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Abstract
Installing the Google Chrome browser from the official Google Chrome repository, as well as updating all installed software using the terminal on a Ubuntu virtual machine.

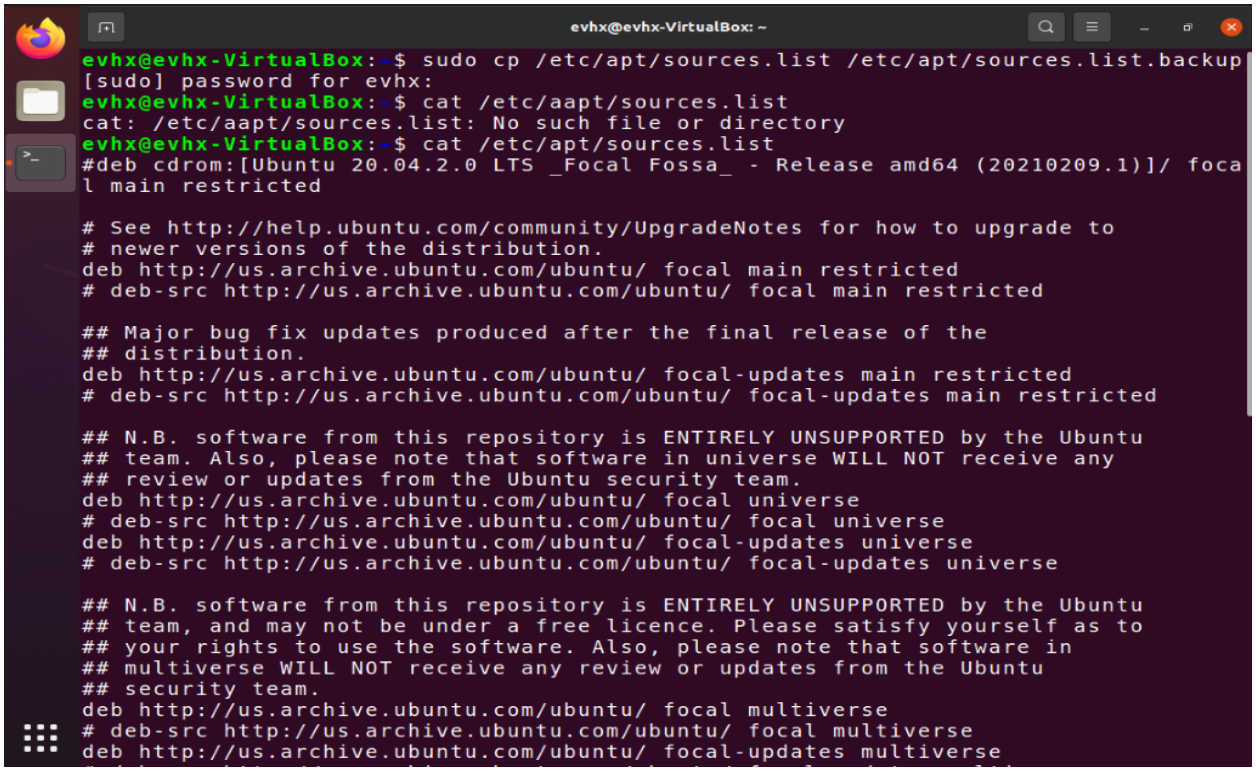
Introduction
On the Ubuntu virtual machine, Google Chrome will be installed with the usage of a PPA, also known as the Personal Package Archives which has its own key it uses to sign its packages. To go further in-depth with how software packages are installed into the repositories, the configuration file called, '/etc/apt/source.list' will be analyzed, because it holds information from remote repositories, such as the Google Chrome repository. The four different repositories on the Ubuntu machine-- Main, Restricted, Universe, Multiverse and their usages in the Ubuntu machine will be defined as well.

Summary of Results
On the Ubuntu virtual machine, a backup of the '/etc/apt/sources.list' will be saved as '/etc/apt/sources.list.backup' to show the comparison of the file before and after the Google Chrome browser is installed in the repository. To create the backup file, use the command:

sudo cp /etc/apt/sources.list /etc/apt/sources.list.backup

Commands:

sudo	(root privileges	)
cp	(copying files or directories to another location	)



Let's view the contents of the ‘sources.list’ file with the command:

cat /etc/apt/sources.list

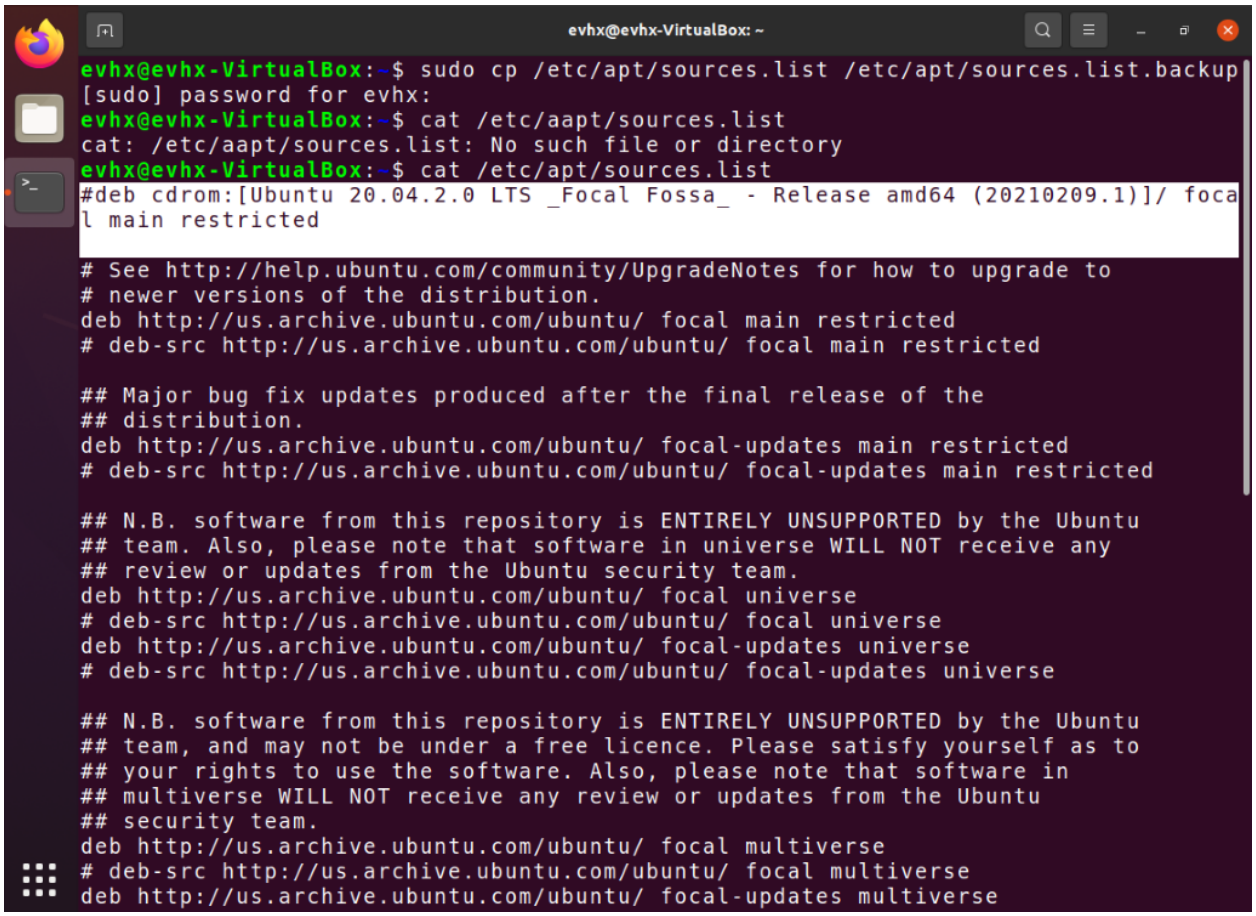
The first piece of information that is seen is the release name or version of the operating system being used, in this case it is:
[Ubuntu 20.04.2.0 LTS _Focal Fossa_ - Release amd64 (20210209.1)]/ focal main restricted
Release name: Focal Fossa

The ‘main’ and ‘restricted’ refer to the repositories located on the Ubuntu system. There are a total of four, which are:

Main	(Officially supported; Open-Source Software	)
Restricted	(Officially supported; Closed-Source Software	)
Universe	(Community maintained; Open-Source Software	)
Multiverse	(Unsupported; Closed-Source & Patent Restricted	)

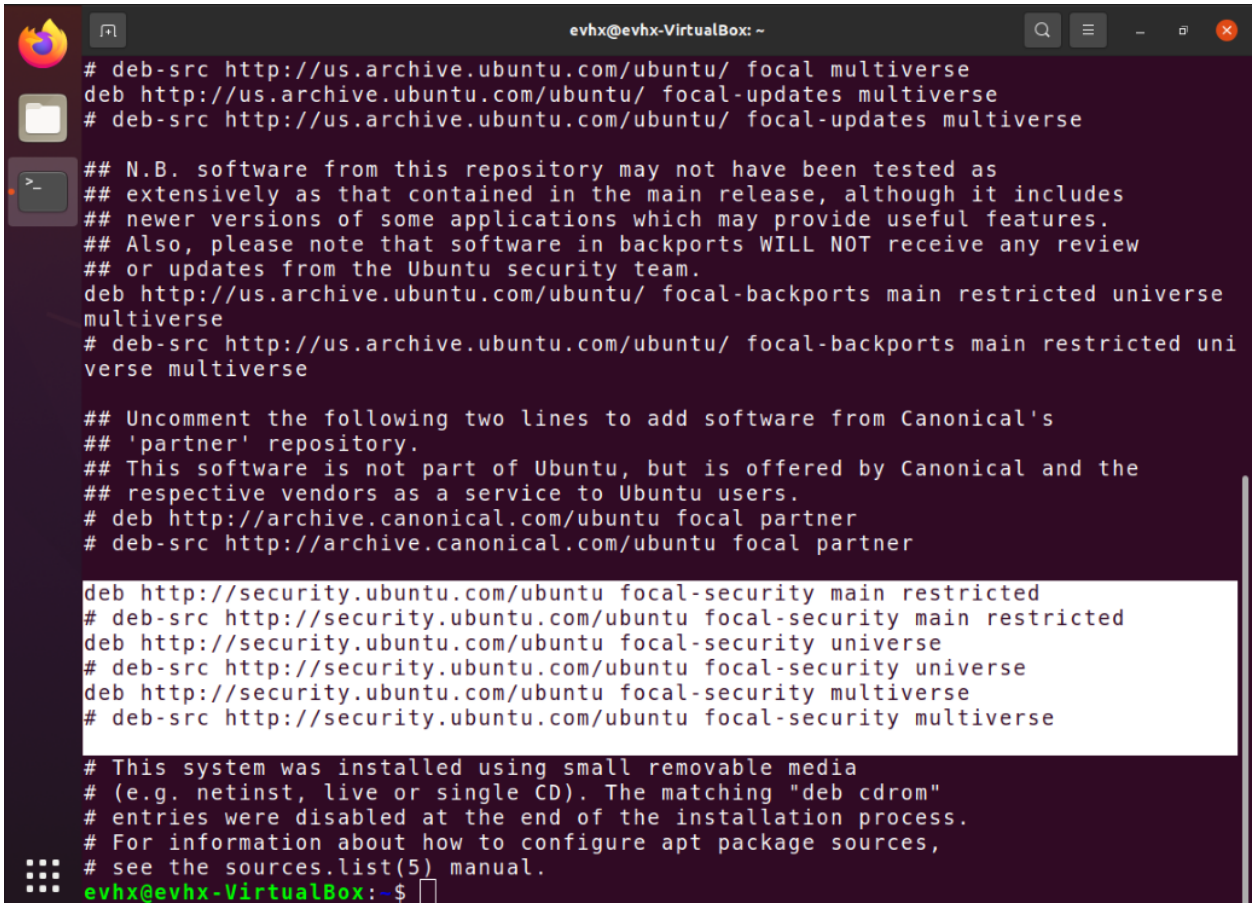
Commands:

cat	(print the content of a file to standard output stream	)



Further down in the ‘sources.list’ file, the four repositories previously stated can be found. Typically with Ubuntu systems, only the ‘Main’ repository will be enabled by default, but the other repositories would have to be installed manually by using the commands:

sudo add-apt-repository universe	(adds the universe repository	)
sudo add-apt-repository restricted	(adds the restricted repository	)
sudo add-apt-repository multiverse	(adds the multiverse repository	)



The release name could also be seen using the command:

lsb_release -sc

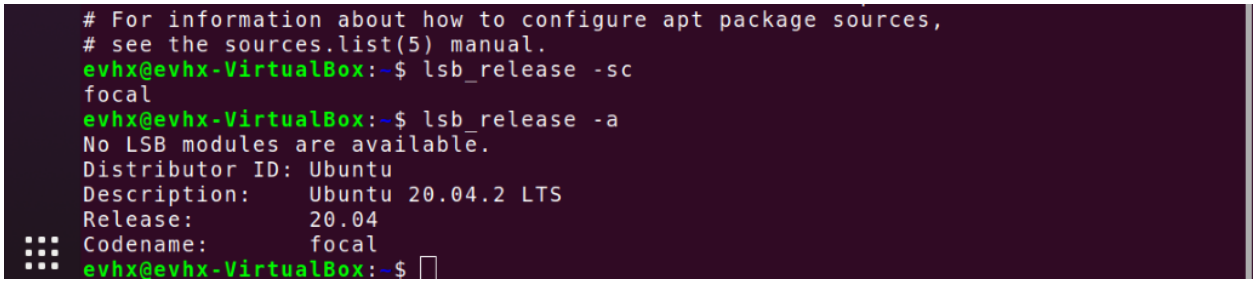
Or to display all the information on the release, use the command:

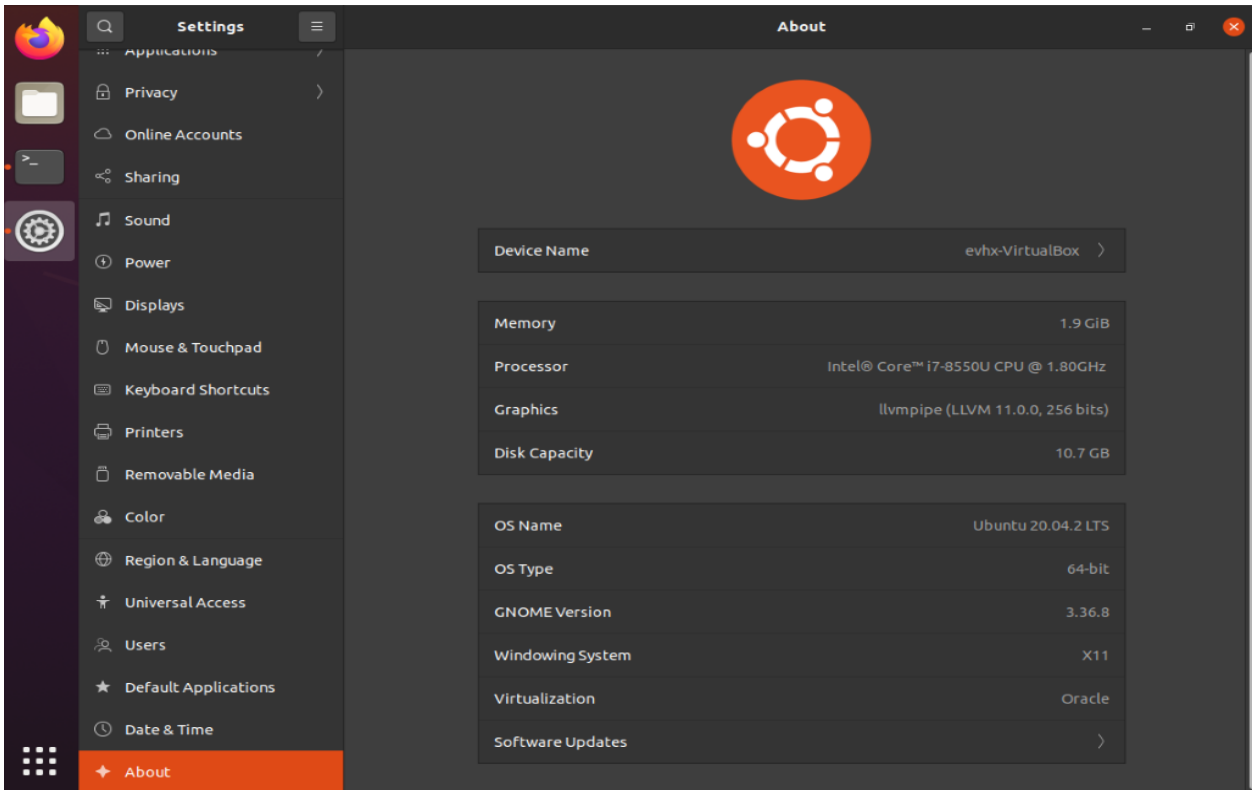
lsb_release -a

The same information can be viewed using the GUI by simply going into the ‘Settings’ menu, then going into the ‘About’ tab.

Commands:

lsb_release	(Linux Standard Base information about the Linux distribution used)
-sc	(short output format + codename)
-a	(all)





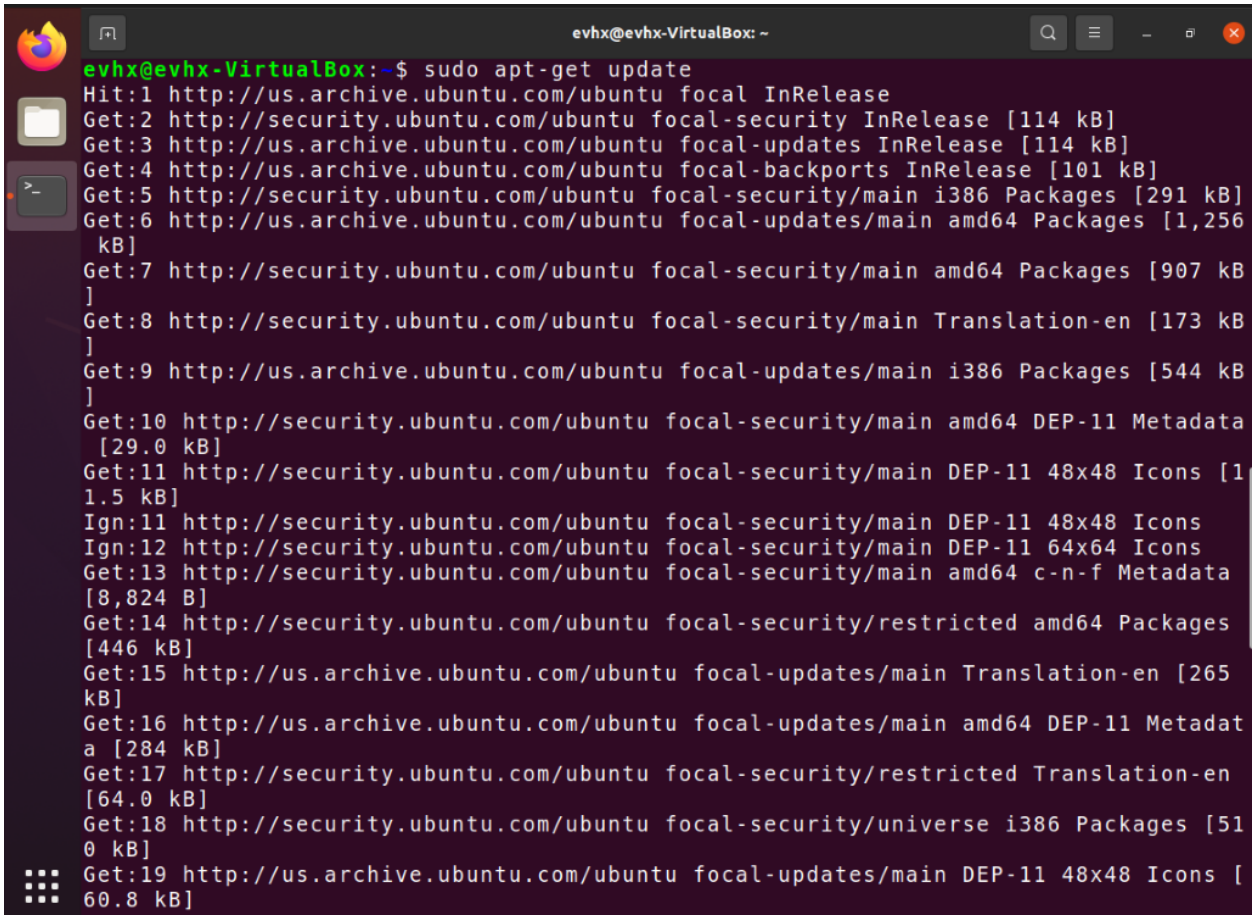
To save the selected sources on the system, update with the command:

sudo apt-get update

When the ‘sudo apt-get update’ command is run, the Ubuntu system uses its APT (Advanced Packaging Tool) to first check and store the information about the software in a cache before the new information is actually downloaded.

Commands:

sudo	(root privileges	)
apt-get	(retrieve information and packages	)
update	(newer than the existing corresponding files	)



The PPA or Personal Package Archives are software repositories for Ubuntu users that are needed because of the lengthy procedures needed to check if software is compatible with the system. Using a PPA is a way around that procedure, since it allows the developers to create their own repositories so that the end user can simply add the PPA repository into the 'sources.list' file, which is how Google Chrome will be added to the Ubuntu machine.
First, to add the PPA for Google Chrome, the required public key needs to be downloaded, with the command:

wget -q -O - https://dl.google.com/linux/linux_signing_key.pub | sudo apt-key add -

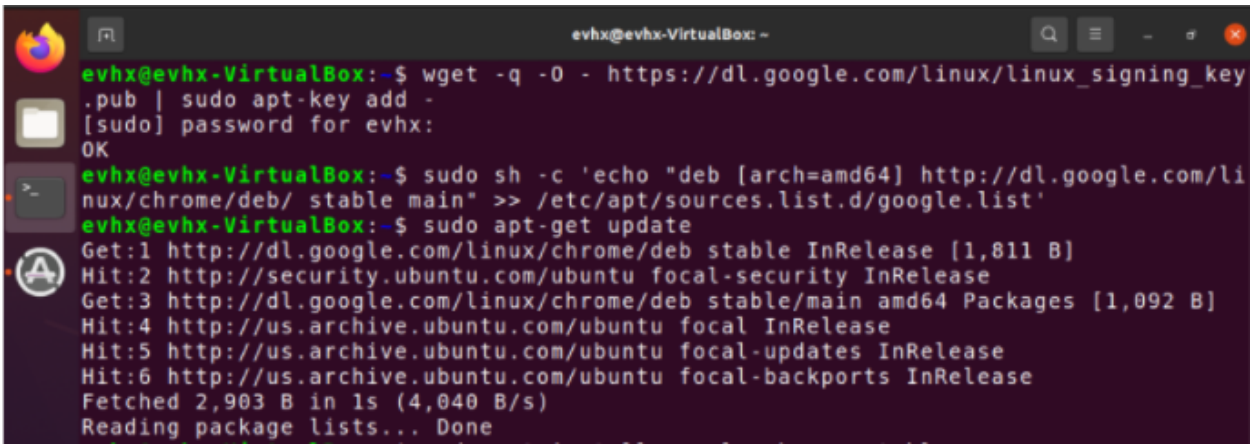
After the key is installed, the Google Chrome repository needs to be added to the 'sources.list', using the command:

sudo sh -c 'echo "deb [arch=amd64] http://dl.google.com/linux/chrome/deb/ stable main" >> /etc/apt/sources.list.d/google.list

Commands:

wget (downloads content from a web server)
-q ('quiets' copyright message)
-O (Opera GPG key)
https://dl.google.com/linux/linux_signing_key.pub (key source)
| sudo apt-key add - (pipeline used to add the package key into the other command)

sh (shell command to retrieve input)
-c (executes command using interpreter(shell))
"deb [arch=amd64] http://dl.google.com/linux/chrome/deb/ stable main" (Google Chrome repository)
>> (accepts the input)
/etc/apt/sources.list.d/google.list (repository location of Google Chrome)



Now that the Google Chrome key was added, and the repository was set, the packages need to be installed, first with an update to the local cache with the command:

sudo apt-get update

To retrieve the remaining packages for Google Chrome, and compare the version in the created repository with the newer version, use the command:

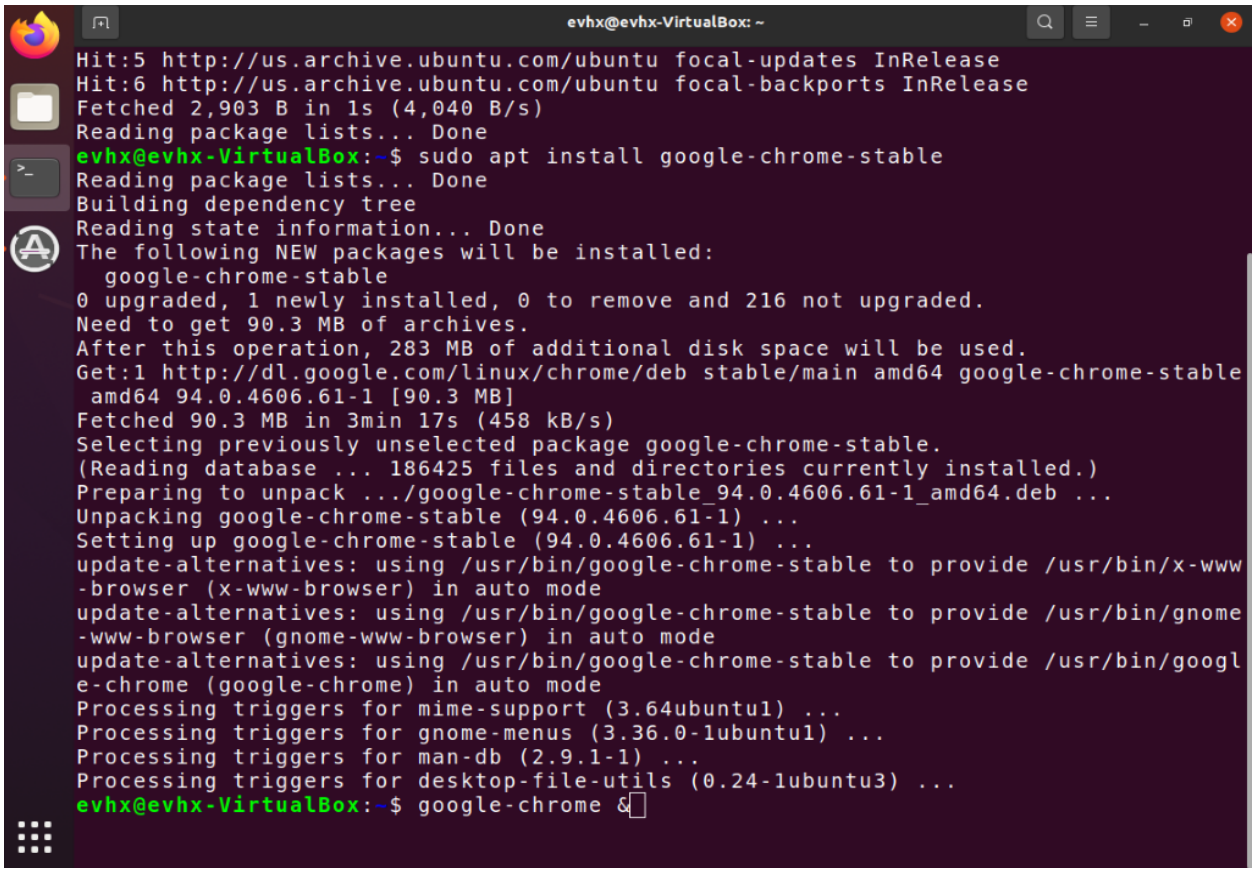
sudo apt install google-chrome-stable

To launch Google Chrome, use the command:

google-chrome &

Commands:

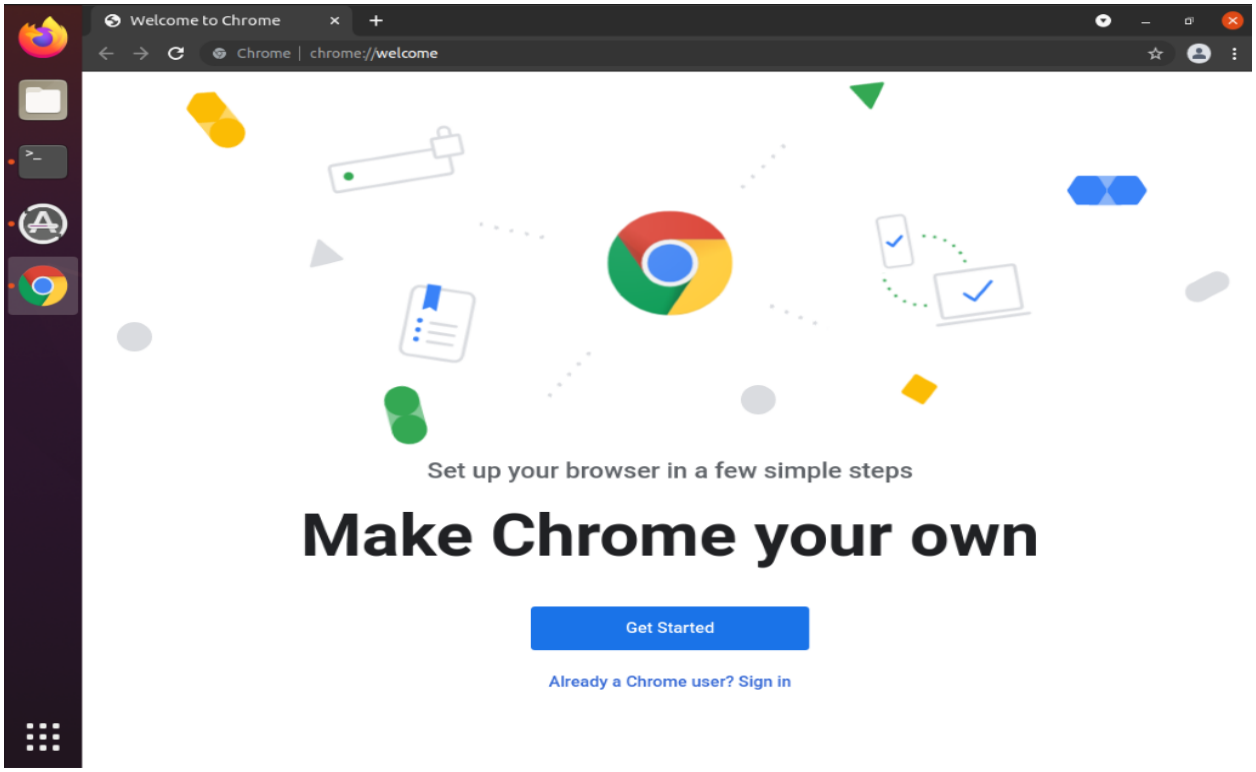
sudo	(root privileges	)
apt	(check and store information	)
-get update	(retrieves update	)
install	(copy files	)
google-chrome-stable	(Google Chrome package	)
google-chrome	(program name	)
&	(runs command in the background	)

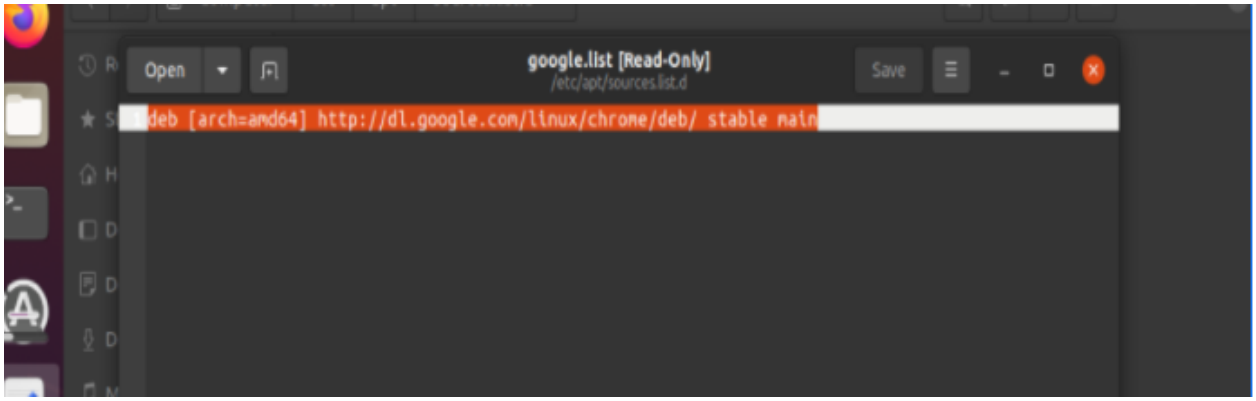


Google Chrome has been successfully installed. To view the Google Chrome repository stored on the Ubuntu machine, go into its saved location as previously stated being:

/etc/apt/sources.list.d/google.list

Here it shows the specific repository installed, the Google Chrome package name, ‘stable’, and its location in the ‘Main’ repository.





Conclusion

Google Chrome was successfully installed on the Ubuntu virtual machine with the usage of Personal Package Archives, which allowed for the Google Chrome key to be added, the repository to be set and the packages to be downloaded. For a better understanding of how Google Chrome was able to be installed onto the Ubuntu system, the four repositories-- Main, Restricted, Universe, and Multiverse and their usages in the Ubuntu machine were reviewed, to show that the ‘sources.list’ located in the Main repository, can be used to add or upgrade applications on the Ubuntu machine.

Even though both the Yum system and the apt-get system are used for installing, removing and updating software packages, they can only be used with their specific Linux distributions. Yum is used with the Red Hat Linux distributions while apt-get is used with the Debian Linux distributions. Yum gets the packages from the net automatically, while apt-get is better for management since it's highly customizable and has more functionalities.