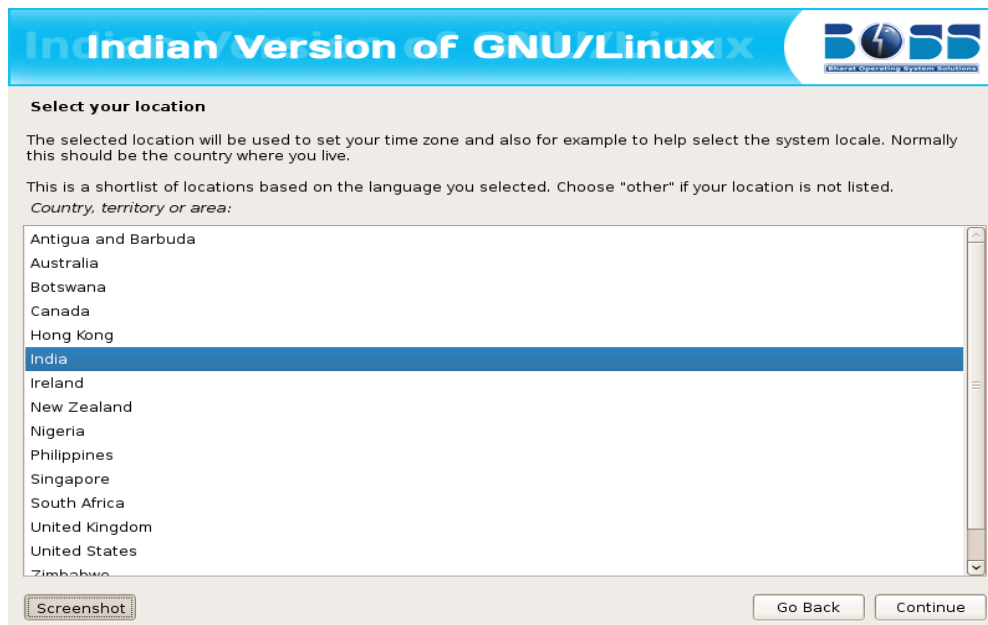


Figure 2.4 Country Selection Screen.

2.5 Keyboard Configuration

The installation program displays a list of the keyboard layouts supported by BOSS MOOL GNU/Linux. Highlight the correct layout on the list, and select “Next”.

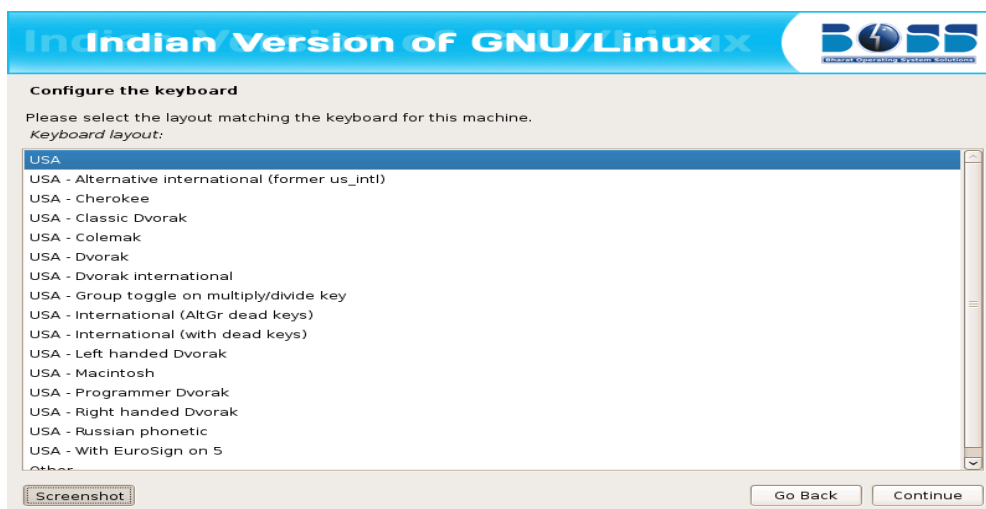


Figure 2.5 Keyboard Configuration Screen.

2.6 Network Configuration

Configuring Network Automatically

If you have a DHCP Server, then the Network will be automatically configured. There is no need for the user to bother about the network configuration.

Configuring Network Manually

If that is not the case, you need to manually configure the network. When the DHCP server is not available, the following screen appears which means you need to configure manually.

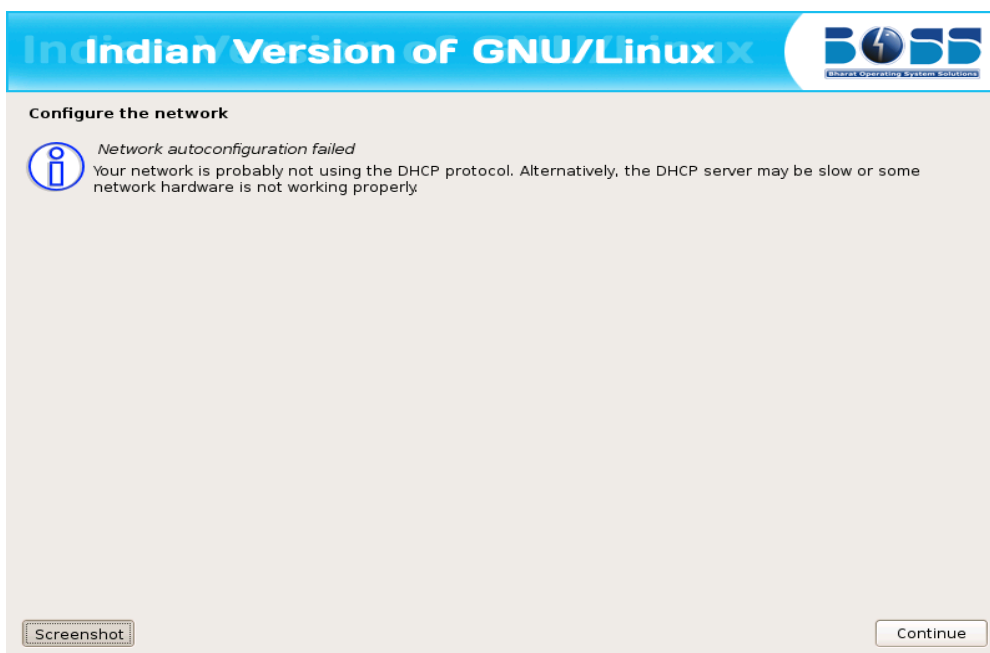



Figure 2.6 Network Configuration.

Click on "Continue" to proceed towards Manual Network configuration.



Figure 2.6.1 Network Configuration.

Select “Configure Network Manually” and set the IP address and configure network.



Indian Version of GNU/Linux x

Configure the network

The IP address is unique to your computer and consists of four numbers separated by periods. If you don't know what to use here, consult your network administrator.

IP address:

Figure 6.2.2 Network Configuration.

The screen shots are as follows:



Indian Version of GNU/Linux x

Configure the network

The gateway is an IP address (four numbers separated by periods) that indicates the gateway router, also known as the default router. All traffic that goes outside your LAN (for instance, to the Internet) is sent through this router. In rare circumstances, you may have no router; in that case, you can leave this blank. If you don't know the proper answer to this question, consult your network administrator.

Gateway:

Figure 6.2.3 Network Configuration.



Figure 6.2.4 Network Configuration.

The next screen will ask you to enter the hostname for the system.

2.7 Set the Root Password

Every Linux uses a special account named root for system administration. The root account on every Linux system is only limited by SELinux. It is not subject to any other normal account restrictions. As the system owner or administrator, you may sometimes require unrestricted access to configure or modify the system. In those cases, use the **root** account. \

*Avoid logging in to EduBOSS as root when possible.
Any administration tools which require root privileges will prompt you for the password.*

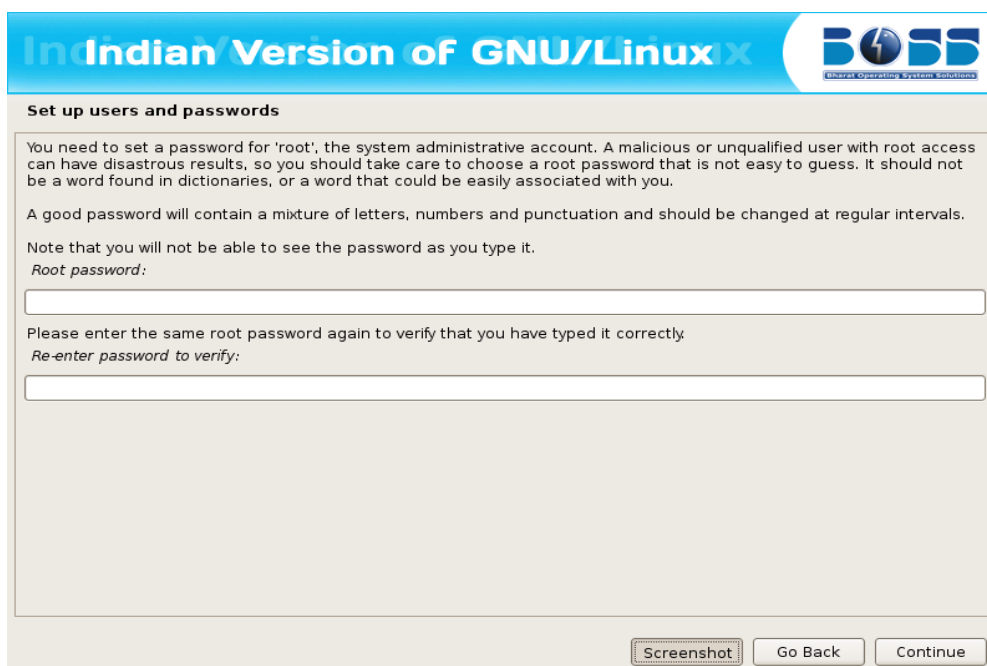
The **root** account may potentially control any part of the system, use the following guidelines to create a good password:

- Use a combination of uppercase letters, lowercase letters, numbers, punctuation and other characters.
- Do not use a word or name. Obscuring the word or name with substitute characters is not effective.
- Do not use the same password for more than one system.

The following are examples of good passwords:

- f9*@1Ls99A
- HL8\$391%%rb
- Iwtb,10 ^ th

Enter the root password into the **Root Password** field. Type the same password into the **Confirm** field to ensure that it is set correctly.



The screenshot shows the 'Set up users and passwords' window for the Indian Version of GNU/Linux. The window has a blue header with the text 'Indian Version of GNU/Linux' and the BOSS logo. The main content area is light gray and contains the following text: 'You need to set a password for 'root', the system administrative account. A malicious or unqualified user with root access can have disastrous results, so you should take care to choose a root password that is not easy to guess. It should not be a word found in dictionaries, or a word that could be easily associated with you.' followed by 'A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.' and 'Note that you will not be able to see the password as you type it.' Below this is the label 'Root password:' followed by a text input field. Then it says 'Please enter the same root password again to verify that you have typed it correctly.' followed by the label 'Re-enter password to verify:' followed by another text input field. At the bottom right, there are three buttons: 'Screenshot', 'Go Back', and 'Continue'.

Figure 2.7 Set Root Password.

2.8 Create User Account

Next step is to create a user account and setting password for the user. You can use this user account for logging into BOSS MOOL GNU/Linux. And this user will be used for auto login to BOSS MOOL GNU/Linux after certain time period.

The screen shots are as follows:



The screenshot shows the 'Set up users and passwords' window for the Indian Version of GNU/Linux. The window has a blue header with the text 'Indian Version of GNU/Linux' and the BOSS logo. The main content area is light gray and contains the following text: 'A user account will be created for you to use instead of the root account for non-administrative activities.' followed by 'Please enter the real name of this user. This information will be used for instance as default origin for emails sent by this user as well as any program which displays or uses the user's real name. Your full name is a reasonable choice.' Below this is the label 'Full name for the new user:' followed by a text input field containing the text 'boss'. At the bottom right, there are three buttons: 'Screenshot', 'Go Back', and 'Continue'.

Figure2.8 Set up user account.

Indian Version of GNU/Linux

Set up users and passwords

Select a username for the new account. Your first name is a reasonable choice. The username should start with a lower-case letter, which can be followed by any combination of numbers and more lower-case letters.

Username for your account:

Figure 2.8.1 Set up user account's username.

Indian Version of GNU/Linux

Set up users and passwords

A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.

Choose a password for the new user:

Please enter the same user password again to verify you have typed it correctly.

Re-enter password to verify:

Figure 2.8.2 Set up user account's password.

2.9 Disk Partitioning Setup

If you are new to Linux, you may want to use the automatic partitioning method. If you are a more experienced Linux user, use the manual partitioning method for more control over your system configuration, or select and modify the automatically defined partitions.

The screen below shows the way you would like to partition. These are the following ways in which you can partition the hard disk

- a) Automatic partitioning
- b) LVM partitioning
- c) Manual partitioning.

a) Automatic Partitioning

By selecting automatic partitioning, you will not have to use partitioning tools to assign mount points, create partitions or allocate space for your installation.

You will be provided with two options in automatic partition -

- Format entire Hard Disk
- Use Existing Hard disk Space

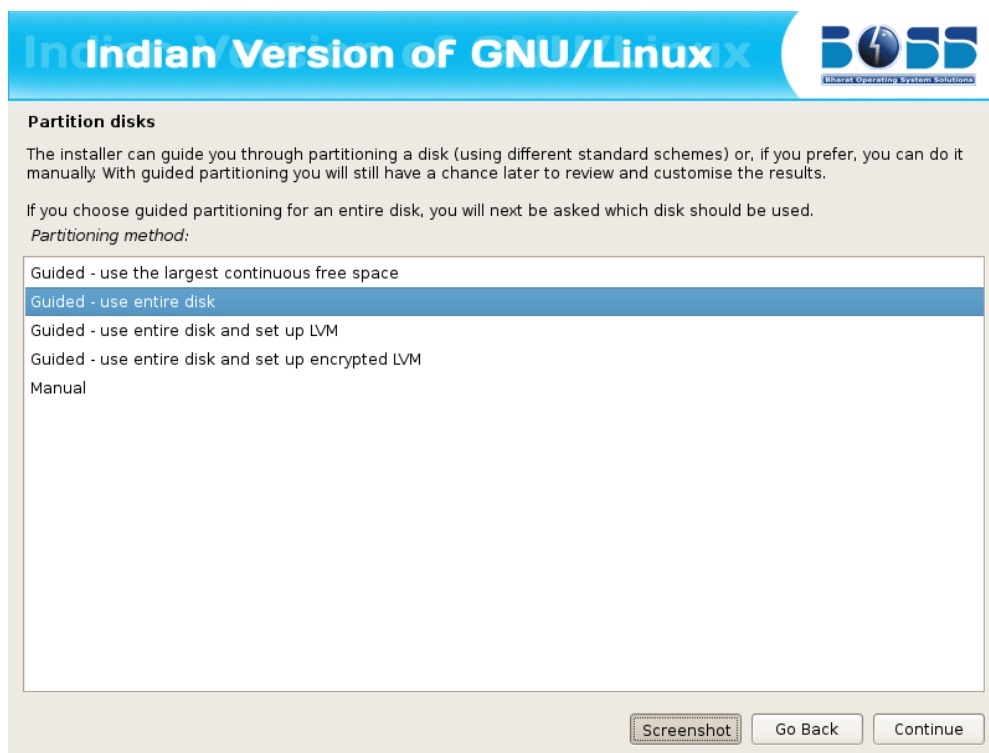


Figure 2.9 (a) Format Entire Hard Disk.

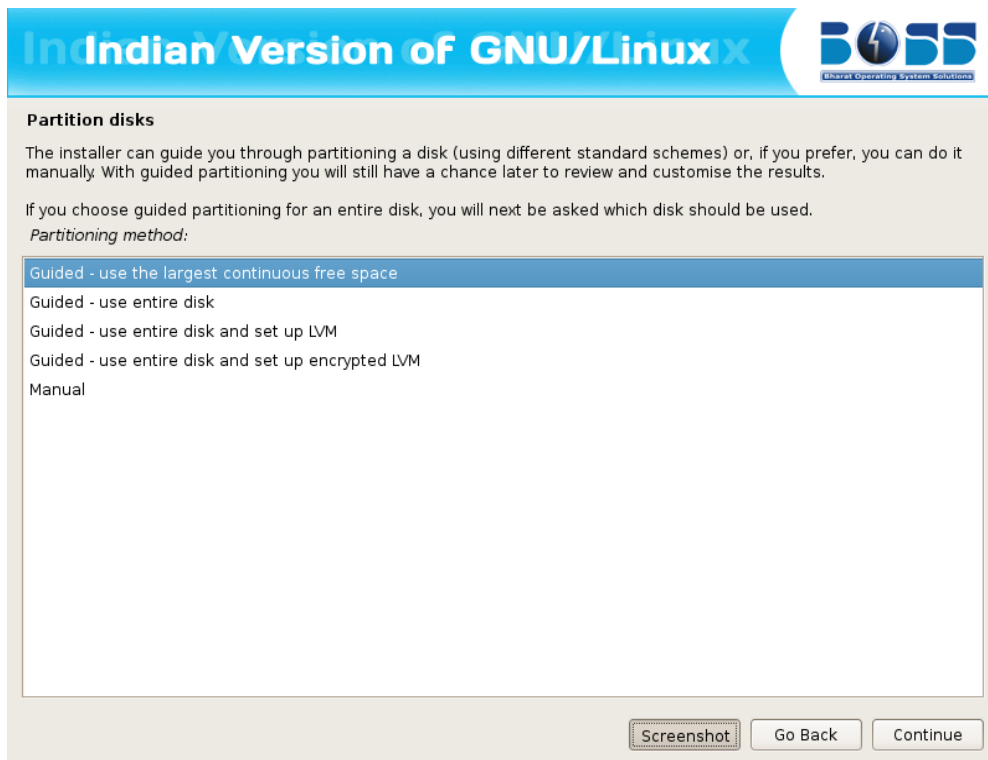


Figure 2.9.1(a) Use the largest Free Space Available.

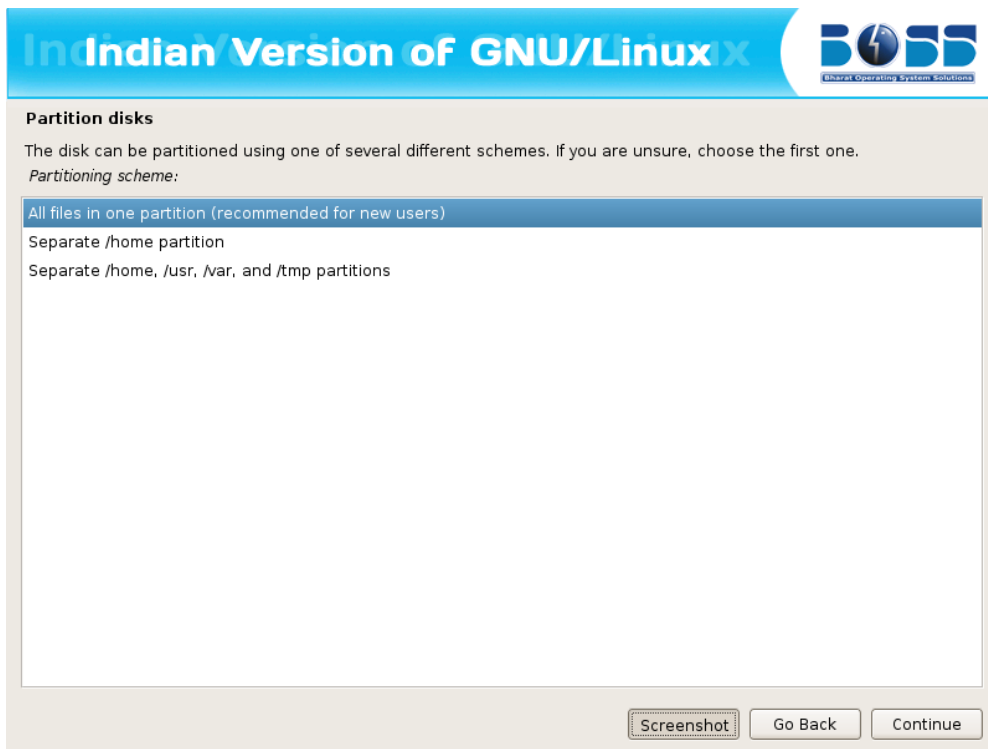


Figure 2.9.2(a) Allot the space for different directories.

b) LVM partitioning

LVM is a tool for logical volume management which includes allocating disks, resizing logical volumes. The Logical Volume Manager (LVM) enables flexible distribution of hard disk space over several file systems. As it is difficult to modify partitions on a running system, LVM was developed. It provides a virtual pool (Volume Group — VG for short) of

memory space from which logical volumes (LV) can be generated if needed. The operating system accesses these instead of the physical partitions.

The screen shots are as follows:

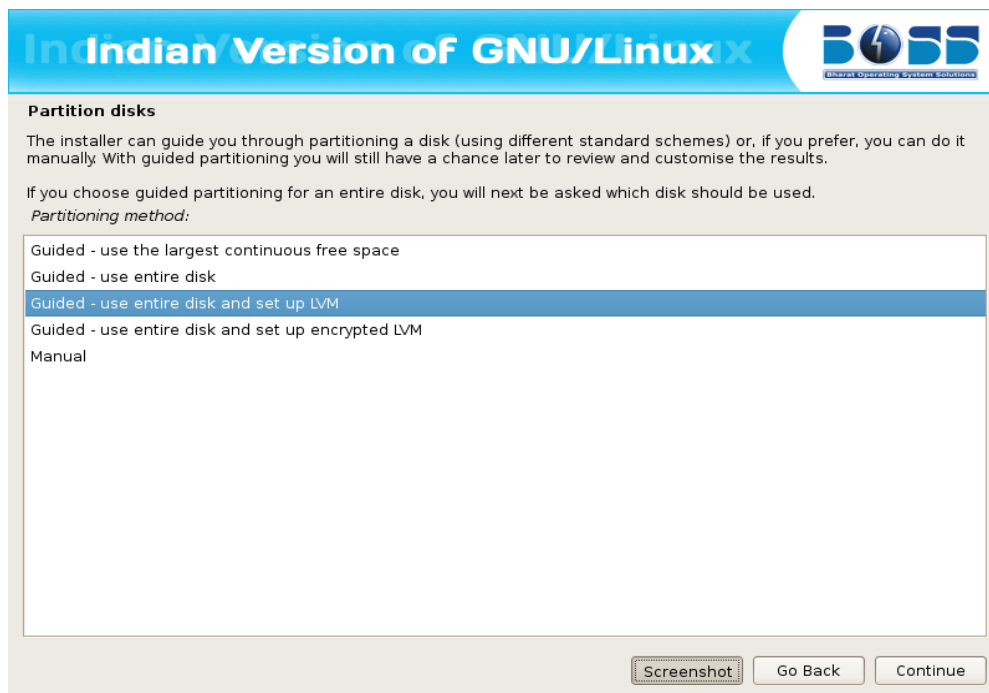


Figure 2.9(b) LVM Partitioning.



Figure 2.9.1(b) Select the disk to partition.

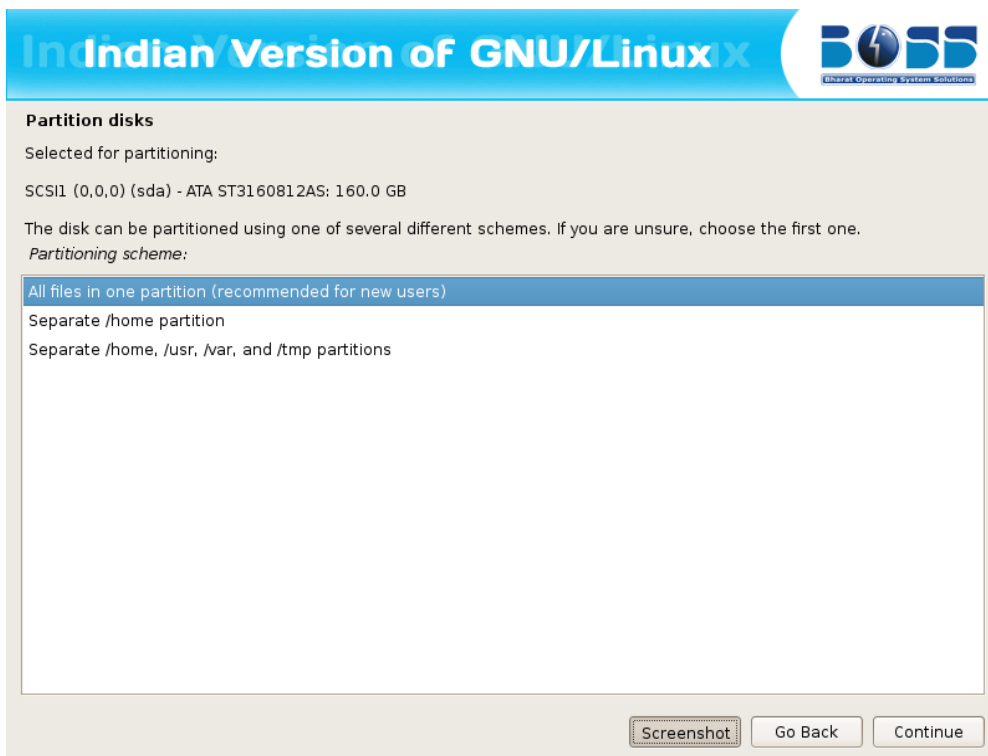


Figure 2.9.2(b) Allot the space for different directories.

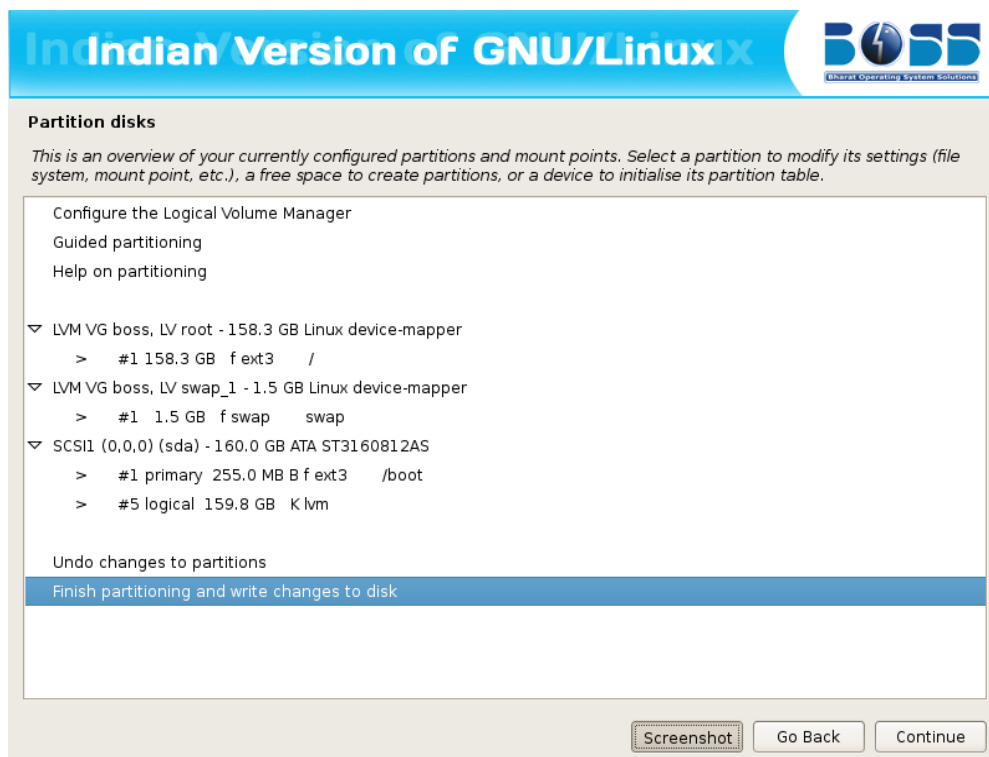


Figure 2.9.3(b) Finish Partitioning.



Figure 2.9.4(b) LVM Partitioning.

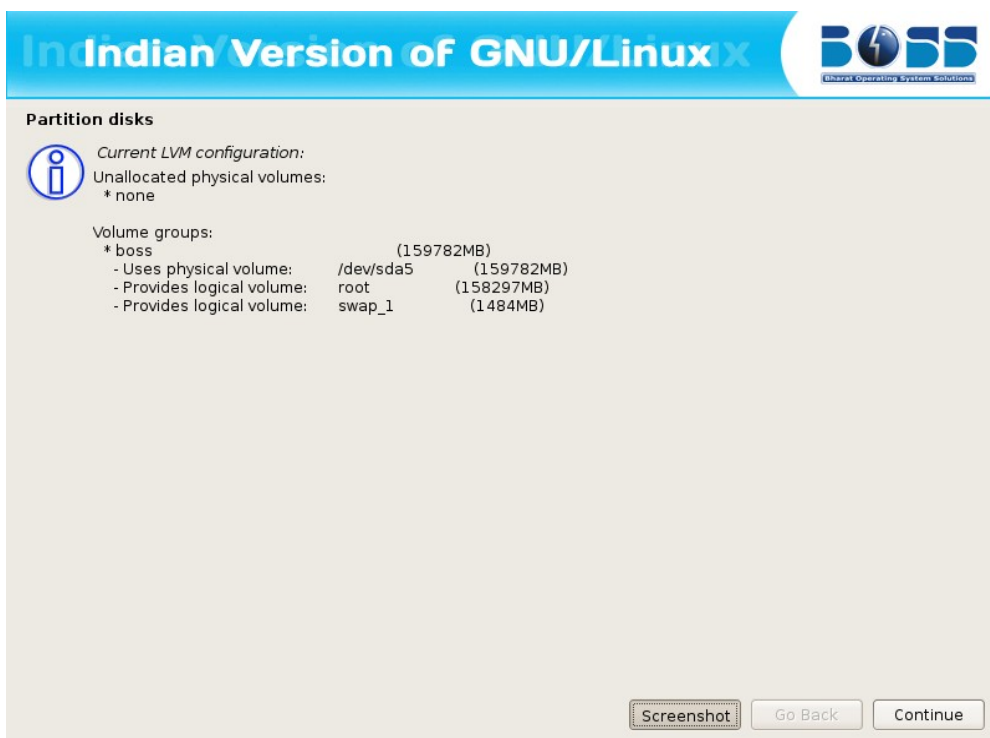


Figure 2.9.5(b) LVM Partitioning.

Use Existing Hard disk Space

This means that you need to have an empty unpartitioned free space which is not used for any other OS like Windows or Linux. Once you select this option it will ask you for the partition space details and then format it, later the installation proceeds.

c) Manual Partitioning

Creating a new partition

To partition manually, the following screen shots will help you setting up the partition.

1. A screen with name “Partition disks” will be displayed. In that click “Manual” and then click “Continue.”

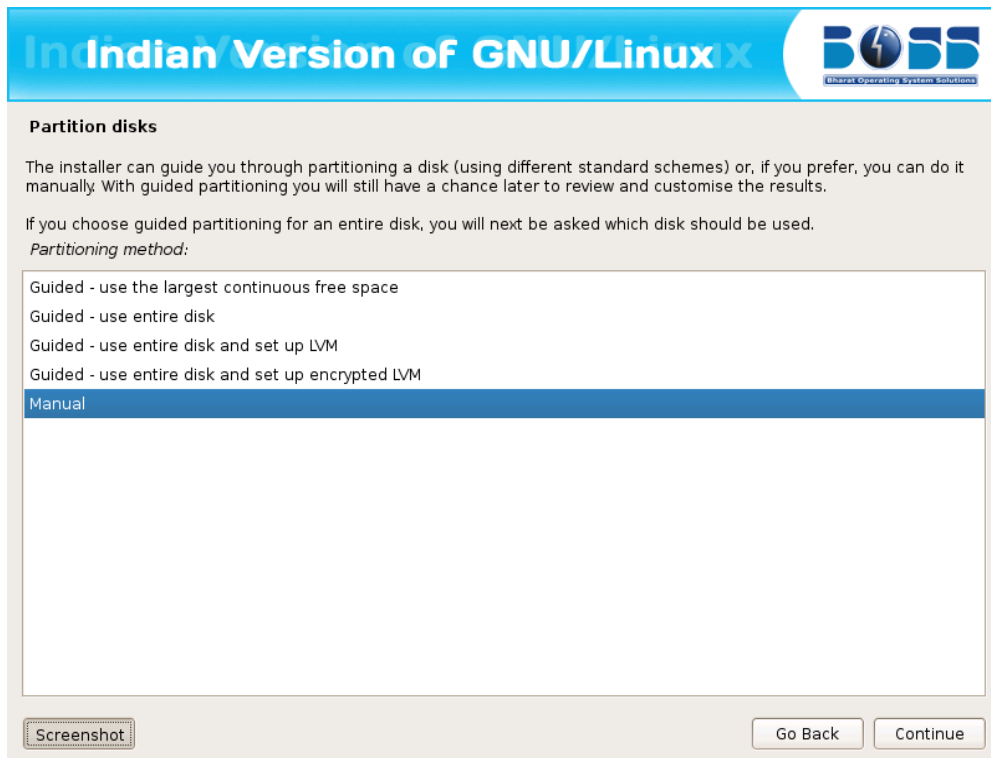


Figure 2.9(c) Manual Partition.

2. After clicking “Manual” a screen will be displayed which contains overview of your currently configured partitions. Click on free space and then click “Continue”.

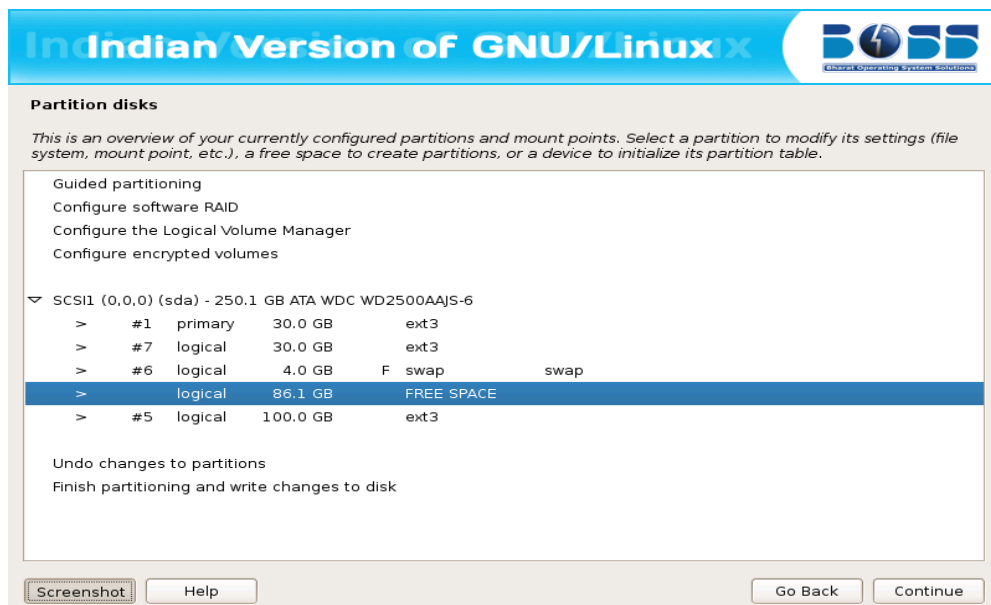


Figure 2.9.1(c) Select the free space to create new partition.

3. Create new partition for BOSS MOOL GNU/Linux by double clicking “Create a new partition”

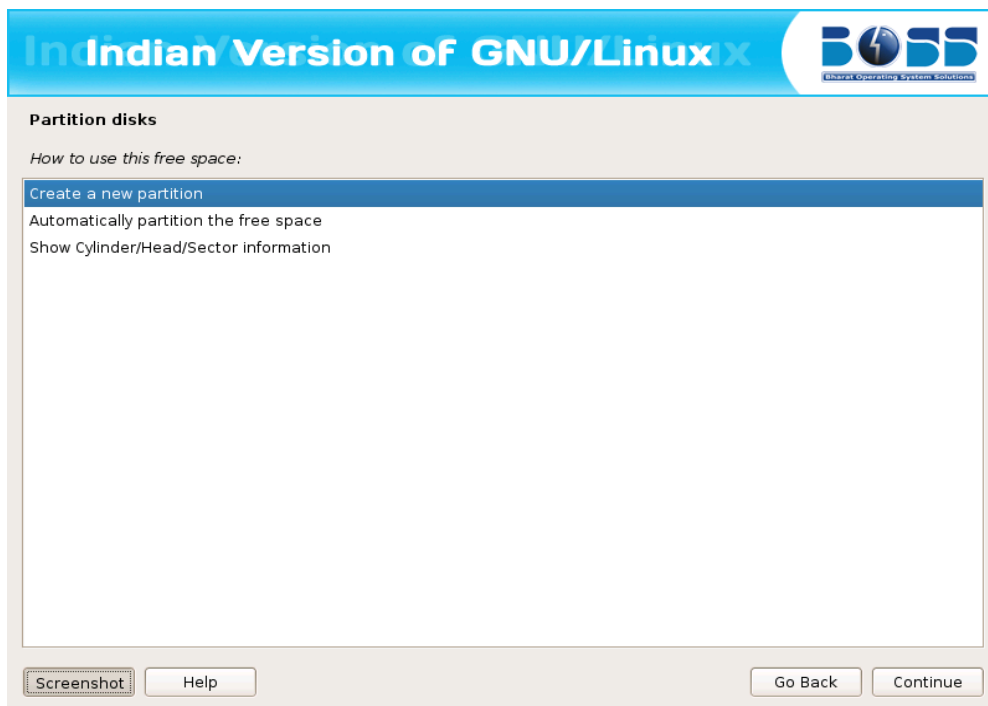


Figure 2.9.2(c) Creat New Partition

4. A screen appears showing the maximum size that can be assigned for this partition.

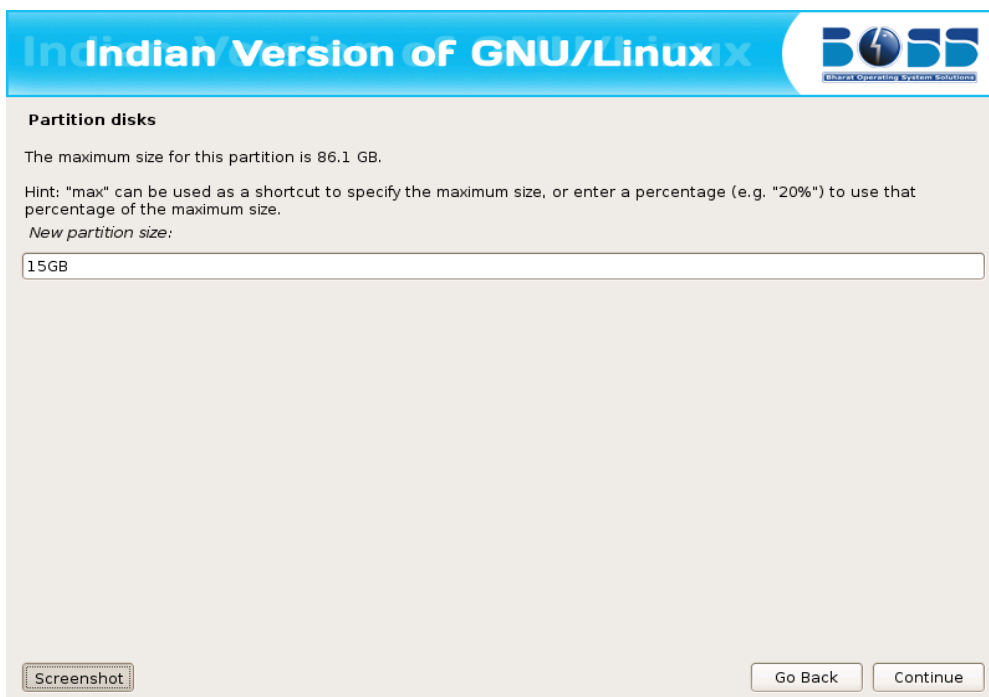
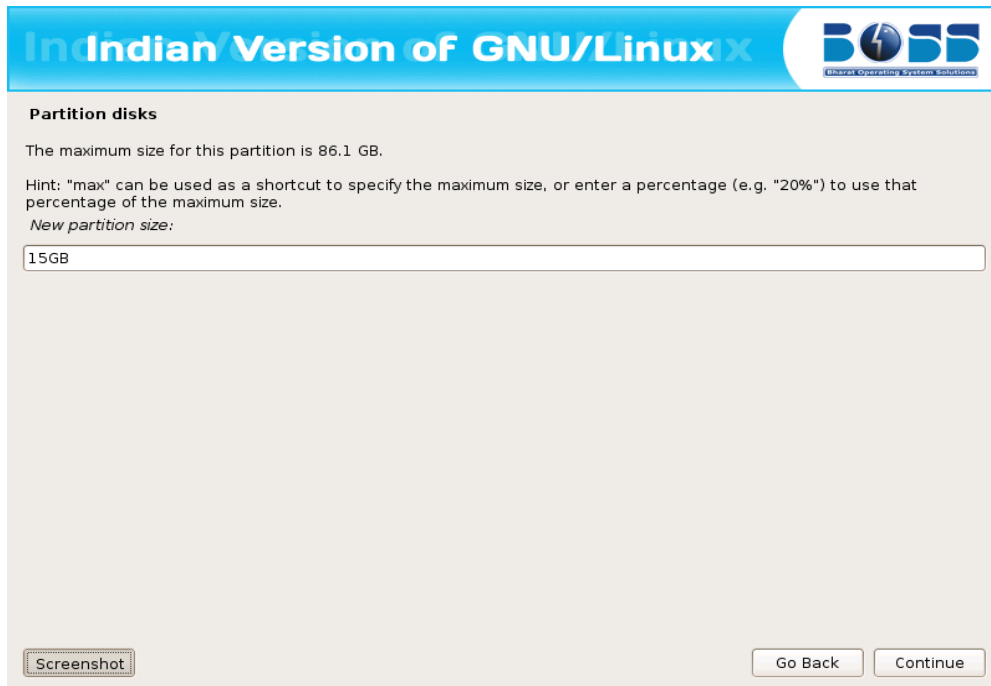


Figure 2.9.3(c) Enter the maximum size of new partition .

In this screen change the size to your required size. The minimum should be 5.0 GB. Then click “Continue”.



Indian Version of GNU/Linux

Partition disks

The maximum size for this partition is 86.1 GB.

Hint: "max" can be used as a shortcut to specify the maximum size, or enter a percentage (e.g. "20%") to use that percentage of the maximum size.

New partition size:

Figure 2.9.4(c) Enter the required size to create new partition .

5. Select the type for the new partition.



Indian Version of GNU/Linux

Partition disks

Type for the new partition:

- Primary
- Logical

Figure 2.9.5(c) Select the type for new partition.

- Specify whether the partition should be at the beginning or at the End.

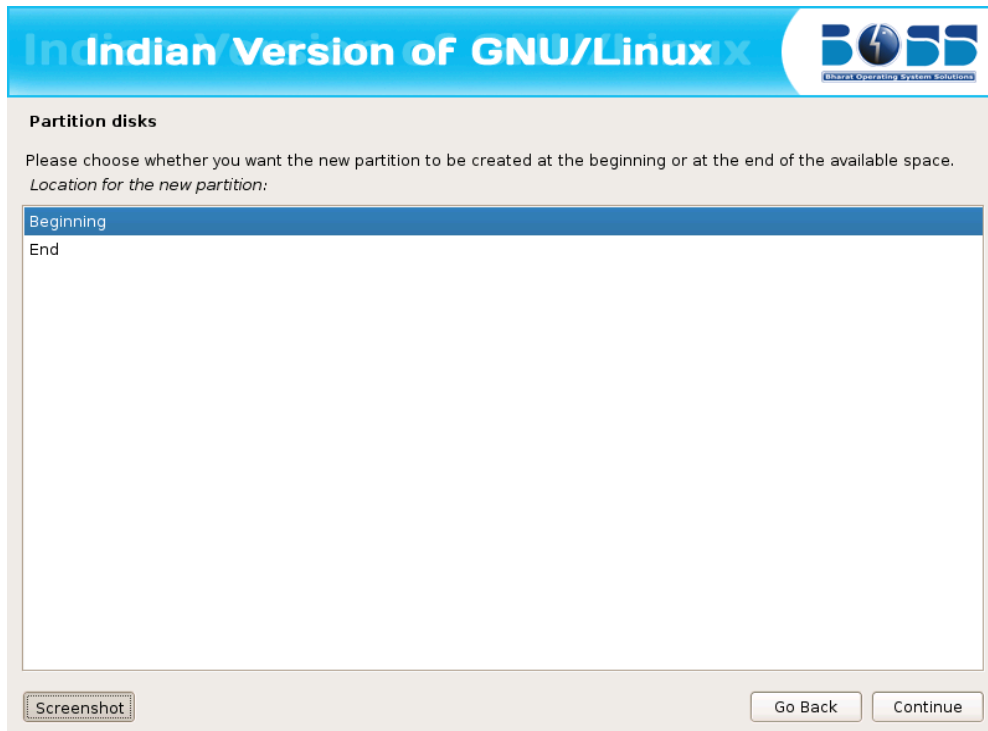


Figure 2.9.6(c) Specify the location for new partition.

- Click “Done setting up the partition” and then click “Continue”.

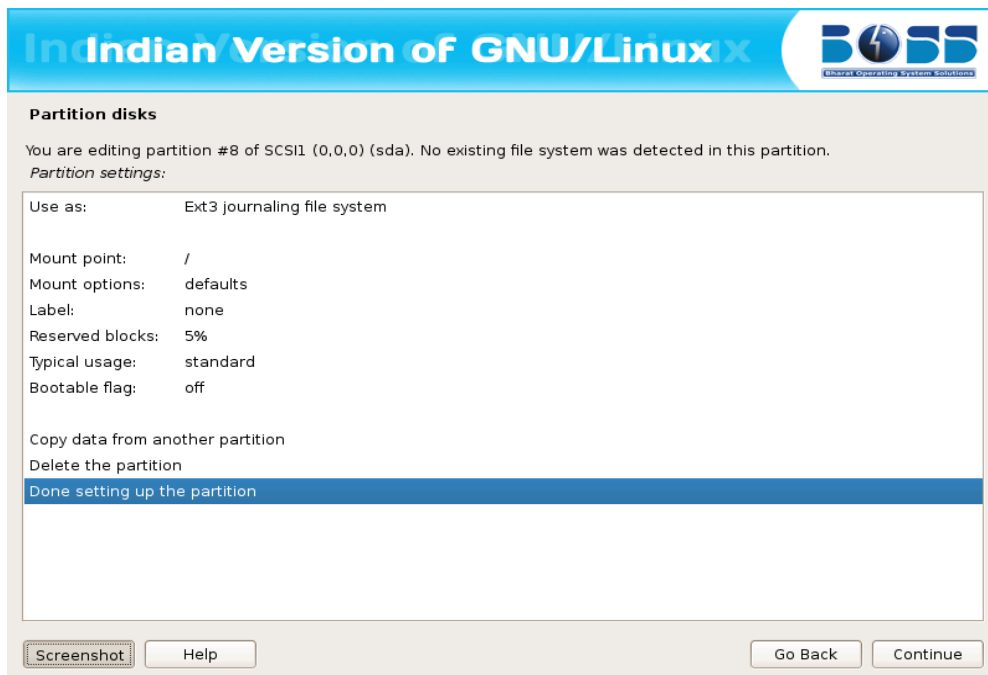


Figure 2.9.7(c) Finish Partitioning.

After selecting the partition for the “/”, you need to select a partition for the “swap” space. If you are already having Linux installed on your system then you will be having a swap space in your system. If so no need of another swap space. The swap should be double the RAM size. If there is no swap space then create a new swap space. The screen shots are as follows:

8. Create a swap area of 1GB from free space.

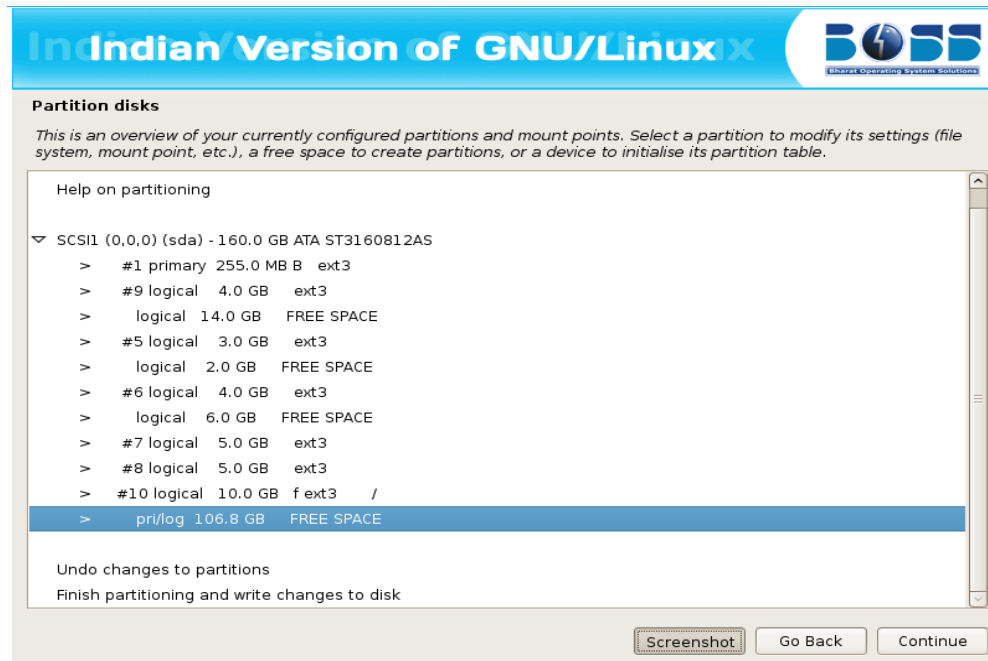


Figure 2.9.8(c) Create Swap area.

9. Click “Create a new partition” and then click “Continue”.

10. Specify the partition size for swap area as 1.0 GB.



Figure 2.9.9(c) Specify partition size to create swap area.

11. Select the type for the new partition.

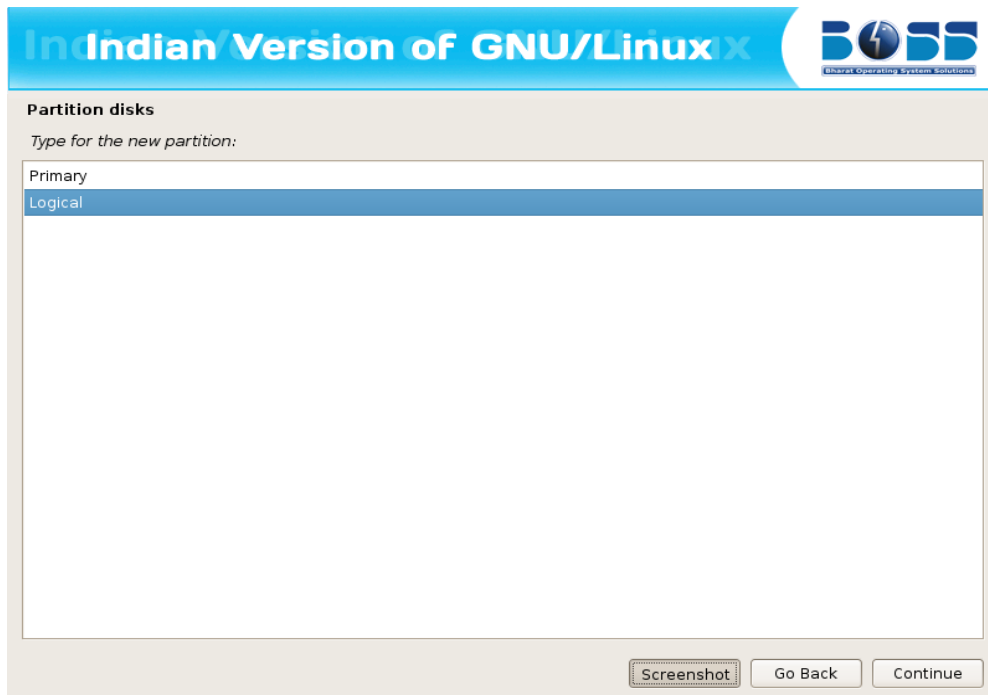


Figure 2.9.10(c) Select the type for new partition.

12. Specify whether the partition should be at the beginning or at the End.

13. Change default file system ext3 to swap by double clicking “Ext3 journaling file system” in the screen shown below.

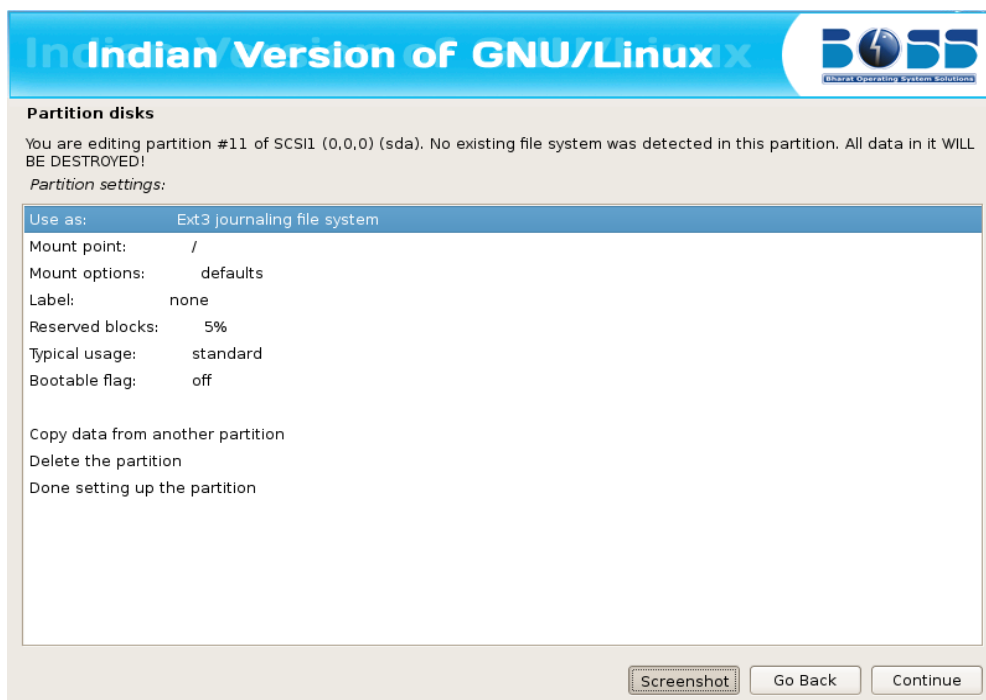


Figure 2.9.11(c) To change the default file system ext3 to swap.

14. Double click “swap area”.

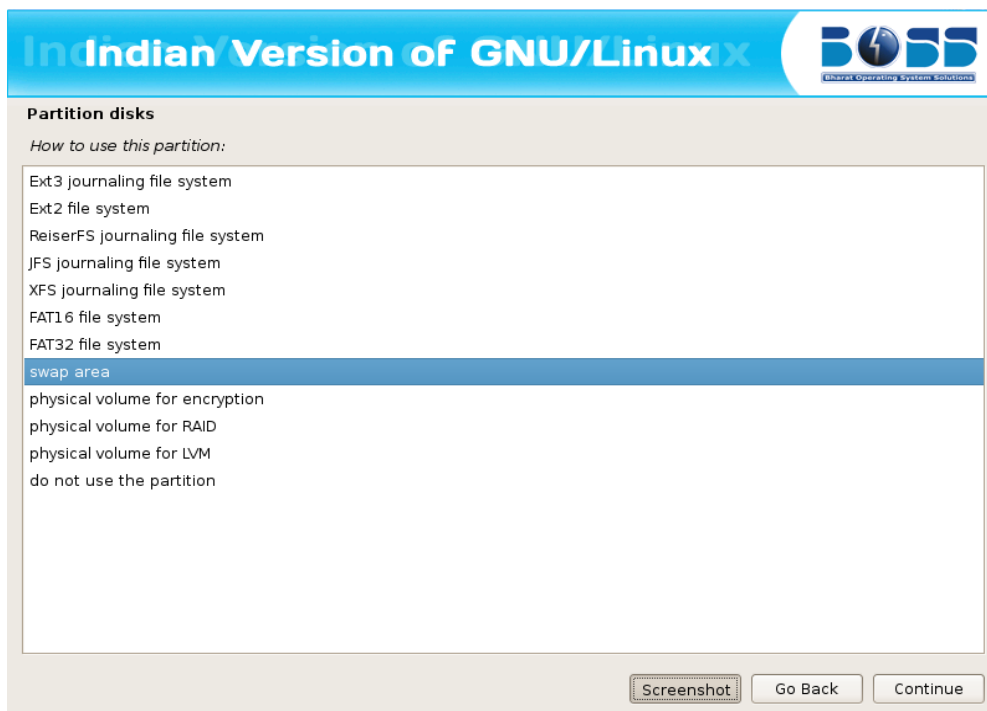


Figure 2.9.12(c) Swap area

15. Creation of swap area is completed. Click “Done setting up the partition” and then click “Continue”

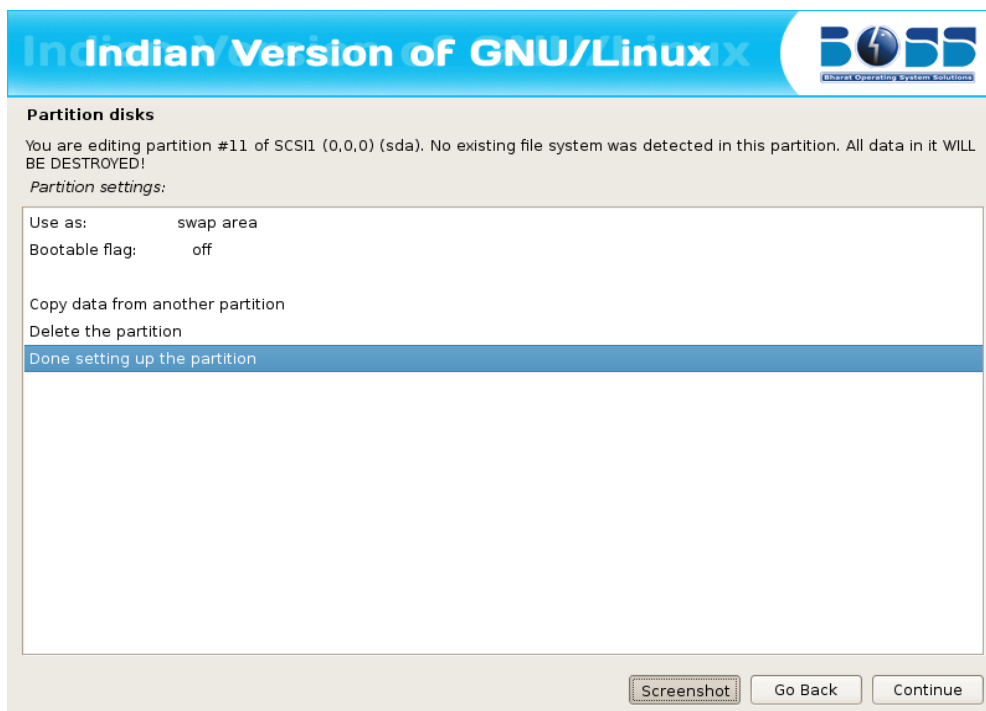


Figure 2.9.13(c) Finish Swap area creation.

16. Finish the partitioning process.

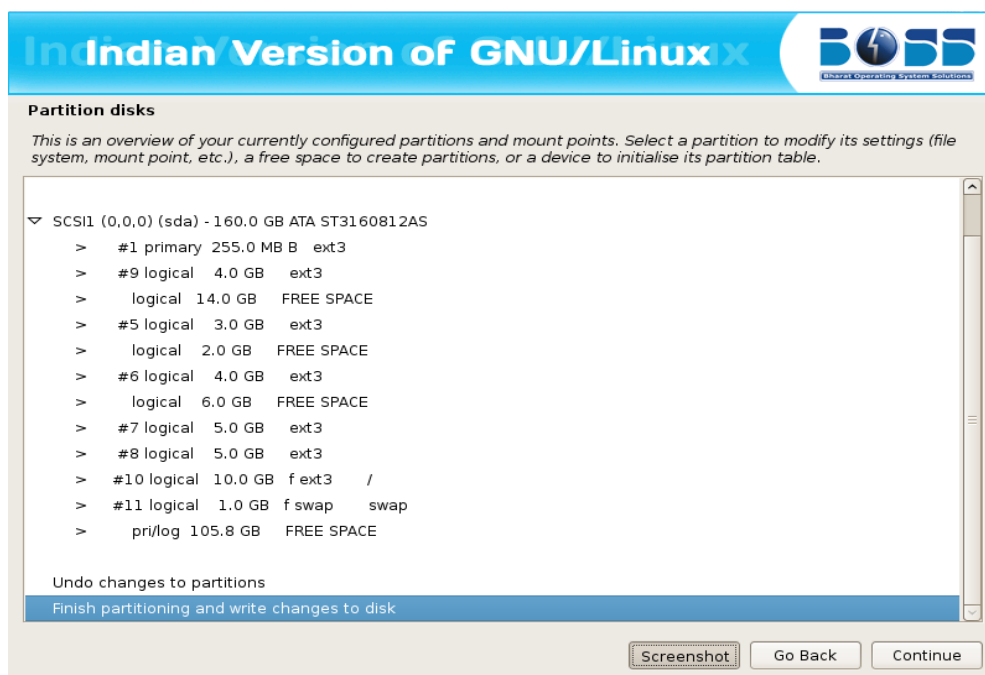


Figure 2.9.14(c) Finish Partitioning.

17. Write the changes to disk by clicking “Yes”.

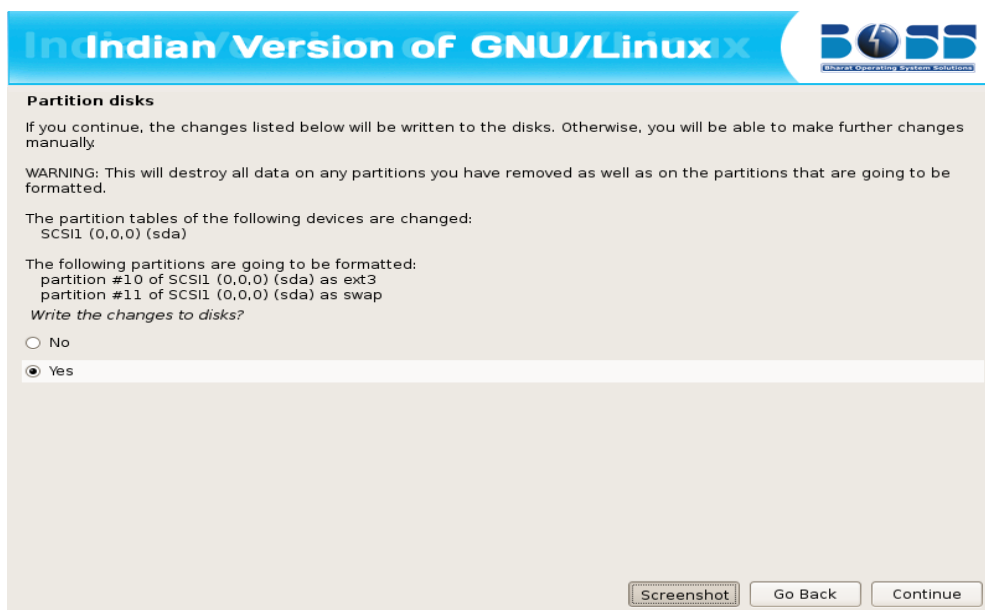


Figure 2.9.15(c) Write the Changes to disk.

Deleting the hard disk partition

To partition manually, the following screen shots will help you setting up the partitioning separately for “/” and “swap”.

1. A screen with name “Partition disks” will be displayed. In that click on “Manual” and then click on “Continue.”

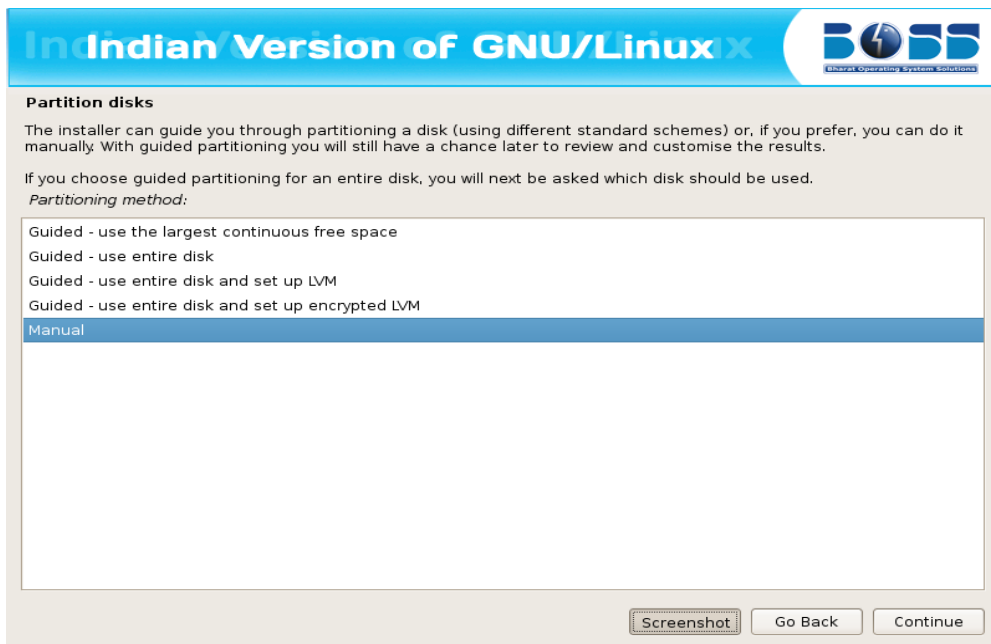


Figure 2.9.16(c) Select the manual to delete the partition.

2. After clicking “Manual” a screen will be displayed which contains overview of your currently configured partitions and mount points.

Then click on partition which you want to delete and then click “Continue”.

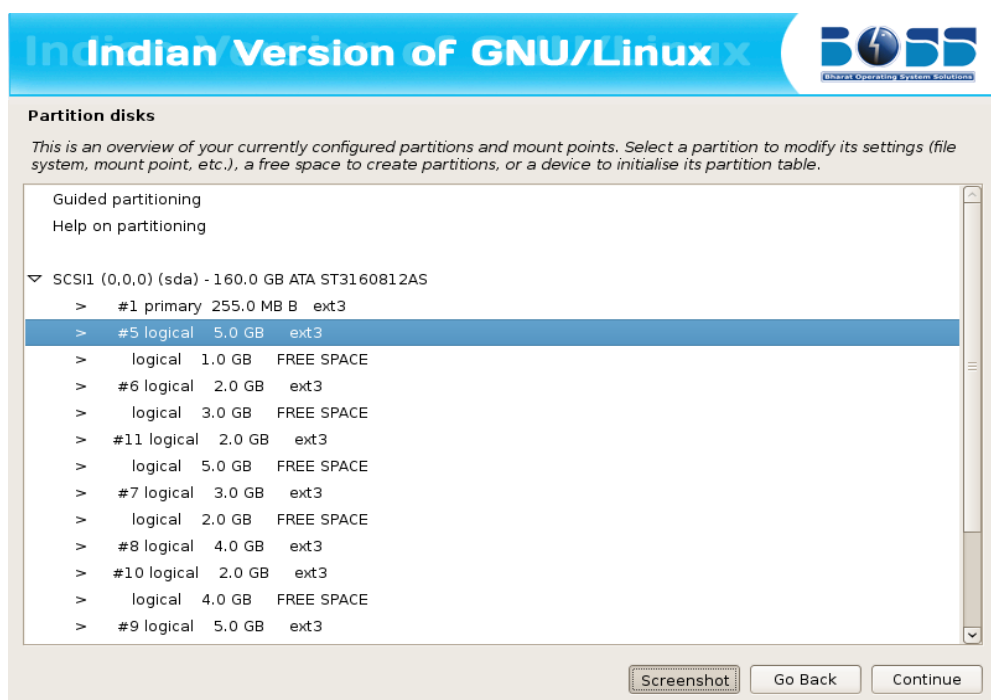


Figure 2.9.17(c) Select the partition which you want to delete.

3. Click on “Delete the partition” and then click “Continue”.

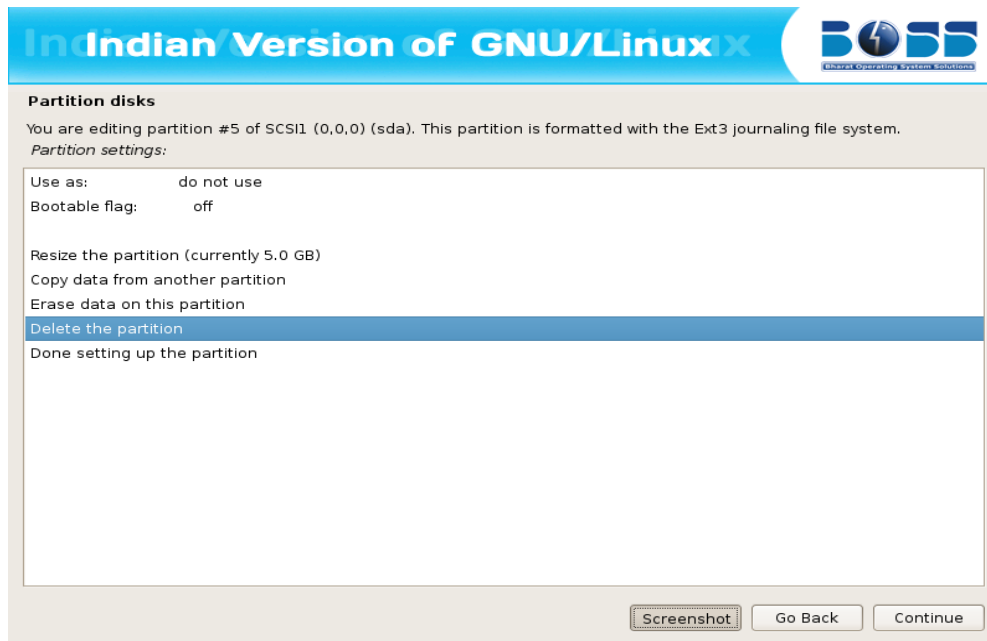


Figure 2.9.18(c) Delete the Partition.

4. Once that partition is deleted you will get some free space.

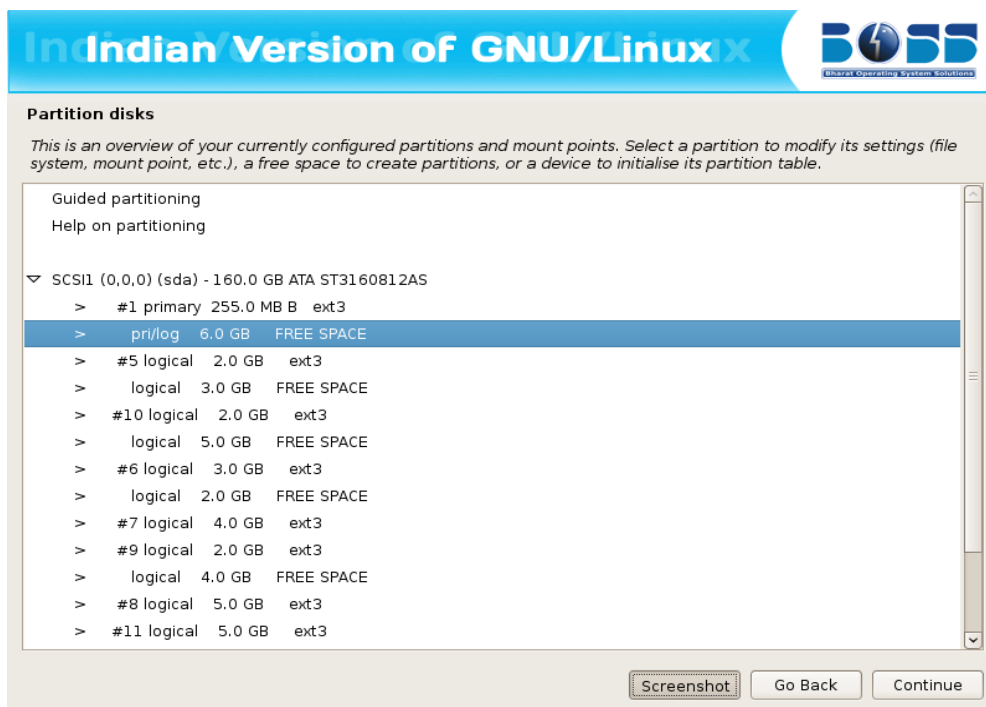


Figure 2.9.19(c) Free Space to create new partition.

5. To create a new partition using that free space double-click on “Create a new partition”.
6. In the next screen specify the new partition size. The minimum size should be 5.0GB.



Figure 2.9.20(c) Specify the new partition size.

7. Select the type for the new partition.



Figure 2.9.21(c) Select the type for new partition.

8. Specify whether the partition should be at the beginning or at the End.
9. Click “Done setting up the partition” and then click “Continue”.

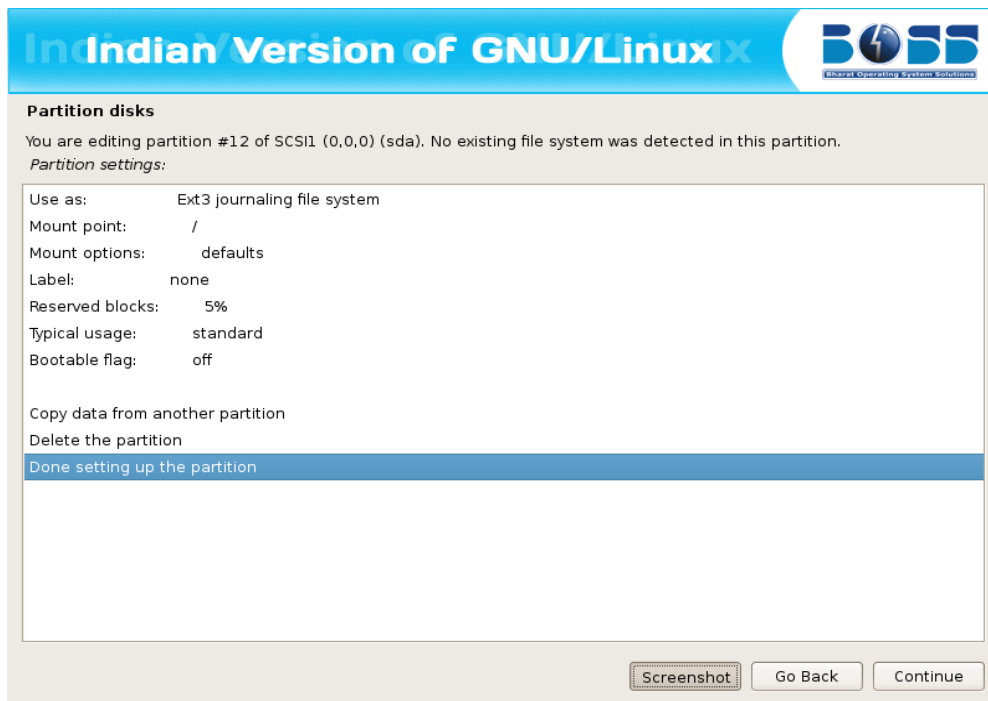


Figure 2.9.22(c) Finish new partition.

After selecting the partition for the “/”, you need to select a partition for the “swap” space. If you are already having Linux installed on your system then you will be having a swap space in your system. If so no need of another swap space. The swap should be double the RAM size. If there is no swap then create a new swap space. The screen shots are as follows:

10. Create swap area of 1GB from free space

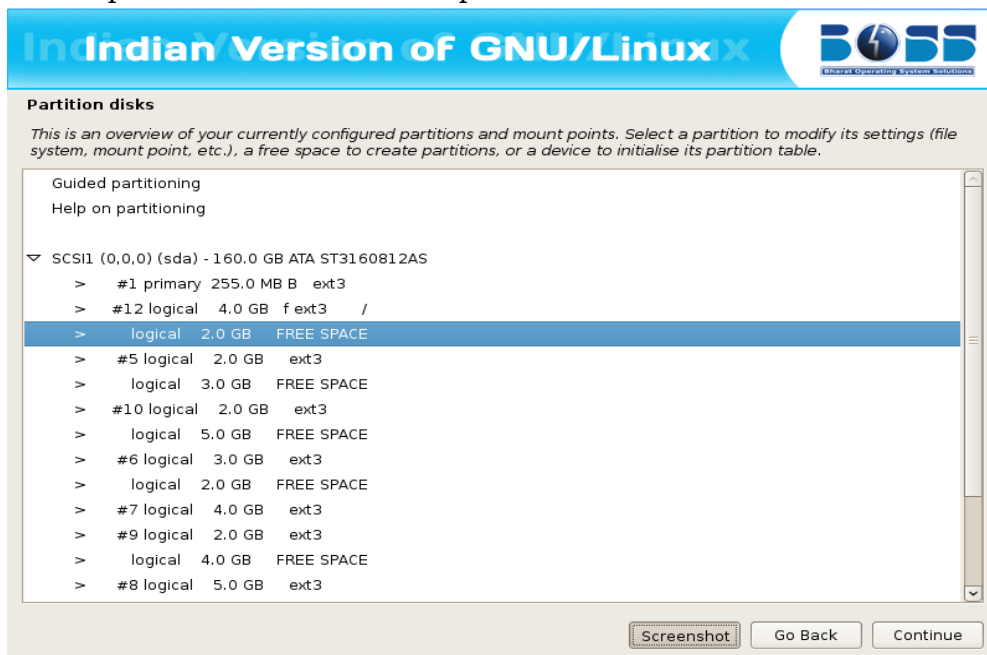


Figure 2.9.23(c) Create Swap area.

11. Create new swap area by double clicking “Create a new partition”.

12. Specify the partition size for swap area as 1.0 GB.

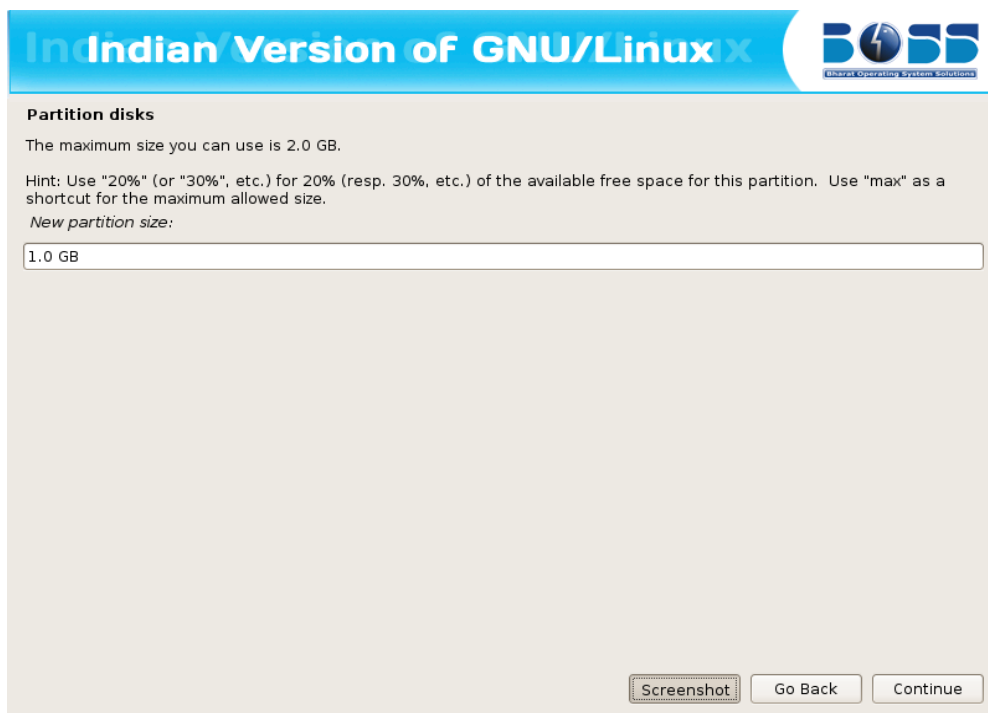


Figure 2.9.24(c) Specify the partition size to create swap area.

13. Select the type for the new partition.

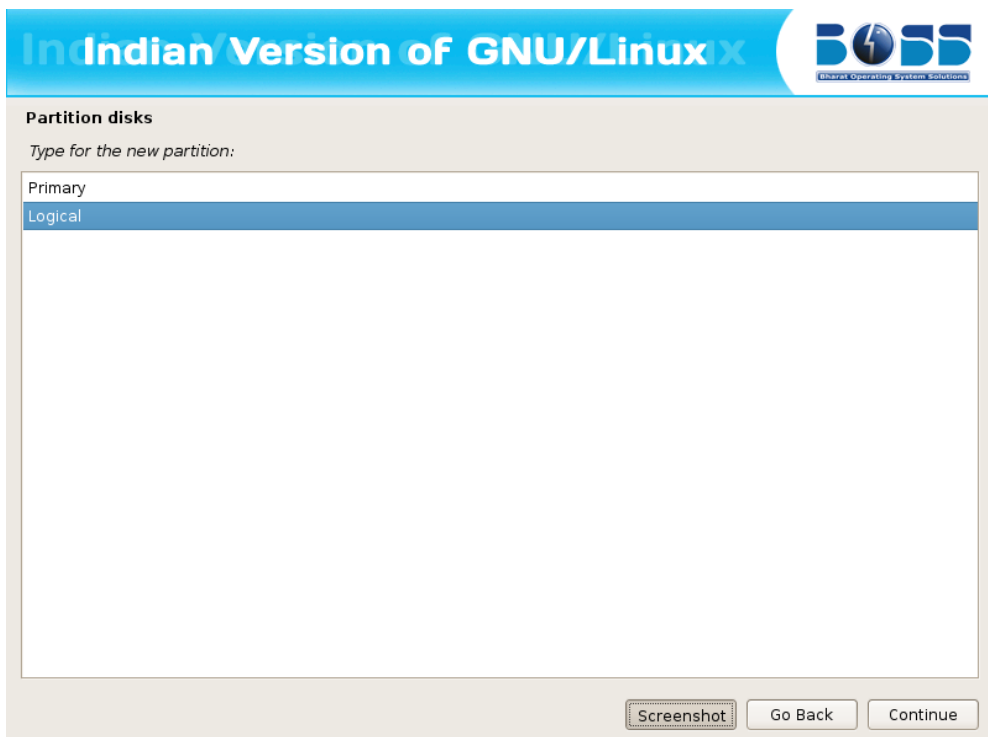


Figure 2.9.25(c) Select the type for new partition.

14. Specify whether the partition should be at the beginning or at the End.

15. Change default file system ext3 to swap by double clicking “Ext3 journaling file system” in the screen shown below.

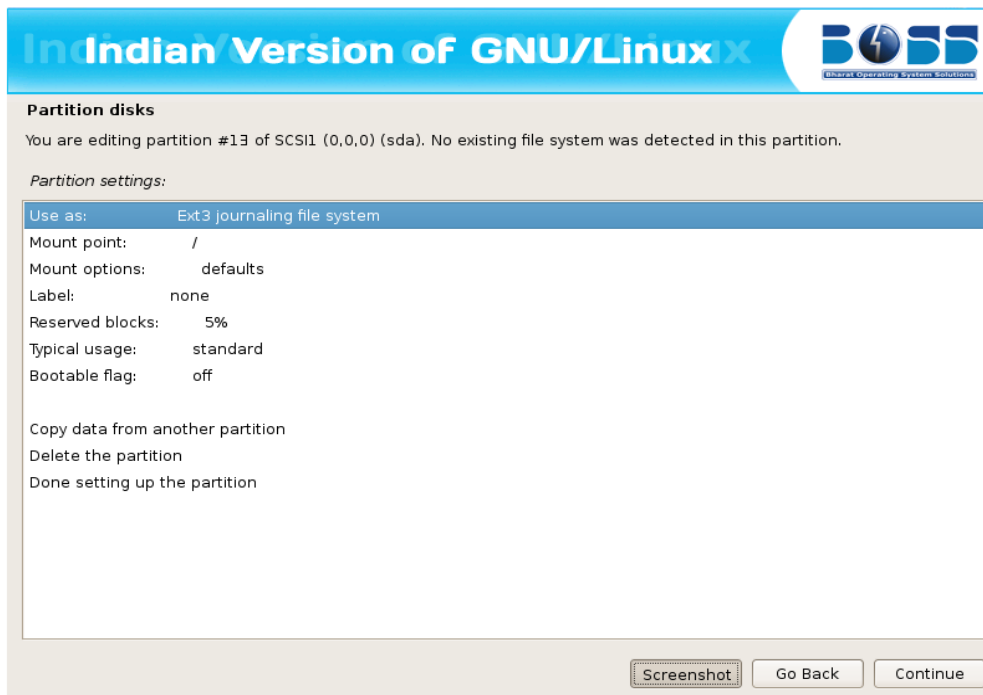


Figure 2.9.26(c) To Change the default file system ext3 to swap

16. Double click on “swap area”.

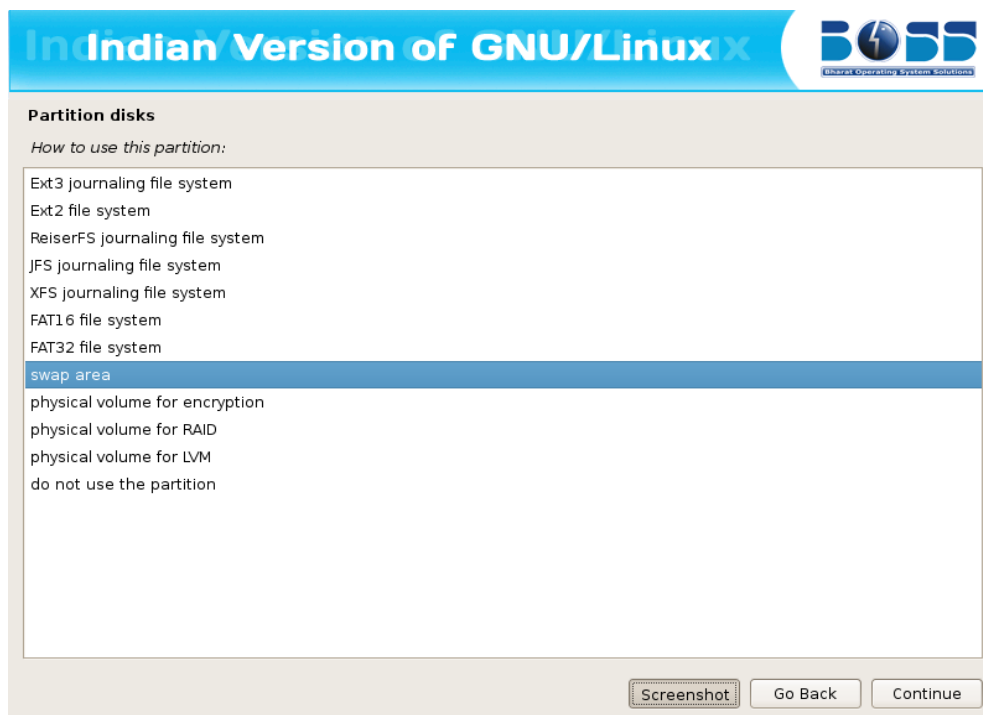


Figure 2.9.27(c) Swap area

17. Creation of swap area is completed. Click on “Done setting up the partition” and then click “Continue”

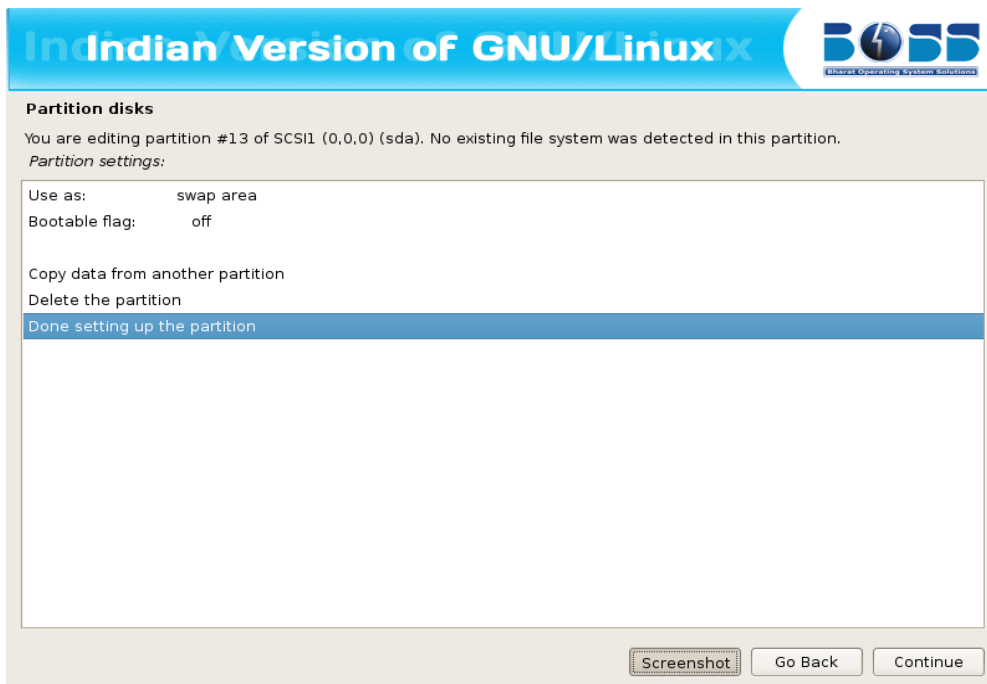


Figure 2.9.28(c) Finish Swap area creation.

18. Finish the partitioning process.

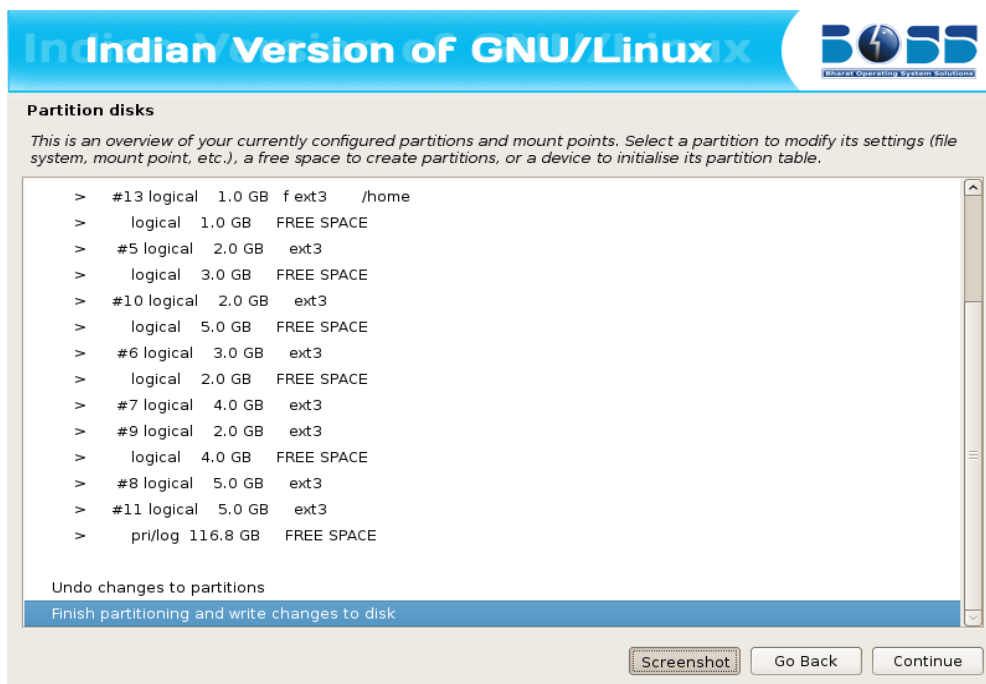


Figure 2.9.29(c) Finish Partitioning.

19. After all the partitions are allocated, you need to write the changes to disk. For this select “Yes” in the following screen and then click “Continue”.

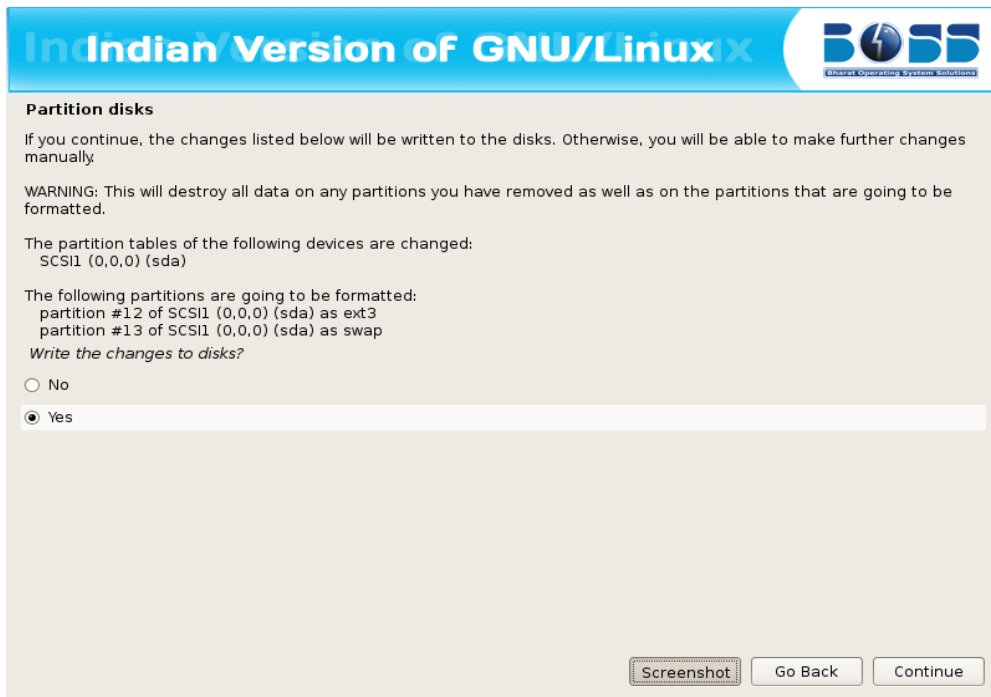


Figure 2.9.30(c) Write the changes to disk.

Resizing the Hard disk Partition

To resize hard disk partition at the time of installing BOSS MOOL GNU/Linux, follow these steps:

1. A screen with name “Partition disks” will be displayed. In that click “Manual” and then click “Continue.”

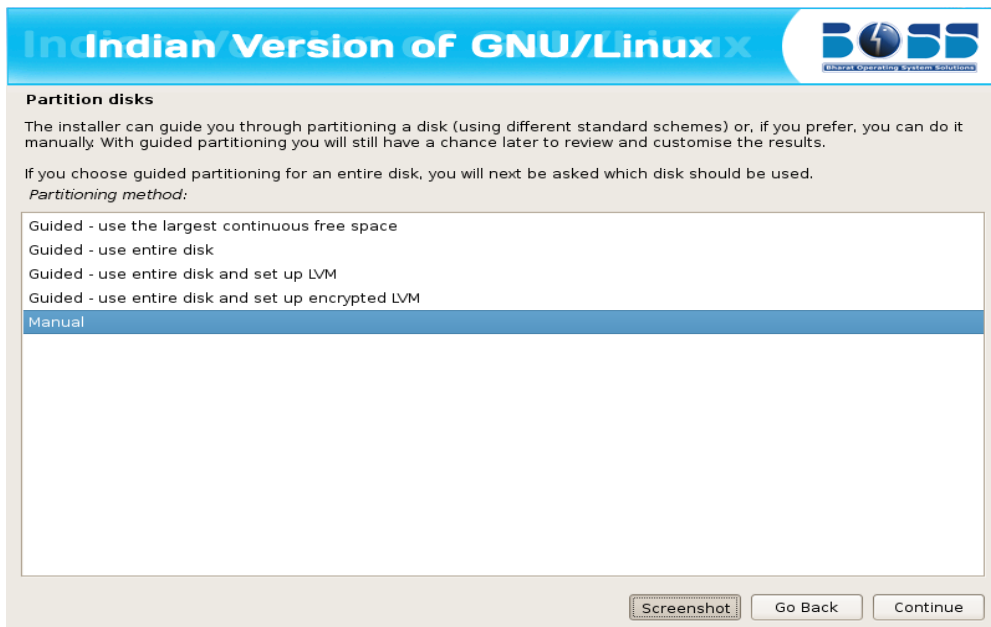


Figure 2.9.31(c) Resizing the hard disk partition.

2. After clicking “Manual” a screen will be displayed which contains overview of your currently configured partitions and mount points. Then click on the partition which you want to resize and then click “Continue”.

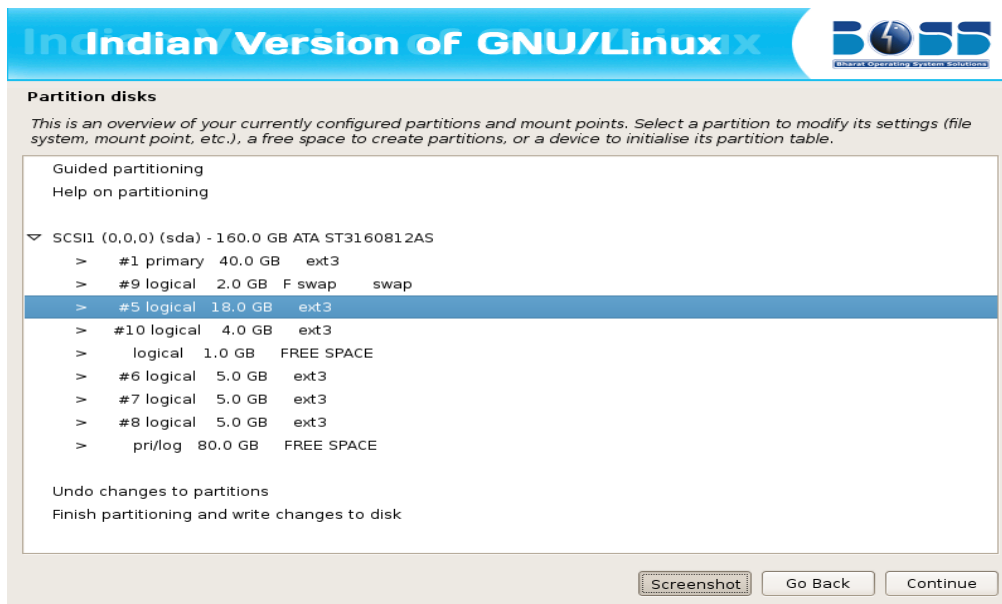


Figure 2.9.32(c) Select the partition which you want to resize.

3. Double click on “Resize the partition”.

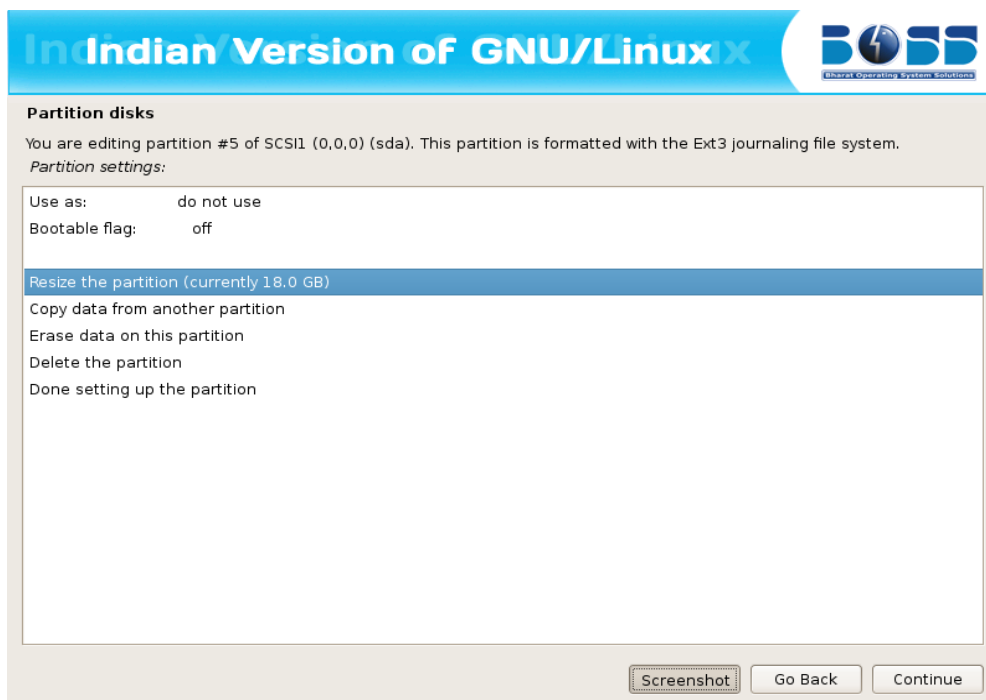


Figure 2.9.33(c) Resize the partition.

4. It will ask the confirmation before writing the changes to disk. Click “Yes” and then click “Continue”.

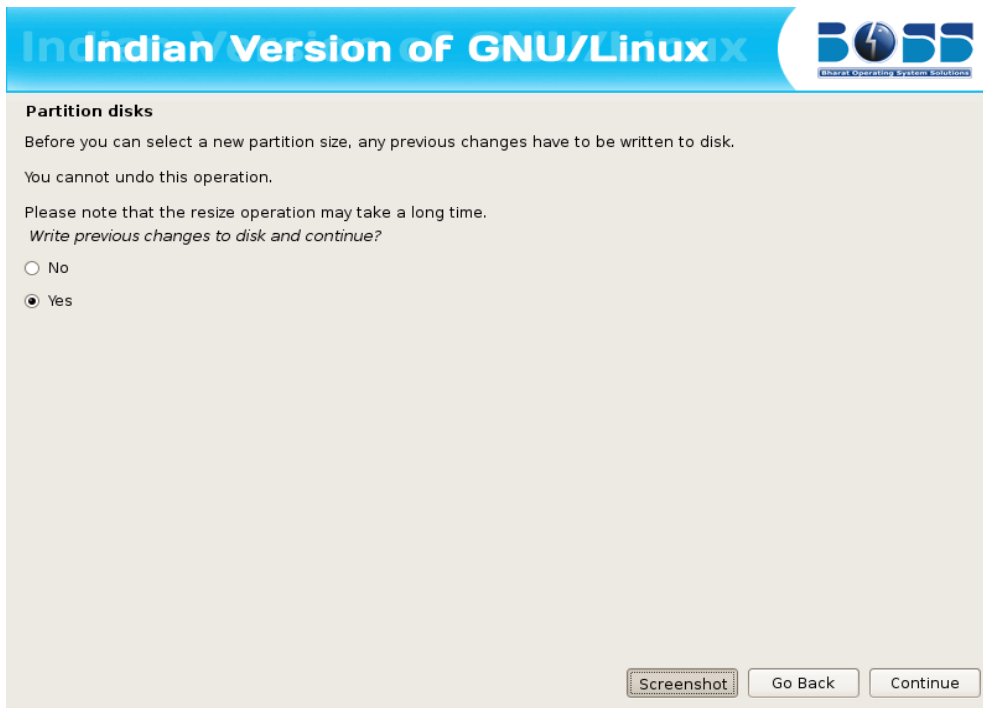


Figure 2.9.34(c) Write the previous changes to disk.

5. This screen will show by default maximum size as a new partition size which you can change as per requirement. You can give new partition size more than whatever required to that particular file system then click “Continue”.

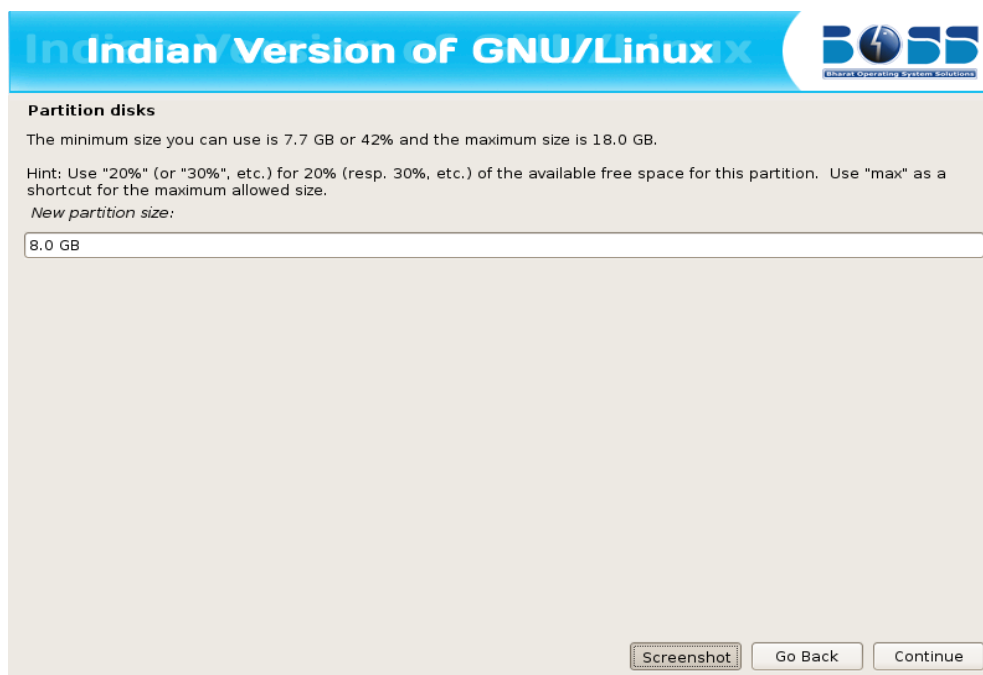


Figure 2.9.35(c) Default size of new partition.

6. Now you have done resizing. You will get some free space to install BOSS MOOL GNU/Linux. Click on free space.

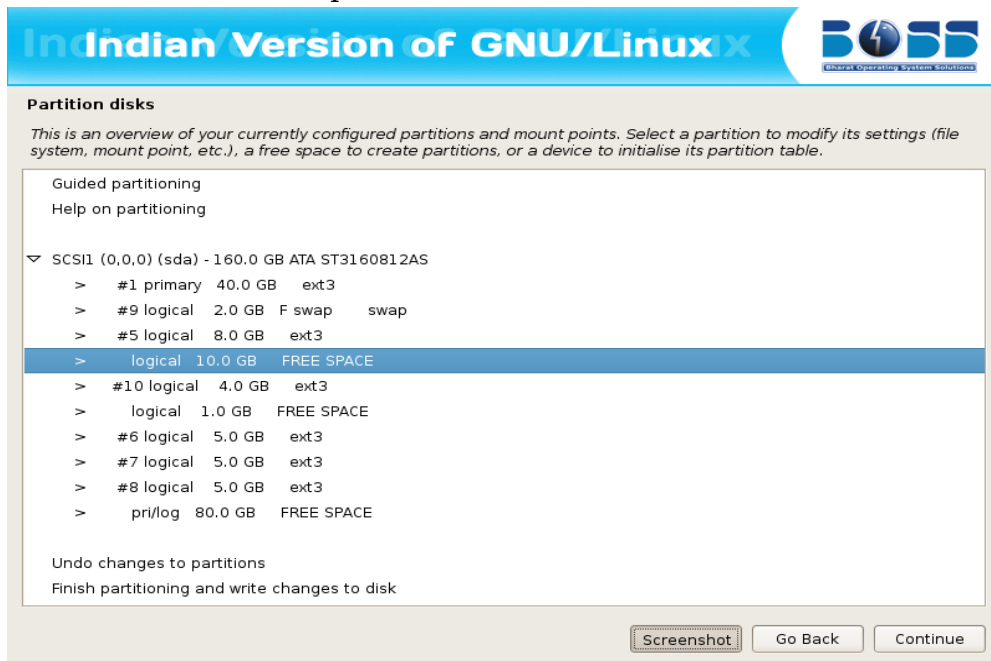


Figure 2.9.36(c) Free Space to create partition.

7. Create new partition for BOSS MOOL GNU/Linux by clicking “Create a new partition”.
8. Give partition size for installing BOSS MOOL GNU/Linux. It should be minimum 5.0 GB.



Figure 2.9.37(c) Specify the size for new partition.

9. Select the type of partition.



Figure 2.9.38(c) Select the type for new partition.

10. Specify whether the partition should be at the beginning or end.



Figure 2.9.39(c) Specify the location for new partition.

11. Partition setting is covered. Click “Done setting up the partition” and click “Continue”.

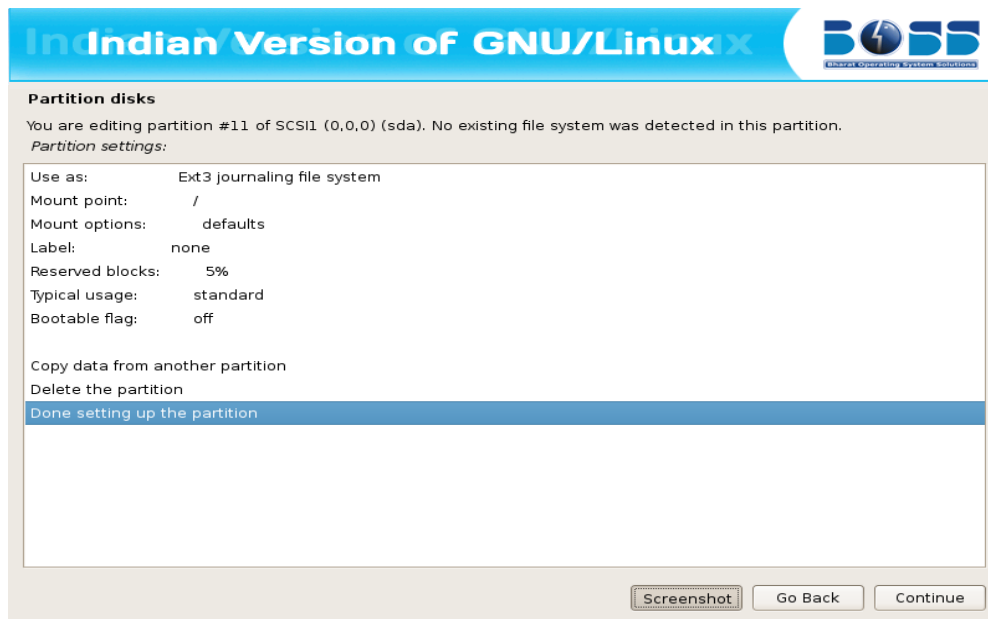


Figure 2.9.40(c) Done setting up the partition.

12. After selecting the partition for the “/”, you need to select a partition for the “swap” space. If you are already having Linux installed on your system then you will be having a swap space in your system. If so no need of another swap space. The swap should be double the RAM size. If there is no swap then create a new swap space by following the steps 8 to 15 in “Creating a new partition” section.

13. Finish the partitioning process.

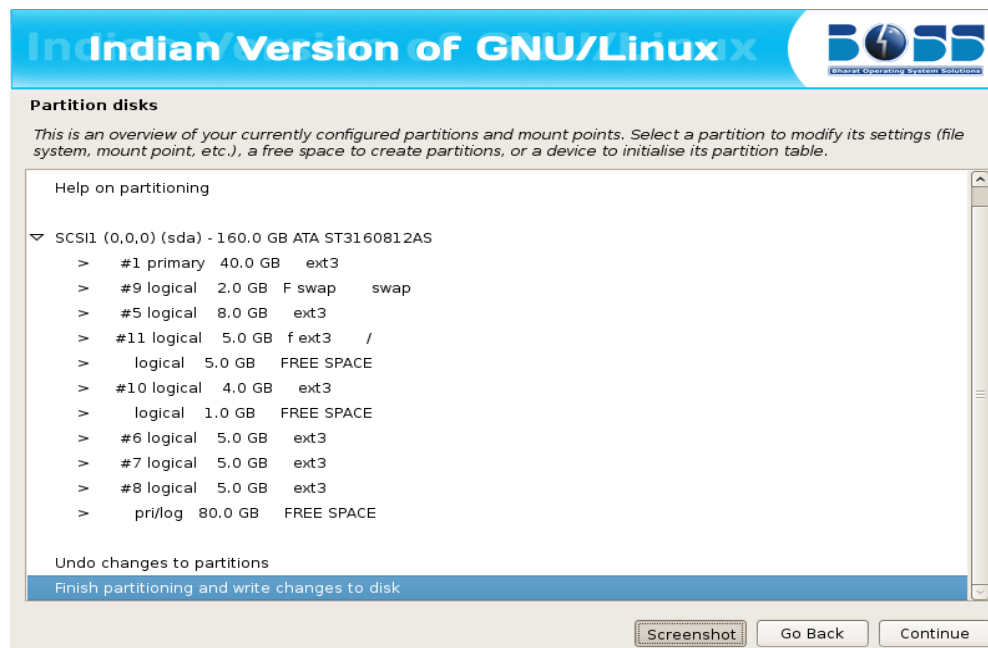


Figure 2.9.41(c) Finish partitioning.

14. After all the partitions are allocated, you need to write the changes to disk. For this select “Yes” in in the following screen and then click “Continue”.

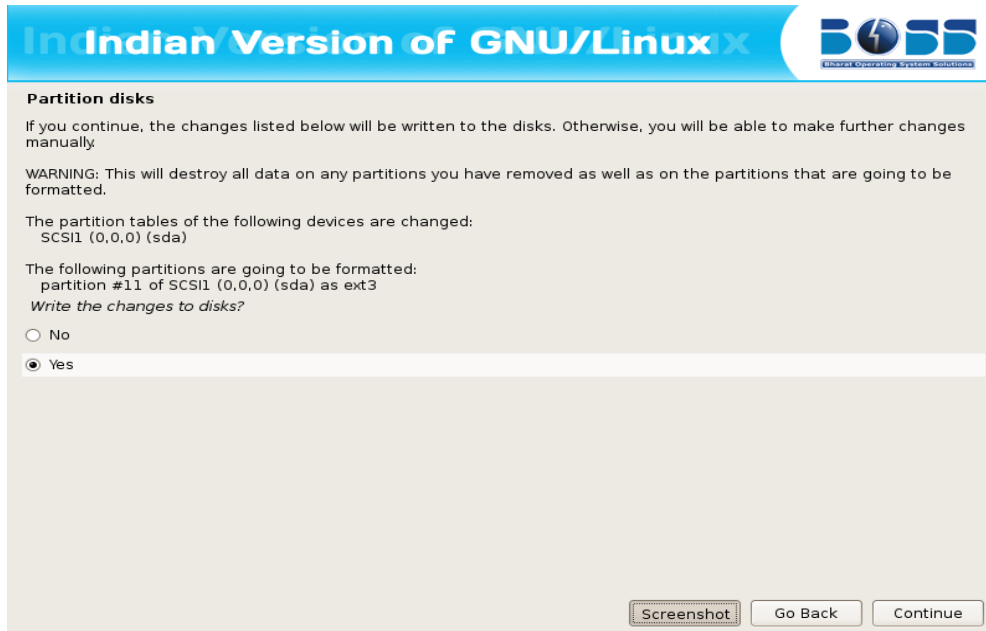


Figure 2.9.42(c) Write the changes to disk.

2.10 Installing the Base System

BOSS MOOL GNU/Linux is ready to install the packages into your system now.

2.11 Software Selection

The first step is to select the packages to be installed. Here BOSS MOOL GNU/Linux provides four categories of packages with a DVD.

Laptop: This installs the laptop related tools like wireless-tools etc.

Standard System: This options also will be enabled by default, as this includes all the standard packages for a system to work properly and some additional packages. BOSS MOOL GNU/Linux recommends not to disable this option.

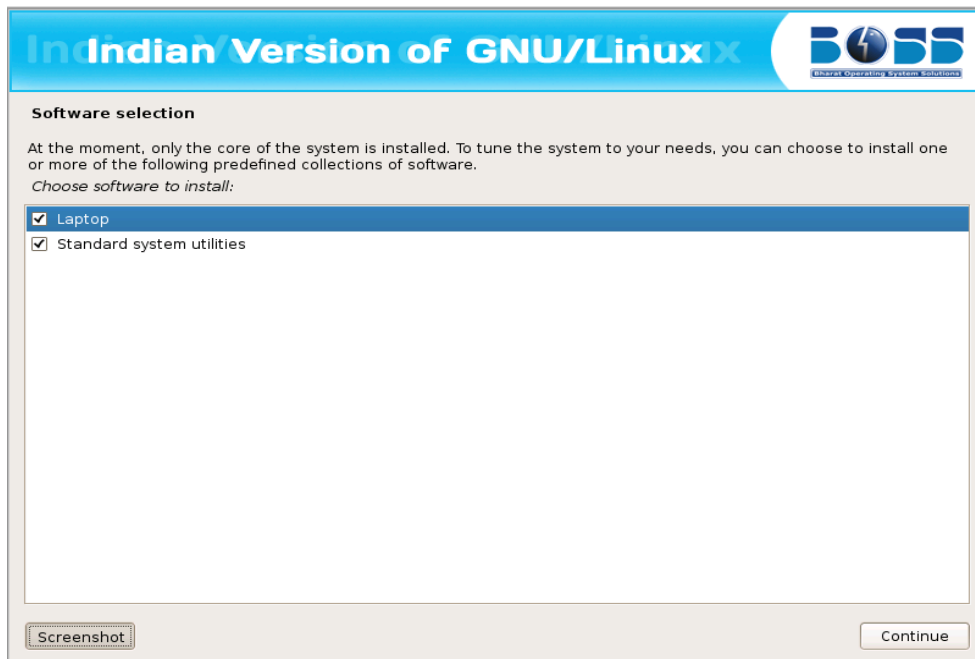


Figure 2.11 Software Selection

In the listed options it is very much needed to set the **Standard System** always selected., since it installs the basic set of Linux. And along with that it is highly recommended to select the Desktop Environment for the user to have Graphical User interface.

3. Tutorial For BOSS MOOL C++ Device Driver

3.1 Introduction:

In this chapter, We introduce some of the basics of the BOSS MOOL: where to get its source, how to compile it, and how to install the new kernel. We then go over the first Hello World sample program.

3.1.1 Guide to write BOSS Mool Device Driver in C++:

A sample C++ Device Driver is available in the BOSS MOOL website (<http://www.bosslinux.in/bossmool>) and also available in the BOSS MOOL DVD.

3.1.2 Steps to Compile & install the C++ driver :

1. Install the BOSS-MOOL distribution using standard Linux system installation procedure.
2. After you installed the boss mool operating system you can find the contents of the mool example from the path /usr/src/mool_example or simply click the icon “ MOOL Example “ is available on your home Desktop.

The contents of the directory are as follows:

hello_imp.C is the C++ module source file that contains a class and few member functions.

Makefile and Makefile_modpost are two files that will be used by 'make' utility to create .ko (kernel object) file that can be inserted into the mool kernel.

Script.sh is a shell script that automates the process of compiling the C++ kernel module and generating the .ko file. In this script, LINUX_HOME variable points to the Linux source code directory and SRC_OBJ is the name of C++ device driver source file (without extension). So these two variables have to be properly set before executing the script.

3. Compile the C++ driver by running script.sh. A loadable kernel module file hello_imp.ko will be generated.
4. Insert the kernel module as root or with sudo:
\$sudo insmod hello_imp.ko

5. Check the dmesg for the message:

```
$dmesg
```

Constructor is being called

Hello world!!

Module inserted:

6. To know the loaded module name

```
$lsmod
```

Module	Size	Used by
--------	------	---------

hello1_imp	2933	0
------------	------	---

7. To remove the mod

```
$sudo rmmod hello1_imp
```

```
$dmesg
```

Module removed:

3.2 Writing first Module Hello World Program

Below is an example of a simple C++ program:

```
// 'Hello World!' program
```

```
#include<c++/begin_include.h>
#include<linux/module.h>          // Needed by all modules
#include<linux/kernel.h>          // Needed by all KERN_INFO
#include<c++/end_include.h>
```

```
MODULE_LICENSE("GPL");
MODULE_DESCRIPTION("LKM in c++");
MODULE_AUTHOR("MOOL");
```

```
void *__ctors_start;
void * get_mm_counter;
```

```
class hello
{
public:
    hello();
    void hi();
};
void hello::hi()
{
    printk("Hello world!! \n");
}
hello::hello()
```

```

{
    printk("Constructor is being called \n");
}
extern "C"
{
    static int __init test_classes_init()    //called when the module is loaded.
    {
        class hello obj;
        obj.hi();
        printk("Module inserted:\n");
        return 0;
    }
    static void __exit test_classes_fini()  //called when the module is removed.
    {
        printk("Module removed:\n");
    }

    module_init(test_classes_init);
    module_exit(test_classes_fini);
}

```

When you write a program you use a development environment. Your development environment can be a basic text editor or a feature rich C++ integrated development environment (IDE). You should not use a word processor like Microsoft Word, because it adds formatting codes to the text.

Now let's understand the module code line by line.

Before We Begin

Before we delve into code, there are a few issues we need to cover. Everyone's system is different and everyone has their own groove. Getting your first "hello world" program to compile and load correctly can sometimes be a trick. Rest assured, after you get over the initial hurdle of doing it for the first time, it will be smooth sailing thereafter.

What Is A Kernel Module?

Modules are pieces of code that can be loaded and unloaded into the kernel upon demand. They extend the functionality of the kernel without the need to reboot the system.

Compiling Kernel Modules

Kernel modules need to be compiled a bit differently from regular userspace apps. Former kernel versions required us to care much about these settings, which are usually stored in Makefiles. Although hierarchically organized, many redundant settings accumulated in sublevel Makefiles and made them large and rather difficult to maintain.

So, let's look at a simple Makefile for compiling a module named `hello_imp.c`:

Example : Makefile for a basic kernel module

```
obj-m += hello_imp.o
```

```
#all:
```

```
    make -C /lib/modules/$(shell uname -r)/build M=$(PWD) hello_imp.o
```

```
clean:
```

```
    rm -rf *.o *.ko *~ core .depend *.mod.c *.cmd .tmp_versions *.o.d
```

From a technical point of view just the first line is really necessary, the "all" and "clean" targets were added for pure convenience.

Now you can compile the module by issuing the command **make**.

Running hello

Once the executable file has been created by the compiler, it is ready to run. This can be accomplished on some systems by merely typing the file name and pressing the ENTER key. On other systems, it might be necessary to precede the file name with a dot and a forward slash and then press the ENTER key, i.e.,

```
./script.sh
```

The result will be to write the text *Hello, world!* on the monitor screen.

Headers:

Every module includes various header files. Some header files depend upon to which particulars system we are going to add the module, e.g.memory, networking, block device driver etc. There are some header files which are independent to which subsystem we are adding code. No matter for whatever purpose we are writing the module, those header files have to be included always. Those header files are module.h, version.h, kernal.h etc.

In the above example we have used the below given header files,

```
#include<linux/module.h>           // Needed by all modules
```

```
#include<linux/kernel.h>          // Needed by all KERN_INFO
```

Entry and Exit Routines:

The `__init` macro causes the init function to be discarded and its memory freed once the init function finishes for built-in drivers, but not loadable modules. If you think about when the init function is invoked, this makes perfect sense.

There is also an `__initdata` which works similarly to `__init` but for init variables rather than functions.

In the above program we have used the static int class. It will call when the module is loaded.

```
static int __init test_classes_init()
```

The `__exit` macro causes the omission of the function when the module is built into the kernel, and like `__exit`, has no effect for loadable modules. Again, if you consider when the cleanup function runs, this makes complete sense; built-in drivers don't need a cleanup

function, while loadable modules do.

In the above program we have used the static int class. It will call when the module is removed.

```
static void __exit test_classes_fini()
```

Printk():

printk() prints a kernel message. Its syntax is same as of printf(). It is available to entire kernel space. We can view the output of printk() in /var/log/messages or also we can use 'dmesg' command to see the output of printk().

Comments and License:

These are module comments and add additional information to the module.

```
MODULE_LICENSE("GPL");  
MODULE_DESCRIPTION("LKM in c++");  
MODULE_AUTHOR("MOOL");
```

MODULE_DESCRIPTION() is used to describe what the module does, MODULE_AUTHOR() declares the module's author, and MODULE_LICENSE() declares what types of Licence the module supports.

Comments

The line added at the beginning:

```
// This program justs displays a string and exits
```

is a comment that tries to explain what the code does. Comments are essential to any non-trivial program so a person who is reading the code can understand what it is expected to do. There is no restriction to what is contained between the comment delimiters. The compiler just ignores all that is there in the comment. Comments are shown italicized in our examples. C++ supports two forms of comments:

- Single line comments start with a // and extend upto the end of the line. These can also be used to the right of statements to explain what that statement does.
- Multi-line comments start with a /* sequence and end with a */ sequence. These can be used for comments spanning multiple lines. These are also known as C-style comments as this is the only type of comments available in C. e.g.

NOTE : Details of BOOS MOOL Device Driver Competition.

We are conducting the competition for BOSS MOOL Device Driver from 15th May to 15th Sep 2013.

Those who are willing to participate in this Please post your driver code in the BOOS MOOL website <http://dos.iitm.ac.in/DeviceDriver/>

For more details Kindly visit the above mentiond website.