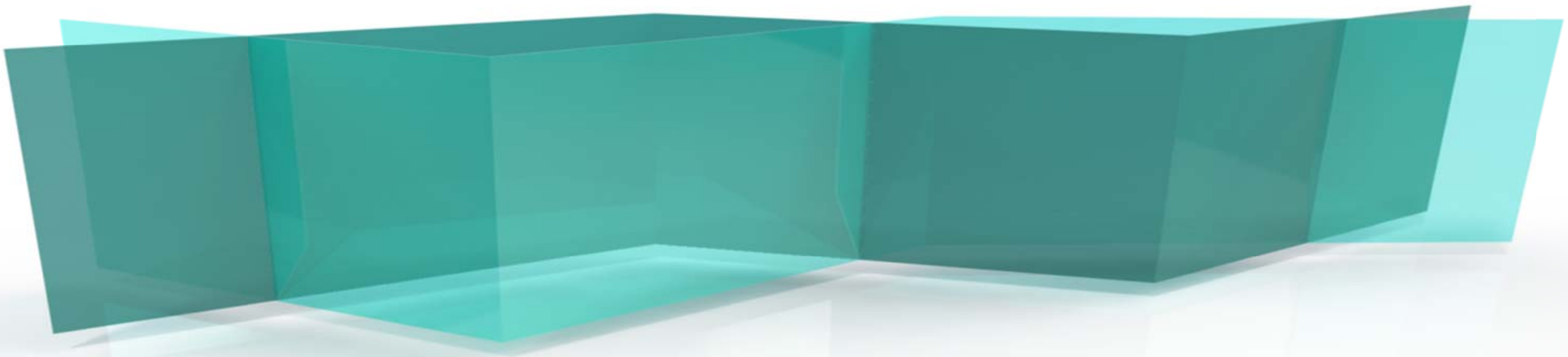
WiRC SDK

Setting up Dension SDK on Debian Squeeze in a VirtualBox

Version 1.0

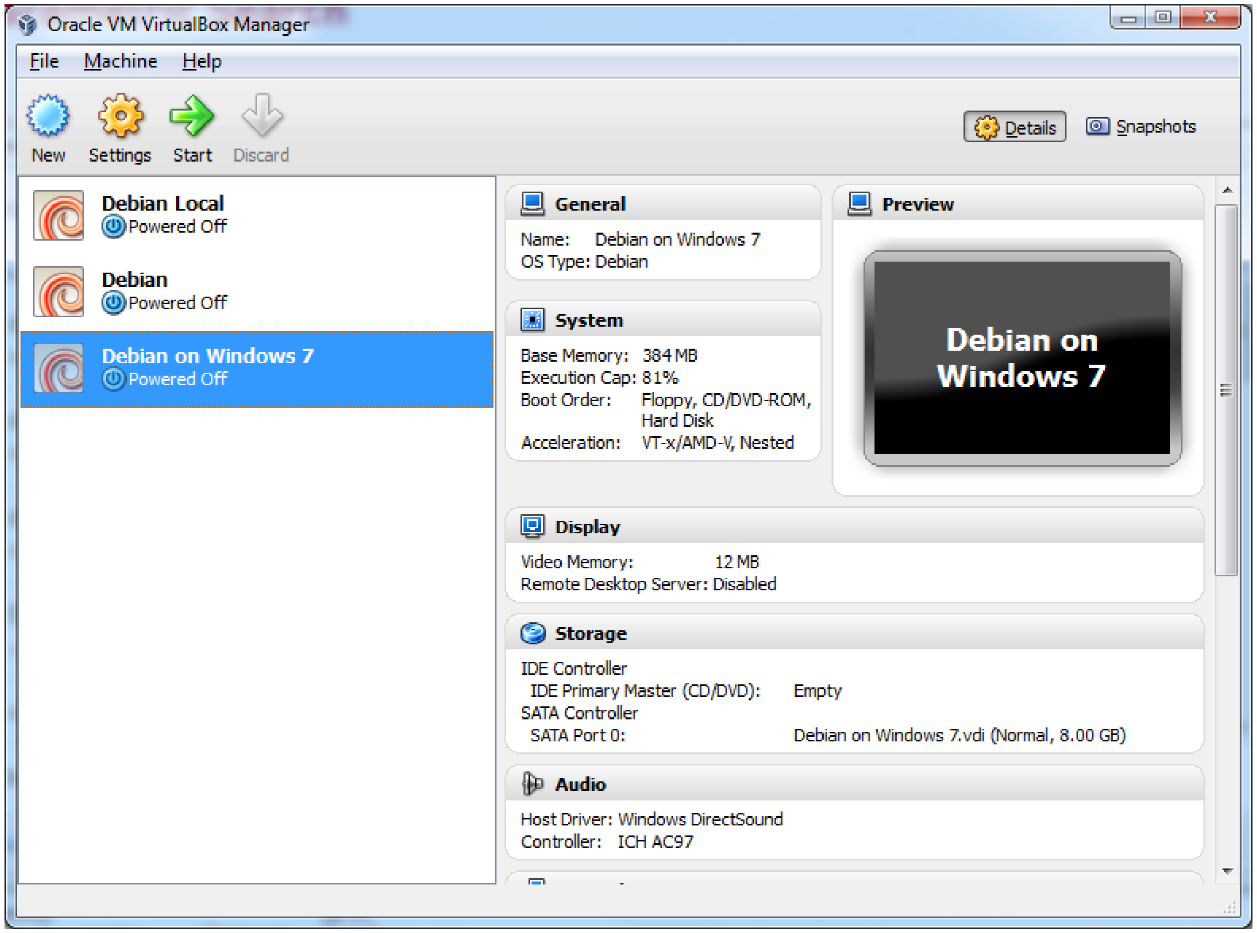
Guillaume Fournier, ing.



1. Go get a coffee and get yourself comfortable, it's going to take some time. You can expect to perform this setup in around 2-3 hours if you do not encounter major problems. Otherwise, only gods knows…

2. Download and install Oracle VM VirtualBox on your target machine. Version used in this document is 4.1.22.
https://www.virtualbox.org/wiki/Downloads

3. Download and install the Oracle VM VirtualBox Extension Pack. Version used in this document is 4.1.22r80657.
https://www.virtualbox.org/wiki/Downloads



Debian Local
Powered Off
Debian
Powered Off
Debian on Windows 7
Powered Off

General
Name: Debian on Windows 7
OS Type: Debian

System
Base Memory: 384 MB
Execution Cap: 81%
Boot Order: Floppy, CD/DVD-ROM, Hard Disk
Acceleration: VT-x/AMD-V, Nested

Preview

Display
Video Memory: 12 MB
Remote Desktop Server: Disabled

Storage
IDE Controller
IDE Primary Master (CD/DVD): Empty
SATA Controller
SATA Port 0: Debian on Windows 7.vdi (Normal, 8.00 GB)

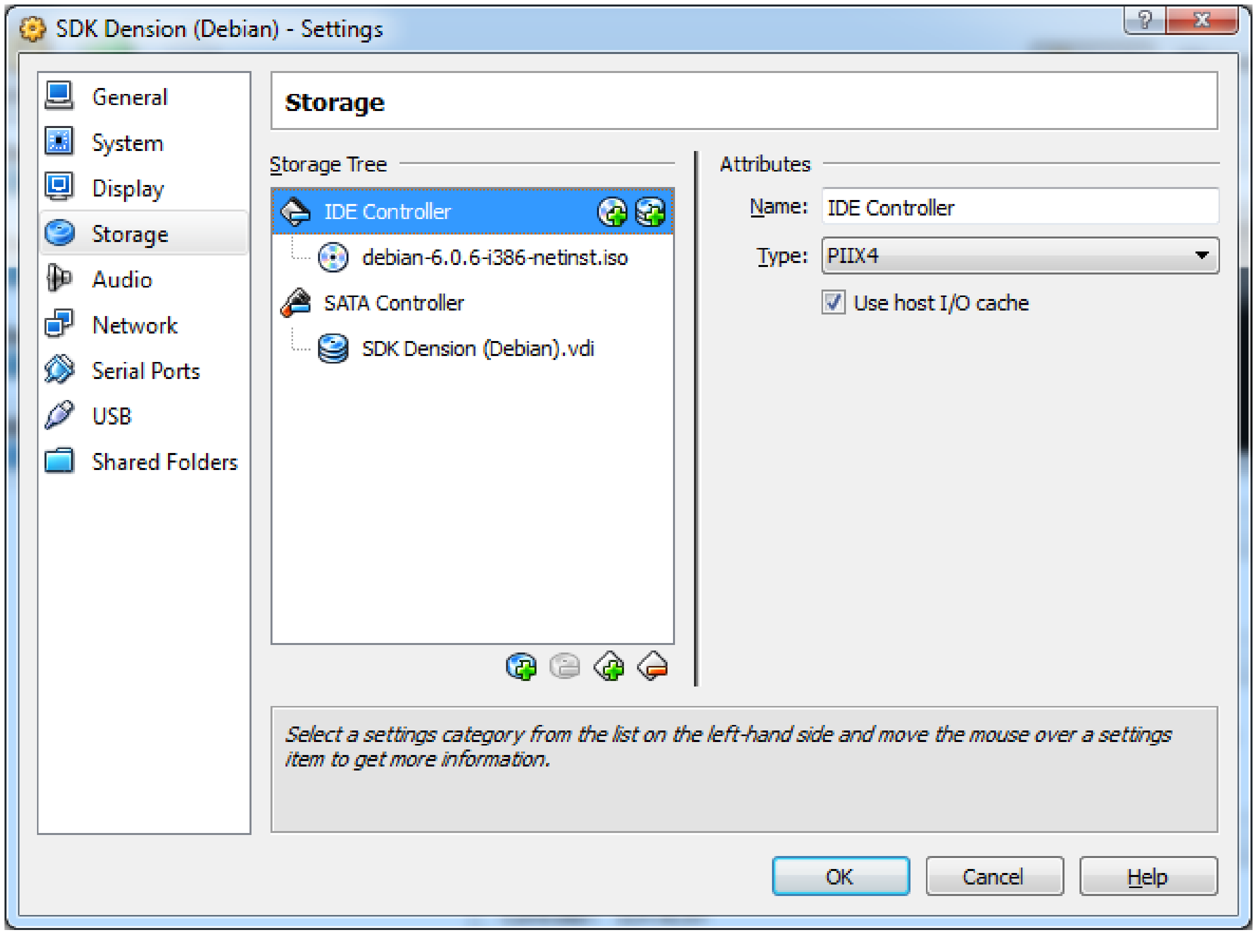
Audio
Host Driver: Windows DirectSound
Controller: ICH AC97

VirtualBox shown with some Virtual Machines in it

4. Create a new Virtual Machine. Give it a proper name and use all standard settings proposed by the wizard (384MB base memory, new dynamically allocated 8GB VDI start-up disk).

5. Download the netinst version of Debian Squeeze through:
   http://www.debian.org/distrib/netinst
   File downloaded in this document is debian-6.0.6-i386-netinst.iso.

6. Modify the settings of the Virtual Machine under Storage to add the new downloaded Debian ISO image as an attached disk.



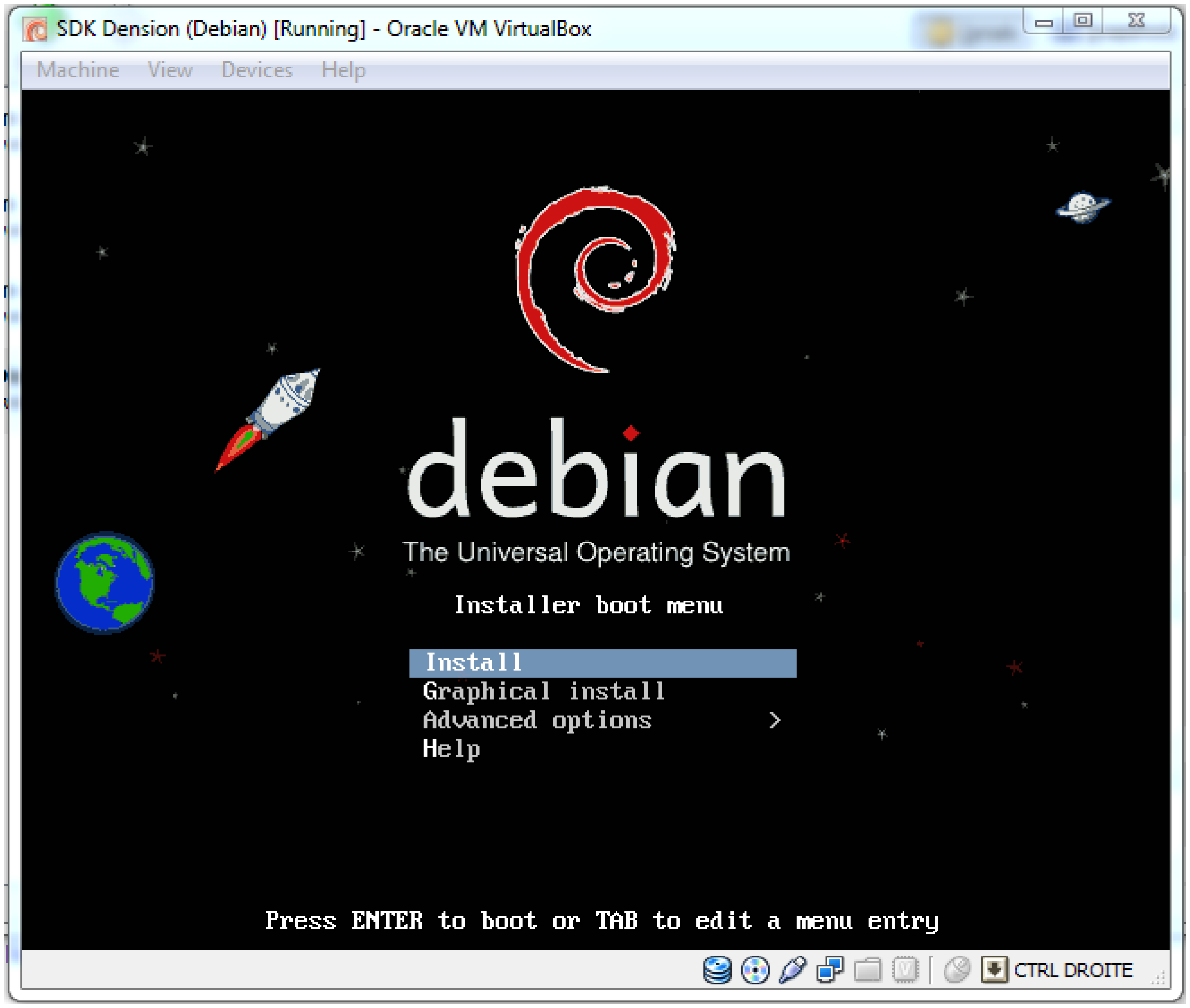
Name: IDE Controller

Type: PIIX4

[✓] Use host I/O cache

Select a settings category from the list on the left-hand side and move the mouse over a settings item to get more information.

7. Start the Virtual Machine. It will boot from the Debian ISO and propose you to install the operating system.


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine
View
Devices
Help
debian
The Universal Operating System
CTRL DROITE

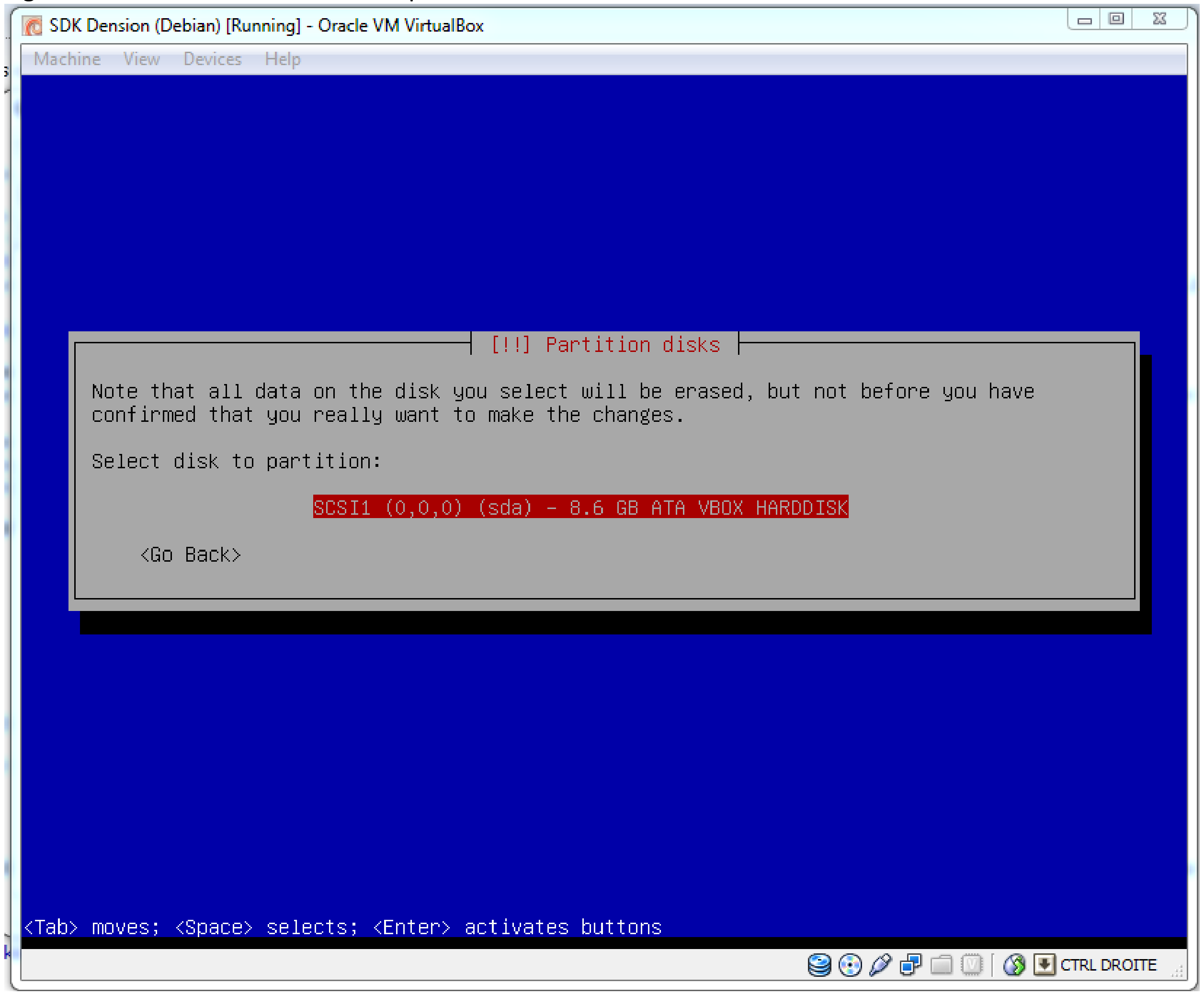
```
Installer boot menu

Install
Graphical install
Advanced options   >
Help

Press ENTER to boot or TAB to edit a menu entry
```

8. Select Install…

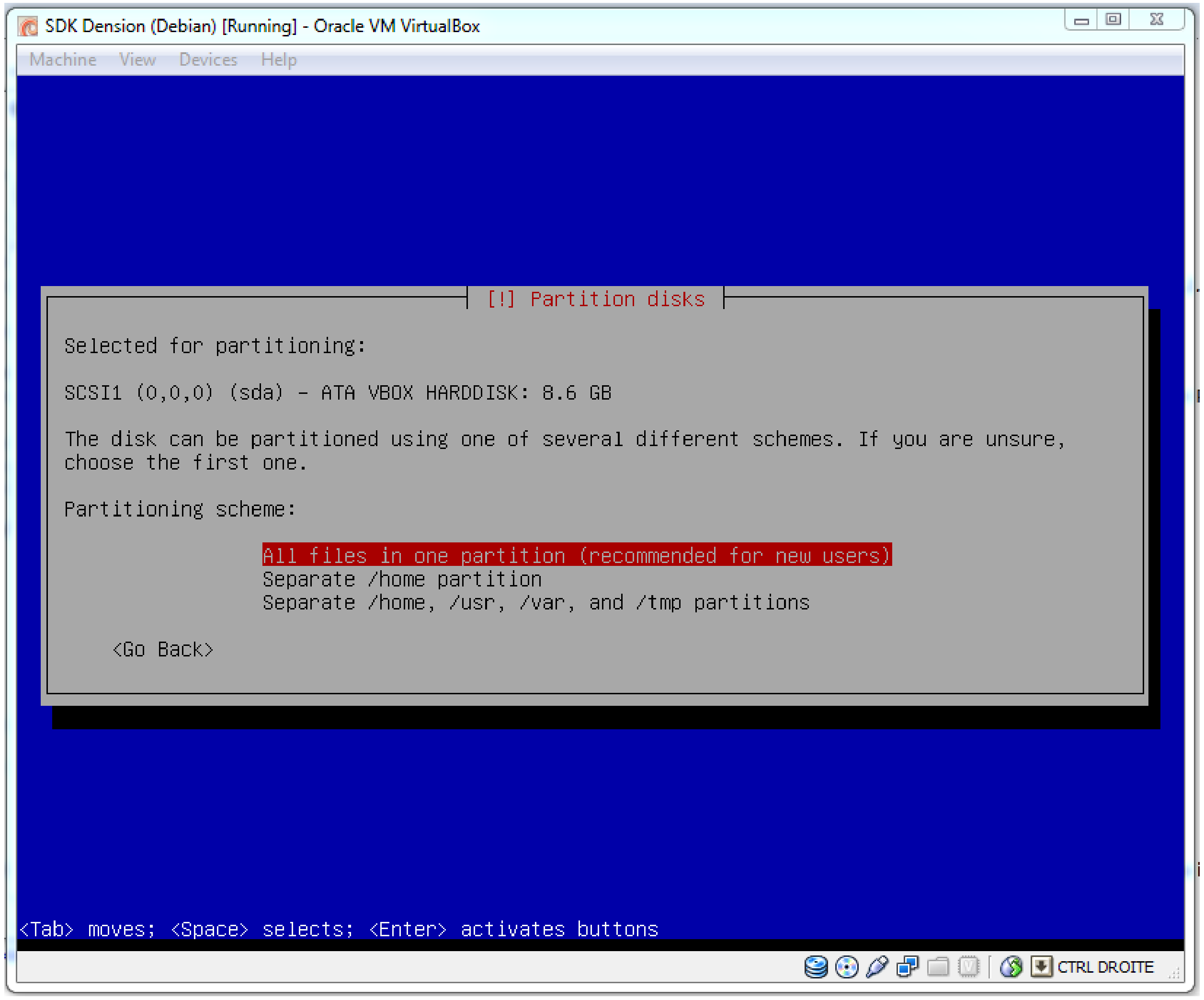
9. Options used in this install (you can change some to fit your language, area, etc.)
    a. Language: English
    b. Country: United States
    c. Keymap: American English

d. Hostname: (anything you want)
e. Domain name: (anything you want)
f. Root password: (anything you want)
g. Full name for the new user: (your full name)
h. Username for the new user: (anything you want)
i. Password for the new user: (anything you want)
j. Time zone: (your time zone)

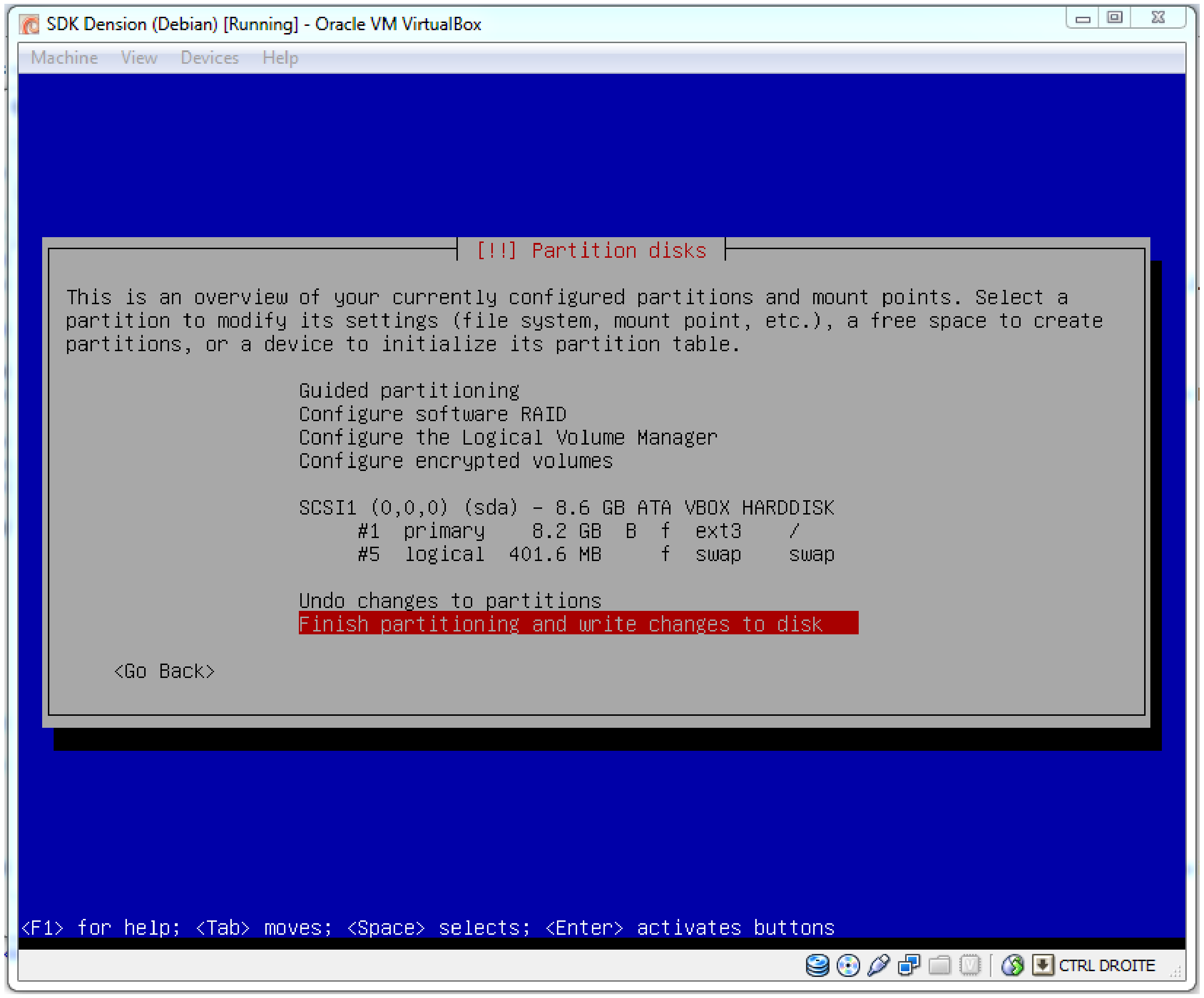
10. Partition the disk using the "Guided – Use entire disk" option.


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

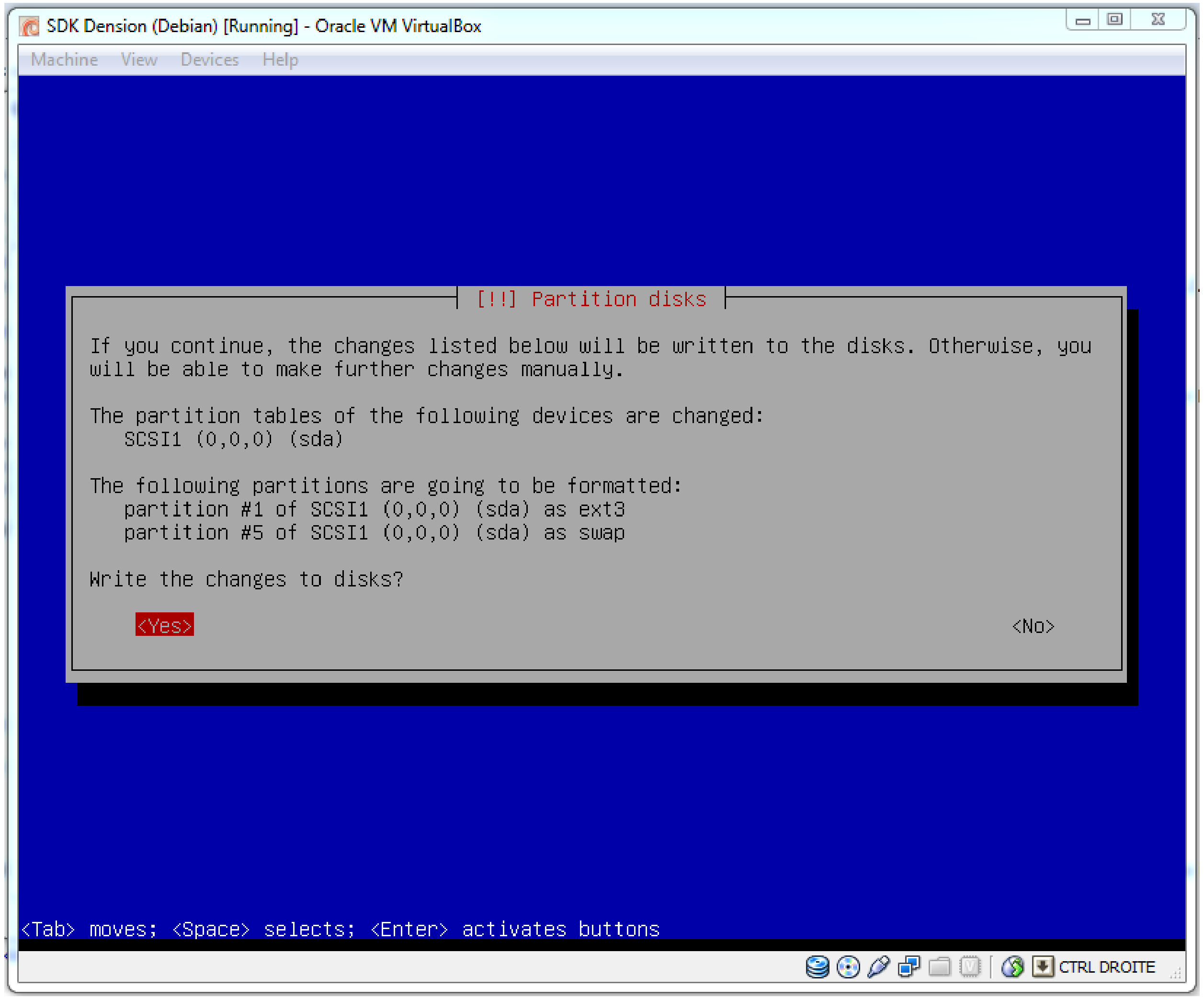
```
[!!] Partition disks

Note that all data on the disk you select will be erased, but not before you have
confirmed that you really want to make the changes.

Select disk to partition:

            SCSI1 (0,0,0) (sda) - 8.6 GB ATA VBOX HARDDISK

    <Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons
```


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

```
[!] Partition disks

Selected for partitioning:

SCSI1 (0,0,0) (sda) - ATA VBOX HARDDISK: 8.6 GB

The disk can be partitioned using one of several different schemes. If you are unsure,
choose the first one.

Partitioning scheme:

                    All files in one partition (recommended for new users)
                    Separate /home partition
                    Separate /home, /usr, /var, and /tmp partitions

    <Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons
```


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

```
[!!] 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

                    SCSI1 (0,0,0) (sda) - 8.6 GB ATA VBOX HARDDISK
                         #1  primary    8.2 GB  B  f  ext3    /
                         #5  logical  401.6 MB     f  swap    swap

                    Undo changes to partitions
                    Finish partitioning and write changes to disk

    <Go Back>

<F1> for help; <Tab> moves; <Space> selects; <Enter> activates buttons
```


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

```
[!!] 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:
   SCSI1 (0,0,0) (sda)

The following partitions are going to be formatted:
   partition #1 of SCSI1 (0,0,0) (sda) as ext3
   partition #5 of SCSI1 (0,0,0) (sda) as swap

Write the changes to disks?

    <Yes>                                                                    <No>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

11. The base system will be installed. It took around 3 minutes on my machine.

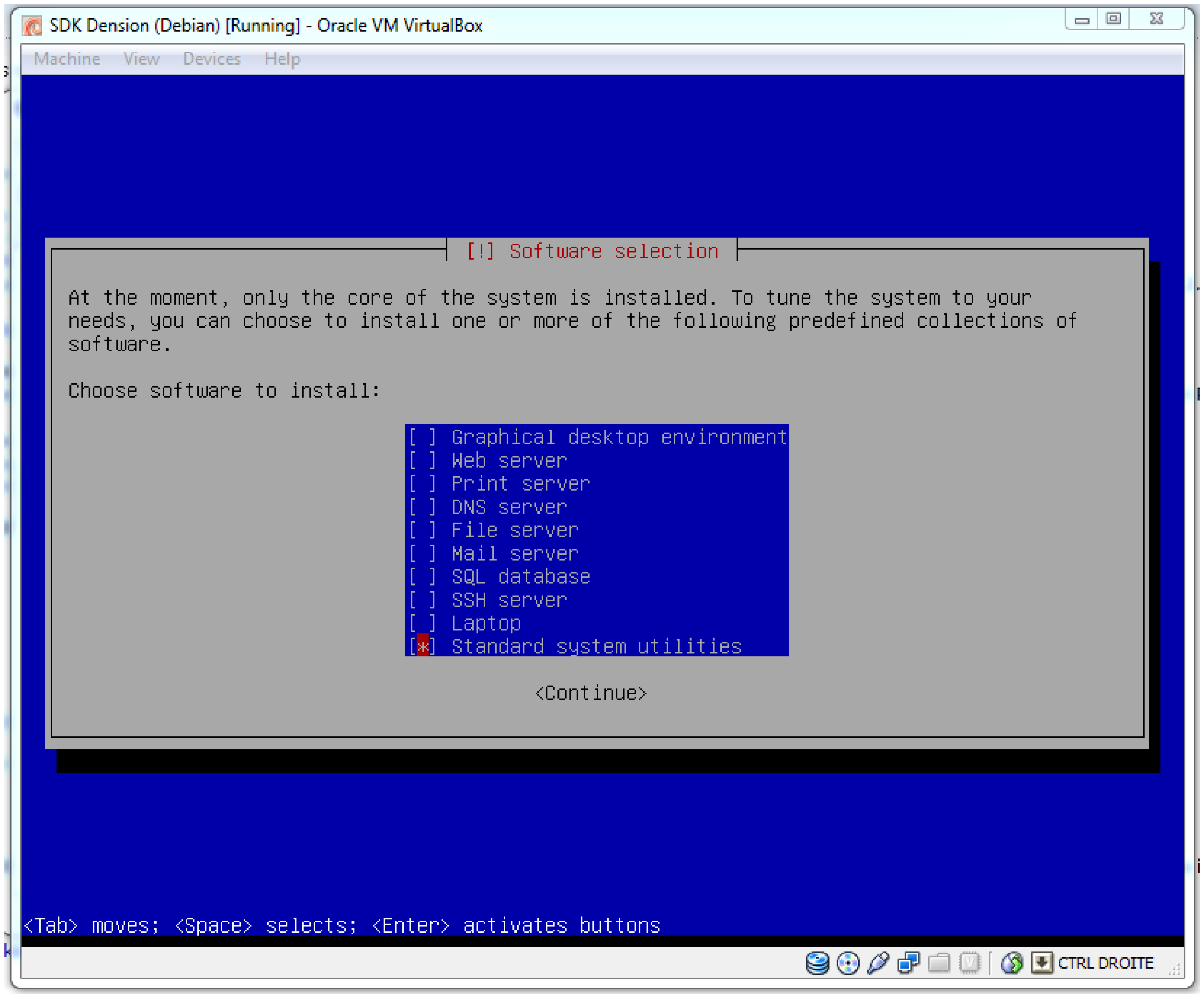
12. Configure the package manager by selecting your closest mirror.

13. APT will configure itself. (1 minute)

14. Some software will now be downloaded and installed. (3 minutes)

15. You will be asked if you want to participate in the survey. I decided not to participate.

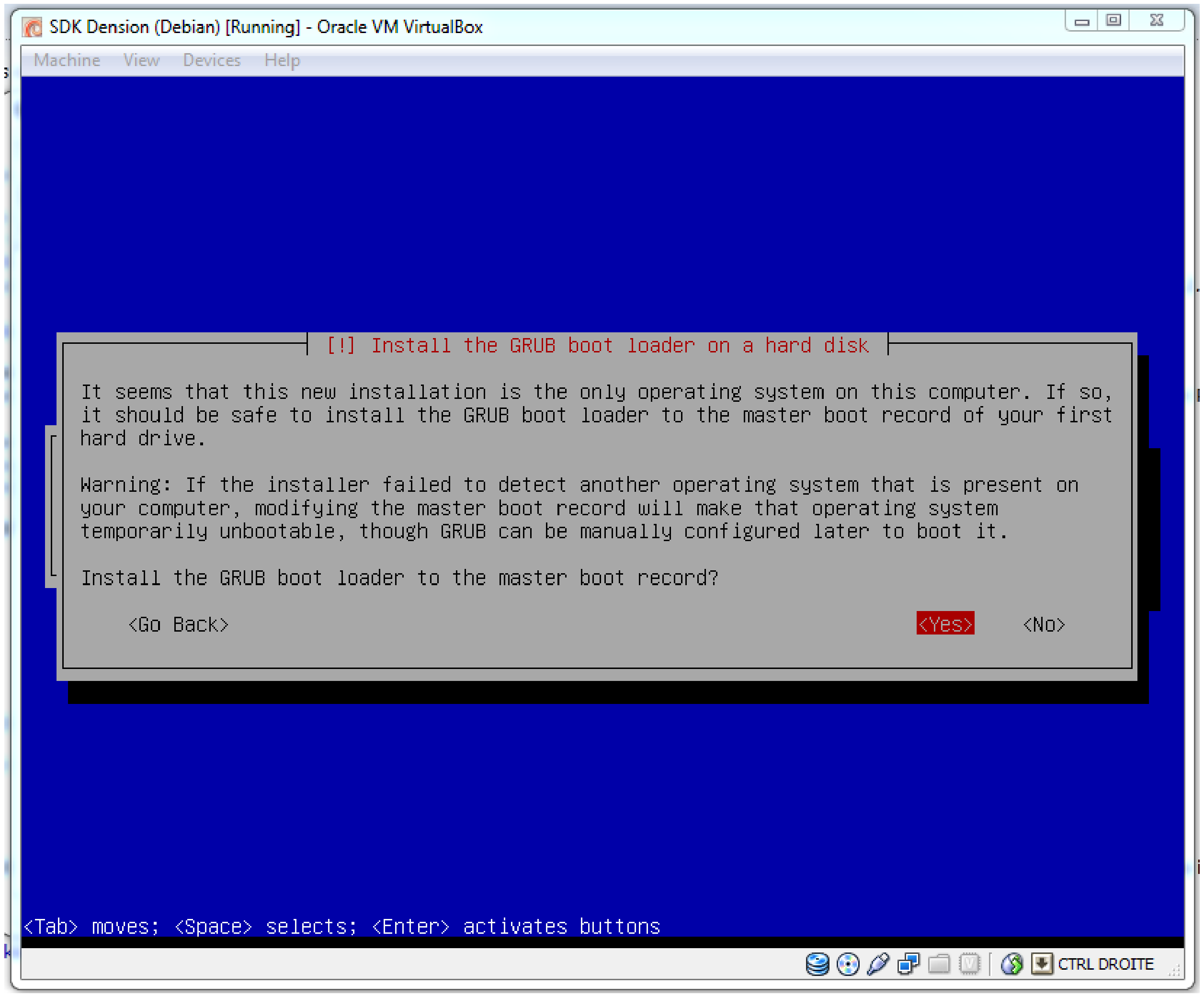
16. You will then have to select what you want to install. Unselect the Graphical desktop environment.


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

```
[!] 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:

                        [ ] Graphical desktop environment
                        [ ] Web server
                        [ ] Print server
                        [ ] DNS server
                        [ ] File server
                        [ ] Mail server
                        [ ] SQL database
                        [ ] SSH server
                        [ ] Laptop
                        [*] Standard system utilities

                              <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

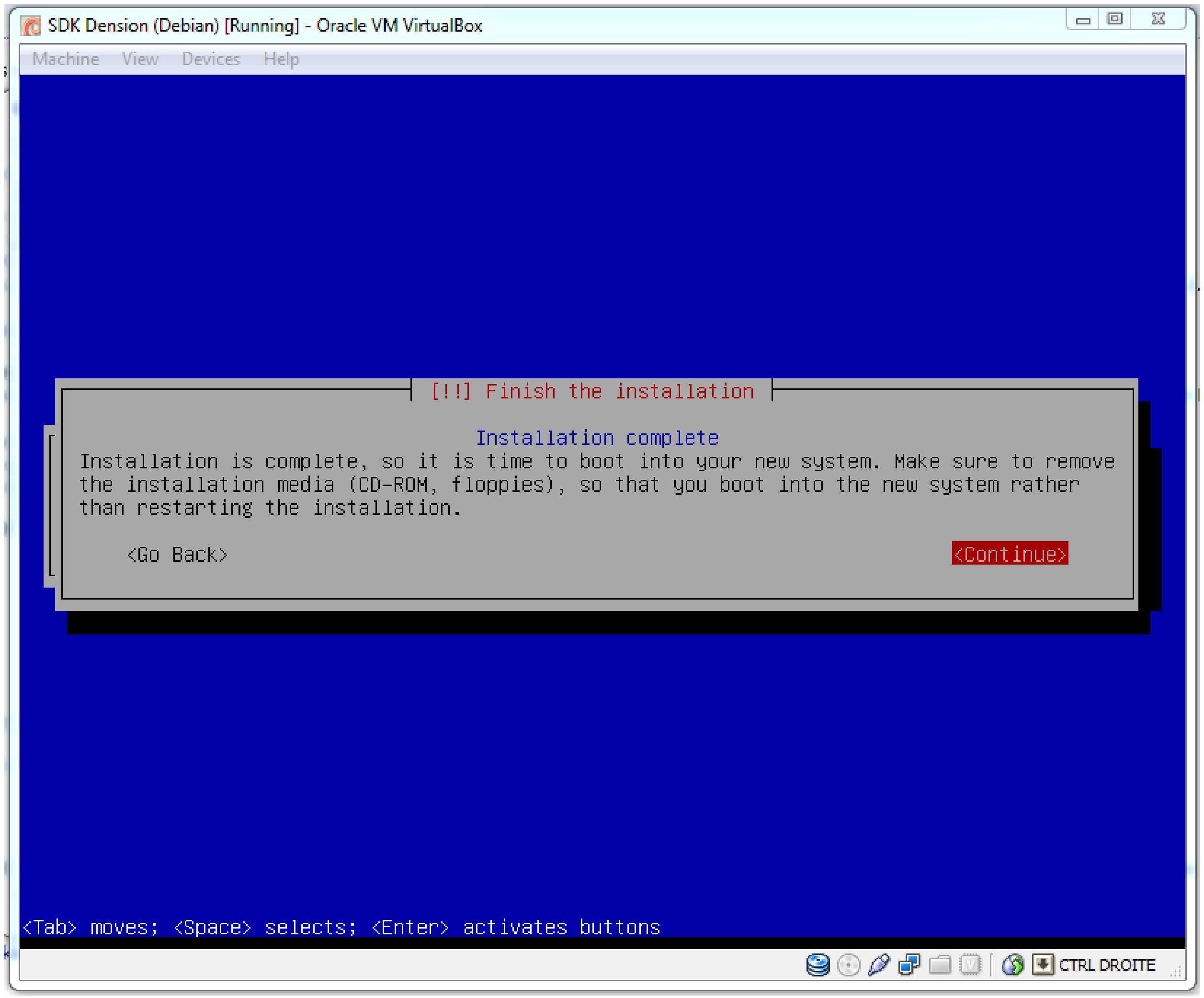
17. Software installation will resume. (2 minutes)

18. GRUB bootloader will be installed next. Install GRUB on the master boot record.


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

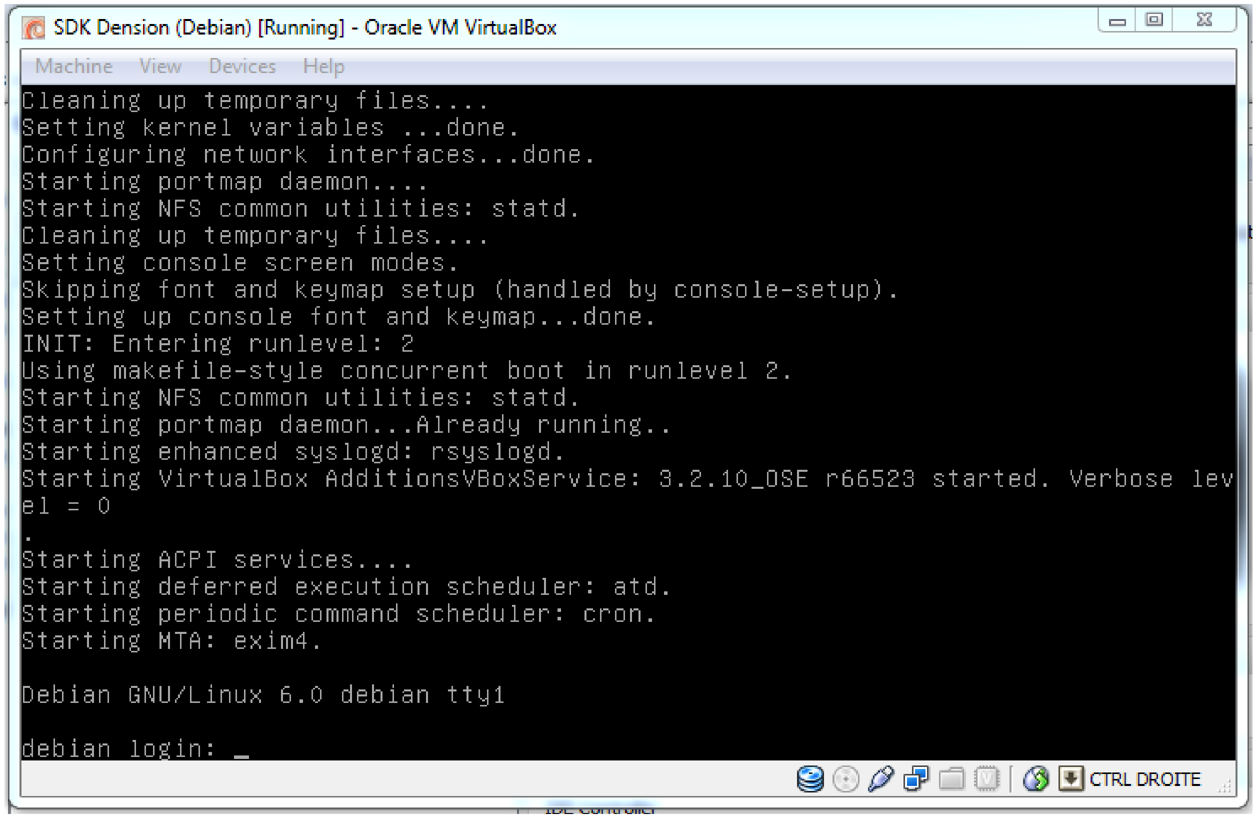
```
[!] Install the GRUB boot loader on a hard disk

It seems that this new installation is the only operating system on this computer. If so,
it should be safe to install the GRUB boot loader to the master boot record of your first
hard drive.

Warning: If the installer failed to detect another operating system that is present on
your computer, modifying the master boot record will make that operating system
temporarily unbootable, though GRUB can be manually configured later to boot it.

Install the GRUB boot loader to the master boot record?

    <Go Back>                                                        <Yes>     <No>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

19. Finish the installation by rebooting. There is no need to remove the ISO disk from the Virtual Machine, it is done automatically.


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

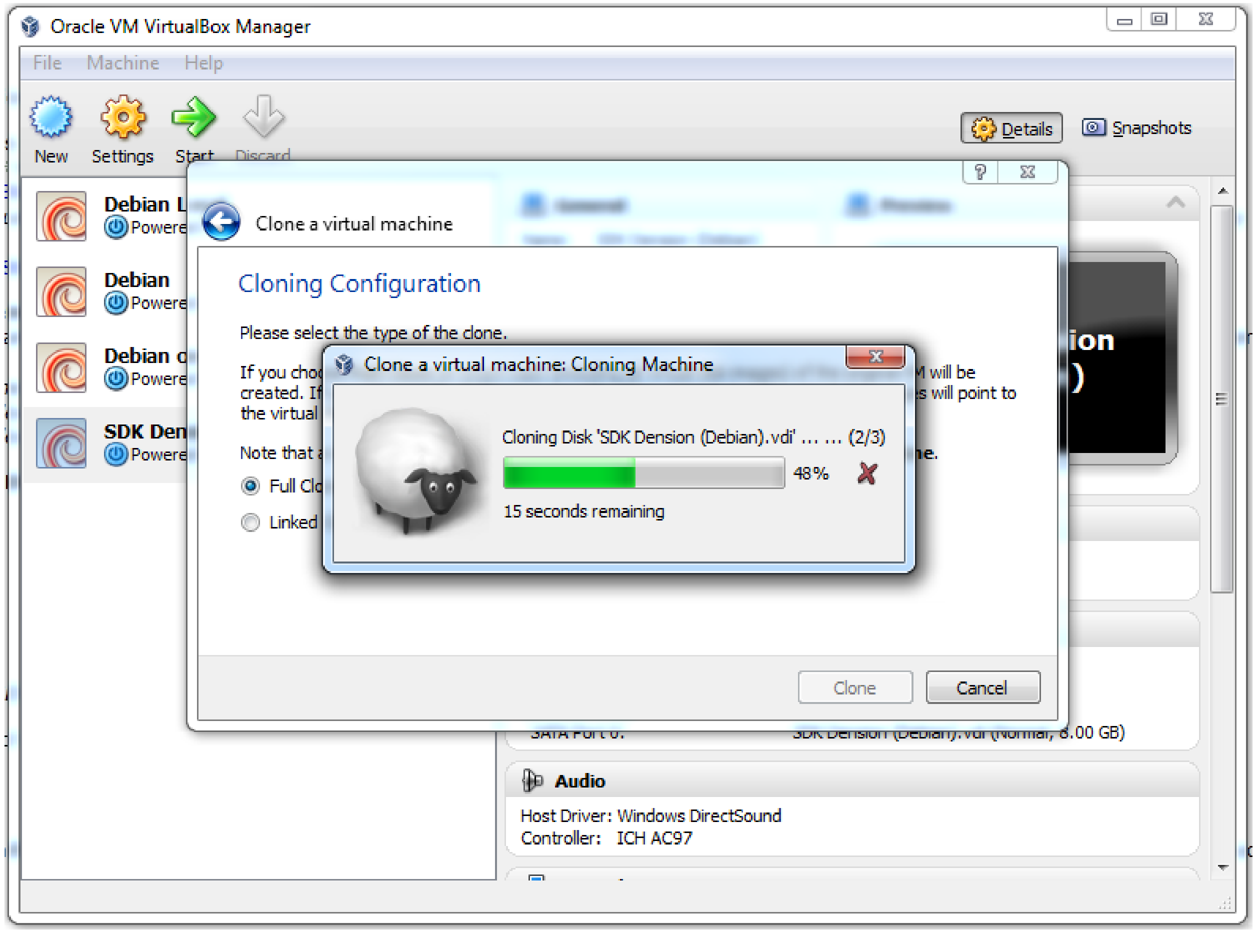
```
[!!] Finish the installation

Installation complete
Installation is complete, so it is time to boot into your new system. Make sure to remove
the installation media (CD-ROM, floppies), so that you boot into the new system rather
than restarting the installation.

     <Go Back>                                                       <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

20. After boot up, you should get access to the Debian login prompt.


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

```
Cleaning up temporary files....
Setting kernel variables ...done.
Configuring network interfaces...done.
Starting portmap daemon....
Starting NFS common utilities: statd.
Cleaning up temporary files....
Setting console screen modes.
Skipping font and keymap setup (handled by console-setup).
Setting up console font and keymap...done.
INIT: Entering runlevel: 2
Using makefile-style concurrent boot in runlevel 2.
Starting NFS common utilities: statd.
Starting portmap daemon...Already running..
Starting enhanced syslogd: rsyslogd.
Starting VirtualBox AdditionsVBoxService: 3.2.10_OSE r66523 started. Verbose lev
el = 0
.
Starting ACPI services....
Starting deferred execution scheduler: atd.
Starting periodic command scheduler: cron.
Starting MTA: exim4.

Debian GNU/Linux 6.0 debian tty1

debian login: _
```

21. At this point, I suggest that you clone your Virtual Machine. If something goes bad with your installation (it did for me and I learned the hard way…), you can always come back to a clean slate. To do so, power off the machine, right click on the Virtual Machine in the VirtualBox manager and select clone. Make sure you perform a FULL clone.



Cloning Configuration

Please select the type of the clone.

Clone a virtual machine: Cloning Machine

Cloning Disk 'SDK Dension (Debian).vdi' ... ... (2/3)

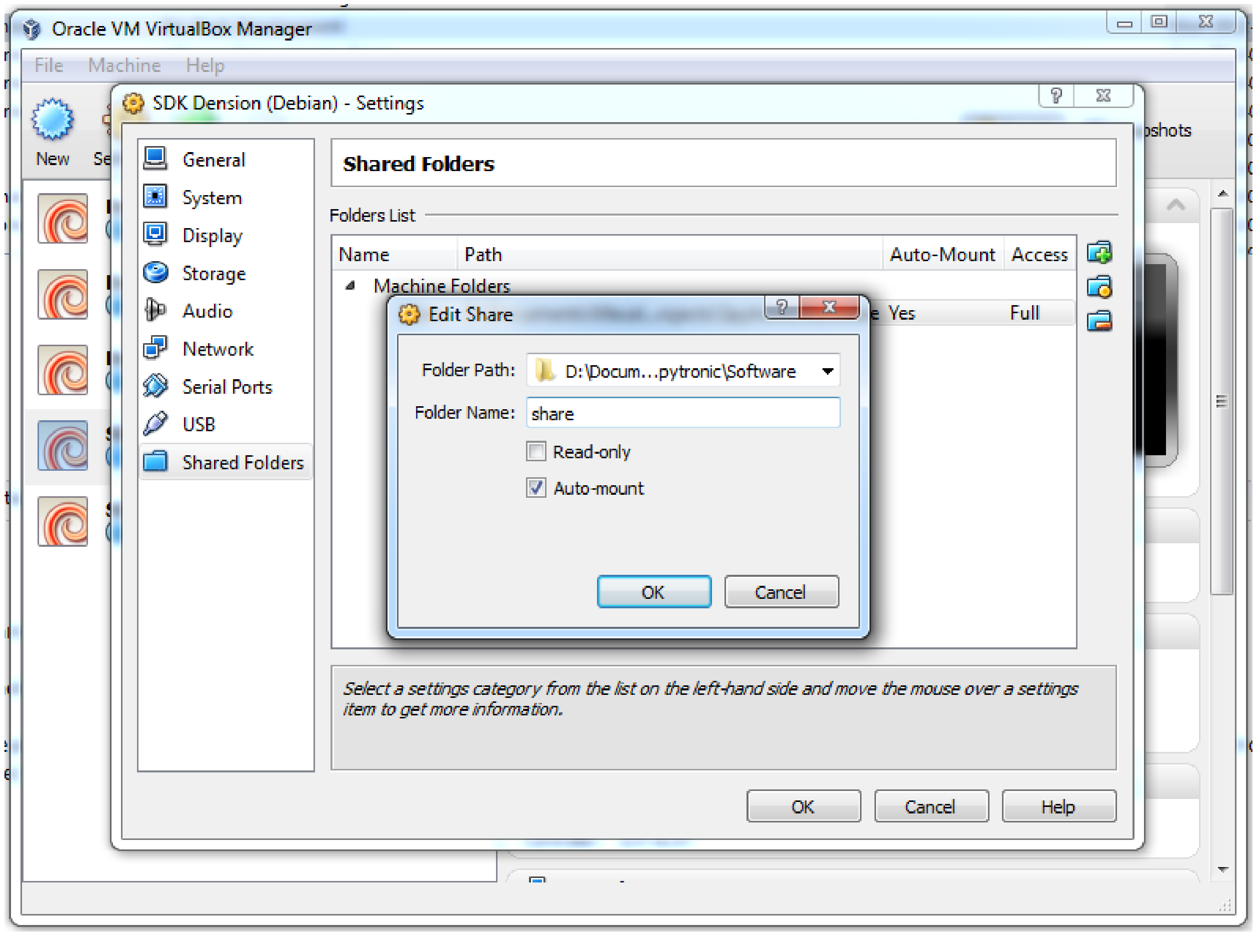
48%

15 seconds remaining

Host Driver: Windows DirectSound
Controller: ICH AC97

22. Create a share folder between your Virtual Machine and your PC. To do so, you will need to create an empty folder on your PC. You can create it anywhere you like and give it the name you want. We will share this folder with the Virtual Machine (VM) in a minute.

23. Open the settings for your VM and go under Shared Folders. Add a share folder. Specify the newly created folder from the previous step and make sure the folder name is set to "share".



Shared Folders

Folders List

Name	Path	Auto-Mount	Access
Machine Folders			
		Yes	Full

Edit Share

Folder Path: D:\Docum...pytronic\Software

Folder Name: share

Read-only [ ]

Auto-mount [✓]

OK Cancel

Select a settings category from the list on the left-hand side and move the mouse over a settings item to get more information.

OK Cancel Help

24. Start your VM and login as root using the password defined during installation.

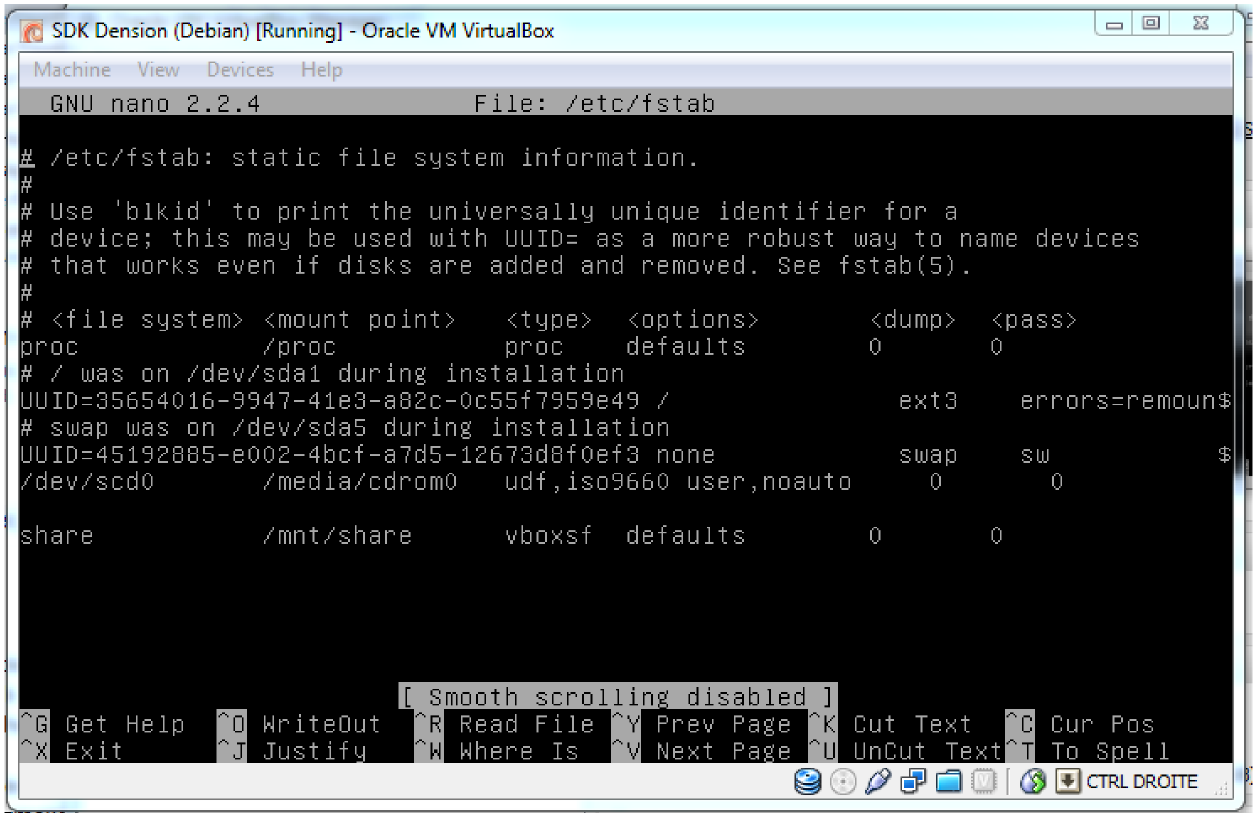
25. Create the mount directory for your share folder.
```
mkdir /mnt/share
```

26. We will want this share folder to be reconnected on each startup of the VM. Edit the fstab file to permanently connect the share folders at bootup. To do so, use the text editor "nano" by typing:
```
nano /etc/fstab
```

    You might want to take some time to learn about nano right now if you don't know it. Mainly, look at CTRL-O (save) and CTRL-X (quit). CTRL-K (cut) and CTRL-U (paste) are also interesting.

27. Add the last line shown in the following snapshot, save the file and quit nano.

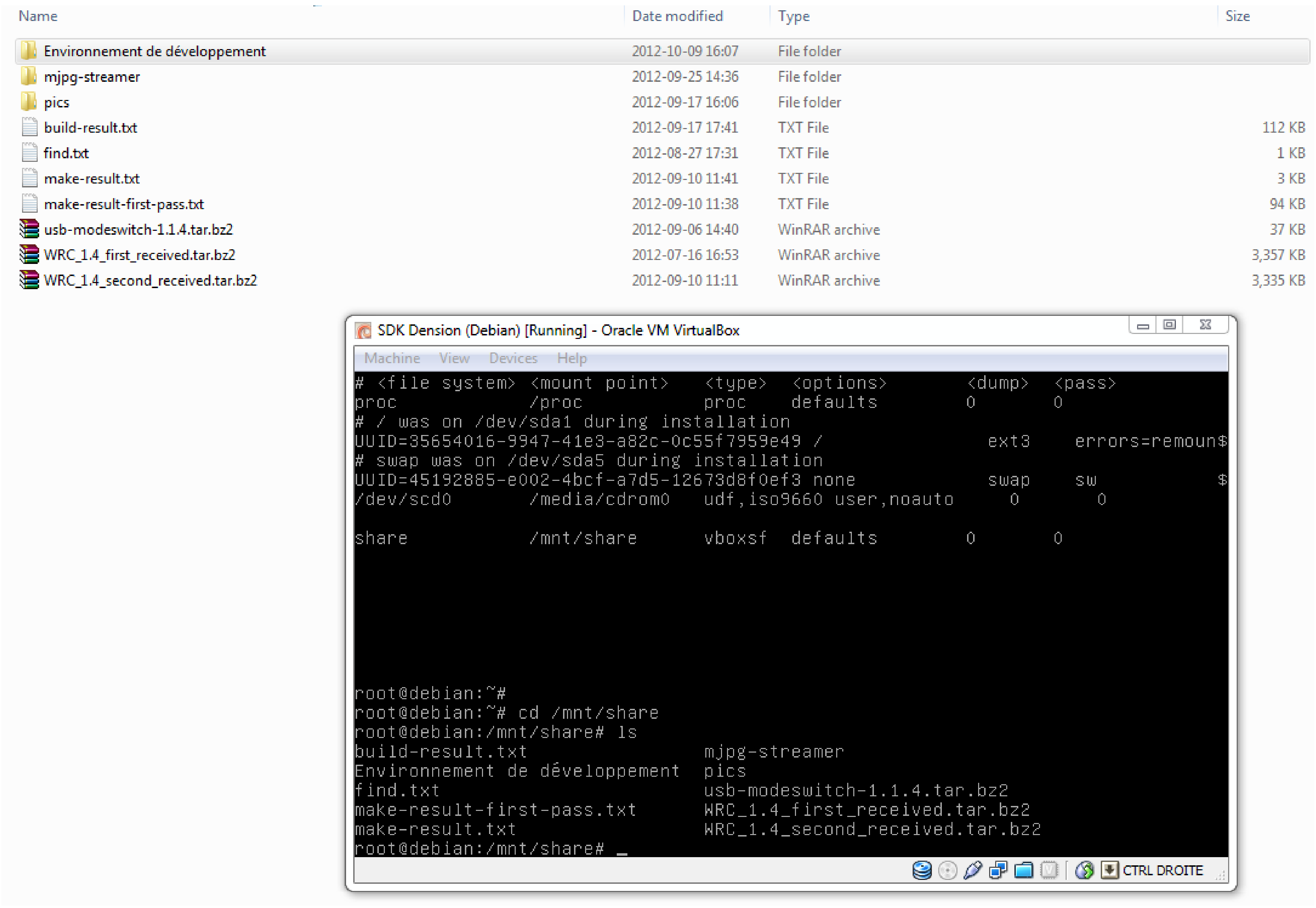
```
share /mnt/share vboxsf defaults 0 0
```


SDK Dension (Debian) [Running] - Oracle VM VirtualBox
Machine View Devices Help
CTRL DROITE

```
  GNU nano 2.2.4                File: /etc/fstab

# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
proc            /proc           proc    defaults        0       0
# / was on /dev/sda1 during installation
UUID=35654016-9947-41e3-a82c-0c55f7959e49 /               ext3    errors=remoun$
# swap was on /dev/sda5 during installation
UUID=45192885-e002-4bcf-a7d5-12673d8f0ef3 none            swap    sw          $
/dev/scd0       /media/cdrom0   udf,iso9660 user,noauto     0       0

share           /mnt/share      vboxsf  defaults        0       0




                          [ Smooth scrolling disabled ]
^G Get Help   ^O WriteOut   ^R Read File  ^Y Prev Page  ^K Cut Text   ^C Cur Pos
^X Exit       ^J Justify    ^W Where Is   ^V Next Page  ^U UnCut Text^T To Spell
```

28. The new fstab will be loaded next time you reboot. To load the new fstab now, type:
    `mount –a`

29. Now, navigate to /mnt/share. If you put a file here, it will show in both your PC and your virtual machine.



Name	Date modified	Type	Size
Environnement de développement	2012-10-09 16:07	File folder	
mjpg-streamer	2012-09-25 14:36	File folder	
pics	2012-09-17 16:06	File folder	
build-result.txt	2012-09-17 17:41	TXT File	112 KB
find.txt	2012-08-27 17:31	TXT File	1 KB
make-result.txt	2012-09-10 11:41	TXT File	3 KB
make-result-first-pass.txt	2012-09-10 11:38	TXT File	94 KB
usb-modeswitch-1.1.4.tar.bz2	2012-09-06 14:40	WinRAR archive	37 KB
WRC_1.4_first_received.tar.bz2	2012-07-16 16:53	WinRAR archive	3,357 KB
WRC_1.4_second_received.tar.bz2	2012-09-10 11:11	WinRAR archive	3,335 KB

SDK Dension (Debian) [Running] - Oracle VM VirtualBox

```
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
proc            /proc           proc    defaults        0       0
# / was on /dev/sda1 during installation
UUID=35654016-9947-41e3-a82c-0c55f7959e49 /               ext3    errors=remoun$
# swap was on /dev/sda5 during installation
UUID=45192885-e002-4bcf-a7d5-12673d8f0ef3 none            swap    sw           $
/dev/scd0       /media/cdrom0   udf,iso9660 user,noauto     0       0

share           /mnt/share      vboxsf  defaults        0       0





root@debian:~#
root@debian:~# cd /mnt/share
root@debian:/mnt/share# ls
build-result.txt                mjpg-streamer
Environnement de développement  pics
find.txt                        usb-modeswitch-1.1.4.tar.bz2
make-result-first-pass.txt      WRC_1.4_first_received.tar.bz2
make-result.txt                 WRC_1.4_second_received.tar.bz2
root@debian:/mnt/share# _
```

30. Copy the WiRC SDK received from Dension after you signed the NDA to the share folder on your PC. Since you saved it in the share folder of the PC, it is available to your VM as well in the /mnt/share folder. The file I received from Dension was named WRC_1.4.tar.bz2

31. Extract the SDK in the root folder.
```
cd /root
tar xvf /mnt/share/WRC_1.4.tar.bz2
```

32. Install some needed packages by typing:
```
apt-get install build-essential
apt-get install bison flex expect gawk autoconf automake libtool cvs lzma
apt-get install libtool cvs lzma libncurses5-dev
apt-get install libacl1-dev zlib1g-dev liblzo2-dev unzip subversion libconfuse-dev rsync zip
```

33. We will soon launch the toolchain build process. However, before we do so, we will have to change some of the build scripts. This is needed because some of the files to be downloaded are not available at their programmed location. We will change some of these locations here. Comment out the first CT_GetFile command on each of these files and add the new line shown.

File	`./ct-ng/lib/ct-ng-1.8.0/scripts/build/debug/200-duma.sh`
New cmd	`CT_GetFile "duma_${CT_DUMA_VERSION}" .tar.gz http://downloads.sourceforge.net/project/duma/2.5.15`

File	`./ct-ng/lib/ct-ng-1.8.0/scripts/build/debug/500-strace.sh`
New cmd	`CT_GetFile "strace-${CT_STRACE_VERSION}" .tar.gz http://downloads.sourceforge.net/project/strace/strace/4.5.19`

34. CD to the toolchain directory.
```
cd /root/WRC_1.4/toolchain/ct-ng
```

35. Build the toolchain. The following command runs "make", redirects stderr and stdout to make_results.txt for future reference while still showing the progress on the console. This will take a while and the screen might even get black (monitor preserve) if you do not press any key for a while. Just press the SHIFT key to make the screen come back up. (60 minutes on my VM)
```
make 2>&1 | tee make_results.txt
```

The good news: a lot of text will be output on the console, don’t worry. Unless the build stops with an error message, you don't really need to look at all this garbage.

The bad news: you will most likely get some errors here. Most errors I got on the first run were related to missing packages or libraries. A good way to see what is wrong is to search for the word "Error" (cap sensitive) in the make_results.txt file. If you use the exact same versions of the files I am using, I made sure to remove all build errors so you should be ok. However, you might not have the same versions by the time you read this…

More information on downloading packages
If the installer is unable to download a package, it will show "Could not retrieve 'package_name_version'". For example, I had the "Could not retrieve 'duma_2_5_15'." package error on the first run and fixed it on step 32 above. Here is how I fixed it.

First, find the package on the internet somewhere. Here I googled "duma_5_15" and found out that it was on Sourceforge at
http://downloads.sourceforge.net/project/duma/duma/2.5.15/duma_2_5_15.tar.gz

Then, use the grep tool to find where this package is being called. Make sure to remove the version of the library from your search since it is rarely used in the Makefiles. I used:
```
grep -r -l "duma" . | more
```

I found that it was probably being called from the build script called 200-duma.sh in `./ct-ng/lib/ct-ng-1.8.0/scripts/build/debug/200-duma.sh.`

Use nano to edit the file so the build script retrieves the file from a good working source.
```
nano ./ct-ng/lib/ct-ng-1.8.0/scripts/build/debug/200-duma.sh
```

I replaced the first CT_GetFile command with:
```
CT_GetFile "duma_${CT_DUMA_VERSION}" .tar.gz http://downloads.sourceforge.net/project/duma/2.5.15
```

Although this is not generic (because of the "2.5.15") and will not age properly, this line replacement will get the job done for the time being. Do this for all problematic packages.

More information on missing libraries
Sometimes, the build process will complain that some headers files are missing. This is probably due to a missing library. For example, on the first run, I got a "error: sys/acl.h: No such file or directory" message.

I googled "sys/acl.h debian package" and found out that I needed the libacl1-dev package.

You can get the package through the package manager as follow:
```
apt-get install missing-package-name
```

I used:
```
apt-get install libacl1-dev
```

36. Once the toolchain is built properly, you will need to build the packages required by the host (2 minutes). To do this, type:
```
cd /root/WRC_1.4/
make host-tools 2>&1 | tee make_host-tools_results.txt
```

37. Before crosscompiling the WiRC software, we need to take care of some stuff to avoid problems during the build. First,
```
mkdir /root/WRC_1.4/filesystems/rootfs/rootfs-wrc/usr/lib
mkdir /root/WRC_1.4/filesystems/rootfs/rootfs-wrc/lib/firmware
mkdir /root/WRC_1.4/filesystems/rootfs/rootfs-wrc/etc
mkdir /root/WRC_1.4/filesystems/rootfs/rootfs-wrc/etc/issue
```

38. Next, change the following file content:

File	`/root/WRC_1.4/filesystems/rootfs/Makefile`
Change this line	`rm $(TARGET_ROOTFS_DIR)/lib/modules/$(KERNEL_VERSION)/modules.usbmap`
With this line	`rm -f $(TARGET_ROOTFS_DIR)/lib/modules/$(KERNEL_VERSION)/modules.usbmap`

File	`/root/WRC_1.4/packages/udev/Makefile`
Change PACKAGE_URL to	`http://pkgs.fedoraproject.org/repo/pkgs/udev/udev-136.tar.bz2/9a27ccd96cf8d529c4e424520547b72a/`

File	`/root/WRC_1.4/packages/usb-modeswitch/Makefile`
Change PACKAGE_URL to	`http://pkgs.fedoraproject.org/repo/pkgs/usb_modeswitch/usb-modeswitch-1.1.4.tar.bz2/a04db36bd0fc6fb303df7567f677b714/`

39. Now it's time to crosscompile the WiRC software (25 minutes). To do this, type:
```
make 2>&1 | tee make_results.txt
```

40. That's it! You have compiled everything that is needed. I suggest that you clone this VM as shown on step 21 and following in case you need to come back to a clean VM.

Running the Telnet daemon on the WiRC

1. Now that we know your environment is setup properly, we'll activate the telnet daemon in the source code and recompile. The telnet daemon will allow you to debug your code more easily. To enable the telnet daemon, change the following file content:

File	`/root/WRC_1.4/filesystems/rootfs/skeleton/etc/inetd.conf`
Uncomment this line	`#23                  stream         tcp          nowait       root     /usr/sbin/telnetd telnetd`

2. Recompile:
```
make 2>&1 | tee make_results.txt
```

3. To create the file needed for the USB firmware upgrade process, change the following file content:

File	`/root/WRC_1.4/scripts/targets/usb-updater.mk`
Change this line	`rm $(UPDATE_FILE);\`
With this line	`rm -f $(UPDATE_FILE);\`

4. Create a new file with the following content:

File	`/root/WRC_1.4/scripts/cfg_reset.sh`

File content

```
#!/bin/sh

if [ $# -lt 1 ]; then
    exit 1
fi

UPDATER_FILE="$1"
CONFIG_PART="/mnt/config"
UPDATE_LOG="$CONFIG_PART/update.log"

echo "Config updater..." > $UPDATE_LOG
echo "Updater file: $UPDATER_FILE" >> $UPDATE_LOG

OLDIFS=$IFS
IFS='
'
for CFG in `unzip -lq $UPDATER_FILE | grep 'config/.\+' | cut -d "/" -f 2`; do
    echo "Update config: config/$CFG" >> $UPDATE_LOG
    unzip -p $UPDATER_FILE config/$CFG > /mnt/config/$CFG
done
IFS=$OLDIFS

exit 0
```

5. Build the USB update file:
   ```
   make usb-updater 2>&1 | tee make_results.txt
   ```

   The generated update file can be found here:
   `/root/WRC_1.4/binaries/wrc/WRC_update.den`

6. Copy this WRC_update.den file to the root directory of a USB pendrive (with normal FAT filesystem). You can either mount your pendrive on the linux VM and copy the file from there or copy the file to your share directory and do it on your PC.

7. Connect the pendrive to one of the USB connectors on the WiRC. It does not matter whether the WiRC is under power or not when you connect the pendrive, but **do not disconnect the USB pendrive or the power supply of the WiRC when the upgrade is in progress!** The internal blue LED on the WiRC will start to blink really fast to indicate the upgrade is in progress.

8. The upgrade process takes about 1-2 minutes. Once the upgrade is completed, the WiRC will reboot and the file on the pendrive is renamed to Updated_WRC_update.den.

9. Using a telnet client on your PC, connect to the WiRC to validate that it works properly. Credentials: username is root, there is no password