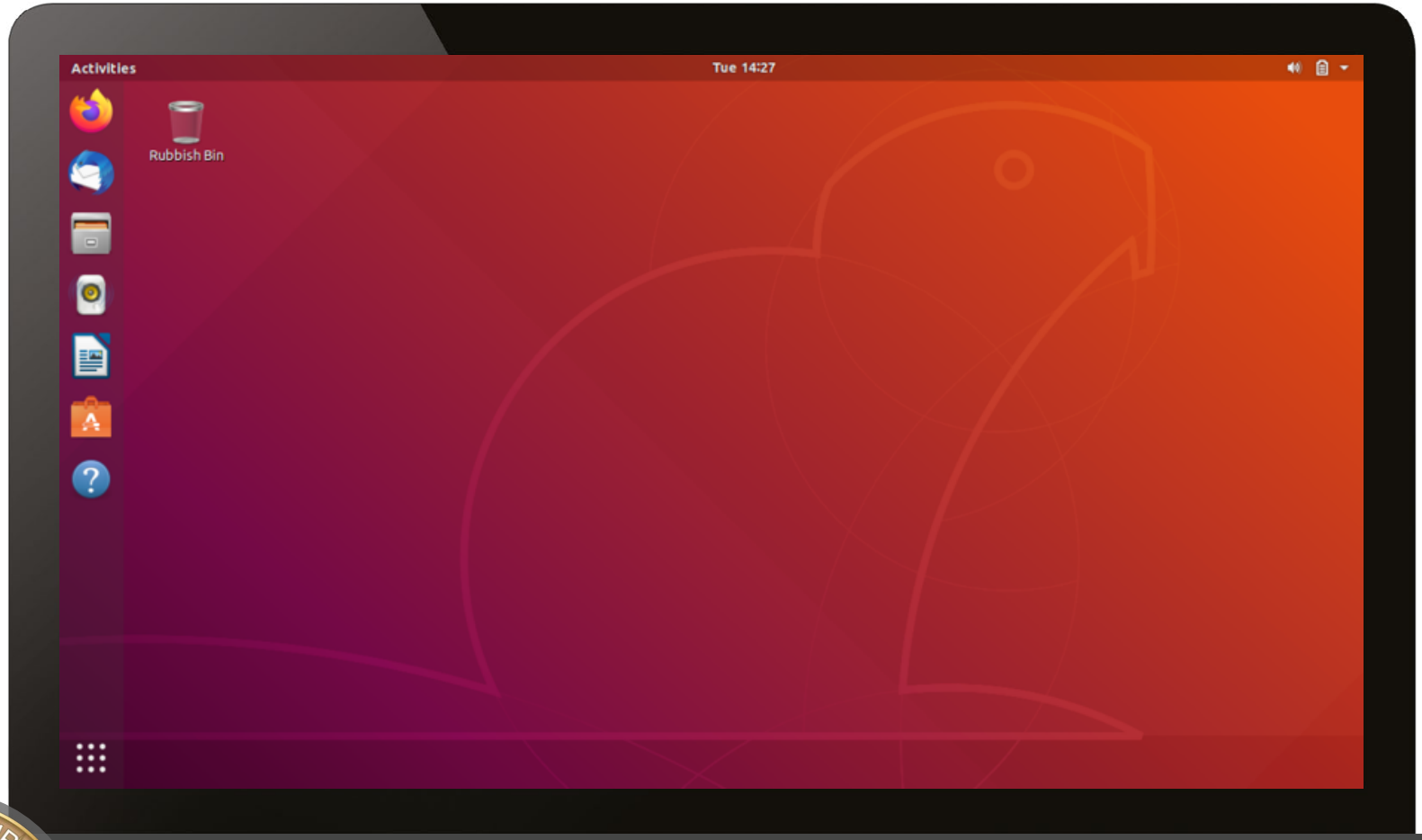
NORTHROP GRUMMAN

STEM LEARNING



CYBERCENTURION
EDUCATE, CHALLENGE, INSPIRE
YOUTH CYBER DEFENCE COMPETITION

Introduction to Linux (Ubuntu)

Contents

As part of this guide, you will:

- define Ubuntu as an operating system,
- identify the basic layout of the GUI (graphical User Interface) of Ubuntu,
- identify the uses of the Ubuntu start menu,
- demonstrate how to locate the different elements of the GUI and how to search for files/applications,
- demonstrate how to use basic command line prompts within the Terminal.

What is Linux?

Linux is a family of open-source operating systems (OS) and is embedded in a wide range of devices from your mobile phone to refrigerators and televisions. The most well-known Linux operating system powered example is Android.

Linux is an open-source operating system and that means:

- anyone can use it, modify it or distribute,
- build software to run from it,
- collaborate with anyone to develop it and
- remain free!

The operating systems that are built off the Linux base are referred to as **flavours**. One of those *flavours* is Ubuntu.

What is Ubuntu?

Ubuntu is a freely available operating system to be used on both desktop and server. Canonical who publishes Ubuntu work closely with Dell, Lenovo and HP to ensure Ubuntu works on the wide range of laptops and workstations available.

As a freely available operating system, Ubuntu will remain free and offers two types of versions. One version is long term support (LTS), comes with 5 years of support and only receives security and bug fix updates. The other version has 6 monthly release cycles and is only supported for 9 months, this means the system is being refreshed and receiving the most up to date releases to support programs.

Ubuntu is committed to remaining as an open-source software, which means it is supported by a community and professionals. For more details click here.

"Our code is shared openly throughout the development cycle. We are transparent about our plans for future releases, so as a developer, hardware manufacturer, or OEM, you can work with us to start building Ubuntu applications and systems now."

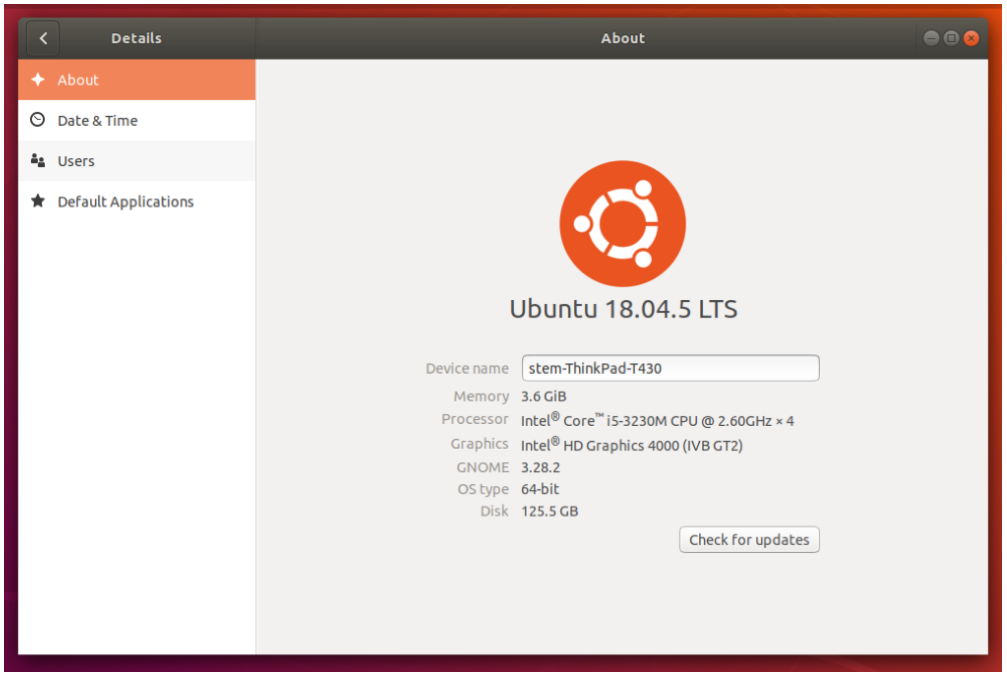
Ubuntu as an operating system has been around since its first release in 2004. You can find out what version you have by following these steps.

- Go to '`Show Applications`'
- Open '`Settings`'
- Locate '`Details`' at the bottom of the left menu bar.
- The Ubuntu version is visible directly below the Ubuntu logo.

On the screenshot on the right, the version is Ubuntu 18.04.5 LTS. (LTS = Long Term Support).

To view a full list of the different versions and builds please click here.

Each operating system comes with its own security concerns and as an operating system is released, older versions are retired from Ubuntu support. Updating a operating system to ensure continued support is essential to a secure device as older operating systems are not fixed when a vulnerability is identified.



Linux vs Windows

- Linux is free, whereas Windows has a cost associated with it.
- The many flavours of Linux mean that it can be made to fit your personal preferences.
- On Linux a lot of the commands are executed using the command line primarily and the GUI is an alternative. You could say the reverse is generally true for Windows.
- Windows is widely used and therefore becomes the target for malware, this consequentially means that there is less malware on Linux. However, Linux has the same vulnerabilities and requires passwords, firewalls etc. and as Linux based systems become more widespread, they are becoming increasingly targeted by malware.
- Hardware and driver support is usually more readily available on Windows.

Open-Source vs Licensed

An open-source piece of software is defined as a freely available piece of software where the code is editable and available to any user to utilise and support.

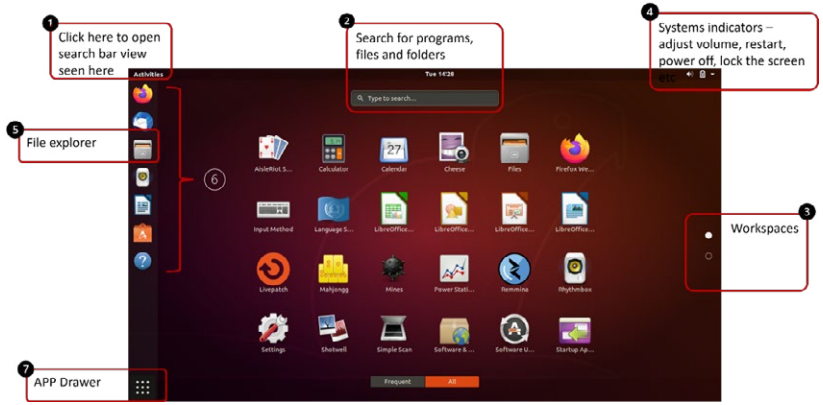
Any updates/fixes and/or support is completed on a more regular basis as it is supported by a vast community of programmers.

A licensed piece of software is only available to purchase, and the code is hidden from everyone outside the company. The support and updates/fixes are all completed by an in-house team and released when completed.

Ubuntu Basics

Within this section we will look at the basics of the Ubuntu Operating System.

To search for programs, files or folders on the device, first click on **`Activities (1)`**, then the view seen in the image below is displayed and the **`search bar (2)`** is available to use.



Visible workspaces are displayed on the right-hand side **`(3)`** and you can create multiple desktop environments on the same computer and accessed here.

The system indicators are in the top right corner **`(4)`** and allow access to restart, power off, adjust volume and lock the screen etc.

The left hand side toolbar **`(6)`** is referred to as the **`dock or launcher`**, holds the applications that are currently running on the device and the file explorer **`(5)`** icon.

The same as Windows there is a file system in place and can be opened using the orange folder **`(1)`** from the left toolbar. The file system can be adjusted visually, in the same way as Windows to be icons or a list.

It is important to note that the location of the file or folder differs to Windows:

- **Windows** - C:\Documents\fileName
- **Linux** - /home/FolderName/fileName

On Linux based operating systems the root directory is not used and it uses forward slashes.

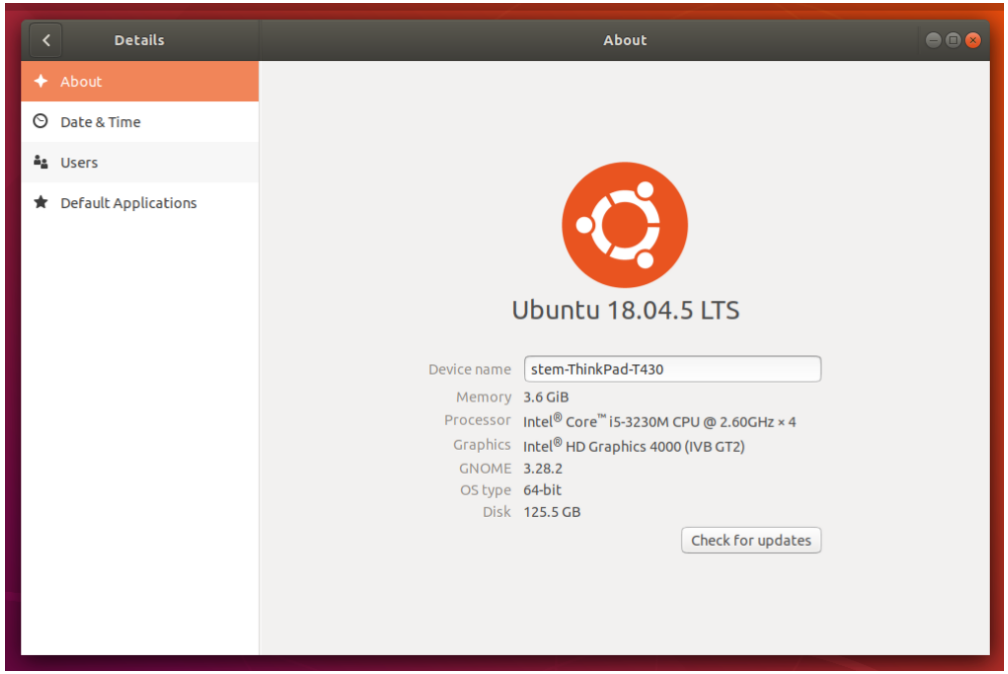
The **`App Drawer (7)`** is located in the bottom right of the display. This is how to access all the programs that are installed on the device and using the options displayed in the bottom middle of the screen, the user can change between the most frequently used programs and all programs.

Once you open an application the name of it is displayed next to activities in the top left of the screen and you can access the settings etc for this application.

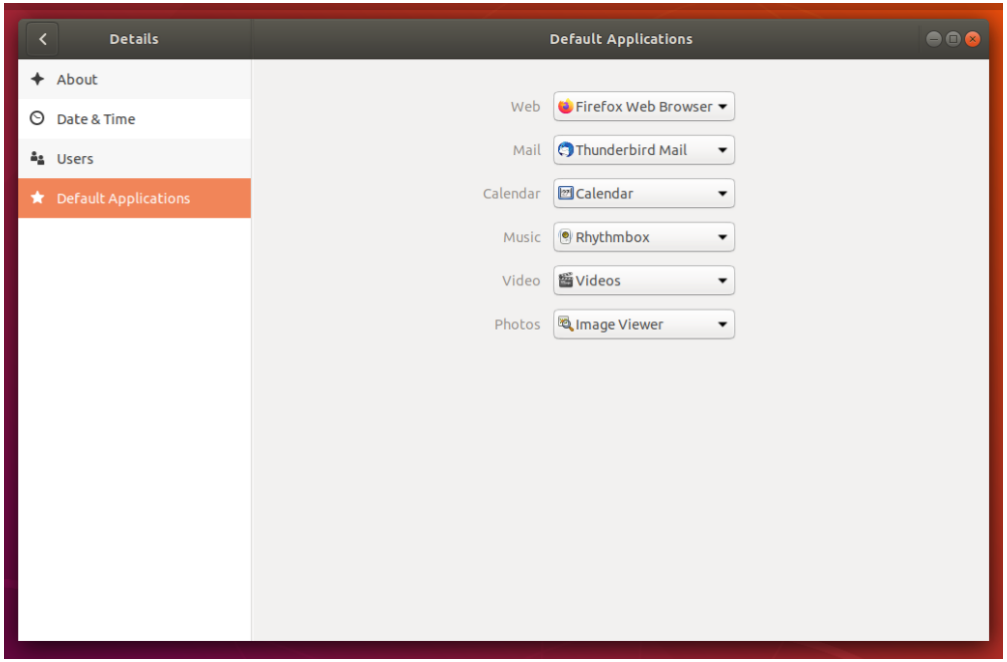
Settings

To access the settings area, you can click on the top right systems indicator area and select **`settings`** or search for the area using the **`APP Drawer`** or **`Activities`** areas.

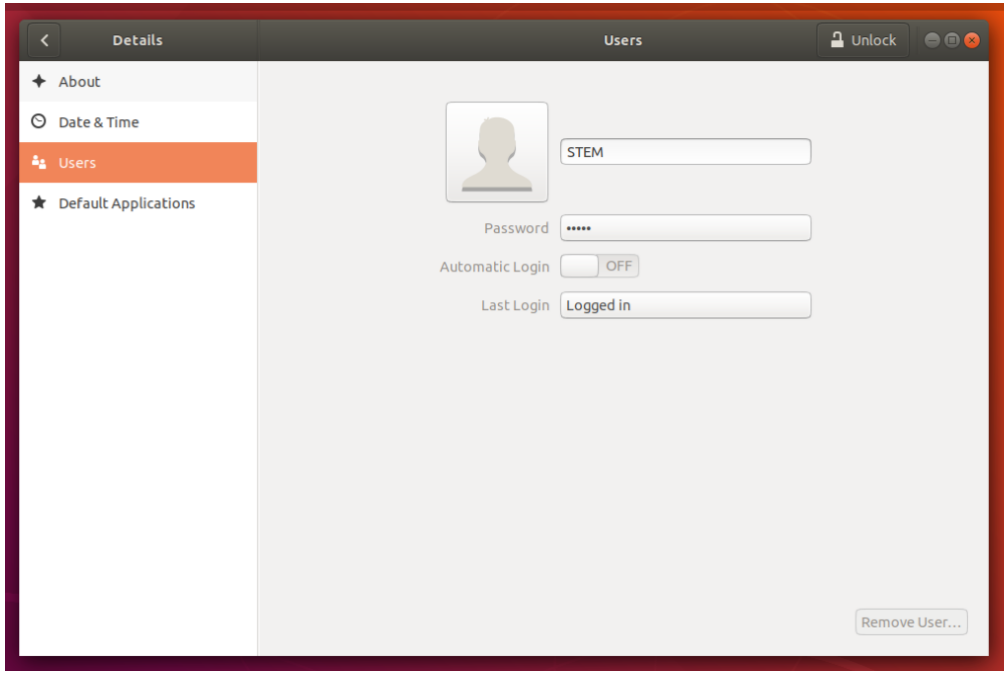
When the settings area is opened go to the bottom left option **`Details`** and you will see the below dialogue box.



Under **`Default applications`** you can see the default applications for a range of day-to-day tasks and can edit accordingly.



You can also view the **Users** on the device and can edit the password and view when they last logged in.



Command Line basics

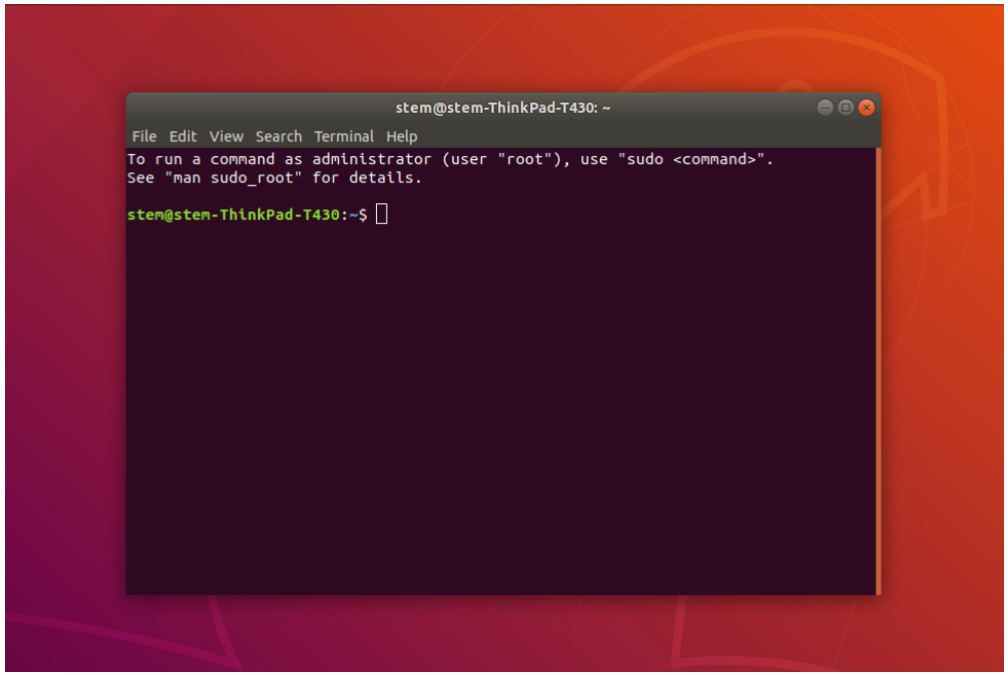
On Linux a lot of the commands are executed using the command line and is a GUI alternative. Some tasks you can be completed using the GUI settings areas but majority on Linux are commands to execute.

Key points to remember when using command line:

- Check capitalisation and spaces
- Enter to execute a command
- Ctrl + D to exit the terminal or close any commands

Terminal

Open the **Terminal** area.



ls

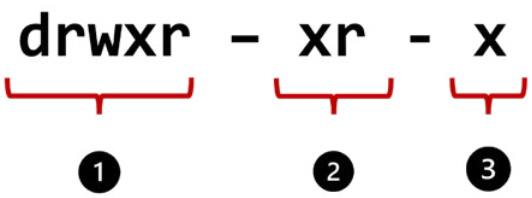
The first command to use is ls this will display all the folders within the directory you are in. The default directory when you first open the terminal is your user directory.

- Type in **ls** and press enter.

You will see the folders within the directory i.e. desktop, downloads, music, public etc

- Type in **ls – l** and press enter

You will now see the details relating the individual folders. This will include the permissions and the date set up. At the start of the line there will be a series of letters and dashes, for example **drwxr – xr – x**



1. This is the user's permissions
2. This is the group's permissions
3. This is everyone else's permissions

d	Delete
rw	Read and write
x	Execute
r	read

Basic commands

`pwd`	Check the directory you are in
`ls`	Listing command to see the folders within the directory you are in
`ls - a`	Show all files including hidden ones
`ls – l`	Extra details with each folder i.e. when created and who has permissions
`mkdir`	Create a directory use the command followed by a space and then the name you want to give the directory. Ie **mkdir dir1** creating a new directory called dir1
`cd dir1`	Change to the new directory created (dir1 is name of directory created)
`cd ..`	Go back a level to go back to home directory
`cd /`	Go back to root directory
`clear`	Clear terminal
`touch file1.txt`	To create a new file within the directory identified

sudo

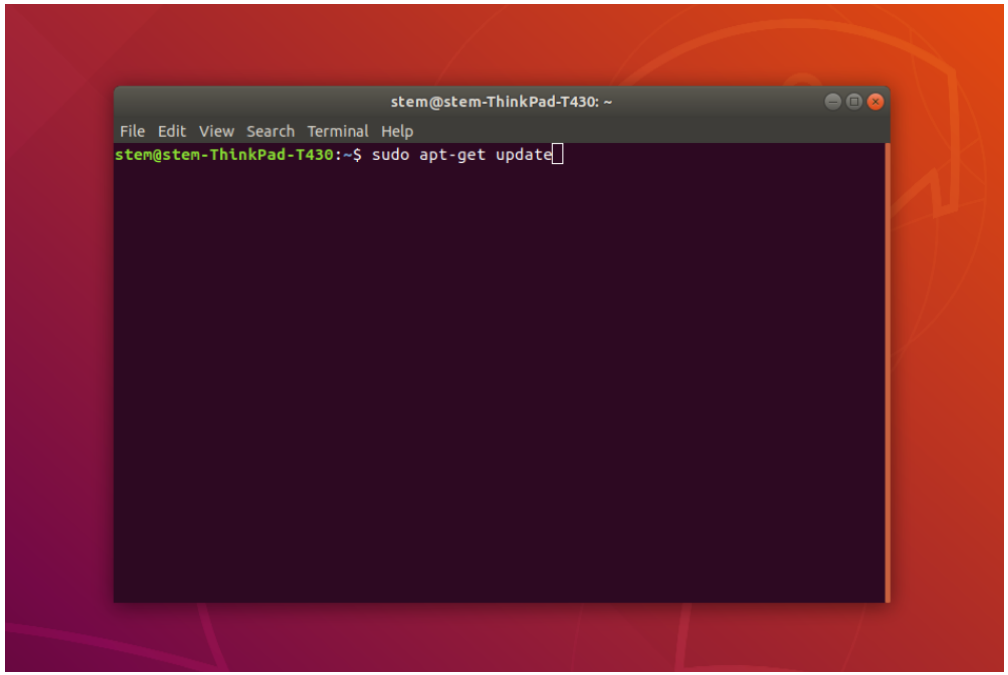
Another command to use is **sudo** as this elevates your user permissions to allow you to run any programs with the security permissions of another user i.e. as the root (admin privileges).

By adding **sudo** before the command you can access files that require administration roles to edit.

Example sudo command

`sudo visudo`	to bring up the file in an editable format and you can view the permissions set for all users.

On the following page is an example of using sudo to access as the admin user to get an update for the system. We will look at this command in the guide **Ubuntu Advanced Cyber Security**.



gedit

The default Graphical User Interface (GUI) text editor in Ubuntu is gedit and is a way to edit files similar to how notepad works on windows. You can open files and edit them within gedit and you can open gedit through the terminal and use commands to access gedit and specific files.

Example gedit commands

To open a specific file	`gedit filename`
To open multiple files	`gedit file1 file2`
Edit system files	`gksudo gedit`

Useful Resources

How to use Ubuntu (beginners Guide) video - https://www.youtube.com/watch?v=lmeDvSgN6zY

https://help.ubuntu.com/community/UsingTheTerminal#Commands

http://ubuntu-manual.org/

http://manpages.ubuntu.com/

https://ryanstutorials.net/linuxtutorial/commandline.php