**Word Count: 838**

Section 3, Linux Fundamentals for Raspberry Pi

In this section, we will cover the following topics

* Basics of Linux
* Basic Linux commands
* Advanced Linux commands
* Automating & Scheduling Tasks

Video, Basics of Linux

In this video, we will learn about the Linux Kernel and functions of a kernel, later we will learn about file system hierarchy in Raspbian Buster, and finally, we will learn user management in Buster.

Linux, like Mac OS, is based on the Unix operating system. A research team at AT&T’s Bell Labs developed Unix in the 60s with a focus on creating an operating system that would be accessible and secure for multiple users. Companies started licensing Unix in the 80s. By the late 1980s, there was interest in building a free operating system that would be similar to Unix, but that could be tinkered with and redistributed. In 1991, Linus Torvalds released the Linux kernel as free, open-source software. Open source means that the code is fully visible, and can be modified and redistributed.

Strictly speaking, Linux is the kernel, not the entire operating system. The kernel provides an interface between your computer’s hardware and the input/output requests from applications. With over 13 million lines of code, the Linux kernel is one of the largest open source projects in the world, but what is a kernel and what is it used for? A kernel has mainly four jobs.

1. Memory management: Keep track of how much memory is used to store what, and where

2. Process management: Determine which processes can use the CPU, when, and for how long

3. Device drivers: Act as mediator/interpreter between the hardware and processes

4. System calls and security: Receive requests for service from the processes

The rest of the operating system usually includes many GNU libraries, utilities, and other software from the Free Software Foundation. The operating system as a whole is known as GNU/Linux.

The Raspbian Buster OS is based on the Debian Linux distribution. A Linux distribution is a version of the open source Linux operating system that is packaged with other components, such as installation programs, management tools, and additional software.

It is important to have a basic understanding of the fundamentals of the Linux file system: where your files are kept, where software is installed, where the danger zones are, and so on. So open the file manager. By default, the file manager will open to **/home/pi** directory. This is where the user's own files are kept. The contents of the user's desktop is in a directory here called Desktop, along with other files and folders.

You can check out the whole linux file system hierarchy on the hierarchy window by going to the root hierarchy, which is denoted by the forward slash. It consists of 19 directories, each with a different purpose. Please check out the table in the resources section to learn the function of each directory. If you don’t know what you are doing, don’t try to modify any of the directories. It's better if you stick with working inside the home directory.

As Linux is a multi-user operating system, there is a high need for an administrator, who can manage user accounts, their rights, and the overall system security. You should know the basics of user management so that you can handle the user accounts, their rights, and the overall system security.

In Buster, user management is done in the command line itself. The default user is pi, and the password is raspberry. You can create additional users on your Raspbian installation with the “adduser” command. Enter “sudo adduser john” and you'll be prompted for a password for the new user “john”. Leave this blank if you don't want a password. When you create a new user, they will have a home folder in **/home/**. The pi user's home folder is at **/home/pi/**. So now the new user’s home folder is at **/home/john/**.

Once you're logged in as the pi user, you can use the “passwd” command to change the default password to improve your Pi's security.

Enter “passwd” on the command line and press Enter. You'll be prompted to enter your current password to authenticate, and then asked for a new password. Press Enter on completion, and you'll be asked to confirm it. Note that no characters will be displayed while entering your password. Once you've correctly confirmed your password, you'll be shown a success message, and the new password will apply immediately.

If your user has sudo permissions, you can change another user's password with “passwd”preceded by the user's username. For example, “sudo passwd john” will allow you to set the user john’s password. You can also remove the password for the user john with “sudo passwd john -d”.

Summary

In this video, we have learned the following topics

* The Linux Kernel & its functions
* File System hierarchy in Buster
* User Management in Buster

In the next video, we will learn some basic linux commands for the Raspbian Buster OS.