Linux: Getting Started HowTo Guide

A technical howto document presented to H3ABioNet



Created by The System Administrator Task-force

Prepared for The greater H3ABioNet and H3Africa Consortium community

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Acronyms and Abbreviations

Acronym and Abbreviations	Description
BIOS	Basic Input Output System
1/0	Input / Output
OS	Operating System
POST	Power On Self-Test is performed once the server is switched on. The POST tests the hardware before booting into the OS
RAID	(Redundant Array of Independent Disks) is often implemented to introduce redundancy across the server's internal physical disk drives.

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1. Introduction

This howto guide provides step by step instruction for installing the Scientific Linux 6.4, Ubuntu 12.4 and Debian 7 server operating systems onto your Dell C6145 server. It includes detailed instruction for installing and configuring a software RAID volume using the default RAID utility bundled with Debian and Ubuntu as well as creating hardware RAID volume using the internal PERC H700 RAID controller shipped with the server chassis. The document includes three additional sections which discuss how to navigate the Linux file system, using command line (CLI) text editors and some useful commands to get you started.

The Dell C6145 is referred to as a headless server meaning that it does not come equipped with a built-in DVD ROM. Your installation options therefore are: (a) use an external USB DVD ROM, (b) a USB memory stick or (c) a network based installation (PXE).

The simplest method of installing your OS is via an external USB DVD ROM, hence, this howto guide follows a USB DVD ROM installation.

In this howto guide we will provide instruction for the following:

- Configure the server BIOS to boot from a USB DVD device
- Configure a RAID volume (hardware or software based), and
- Installation of one of the three supported OS's (Ubuntu, Debian or Scientific Linux)
- How to navigate a Linux file system
- How to edit files from the command line
- Useful commands
- To learn more about configuring and securing your server -refer to document two in this series- "Linux: Configuring and securing your server howto guide".

2. Support Contact Information

Table 1 below lists all the support contact details for the C6145 server. Both groups of support personnel will provide both hardware and software support to H3ABioNet consortium members. The H3ABioNet helpdesk will however provide additional bioinformatics support.

Vendor	Contact Number	Contact Person	Description
Dell Support	011 709 7729	Call Centre	To access the official dell helpdesk, you would need to supply the server's service tag. This is often made up of seven characters and located on the face of the server
H3ABioNet Helpdesk	helpdesk@h3abionet.org	Helpdesk	Log all calls via the H3AbioNet helpdesk and a support specialist will be assigned to your call

Table 1

3. Hardware Settings

Table 2 below has been provided to allow you to record your hardware settings:

Table 2

Asset Tag:		Hostname:		DN	S name:		
Operating Syst	tem:				Versi	on:	
RAID Configur	ation:						
			Netw	orking			
Eth0							
IP Address:				Static	or DHCP	Assigned:	
Subnet Mask:			Default Ga	teway:			
Primary DNS:			Sec	ondary D	NS:		
MAC Address:		0	Card Speed	:	Swi	tch Port:	
Additional Notes:							
Eth1							
IP Address:				Static or	DHCP A	Assigned:	
Subnet Mask:			Default G	ateway:			
Primary DNS:			Sec	ondary D	NS:		
MAC Address:		Card Speed:		:	Swi	tch Port:	
Additional No	tes:						

4. BIOS Configuration

Before you can install your OS, you need to configure your server to use your preferred installation method. The Dell C6145 server does not have an internal DVD ROM, this therefore leaves you with three options of installing your OS; (a) use a USB DVD ROM, (b) use a USB memory stick or (c) install your OS via PXE (network installation). In this step by step guide, we used an external USB DVD ROM for installing the OS.

4.1. First we need to configure your server to boot from USB > switch on the C6145 server > when the Dell logo is displayed, depress the "F2" key to invoke the BIOS configuration



4.2. From the BIOS configuration screen > using your keyboard's arrow keys, navigate to the "**Boot**" menu option and then select the "**Boot Device Priority**" option



4.3. With the "Boot Device Priority" option highlighted, depress the "enter" key to access this option > from the pop up screen, scroll to the desired option and depress the "enter" key to select your boot device option. For the purposes of this step by step guide, we will be using the external USB DVD ROM method of installation.



4.4. Now exit and save the configuration by using your arrow keys on your keyboard to navigate to the "Exit" menu option > scroll down and select the "Save Changes and Exit" option – alternatively you can depress the "F10" key on your keyboard to save and exit the BIOS menu.

Mater			BIOS SETU	P UTILITY	
nain	Havanced	Boot	Security	Server	Exit
Exit (Options				Exit system setup
Save (Discar	Changes and E rd Changes an	xit d Exit			changes.
Disca	rd Changes				F10 key can be used
Load (Load)	Dptimal Defau Failsafe Defa	lts ults			
Save (Load (Customized De Customized De	faults faults			
					↔ Select Screen 1↓ Select Item Enter Go to Sub Screen
					F1 General Help F10 Save and Exit ESC Exit

4.5. Excellent, you have just configured your server to boot from your external USB DVD ROM device. The next step is to create a RAID volume on which to install your OS. There are two methods of creating a RAID volume presented in this howto guide. The first method is a software RAID which was used on the Ubuntu and Debian installations where the software RAID utility bundled with the respective Linux OS was used. The second is a hardware RAID configuration which was used in the Scientific Linux installation utilizing the Dell PERC H700 hardware RAID controller supplied with the C6145 server.

5. Redundant Array of Independent Disks (RAID)

5.1. RAID Overview

The acronym "RAID" stands for "Redundant Array of Independent Disks" which ultimately is the process of striping data across multiple physical disks to either provide the OS access to a larger disk volume or to introduce data protection via various levels of fault tolerance. See table 3 below for RAID level descriptions for some of the more commonly used RAID configurations.

Most RAID controllers / utilities make allowances for using a physical disk/s as "hot spares". A hot spare is a physical disk that is not part of any RAID configuration but is used by the RAID volume to automatically replace a failed physical disk drive in the event of a physical disk failure within the specified RAID volume.

Note:

Once you have a physical disk failure, it is of utmost importance that you order your replacement disk drive from Dell and replace any faulty disk drive/s as soon as possible. If you continue to operate your server with the failed disk drive -you lose all disk drive fault tolerance and are at great risk of losing your data contained on the RAID volume.

5.2. RAID Levels

There are multiple RAID levels. The more commonly used RAID configurations are listed in the below table with a brief description for each level

Table 3	
RAID Level	Description
RAIDO	This RAID level does not offer any fault tolerance. Instead it serves as a way of grouping all of your physical disk drives together and presents a single larger volume to the OS as opposed to individual disk drives. This level offers the fastest read / writes speeds compared to other RAID levels as there is no fault tolerance to be written back to the disks. In the event of a single disk failing, your RAID will become inaccessible and you could potentially lose all data on this RAID. This RAID level requires a minimum of two physical disk drives
RAID1	Referred to as a "mirror" RAID. This configuration requires two physical hard disks and effectively mirrors each other. In the event of one physical disk failing, the mirrored disk drive takes over operation without any disruption to production. The failed disk should be replaced and the mirror rebuilt to restore the fault tolerance provided by this RAID level.
RAID5	RAID5 is configured across a minimum of three physical disk drives and is often referred to as a "striped with parity RAID". This level allows for the failure of one physical disk drive in the RAID without disrupting productivity. Should a second disk fail –the RAID will become inaccessible and all data would potentially be lost.
RAID6	This RAID level is often referred to as "striped with dual parity" and works much same as RAID5 above but allows for a maximum of two disk failures without disrupting productivity.
RAID10	RAID10 is a combination of RAID1 and RAID0. Effectively, the physical disk drives are looped together in a RAID0 configuration and then mirrored to introduce a level of redundancy. This option is often reserved for devices housing many disks and would not prove useful for your C6145 server.

5.3. Hardware RAID vs software RAID

There are pro's and con's to both systems. Hardware RAID controllers manage the RAID volume/s which reduces the I/O burden on the OS and is considered to be faster. The disadvantage however is that in the event of a RAID controller failure, you would need to find the same type of RAID controller to replace the faulty one as other makes or models will often be incompatible. This really only becomes a problem for older servers where the RAID controller is so old, it has been discontinued.

A software RAID is as its name suggests –is built into the OS layer. There is a high I/O burden as the OS has to manage the RAID I/O and is often shied away from. The advantage here though is that if you ever need to replace your RAID, it is easily achieved as the RAID is software based and can be reinstalled at any time.

On the C6145, if you would like to use a RAID5 or RAID6 volume –you will have to use a software RAID as the built-in hardware RAID controller does not accommodate RAID level 5

It is recommended that you use a RAID 1 configuration for your OS installation and RAID 5 or 6 for your data storage area. As you are limited by the number of physical disk drives your server chassis can accommodate, RAID5 would probably be better suited as it will provide sufficient fault tolerance while maximizing your disk storage space.

The major difference between RAID5 and RAID6 is the amount of disks you lose to parity. In RAID5, you lose one disk to parity while in a RAID6 you will lose two disks to parity. The benefits however is that you can survive a two disk failure in a RAID6 and only a single disk failure in RAID5.

6. Hardware RAID Setup and Configuration

The PERC H700 internal RAID controller supplied with your C6145 server can accommodate a RAID0, 1 or 1E/10 configuration. The RAID controller is capable of hosting two separate configurations simultaneously. For example: configuring a RAID 1 for your OS and a RAID 5 for your data storage. The below instruction will guide you through configuring a RAID volume. Simply repeat the steps for each RAID configuration you require.

To successfully create a working hardware RAID volume you would need to first invoke the RAID configuration utility > Choose your RAID option > Select the physical disks that will form part of the RAID > define a hot spare should you prefer having one > Create the RAID > Initialize your newly created RAID > Ensure the RAID you intend booting with is selected as the boot device > Redo to configure a second RAID option or finish to begin installing your server OS.

6.1. Your Dell C6145 server ships with the physical hard disks already installed. Your server should have 5 x 2TB 3.5" Near Line SAS disk drives > Switch on your Dell C6145 server > during the boot process, look for the text displayed in the below image > depress the "Ctrl" and "R" keys simultaneously to invoke the built-in RAID configuration utility.

PowerEdge Expandable RAID Controller BIOS Copyright(c) 2010 LSI Corporation Press <Ctrl><R> to Run Configuration Utility

6.2. From the virtual disk management screen > navigate down to the "**RAID Properties**" option and depress your "**enter**" key

Adapter	SAS 2008 FW v2.4
PCI Slot	1B
PCI Address(Bus/Dev)	02:00
MPT Firmware Revision	14.00.02.00-IR
SAS Address	500A0D10:0067F970
NVDATA Version	0E.03
Status	Enabled
Boot Order	0
Boot Support	[Enabled BIOS & OS]
RAID Properties SAS Topology Advanced Adapter Properties	

6.3. The next screen will allow you to create a RAID volume or view an existing volume's properties: to view the properties of an existing volume, navigate to the "View Existing Volume" option and depress your "enter" key > to create a RAID volume, navigate to the desired RAID level and depress the enter key.

Note:

The option to view an existing RAID volume is only displayed if there is an existing RAID volume present. The RAID controller which comes bundled with the C6145 can only accommodate a RAID0, 1 or 1E/10

View Existing Volume	View the existing configuration.
Create RAID 1 Volume	Create a RAID 1 volume consisting of 2 disks plus up to 2 optional hot spares. ALL DATA on volume disks will be DELETED!
Create RAID 1E/10 Volume	Create a RAID 1E or RAID 10 volume consisting of 3 to 10 disks including up to 2 optional hot spares. ALL DATA on volume disks will be DELETED!
Create RAID 0 Volume	Create a RAID 0 volume consisting of 2 to 10 disks. ALL DATA on volume disks will be DELETED!

6.4. The following screen allows you to select the physical disks you wish to include in your RAID configuration. Use your arrow or tab key to navigate to the "RAID Disk" column and use your space bar or +/- keys to toggle between "No" or "Yes". Changing this setting to "Yes" includes the physical disk into RAID configuration, similarly, selecting "No" removes the physical disk from the volume > Once you have chosen all disks you which to include in the RAID, depress the "C" character on your keyboard to create the RAID volume.

Vo I Vo I	ume Typ ume Siz	e: e(GB):		RAID 837	1		
Slot Num 0 1 2 3 4 5 6 7 8 9 10 11	Device WD WD WD WD WD WD WD WD WD WD WD WD WD	Identifier WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG	D154 D154 D154 D154 D154 D154 D154 D154	RAID Disk [Yes] [Yes] [No] [No] [No] [No] [No] [No] [No] [No	Drive Status Primary Secondary Max Dsks Max Dsks	Pred Fail No No No No No No No No No No	Size (GB) 838 838 838 838 838 838 838 838 838 83



6.5. Once the RAID volume has been built, you will be redirected to the RAID utility's home screen. From this point you can chose to configure another RAID volume or view the properties of an existing volume. Select "**View existing volume**" -the next screen will present a summary of the RAID volume you just created. Information supplied will show the RAID level and the disks included in the RAID. Note the RAID is listed as 0% initialized. You need to first initialize the RAID volume before it can be made available to the server and OS.

	Volume Identifi Type Size(GB) Status Task	ier)	1 LS RA 83 Op 02	of 1 I ID 1 7 timal Initi	Logical alized	Volume 300	00	
Slot Num	Manage L Device	Jolune Identifier		RAID Disk	Hot Spr	Drive Status	Pred	Size
0 1	WD WD	WD9001BKHG WD9001BKHG	D1S4 D1S4	Yes Yes	No No	Primary Secondary	No No	837 837

6.6. Navigate to "**Manage Volume**" and depress your enter key. From the manage volume screen you could delete, activate the RAID volume or create and manage a hot spare should you wish to use any.

ldentifier Type Size(GB) Status Task	LSI Logical Volume 3000 RAID 1 837 Optimal 0% Initialized
Manage Hot Spares	
Consistency Check	
Activate Volume	
Delete Volume	
Online Capacity Expansion	on

• To define a hot spare > choose the "Manage Hot Spares" option from the below screen > navigate to the physical disk you wish to dedicate as the hot spare > tab or navigate via the arrow keys to the "Hot Spr" column and depress your space bar or use the +/- keys to toggle between the "No" and "Yes" options. Selecting the "Yes" option will configure the selected disk as the nominated hot spare > depress the "C" character to commit changes > depress the escape key to return to the previous menu.

	Identi Type Size((Status Task	ifier 38) 5	LS RA 83' Op: 0%	I I ID 1 7 timal Initia	logical Volu lized	ne 300	0
Slot Num 2 3 4 5 6 6 7 8 9 9 10 11 Esc = Snor	Devic WD WD WD WD WD WD WD WD WD WD Exit	CE Identifier WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG WD9001BKHG	D1S4 D1S4 D1S4 D1S4 D1S4 D1S4 D1S4 D1S4	Hot Spr [No] [No] [No] [No] [No] [No] [No] [No]	Drive Status	Pred Fail No No No No No No No	Size (GB) 838 838 838 838 838 838 838 838 838 83
Space	/+/-	= Change Item		C = C	ommit Changes	5	

• From the manage volume window choose to active the volume. Once initialized, the newly created RAID volumes will display during the boot process.

LSI Corporation MPT Sf MPT2BIOS-7.27.00.00 (2 Copyright 2000-2012 LS	AS2 BIOS 2012.07.02) 31 Corporation.	
PCI ENCL LUN VENDOR SLOT SLOT NUM NAME	PRODUCT IDENTIFIER	PRODUCT SIZE N REVISION NVDATA
27 LSI 27 LSI 27 LSI 27 LSI	SAS2008-IR Logical Volume Logical Volume	14.00.02.00 NV 0E:03 3000 898.9 GB 3000 8.989 TB
LSI Corporation MPT2 b	oot ROM successful	lly installed!

 If you see the above screen during the boot process, you have successfully created a hardware RAID volume. You can now proceed onto the next step - installing your server OS.

Note:

If you prefer to us a software RAID, instructions to setup a software RAID are part of the Ubuntu and Debian installations. Should you wish to configure a hardware RAID, simply ignore the software RAID instructions in the Ubuntu and Debian installation and use the above hardware RAID instructions

7. Operating System Installation

An Operating System (OS) at its most basic definition is a piece of software which installed on a computer system's hard drive. Its purpose is to manage the computer system's hardware and act as a go between the user applications and the hardware present in the computer. An OS is an integral part of any computer system, all applications developed is dependent on an underlining OS to function.

7.1. Choosing a Linux distribution

Linux has many distributions and each distribution have multiple releases of the OS. Each one has its own set of advantages and disadvantages. To simplify support via the H3ABioNet helpdesk, the system administrator task force has identified the following community based Linux distributions: Ubuntu, Scientific Linux and Debian as the officially supported OS's. This decision by no means excludes other Linux distributions; it does however mean that official documentation will only be generated for the above distributions. With that in mind, one of the biggest questions asked when deciding to install Linux is "Which Linux distribution is best for me?" The metrics you use to compare between distributions largely depend on what you want to do with your Linux server. Below is a short list of the more commonly used metrics to determine which distribution is better suited for your need and that of the organization.

Ease of use

This has to be the number one question on everyone's mind when deciding on using Linux as the OS. The term "ease of use" is often loosely used when talking about applications or operating systems but what does it really mean to you? A novice to Linux might find any Linux distribution intimidating and not user friendly while an expert would easily navigate around the file system. The desktop components of an OS are generally much easier to use when compared to their server counterparts, this is largely due to the fact that a desktop system has a graphical user interface (GUI) whereas a server does not. Unlike Microsoft Windows, all interaction with a Linux server is via the command line which can be intimidating at first.

The Debian and Scientific Linux (SL) Linux distributions are not considered user friendly for the novice Linux user as they come shipped with minimal software and generally provide a slower software release cycle which could prove problematic for hardware compatibility. Ubuntu however is a bit more feature rich and maintains a shorter software release cycle. Ubuntu was specifically designed for the Linux newbie while Debian and SL is gear more towards the seasoned Linux user. Out of the box, Ubuntu has a lot more applications and driver support while the Debian and SL adopts a more minimalistic approach to their OS builds. From an ease of use perspective, Ubuntu seems to win this round as you will find an Ubuntu installation a lot easier with all the hardware often detected and supported - this is not always the case with the Debian and SL distributions.

Hardware Compatibility

The next question on everyone's lips after ease of use is often the hardware compatibility of an OS. Different distributions package a range of drivers and useful applications while other package not so useful applications making the OS application heavy. The first step in deciding which distribution to use would be to research and identify if the distribution you intend installing on your server has driver support for all your hardware, next look at what default features it comes bundled with such as system administration, network management applications etc. Please bear in mind that if your

distribution does not have a driver or feature that you need; you could easily acquire the required software via the repository or the manufactures website. The important part is that your OS supports the hardware.

Lucky for us, the Dell C6145 server hardware is compatible with all three distributions we are officially supporting; hence, you can choose either OS. In this instance, all three distributions are winners.

Application and OS stability

Another hot topic is the matter of OS updates and release life cycles. Different Linux distributions have different release and update cycles. Debian for instance does not have pre-set release dates. They do however have at any one point, three versions of a distribution running: Unstable, testing and stable. Unstable is the initial version which is then polished and moved into a testing release and once all the release bugs have been resolved, it is moved into a stable release. This robust testing of the OS before it is released is considered by most the makings of a very stable OS, the disadvantage however is felt in potential hardware compatibility issues.

Ubuntu which is based on the Debian distribution provides releases every 6 months which is supported for 9 months while the long term support (LTS) releases are produced every 2 years and supported for 5 years. While the OS is considered stable due to the Debian base, many consider the OS to be less desirable as a production server. This is largely due to the frequency of releases and the additional applications bundled with the OS.

When choosing Ubuntu as the preferred OS, it is recommended to use the Ubuntu LTS release. When an Ubuntu release reaches its end of life cycle, it received no further update. To review the status of your Ubuntu release, from the command line type the following command:

:: Ubuntu-support-status

Scientific Linux (SL) is based on the commercially available Red Hat Enterprise Linux (RHEL) distribution and much like Debian is considered to be a stable OS. SL closely mimic's the release cycle of RHEL.

With Debian, all previous stable releases are generally supported for 1 year after it has been superseded by another stable release. In short, of the three distributions, Ubuntu offers the longest support life cycle but as it provides releases at 6 month intervals, it's considered less stable compared to its counterparts.

Debian and SL seem to win this round.

Security

Security is another big deciding factor. It is argued that Ubuntu is less secure compared to the Debian and SL distributions – the reason for this seems to centre around the Ubuntu short OS release cycle and the additional applications bundled with their installations to make the release more user-friendly.

Side Note: it is good practice to regularly monitor any open ports and manage the local accounts specifically the ones with sudo rights on your server. This will go a long way in securing your server reducing its attack surface.

Conclusion

In conclusion, the hardware bundled with the Dell C6145 servers is compatible with all three Linux distributions so from a novice point of view and in the context of bioinformatics. It does not make too much of a difference which OS you decide on as none of these OS's come with pre-bundled applications for bioinformatics use.

The following three sections look into the actual installation process of the three officially supported Linux distributions.

7.2. Ubuntu 12.04 OS Installation

This tutorial was completed using the Virtual Box application. For the purposes of this guide, a virtual machine was created with 3 virtual hard disk drives and 4GB RAM. Should you require the latest version of Ubuntu server, the iso can be obtained from the following website >> http://www.ubuntu.com/download/server.

Note:

This tutorial doesn't deal with the issues that arise when working with GPT partition tables

Let's get started...

- Make sure your external USB DVD ROM is connected to your server's USB port > insert your Ubuntu 12.04 server installation DVD and switch on your server.
- Following a POST test, the installation wizard might prompt you to choose a language for the wizard installation > select your preferred language for the OS and installation.

La		nguage	
Amharic	Gaeilge	Malayalam	Thai
Arabic	Galego	Marathi	Tagalog
Asturianu	Gujarati	Nepali	Türkçe
Беларуская	עברית	Nederlands	Uyghur
Български	Hindi	Norsk bokmål	Українська
Bengali	Hrvatski	Norsk nynorsk	Tiếng Việt
Bosanski	Magyar	Punjabi(Gurmukhi)	中文(简体)
Català	Bahasa Indonesia	Polski	中文(繁體)
Čeština	Íslenska	Português do Brasil	
Dansk	Italiano	Português	
Deutsch	日本語	Română	
Dzongkha	ქართული	Русский	
Ελληνικά	Қазақ	Sámegillii	
English	Khmer	ສິ∘ ກ ⊚	
Esperanto	ಕನ್ನಡ	Slovenčina	
Español	한국어	Slovenščina	
Eesti	Kurdî	Shqip	
Euskara	Lao	Српски	
ىسراف	Lietuviškai	Svenska	
Suomi	Latviski	Tamil	
Français	Македонски	ජ වාතා	
F2 Language F3	∃Keymap F4 Modes	F5 Accessibility F6 O	ther Options

• The next screen will present some options to you > Select "Install Ubuntu Server" from the list of options to begin your OS installation.



• The wizard will prompt you once again to select your language of choice > choose your preferred language to continue.

Arabic	[11] Sele Choose the language to be used for the inst also be the default language for the instal Language: C Albanian	ct a language allation process. The selected language will led system. - No localization * - Shqip
English - English Esperanto - Esperanto Estonian - Eesti Finnish - Suomi French - Français Galician - Galego German - Deutsch Greek - Ελληνικά +	Arabic Asturian Basque Belarusian Bosnian Bulgarian Catalan Chinese (Simplified) Chinese (Traditional) Croatian Czech Danish Dutch	- John - Asturianu - Euskara - Benapyckan - Bosanski - Bosanski - Catala - 中文(简体) - 中文(简体) - 中文(爾佛) - Hrvatski - Čeština - Dansk - Nederlands
	English Esperanto Estonian Finnish French Galician German Greek	 English Esperanto Eesti Suomik Français Galego Deutsch Ελληνικά +
<go back=""></go>	<go back=""></go>	

• Next, select the country you reside in or where the server will be physically located.

[!!] Select your location
The selected location will be used to set your time zone and also for example to help select the system locale. Normally this should be the country where you live.
This is a shortlist of locations based on the language you selected. Choose "other" if your location is not listed.
Country, territory or area:
Antigua and Barbuda Australia Botswana Canada Hong Kong India Ireland New Zealand Nigeria Philippines Singapore South Africa United Kingdom United States Zambia Zimbabwe other
<go back=""></go>
Tab> moves; <space> selects; <enter> activates buttons</enter></space>

Next you are prompted to configure your keyboard. You could choose "Yes" to allow the installation wizard to detect your keyboard, should you choose "Yes" –you will be presented with some additional wizard screens to determine your keyboard type. I often select the "No" option.



• Choosing "No" will prompt you to select a keyboard layout > select the keyboard layout of your choice to continue with the wizard

	[!] Configure the keyboard
	The layout of keyboards varies per country, with some countries having multiple common layouts. Please select the country of origin for the keyboard of this computer.
	Country of origin for the keyboard:
	Arabic (Syria) Armenian Azerbaijani Bambara Belarusian Belgian Bengali Bosnian Braille Bulgarian Burmese Catalan Chinese Croatian Czech Danish Dhivehi Dutch Dzongkha English (Chana) English (Shana) English (Shana)
	<go back=""></go>
<ta< th=""><th>ab> moves; <space> selects; <enter> activates buttons</enter></space></th></ta<>	ab> moves; <space> selects; <enter> activates buttons</enter></space>

• Based on your selections thus far, the wizard will begin detecting your hardware and loading the necessary drivers.

Retrieving partman–auto–raid	Loading additional components 36%
	×

• Once the drivers have been loaded, you will be prompted to give your new server a name. Chose a hostname or alternatively leave the default of "Ubuntu" for now. This can be edited later post the OS installation.

TIP: *It's less hassle to simply set the hostname now. Try and choose a short descriptive name for the server instance.*

Please enter the The hostname is know what your H up your own home	[!] Configure the network hostname for this system. a single word that identifies your system to the network. If you don't nostname should be, consult your network administrator. If you are setting e network, you can make something up here.
Hostname:	
ubuntu <go back=""></go>	<continue></continue>

 Next you will be prompted to create a user account to perform non-administrative activities. The first screen prompts you for the full name of the user while the second screen prompts you to choose a username. The wizard chooses the first name supplied in the previous box as the username. You could leave this as is or choose a specific username for the account.

	[!!] Set up users and passwords
A user account will be create non-administrative activities	ed for you to use instead of the root account for s.
Please enter the real name of default origin for emails sen the user's real name. Your fu	f this user. This information will be used for instance as nt by this user as well as any program which displays or uses Jl name is a reasonable choice.
Full name for the new user:	
newuser	
<go back=""></go>	< <u>Continue></u>
	▶
Tab> moves; <space> selects; <en< td=""><td>ter> activates buttons</td></en<></space>	ter> activates buttons

	[!!] Set up users and passwords
Select a username for the r username should start with of numbers and more lower-o	new account. Your first name is a reasonable choice. The a lower-case letter, which can be followed by any combination case letters.
Username for your account:	1
newuser	
<go back=""></go>	<continue></continue>
	▶

Choose a password for the user account and click "Continue" to proceed. The wizard will prompt you to confirm the password by retyping it > retype the password and click "Continue" to proceed.

A good password will contain a mixture of letters, numbers and punctuatio changed at regular intervals.	n and should be
Choose a password for the new user: 	<continue></continue>
₩	
<pre>(Tab> moves; <space> selects; <enter> activates buttons</enter></space></pre>	

• The next screen will offer to encrypt the home directory of the newly created user account. I always select the "**NO**" option.

[1] Set un users and nasswords
You may configure your home directory for encryption, such that any files stored there remain private even if your computer is stolen.
The system will seamlessly mount your encrypted home directory each time you login and automatically unmount when you log out of all active sessions.
Encrypt your home directory? <go back=""> <yes> <no></no></yes></go>

- You will then be allowed to select your time zone (Ubuntu may detect this automatically if connected to the Internet).
- You will then be presented with the "**Partition disks**" window.



• The next screen presents the "**Partition Disks**" screen. This is the stage where we configure a RAID volume. Should you prefer to install the OS on the hard disk without implementing any RAID fault tolerance, simply highlight the first disk drive usually represented as sda. The wizard will guide you through a few screens where you will be allowed to partition the disk or use the entire disk for the installation. The purpose of this howto guide is to demonstrate the RAID volume setup so we will select the "**Manual**" option as we would like to partition our hard drives ourselves.

TIP: In Linux, your hard disk drives are usually represented as sda, sdb, sdc,....sdn

[!!] Partition disks
The installer can guide you through partitioning a disk (using different standard schemes) or, if you prefer, you can do it manually. With guided partitioning you will still have a chance later to review and customise the results.
If you choose guided partitioning for an entire disk, you will next be asked which disk should betweed.
Partitioning method:
Guided – resize SCSI1 (0,0,0), partition #3 (sda) and use freed space Guided – use entire disk Guided – use entire disk and set up LVM
Guided – use entire disk and set up encrypted LVM Manual
<go back=""></go>

• The wizard prompts you with a warning that all data will be lost if you repartition the disk drive. As this is a new installation, there shouldn't be any existing partitions or data existing on the hard disk. Choose the "**Yes**" option to continue.

Note:

If you are partitioning a disk drive that has an existing partition or data residing on the disk. It is highly recommended that you first backup all data on the disk before continuing. Failure to do so will result in all your data being deleted

	[!!] Partition disks
	You have selected an entire device to partition. If you proceed with creating a new partition table on the device, then all current partitions will be removed.
	Note that you will be able to undo this operation later if you wish.
	Create new empty partition table on this device?
	<go back=""> (Yes) <no></no></go>
j	

- You will be presented with a screen that shows you your hard drives with the partitions currently on them. If you are installing an OS for the first time, your hard drives will not have any partitions on them. Go down to your first hard drive (it should be labelled something along the lines of "SCSI (0,0,0) (sda)". Push enter and you will be asked if you would like to create a new partition table on that hard drive. Select "YES".
- Repeat the above steps for all your hard drives. Your partitions should now look similar to the below image (The amount of disk drives will vary based on your system)



 Now that we have partition tables on each drive, we need to carve up the partitions. We are going to create two partitions on each drive. Both partitions will be RAID'd. One RAID partition will then be set up as the swap space and the other as the root file system.

Note:

This tutorial was done on virtual box and I was unable to recreate the problems I had doing the installation on the actual C6145. There, problems arose due to the partition tables being GPT partition tables (I'm assuming Ubuntu automatically sets this when using big HDDs). This is, because the MSDOS tables cannot handle partitions greater than 2TB. When using GPT tables you need to create a small 50MB partition at the beginning of each drive as a "Reserved BIOS boot area". GRUB must then be installed to this partition

Select the free space below your first hard drive and push enter > you will be presented with the below screen > select "Create a new partition".



• I set this partition to 4GB as I want a partition of 8GB for swap space after I've RAIDed the

partitions. You may set this size to whatever suits your needs.



• Select "**Primary**" for the partition type.

[!!] Partition disks Type for the new partition: Primary Logical <go back=""></go>	

• Select "Beginning" for the location of the partition

[11] Partition disks
Please choose whether you want the new partition to be created at the beginning or at the end of the available space.
Location for the new partition:
Beginning End
<go back=""></go>

• On the next screen, when prompted how to use this new partition, select the "**Physical** volume for RAID" option and then select "Done setting up the partition"



[!!] Partition disks			
You are editing partition #1 of SCSI1 (0,0,0) (sda). No existing file system was detected in this partition.			
Partition settings:			
Use as: physical volume for RAID			
Bootable flag: off			
Copy data from another partition			
Done setting up the partition			
<go back=""></go>			

- Now repeat steps from 7.1.20 through to 7.1..24 to create a second partition on the first hard drive, but this time -allow this partition to use the remainder of the space on the drive. Once again, select the "**Physical volume for RAID**" option when prompted
- Your first hard drive should now have two partitions, each set to "**Physical volume for RAID**".
- Repeat steps 7.1.20 through to 7.1.24 for each hard drive. Your partitions should look similar to the below image (The amount of disk drives will vary based on your system)

This is an overvie partition to modif partitions, or a d	w of your currently configured partitions and mount points. Select a y its settings (file system, mount point, etc.), a free space to create evice to initialize its partition table.
	Guided partitioning Configure software RAID Configure the Logical Volume Manager Configure encrypted volumes Configure iSCSI volumes
	SCSI1 (0,0,0) (sda) - 26.8 GB ATA VBOX HARDDISK #1 primary 4.0 GB K raid #2 primary 22.8 GB K raid SCSI1 (0,1,0) (sdb) - 26.8 GB ATA VBOX HARDDISK #1 primary 4.0 GB K raid #2 primary 22.8 GB K raid SCSI2 (0,1,0) (sdc) - 26.8 GB ATA VBOX HARDDISK #1 primary 4.0 GB K raid #2 primary 22.8 GB K raid
(Go Back)	Undo changes to partitions Finish partitioning and write changes to disk

- You have just prepared all your physical disk drives for your RAID setup. It is now time to configure our RAID. Select "**Configure Software RAID**" from the options in the above > select "**Yes**" when asked if you would like to write the changes to the storage devices.
- From the list option on the following screens > select the "Create MD device" option.

	[!!] Partition disks
This is the software RAD	D (or MD, "multiple device") configuration menu.
Software RAID configurat	ion actions
	<mark>Create MD device</mark> Delete MD device Finish
<go back=""></go>	

Select "RAID 5" from the list of options.

Note:

You may want to select RAID 1 here if you are worried about data security. RAID 1 will mirror all your data across drives. This means you will have half the amount of usable space as drives i.e. if you have 4 x 2TB HDDs, you will only have 4TBs worth of usable space instead of 8TB. This data will be mirrored on the other drives, so you have backup should any drive fail



• Select the number of active devices for the RAID 5 array. The minimum number of physical disks for a RAID 5 volume is 3. If you have more than 3 drives, you may wish to leave one out at this point to use as a spare in the next screen.

The RAIL array will co those used, while the s devices fail. A minimur NOTE: this setting cann	ponsist of both active and spa spare devices will only be us m of 3 active devices is requ not be changed later.	re devices. The active devices are ed if one or more of the active ired.
Number of active device	es for the RAID5 array:	
<pre>Go Back></pre>		<continue></continue>

• Select the number of drives you want to use as spares. If you used all your drives as active devices in the last screen, leave this as 0.

[!!] Partition disks Number of spare devices for the RAID5 array:

• Select the partitions you set out as the swap partitions. These will most likely be /dev/sda1, /dev/sdb1, /dev/sdc1, ..., /dev/sd<n>1, and continue.

[!!] Partiti	on disks		
You have chosen to create a RAID5 array with 3 active devices.			
Please choose which partitions are active devices. You must select exactly 3 partitions.			
Active devices for the RAID5 array:			
<pre>[*] /dev/sda1 [] /dev/sda2 [*] /dev/sdb1 [] /dev/sdb2 [*] /dev/sdc1 [] /dev/sdc2</pre>	(3999MB; raid) (22842MB; raid) (3999MB; raid) (22842MB; raid) (3999MB; raid) (22842MB; raid)		
<go back=""></go>	<continue></continue>		

- Repeat steps from 7.1.28 through to 7.1.33 to set up your RAID 5 partition that will be used as the "/" root of the file system. This RAID will use the remaining partitions.
- Select "Finish" to go back to the partitions screen

This is an overview of your currently configured partitions and mount points. Select a partition to modify its settings (file system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table.
Guided partitioning Configure software RAID Configure the Logical Volume Manager Configure encrypted volumes Configure iSCSI volumes
RAID5 device #0 – 8.0 GB Software RAID device
#1 8.0 GB
512.0 B unusable
HIDS DEVICE #1 - 45.6 GB SUTTWARE RHID DEVICE
512.0 B unusable
SCSI1 (0,0,0) (sda) – 26.8 GB ATA VBOX HARDDISK
#1 primary 4.0 GB K raid
#2 primary 22.8 GB K raid
#1 npimaru 4 0 GB K raid
#2 primary 22.8 GB K raid
SCSI2 (0,1,0) (sdc) – 26.8 GB ATA VBOX HARDDISK
#1 primary 4.0 GB K raid
#2 primary 22.8 GB K raid
Undo changes to partitions Finish partitioning and write changes to disk
<go back=""></go>

• You should now see two RAID 5 devices above your hard drives similar to the above image. Select the partition on the first RAID device. You will see the below screen:

[!!] Partition disks
You are editing partition #1 of RAID5 device #0. No existing file system was detected in this partition.
Partition settings:
Use as: do not use
Copy data from another partition Erase data on this partition Done setting up the partition
<go back=""></go>

• Select the "swap area" from the list of options when asked how to use this newly created partition.

[11] Partition disks How to use this partition: Ext4 journaling file system Ext3 journaling file system Ext2 file system Btrfs journaling file system JFS journaling file system YFS journaling file system FAT16 file system FAT32 file system Swap area physical volume for encryption physical volume for LVM do not use the partition	
physical volume for LVM do not use the partition <go back=""></go>	

Go back and select the partition on the second RAID device > select the "Ext 4 journaling file system" option and set the "Mount point" to "/" - root of the file system. The partition should look like the below image

You are editing par this partition. Partition settings:	vtition #1 of RAID5] Partition disks device #1. No existing file system was detected in
	Use as: <u>Mount options:</u> Label: Reserved blocks: Typical usage: Copy data from ar Erase data on thi Done setting up t	Ext4 journaling file system defaults none 5% standard nother partition is partition the partition
<go back=""></go>		

You partitions should look similar to the below image.

- Fill Departure distance						
[[] Fartition disks [
This is an overview of your currently configured partitions and mount points. Select a partition to modify its settings (file system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table.						
Guided partitioning Configure software RAID Configure the Logical Volume Manager Configure encrypted volumes Configure iSCSI volumes						
RAID5 device #0 - 8.0 GB Software RAID device #1 8.0 GB f swap swap 512.0 B unusable RAID5 device #1 - 45.6 GB Software RAID device #1 45.6 GB f ext4 / 512.0 B unusable SCSI1 (0,0,0) (sda) - 26.8 GB ATA VB0X HARDDISK #1 primary 4.0 GB K raid #2 primary 22.8 GB K raid SCSI1 (0,1,0) (sdb) - 26.8 GB ATA VB0X HARDDISK #1 primary 4.0 GB K raid #2 primary 22.8 GB K raid SCSI2 (0,1,0) (sdc) - 26.8 GB ATA VB0X HARDDISK #1 primary 4.0 GB K raid SCSI2 (0,1,0) (sdc) - 26.8 GB ATA VB0X HARDDISK #1 primary 4.0 GB K raid SCSI2 (0,1,0) (sdc) - 26.8 GB ATA VB0X HARDDISK #1 primary 4.0 GB K raid SCSI2 (0,1,0) (sdc) - 26.8 GB ATA VB0X HARDDISK #1 primary 4.0 GB K raid						
Undo changes to partitions Finish partitioning and write changes to disk						

- You can now carry on with your OS installation > select the "Finish partitioning and write changes to disk" option and select "Yes" if prompted. The installation of the system will then begin.
- At some point you will be asked to enter your HTTP proxy information. If you are not behind a proxy, you can leave this blank.



• The installation will proceed until you are asked how you want to handle updates to the system. I told it to install security updates automatically.



- The installation will proceed again until you get asked what software you would like to install. This will depend on what you plan on using the server for. I just selected "OpenSSH Server" for now. You can, of course, install any of this software at a later stage
- **TIP:** As a minimum install OpenSSH Server as this will allow you to access this server remotely once configured

[1] Software selection
At the moment, only the core of the system is installed. To tune the system to your needs, you can choose to install one or more of the following predefined collections of software. Choose software to install:
<pre> (*) OpenSSH server () DNS server () LAMP server () Mail server () PostgreSQL database () Print server () Samba file server () Samba file server () Virtual Machine host () Manual package selection </pre>

• When asked if you would like to install grub to your master boot record, select "Yes".

Note:

When using GPT tables, you would select NO here and then select the partition you created as "Reserved BIOS boot area" to install grub

• Once grub is installed, the installation completes and you may reboot. You should boot to a login screen that looks similar to the below image.

ubuntu login:	Ubuntu	12.04.3	LTS	ubuntu	tty1				
	ubuntu	log in:							

:: Instruction Complete ::

7.3. Scientific Linux OS Installation

The following installation was performed on the actual C6145 server. Should you require a copy of the latest Scientific Linux distribution, a copy of the iso can be obtained from either of the following websites >> <u>http://ftp.scientificlinux.org/linux/scientific/6.4/x86_64/iso/</u> or <u>https://www.scientificlinux.org/</u>. Choose the "install-dvd.iso" option.

• Once you have booted up using your preferred installation option, you will be presented with the below welcome screen > select your preferred option to begin the installation.

Note: For a new installation, I would recommend using option 1 "Install or upgrade an existing system"



• The next screen will offer you the option to test your installation media before you begin the installation. I often choose the "**Skip**" option

	Disc Found To begin testing the media before installation press OK.
	Choose Skip to skip the media test and start the installation.
<tab>/<alt-tab> bet</alt-tab></tab>	ween elements <space> selects <f12> next screen</f12></space>
• If you chose to test your media, a quick test will be performed. If you opted to skip the media test > you will be presented with the below screen > click "**next**" to continue



 The next screen will prompt you to choose a language > choose your language of choice and click "next" to continue

	SCIENTIFIC LINUX	
	What language would you like to use during the installation process?	
	Catalan (Català)	^
	Chinese(Simplified) (中文(简体))	_
	Chinese(Traditional)(中文(正體))	
	Croatian (Hrvatski)	=
	Czech (Čeština)	
	Danish (Dansk)	
	Dutch (Nederlands)	
	English (English)	
	Estonian (eesti keel)	
	Finnish (suomi)	
	French (Français)	
Ĩ	© German (Deutsch)	
	Greek (Ελληνικά)	
	Gujarati (ગુજરાતી)	
	Hebrew (עברית)	~
	Reck Sack	<u>N</u> ext

 Next you will be prompted to choose your keyboard layout > make your preferred choice and click "next" to continue

SCIENTIFIC LINUX			
Select the appropriate keyboard for the system.	k		
Russian			^
Serbian			
Serbian (latin)			
Slovak (qwerty)			
Slovenian			
Spanish			
Swedish			
Swiss French			
Swiss French (latin1)			
Swiss German			
Swiss German (latin1)			
Turkish	N		
U.S. English	3		
U.S. International			=
Ukrainian			
United Kingdom			\sim
		here and the second sec	➡ <u>N</u> ext

The following screen will prompt you to choose the type of installation for your OS > option

 (a) "Basic Storage Devices" is the default option and will allow you to install your OS onto a local hard disk located inside your server > option (b) "Specialized Storage Devices" will allow you to install your OS on a Storage Area Network (SAN) or select iSCSI disks > choose your preferred option and click "next" to continue

Note:

If you purchased one of the H3ABioNet recommended server options and will be installing your OS on your local server. The default option A should suffice

hat type of devices will your installation involve?	
Basic Storage Devices Installs or upgrades to typical types of storage devices. If you're not sure which this is probably it.	h option is right for you,
Specialized Storage Devices Installs or upgrades to enterprise devices such as Storage Area Networks (SANs you to add FCoE / ISCSI / zFCP disks and to filter out devices the installer should	s). This option will allow l ignore.

• Choosing option A will display a warning screen notifying you that should you continue, all data on the selected disk will be lost. Click your preferred option and then click "**next**" to continue



 The following screen will prompt you to type in a unique name that will identify this server on your network > type in a hostname for this server and click "next" to continue

SCIENTIFIC LINUX	
Please name this computer. The hostname identifies the computer on a network. Hostname: Iocalhost.localdomain	
¢.	
<u>C</u> onfigure Network	▲Back

 In the following screen, choose a time zone which your server would use for its data and time stamps > deselect the "System clock uses UTC" > click "next" to continue



• The following screen will prompt you to type in a root password for this server. This root password will serve as the default root account on the server

SCIENTI	FIC LINUX		
The root the syste user.	account is used for administering em. Enter a password for the root		
Root <u>P</u> assword:	•••••		
<u>C</u> onfirm:	•••••		
		e Back	➡ <u>N</u> ext

The following screen will prompt you to choose the type of installation for your OS > review the various options and decide which best suits your environment > click "**next**" to continue

Note:

The default option "**Use All Space**" would suffice if you are following a basic default installation. This option will erase all data on the selected hard disk / partition and install the SL 6.4 OS in this location. I normally leave the "**Encrypt system**" and "**Review and modify partitioning layout**" option deselected



The next screen will prompt you to choose a disk or partition to install your OS on > double click or highlight your option on the left hand side of the screen > if using the keyboard only, tab across to the right hand arrow and depress your space bar to move the highlighted option to the right hand side of the screen > in the right hand side of the screen, select your disk / partition where the boot loader will be installed on > click "next" to continue

Below are the storage de ndicate using the arrow not be formatted, only n these may be formatted pootloader installed.	evices you'v s below whic nounted) and d). Please al	e selected t ch devices y d which dev so indicate	to be a part of th you'd like to use ices you'd like t which system o	nis installation. e as data drives to use as syster drive will have t	Please (these v m drives the	vill	
Data Storage Device:	s (to be mou	nted only)			Install	Target Devices	
Model	Capacity	Vendor	Identifier		Boot Loader	Model	Capacity
vmware virtual disk	10240 MB	vmware	pc1-0000:00:10	•	۲	VMware Virtual disk	25600 MB
Tip: Install target de	vices will be	reformatte	d and wiped of	any data. Mak	e sure yo	bu have	(

 Clicking next on the above screen will display a warning screen > if you are happy to proceed, click "Write changes to disk" to continue



 Clicking "Write changes to disk" will begin formatting the disk / partition selected in point 7.11 above

Formatting
Creating ext4 filesystem on /dev/mapper/vg_nsolo-lv_root

Once the disk / partition has been formatted, the next screen will prompt you to choose a type of OS installation displayed in figure A below > choose the "Basic Server" option > click "next" to continue

Note:

Should you wish to add additional repositories at this stage > click the "Add additional software repositories", doing this will present the screen displayed in figure B below. To successfully setup your new repositories at this stage, you would need a valid IP with gateway to the internet. You will be able to setup new repositories once the OS has been installed. Instruction to do this is discussed in point 7 below

Figure A

CIENTIFIC LINUX	
Please pick the type of install for Scientific Linux. You can optionally select a different s of software now.	et
O Desktop	A
O Minimal Desktop	=
Basic Server	1
O Database Server	
O Web Server	
Please select any additional repositories that you want to use for software installation. Image: Scientific Linux	
Add additional software repositories	
You can further customize the software selection now, or after install via the software management application.	
Customize later <u>C</u> ustomize now	
	▲Back ▶Next

Figure B

	Add Repository
Please prov information	vide the configuration n for this software repository.
Repository <u>n</u> ame:	
Repository <u>type</u> : H	ITP/FTP
Repository <u>U</u> RL	
URL is a <u>m</u> irror list	
Configure proxy	
Proxy U <u>R</u> L (host:port)	
Proxy u <u>s</u> ername	
Proxy pass <u>w</u> ord	
	<u>C</u> ancel <u>O</u> K

• Once you have made your choice and clicked next, the wizard will look for any dependencies that are needed



• If the wizard finds all the dependencies, it will kick off the OS installation



• On completion of the installation, you will be presented with the "installation is complete" screen > remove all install media and click the "Reboot" button to login to your new SL 6.4 installation.



:: Instruction Complete ::

7.4. Debian OS Installation

This howto guide was configured using a virtual server created in the VMWare workstation application. The steps outlined are relevant for both virtual and physical server installations. The virtual hardware used for this server is listed below. To get a copy of the latest Debian release, please visit the following website >> <u>http://www.debian.org/</u>

- Server Type: VMware Workstation 10
- Memory: 1GB
- **Processor:**_1,53GHZ 2 core
- Hard disk: 2 SCSI Disk with 20GB each

ile Edit View VM Tab	s Help			15640000
a 10 🕨 😒 🙆 s	napshot 🕃 Revert 🕼		Unity 💼	
brary ×	📾 Home 🗶 🎒 Debia	n7 ×		
7 📰 My Computer	🗊 Debian 7			
Debian 7	Start up this guest	operating system		
	Edit virtual machin	e settings		
	Memory	1 GB		
	Processors	2		
	Hard Disk (SCSI)	20 GB		
	Hard Disk 2 (SCS	I) 20 GB		
	() CD/DVD (IDE)	86-DVD-1.iso		
	Network Adapte	r NAT		
	USB Controller	Present		
	Sound Card	Auto detect		
	Printer	Present		
	🐺 Display	Auto detect		
	✓ Description Type here to enter a this virtual machine	description of		
			✓ Virtual Machine Details State: Powered Off Configuration file: /home/alibi/vmware/Debian 7/Debian 7.vmx Hardware compatibility: Workstation 10.0 virtual machine	

• Start the machine (Server or PC) and select Graphical install

• Choose your language

			uebian	6
elect a language				
Choose the language t default language for tl Language:	o be used for the ne installed system	installation process. The selected l m.	anguage will also be the	
Chinese (Simplified)	- 中文(简体)			-
Chinese (Traditional)	- 中文(繁體)			
Croatian	- Hrvatski			
Czech	- Čeština			
Danish	- Dansk			=
Dutch	- Nederlands	*		
Dzongkha	- in⊃ji			
English	- English			
Esperanto	- Esperanto	The system families		
Estonian	- Eesti	The system tanguage		
Finnish	- Suomi			
French	- Français			
Galician	- Galego			
Georgian	- ქართული			
German	- Deutsch			
Grook	- Ελλουικά			~

• Choose the keyboard layout

		debian 🔿
Configure the keybo	ard	
Keymap to use:		
American English		6
Albanian	Keyboard layout	
Arabic		
Asturian		
Bangladesh		
Belarusian		
Bengali		
Belgian		
Bosnian		
Brazilian		
British English		
Bulgarian		
Bulgarian (phonetic	: layout)	
Canadian French		
Canadian Multilingu	Jal	
Catalan		
Chinese		
Croatian		(¥)

• Configure the basic network setup by typing the machine name

		debian 🤇
Configure the network		
Please enter the hostname f The hostname is a single wo hostname should be, consult you can make something up Hostname:	or this system. rd that identifies your system your network administrator. here.	n to the network. If you don't know what your If you are setting up your own home network,
debian7		
Screenshot		Go Back Continue

• Choose a root password for the system

	debian 🔿
Set up users and passwords	
You need to set a password fo with root access can have disa not easy to guess. It should n associated with you. A good password will contain regular intervals. The root user should not have disabled and the system's init command. Note that you will not be able	r 'root', the system administrative account. A malicious or unqualified user astrous results, so you should take care to choose a root password that is ot be a word found in dictionaries, or a word that could be easily a mixture of letters, numbers and punctuation and should be changed at an empty password. If you leave this empty, the root account will be ial user account will be given the power to become root using the "sudo" to see the password as you type it.
Root password:	
Please enter the same root pa Re-enter password to verify:	assword again to verify that you have typed it correctly.
••••	
Screenshot	Go Back Continue

• Create a default user account by typing a name in the following box. You will use this default user account to log into the server once the installation is complete.

			de	bian	(\circlet)
Set up users and passwo	rds				
A user account will be cre Please enter the real nar emails sent by this user a name is a reasonable cho Full name for the new user:	eated for you to use i ne of this user. This in as well as any progra vice.	nstead of the root a nformation will be us m which displays or	ccount for non-adm sed for instance as uses the user's rea	inistrative act default origin al name. Your f	ivities. for ull
user1		k]
Screenshot			Go	Back Coi	ntinue

• Choose a secure password for this user account. It is common practice to choose a password which conforms to the following criteria: a minim of 8 characters is made up of numbers, special characters and both upper and lower case letters.

		debian 🤆
et up users and passwords		
A good password will contain a regular intervals.	nixture of letters, numbers and pu	nctuation and should be changed at
choose a password for the new day	i	
Please enter the same user par Re-enter password to verify:	sword again to verify you have typ	ed it correctly.
••••		

• In the following box you will define a domain.

	debian 🤆
onfigure the network	
he domain name is the part of your Internet address to the rig omething that ends in .com, .net, .edu, or .org. If you are sett omething up, but make sure you use the same domain name o	jht of your host name. It is often ting up a home network, you can make n all your computers.
Domain name:	
pasteur.tn	
₩	

• The next screen prompts you to choose a disk partitioning method. As we will be creating a RAID configuration > choose the option to manually partition your disks.

	debian 🔿
artition disks	
The installer can guide you through partitioning a disk (using differe prefer, you can do it manually. With guided partitioning you will still customise the results. If you choose guided partitioning for an entire disk, you will next be Partitioning method:	ent standard schemes) or, if you have a chance later to review and asked which disk should be used.
Guided - use entire disk Guided - use entire disk and set up LVM Guided - use entire disk and set up encrypted LVM	
Manual	
Screenshot	Go Back Continue

• You will now be asked to choose a disk to partition. Choose the first disk which is usually represented as "sda" in Linux based installations.

tition disks is is an overview of your currently configured partitions and mount points. Select a partition to modify its is a system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table. Guided partitioning SCSI3 (0,0,0) (sda) - 21.5 GB VMware, VMware Virtual S SCSI3 (0,1,0) (sdb) - 21.5 GB VMware, VMware Virtual S Undo changes to partitions Finish partitioning and write changes to disk	n (C
is is an overview of your currently configured partitions and mount points. Select a partition to modify its e system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table. Guided partitioning SCSI3 (0,0,0) (sda) - 21.5 GB VMware, VMware Virtual S SCSI3 (0,1,0) (sdb) - 21.5 GB VMware, VMware Virtual S Undo changes to partitions Finish partitioning and write changes to disk	
Guided partitioning SCSI3 (0,0,0) (sda) - 21.5 GB VMware, VMware Virtual S SCSI3 (0,1,0) (sdb) - 21.5 GB VMware, VMware Virtual S Undo changes to partitions Finish partitioning and write changes to disk	settings
SCSI3 (0,0,0) (sda) - 21.5 GB VMware, VMware Virtual S SCSI3 (0,1,0) (sdb) - 21.5 GB VMware, VMware Virtual S Undo changes to partitions Finish partitioning and write changes to disk	
SCSI3 (0,1,0) (sdb) - 21.5 GB VMware, VMware Virtual S Undo changes to partitions Finish partitioning and write changes to disk	
Undo changes to partitions Finish partitioning and write changes to disk	
Finish partitioning and write changes to disk	
*	
•	
*	
eenshot Help Go Back	Continue

• Click the continue button to begin partitioning this disk. The wizard will prompt you to confirm that you want proceed with the partition. As there is no data on this hard disk > choose "Yes" to continue. If you are performing this operation on a hard disk which has data, it is strongly recommended that you first backup the data before proceeding as all data will be destroyed.

debian 🔿
Partition disks
You have selected an entire device to partition. If you proceed with creating a new partition table on the device, then all current partitions will be removed. Note that you will be able to undo this operation later if you wish. Create new empty partition table on this device? ○ No ④ Yes
Screenshot Go Back Continue

• Start partitioning by selecting the first partition.

debian 🔿
Partition disks
This is an overview of your currently configured partitions and mount points. Select a partition to modify its settings (file system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table.
Guided partitioning
Configure software RAID
Configure the Logical Volume Manager
Configure encrypted volumes
✓ SCSI3 (0,0,0) (sda) - 21.5 GB VMWare, VMWare Virtual S pri/log 21.5 GP EPEE SDACE
SCSI3 (0.1.0) (sdb) - 21.5 GB VMware VMware Virtual S
Undo changes to partitions
Finish partitioning and write changes to disk
Screenshot Help Go Back Continue

• Choose the size for this first partition.

	debian 🔿
Partition disks	
The maximum size for this partition is 21.5 GB. Hint: "max" can be used as a shortcut to specify the maximum size, or enter a use that percentage of the maximum size. New partition size:	percentage (e.g. "20%") to
[1]1.5 GB	
Screenshot	Go Back Continue

• Choose the file system and the mount point then confirm.

Partition settings:	tition #1 of SCSI3 (0,0,0) (sda). No existing the system was detected in this partition.
Jse as:	Ext4 journaling file system
4ount point:	T
Mount options:	defaults
abel:	none
Reserved blocks:	5%
ypical usage:	standard
Bootable flag:	off
Copy data from an	other partition
Delete the partitio	νn
one setting up th	ne partition

• Select the free space to setup the other partition.

								debia	an (
artition o	lisks								
This is an o (file syster	overvie n, mou	w of your cu nt point, etc	rrently config	ured partitions ce to create pa	and moun titions, or	: points. S a device	Select a p to initializ	artition to modify the its partition tabl	its settings e.
Guideo Config Config Config	l parti ure so ure th ure en	tioning ftware RAI e Logical V hcrypted vo (sda) - 21 '	D Iolume Mana Ilumes 5 GB VMwar	iger • VMware Vir	ual S				
> 303131	#1	primary	11.5 GB	f ext4	uar 5	1			
> SCSI31	(0,1,0)	pri/log (sdb) = 21.1	10.0 GB	FREE SF e. VMware Vir	ACE Tual S				
Undo c Finish	:hange partiti	es to partit	ions write chanç	ies to disk					

• Choose the second partition disk space and assign it a partition size.

	debian (C
Partition disks	
The maximum size for this partition is 10.0 GB. Hint: "max" can be used as a shortcut to specify the maxi use that percentage of the maximum size. New partition size:	ximum size, or enter a percentage (e.g. "20%") to
[10.0 GB	
Screenshot	Go Back Continue

• Setup the file system, mount point and confirm.

	uedian (
artition disks	
fou are editing pa Partition settings:	tition #5 of SCSI3 (0,0,0) (sda). No existing file system was detected in this partition.
Use as:	Ext4 journaling file system
Mount point:	/home
Mount options:	defaults
Label:	none
Reserved blocks:	5%
Typical usage:	standard
Bootable flag:	off
Copy data from an	other partition
Delete the partitio	n
Done setting up th	ne partition
Screenshot	Go Back Contin

• Select the second disk for partitioning the same as the first to make the software RAID on it.

							debi	an (C
artition d	lisks							
This is an c (file system	overvie n, mou	w of your cu nt point, etc	rrently config :.), a free spac	ured partitions ce to create pa	and mount (artitions, or a	ooints. Select device to initi	a partition to modify ialize its partition tab	its settings lle.
Guidea Configu Configu Configu ⊽ SCSI3 (>	paru Jre so Jre th Jre en (0,0,0) #1	ftoning ftware RAI e Logical V icrypted vo (sda) - 21. primary	D olume Mana Ilumes 5 GB VMware 11.5 GB	ger e, VMware Vir K ext4	rtual S /			
>	#5	logical	10.0 GB	K ext4	/home			
Undo c Finish j	hange partiti	es to partit	ions write chang	es to disk	tuar s			
Screensho	ot	Help					Go Back	Continue

• Create the partition table and start partitioning.

									det	piar	1 (
artition	disks										
This is an (file systei	overvie m, mou	w of your cu nt point, etc	rrently config .), a free spa	ured pa ce to cr	artitions an eate partit	d mount ions, or a	ooints. Sel device to	lect a pa initialize	rtition to m its partitior	odify its se n table.	ttings
Guide Config Config Config ⊽ SCSI3	d parti jure so jure th jure en (0,0,0)	tioning ftware RAI e Logical V acrypted vo (sda) - 21.'	D folume Mana flumes 5 GB VMware	iger e, VMw	vare Virtua	al S					
>	#1	primary	11.5 GB	к	ext4	1					
>	#5	logical	10.0 GB	K	ext4	/ .1.c	home				
> 50513	(0,1,0)	(sab) - 21.	21.5 GB	e, vmv	EREE SPA						
Undo Finish	change partiti	es to partit ioning and	ions write chang	jes to i	disk						
creensh	iot	Help]						Go Ba	k C	Continue

• Create the first partition with the same space as the one in the other disk.

	debian 🔿
Partition disks	
You are editing pa Partition settings:	rtition #1 of SCSI3 (0,1,0) (sdb). No existing file system was detected in this partition.
Use as:	Ext4 journaling file system
Mount point:	/usr
Mount options:	defaults
Label:	none
Reserved blocks:	5%
Typical usage:	standard
Bootable flag:	off
Copy data from ar	nother partition
Delete the partiti	on
Done setting up t	he partition
	7
Screenshot	Help Go Back Continue

• Choose the "Do not mount it" option.

	debian 🔿
Partition disks	
Mount point for this partition:	
/ - the root file system	
/boot - static files of the boot loader	
/home - user home directories	
/tmp - temporary files	
/usr - static data	
/var - variable data	
/srv - data for services provided by this system	
/opt - add-on application software packages	
/usr/local - local hierarchy	
Enter manually	
Do not mount it	,
	×
Screenshot	Go Back Continue

• Confirm the modification of the second partition.

	debian 🔿
Partition disks	
You are editing partition settings:	rtition #5 of SCSI3 (0,1,0) (sdb). No existing file system was detected in this partition.
Use as:	Ext4 journaling file system
Mount point:	none
Mount options:	defaults
Label:	none
Reserved blocks:	5%
Typical usage:	standard
Bootable flag:	off
Copy data from an	other partition
Delete the partitio	n
Done setting up th	ne partition
Screenshot	Help Go Back Continue

• Start the RAID configuration by choosing the "**Configure software RAID**" option.

		11					deb	ian (C
Partition	disks							
This is an (file syster	overvie m, mou	w of your cu nt point, etc	rrently config .), a free spac	ured p ce to d	artitions reate pa	and mount points. S rtitions, or a device t	elect a partition to moo o initialize its partition	dify its settings table.
Guide	d parti	tioning						
Config	ure so	ftware RAI	D					
Config	ure th	e Logical V	olume Mana	ger				
Config	ure er	crypted vo	lumes					
⊽ SCSI3	(0, 0, 0)	(sda) - 21.	5 GB VMwar	e, VM	ware Vir	tual S		
>	#1	primary	11.5 GB	к	ext4	1		
>	#5	logical	10.0 GB	к	ext4	/home		
→ SCSI3	(0,1,0)	(sdb) - 21.	5 GB VMwar	e, VM	ware Vir	tual S		
>	#1	primary	11.5 GB	f	ext4			
>	#5	logical	10.0 GB	f	ext4			
Undo Finish	change partiti	es to partit ioning and	ions write chang	jes to	disk			×.
Screensh	ot	Help					Go Back	Continue

• Choose the "Create MD device".

	debian	0
Partition disks		
This is the software RAID (or MD, "multiple device") configuration menu. Please select one of the proposed actions to configure software RAID. Software RAID configuration actions		
Create MD device		
Delete MD device		
		×
Screenshot	Go Back Cor	ntinue

• Choose the "RAID1" option.

	debian 📿
Partition disks	
Please choose the type of the software RAID device to be created. Software RAID device type:	
RAIDO	
RAID1	
RAID5	
RAID6	
	×
Screenshot	Go Back Continue

• Type the number 2 for the number of disks to be used.

	debian 🔿
Partition disks	
The RAID1 array will consist of both the spare devices will only be used is required. NOTE: this setting cannot be chang Number of active devices for the RAID1	active and spare devices. The active devices are those used, while if one or more of the active devices fail. A minimum of 2 active devices ed later. array:
E	
	*
	*
	k
	ħ
	¥

• Type the number 0 when asked to specify any spare devices. We will not be using hot spares for this demonstration.

	debian 🔿
Partition disks	
Number of spare devices for the RAID1 array:	
C	
	•
Screenshot	Go Back Continue
decensite	Co back

• Select the two primary partitions to be the active devices.

		debian 🔿
Partition disks		
You have chosen to Please choose whic Active devices for the	create a RAID1 array with 2 active devices. h partitions are active devices. You must select exac RAID1 array:	tly 2 partitions.
✓ /dev/sdal	(11498MB; raid)	
/dev/sda5	(9973MB; ext4)	
✓ /dev/sdb1	(11498MB; raid)	
		k
Screenshot		Go Back Continue

• The first partition is done. Redo the RAID configurations on both disks to create the second partition.

his is an overview c file system, mount j Guided partitio	f your currently configure point, etc.), a free space	d partitions to create par	and mount points. Sel	ect a partition to modify i	's settings
Guided partitio			unons, or a device to	initialize its partition table	l
	ning			280	
Configure softw	are RAID				
Configure the L	ogical Volume Manage	r			
Configure encr	pted volumes				
7 SCSI3 (0, 0, 0) (s	ia) - 21.5 GB VMware, V	/Mware Virl	tual S		
> #1 p	rimary 11.5 GB	K raid			
> #5 l	gical 10.0 GB	K ext4	/home		
7 SCSI3 (0,1,0) (s	b) - 21.5 GB VMware, \	/Mware Virl	tual S		
> #1 p	rimary 11.5 GB	K raid			
> #5 l	gical 10.0 GB	F ext4			-
					R.
Undo changes	o partitions				
	ing and write changes	to disk			
Finish partition					

• Select the "Create new MD device" option.

	debian	0
Partition disks		
This is the software RAID (or MD, "multiple device") configuration menu. Please select one of the proposed actions to configure software RAID. Software RAID configuration actions		
Create MD device		
Delete MD device		
		k
Screenshot	Go Back Con	tinue

• Choose the "RAID1" option.

	debian 🔿
Partition disks	
Please choose the type of the software RAID device to be created. Software RAID device type:	
RAIDO	
RAID1	
RAID5	
RAID6	
Screenshot	Go Back Continue

• Select the second two partitions created for the active devices.

	debian (C
Partition disks	
You have chosen to Please choose whi Active devices for the	o create a RAID1 array with 2 active devices. ch partitions are active devices. You must select exactly 2 partitions. # RAID1 array:
✓ /dev/sda5	(9973MB; ext4)
✓ /dev/sdb5	(9973MB; ext4)
	×
	*

• Confirm the RAID configuration.

debian 🔿
Partition disks
Before RAID can be configured, the changes have to be written to the storage devices. These changes cannot be undone. When RAID is configured, no additional changes to the partitions in the disks containing physical volumes are allowed. Please convince yourself that you are satisfied with the current partitioning scheme in these disks.
The partition tables of the following devices are changed: SCSI3 (0,0,0) (sda) SCSI3 (0,1,0) (sdb)
Write the changes to the storage devices and configure RAID?
○ No ● Yes
▶
Screenshot Continue

• Choose to finish the RAID configuration.

	debian 🔿
Partition disks	
This is the software RAID (or MD, "multiple device") configuration menu. Please select one of the proposed actions to configure software RAID. Software RAID configuration actions	
Create MD device	
Delete MD device	
Screenshot	Go Back Continue

• Start the RAID disk partitioning by defining the file system and the mount point.

					debian 🤇
Partition o	lisks				
This is an o (file system	overview of your c n, mount point, et	urrently config tc.), a free spa	ured p ce to c	partitions and mount points. S create partitions, or a device i	elect a partition to modify its settings to initialize its partition table.
Guidec Config Config Config ⊽ RAID1 > >	partitioning ure software RA ure the Logical ' ure encrypted v device #0 - 11.5 #1 device #1 - 10.0	ND Volume Mana olumes GB Software 11.5 GB 512.0 B	ager RAID f	device ext4 / unusable device	=
▼ KAID1	#1	10.0 GB	NAID	device	
~		512.0B		unusable	
	0.0.0) (sda) - 21	.5 GB VMwar	e. VM	ware Virtual S	¥
>	#1 primary	11.5 GB	ĸ	raid	
>	#5 logical	10.0 GB	к	raid	
	0,1,0) (sdb) - 21	.5 GB VMwar	e, VM	ware Virtual S	
	10012411 212.3	11 5 GB	к	raid	
	#1 primary	11.5 00			

• Start configuring the partition.

	debia	an (O
Partition disks		
You are editing partition #1 of RAID1 device #0. No existing file system was Partition settings:	as detected in this p	artition.
Use as: do not use		
Copy data from another partition Erase data on this partition Done setting up the partition		
		×
Screenshot Help	Go Back	Continue

• Choose the file system as Ext4 and mount point as / and confirm.

		debia	an (C
artition disks			
You are editing par Partition settings:	tition #1 of RAID1 device #0. No existing file system v	was detected in this pa	artition.
Use as:	Ext4 journaling file system		
Mount point:	1		
Mount options: Label:	defaults none		
Reserved blocks:	5%		
Typical usage:	standard		
Copy data from an	other partition		
Erase data on this	partition	k	
Done setting up th	e partition		
(areanabat)	delp.	Go Back	Cantinua

• Choose the second RAID partition to start configuring it.

					debian 🤇
artition	disks				
This is an 'file systei	overview of your c m, mount point, et	urrently config tc.), a free spa	ured p ce to c	artitions and mount points. reate partitions, or a device	Select a partition to modify its settings to initialize its partition table.
Guide Config Config Config	d partitioning ure software RA ure the Logical ure encrypted v	ND Volume Mana olumes	ager		2
7 RAID1	device #0 - 11.5	GB Software	RAID	device	
2	<i>#</i> 1	F12.0B	- B	ext4 /	
	device #1 - 10 0	GB Software	RAID	device	
TUADI	#1	10.0 GB	TURID	device	
~		512 0 B		unusable	
SCSIR	(0 0 0) (eda) - 21	5 GB VMwar		ware Virtual S	K
500.0	#1 nrimary	11 5 GB	к.	raid	3
>	#5 logical	10.0 GB	к	raid	
SCSI3	(0.1.0) (sdb) - 21	.5 GB VMwar	e. VM	ware Virtual S	
>	#1 primary	11.5 GB	ĸ	raid	
>	#5 logical	10.0 GB	к	raid	

• Setup the file system as Ext4 and the mount point as /home and confirm.

	debian	
artition disks		
You are editing par Partition settings:	tition #1 of RAID1 device #1. No existing file system was detected in this partition.	
Use as:	Ext4 journaling file system	
Mount point:	/home	
Mount options:	defaults	
Label:	none	
Reserved blocks:	5%	
Typical usage:	standard	
Copy data from an	other partition	
Erase data on this	partition	
Done setting up th	ne partition	
Screenshot	Help Go Back Contin	ue

• Choose finish partitioning.

This is an o							
(file system	verviev 1, mour	w of your cu nt point, etc	rrently config .), a free spa	ured p ce to c	artitions a reate pai	and mount points. Select a partition to modify its setting rtitions, or a device to initialize its partition table.	ıs
Configu	Jre en	crypted vo	lumes				[
	levice	#0 - 11.5 G	iB Software	RAID	device		
>	#1		11.5 GB	f	ext4	1	
>			512.0 B		unusat	ale	
	levice	#1 - 10.0 G	iB Software	RAID	device		
>	#1		10.0 GB	f	ext4	/home	
>			512.0 B		unusat	ble	
	0, 0, 0)	(sda) - 21.5	5 GB VMware	e, VMv	ware Virt	tual S	
>	#1	primary	11.5 GB	к	raid		ŧ
>	#5	logical	10.0 GB	к	raid		۱.
🗢 SCSI3 (0,1,0)	(sdb) - 21.5	5 GB VMwarı	e, VMv	ware Virt	tual S	
>	#1	primary	11.5 GB	к	raid		
~	#5	logical	10.0 GB	к	raid		

• Confirm the application of the changes on the disk.

debian 🔿
Partition disks
If you continue, the changes listed below will be written to the disks. Otherwise, you will be able to make further changes manually. The partition tables of the following devices are changed: RAID1 device #0 RAID1 device #1 The following partitions are going to be formatted: partition #1 of RAID1 device #0 as ext4 partition #1 of RAID1 device #1 as ext4 Write the changes to disks?
O No • Yes k
Screenshot Continue

• Wait for the basic system program to be installed.

	debian	\bigcirc
Install the base system		
Installing the base system		
Validating diffutils		
		()

• Select "No" we will be using the first Debian DVD only.

	debian 🔿
Configure the package manager	
Your installation CD or DVD has been scanned; its label is: Debian GNU/Linux 7.4.0 _Wheezy Official amd64 DVD Binary-1.2 You now have the option to scan additional CDs or DVDs for use these should be from the same set as the installation CD/DVD. I DVDs available, this step can just be skipped.	20140208-13:47 by the package manager (apt). Normally f you do not have any additional CDs or
If you wish to scan another CD or DVD, please insert it now. Scan another CD or DVD? No Yes	
	*
Screenshot	Go Back Continue

• Choose "Yes" to setup a mirror to get programs and updates from.

	debian 🔿
Configure the package manager	
A network mirror can be used to supplement th make newer versions of software available. You are installing from a DVD. Even though the I missing. If you have a reasonably good internel install a graphical deckton environment	e software that is included on the CD-ROM. This may also DVD contains a large selection of packages, some may be t connection, use of a mirror is suggested if you plan to
Use a network mirror?	
O No	
• Yes	
	k
Screenshot	Go Back Continue

• Choose a country to use its mirror server.

	debian	0
onfigure the package manager		
he goal is to find a mirror of the Debian archive that is close to you learby countries, or even your own, may not be the best choice. Debian archive mirror country:	J on the network be aware that	
Slovakia		^
Slovenia		
South Africa		
Spain		
Sweden		
Switzerland		
Taiwan		
Tajikistan		
Thailand		
Turkey		
Ukraine		
United Kingdom		
United States		
Uzbekistan		1
Venezuela		
Viet Nam		~

• Choose the mirror server link.

	debian 🤆
onfigure the package manager	
Please select a Debian archive mirror. You should use a mirror i know which mirror has the best Internet connection to you. Jsually, ftp. <your code="" country="">.debian.org is a good choice. Debian archive mirror:</your>	n your country or region if you do not
ftp.us.debian.org	
ftp.egr.msu.edu	
mirrors.kernel.org	=
debian.lcs.mit.edu	
debian.osuosl.org	-
ftp-nyc.osuosl.org	
ftp-chi.osuosl.org	
mirror.cc.columbia.edu	
mirror.hmc.edu	
mirror. ancl. hawaii. edu	
debian.cc.lehigh.edu	
debian.gtisc.gatech.edu	
cdn.debian.net	
ftp.gtlib.gatech.edu	
	1

• Leave the proxy configuration blank if you have no proxy configuration at the network.

		debia	n (c
Configure the package manager			
f you need to use a HTTP proxy to access the o Otherwise, leave this blank. The proxy information should be given in the s HTTP proxy information (blank for none):	outside world, enter tandard form of "http	the proxy information here p://[[user][:pass]@]host[:po	rt]/".
creenshot		Go Back	Continue

• Choose some environment or software if needed for the working of the machine.

	debian 🤆
software selection	
At the moment, only the core of the system is installed. To tune the sys choose to install one or more of the following predefined collections of Choose software to install:	stem to your needs, you can software.
✓ Debian desktop environment	
Web server	
✓ Print server	
SQL database	
DNS Server	
🗌 File server	
🗌 Mail server	
SSH server	
Laptop	
✓ Standard system utilities	
Screenshot	Continue

• Choose "**Yes**" to setup the boot loader menu at the startup of the machine.

	debian 🔿
Install the GRUB boot loader on a hard disk	
It seems that this new installation is the only operating system on this compute to install the GRUB boot loader to the master boot record of your first hard drive	er. If so, it should be safe e.
Warning: If the installer failed to detect another operating system that is prese modifying the master boot record will make that operating system temporarily can be manually configured later to boot it.	ant on your computer, unbootable, though GRUB
Install the GRUB boot loader to the master boot record?	
O No	
• Yes	
	k
Screenshot	Go Back Continue

• The installation is complete, tap Continue to restart the server.

de	bian	\bigcirc
Finish the installation		
Installation complete Installation is complete, so it is time to boot into your new system. Make sure installation media (CD-ROM, floppies), so that you boot into the new system ra restarting the installation.	to remove the other than	
		k
Screenshot Go B	ack Con	tinue

• The boot menu loads up, choose the first option to start your system in normal mode.

	GNU GRUB versi	on 1.99–27+deb7u2	
<mark>Debian GNU/Linux,</mark>	with Linux 3.2.0-	4-amd64	
Debian GNU/Linux,	with Linux 3.2.0-	4-amd64 (recovery mode)	
Use the ↑ and	+ keys to select	which entry is highligh	ited.
Press enter to	boot the selecte	d OS, 'e' to edit the c	
before booting	or 'c' for a com	mand–line.	

• Click on the user account you created during the installation and type in the password you set.

Thu 2:56	6 U
debian7	
Password:	
System Default V Cancel Log In	

• The desktop GUI or server interface will load.



PS: the Basic install (Non graphical install) have the same menu options without the mouse and the screen-shots option.

:: Instruction Complete ::

8. Navigating the Linux File System

Linux has a different directory structure to Windows. Linux servers typically do not have a Graphical User Interface (GUI), it is therefore vitally important that as a Linux system administrator you are familiar with the Linux directory structure and knows how to navigate and manipulate the files and the file system. In this section, we try to give you an overview of the Linux directory structure.

Linux directory structure



(Source: http://training.h3abionet.org/qiime_hands-on_workshop_2014/?page_id=101)

The below table describes the components listed in the above graphic.

Structure	Description
/	The forward slash is referred to as root and signifies the starting point of the Linux file system. This will be the C:\ equivalent in Microsoft Windows.
/bin	The bin folder contains the user usable binary files that are essential for general operation of your computer. These executable files include commands such as the ls, ping, mv type commands and allows you to navigate and interact with the file system.
/sbin	/sbin is similar to the /bin folder with the exception that these binaries are reserved for the root user or when you run commands with elevated rights such as with the sudo command. Examples of typical binaries would include the mke2fs, ifconfig and fdisk commands.
/etc	In Linux, all devices are configured using text files. These configuration files are usually stored in the /etc folder. Typical files would be your network interface cards, software repository files, etcetera.
/dev	The /dev folder contains the devices attached or mounted to the system. Unlike
	Windows, all Linux devices are represented as directories.
--------	--
/proc	The /proc folder contains all the run time system information such as the system memory, processor, all mounted devices. In essence, it provides information on all locally installed hardware accessible to the server.
/var	The /var folder contains all the server log files and email messages.
/tmp	/tmp is the area used for temporary storage. Running programs or programs which are being installed often make use of location and is similar to the temp folder in Windows. The contents of this folder is often delete after a system reboot.
/usr	The /usr folder is similar to the bin and /sbin folders but differs in that it contains all the user specific binaries for the user installed applications.
/home	The home folder contains a folder for each user who logs into the server and is referred to the user's home folder. This subfolder is used to house all user specific documents and is similar to the "document and settings" folder in Windows.
/boot	This folder contains all the files that are necessary for the Linux system to boot correctly.
/lib	The lib folder contains all the system library binaries and is equivalent to the system32 folder in Windows which houses the .dll files. The Linux library files are represented with a .so extension.
/opt	The /opt folder is reserved for additional software you install. This is similar to the "program files" in the Microsoft Windows machines
/mnt	In Linux, any device needs to be mounted to the system before it can be accessed. Typically you would mount a device to a folder and then access the folder to access the content of the device. The /mnt folder typically contains mount points for internal devices such as the Linux root file system which is mounted to /. It also contains mounts for internal devices such as the internal hard drives which in Linux are referred to as sda1. The number 1 increments by one for each new hard drive device mounted to the system.
/media	The media folder is similar to the /mnt folder but would typically contain mount points for removable media such as CD ROM's, memory sticks, and removable hard drives, etcetera. When the user temporarily mounts a device to the system, they should mount it in this folder.
/srv	The /srv folder contains protocol specific data such as the ftp, rsync, www protocols.

9. Command line text editors

Unlike Windows based server operating systems, Linux servers do not have a graphical user interface. All interaction with the server is via the command line. Below is a short section about editing files using the nano command line text editor. There are a multitude of text editors available to be used in the CLI. In this section we discuss the nano command line text editor

In this tutorial most of the files that we have been editing are only root editable. So you will be using sudo every time you use nano. To use nano you should type: *sudo nano <<file_location/file_name>>*

Example:

sudo nano /etc/ntp.config

To move around in the file you should use the cursor keys

To save and exit nano: Type *Ctrl* + x then type Y then *Enter*

To exit without saving: Type *Ctrl* + *x* then type *N* then *Enter*

To search for a line: Type *Ctrl* + w then type *the work you looking for* then *Enter*

To check to line number: Type *Ctrl* + *c*

To delete a line: Go to the line then type Ctrl + k

To copy something: Select the line or the word then type Ctrl + Shift + c

To past something: Select the position then type Ctrl + Shift + v

GNU nano 2.2.6		File: /etc/globus-conn	ect-server.conf		
B	Globus User Conf	iguration			
; These settings configu ; creating or modifying ; [Globus]	re how to contact G an endpoint.	lobus when	;		
; Globus user name. If n ; value of GLOBUS_USER e ; prompting if it is not User = %(GLOBUS_USER)s	ot set, or left at nvironment variable present.	its default, then the is used, falling back to			
; Globus login password. ; value of the GLOBUS_PA: ; to prompting if it is Password = %(GLOBUS_PASS)	If not set, or lef SSWORD environment not present. WORD)s	t at its default, then the variable is used, falling∣	back		
;;	Globus Endpoint Co	nfiguration			
; Set these if you want	to add or modify th	e core attributes of the e	ndpoint. Read 252 lines l		
<mark>^G</mark> Get Help <mark>^X</mark> Exit	<mark>^0</mark> WriteOut <mark>^J</mark> Justify	<mark>^R</mark> Read File <mark>^W</mark> Where Is	<mark>^Y</mark> Prev Page <mark>^V</mark> Next Page	<mark>^K</mark> Cut Text <mark>^U</mark> UnCut Text	<mark>^C</mark> Cur Pos <mark>^T</mark> To Spell



10. Network File Sharing (NFS)

The Network File System (NFS) is a distributed file system protocol originally developed by Sun Microsystems in 1984. NFS allows a user on a client computer to access files over a network much like a user on a Windows based machine will access a shared drive or folder over the network.

Terminology:

<u>Server</u>: the machine that will be exporting the folder i.e. the machine on which the folder is locally based. In this tutorial, the server's address will be serverA.co.za

<u>Client:</u> the machine that the folder will be mounted on i.e. the machine on which the folder will be remotely accessed. In this tutorial, the client's address will be clientA.co.za

Setting up NFS would require you to have root privileges. As opposed to appending the "sudo" option to your command in order to run the installation with elevated rights. One could change into "sudo mode" by typing "su" at the CLI. The main difference between using "sudo" and "su" is that with "sudo", the single command is run with administrative rights and is usefull when installing a single application. The sudo password is held in cache for a few minutes but thereafter you would be required to retype the administrator password for each subsequent command requiring elevated rights. When you will be running a series of commands which require elevated rights, it is easier to change into sudo mode. This will run all commands typed after the "su" command until the user exists's sudo mode.

To enter into sudo mode in all there OS's, at the CLI type:

sudo su

You will be prompted for your administrator password. Type this in to complete the change to sudo mode.

10.1 Server side setup

Install the NFS server-side software on the server (e.g. serverA.co.za) using either the "sudo" command or switching to sudo mode.

Ubuntu or Debian

apt-get install nfs-kernel-server

SL 6.4

yum –y install nfs-kernel-server

Create the directory you want to export (if it does not already exist):

mkdir -p /path/to/directory

Set permissions (required if you are not using LDAP authentication):

chmod -R 777 /path/to/directory

To export the folder to an IP address, add the following line to /etc/exports

/path/to/directory client.co.za(rw,fsid=0,insecure,no_subtree_check,async)

Restart the NFS service

service nfs-kernel-server restart

10.2. Client side setup

Install the NFS client software on the client machine (e.g. clientA.co.za). You could either use the "sudo" command to elevate the logged on user's rights or switch to sudo mode as with the server installation.

Ubuntu / Debian

apt-get install nfs-common

SL 6.4

yum –y install nfs-common

Create the directory you would like the filesystem to be mounted to (if it does not already exist)

mkdir -p /path/to/directory

Edit the /etc/fstab file to add the filesystem you would like to mount:

serverA.co.za:/path/to/directory /path/to/directory nfs
auto,noatime,nolock,bg,nfsvers=3,intr,tcp,actimeo=1800 0 0

Now from the CLI mount the filesystem

mount –a

The mount -a switch will remount all the mount points found in the fstab configuration file

11. Task scheduling

Another useful utility is the ability to schedule repetitive tasks to automatically run at a predetermined point in time. This ability is managed and configured by the "Cron" software utility. Cron is similar to the Windows based task scheduler program. It is designed to schedule jobs

(commands or shell scripts) to run periodically at fixed times, dates, or intervals. It typically automates system maintenance or administration—it is also useful for general-purpose scheduling for things like connecting to the Internet and downloading email at regular intervals.

To configure Cron to schedule a task > log into the machine as the user you would like to run the task as. If the task needs to be run with root privileges, for example, you must be logged in as root. To open a crontab, from the command prompt type;

crontab -е

Jobs are added to this configuration file as a single line consisting of 6 columns in the following order:

- Minute
- Hour
- day_of_month
- month
- day_of_week (0 is Sunday, 1 is Monday...)
- command_to_be_run

As an example, to schedule a script to run every Monday at 4:30pm, you would enter the following:

```
30 4 * * 1 script.sh arg1 arg2## runs the command at 04h30am30 16 ** 1 script.sh arg1 arg2## runs the command at 16h30pm
```

If you have your server set up to send emails (see "Set up postfix to send emails from your server"), you can set cron to email you when it has notifications for you using the MAILTO directive. At the top of the crontab, add:

MAILTO=email_address

12. Useful commands

Linux provides several powerful administrative tools and utilities which will help you to manage your systems effectively. If you don't know what these tools are and how to use them, you could be spending lot of time trying to perform even the basic administrative tasks. The focus of this section is to help you understand the basic system administration tools, which will help you to become an effective Linux system administrator.

Command	Description
man	The man command stands for "manual" and is similar to the "help" or "?" command in Windows. To review the syntax for a particular command, at the CLI, type man command_name
ls	Is stands or list and is similar to the "dir" command in Windows. Is will display the contents of a folder. Using the Is -I switch will display the file date stamp and ownership
pwd	pwd stands for "print working directory". When navigating around the file system, you might get to a point where you don't know where you are in the file system.

	Running the pwd command will display where you are in the file system.				
ср	Is the copy command and is used to copy files to different locations on the local machine. The cp syntax is cp file new_location				
scp	scp is the secure copy command and is used when copying data across the network. The syntax for coping a file from the local serve to a remote host is scp file user_@remote_host:location when coping a file from a remote server to the local server scp username_@remote_host:location location_on_local_server				
mv	The mv command stands for "move" and has two functions. The first is as the name suggests, it moves a file from one location to another. The mv command is also use to rename a file. To rename a file, use the mv command but instruct the command move the file into the same location as the original adding only the new file name. This will rename the file. Examples				
	Moving a file <i>mv file destination_location</i>				
	Renaming a file <i>mv filename new_filename</i> if the file you renaming is in a remote location, add the path to the above command				
rm	The rm command is used to remove of delete a file. When removing a folder, you need to add the -r option. rm file_name or, rm -r folder_name				
mkdir	The make directory command is as the name suggests used to make a directory. mkdir new_directory_name				
cd	The cd command is used to change your working directory. The syntax for this would be: cd /path_to_directory cd will revert the cd command by one folder at a time				
Viewing file content	There are a few ways to achieve this. One method is to use a text editor; instruction for this is in point 9 above. To view the content of a file from the CLI, the following commands can be used <i>cat</i> – will display the contents of the file on the screen <i>more</i> – using the more option will fill display the file contents one screen at a time <i>less</i> – works the same as the more command <i>tail</i> – will give you the first 10 lines of the file <i>head</i> – will give you the last 10 lines of the file				

13. References

- 13.1. RAID
 - <u>http://www.thegeekstuff.com/2010/08/raid-levels-tutorial/</u>
- 13.2. Linux hard disk naming convention
 - <u>http://www.tldp.org/HOWTO/Partition-Mass-Storage-Definitions-Naming-HOWTO/x99.html</u>

13.3. Nano

- <u>http://en.wikipedia.org/wiki/Vim (text_editor)</u> vim background
- <u>http://www.openvim.com/tutorial.html</u> vim tutorial
- <u>http://www.fprintf.net/vimCheatSheet.html</u> vim cheat sheet

13.4. VIM

- <u>http://www.howtogeek.com/howto/42980/the-beginners-guide-to-nano-the-linux-command-line-text-editor/</u> nano howto
- <u>https://wiki.gentoo.org/wiki/Nano/Basics_Guide</u>
- <u>https://help.ubuntu.com/community/Nano</u> how to install nano
- <u>http://mintaka.sdsu.edu/reu/nano.html</u>

13.5. Basic Linux commands

• <u>http://www.ee.surrey.ac.uk/Teaching/Unix/</u>

Please forward any queries, comments or complaints you may have about howto to the H3ABioNet System Administrator Task-force: <u>sys_admin_tf@lists.h3abionet.org</u>