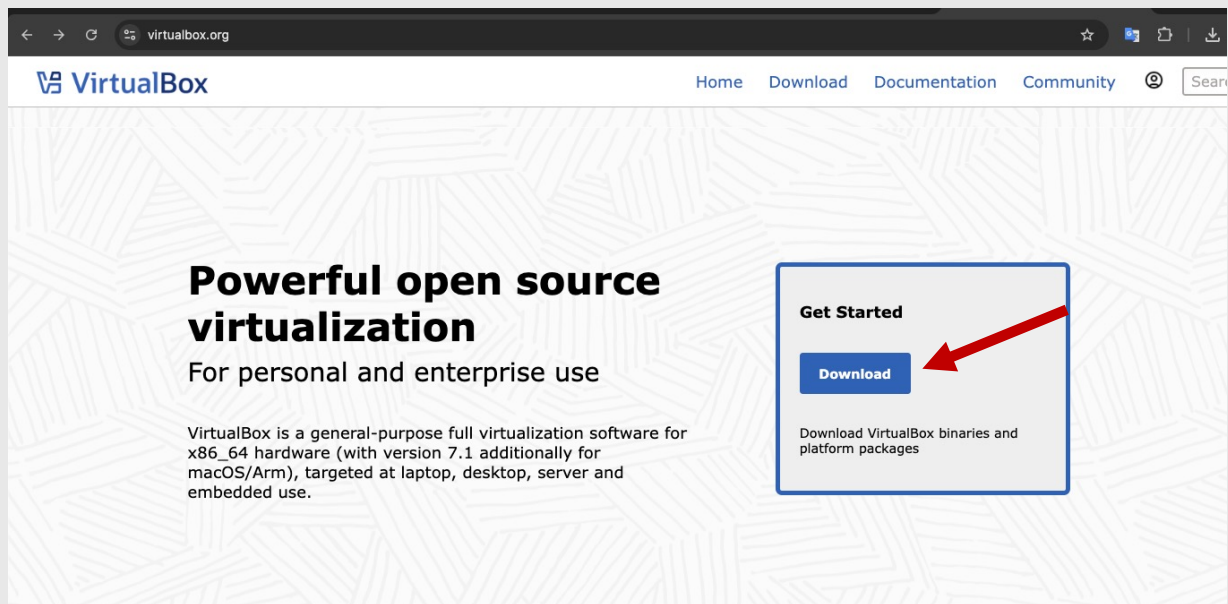
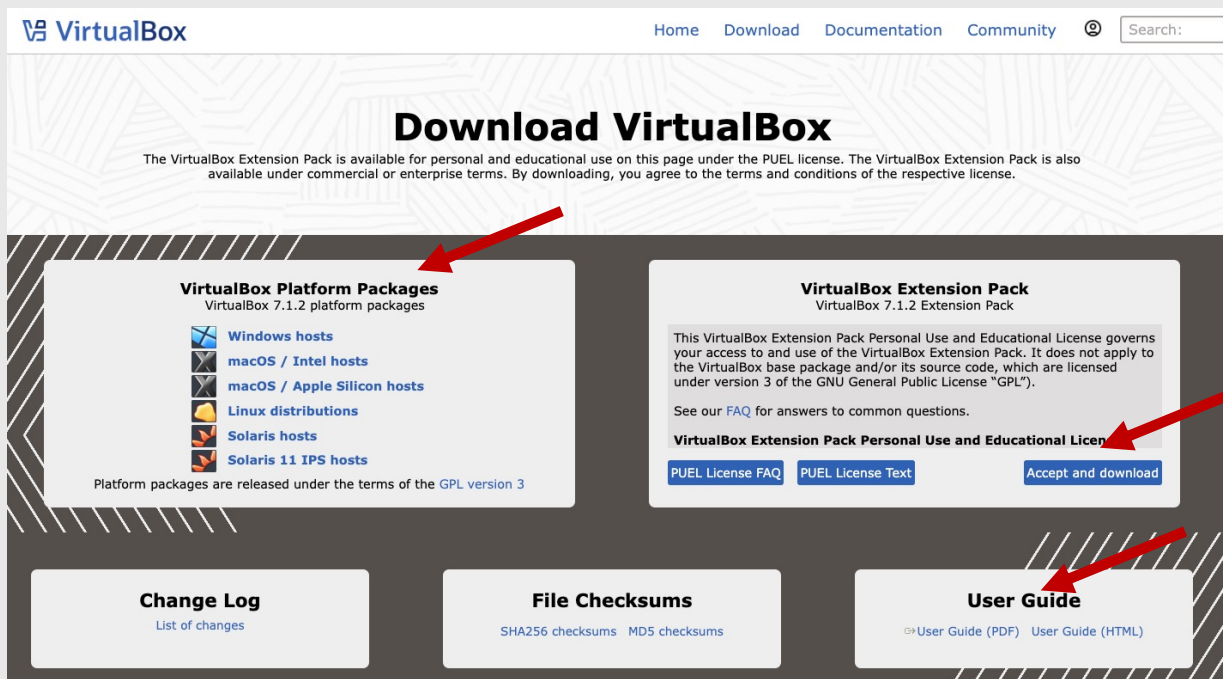


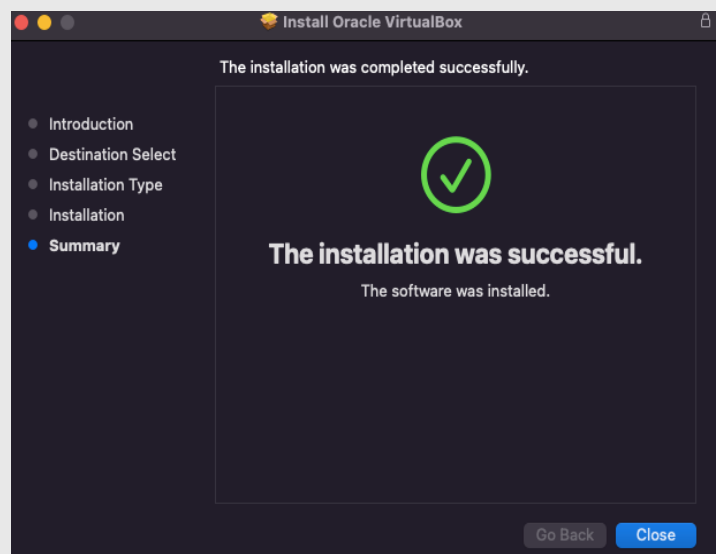
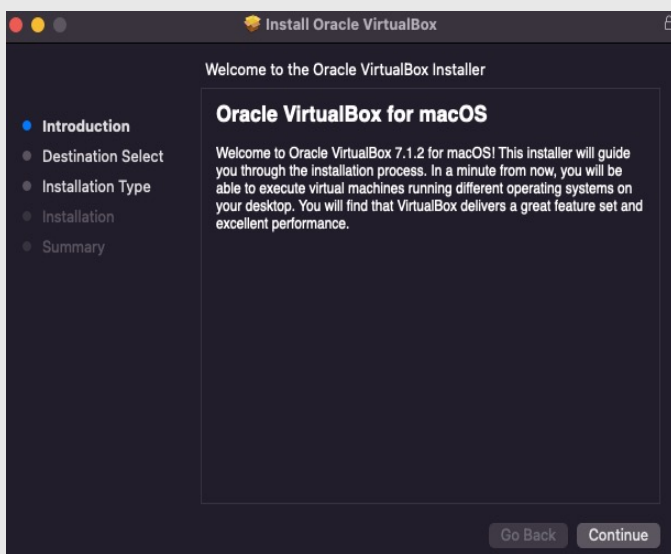
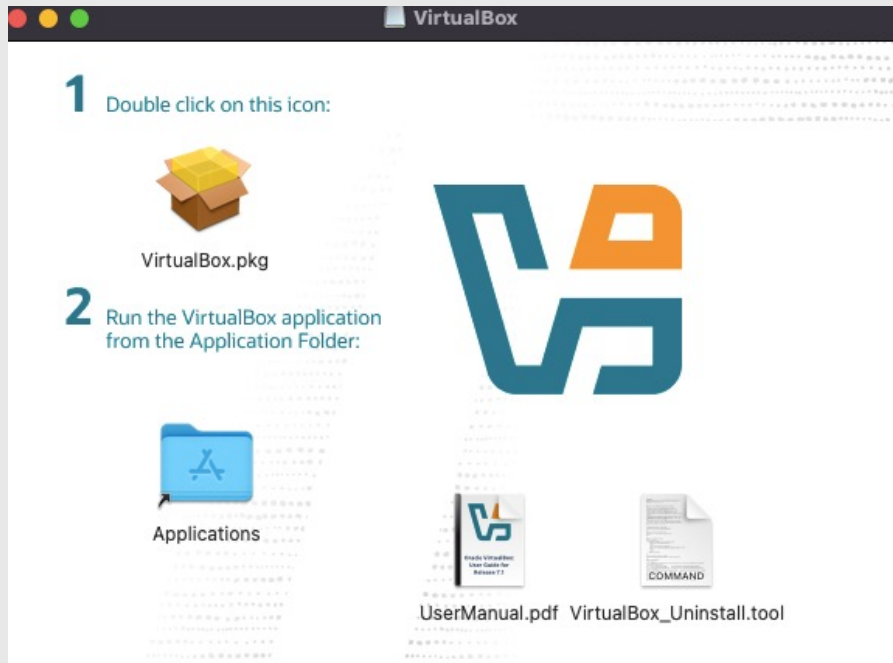
1.) Navigate to <https://www.virtualbox.org/> and enter Download section



2.) Download the VM for your system, the extension pack, and the user guide.



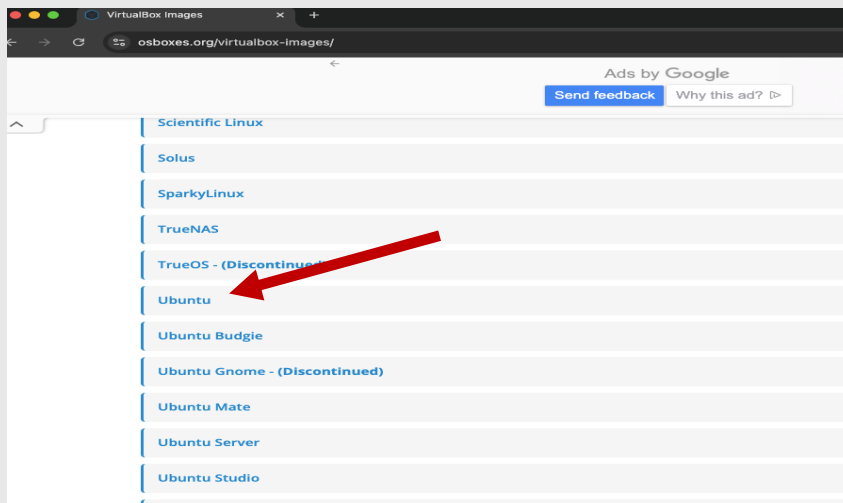
3.) Follow the installation instructions. Leave the default settings. These can be modified later. **Note:** It didn't work on my Mac with silicon chip (M2). Worked well on Intel Mac.



4.) Navigate to osboxes.org. Then VM images and enter VirtualBox Images



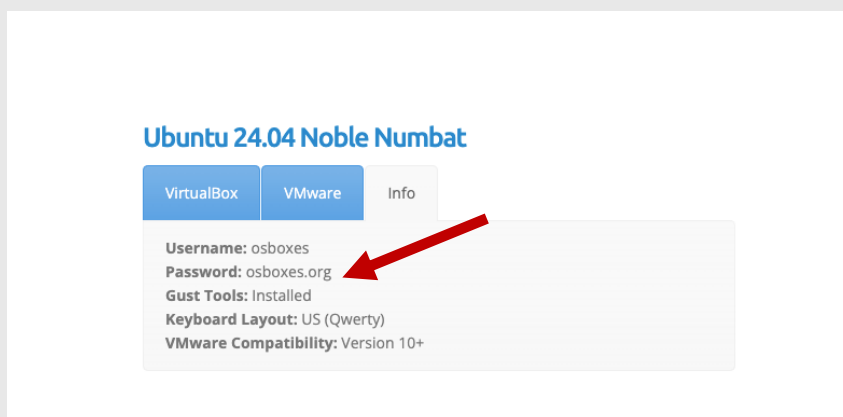
5.) Select Ubuntu



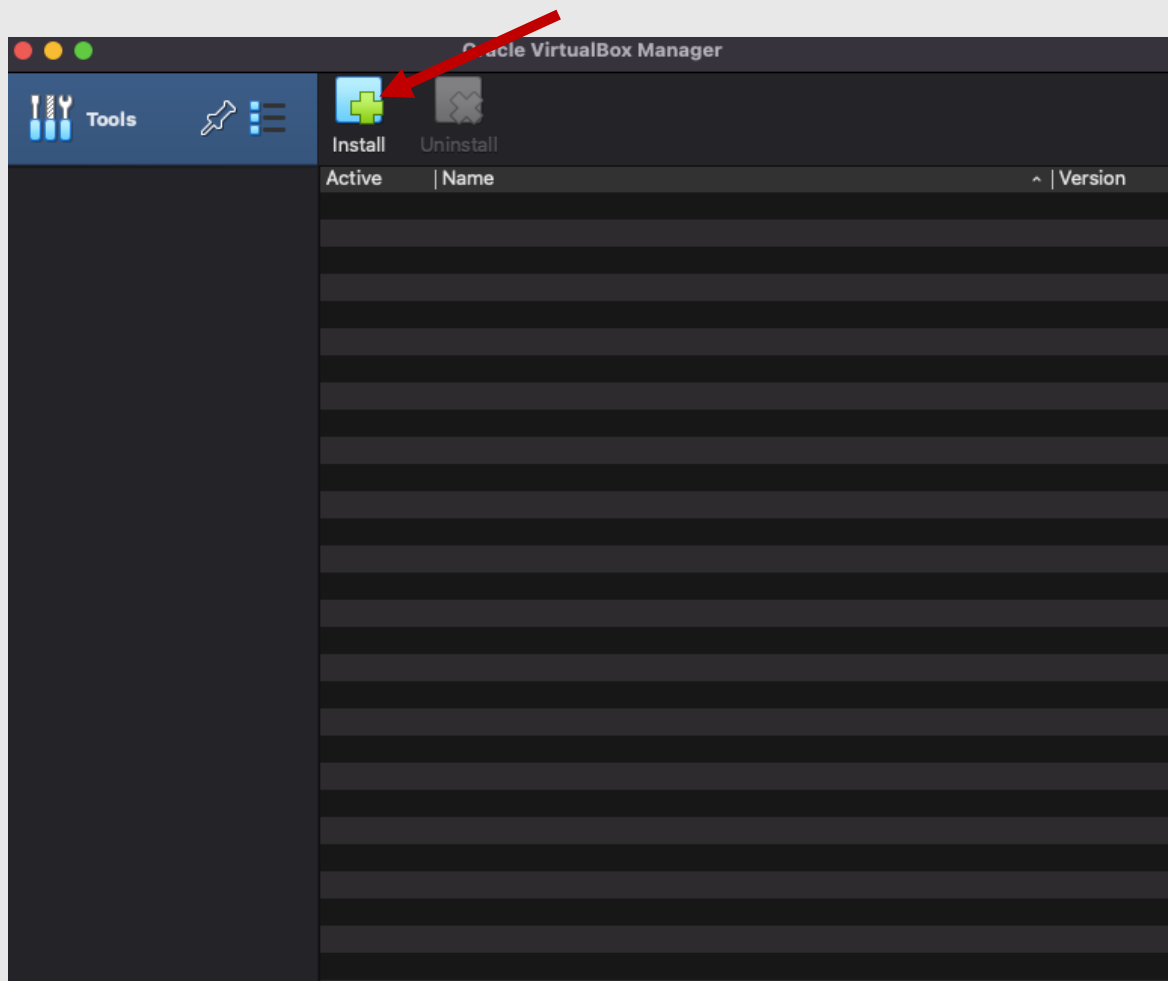
6.) Download the OVA Version



7.) Make a note of the password in the Info tab



8.) Open the VM and Install the expansion pack.
Oracle_VirtualBox_Extension_Pack-7.1.2.vbox-extpack



9.) Double click on the Ubuntu .ova file you downloaded. Follow the instructions. Also look the manual page 50.

1.15.2 Importing an Appliance in OVF Format

The following steps show how to import an appliance in OVF format.

1. Double-click the OVF or OVA file.

Oracle VirtualBox creates file type associations automatically for any OVF and OVA files on your host OS.

The **Appliance Settings** page of the **Import Virtual Appliance** wizard is shown. This page shows the VMs described in the OVF or OVA file and enables you to change the VM settings.

2. By default, membership of VM groups is preserved on import for VMs that were initially exported from Oracle VirtualBox. You can change this behavior by using the **Primary Group** setting for the VM.

The following global settings apply to all of the VMs that you import:

- **Base Folder:** Specifies the directory on the host in which to store the imported VMs.

If an appliance has multiple VMs, you can specify a different directory for each VM by editing the **Base Folder** setting for the VM.

- **MAC Address Policy:** Reinitializes the MAC addresses of network cards in your VMs prior to import, by default. You can override the default behavior and preserve the MAC addresses on import.
- **Import Hard Drives as VDI:** Imports hard drives in the VDI format rather than in the default VMDK format.

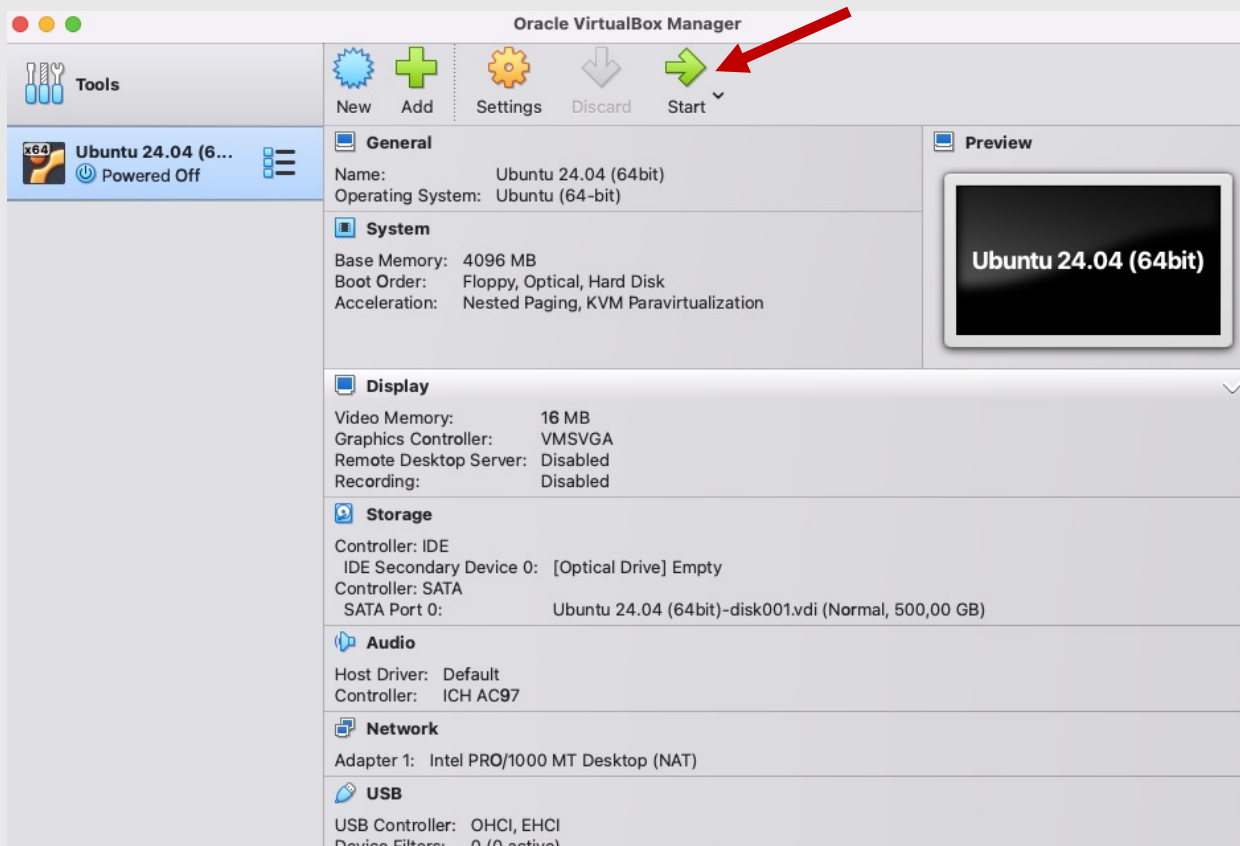
3. Click **Finish** to import the appliance.

Oracle VirtualBox copies the disk images and creates local VMs with the settings described on the **Appliance Settings** page. The imported VMs are shown in the list of VMs in VirtualBox Manager.

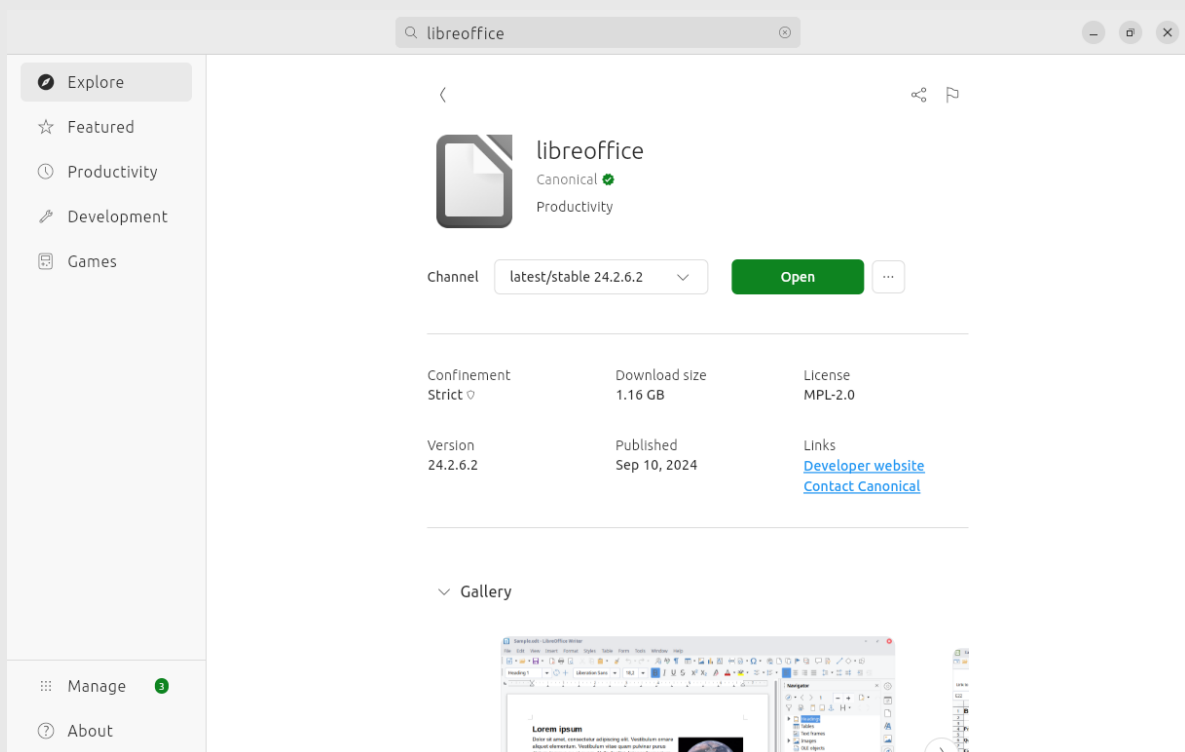
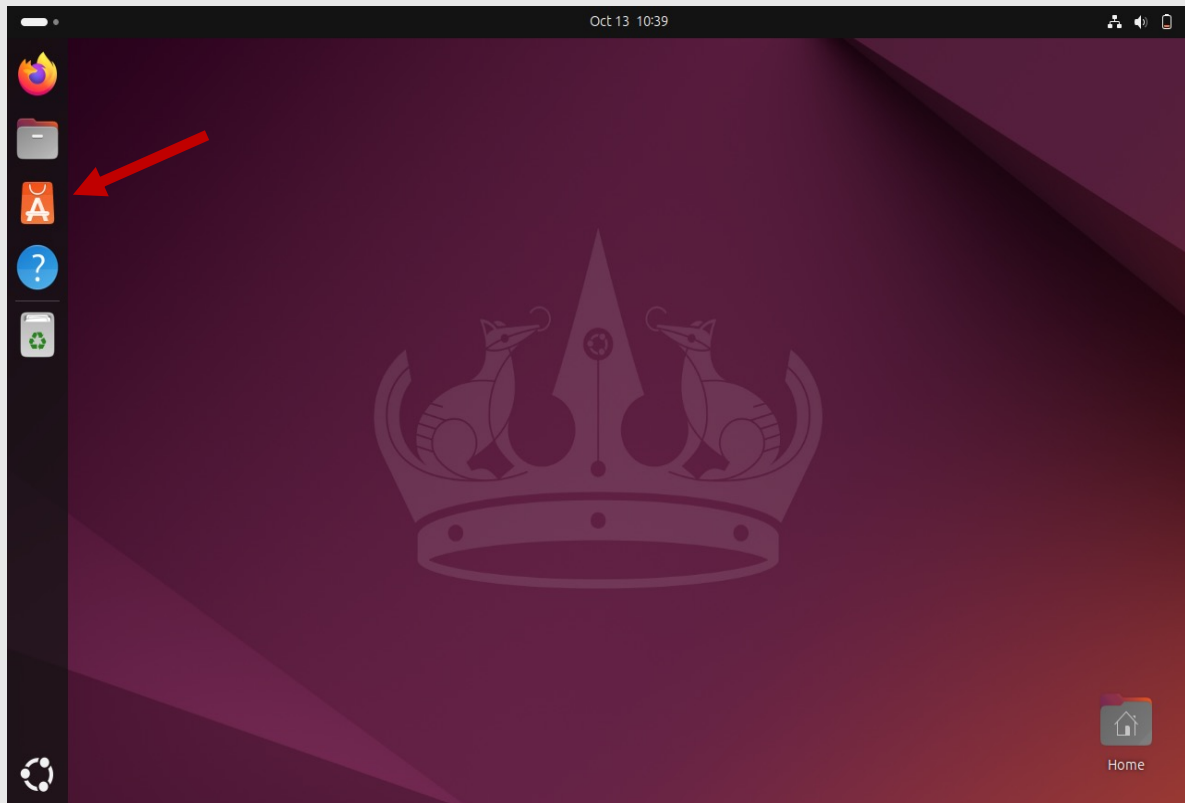
Because disk images are large, the VMDK images that are included with virtual appliances are shipped in a compressed format that cannot be used directly by VMs. So, the images are first unpacked and copied, which might take several minutes.

You can use the `VBoxManage import` command to import an appliance. See [8.29 VBoxManage import on page 310](#).

10.) Start the Vm and enter the password

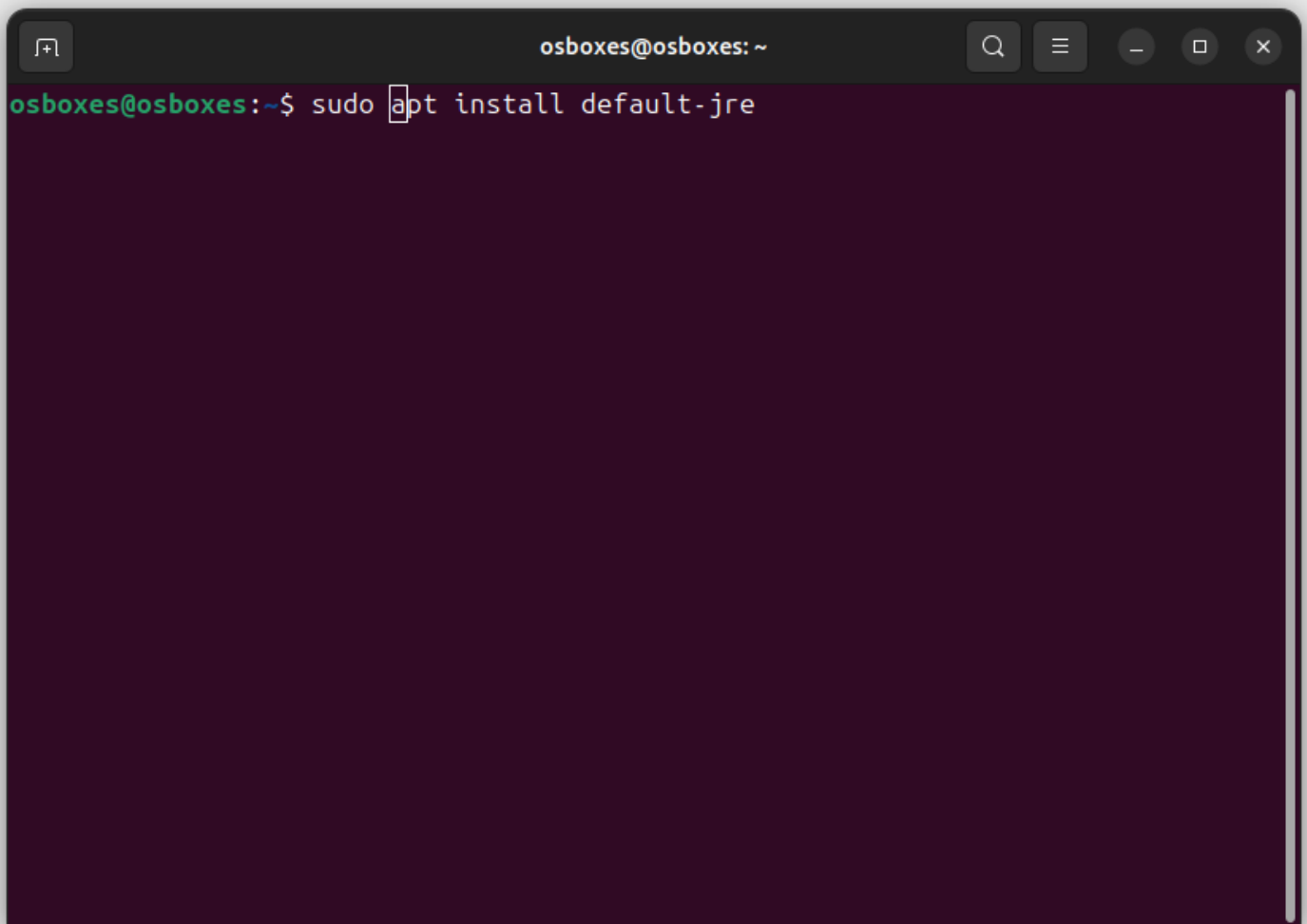


11.) Install LibreOffice from the App Center in Ubuntu



Install Java

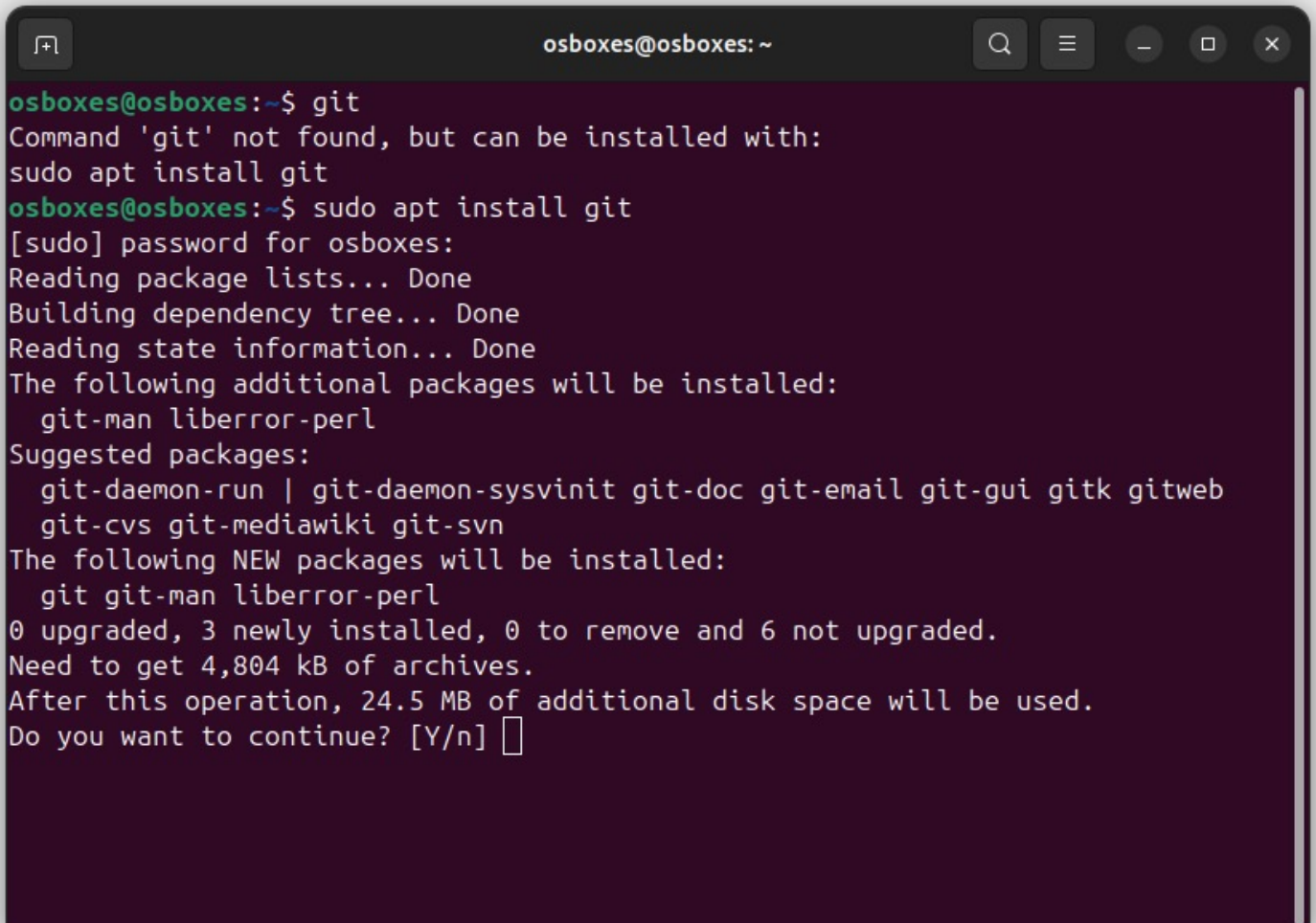
\$ sudo apt install default-jre

A terminal window with a dark background and a title bar. The title bar contains a window icon, the text 'osboxes@osboxes: ~', and standard window controls (search, menu, zoom, and close). The terminal text shows the prompt 'osboxes@osboxes:~\$' followed by the command 'sudo apt install default-jre'. The cursor is positioned at the end of the command.

```
osboxes@osboxes:~$ sudo apt install default-jre
```

Install Git

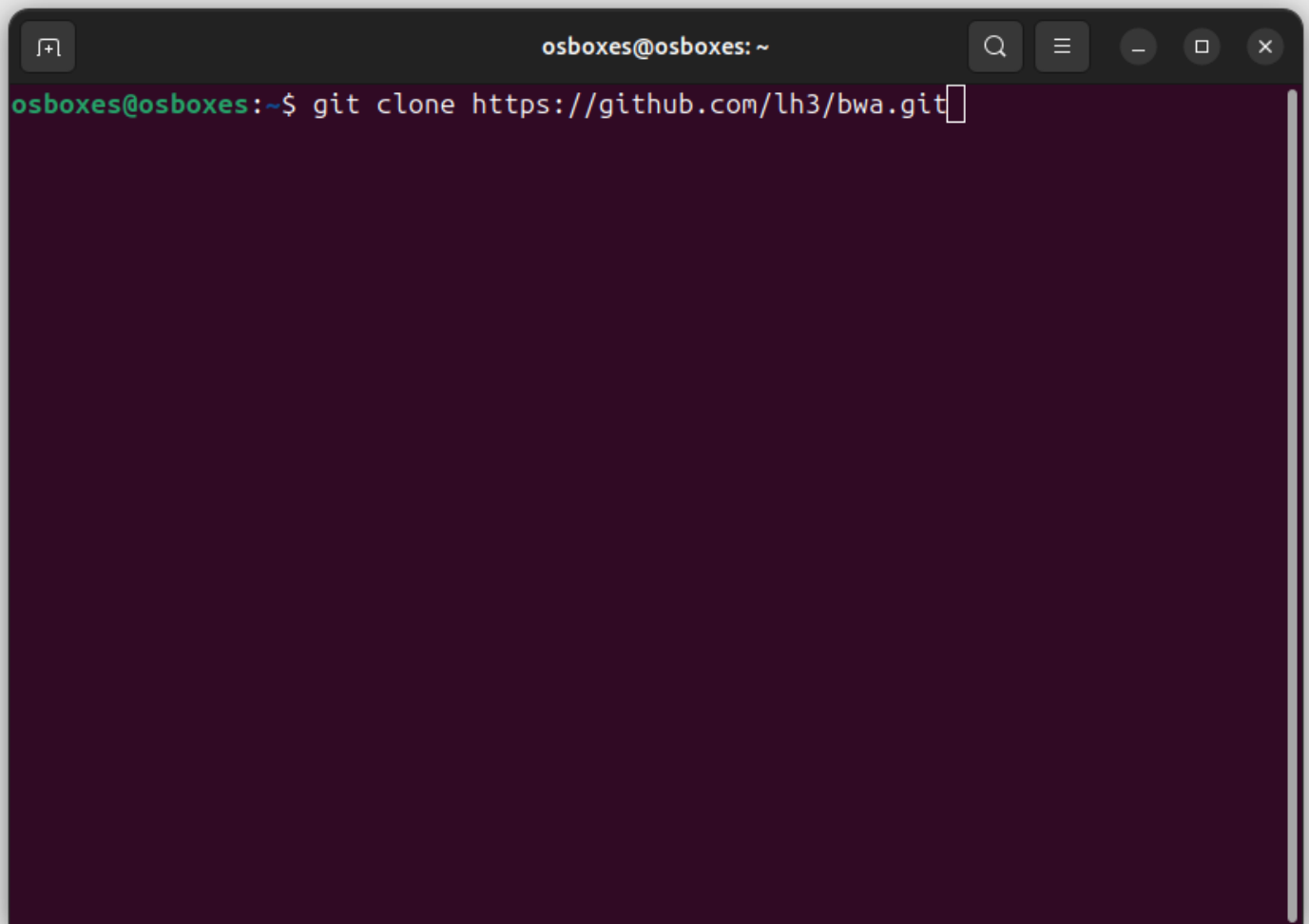
`$ sudo apt install git`



```
osboxes@osboxes: ~  
osboxes@osboxes:~$ git  
Command 'git' not found, but can be installed with:  
sudo apt install git  
osboxes@osboxes:~$ sudo apt install git  
[sudo] password for osboxes:  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following additional packages will be installed:  
  git-man liberror-perl  
Suggested packages:  
  git-daemon-run | git-daemon-sysvinit git-doc git-email git-gui gitk gitweb  
  git-cvs git-mediawiki git-svn  
The following NEW packages will be installed:  
  git git-man liberror-perl  
0 upgraded, 3 newly installed, 0 to remove and 6 not upgraded.  
Need to get 4,804 kB of archives.  
After this operation, 24.5 MB of additional disk space will be used.  
Do you want to continue? [Y/n] ☐
```

Use git to clone the bwa repository

\$ git clone https://github.com/lh3/bwa.git

A terminal window with a dark background and light-colored text. The window title bar shows 'osboxes@osboxes: ~' and standard window controls. The terminal content shows the command 'git clone https://github.com/lh3/bwa.git' being entered at the prompt 'osboxes@osboxes:~\$'.

```
osboxes@osboxes:~$ git clone https://github.com/lh3/bwa.git
```

Download samtools, bcftools,htslib

<https://www.htslib.org/download/>

htslib.org/download/

Samtools

Home

Download ▾

Workflows ▾

Documentation ▾

Support ▾

Current releases

SAMtools and **BCFtools** are distributed as individual packages. The code uses HTSlib internally, but these source packages contain their own copies of htslib so they can be built independently.

HTSlib is also distributed as a separate package which can be installed if you are writing your own programs against the HTSlib API. HTSlib also provides the **bgzip**, **htsfile**, and **tabix** utilities, so you may also want to build and install htslib to get these utilities. For see the additional instructions in **INSTALL** to install them from a samtools or bcftools source package.

Download current source releases:

📄 samtools-1.21

📄 bcftools-1.21

📄 htslib-1.21

See also release notes for [samtools](#), [bcftools](#), and [htslib](#).

New releases are announced on the [samtools mailing lists](#) and by [@htslib](#) on Twitter. Previous releases are available from the [samtools GitHub organisation](#) (see [samtools](#), [bcftools](#), or [htslib](#) releases) or from the [samtools Sourceforge project](#).

Building and installing

Building each desired package from source is very simple:

```
cd samtools-1.x    # and similarly for bcftools and htslib
./configure --prefix=/where/to/install
make
make install
```

See **INSTALL** in each of the source directories for further details.

The executable programs will be installed to a **bin** subdirectory under your specified prefix, so you may wish to add this directory to your \$PATH:

```
export PATH=/where/to/install/bin:$PATH    # for sh or bash users
```

```
setenv PATH /where/to/install/bin:$PATH    # for csh users
```

Navigate to the Download folder and install these libraries first

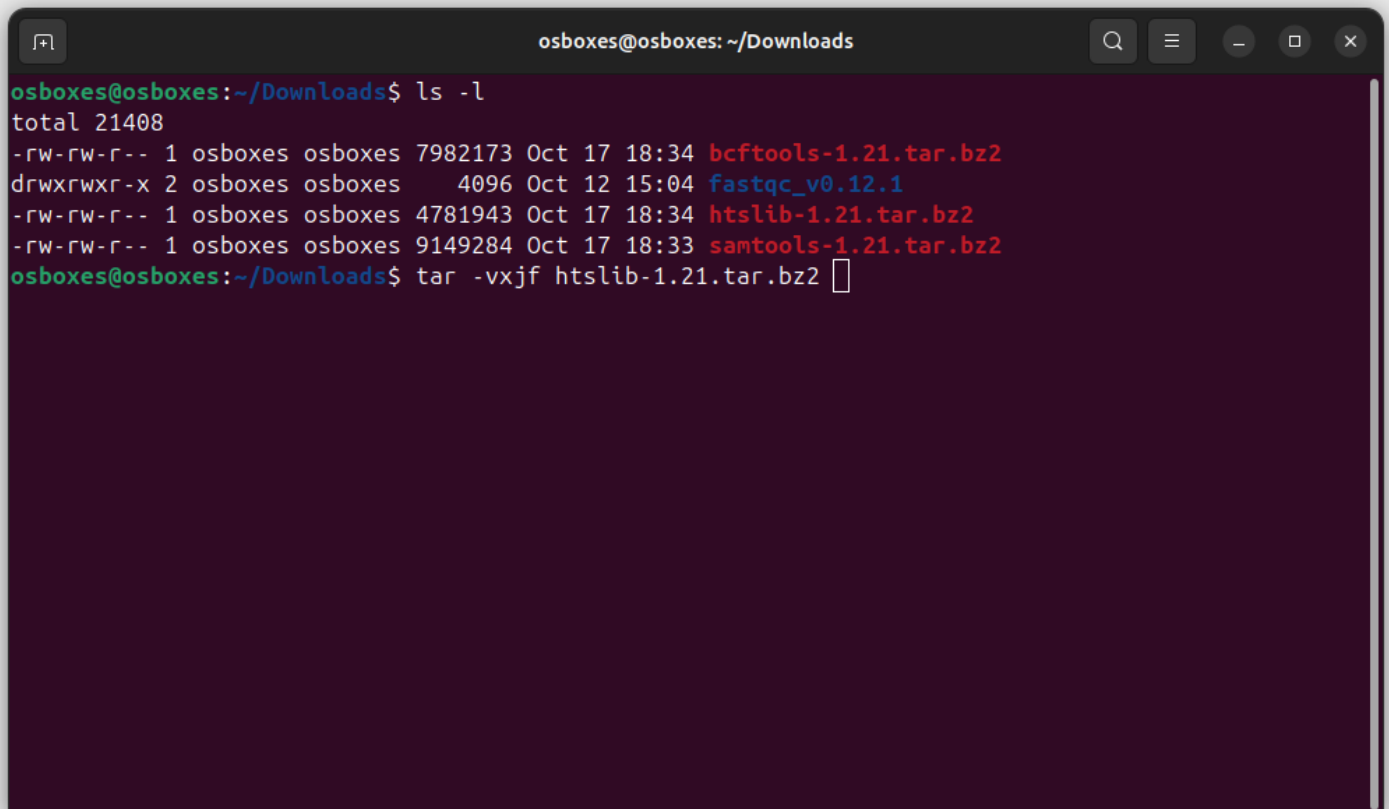
\$ sudo apt-get install -y libncurses-dev libbz2-dev liblzma-dev

A terminal window with a dark background and light text. The title bar at the top reads "osboxes@osboxes: ~/Downloads". The terminal shows the command "sudo apt-get install -y libncurses-dev libbz2-dev liblzma-dev" being entered at the prompt "osboxes@osboxes:~/Downloads\$". The cursor is at the end of the command line.

```
osboxes@osboxes: ~/Downloads
osboxes@osboxes:~/Downloads$ sudo apt-get install -y libncurses-dev libbz2-dev liblzma-dev
```

Untar the tar.bz2 samtools, bcftools and htlib bundles

```
$ tar -vxjf htlib-1.21.tar.bz2
```

A terminal window titled 'osboxes@osboxes: ~/Downloads' with standard window controls. The terminal shows the output of 'ls -l' and the execution of a tar command. The file listing shows four files: bcftools-1.21.tar.bz2, fastqc_v0.12.1, htlib-1.21.tar.bz2, and samtools-1.21.tar.bz2. The tar command is currently executing on htlib-1.21.tar.bz2.

```
osboxes@osboxes:~/Downloads$ ls -l
total 21408
-rw-rw-r-- 1 osboxes osboxes 7982173 Oct 17 18:34 bcftools-1.21.tar.bz2
drwxrwxr-x 2 osboxes osboxes  4096 Oct 12 15:04 fastqc_v0.12.1
-rw-rw-r-- 1 osboxes osboxes 4781943 Oct 17 18:34 htlib-1.21.tar.bz2
-rw-rw-r-- 1 osboxes osboxes 9149284 Oct 17 18:33 samtools-1.21.tar.bz2
osboxes@osboxes:~/Downloads$ tar -vxjf htlib-1.21.tar.bz2
```

Install samtools, bcftools, and htslib. Follow the commands below in order.

```
$ cd samtools-1.x
```

```
$ ./configure --prefix=/path/ # we will decide in class. Default /usr/bin
```

```
$ make
```

```
$ make install
```

Building and installing

Building each desired package from source is very simple:

```
cd samtools-1.x    # and similarly for bcftools and htslib
./configure --prefix=/where/to/install
make
make install
```

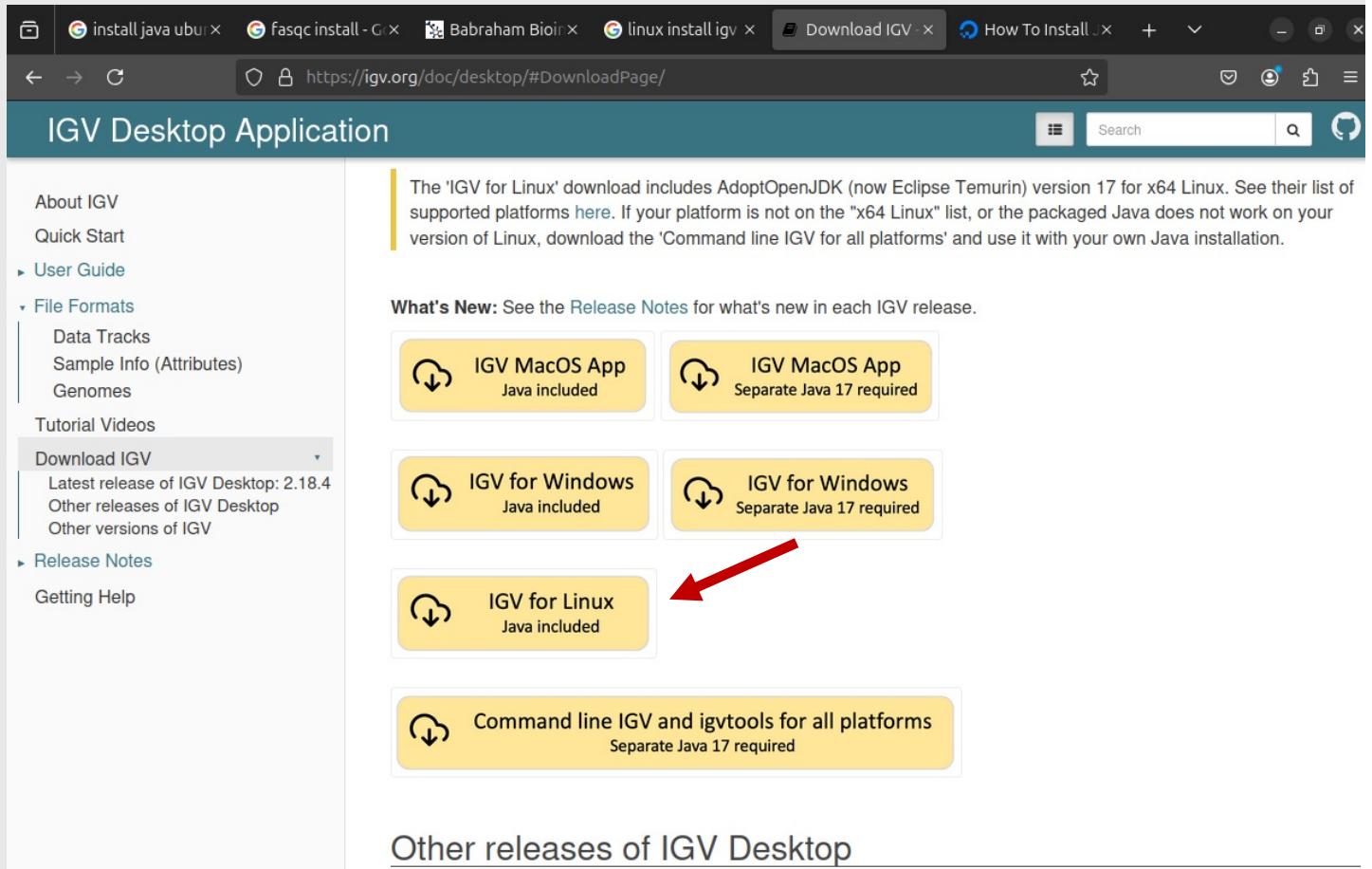
See **INSTALL** in each of the source directories for further details.

The executable programs will be installed to a **bin** subdirectory under your specified prefix, so you may wish to add this directory to your \$PATH:

```
export PATH=/where/to/install/bin:$PATH    # for sh or bash users
```

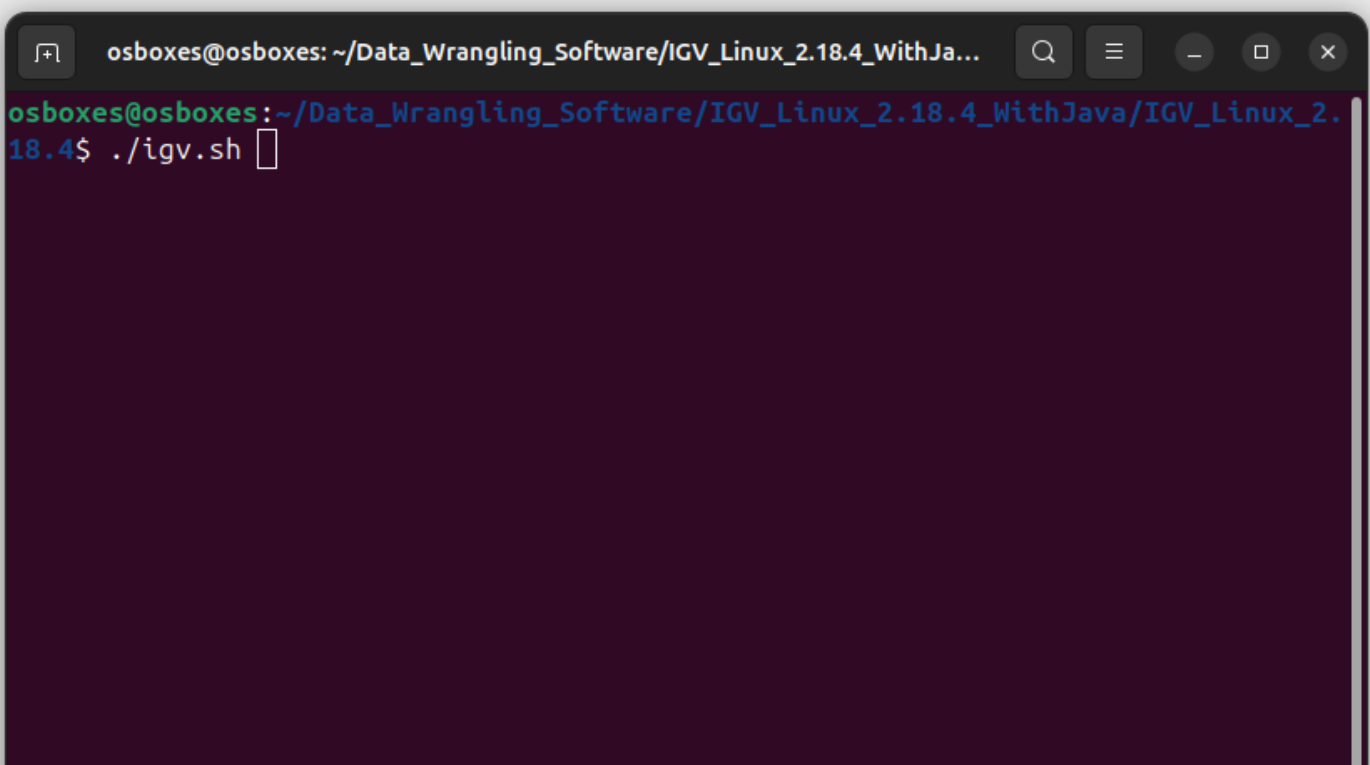
```
setenv PATH /where/to/install/bin:$PATH    # for csh users
```


Download IGV genome viewer



The screenshot shows the IGV Desktop Application download page. The browser address bar displays `https://igv.org/doc/desktop/#DownloadPage/`. The page title is "IGV Desktop Application". On the left, a sidebar menu includes links for "About IGV", "Quick Start", "User Guide", "File Formats" (with sub-links for "Data Tracks", "Sample Info (Attributes)", and "Genomes"), "Tutorial Videos", "Download IGV" (highlighted), "Release Notes", and "Getting Help". The main content area features a text block stating that the Linux download includes AdoptOpenJDK (now Eclipse Temurin) version 17 for x64 Linux. Below this, a "What's New" section mentions release notes. A grid of download buttons is presented for various operating systems: "IGV MacOS App" (Java included and Separate Java 17 required), "IGV for Windows" (Java included and Separate Java 17 required), "IGV for Linux" (Java included), and "Command line IGV and igvtools for all platforms" (Separate Java 17 required). A red arrow points to the "IGV for Linux" button. At the bottom, a section titled "Other releases of IGV Desktop" is visible.

To lunch IGV



The screenshot shows a terminal window with the title `osboxes@osboxes: ~/Data_Wrangling_Software/IGV_Linux_2.18.4_WithJa...`. The prompt is `osboxes@osboxes:~/Data_Wrangling_Software/IGV_Linux_2.18.4_WithJava/IGV_Linux_2.18.4$`. The command `./igv.sh` has been entered, and the cursor is positioned at the end of the line.