Parallel Programming

Installing Ubuntu Virtual Machine within VirtualBox

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These instructions assume you have already installed VirtualBox (See separate instructions for that.) As the image file to download can be large (approx. 1000 MB), make sure you wait for download to complete before continuing. In Windows, look at the Windows task manager /Networking.

Download Operating System ISO image file

For Ubuntu:

If you intend to install Ubuntu, go to the Ubuntu site for desktops:

http://www.ubuntu.com/download/desktop/

Normally one selects "64-bit" if your system will support it.¹ Download the **.iso** file (e.g. **ubuntu-14.04-desktop-amd64.iso).** Note where the file is saved (example the **Downloads** folder). You will need this file later. Our original testing and documentation was done with Ubuntu 14.04 although there may be a more recent version now available. *I recommend staying with 14.04 for now.*

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¹ Because some students have had difficulty getting the 64-bit version operating on their computer our provided VM is 32-bits. For issues during the installation check course FAQ under "VirtualBox and Course Virtual Machine."

Create a Virtual machine within VirtualBox

Start VirtualBox. Click on "New" at the top left corner of the VirtualBox manager window:



enter a name for the OS, e.g. "Ubuntu-64" (Type and version should auto-enter after such a name.)

Create	e Virtual Machine
Name Please cl	and operating system
type of o used three	perating system you intend to install on it. The name you choose will be oughout VirtualBox to identify this machine.
<u>Type:</u>	Linux •
Version:	Ubuntu (64 bit)
	Hide Description <u>N</u> ext Cancel

In the Create Virtual Machine, the memory size gives available space (green bar):

IMPORTANT: It is highly recommended to select the largest size for memory allocation that you can live, at least 1024 MB:



Note increasing the memory allocation will limit other activities and having other simultaneous virtual machines but may increase the speed significantly.²

Then, create a virtual hard drive:

Hard	drive				
If you v create using th	vish you can a new hard o ne folder icor	add a virtual ha drive file or sele n.	rd drive to t ct one from	he new machine the list or from	e. You can eithe another locatio
If you r change	eed a more s to the mac	complex storag	e set-up you ce the mach	i can skip this sto nine is created.	ep and make th
The red	ommended	size of the hard	drive is 8.0	O GB.	
0 <u>D</u> o 1	iot add a virl	tual hard drive			
O Crea	ate a virtual	hard drive now			
O Use	an existing v	virtual hard driv	e file		
Libe	intu-64 vdi (Normal 8 00 CE	0		*]

Select VDI (VirtualBox Disk Image):

² The setting can altered after the OS is installed from **Machine > Settings > System > MotherBoard** if desired. The number of processor cores that is used can also be altered at **Machine > Settings > System > Processor**. It might default to 1.

? — X —
Create Virtual Hard Drive
Hard drive file type
Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged.
VDI (VirtualBox Disk Image)
VMDK (Virtual Machine Disk)
VHD (Virtual Hard Disk)
HDD (Parallels Hard Disk)
QED (QEMU enhanced disk)
O QCOW (QEMU Copy-On-Write)
Hide Description Next Cancel

On can select either **Fixed allocated** or **Dynamically allocated** hard drive next. (**Fixed allocation** gives faster speed in use initially.³)

State Street	? ×
Create Virtual Hard Drive	
Storage on physical hard drive	
Please choose whether the new virtual hard drive file should grow as it is allocated) or if it should be created at its maximum size (fixed size).	used (dynamically
A dynamically allocated hard drive file will only use space on your phys fills up (up to a maximum fixed size), although it will not shrink again au space on it is freed.	sical hard drive as it tomatically when
A fixed size hard drive file may take longer to create on some systems b use.	ut is often faster to
Dynamically allocated	
Eixed size	
Next	Cancel

Choose a size for the hard drive file (8 GB default here). It is recommended to increase this size to at least 16 GB if you can live with that taken from the host system.

³ VirtualBox documentation (<u>https://www.virtualbox.org/manual/ch05.html#vdidetails</u>) suggests that over time the size stabilizes, and the speed difference between fixed allocated and dynamically allocated hard drive is negligible.

File location and size		
Please type the name of the new virtual hard drive file into the b icon to select a different folder to create the file in.	ox below or click	on the fold
Ubuntu-64		
Select the size of the virtual hard drive in menabytes. This size is	the limit on the	amount of
file data that a virtual machine will be able to store on the hard o	Irive.	
file data that a virtual machine will be able to store on the hard of	2 00 TB	8.00
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At this point, you will see something like:



When completed:



Now you have to install the operating system within the created virtual hard drive. Double click on virtual machine icon (Ubuntu-64 in previous image). On the Select startup disk window, click on the icon on right side to navigate through your file system and select the **.iso** Ubuntu file previously downloaded (e.g. **ubuntu-14.04-desktop-amd64.iso**), and click "Start".



Wait for the OS to be installed.⁴



Click on "Install Ubuntu" and continue, and erase disk, ... etc as shown below/overleaf:



⁴ Possible issue here is mouse integration that stops the cursor moving across VirtualBox window, see VirtualBox documentation.

e issail	t 🔞 ta 🖬 40 O
Where are you?	Keyboard layout English (Dana) English (DS) English (Dana) English (DS) English (DAna) English (DS) English (DAna) English (DS) English (DS) English (DS)
New York	Detect Arytosard Lytox

At the following screen you need to enter details including the computer name used to communicate with other computers. If you want to use the actual computer name, it can be found by issuing the command "hostname" from the command line console. The Windows console **cmd.exe** can found by searching on "cmd" at "Start" (Lower left corner of Windows).

"Log in automatically" can be selected if desired. A password is required and will be needed on occasion. This password is the password associated with the username (user's account on the installed Ubuntu). For access with root privileges, you have to use **sudo** even as the installer, see later.

	💽 🍕 🖬 📢 🗘		14 En 40 O
Metrill Who are you? Your name: [Your name:] Your computer's name: The name it was when it bits to other computers.			
Pick a username: Username		Installation Complete	
Choose a password: Password		Installation is complete. You need to restart the computer in order to use the new installation.	
Contrain your password: Contrain your password: Contrain your password to log in Contrain your password to log in Contrain your password to log in		(Pestart New)	
	Back Continue		

Wait for the installation to complete. Then success!

Restart and press "Enter" key and wait for Ubuntu to start. (Disable encryption if asked. If any errors at this point try reboot without saving the machine state.):



It can take some time to get to this point so be patient.

Terminal window: Click the search icon (to left on icon ribbon) to search on "Term" and start a terminal:



You will need this subsequently to enter commands to install software, so lock terminal to left side launcher (click on terminal icon on left side ribbon).

Screen locking. For convenience on a private computer, you may wish to change the setting for locking the screen after user inactivity (5 minutes). Go to right side upper corner icon > **Systems Settings > Brightness and lock**, and alter as desired.



Installation of software using the Ubuntu Package Repository

The easiest way to install software in the Ubuntu OS is from the Ubuntu package repository (<u>https://help.ubuntu.com/community/Repositories/Ubuntu</u>) using the **apt-get** command.⁵ This may not get the most recently available versions but is much easier than installing the software directly from the source. Packages can be searched from: <u>http://packages.ubuntu.com/</u>

In Ubuntu, you cannot login as root, so for commands that require root privileges you will need to switch user to root with the command **sudu su** or prefix each command with **sudo**.

Generally before installing any packages with **apt-get**, check the package repository is up-todate with the command:

sudo apt-get update

The command to check if installed software needs updating to a newer version (e.g. a security update) is:

sudo apt-get upgrade

VirtualBox Guest Additions

It is highly recommended to add so-called VirtualBox guest additions that enable a number of important features such as copy-and-paste across host and guest OS and desktop scaling. This makes your life much easier.

To install guest additions, issue the command:

sudo apt-get install virtualbox-guest-x11

on a terminal window. 6

Copy-and-Paste across Host and Guest OS.

After guest additions are installed, copy-and-paste across host and guest OS is then enabled by first selecting the machine icon (e.g. "Ubuntu-64") and then setting from **Machine > Settings > Advanced > Shared Clipboard "Bidirectional" and Drag 'n' Drop "Bidirectional"**. Note this only applies to a particular machine. If you have multiple virtual machines installed, you would need to do it for each machine.

Closing the Machine. Note: when you close a virtual machine you have the option of "*Save the machine state*" or *"Power off the machine"*. *"Power off the machine"* is necessary if you intend to reboot, reading the ~*I*.profile file (see software installations)

For more information on VirtualBox see <u>https://www.virtualbox.org/manual/ch04.html</u>

⁵ See <u>https://help.ubuntu.com/12.04/serverguide/apt-get.html</u> for more information on the **apt** tool.

⁶ An alternative probably more extensive way is to go to **Devices > Insert Guest addition CD image ...**