

**Below are the set of packages  
installed at SYSTEM level**

(Outside Virtual Environment)

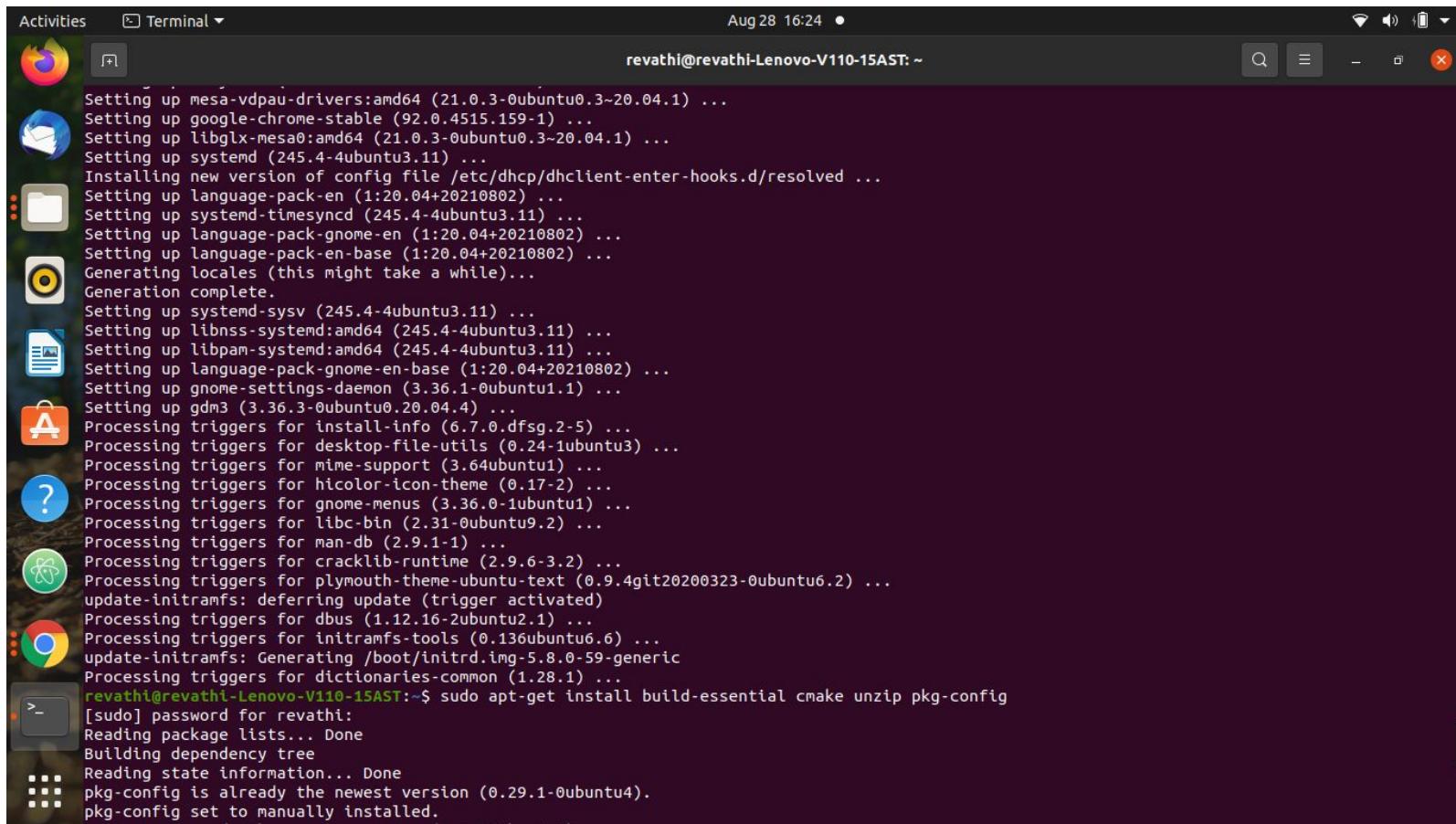
# \$ sudo apt-get update

# \$ sudo apt-get upgrade

```
Activities Terminal Aug 28 15:55 •
revathi@revathi-Lenovo-V110-15AST: ~
bash: /home/revathi/.local/bin/virtualwrapper.sh: No such file or directory
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get update
[sudo] password for revathi:
Hit:1 http://in.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://dl.google.com/linux/chrome/deb stable InRelease
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [522 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [27.6 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,169 kB]
Get:9 http://security.ubuntu.com/ubuntu focal-security/universe amd64 DEP-11 Metadata [61.0 kB]
Get:10 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 DEP-11 Metadata [2,468 B]
Get:11 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [282 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [848 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [629 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [351 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 DEP-11 Metadata [944 B]
Get:16 http://in.archive.ubuntu.com/ubuntu focal-backports/universe amd64 DEP-11 Metadata [10.3 kB]
Fetched 4,234 kB in 7s (631 kB/s)
Reading package lists... Done
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer required:
  libllvm11 shim
Use 'sudo apt autoremove' to remove them.
The following packages have been kept back:
  fwupd fwupd-signed gnome-shell-extension-desktop-icons libfwupd2 libfwupdplugin1 linux-generic-hwe-20.04 linux-headers-generic-hwe-20.04
    linux-image-generic-hwe-20.04
The following packages will be upgraded:
  alsu-ucm-conf aspell base-files distro-info-data firefox firefox-locale-en gdm3 gir1.2-gdm-1.0 gir1.2-javascriptcoregtk-4.0
  gir1.2-webkit2-4.0 gnome-settings-daemon gnome-settings-daemon-common google-chrome-stable grub-common grub-pc grub-pc-bin grub2-common
  language-pack-en language-pack-en-base language-pack-gnome-en language-pack-gnome-en-base libaspell15 libcurl3-gnutls libcurl4
  libdmgmount libdmz libfm libfm-int1 libfm-qt libfm-qt4 libfm1 libfm1 libfm1.0 libfm1.0-gtk dai
```

# \$ sudo apt-get install build-essential cmake unzip pkg-config

tools



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window has a dark purple background and displays the output of a command-line session. The session starts with the command \$ sudo apt-get install build-essential cmake unzip pkg-config, followed by a password prompt [sudo] password for revathi:. It then shows the progress of installing various packages, including mesa-vdpau-drivers, google-chrome-stable, libglx-mesa0, systemd, language-pack-en, language-pack-gnome-en, language-pack-en-base, locales, systemd-sysv, libnss-systemd, libpam-systemd, language-pack-gnome-en-base, gnome-settings-daemon, gdm3, triggers for install-info, desktop-file-utils, mime-support, hicolor-icon-theme, gnome-menus, libc-bin, man-db, cracklib-runtime, triggers for plymouth-theme-ubuntu-text, update-initramfs, dbus, initramfs-tools, update-initramfs, dictionaries-common, and finally pkg-config. The terminal window also shows the user's name (revathi) and the host (revathi-Lenovo-V110-15AST). The desktop environment includes a dock with icons for the Dash, Home, and other applications like a browser and file manager.

```
Setting up mesa-vdpau-drivers:amd64 (21.0.3-0ubuntu0.3~20.04.1) ...
Setting up google-chrome-stable (92.0.4515.159-1) ...
Setting up libglx-mesa0:amd64 (21.0.3-0ubuntu0.3~20.04.1) ...
Setting up systemd (245.4-4ubuntu3.11) ...
Installing new version of config file /etc/dhcp/dhclient-enter-hooks.d/resolved ...
Setting up language-pack-en (1:20.04+20210802) ...
Setting up systemd-timesyncd (245.4-4ubuntu3.11) ...
Setting up language-pack-gnome-en (1:20.04+20210802) ...
Setting up language-pack-en-base (1:20.04+20210802) ...
Generating locales (this might take a while)...
Generation complete.
Setting up systemd-sysv (245.4-4ubuntu3.11) ...
Setting up libnss-systemd:amd64 (245.4-4ubuntu3.11) ...
Setting up libpam-systemd:amd64 (245.4-4ubuntu3.11) ...
Setting up language-pack-gnome-en-base (1:20.04+20210802) ...
Setting up gnome-settings-daemon (3.36.1-0ubuntu1.1) ...
Setting up gdm3 (3.36.3-0ubuntu0.20.04.4) ...
Processing triggers for install-info (6.7.0.dfsg.2-5) ...
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for cracklib-runtime (2.9.6-3.2) ...
Processing triggers for plymouth-theme-ubuntu-text (0.9.4git20200323-0ubuntu6.2) ...
update-initramfs: deferring update (trigger activated)
Processing triggers for dbus (1.12.16-2ubuntu2.1) ...
Processing triggers for initramfs-tools (0.136ubuntu6.6) ...
update-initramfs: Generating /boot/initrd.img-5.8.0-59-generic
Processing triggers for dictionaries-common (1.28.1) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install build-essential cmake unzip pkg-config
[sudo] password for revathi:
Reading package lists... Done
Building dependency tree
Reading state information... Done
pkg-config is already the newest version (0.29.1-0ubuntu4).
pkg-config set to manually installed.
```

# \$ sudo apt-get install gcc-6 g++-6 (compiler tools)

```
Activities Terminal Aug 28 16:25 • revathi@revathi-Lenovo-V110-15AST: ~
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libjsoncpp1 amd64 1.7.4-3.1ubuntu2 [75.6 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal/main amd64 librhash0 amd64 1.3.9-1 [113 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 cmake amd64 3.16.3-1ubuntu1 [3,669 kB]
Fetched 5,470 kB in 6s (871 kB/s)
Selecting previously unselected package cmake-data.
(Reading database ... 191800 files and directories currently installed.)
Preparing to unpack .../cmake-data_3.16.3-1ubuntu1_all.deb ...
Unpacking cmake-data (3.16.3-1ubuntu1) ...
Selecting previously unselected package libjsoncpp1:amd64.
Preparing to unpack .../libjsoncpp1_1.7.4-3.1ubuntu2_amd64.deb ...
Unpacking libjsoncpp1:amd64 (1.7.4-3.1ubuntu2) ...
Selecting previously unselected package librhash0:amd64.
Preparing to unpack .../librhash0_1.3.9-1_amd64.deb ...
Unpacking librhash0:amd64 (1.3.9-1) ...
Selecting previously unselected package cmake.
Preparing to unpack .../cmake_3.16.3-1ubuntu1_amd64.deb ...
Unpacking cmake (3.16.3-1ubuntu1) ...
Setting up librhash0:amd64 (1.3.9-1) ...
Setting up cmake-data (3.16.3-1ubuntu1) ...
Setting up libjsoncpp1:amd64 (1.7.4-3.1ubuntu2) ...
Setting up cmake (3.16.3-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install gcc-6 g++-6
Reading package lists... Done
Building dependency tree
Reading state information... Done
Package gcc-6 is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source

Package g++-6 is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source

E: Package 'gcc-6' has no installation candidate
E: Package 'g++-6' has no installation candidate
revathi@revathi-Lenovo-V110-15AST:~$
```

# To Resolve gcc installation error - open ~/.bashrc profile

```
Activities Terminal Aug 28 17:21 • revathi@revathi-Lenovo-V110-15AST: ~
Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 cmake amd64 3.16.3-1ubuntu1 [3,669 kB]
Fetched 5,470 kB in 6s (871 kB/s)
Selecting previously unselected package cmake-data.
(Reading database ... 191800 files and directories currently installed.)
Preparing to unpack .../cmake-data_3.16.3-1ubuntu1_all.deb ...
Unpacking cmake-data (3.16.3-1ubuntu1) ...
Selecting previously unselected package libjsoncpp1:amd64.
Preparing to unpack .../libjsoncpp1_1.7.4-3.1ubuntu2_amd64.deb ...
Unpacking libjsoncpp1:amd64 (1.7.4-3.1ubuntu2) ...
Selecting previously unselected package librhash0:amd64.
Preparing to unpack .../librhash0_1.3.9-1_amd64.deb ...
Unpacking librhash0:amd64 (1.3.9-1) ...
Selecting previously unselected package cmake.
Preparing to unpack .../cmake_3.16.3-1ubuntu1_amd64.deb ...
Unpacking cmake (3.16.3-1ubuntu1) ...
Setting up librhash0:amd64 (1.3.9-1) ...
Setting up cmake-data (3.16.3-1ubuntu1) ...
Setting up libjsoncpp1:amd64 (1.7.4-3.1ubuntu2) ...
Setting up cmake (3.16.3-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install gcc-6 g++-6
Reading package lists... Done
Building dependency tree
Reading state information... Done
Package gcc-6 is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source
Package g++-6 is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source
E: Package 'gcc-6' has no installation candidate
E: Package 'g++-6' has no installation candidate
revathi@revathi-Lenovo-V110-15AST:~$ sudo nano /etc/apt/sources.list
[sudo] password for revathi:
revathi@revathi-Lenovo-V110-15AST:~$ 
```

# Updating ~/.bashrc to install gcc

Activities Terminal Aug 28 17:23 revathi@revathi-Lenovo-V110-15AST: ~ Modified

```
GNU nano 4.8 /etc/apt/sources.list
# deb-src http://in.archive.ubuntu.com/ubuntu/ focal multiverse
deb http://in.archive.ubuntu.com/ubuntu/ focal-updates multiverse
# deb-src http://in.archive.ubuntu.com/ubuntu/ focal-updates multiverse

## N.B. software from this repository may not have been tested as
## extensively as that contained in the main release, although it includes
## newer versions of some applications which may provide useful features.
## Also, please note that software in backports WILL NOT receive any review
## or updates from the Ubuntu security team.
deb http://in.archive.ubuntu.com/ubuntu/ focal-backports main restricted universe multiverse
# deb-src http://in.archive.ubuntu.com/ubuntu/ focal-backports main restricted universe multiverse

## Uncomment the following two lines to add software from Canonical's
## 'partner' repository.
## This software is not part of Ubuntu, but is offered by Canonical and the
## respective vendors as a service to Ubuntu users.
# deb http://archive.canonical.com/ubuntu focal partner
# deb-src http://archive.canonical.com/ubuntu focal partner

deb http://security.ubuntu.com/ubuntu focal-security main restricted
# deb-src http://security.ubuntu.com/ubuntu focal-security main restricted
deb http://security.ubuntu.com/ubuntu focal-security universe
# deb-src http://security.ubuntu.com/ubuntu focal-security universe
deb http://security.ubuntu.com/ubuntu focal-security multiverse
# deb-src http://security.ubuntu.com/ubuntu focal-security multiverse

# This system was installed using small removable media
# (e.g. netinst, live or single CD). The matching "deb cdrom"
# entries were disabled at the end of the installation process.
# For information about how to configure apt package sources,
# see the sources.list(5) manual.

#to handle candidate error while installing gcc-6 and gcc++-6 - 28/08/2021
deb http://in.archive.ubuntu.com/ubuntu trusty main restricted
```

>\_

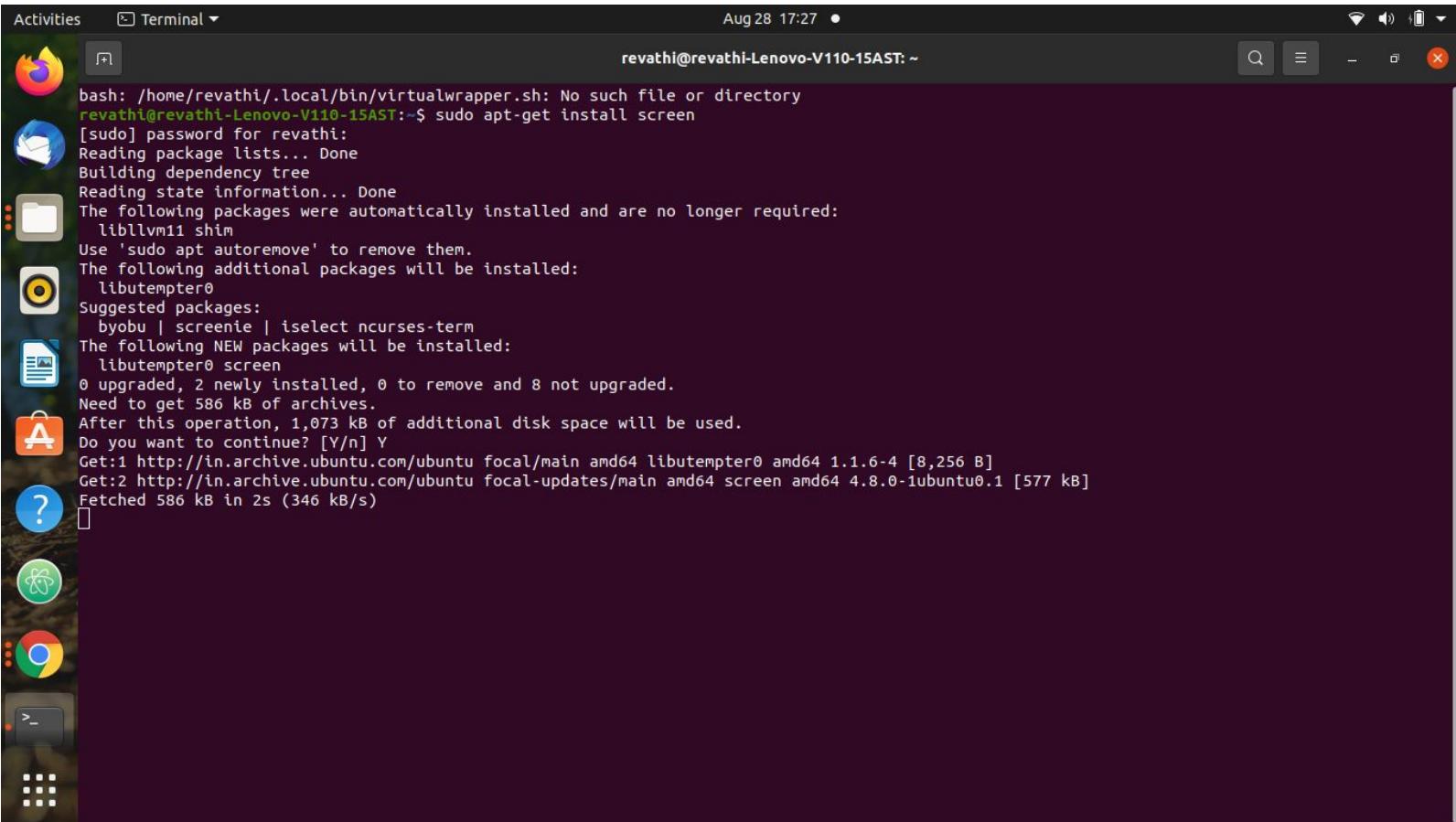
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos M-U Undo M-A Mark Text M-] To Bracket  
^X Exit ^R Read File ^\ Replace ^U Paste Text ^T To Spell ^\_ Go To Line M-E Redo M-6 Copy Text ^Q Where Was

# Install gcc - \$ sudo apt-get install gcc

```
Activities Terminal Aug 28 17:24 • revathi@revathi-Lenovo-V110-15AST: ~
revathi@revathi-Lenovo-V110-15AST:~$ sudo nano /etc/apt/sources.list
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get update
Hit:1 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu focal InRelease
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Ign:6 http://in.archive.ubuntu.com/ubuntu trusty InRelease
Get:7 http://in.archive.ubuntu.com/ubuntu trusty Release [58.5 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu trusty Release.gpg [933 B]
Get:9 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [522 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,169 kB]
Get:11 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [27.6 kB]
Get:12 http://security.ubuntu.com/ubuntu focal-security/universe amd64 DEP-11 Metadata [61.1 kB]
Get:13 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 DEP-11 Metadata [2,468 B]
Get:14 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [282 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [629 kB]
Get:16 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [848 kB]
Get:17 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [351 kB]
Get:18 http://in.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 DEP-11 Metadata [940 B]
Get:19 http://in.archive.ubuntu.com/ubuntu focal-backports/universe amd64 DEP-11 Metadata [10.3 kB]
Get:20 http://in.archive.ubuntu.com/ubuntu trusty/main amd64 Packages [1,350 kB]
Get:21 http://in.archive.ubuntu.com/ubuntu trusty/main i386 Packages [1,348 kB]
Get:22 http://in.archive.ubuntu.com/ubuntu trusty/restricted amd64 Packages [13.0 kB]
Get:23 http://in.archive.ubuntu.com/ubuntu trusty/restricted i386 Packages [13.4 kB]
Fetched 7,018 kB in 9s (797 kB/s)
Reading package lists... Done
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install gcc
Reading package lists... Done
Building dependency tree
Reading state information... Done
gcc is already the newest version (4:9.3.0-1ubuntu2).
gcc set to manually installed.
The following packages were automatically installed and are no longer required:
  libllvm11 shim
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
revathi@revathi-Lenovo-V110-15AST:~$
```

```
$ sudo apt-get install screen
```

screen, a tool used for multiple terminals in the same window

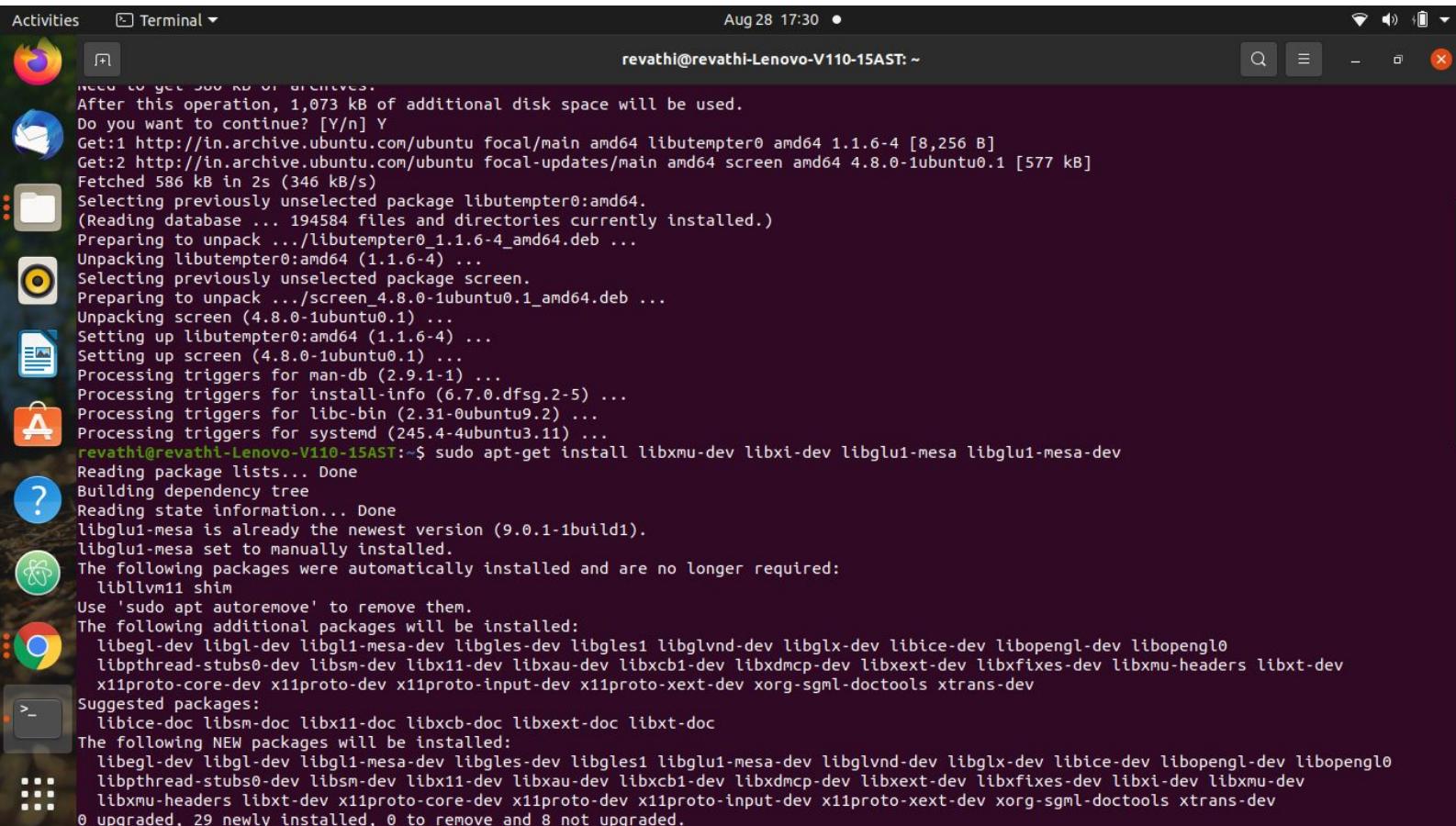


The screenshot shows a Linux desktop environment with a dark theme. A terminal window is open in the center, displaying the command `sudo apt-get install screen` and its execution. The terminal window has a title bar showing the date and time (Aug 28 17:27) and the user's name (revathi@revathi-Lenovo-V110-15AST). The terminal content includes error messages about missing files, package lists, dependency trees, and state information. It also lists automatically installed packages like liblvm1 shim, suggests byobu or screenie for ncurses-term, and installs libutempter0 and screen. The terminal shows the download progress from the Ubuntu archive, fetching 586 kB in 2 seconds at 346 kB/s. The desktop background features a blurred image of a landscape.

```
Activities Terminal Aug 28 17:27 revathi@revathi-Lenovo-V110-15AST: ~
bash: /home/revathi/.local/bin/virtualwrapper.sh: No such file or directory
[sudo] password for revathi:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  liblvm1 shim
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libutempter0
Suggested packages:
  byobu | screenie | iselect ncurses-term
The following NEW packages will be installed:
  libutempter0 screen
0 upgraded, 2 newly installed, 0 to remove and 8 not upgraded.
Need to get 586 kB of archives.
After this operation, 1,073 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libutempter0 amd64 1.1.6-4 [8,256 B]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 screen amd64 4.8.0-1ubuntu0.1 [577 kB]
Fetched 586 kB in 2s (346 kB/s)
```

```
$ sudo apt-get install libxmu-dev libxi-dev libglu1-mesa libglu1-mesa-dev
```

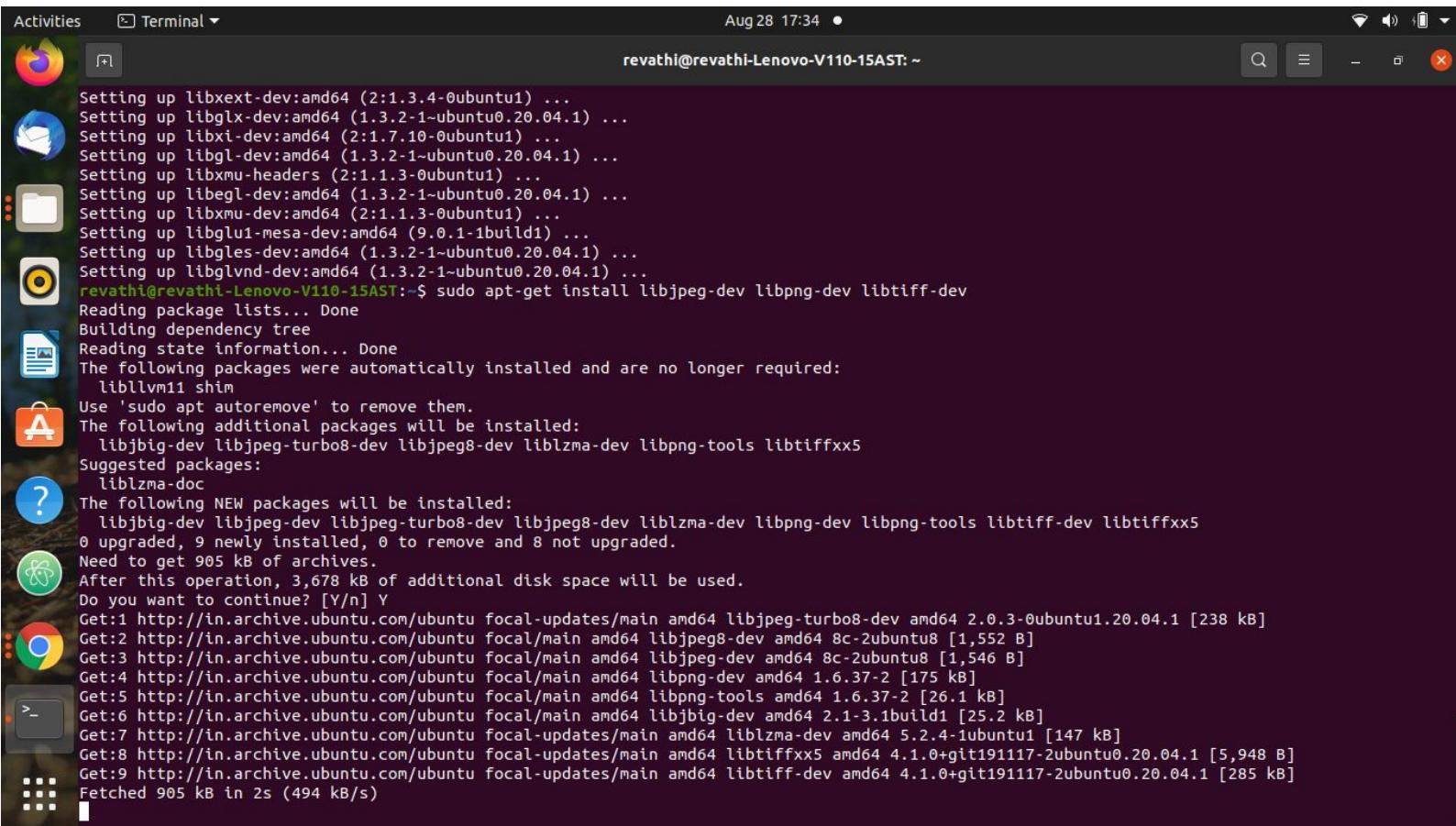
## install X windows libraries and OpenGL libraries



```
Activities Terminal Aug 28 17:30 revathi@revathi-Lenovo-V110-15AST: ~
revathi@revathi-Lenovo-V110-15AST: ~
Need to get 500 kB of archives.
After this operation, 1,073 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libutempter0 amd64 1.1.6-4 [8,256 B]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 screen amd64 4.8.0-1ubuntu0.1 [577 kB]
Fetched 586 kB in 2s (346 kB/s)
Selecting previously unselected package libutempter0:amd64.
(Reading database ... 194584 files and directories currently installed.)
Preparing to unpack .../libutempter0_1.1.6-4_amd64.deb ...
Unpacking libutempter0:amd64 (1.1.6-4) ...
Selecting previously unselected package screen.
Preparing to unpack .../screen_4.8.0-1ubuntu0.1_amd64.deb ...
Unpacking screen (4.8.0-1ubuntu0.1) ...
Setting up libutempter0:amd64 (1.1.6-4) ...
Setting up screen (4.8.0-1ubuntu0.1) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for install-info (6.7.0.dfsg.2-5) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for systemd (245.4-4ubuntu3.11) ...
revathi@revathi-Lenovo-V110-15AST: ~$ sudo apt-get install libxmu-dev libxi-dev libglu1-mesa libglu1-mesa-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
libglu1-mesa is already the newest version (9.0.1-1build1).
libglu1-mesa set to manually installed.
The following packages were automatically installed and are no longer required:
  liblvm1 shim
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libegl-dev libgl-dev libgl1-mesa-dev libgles-dev libgles1 libglvnd-dev libglx-dev libice-dev libopengl-dev libopengl0
  libpthread-stubs0-dev libsm-dev libxi1-dev libxau-dev libxcb1-dev libxdmcp-dev libxext-dev libxfixes-dev libxmu-headers libxt-dev
  x11proto-core-dev x11proto-dev x11proto-input-dev x11proto-xext-dev xorg-sgml-doctools xtrans-dev
Suggested packages:
  libice-doc libsm-doc libxcb-doc libxext-doc libxt-doc
The following NEW packages will be installed:
  libegl-dev libgl-dev libgl1-mesa-dev libgles-dev libgles1 libglu1-mesa-dev libglvnd-dev libglx-dev libice-dev libopengl-dev libopengl0
  libpthread-stubs0-dev libsm-dev libxi1-dev libxau-dev libxcb1-dev libxdmcp-dev libxext-dev libxfixes-dev libxi-dev libxmu-dev
  libxmu-headers libxt-dev x11proto-core-dev x11proto-dev x11proto-input-dev x11proto-xext-dev xorg-sgml-doctools xtrans-dev
0 upgraded, 29 newly installed, 0 to remove and 8 not upgraded.
```

```
$ sudo apt-get install libjpeg-dev libpng-dev libtiff-dev
```

## Image and video I/O libraries

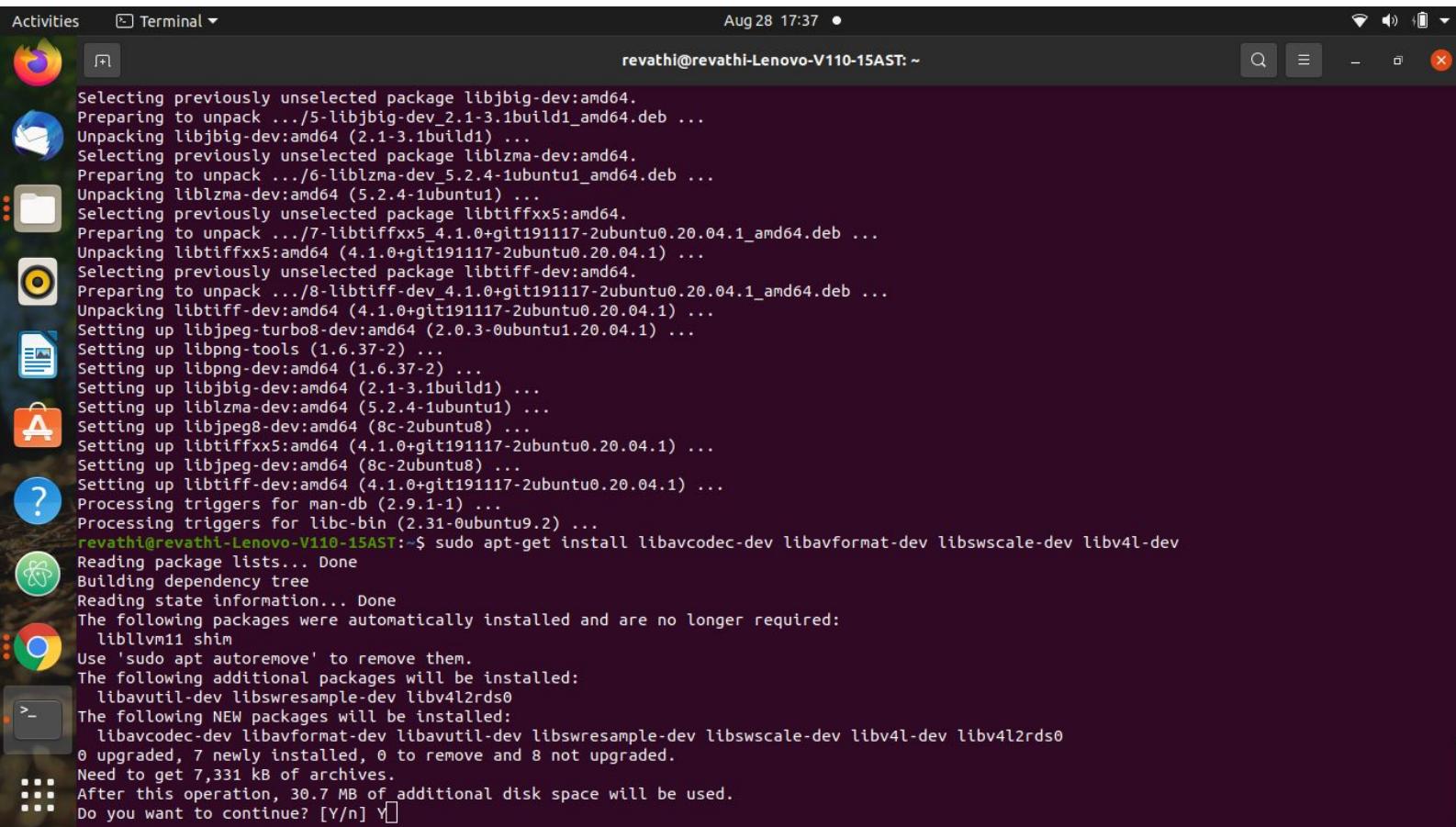


The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "revathi@revathi-Lenovo-V110-15AST: ~". The terminal content displays the output of the command \$ sudo apt-get install libjpeg-dev libpng-dev libtiff-dev. The output includes dependency resolution, package selection, and download details.

```
Setting up libxext-dev:amd64 (2:1.3.4-0ubuntu1) ...
Setting up libglx-dev:amd64 (1.3.2-1~ubuntu0.20.04.1) ...
Setting up libxi-dev:amd64 (2:1.7.10-0ubuntu1) ...
Setting up libgl-dev:amd64 (1.3.2-1~ubuntu0.20.04.1) ...
Setting up libxml2-headers (2:1.1.3-0ubuntu1) ...
Setting up libegl-dev:amd64 (1.3.2-1~ubuntu0.20.04.1) ...
Setting up libxml2-dev:amd64 (2:1.1.3-0ubuntu1) ...
Setting up libglu1-mesa-dev:amd64 (9.0.1-1build1) ...
Setting up libgles-dev:amd64 (1.3.2-1~ubuntu0.20.04.1) ...
Setting up libglvnd-dev:amd64 (1.3.2-1~ubuntu0.20.04.1) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install libjpeg-dev libpng-dev libtiff-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  liblvm1 shim
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libjbig-dev libjpeg-turbo8-dev libjpeg8-dev liblzma-dev libpng-tools libtiffxx5
Suggested packages:
  liblzma-doc
The following NEW packages will be installed:
  libjbig-dev libjpeg-dev libjpeg-turbo8-dev libjpeg8-dev liblzma-dev libpng-dev libpng-tools libtiff-dev libtiffxx5
0 upgraded, 9 newly installed, 0 to remove and 8 not upgraded.
Need to get 905 kB of archives.
After this operation, 3,678 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 libjpeg-turbo8-dev amd64 2.0.3-0ubuntu1.20.04.1 [238 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libjpeg8-dev amd64 8c-2ubuntu8 [1,552 B]
Get:3 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libjpeg-dev amd64 8c-2ubuntu8 [1,546 B]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libpng-dev amd64 1.6.37-2 [175 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libpng-tools amd64 1.6.37-2 [26.1 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libjbig-dev amd64 2.1-3.1build1 [25.2 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 liblzma-dev amd64 5.2.4-1ubuntu1 [147 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 libtiffxx5 amd64 4.1.0+git191117-2ubuntu0.20.04.1 [5,948 B]
Get:9 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 libtiff-dev amd64 4.1.0+git191117-2ubuntu0.20.04.1 [285 kB]
Fetched 905 kB in 2s (494 kB/s)
```

```
$ sudo apt-get install libavcodec-dev libavformat-dev libswscale-dev libv4l-dev
```

## Image and video I/O libraries



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "revathi@revathi-Lenovo-V110-15AST: ~". The window contains the output of a terminal command to install development packages for image and video processing. The log includes messages about selecting previously unselected packages like libjbig-dev, liblzma-dev, libtiff-dev, libjpeg-turbo8-dev, libpng-tools, and libavutil-dev. It also lists automatically removed packages (liblvm1) and additional packages to be installed (libavutil-dev, libswresample-dev, libv4l2rds0). The terminal concludes with a prompt asking if the user wants to continue the operation.

```
Selecting previously unselected package libjbig-dev:amd64.  
Preparing to unpack .../5-libjbig-dev_2.1-3.1build1_amd64.deb ...  
Unpacking libjbig-dev:amd64 (2.1-3.1build1) ...  
Selecting previously unselected package liblzma-dev:amd64.  
Preparing to unpack .../6-liblzma-dev_5.2.4-1ubuntu1_amd64.deb ...  
Unpacking liblzma-dev:amd64 (5.2.4-1ubuntu1) ...  
Selecting previously unselected package libtiffxx5:amd64.  
Preparing to unpack .../7-libtiffxx5_4.1.0+git191117-2ubuntu0.20.04.1_amd64.deb ...  
Unpacking libtiffxx5:amd64 (4.1.0+git191117-2ubuntu0.20.04.1) ...  
Selecting previously unselected package libtiff-dev:amd64.  
Preparing to unpack .../8-libtiff-dev_4.1.0+git191117-2ubuntu0.20.04.1_amd64.deb ...  
Unpacking libtiff-dev:amd64 (4.1.0+git191117-2ubuntu0.20.04.1) ...  
Setting up libjpeg-turbo8-dev:amd64 (2.0.3-0ubuntu1.20.04.1) ...  
Setting up libpng-tools (1.6.37-2) ...  
Setting up libpng-dev:amd64 (1.6.37-2) ...  
Setting up libjbig-dev:amd64 (2.1-3.1build1) ...  
Setting up liblzma-dev:amd64 (5.2.4-1ubuntu1) ...  
Setting up libjpeg8-dev:amd64 (8c-2ubuntu8) ...  
Setting up libtiffxx5:amd64 (4.1.0+git191117-2ubuntu0.20.04.1) ...  
Setting up libjpeg-dev:amd64 (8c-2ubuntu8) ...  
Setting up libtiff-dev:amd64 (4.1.0+git191117-2ubuntu0.20.04.1) ...  
Processing triggers for man-db (2.9.1-1) ...  
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...  
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install libavcodec-dev libavformat-dev libswscale-dev libv4l-dev  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following packages were automatically installed and are no longer required:  
  liblvm1 shim  
Use 'sudo apt autoremove' to remove them.  
The following additional packages will be installed:  
  libavutil-dev libswresample-dev libv4l2rds0  
The following NEW packages will be installed:  
  libavcodec-dev libavformat-dev libavutil-dev libswresample-dev libswscale-dev libv4l-dev libv4l2rds0  
0 upgraded, 7 newly installed, 0 to remove and 8 not upgraded.  
Need to get 7,331 kB of archives.  
After this operation, 30.7 MB of additional disk space will be used.  
Do you want to continue? [Y/n] Y
```

```
$ sudo apt-get install libxvidcore-dev libx264-dev
```

## Image and video I/O libraries

```
Activities Terminal Aug 28 17:39 • revathi@revathi-Lenovo-V110-15AST: ~ Q - X

Preparing to unpack .../2-libavcodec-dev_7%3a4.2.4-1ubuntu0.1_amd64.deb ...
Unpacking libavcodec-dev:amd64 (7:4.2.4-1ubuntu0.1) ...
Selecting previously unselected package libavformat-dev:amd64.
Preparing to unpack .../3-libavformat-dev_7%3a4.2.4-1ubuntu0.1_amd64.deb ...
Unpacking libavformat-dev:amd64 (7:4.2.4-1ubuntu0.1) ...
Selecting previously unselected package libswscale-dev:amd64.
Preparing to unpack .../4-libswscale-dev_7%3a4.2.4-1ubuntu0.1_amd64.deb ...
Unpacking libswscale-dev:amd64 (7:4.2.4-1ubuntu0.1) ...
Selecting previously unselected package libv4l2rds0:amd64.
Preparing to unpack .../5-libv4l2rds0_1.18.0-2build1_amd64.deb ...
Unpacking libv4l2rds0:amd64 (1.18.0-2build1) ...
Selecting previously unselected package libv4l-dev:amd64.
Preparing to unpack .../6-libv4l-dev_1.18.0-2build1_amd64.deb ...
Unpacking libv4l-dev:amd64 (1.18.0-2build1) ...
Setting up libavutil-dev:amd64 (7:4.2.4-1ubuntu0.1) ...
Setting up libswresample-dev:amd64 (7:4.2.4-1ubuntu0.1) ...
Setting up libavcodec-dev:amd64 (7:4.2.4-1ubuntu0.1) ...
Setting up libavformat-dev:amd64 (7:4.2.4-1ubuntu0.1) ...
Setting up libswscale-dev:amd64 (7:4.2.4-1ubuntu0.1) ...
Setting up libv4l2rds0:amd64 (1.18.0-2build1) ...
Setting up libv4l-dev:amd64 (1.18.0-2build1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install libxvidcore-dev libx264-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  liblvm11 shim
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  libx264-dev libxvidcore-dev
0 upgraded, 2 newly installed, 0 to remove and 8 not upgraded.
Need to get 913 kB of archives.
After this operation, 4,123 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libx264-dev amd64 2:0.155.2917+git0a84d98-2 [569 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libxvidcore-dev amd64 2:1.3.7-1 [344 kB]
Fetched 913 kB in 2s (489 kB/s)
```

```
$ sudo apt-get install libopenblas-dev libatlas-base-dev liblapack-dev gfortran
```

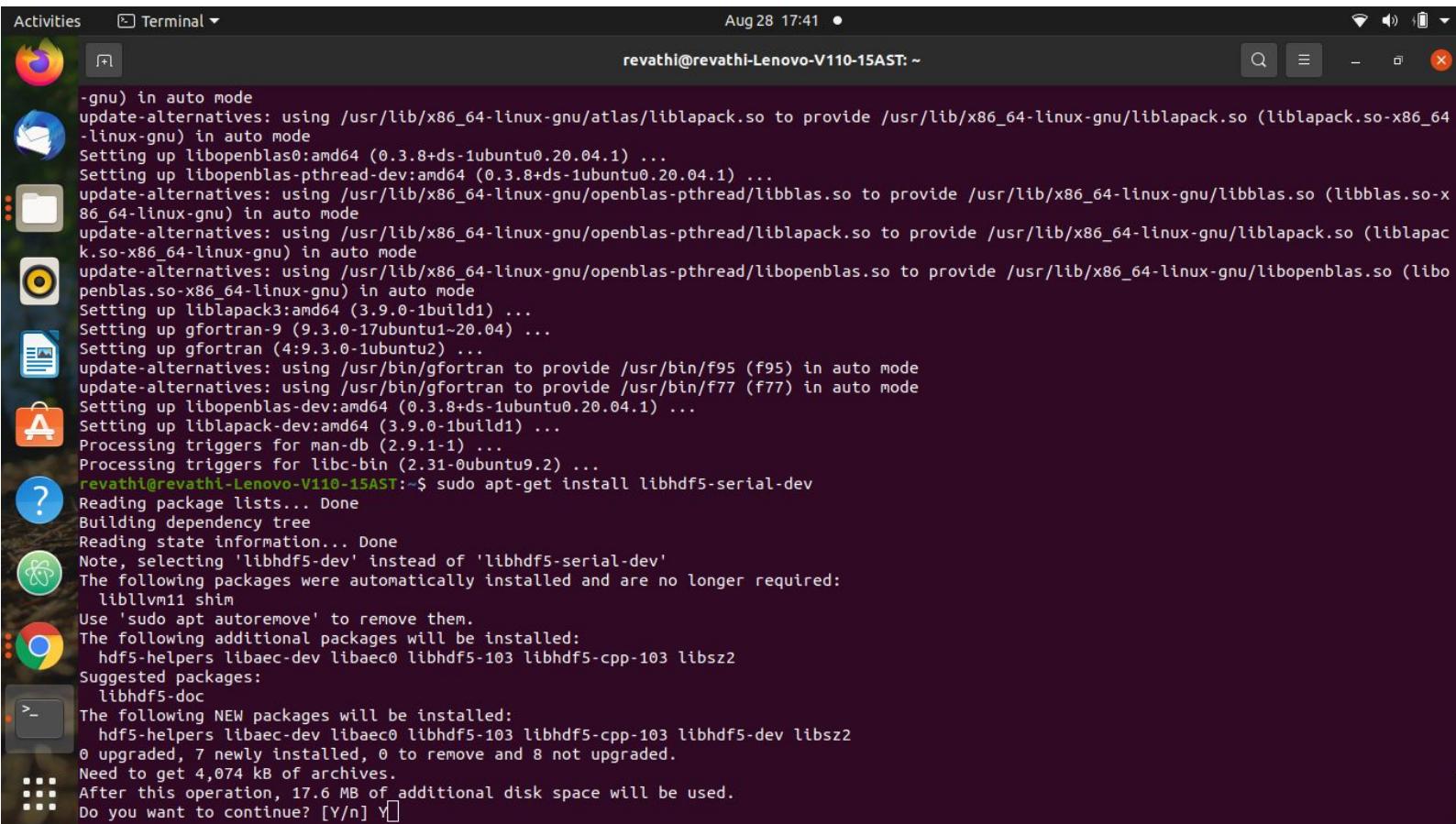
## Optimization libraries

```
Activities Terminal Aug 28 17:39 • revathi@revathi-Lenovo-V110-15AST: ~ Q - X

The following packages were automatically installed and are no longer required:
  libllvm11 shim
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  libx264-dev libxvidcore-dev
0 upgraded, 2 newly installed, 0 to remove and 8 not upgraded.
Need to get 913 kB of archives.
After this operation, 4,123 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libx264-dev amd64 2:0.155.2917+git0a84d98-2 [569 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libxvidcore-dev amd64 2:1.3.7-1 [344 kB]
Fetched 913 kB in 2s (489 kB/s)
Selecting previously unselected package libx264-dev:amd64.
(Reading database ... 195928 files and directories currently installed.)
Preparing to unpack .../libx264-dev_2%3a0.155.2917+git0a84d98-2_amd64.deb ...
Unpacking libx264-dev:amd64 (2:0.155.2917+git0a84d98-2) ...
Selecting previously unselected package libxvidcore-dev:amd64.
Preparing to unpack .../libxvidcore-dev_2%3a1.3.7-1_amd64.deb ...
Unpacking libxvidcore-dev:amd64 (2:1.3.7-1) ...
Setting up libxvidcore-dev:amd64 (2:1.3.7-1) ...
Setting up libx264-dev:amd64 (2:0.155.2917+git0a84d98-2) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install libopenblas-dev libatlas-base-dev liblapack-dev gfortran
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libllvm11 shim
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  gfortran-9 libatlas3-base libgfortran-9-dev libgfortran5 liblapack3 libopenblas-pthread-dev libopenblas0 libopenblas0-pthread
Suggested packages:
  gfortran-multilib gfortran-doc gfortran-9-multilib gfortran-9-doc libcoarrays-dev libatlas-doc liblapack-doc
The following NEW packages will be installed:
  gfortran gfortran-9 libatlas-base-dev libatlas3-base libgfortran-9-dev libgfortran5 liblapack-dev liblapack3 libopenblas-dev
  libopenblas-pthread-dev libopenblas0 libopenblas0-pthread
0 upgraded, 12 newly installed, 0 to remove and 8 not upgraded.
Need to get 37.2 MB of archives.
After this operation, 270 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

```
$ sudo apt-get install libhdf5-serial-dev
```

## HDF5 for working with large datasets

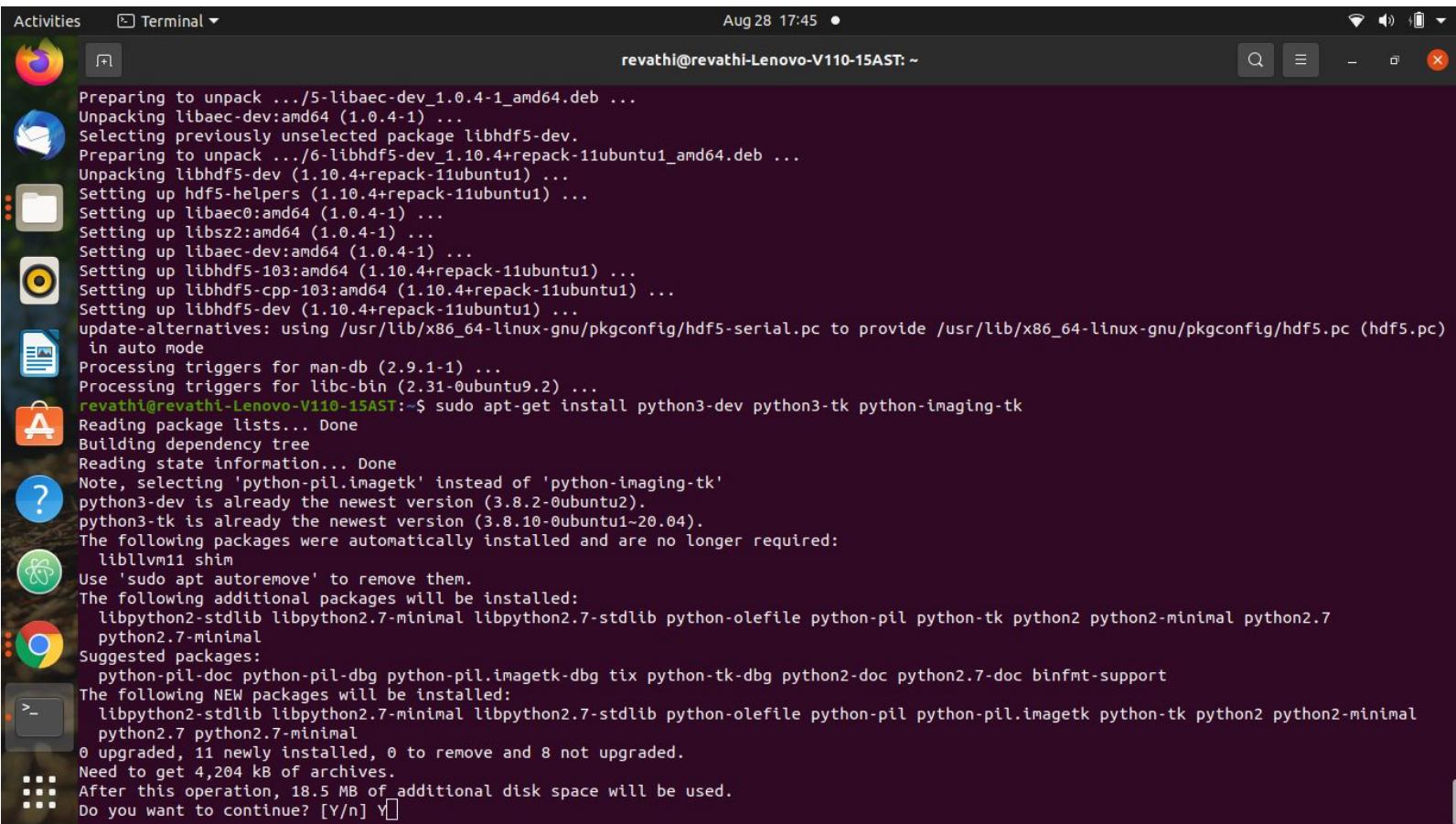


The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "revathi@revathi-Lenovo-V110-15AST: ~". The terminal content displays the output of the command \$ sudo apt-get install libhdf5-serial-dev. The output includes several dependency installations for libhdf5-serial-dev, such as liblapack-dev, libblas-dev, gfortran, and hdf5-helpers. It also lists packages being removed (liblvm11 shim) and new packages being installed (hdf5-helpers, libaec-dev, libaec0, libhdf5-103, libhdf5-cpp-103, libs2). The terminal concludes with a prompt asking if the user wants to continue the operation.

```
-gnu) in auto mode
update-alternatives: using /usr/lib/x86_64-linux-gnu/atlas/liblapack.so to provide /usr/lib/x86_64-linux-gnu/liblapack.so (liblapack.so-x86_64-linux-gnu) in auto mode
Setting up libopenblas0:amd64 (0.3.8+ds-1ubuntu0.20.04.1) ...
Setting up libopenblas-pthread-dev:amd64 (0.3.8+ds-1ubuntu0.20.04.1) ...
update-alternatives: using /usr/lib/x86_64-linux-gnu/openblas-pthread/libblas.so to provide /usr/lib/x86_64-linux-gnu/libblas.so (libblas.so-x86_64-linux-gnu) in auto mode
update-alternatives: using /usr/lib/x86_64-linux-gnu/openblas-pthread/liblapack.so to provide /usr/lib/x86_64-linux-gnu/liblapack.so (liblapack.so-x86_64-linux-gnu) in auto mode
update-alternatives: using /usr/lib/x86_64-linux-gnu/openblas-pthread/libopenblas.so to provide /usr/lib/x86_64-linux-gnu/libopenblas.so (libopenblas.so-x86_64-linux-gnu) in auto mode
Setting up liblapack3:amd64 (3.9.0-1build1) ...
Setting up gfortran-9 (9.3.0-17ubuntu1~20.04) ...
Setting up gfortran (4:9.3.0-1ubuntu2) ...
update-alternatives: using /usr/bin/gfortran to provide /usr/bin/f95 (f95) in auto mode
update-alternatives: using /usr/bin/gfortran to provide /usr/bin/f77 (f77) in auto mode
Setting up libopenblas-dev:amd64 (0.3.8+ds-1ubuntu0.20.04.1) ...
Setting up liblapack-dev:amd64 (3.9.0-1build1) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install libhdf5-serial-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'libhdf5-dev' instead of 'libhdf5-serial-dev'
The following packages were automatically installed and are no longer required:
  liblvm11 shim
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  hdf5-helpers libaec-dev libaec0 libhdf5-103 libhdf5-cpp-103 libs2
Suggested packages:
  libhdf5-doc
The following NEW packages will be installed:
  hdf5-helpers libaec-dev libaec0 libhdf5-103 libhdf5-cpp-103 libhdf5-dev libs2
0 upgraded, 7 newly installed, 0 to remove and 8 not upgraded.
Need to get 4,074 kB of archives.
After this operation, 17.6 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

```
$ sudo apt-get install python3-dev python3-tk python-imaging-tk
```

## Python 3 development libraries including TK and GTK GUI support

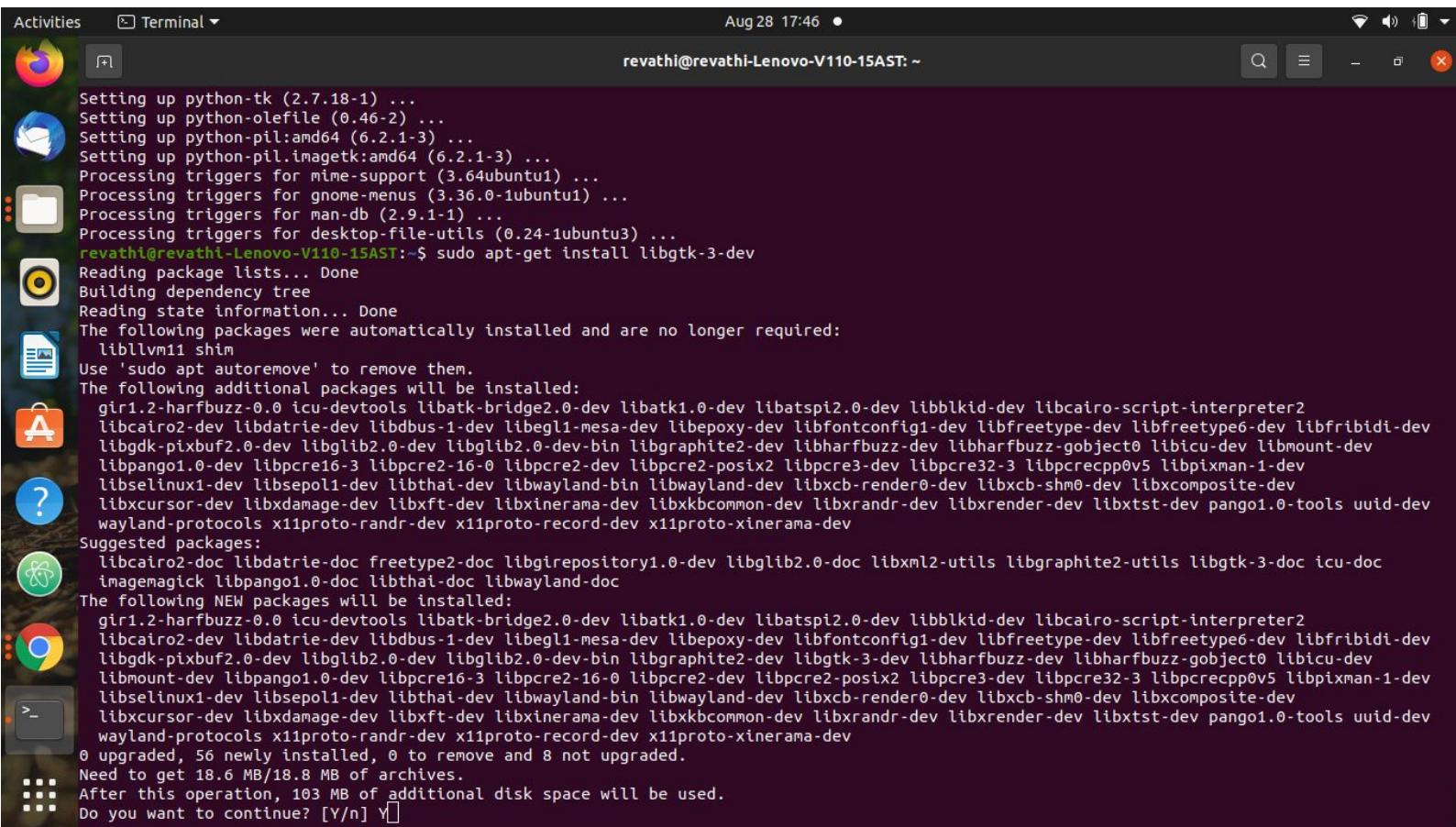


The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "revathi@revathi-Lenovo-V110-15AST: ~". The terminal content displays the output of the command \$ sudo apt-get install python3-dev python3-tk python-imaging-tk. The output includes package unpacking, dependency resolution, and upgrade information. The desktop interface features a dock with icons for various applications like a browser, file manager, and system tools.

```
Preparing to unpack .../5-libaec-dev_1.0.4-1_amd64.deb ...
Unpacking libaec-dev:amd64 (1.0.4-1) ...
Selecting previously unselected package libhdf5-dev.
Preparing to unpack .../6-libhdf5-dev_1.10.4+repack-11ubuntu1_amd64.deb ...
Unpacking libhdf5-dev (1.10.4+repack-11ubuntu1) ...
Setting up hdf5-helpers (1.10.4+repack-11ubuntu1) ...
Setting up libaec0:amd64 (1.0.4-1) ...
Setting up libsz2:amd64 (1.0.4-1) ...
Setting up libaec-dev:amd64 (1.0.4-1) ...
Setting up libhdf5-103:amd64 (1.10.4+repack-11ubuntu1) ...
Setting up libhdf5-cpp-103:amd64 (1.10.4+repack-11ubuntu1) ...
Setting up libhdf5-dev (1.10.4+repack-11ubuntu1) ...
update-alternatives: using /usr/lib/x86_64-linux-gnu/pkgconfig/hdf5-serial.pc to provide /usr/lib/x86_64-linux-gnu/pkgconfig/hdf5.pc (hdf5.pc)
in auto mode.
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install python3-dev python3-tk python-imaging-tk
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'python-pil.imagetk' instead of 'python-imaging-tk'
python3-dev is already the newest version (3.8.2-0ubuntu2).
python3-tk is already the newest version (3.8.10-0ubuntu1~20.04).
The following packages were automatically installed and are no longer required:
  liblvm1 shim
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libpython2.7-dev libpython2.7-minimal libpython2.7-stdlib python-olefile python-pil python-tk python2 python2-minimal python2.7
  python2.7-minimal
Suggested packages:
  python-pil-doc python-pil-dbg python-pil.imagetk-dbg tix python-tk-dbg python2-doc python2.7-doc binfmt-support
The following NEW packages will be installed:
  libpython2.7-dev libpython2.7-minimal libpython2.7-stdlib python-olefile python-pil python-pil.imagetk python-tk python2 python2-minimal
  python2.7 python2.7-minimal
0 upgraded, 11 newly installed, 0 to remove and 8 not upgraded.
Need to get 4,204 kB of archives.
After this operation, 18.5 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

```
$ sudo apt-get install libgtk-3-dev
```

## Python 3 development libraries including TK and GTK GUI support



The screenshot shows a terminal window in an Ubuntu desktop environment. The terminal is titled "revathi@revathi-Lenovo-V110-15AST: ~". The output of the "sudo apt-get install libgtk-3-dev" command is displayed, showing the installation of various Python development libraries and dependencies. The terminal window has a dark theme with icons for various applications like a browser, file manager, and system settings visible on the left.

```
Setting up python-tk (2.7.18-1) ...
Setting up python-olefile (0.46-2) ...
Setting up python-pil:amd64 (6.2.1-3) ...
Setting up python-pil.imagetk:amd64 (6.2.1-3) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo apt-get install libgtk-3-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  liblvm1 shim
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  gir1.2-harfbuzz-0.0  icu-devtools libatk-bridge2.0-dev libatk1.0-dev libatspi2.0-dev libblkid-dev libcairo-script-interpreter2
  libcairo2-dev libdatrie-dev libdbus-1-dev libegl1-mesa-dev libepoxy-dev libfontconfig1-dev libfreetype-dev libfreetype6-dev libfribidi-dev
  libgdk-pixbuf2.0-dev libglib2.0-dev libglib2.0-dev-bin libgraphite2-dev libharfbuzz-dev libharfbuzz-gobject0 libicu-dev libmount-dev
  libpango1.0-dev libpcre16-3 libpcre2-16-0 libpcre2-dev libpcre2-posix2 libpcre3-dev libpcre32-3 libpcrecpp0v5 libpixman-1-dev
  libselinux1-dev libsepolicy1-dev libthai-dev libwayland-bin libwayland-dev libxcb-render0-dev libxcb-shm0-dev libxcomposite-dev
  libxcursor-dev libxdamage-dev libxft-dev libxinerama-dev libxkbcommon-dev libxrandr-dev libxrender-dev libxtst-dev pango1.0-tools uuid-dev
  wayland-protocols x11proto-randr-dev x11proto-record-dev x11proto-xinerama-dev
Suggested packages:
  libcairo2-doc libdatrie-doc freetype2-doc libgirepository1.0-dev libglib2.0-doc libxml2-utils libgraphite2-utils libgtk-3-doc icu-doc
  imagemagick libpango1.0-doc libthai-doc libwayland-doc
The following NEW packages will be installed:
  gir1.2-harfbuzz-0.0  icu-devtools libatk-bridge2.0-dev libatk1.0-dev libatspi2.0-dev libblkid-dev libcairo-script-interpreter2
  libcairo2-dev libdatrie-dev libdbus-1-dev libegl1-mesa-dev libepoxy-dev libfontconfig1-dev libfreetype-dev libfreetype6-dev libfribidi-dev
  libgdk-pixbuf2.0-dev libglib2.0-dev libglib2.0-dev-bin libgraphite2-dev libgtk-3-dev libharfbuzz-dev libharfbuzz-gobject0 libicu-dev
  libmount-dev libpango1.0-dev libpcre16-3 libpcre2-16-0 libpcre2-dev libpcre2-posix2 libpcre3-dev libpcre32-3 libpcrecpp0v5 libpixman-1-dev
  libselinux1-dev libsepolicy1-dev libthai-dev libwayland-bin libwayland-dev libxcb-render0-dev libxcb-shm0-dev libxcomposite-dev
  libxcursor-dev libxdamage-dev libxft-dev libxinerama-dev libxkbcommon-dev libxrandr-dev libxrender-dev libxtst-dev pango1.0-tools uuid-dev
  wayland-protocols x11proto-randr-dev x11proto-record-dev x11proto-xinerama-dev
0 upgraded, 56 newly installed, 0 to remove and 8 not upgraded.
Need to get 18.6 MB/18.8 MB of archives.
After this operation, 103 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

# Ready pip

Activities Terminal Aug 28 17:49 • revathi@revathi-Lenovo-V110-15AST: ~

```
Setting up libegl1-mesa-dev:amd64 (21.0.3-0ubuntu0.3~20.04.1) ...
Setting up libblkid-dev:amd64 (2.34-0.1ubuntu9.1) ...
Setting up libpcre2-dev:amd64 (10.34-7) ...
Setting up libselinux1-dev:amd64 (3.0-1build2) ...
Setting up libpcre3-dev:amd64 (2:8.39-12build1) ...
Setting up libxcursor-dev:amd64 (1:1.2.0-2) ...
Setting up libpoxy-dev:amd64 (1.5.4-1) ...
Setting up libwayland-dev:amd64 (1.18.0-1) ...
Setting up libfreetype6-dev:amd64 (2.10.1-2ubuntu0.1) ...
Setting up libxrandr-dev:amd64 (2:1.5.2-0ubuntu1) ...
Setting up libthai-dev:amd64 (0.1.28-3) ...
Setting up libmount-dev:amd64 (2.34-0.1ubuntu9.1) ...
Setting up libfontconfig1-dev:amd64 (2.13.1-2ubuntu3) ...
Setting up libglib2.0-dev:amd64 (2.64.6-1~ubuntu20.04.4) ...
Setting up libxft-dev:amd64 (2.3.3-0ubuntu1) ...
Processing triggers for libglib2.0-0:amd64 (2.64.6-1~ubuntu20.04.4) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for man-db (2.9.1-1) ...
Setting up libgdk-pixbuf2.0-dev:amd64 (2.40.0+dfsg-3ubuntu0.2) ...
Processing triggers for sgml-base (1.29.1) ...
Setting up libcairo2-dev:amd64 (1.16.0-4ubuntu1) ...
Setting up libatk1.0-dev:amd64 (2.35.1-1ubuntu2) ...
Setting up libatspi2.0-dev:amd64 (2.36.0-2) ...
Setting up libharfbuzz-dev:amd64 (2.6.4-1ubuntu4) ...
Setting up libatk-bridge2.0-dev:amd64 (2.34.2-0ubuntu2-20.04.1) ...
Setting up libpango1.0-dev:amd64 (1.44.7-2ubuntu4) ...
Setting up libgtk-3-dev:amd64 (3.24.20-0ubuntu1) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo -H pip3 install --upgrade pip
Collecting pip
  Downloading pip-21.2.4-py3-none-any.whl (1.6 MB)
    |██████████| 1.6 MB 250 kB/s
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 20.0.2
    Not uninstalling pip at /usr/lib/python3/dist-packages, outside environment /usr
    Can't uninstall 'pip'. No files were found to uninstall.
Successfully installed pip-21.2.4
revathi@revathi-Lenovo-V110-15AST:~$
```

## Ready virtual environments

Activities Terminal Aug 28 17:53 • revathi@revathi-Lenovo-V110-15AST: ~

```
Setting up libblkid-dev:amd64 (2.34-0.1ubuntu9.1) ...
Setting up libpcre2-dev:amd64 (10.34-7) ...
Setting up libselinux1-dev:amd64 (3.0-1build2) ...
Setting up libpcre3-dev:amd64 (2:8.39-12build1) ...
Setting up libxcursor-dev:amd64 (1:1.2.0-2) ...
Setting up libepoxy-dev:amd64 (1.5.4-1) ...
Setting up libwayland-dev:amd64 (1.18.0-1) ...
Setting up libfreetype6-dev:amd64 (2.10.1-2ubuntu0.1) ...
Setting up libxrandr-dev:amd64 (2:1.5.2-0ubuntu1) ...
Setting up libthai-dev:amd64 (0.1.28-3) ...
Setting up libmount-dev:amd64 (2.34-0.1ubuntu9.1) ...
Setting up libfontconfig1-dev:amd64 (2.13.1-2ubuntu3) ...
Setting up libglib2.0-dev:amd64 (2.64.6-1~ubuntu20.04.4) ...
Setting up libxft-dev:amd64 (2.3.3-0ubuntu1) ...
Processing triggers for libglib2.0-0:amd64 (2.64.6-1~ubuntu20.04.4) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for man-db (2.9.1-1) ...
Setting up libgdk-pixbuf2.0-dev:amd64 (2.40.0+dfsg-3ubuntu0.2) ...
Processing triggers for sgml-base (1.29.1) ...
Setting up libcairo2-dev:amd64 (1.16.0-4ubuntu1) ...
Setting up libatk1.0-dev:amd64 (2.35.1-1ubuntu2) ...
Setting up libatspi2.0-dev:amd64 (2.36.0-2) ...
Setting up libharfbuzz-dev:amd64 (2.6.4-1ubuntu4) ...
Setting up libatk-bridge2.0-dev:amd64 (2.34.2-0ubuntu2-20.04.1) ...
Setting up libpango1.0-dev:amd64 (1.44.7-2ubuntu4) ...
Setting up libgtk-3-dev:amd64 (3.24.20-0ubuntu1) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo -H pip3 install --upgrade pip
Collecting pip
  Downloading pip-21.2.4-py3-none-any.whl (1.6 MB)
    |██████████| 1.6 MB 250 kB/s
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 20.0.2
    Not uninstalling pip at /usr/lib/python3/dist-packages, outside environment /usr
    Can't uninstall 'pip'. No files were found to uninstall.
Successfully installed pip-21.2.4
revathi@revathi-Lenovo-V110-15AST:~$ nano ~/.bashrc
revathi@revathi-Lenovo-V110-15AST:~$ nano ~/.bashrc
```

## Activate virtual environment

```
Activities Terminal ▾ Aug 28 17:54 •
revathi@revathi-Lenovo-V110-15AST: ~/environments
Setting up libpcre3-dev:amd64 (2:8.39-12build1) ...
Setting up libxcursor-dev:amd64 (1:1.2.0-2) ...
Setting up libepoxy-dev:amd64 (1.5.4-1) ...
Setting up libwayland-dev:amd64 (1.18.0-1) ...
Setting up libfreetype6-dev:amd64 (2.10.1-2ubuntu0.1) ...
Setting up libxrandr-dev:amd64 (2:1.5.2-0ubuntu1) ...
Setting up libthai-dev:amd64 (0.1.28-3) ...
Setting up libmount-dev:amd64 (2.34-0.1ubuntu9.1) ...
Setting up libfontconfig1-dev:amd64 (2.13.1-2ubuntu3) ...
Setting up libglib2.0-dev:amd64 (2.64.6-1~ubuntu20.04.4) ...
Setting up libbft-dev:amd64 (2.3.3-0ubuntu1) ...
Processing triggers for libglib2.0-0:amd64 (2.64.6-1~ubuntu20.04.4) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for man-db (2.9.1-1) ...
Setting up libgdk-pixbuf2.0-dev:amd64 (2.40.0+dfsg-3ubuntu0.2) ...
Processing triggers for sgml-base (1.29.1) ...
Setting up libcairo2-dev:amd64 (1.16.0-4ubuntu1) ...
Setting up libatk1.0-dev:amd64 (2.35.1-1ubuntu2) ...
Setting up libatspi2.0-dev:amd64 (2.36.0-2) ...
Setting up libharfbuzz-dev:amd64 (2.6.4-1ubuntu4) ...
Setting up libatk-bridge2.0-dev:amd64 (2.34.2-0ubuntu2-20.04.1) ...
Setting up libpango1.0-dev:amd64 (1.44.7-2ubuntu4) ...
Setting up libgtk-3-dev:amd64 (3.24.20-0ubuntu1) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo -H pip3 install --upgrade pip
Collecting pip
  Downloading pip-21.2.4-py3-none-any.whl (1.6 MB)
    |██████████| 1.6 MB 250 kB/s
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 20.0.2
    Not uninstalling pip at /usr/lib/python3/dist-packages, outside environment /usr
    Can't uninstall 'pip'. No files were found to uninstall.
Successfully installed pip-21.2.4
revathi@revathi-Lenovo-V110-15AST:~$ nano ~/.bashrc
revathi@revathi-Lenovo-V110-15AST:~$ nano ~/.bashrc
revathi@revathi-Lenovo-V110-15AST:~$ cd environments
revathi@revathi-Lenovo-V110-15AST:~/environments$ source environ1/bin/activate
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ 
```

## Check numpy & tensorflow in virtual environment

```
Activities Terminal Aug 28 17:58 • revathi@revathi-Lenovo-V110-15AST: ~/environments
Setting up libatspi2.0-dev:amd64 (2.36.0-2) ...
Setting up libharfbuzz-dev:amd64 (2.6.4-1ubuntu4) ...
Setting up libatk-bridge2.0-dev:amd64 (2.34.2-0ubuntu2-20.04.1) ...
Setting up libpango1.0-dev:amd64 (1.44.7-2ubuntu4) ...
Setting up libgtk-3-dev:amd64 (3.24.20-0ubuntu1) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo -H pip3 install --upgrade pip
Collecting pip
  Downloading pip-21.2.4-py3-none-any.whl (1.6 MB)
    |██████████| 1.6 MB 250 kB/s
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 20.0.2
    Not uninstalling pip at /usr/lib/python3/dist-packages, outside environment /usr
    Can't uninstall 'pip'. No files were found to uninstall.
Successfully installed pip-21.2.4
revathi@revathi-Lenovo-V110-15AST:~$ nano ~/.bashrc
revathi@revathi-Lenovo-V110-15AST:~$ nano ~/.bashrc
revathi@revathi-Lenovo-V110-15AST:~$ cd environments
revathi@revathi-Lenovo-V110-15AST:~/environments$ source environ1/bin/activate
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ python3
Python 3.8.10 (default, Jun  2 2021, 10:49:15)
[GCC 9.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import numpy
>>> import tensorflow as tf
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ModuleNotFoundError: No module named 'tensorflow'
>>> exit()
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install tensorflow==2.0.0
ERROR: Could not find a version that satisfies the requirement tensorflow==2.0.0 (from versions: 2.2.0rc1, 2.2.0rc2, 2.2.0rc3, 2.2.0rc4, 2.2.0, 2.2.1, 2.2.2, 2.2.3, 2.3.0rc0, 2.3.0rc1, 2.3.0rc2, 2.3.0, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.0rc0, 2.4.0rc1, 2.4.0rc2, 2.4.0rc3, 2.4.0rc4, 2.4.0, 2.4.1, 2.4.2, 2.4.3, 2.5.0rc0, 2.5.0rc1, 2.5.0rc2, 2.5.0rc3, 2.5.0, 2.5.1, 2.6.0rc0, 2.6.0rc1, 2.6.0rc2, 2.6.0)
ERROR: No matching distribution found for tensorflow==2.0.0
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install tensorflow==2.4.2
Collecting tensorflow==2.4.2
  Downloading tensorflow-2.4.2-cp38-cp38-manylinux2010_x86_64.whl (394.5 MB)
    |██████████| 29.9 MB 1.4 MB/s eta 0:04:30
```

## Install tensorflow==2.4.2 in designated virtual environment

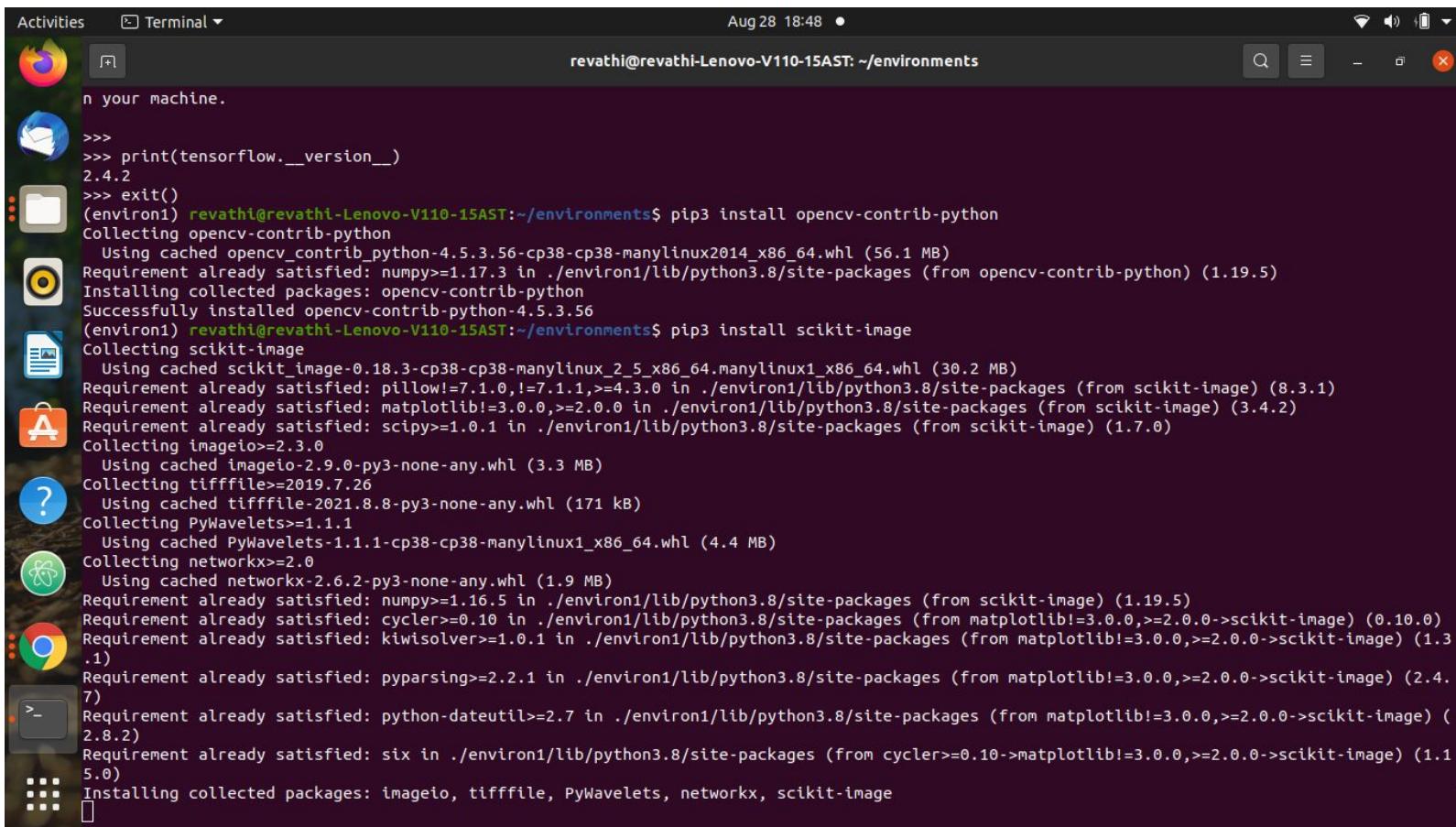
```
Activities Terminal ▾ revathi@revathi-Lenovo-V110-15AST: ~/environments Aug 28 17:58 •
Setting up libatspi2.0-dev:amd64 (2.36.0-2) ...
Setting up libharfbuzz-dev:amd64 (2.6.4-1ubuntu4) ...
Setting up libatk-bridge2.0-dev:amd64 (2.34.2-0ubuntu2-20.04.1) ...
Setting up libpango1.0-dev:amd64 (1.44.7-2ubuntu4) ...
Setting up libgtk-3-dev:amd64 (3.24.20-0ubuntu1) ...
revathi@revathi-Lenovo-V110-15AST:~$ sudo -H pip3 install --upgrade pip
Collecting pip
  Downloading pip-21.2.4-py3-none-any.whl (1.6 MB)
    |██████████| 1.6 MB 250 kB/s
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 20.0.2
    Not uninstalling pip at /usr/lib/python3/dist-packages, outside environment /usr
    Can't uninstall 'pip'. No files were found to uninstall.
Successfully installed pip-21.2.4
revathi@revathi-Lenovo-V110-15AST:~$ nano ~/.bashrc
revathi@revathi-Lenovo-V110-15AST:~$ nano ~/.bashrc
revathi@revathi-Lenovo-V110-15AST:~$ cd environments
revathi@revathi-Lenovo-V110-15AST:~/environments$ source environ1/bin/activate
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ python3
Python 3.8.10 (default, Jun  2 2021, 10:49:15)
[GCC 9.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import numpy
>>> import tensorflow as tf
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ModuleNotFoundError: No module named 'tensorflow'
>>> exit()
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install tensorflow==2.0.0
ERROR: Could not find a version that satisfies the requirement tensorflow==2.0.0 (from versions: 2.2.0rc1, 2.2.0rc2, 2.2.0rc3, 2.2.0rc4, 2.2.0, 2.2.1, 2.2.2, 2.2.3, 2.3.0rc0, 2.3.0rc1, 2.3.0rc2, 2.3.0, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.0rc0, 2.4.0rc1, 2.4.0rc2, 2.4.0rc3, 2.4.0rc4, 2.4.0, 2.4.1, 2.4.2, 2.4.3, 2.5.0rc0, 2.5.0rc1, 2.5.0rc2, 2.5.0rc3, 2.5.0, 2.5.1, 2.6.0rc0, 2.6.0rc1, 2.6.0rc2, 2.6.0)
ERROR: No matching distribution found for tensorflow==2.0.0
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install tensorflow==2.4.2
Collecting tensorflow==2.4.2
  Downloading tensorflow-2.4.2-cp38-cp38-manylinux2010_x86_64.whl (394.5 MB)
    |██████████| 29.9 MB 1.4 MB/s eta 0:04:30
```

## Check numpy & tensorflow installation

```
Activities Terminal Aug 28 18:47 • revathi@revathi-Lenovo-V110-15AST: ~/environments
+ revathi@revathi-Lenovo-V110-15AST: ~/environments
Created wheel for termcolor: filename=termcolor-1.1.0-py3-none-any.whl size=4829 sha256=824f7de8a4c8c2cab7226a1a85776475f8f451acd61efbbd4aad
ca73970ba757
Stored in directory: /home/revathi/.cache/pip/wheels/a0/16/9c/5473df82468f958445479c59e784896fa24f4a5fc024b0f501
Successfully built wrapt termcolor
Installing collected packages: typing-extensions, six, protobuf, numpy, opt-einsum, absl-py, tensorboard-plugin-wit, pyasn1, rsa, cachetools,
pyasn1-modules, google-auth, grpcio, idna, charset-normalizer, certifi, urllib3, requests, oauthlib, requests-oauthlib, google-auth-oauthlib,
markdown, tensorboard-data-server, tensorboard, flatbuffers, keras-preprocessing, wrapt, astunparse, tensorflow-estimator, gast, google-pasta,
termcolor, h5py, tensorflow
Attempting uninstall: six
  Found existing installation: six 1.16.0
  Uninstalling six-1.16.0:
    Successfully uninstalled six-1.16.0
Attempting uninstall: numpy
  Found existing installation: numpy 1.21.1
  Uninstalling numpy-1.21.1:
    Successfully uninstalled numpy-1.21.1
Successfully installed absl-py-0.13.0 astunparse-1.6.3 cachetools-4.2.2 certifi-2021.5.30 charset-normalizer-2.0.4 flatbuffers-1.12 gast-0.3.3
google-auth-1.35.0 google-auth-oauthlib-0.4.5 google-pasta-0.2.0 grpcio-1.32.0 h5py-2.10.0 idna-3.2 keras-preprocessing-1.1.2 markdown-3.3.4
numpy-1.19.5 oauthlib-3.1.1 opt-einsum-3.3.0 protobuf-3.17.3 pyasn1-0.4.8 pyasn1-modules-0.2.8 requests-2.26.0 requests-oauthlib-1.3.0 rsa-4.7
.2 six-1.15.0 tensorboard-2.6.0 tensorboard-data-server-0.6.1 tensorboard-plugin-wit-1.8.0 tensorflow-2.4.2 tensorflow-estimator-2.4.0 termcol
or-1.1.0 typing-extensions-3.7.4.3 urllib3-1.26.6 wrapt-1.12.1
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ python3
Python 3.8.10 (default, Jun 2 2021, 10:49:15)
[GCC 9.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import numpy
>>> print(numpy.__version__)
1.19.5
>>> import tensorflow
2021-08-28 18:47:01.190363: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'libcudart.so.11.0'
; dlerror: libcudart.so.11.0: cannot open shared object file: No such file or directory
2021-08-28 18:47:01.190489: I tensorflow/stream_executor/cuda/cudart_stub.cc:29] Ignore above cudart dlerror if you do not have a GPU set up o
n your machine.

>>>
>>> print(tensorflow.__version__)
2.4.2
>>> 
```

\$ pip install opencv-contrib-python \$ pip install scikit-image (Standard image processing libraries)



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "revathi@revathi-Lenovo-V110-15AST: ~/environments". The terminal content displays the command-line session for installing Python packages:

```
n your machine.  
->>> print(tensorflow.__version__)  
2.4.2  
->>> exit()  
(envir0n1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install opencv-contrib-python  
Collecting opencv-contrib-python  
  Using cached opencv_contrib_python-4.5.3.56-cp38-cp38-manylinux2014_x86_64.whl (56.1 MB)  
Requirement already satisfied: numpy>=1.17.3 in ./envir0n1/lib/python3.8/site-packages (from opencv-contrib-python) (1.19.5)  
Installing collected packages: opencv-contrib-python  
Successfully installed opencv-contrib-python-4.5.3.56  
(envir0n1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install scikit-image  
Collecting scikit-image  
  Using cached scikit_image-0.18.3-cp38-cp38-manylinux_2_5_x86_64.manylinux1_x86_64.whl (30.2 MB)  
Requirement already satisfied: pillow!=7.1.0,!>=7.1.1,>=4.3.0 in ./envir0n1/lib/python3.8/site-packages (from scikit-image) (8.3.1)  
Requirement already satisfied: matplotlib!=3.0.0,>=2.0.0 in ./envir0n1/lib/python3.8/site-packages (from scikit-image) (3.4.2)  
Requirement already satisfied: scipy>=1.0.1 in ./envir0n1/lib/python3.8/site-packages (from scikit-image) (1.7.0)  
Collecting imageio>=2.3.0  
  Using cached imageio-2.9.0-py3-none-any.whl (3.3 MB)  
Collecting tifffile>=2019.7.26  
  Using cached tifffile-2021.8.8-py3-none-any.whl (171 kB)  
Collecting PyWavelets>=1.1.1  
  Using cached PyWavelets-1.1.1-cp38-cp38-manylinux1_x86_64.whl (4.4 MB)  
Collecting networkx>=2.0  
  Using cached networkx-2.6.2-py3-none-any.whl (1.9 MB)  
Requirement already satisfied: numpy>=1.16.5 in ./envir0n1/lib/python3.8/site-packages (from scikit-image) (1.19.5)  
Requirement already satisfied: cycler>=0.10 in ./envir0n1/lib/python3.8/site-packages (from matplotlib!=3.0.0,>=2.0.0->scikit-image) (0.10.0)  
Requirement already satisfied: kiwisolver>=1.0.1 in ./envir0n1/lib/python3.8/site-packages (from matplotlib!=3.0.0,>=2.0.0->scikit-image) (1.3.1)  
Requirement already satisfied: pyparsing>=2.2.1 in ./envir0n1/lib/python3.8/site-packages (from matplotlib!=3.0.0,>=2.0.0->scikit-image) (2.4.7)  
Requirement already satisfied: python-dateutil>=2.7 in ./envir0n1/lib/python3.8/site-packages (from matplotlib!=3.0.0,>=2.0.0->scikit-image) (2.8.2)  
Requirement already satisfied: six in ./envir0n1/lib/python3.8/site-packages (from cycler>=0.10->matplotlib!=3.0.0,>=2.0.0->scikit-image) (1.1.5.0)  
Installing collected packages: imageio, tifffile, PyWavelets, networkx, scikit-image
```

\$ pip install pillow    \$ pip install imutils

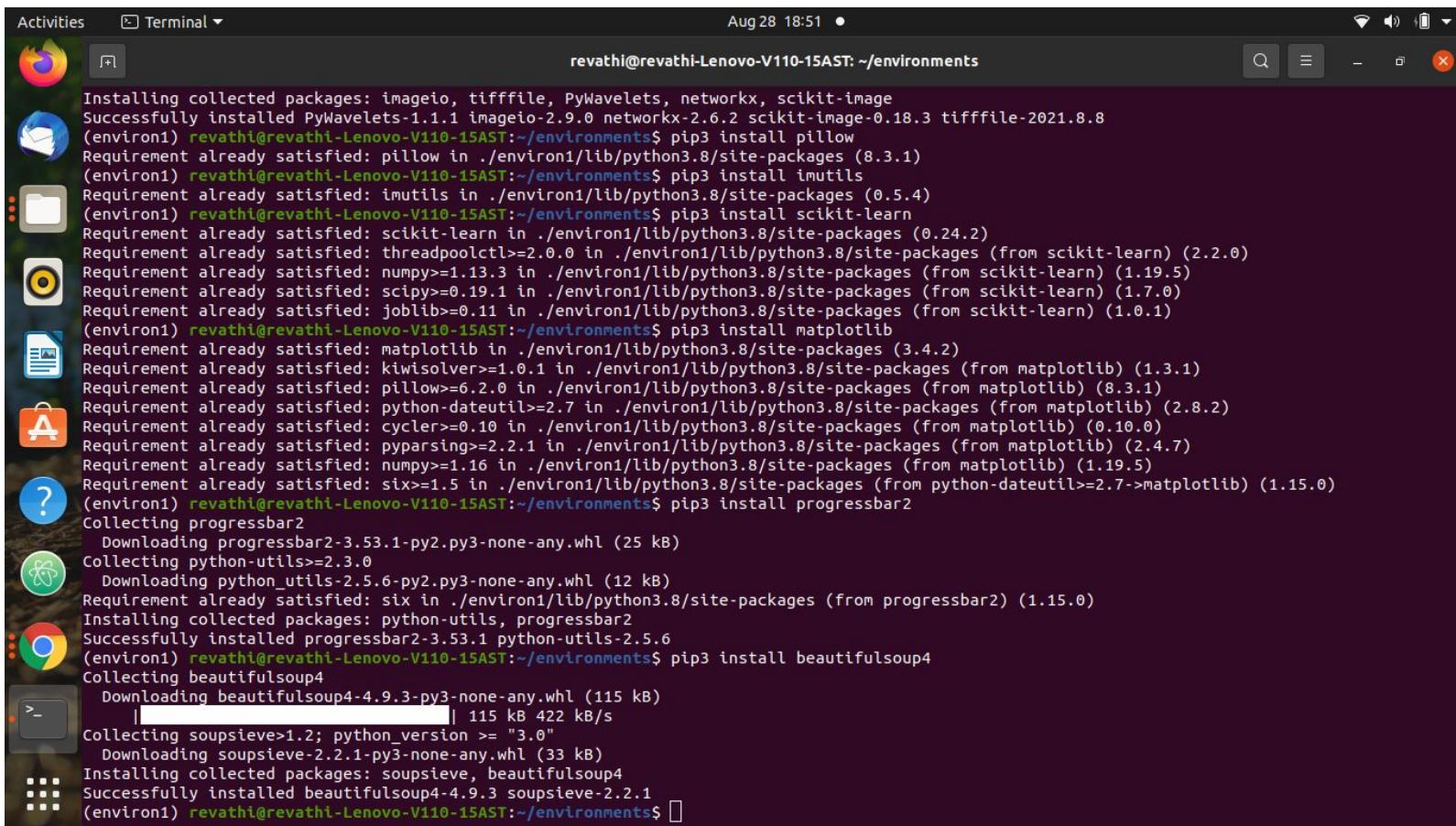
(Standard image processing libraries)

Activities Terminal ▾ revathi@revathi-Lenovo-V110-15AST: ~/environments Aug 28 18:51 •

```
Installing collected packages: imageio, tifffile, PyWavelets, networkx, scikit-image
Successfully installed PyWavelets-1.1.1 imageio-2.9.0 networkx-2.6.2 scikit-image-0.18.3 tifffile-2021.8.8
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install pillow
Requirement already satisfied: pillow in ./environment1/lib/python3.8/site-packages (0.3.1)
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install imutils
Requirement already satisfied: imutils in ./environment1/lib/python3.8/site-packages (0.5.4)
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install scikit-learn
Requirement already satisfied: scikit-learn in ./environment1/lib/python3.8/site-packages (0.24.2)
Requirement already satisfied: threadpoolctl>=2.0.0 in ./environment1/lib/python3.8/site-packages (from scikit-learn) (2.2.0)
Requirement already satisfied: numpy>=1.13.3 in ./environment1/lib/python3.8/site-packages (from scikit-learn) (1.19.5)
Requirement already satisfied: scipy>=0.19.1 in ./environment1/lib/python3.8/site-packages (from scikit-learn) (1.7.0)
Requirement already satisfied: joblib>=0.11 in ./environment1/lib/python3.8/site-packages (from scikit-learn) (1.0.1)
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install matplotlib
Requirement already satisfied: matplotlib in ./environment1/lib/python3.8/site-packages (3.4.2)
Requirement already satisfied: kiwisolver>=1.0.1 in ./environment1/lib/python3.8/site-packages (from matplotlib) (1.3.1)
Requirement already satisfied: pillow>=6.2.0 in ./environment1/lib/python3.8/site-packages (from matplotlib) (8.3.1)
Requirement already satisfied: python-dateutil>=2.7 in ./environment1/lib/python3.8/site-packages (from matplotlib) (2.8.2)
Requirement already satisfied: cycler>=0.10 in ./environment1/lib/python3.8/site-packages (from matplotlib) (0.10.0)
Requirement already satisfied: pyparsing>=2.2.1 in ./environment1/lib/python3.8/site-packages (from matplotlib) (2.4.7)
Requirement already satisfied: numpy>=1.16 in ./environment1/lib/python3.8/site-packages (from matplotlib) (1.19.5)
Requirement already satisfied: six>=1.5 in ./environment1/lib/python3.8/site-packages (from python-dateutil>=2.7->matplotlib) (1.15.0)
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install progressbar2
Collecting progressbar2
  Downloading progressbar2-3.53.1-py2.py3-none-any.whl (25 kB)
Collecting python-utils>=2.3.0
  Downloading python_utils-2.5.6-py2.py3-none-any.whl (12 kB)
Requirement already satisfied: six in ./environment1/lib/python3.8/site-packages (from progressbar2) (1.15.0)
Installing collected packages: python-utils, progressbar2
Successfully installed progressbar2-3.53.1 python-utils-2.5.6
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install beautifulsoup4
Collecting beautifulsoup4
  Downloading beautifulsoup4-4.9.3-py3-none-any.whl (115 kB)
|██████████| 115 kB 422 kB/s
Collecting soupsieve>1.2; python_version >= "3.0"
  Downloading soupsieve-2.2.1-py3-none-any.whl (33 kB)
Installing collected packages: soupsieve, beautifulsoup4
Successfully installed beautifulsoup4-4.9.3 soupsieve-2.2.1
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$
```

```
$ pip install scikit-learn $ pip install matplotlib $ pip install progressbar2 $ pip install beautifulsoup4
```

## Machine learning libraries and support libraries



The screenshot shows a terminal window in a Linux desktop environment. The terminal title is "revathi@revathi-Lenovo-V110-15AST: ~/environments". The window contains the command-line output of several pip installations:

```
Installing collected packages: imageio, tifffile, PyWavelets, networkx, scikit-image
Successfully installed PyWavelets-1.1.1 imageio-2.9.0 networkx-2.6.2 scikit-image-0.18.3 tifffile-2021.8.8
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install pillow
Requirement already satisfied: pillow in ./environ1/lib/python3.8/site-packages (8.3.1)
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install imutils
Requirement already satisfied: imutils in ./environ1/lib/python3.8/site-packages (0.5.4)
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install scikit-learn
Requirement already satisfied: scikit-learn in ./environ1/lib/python3.8/site-packages (0.24.2)
Requirement already satisfied: threadpoolctl>=2.0.0 in ./environ1/lib/python3.8/site-packages (from scikit-learn) (2.2.0)
Requirement already satisfied: numpy>=1.13.3 in ./environ1/lib/python3.8/site-packages (from scikit-learn) (1.19.5)
Requirement already satisfied: scipy>=0.19.1 in ./environ1/lib/python3.8/site-packages (from scikit-learn) (1.7.0)
Requirement already satisfied: joblib>=0.11 in ./environ1/lib/python3.8/site-packages (from scikit-learn) (1.0.1)
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install matplotlib
Requirement already satisfied: matplotlib in ./environ1/lib/python3.8/site-packages (3.4.2)
Requirement already satisfied: kiwisolver>=1.0.1 in ./environ1/lib/python3.8/site-packages (from matplotlib) (1.3.1)
Requirement already satisfied: pillow>=6.2.0 in ./environ1/lib/python3.8/site-packages (from matplotlib) (8.3.1)
Requirement already satisfied: python-dateutil>=2.7 in ./environ1/lib/python3.8/site-packages (from matplotlib) (2.8.2)
Requirement already satisfied: cycler>=0.10 in ./environ1/lib/python3.8/site-packages (from matplotlib) (0.10.0)
Requirement already satisfied: pyparsing>=2.2.1 in ./environ1/lib/python3.8/site-packages (from matplotlib) (2.4.7)
Requirement already satisfied: numpy>=1.16 in ./environ1/lib/python3.8/site-packages (from matplotlib) (1.19.5)
Requirement already satisfied: six>=1.5 in ./environ1/lib/python3.8/site-packages (from python-dateutil>=2.7->matplotlib) (1.15.0)
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install progressbar2
Collecting progressbar2
  Downloading progressbar2-3.53.1-py2.py3-none-any.whl (25 kB)
Collecting python-utils>=2.3.0
  Downloading python_utils-2.5.6-py2.py3-none-any.whl (12 kB)
Requirement already satisfied: six in ./environ1/lib/python3.8/site-packages (from progressbar2) (1.15.0)
Installing collected packages: python-utils, progressbar2
Successfully installed progressbar2-3.53.1 python-utils-2.5.6
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install beautifulsoup4
Collecting beautifulsoup4
  Downloading beautifulsoup4-4.9.3-py3-none-any.whl (115 kB)
Collecting soupsieve>1.2; python_version >= "3.0"
  Downloading soupsieve-2.2.1-py3-none-any.whl (33 kB)
Installing collected packages: soupsieve, beautifulsoup4
Successfully installed beautifulsoup4-4.9.3 soupsieve-2.2.1
(environ1) revathi@revathi-Lenovo-V110-15AST:~/environments$
```

\$ pip install pandas (Machine learning libraries and support libraries)

## Check tensorflow and openCV

```
Activities Terminal Aug 28 18:54 • revathi@revathi-Lenovo-V110-15AST: ~/environments Requirement already satisfied: pyparsing>=2.2.1 in ./environment1/lib/python3.8/site-packages (from matplotlib) (2.4.7) Requirement already satisfied: numpy>=1.16 in ./environment1/lib/python3.8/site-packages (from matplotlib) (1.19.5) Requirement already satisfied: six>=1.5 in ./environment1/lib/python3.8/site-packages (from python-dateutil>=2.7->matplotlib) (1.15.0) (environment1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install progressbar2 Collecting progressbar2 Downloading progressbar2-3.53.1-py2.py3-none-any.whl (25 kB) Collecting python-utils>=2.3.0 Downloading python_utils-2.5.6-py2.py3-none-any.whl (12 kB) Requirement already satisfied: six in ./environment1/lib/python3.8/site-packages (from progressbar2) (1.15.0) Installing collected packages: python-utils, progressbar2 Successfully installed progressbar2-3.53.1 python-utils-2.5.6 (environment1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install beautifulsoup4 Collecting beautifulsoup4 Downloading beautifulsoup4-4.9.3-py3-none-any.whl (115 kB) | 115 kB 422 kB/s Collecting soupsieve>1.2; python_version >= "3.0" Downloading soupsieve-2.2.1-py3-none-any.whl (33 kB) Installing collected packages: soupsieve, beautifulsoup4 Successfully installed beautifulsoup4-4.9.3 soupsieve-2.2.1 (environment1) revathi@revathi-Lenovo-V110-15AST:~/environments$ pip3 install pandas Requirement already satisfied: pandas in ./environment1/lib/python3.8/site-packages (1.3.0) Requirement already satisfied: numpy>=1.17.3 in ./environment1/lib/python3.8/site-packages (from pandas) (1.19.5) Requirement already satisfied: pytz>=2017.3 in ./environment1/lib/python3.8/site-packages (from pandas) (2021.1) Requirement already satisfied: python-dateutil>=2.7.3 in ./environment1/lib/python3.8/site-packages (from pandas) (2.8.2) Requirement already satisfied: six>=1.5 in ./environment1/lib/python3.8/site-packages (from python-dateutil>=2.7.3->pandas) (1.15.0) (environment1) revathi@revathi-Lenovo-V110-15AST:~/environments$ python3 Python 3.8.10 (default, Jun 2 2021, 10:49:15) [GCC 9.4.0] on linux Type "help", "copyright", "credits" or "license" for more information. >>> import tensorflow.keras 2021-08-28 18:53:05.106508: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'libcudart.so.11.0'; dlerror: libcudart.so.11.0: cannot open shared object file: No such file or directory 2021-08-28 18:53:05.106577: I tensorflow/stream_executor/cuda/cudart_stub.cc:29] Ignore above cudart dlerror if you do not have a GPU set up on your machine. >>> >>> import cv2 >>> 
```