Introduction

- Starting up Linux on a RaspberryPi
- Logging on to Linux
- Linux as a multi-user, multi-tasking operating system
- Accessing the command line (terminal and desktop)
- Accessing and using manual pages

Working with the command line and the shell

- Introduction to command shells
- Understanding command syntax
- Executing commands at the command line
- Common command line tasks
- Piping and redirection
- Managing user accounts
- Performing RPM and APT package related operations

Managing directories and files

- Understanding the filesystem hierarchy standard (FHS)
- Changing directories and listing directory contents
- Creating, viewing and appending files
- Copying and moving files and directories
- Creating directories
- Deleting files and directories
- Finding files on linux
- Managing file permissions and ownership

Basic use of the vi text editor

Understanding and viewing processes

- Viewing processes from the command line
- Understanding the runlevel concept
- Understanding the concepts underlying multiuser processes, multitasking and multi-threading

Managing the network configuration

- Basic network configuration
- Overview of the network-related command-line tools

Managing user access and security

- Basic Linux user security features
- Managing Linux users and groups
- Managing and securing the linux user environment

- Securing files and directories with permissions

Setting up a linux file system

- An overview of the various types of Linux filesystems
- Overview of configuring linux filesystem partitions
- Overview of configuring and managing a linux file system
- Backing up and restoring a file system
- Working with Flash File Systems and SD/MMC cards

Understanding System initialisation

- Overview of bootloaders and the Linux boot process
- Overview of run levels and system settings
- Overview of startup shell scripts and services

Connecting a system to the network

- Network components and architecture
- Configuring a network connection
- Configuring and managing routes
- Testing a network interface
- Enabling network services

Installing and Configuring Linux

- Installing Linux as a standalone operating system on a PC
- Linux as a way of extending the usefulness of older PCs in the classroom
- Installing Linux on a RaspberrPi
- Configuring and testing your Linux installations
- Setting up a Web server - Apache on the PC, lighttpd on the RaspberrPi
- Let there be video and sound - Installing and configuring Audio and Video applications on the RaspberryPi

Introduction

- Overview of command line tools and utilities
- Introduction to Cygwin - bringing Linux tools and utilities to Microsoft Windows
- Accessing and using manual pages

Basic utilities

- Simple filters: cat, wc, head, tail, tr, uniq...
- Sorting and searching tools: find, sort, grep, wildcards
- System reporting tools: ls, du, df, ps, netstat, uname, date ...
- Stream editing with sed
- Building solutions by combining tools

Searching and matching text with regular expressions

- Regular Expression syntax
- Examples using grep
- Other contexts for using regular expressions
- Substitutions using tagged regular expressions in sed and vi

Creating Shell Scripts

- Passing arguments to a script
- Built-in variables and environment variables
- I/O with echo and read
- Redirecting input and output
- Arithmetic and string operations

Flow control in the shell

- Conditional execution with if ... else
- Testing exit status of a command
- Testing file properties
- Looping with for, while and until
- Multiway branching using case
- Busybox Ash and Bash compared

Using sed to process documents

- How a stream editor works
- sed as an example mini-language
- Using sed scripts to modify documents - word substitution, rearrangment of text
- Using sed to modify tags in HTML documents or XML documents

Using awk to process structured input

- How awk processes lines and fields
- Patterns and actions
- Variables, operators and functions
- Formatted output
- Looping and branching in awk

Putting it all together

- Using pipes and command substitution
- Choosing the right tool for the job
- Incremental development of solutions
- Some common idioms

RaspberryPi - GPIO

- Overview of the Linux memory manager and virtual memory
- Memory mapping - an introduction
- Using memory mapping to access the GPIO pins on the RaspberryPi
- Controlling LEDs and push buttons attached to the RaspberryPi GPIO pins
- Understanding I2C on the RaspberryPi
- Attaching various I2C sensor, port expander and A2D converter chips to the RaspberryPi - Arduino like breadboarding experiments.
- Direct Motor and Servo control via the RaspberryPi

Wireless Sensors - An introduction to the Internet of Things - Part 1 - Bluetooth

- An introduction to Bluetooth
- Adding Bluetooth to the RaspberryPi
- Adding Bluetooth to the the Arduino
- Data and control information exchange over Bluetooth
- An introduction to very low energy Bluetooth
- Communicating with Mobile phone devices over Bluetooth
- Incorporating Bluetooth, Arduino, and the RaspberryPi into the design of a basic Home Control System (HCS)

Wireless Sensors - An introduction to the Internet of Things - Part 1 - WiFi (Optional - Time Permitting)

- An introduction to WiFi
- Adding WiFi to the RaspberryPi
- Adding WiFi to the the Arduino
- Data and control information exchange over TCP/IP over WiFi
- Adding WiFi into the design of a basic Home Control System (HCS)

Wireless Sensors - An introduction to the Internet of Things - Part 1 - RFID (Optional - Time Permitting)

- An introduction to RFID
- Adding RFID to the RaspberryPi
- Adding RFID to the the Arduino
- Adding RFID into the design of a basic Home Control System (HCS)