

StarWind® Ceph all-in-one Cluster

How to deploy Ceph all-in-one Cluster

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TECHINICAL PAPER

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StarWind is a pioneer in virtualization and a company that participated in the development of this technology from its earliest days. Now the company is among the leading vendors of software and hardware hyper-converged solutions. The company's core product is the years-proven StarWind Virtual SAN, which allows SMB and ROBO to benefit from cost-efficient hyperconverged IT infrastructure. Having earned a reputation of reliability, StarWind created a hardware product line and is actively tapping into hyperconverged and storage appliances market. In 2016, Gartner named StarWind "Cool Vendor for Compute Platforms" following the success and popularity of StarWind HyperConverged Appliance. StarWind partners with world-known companies: Microsoft, VMware, Veeam, Intel, Dell, Mellanox, Citrix, Western Digital, etc.

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Introduction

This guidance will show you how to deploy a Ceph all-in-one cluster. The paper will walk you through the Ceph cluster configuration process and describe how to create a Ceph monitor and Ceph OSD.

Ceph is an open-source project, which provides unified software solution for storing blocks, files, and objects. The main idea of the project is to provide a high-performing distributed storage system which can provide an ability to perform a massive storage scale-out and will have no single points of failure. It has become one of the most popular Software-Defined Storage technologies.

Ceph becomes more attractive to the storage industry due to its openness, scalability, and reliability. Cloud computing and IaaS era requires a system which must be Software-Defined and ready for cloud technologies. Ceph injects here more than perfect, regardless the environment where it is going to be used (public, private, or hybrid cloud).

This guide is intended for experienced IT and Storage administrators and professionals who would like to deploy the Ceph all-in-one cluster to check out all the benefits of Ceph object storage.

A full set of up-to-date technical documentation can always be found [here](#), or by pressing the **Help** button in the StarWind Management Console.

For any technical inquiries please visit our [online community](#), [Frequently Asked Questions](#) page, or use the [support form](#) to contact our technical support department.

Before you begin

This guide describes the installation and configuration of the Ceph all-in-one cluster, which means that we are going to build the Ceph cluster using only one VM. We are going to deploy the ESXi VM and install Debian 8 on it.

You can download our pre-deployed [OVF template](#) or follow these steps:

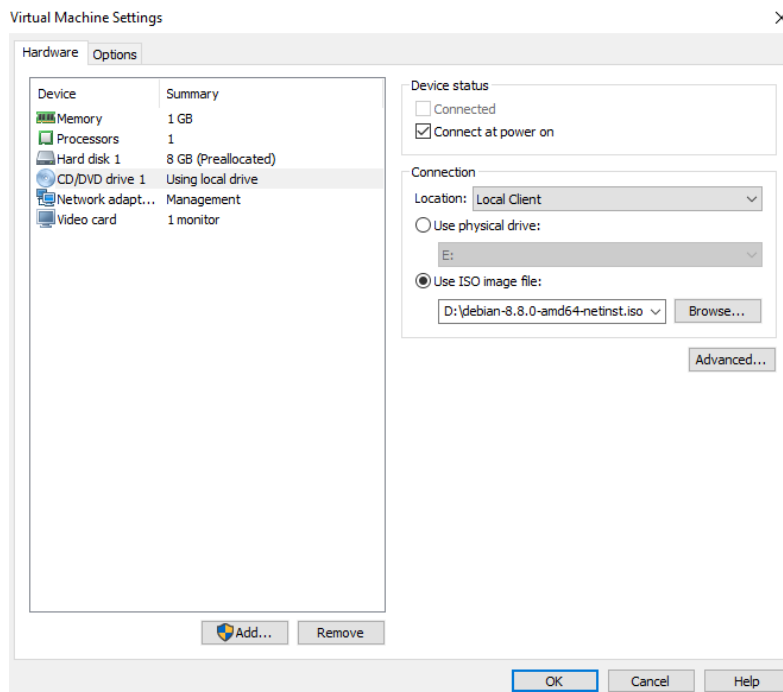
Virtual Machine Deployment and OS installation

1. Download Debian 8 ISO for OS installation here:
<https://cdimage.debian.org/cdimage/archive/8.8.0/amd64/iso-cd/debian-8.8.0-amd64-netinst.iso>
2. Create the ESXi VM with following settings:

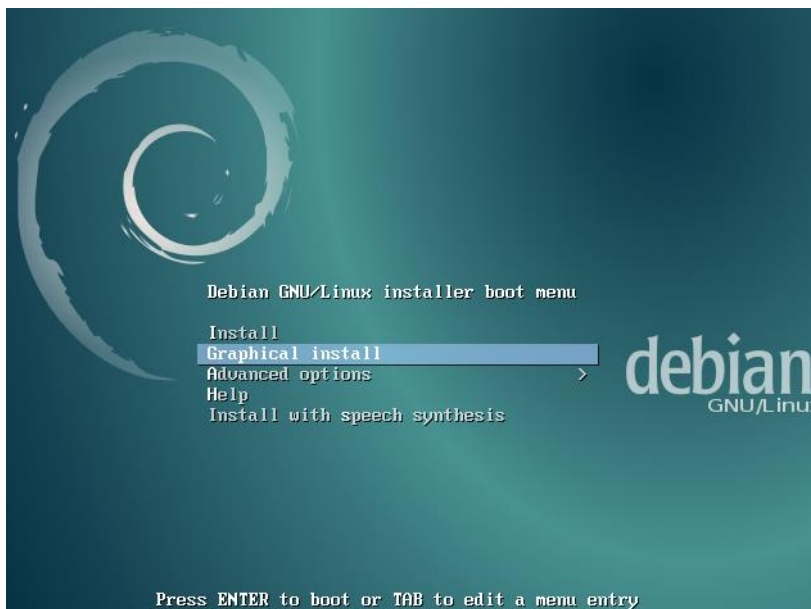
The screenshot shows the 'New Virtual Machine' wizard in VMware Workstation, specifically the 'Customize hardware' step. The left sidebar shows the progress: 1. Select creation type (completed), 2. Edit settings (completed), and 3. Ready to complete. The 'Customize hardware' section has three tabs: 'Virtual Hardware' (selected), 'VM Options', and 'SDRS Rules'. The 'Virtual Hardware' tab shows a list of components with their configured values: CPU (1), Memory (1024 MB), New Hard disk (8 GB), New SCSI controller (LSI Logic Parallel), *New Network (Management), Status (checked 'Connect At Power On'), Adapter Type (VMXNET 3), DirectPath I/O (unchecked 'Enable'), MAC Address (Automatic), New CD/DVD Drive (Client Device), Video card (Specify custom settings), VMCI device, New SATA Controller, and Other Devices. At the bottom, there is a 'New device:' section with a 'Select' dropdown and an 'Add' button. The compatibility is set to 'ESXi 5.5 and later (VM version 8)'. Navigation buttons 'Back', 'Next', 'Finish', and 'Cancel' are at the bottom right.

Component	Value
CPU	1
Memory	1024 MB
New Hard disk	8 GB
New SCSI controller	LSI Logic Parallel
*New Network	Management
Status	<input checked="" type="checkbox"/> Connect At Power On
Adapter Type	VMXNET 3
DirectPath I/O	<input type="checkbox"/> Enable
MAC Address	Automatic
New CD/DVD Drive	Client Device
Video card	Specify custom settings
VMCI device	
New SATA Controller	
Other Devices	

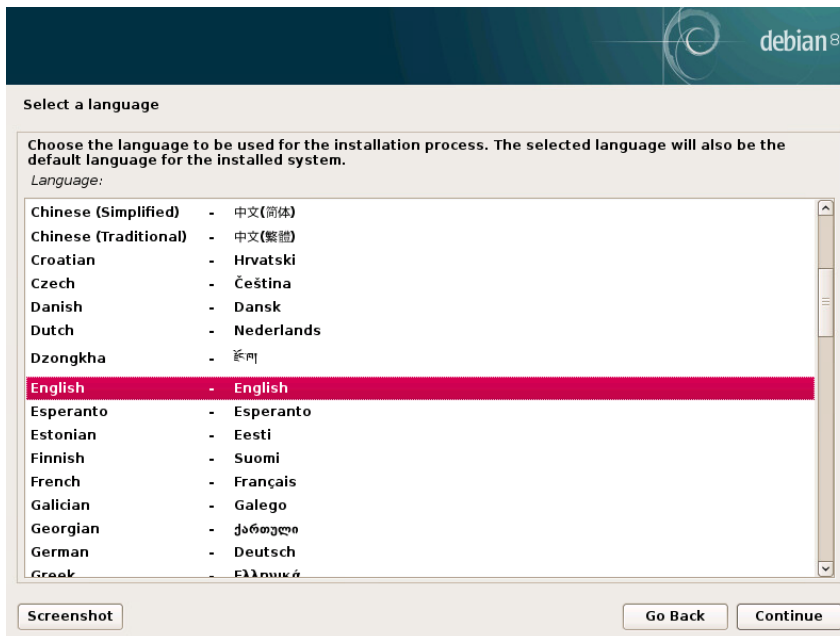
3. Mount the ISO image to the VM and boot from it.



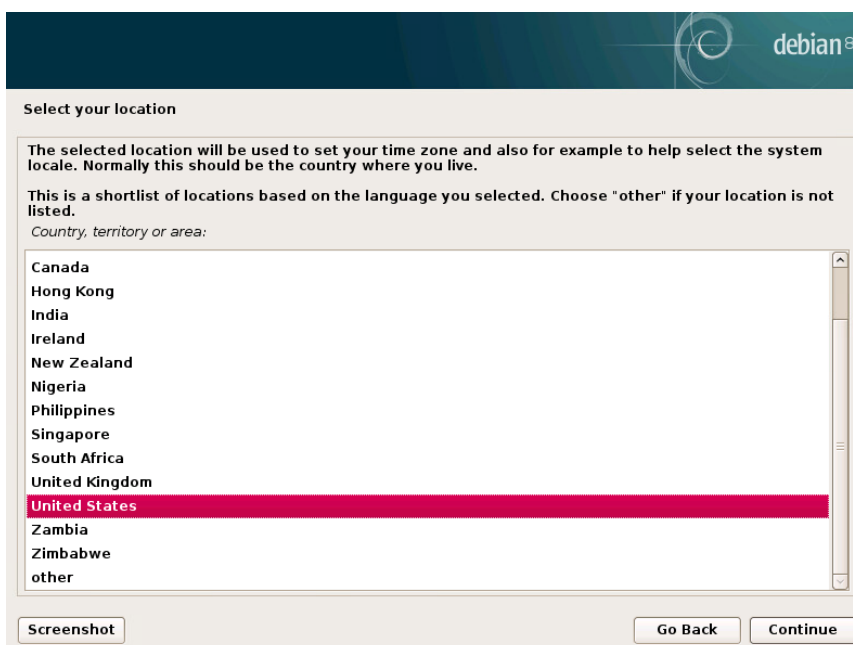
4. Choose **Graphical install option**



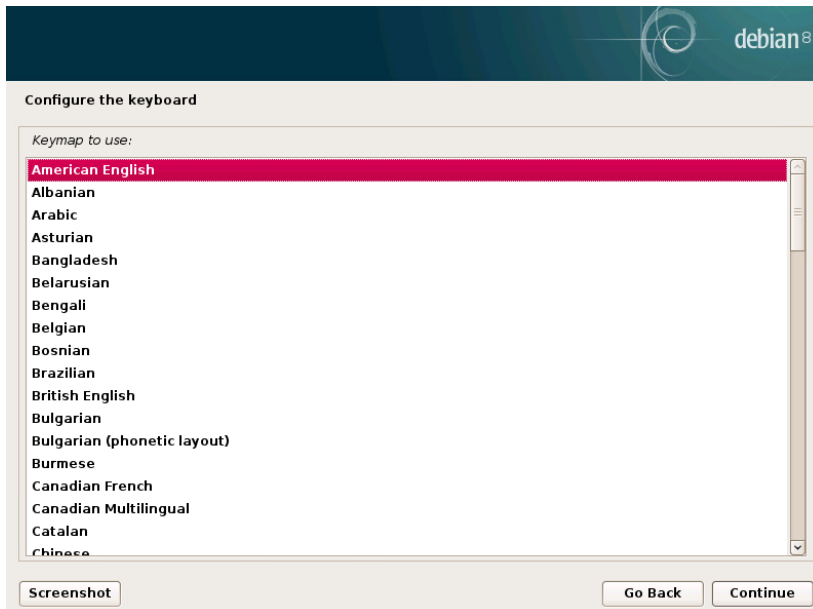
5. Choose an eligible language for the installation process



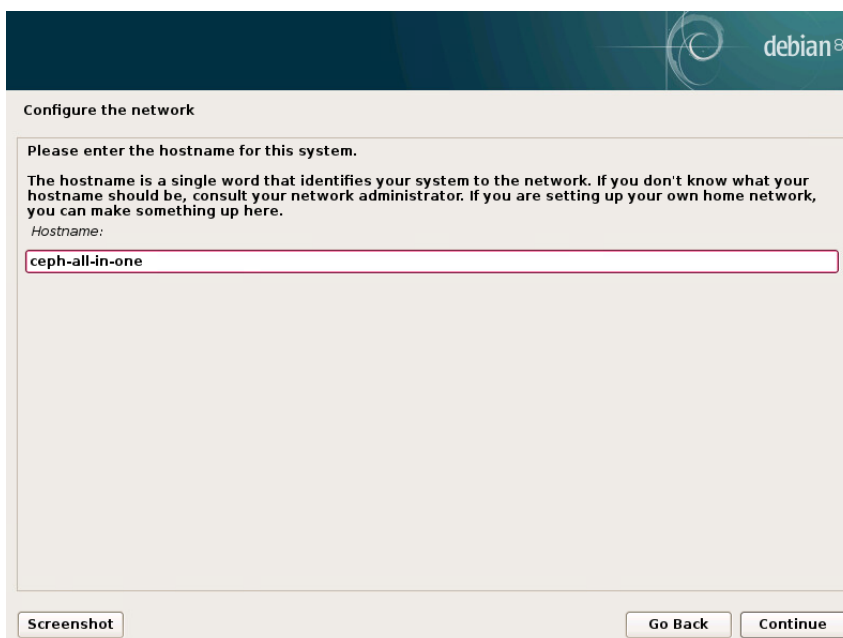
6. Select your location, which is going to be used to set your time zone.



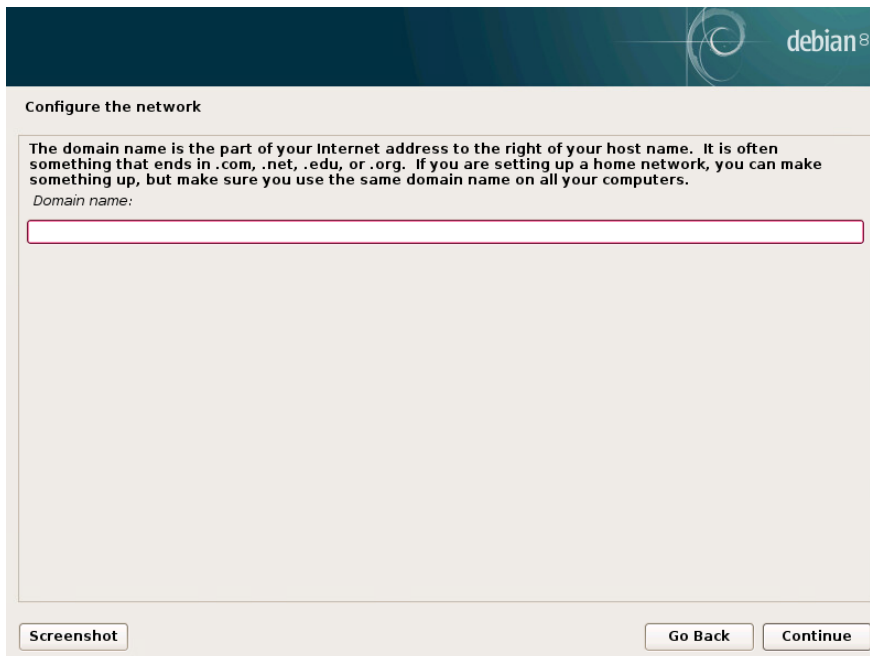
7. Configure the keyboard (choose **American English**)



8. Enter the hostname

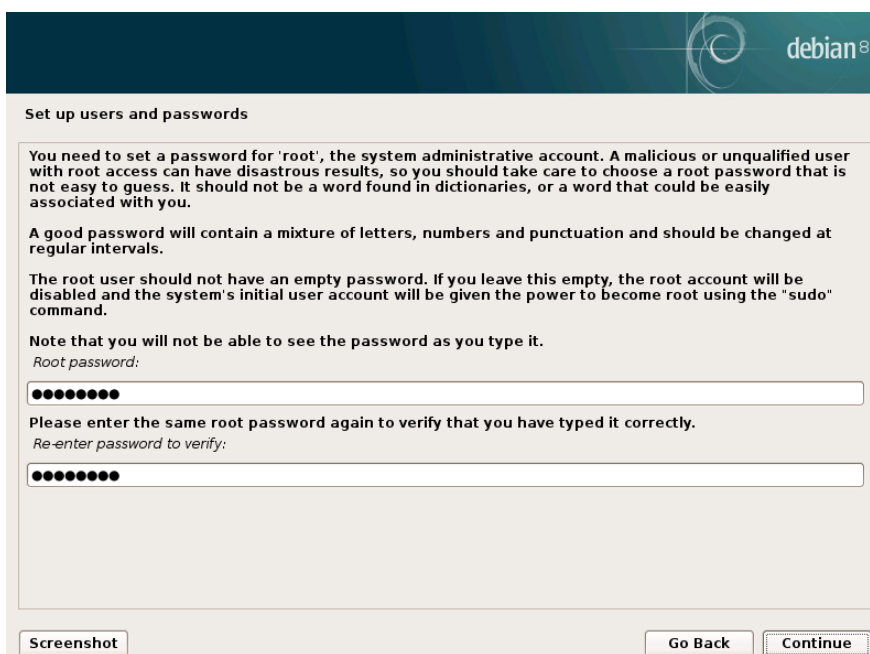


9. Configure your network.



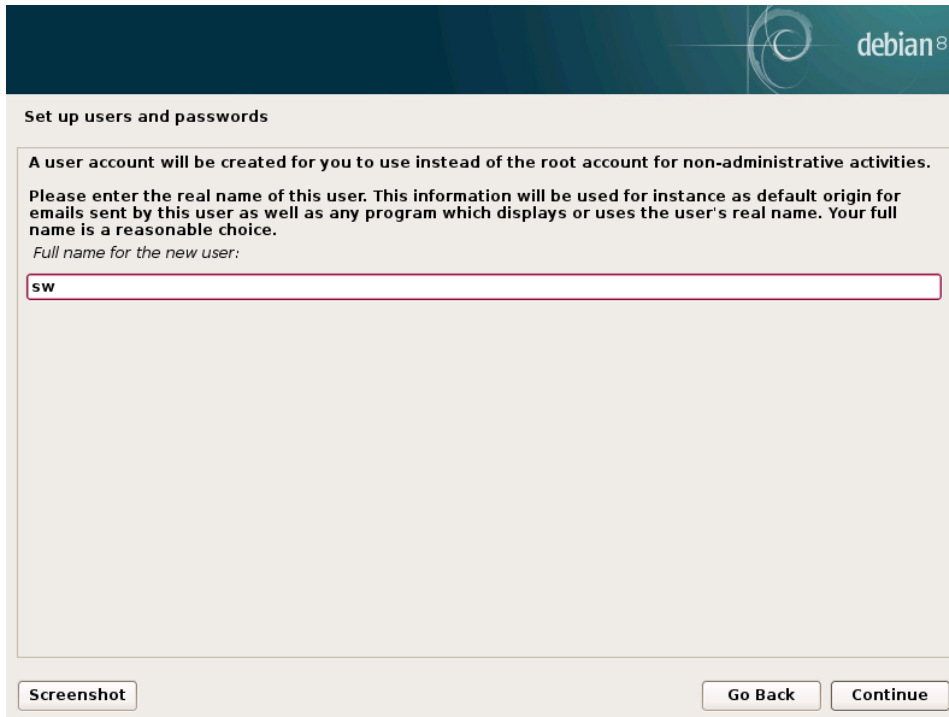
The screenshot shows the 'Configure the network' window in the Debian 8 installer. The window has a dark blue header with the Debian logo and 'debian 8' text. Below the header, the title 'Configure the network' is displayed. The main content area contains a paragraph explaining domain names: 'The domain name is the part of your Internet address to the right of your host name. It is often something that ends in .com, .net, .edu, or .org. If you are setting up a home network, you can make something up, but make sure you use the same domain name on all your computers.' Below this text, the label 'Domain name:' is followed by a large, empty text input field. At the bottom of the window, there are three buttons: 'Screenshot' on the left, and 'Go Back' and 'Continue' on the right.

10. Set up a password for 'root' account



The screenshot shows the 'Set up users and passwords' window in the Debian 8 installer. The window has a dark blue header with the Debian logo and 'debian 8' text. Below the header, the title 'Set up users and passwords' is displayed. The main content area contains several paragraphs of instructions: 'You need to set a password for 'root', the system administrative account. A malicious or unqualified user with root access can have disastrous results, so you should take care to choose a root password that is not easy to guess. It should not be a word found in dictionaries, or a word that could be easily associated with you.'; 'A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.'; 'The root user should not have an empty password. If you leave this empty, the root account will be disabled and the system's initial user account will be given the power to become root using the "sudo" command.'; and 'Note that you will not be able to see the password as you type it.' Below these instructions, the label 'Root password:' is followed by a password input field showing eight dots. Below this, the text 'Please enter the same root password again to verify that you have typed it correctly.' is followed by the label 'Re-enter password to verify:' and another password input field showing eight dots. At the bottom of the window, there are three buttons: 'Screenshot' on the left, and 'Go Back' and 'Continue' on the right.

11. Create a user account which is going to be used instead of the root account for non-administrative activities



The image shows a screenshot of the Debian 8 installer window titled "Set up users and passwords". The window has a dark blue header with the Debian logo and "debian 8" text. The main content area is light gray and contains the following text:

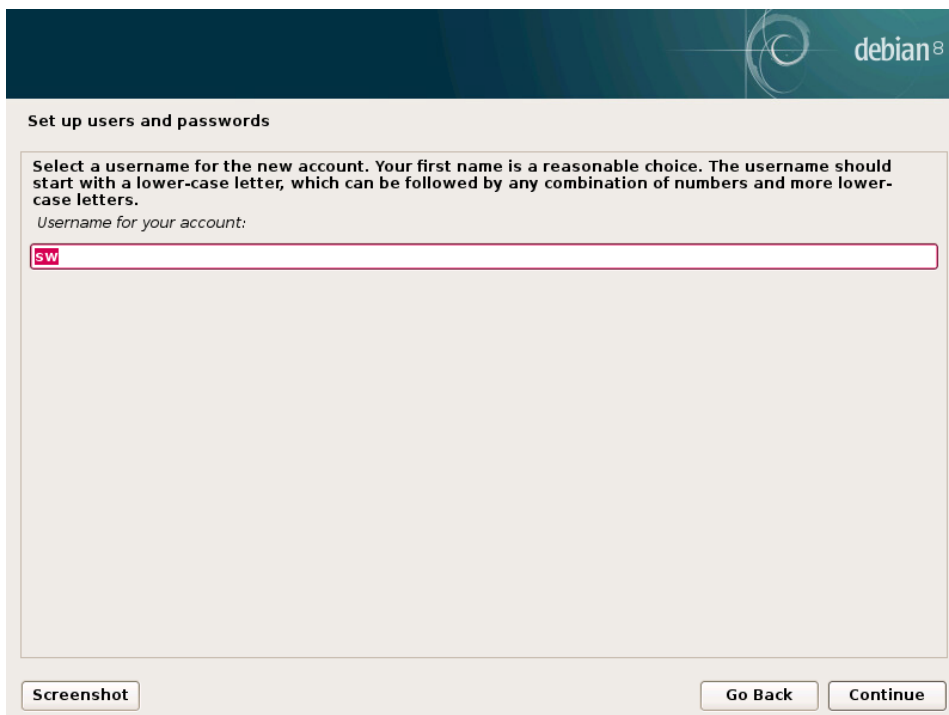
A user account will be created for you to use instead of the root account for non-administrative activities.

Please enter the real name of this user. This information will be used for instance as default origin for emails sent by this user as well as any program which displays or uses the user's real name. Your full name is a reasonable choice.

Full name for the new user:

Below the text is a large text input field with a red border. The text "sw" is entered into the field.

At the bottom of the window, there are three buttons: "Screenshot" on the left, and "Go Back" and "Continue" on the right.



The image shows a screenshot of the Debian 8 installer window titled "Set up users and passwords". The window has a dark blue header with the Debian logo and "debian 8" text. The main content area is light gray and contains the following text:

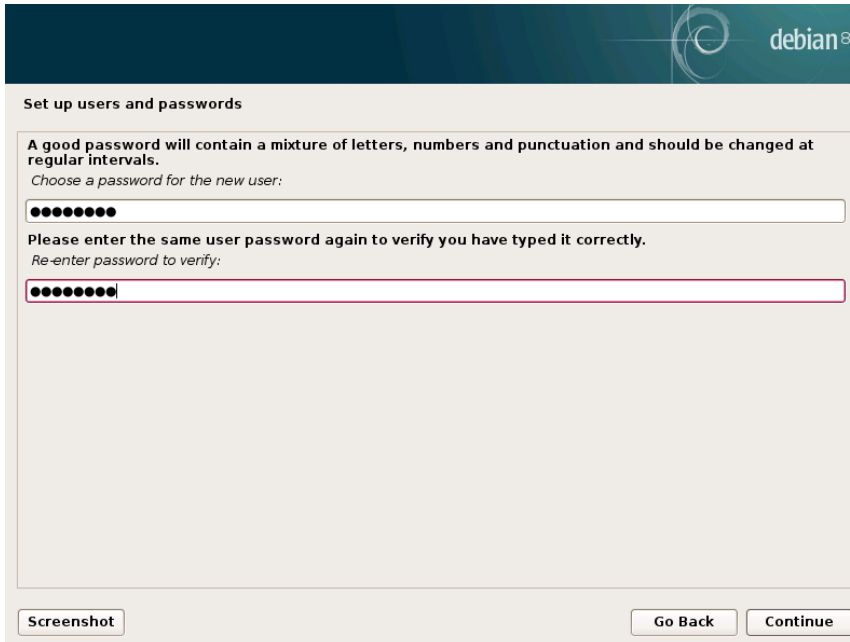
Select a username for the new account. Your first name is a reasonable choice. The username should start with a lower-case letter, which can be followed by any combination of numbers and more lower-case letters.

Username for your account:

Below the text is a large text input field with a red border. The text "sw" is entered into the field.

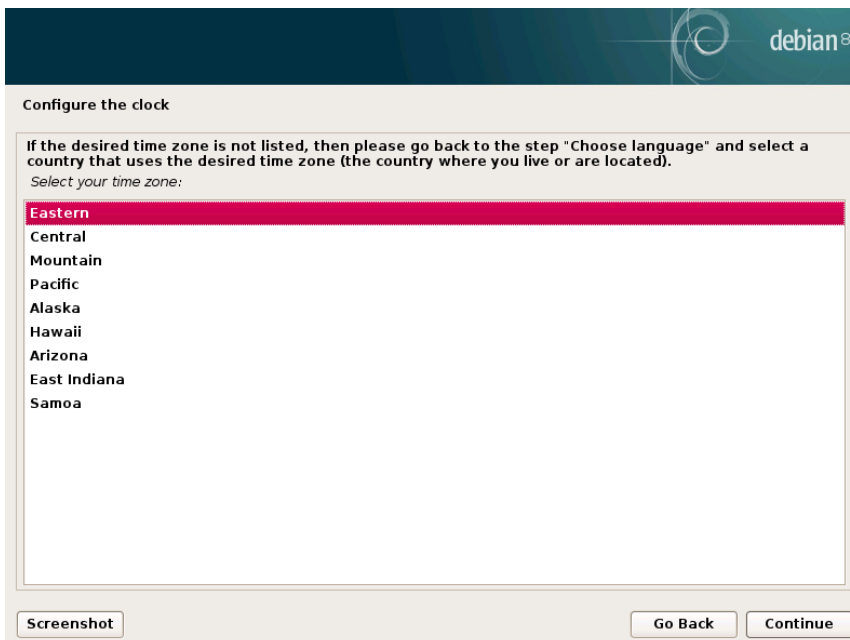
At the bottom of the window, there are three buttons: "Screenshot" on the left, and "Go Back" and "Continue" on the right.

12. Set up a password for the newly created account



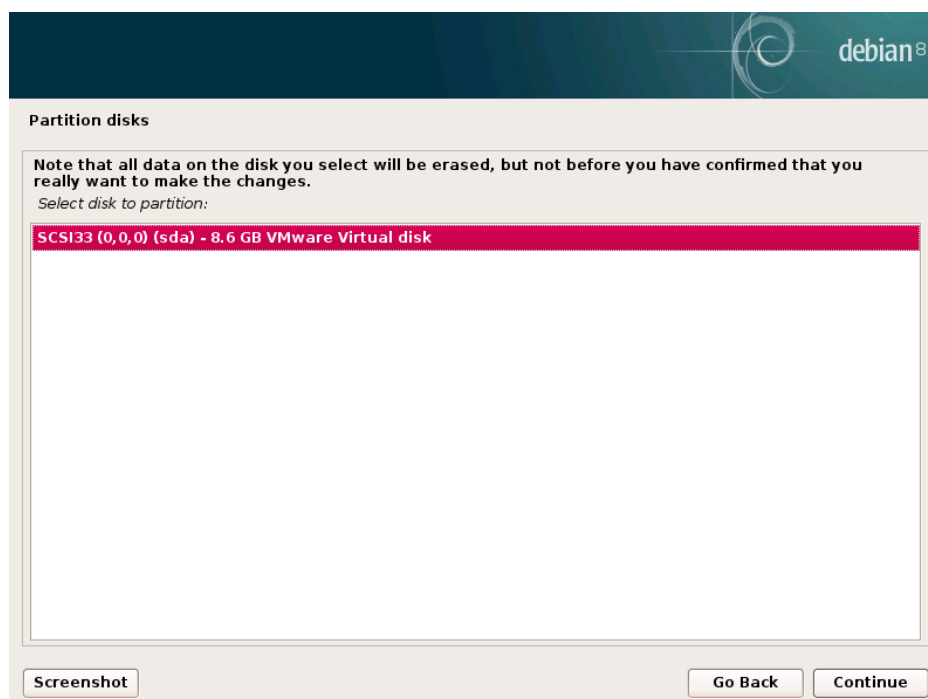
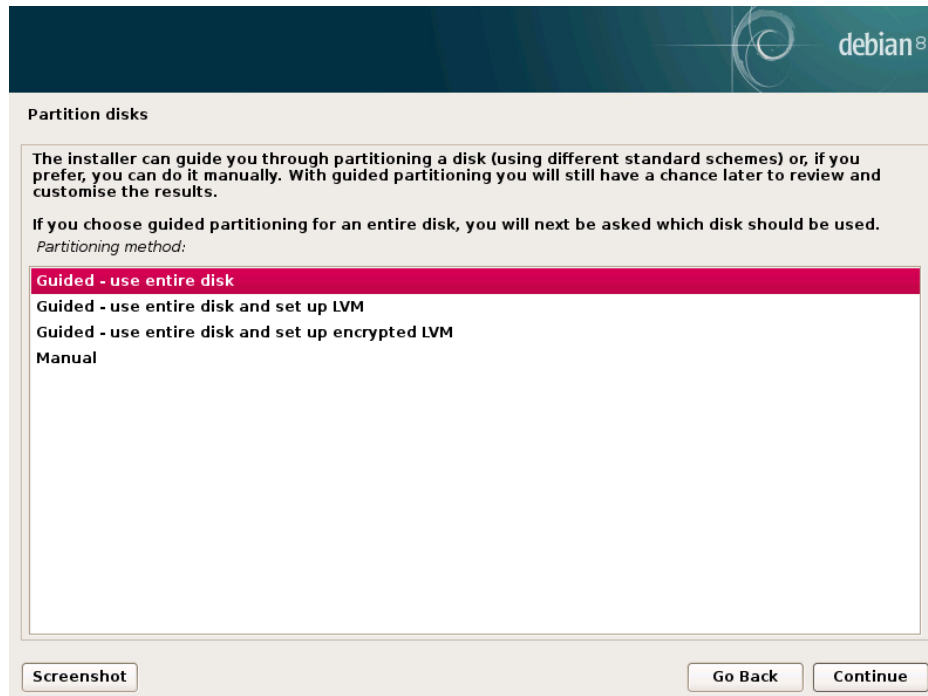
The screenshot shows the 'Set up users and passwords' screen in the Debian 8 installer. At the top, there's a header with the Debian logo and 'debian 8'. Below the header, the title 'Set up users and passwords' is displayed. A message states: 'A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals. Choose a password for the new user:'. There are two password input fields, each containing eight dots. The second field is highlighted with a red border. Below the fields, a message says: 'Please enter the same user password again to verify you have typed it correctly. Re-enter password to verify:'. At the bottom, there are three buttons: 'Screenshot', 'Go Back', and 'Continue'.

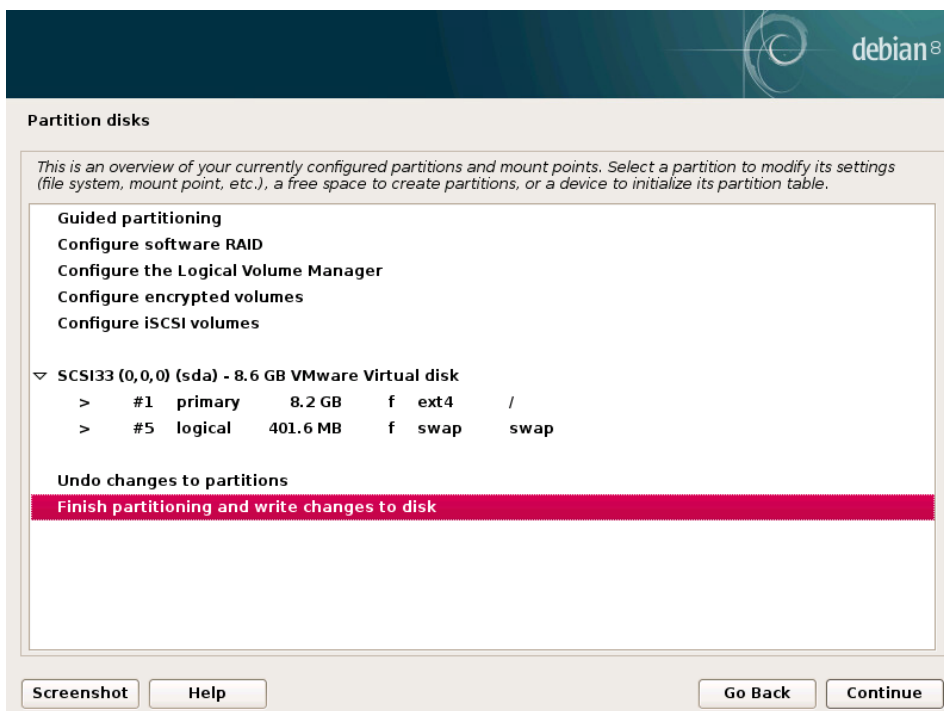
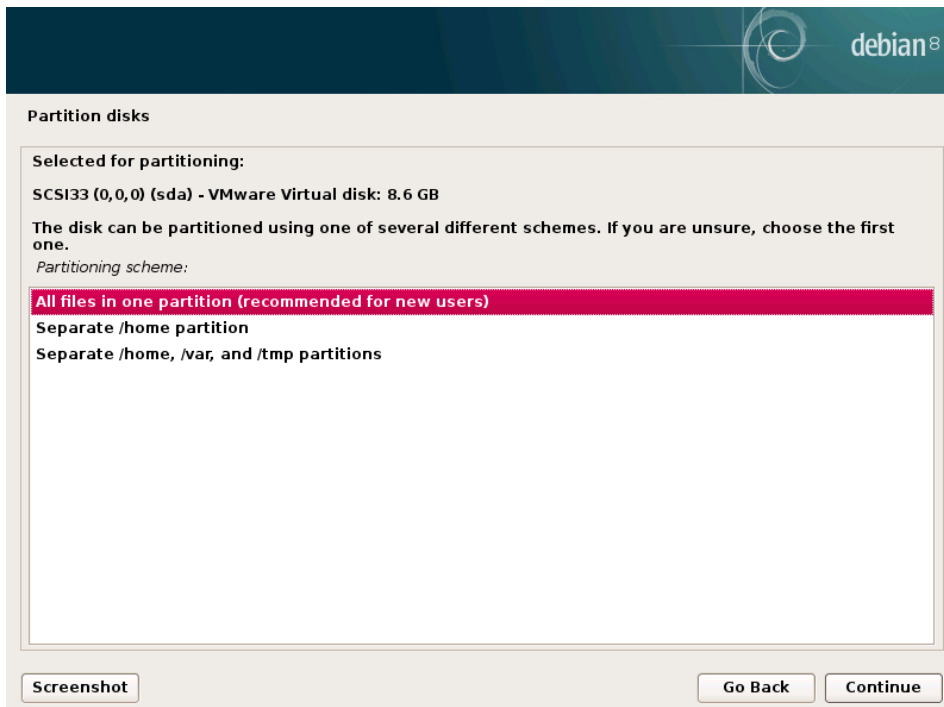
13. Select the desired time zone for you



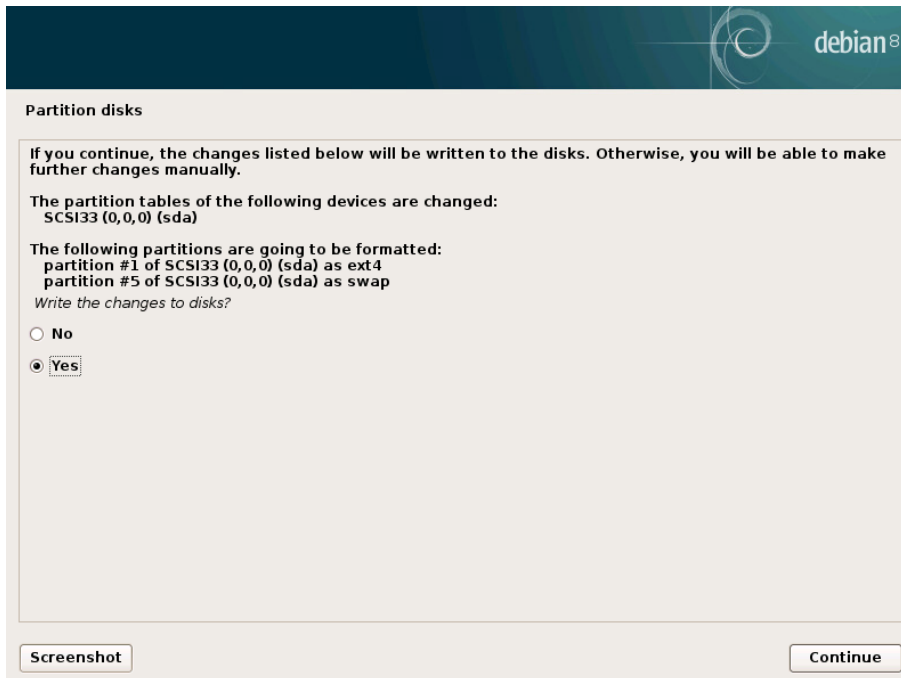
The screenshot shows the 'Configure the clock' screen in the Debian 8 installer. At the top, there's a header with the Debian logo and 'debian 8'. Below the header, the title 'Configure the clock' is displayed. A message states: 'If the desired time zone is not listed, then please go back to the step "Choose language" and select a country that uses the desired time zone (the country where you live or are located). Select your time zone:'. Below the message is a list of time zones: 'Eastern', 'Central', 'Mountain', 'Pacific', 'Alaska', 'Hawaii', 'Arizona', 'East Indiana', and 'Samoa'. The 'Eastern' option is highlighted with a red background. At the bottom, there are three buttons: 'Screenshot', 'Go Back', and 'Continue'.

14. Partition the disks

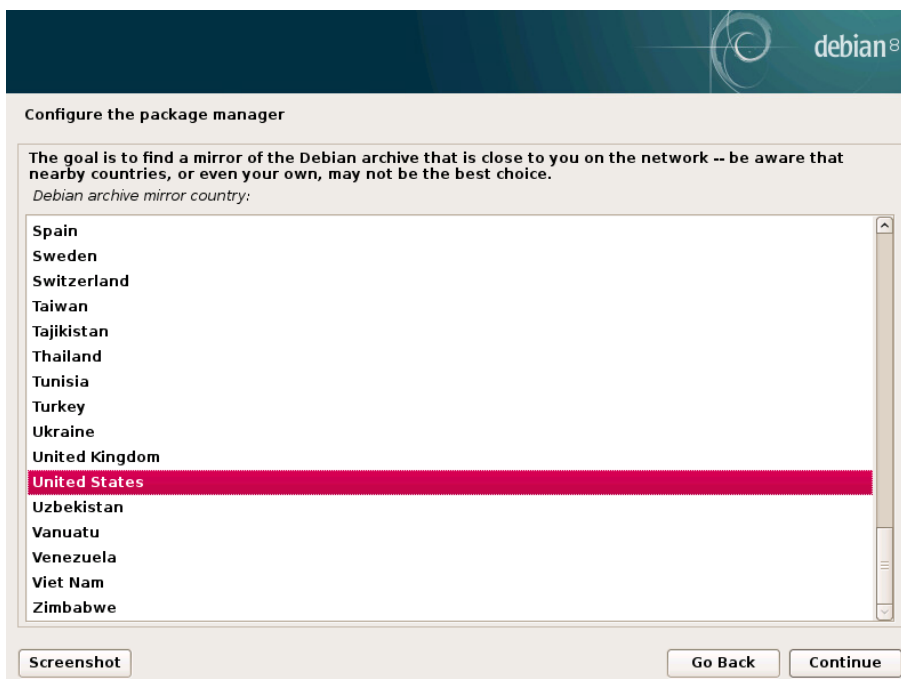




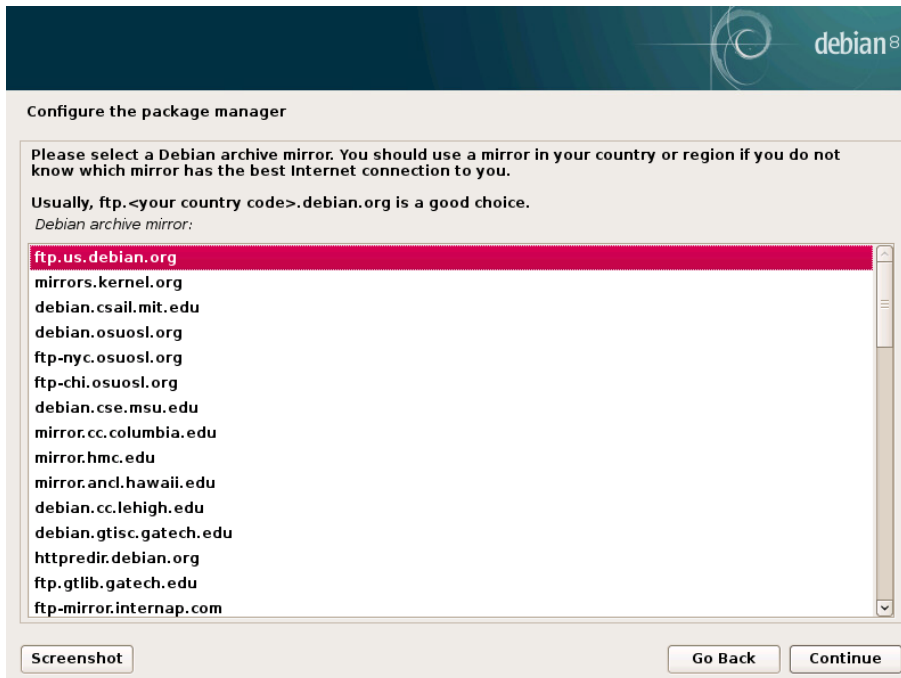
15. Write changes to the disks



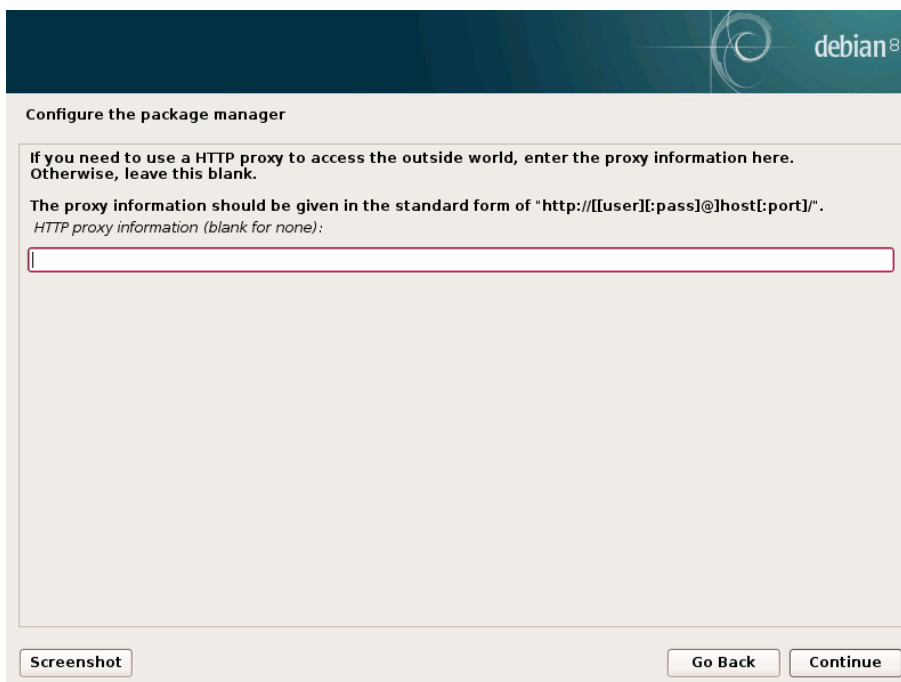
16. Configure the package manager




17. Select a Debian Archive mirror



18. Enter proxy information if you need to use HTTP proxy.



19. Configure popularity contest



Configuring popularity-contest

The system may anonymously supply the distribution developers with statistics about the most used packages on this system. This information influences decisions such as which packages should go on the first distribution CD.


If you choose to participate, the automatic submission script will run once every week, sending statistics to the distribution developers. The collected statistics can be viewed on <http://popcon.debian.org/>.

This choice can be later modified by running "dpkg-reconfigure popularity-contest".
Participate in the package usage survey?

☒ No
☐ Yes

[Screenshot](#) [Continue](#)

20. Select software needed



Software selection

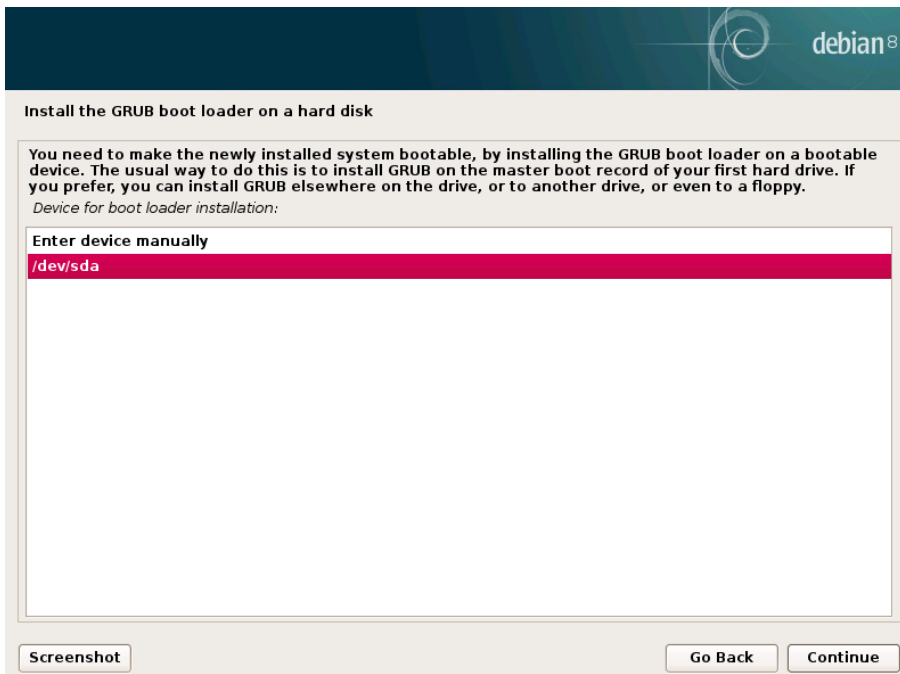
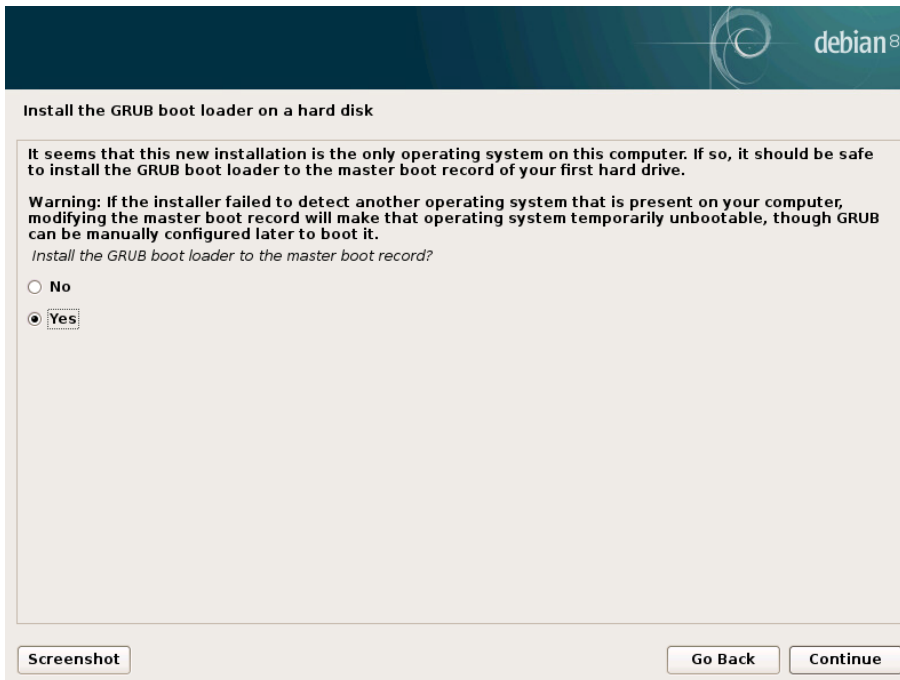
At the moment, only the core of the system is installed. To tune the system to your needs, you can choose to install one or more of the following predefined collections of software.

Choose software to install:

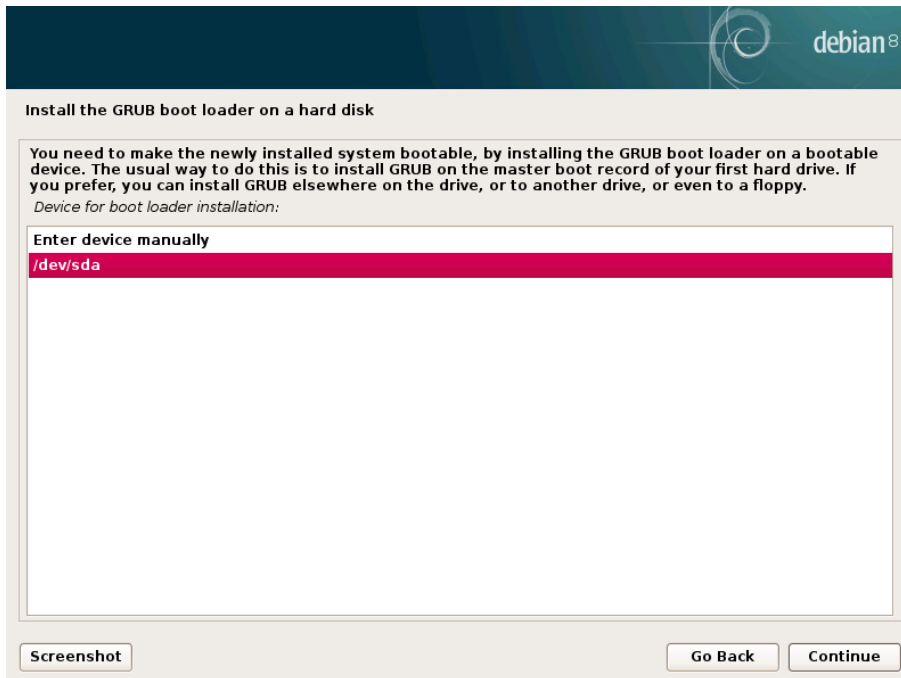
- ☐ Debian desktop environment
- ☐ ... GNOME
- ☐ ... Xfce
- ☐ ... KDE
- ☐ ... Cinnamon
- ☐ ... MATE
- ☐ ... LXDE
- ☐ web server
- ☐ print server
- ☒ SSH server
- ☒ standard system utilities

[Screenshot](#) [Continue](#)

21. Install the GRUB boot loader

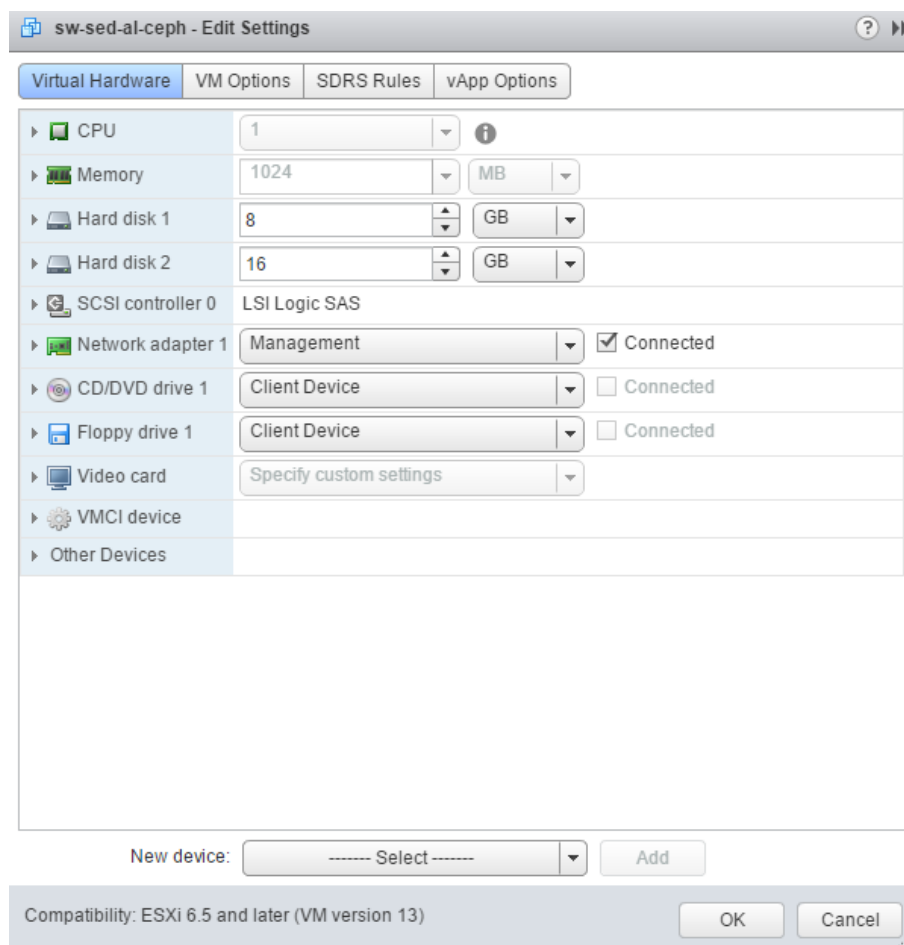


22. Finish the installation



Virtual Machine configuration

23. Add a Virtual Disk with a desirable size to the VM. This Virtual Disk will be used by OSD Daemon.



24. Boot the VM into the recently installed OS and log in to it using the root account. Update Debian using the following command: **apt-get -y update**

25. Install packages and configure NTP.
apt-get install -y sudo python python-pip ntp;
systemctl enable ntp;
systemctl start ntp;
26. Add user you have created to sudoers (where %USERNAME% is the user account you have created during OS installation):
usermod -aG sudo %USERNAME%;
echo "%USERNAME% ALL = (root) NOPASSWD:ALL" | sudo tee
/etc/sudoers.d/%USERNAME%;
chmod 0440 /etc/sudoers.d/%USERNAME%;
27. Connect to the VM via SSH and log in using your user account.
28. Configure SSH:
Generate the ssh keys for %USERNAME% user:
ssh-keygen
Leave passphrase as blank/empty.
Edit file id_rsa.pub and remove "%USERNAME%@host" (name of your user) at the end of the string
nano /home/%USERNAME%/.ssh/id_rsa.pub
cp /home/%USERNAME%/.ssh/id_rsa.pub
/home/%USERNAME%/.ssh/authorized_key
29. Add to /etc/hosts host ip (eth0) and a hostname

```

GNU nano 2.2.6                                     File: /etc/hosts
127.0.0.1      localhost
127.0.1.1      ceph-all-in-one
192.168.0.69   ceph-all-in-one

# The following lines are desirable for IPv6 capable hosts
::1          localhost ip6-localhost ip6-loopback
ff02::1      ip6-allnodes
ff02::2      ip6-allrouters

```

Ceph Deployment

30. Deploy Ceph "all-in-one":

- Create directory "Ceph-all-in-one":
mkdir ~/Ceph-all-in-one;
cd ~/Ceph-all-in-one;
- Install Ceph-deploy:
sudo pip install Ceph-deploy
- Create new config:
sCeph-deploy new Ceph-all-in-one;
echo "[osd]" >> /home/%USERNAME%/Ceph-all-in-one/Ceph.conf;
echo "osd pool default size = 1" >> /home/sw/Ceph-all-in-one/Ceph.conf;
echo "osd crush chooseleaf type = 0" >> /home/%USERNAME%/Ceph-all-in-one/Ceph.conf;

31. Install Ceph and add mon role to node

Ceph-deploy install Ceph-all-in-one; ("Ceph-all-in-one" our hostname)
Ceph-deploy mon create-initial;
Ceph-deploy osd create Ceph-all-in-one:sdb; ("Ceph-all-in-one" our hostname, sdb name of the disk we have added in the Virtual Machine configuration section)

32. Change Ceph rbd pool size:

sudo Ceph osd pool set rbd size 1

```
sw@sw-sed-al-ceph:~/ceph-all-in-one$ sudo ceph osd pool set rbd size 1
set pool 0 size to 1
sw@sw-sed-al-ceph:~/ceph-all-in-one$
```

33. After deployment:
Check cluster status: **sudo ceph -s**

```
sw@sw-sed-al-ceph:~/ceph-all-in-one$ sudo ceph -s
cluster cbb947f6-5998-4c0e-97f8-f157a935fe2a
health HEALTH_OK
monmap el: 1 mons at {sw-sed-al-ceph=192.168.0.69:6789/0}
election epoch 4, quorum 0 sw-sed-al-ceph
osdmap ell: 1 osds: 1 up, 1 in
flags sortbitwise,require_jewel_osds
pgmap v24: 64 pgs, 1 pools, 370 bytes data, 4 objects
34748 kB used, 11219 MB / 11252 MB avail
64 active+clean
sw@sw-sed-al-ceph:~/ceph-all-in-one$
```

NOTE: Please keep in mind that we have deployed Ceph cluster without the replication. It is not recommended to use this scenario in production.

Conclusion

By following these instructions, you have deployed Debian VM and configured it for creating Ceph all-in-one cluster. We have configured the VM as a Ceph monitor and created an OSD and Ceph pool. As a result, you can create RBD device, format it and mount to store your data.

Contacts

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	 +33 097 7197 857 (France)
	 +7 495 975 94 39 (Russian Federation and CIS)
	 1-866-790-2646

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