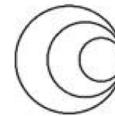




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Next Generation Sequencing Bioinformatics Course 2021 Introduction to Linux

Session 1



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NGS Bioinformatics Course Africa 2021
Amel Ghouila

Learning outcomes

- Understand the Linux file structure
- Understand the command line structure and learn basic commands
- Learn how to create, access files and directories and navigate through them
- Learn how to read files content and extract information from them
- Learn how to combine commands and redirect outputs

Part I: Introduction to Unix, file structure and navigation



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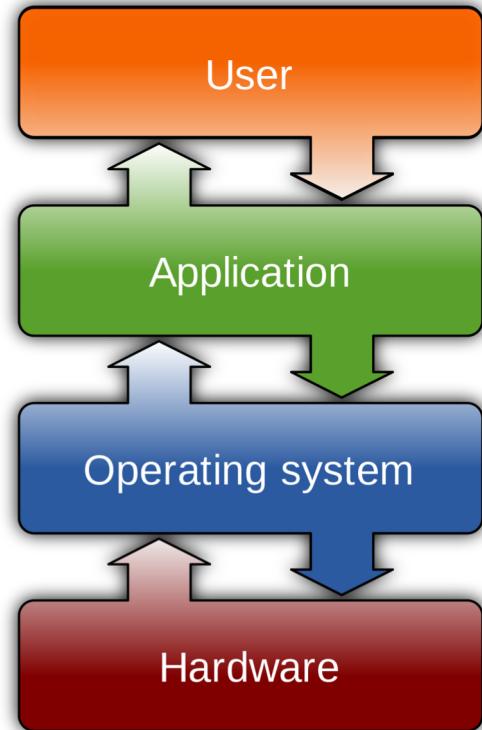
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What is Linux?

- UNIX is an **Operating System** (OS) initially developed in the 1960
- OS: software that supports the computer's basic functions
- There are many different versions of UNIX, that share many similarities
- The most popular varieties of UNIX are **Linux** and MacOS
- UNIX systems have a graphical user interface (GUI) making easier the environment

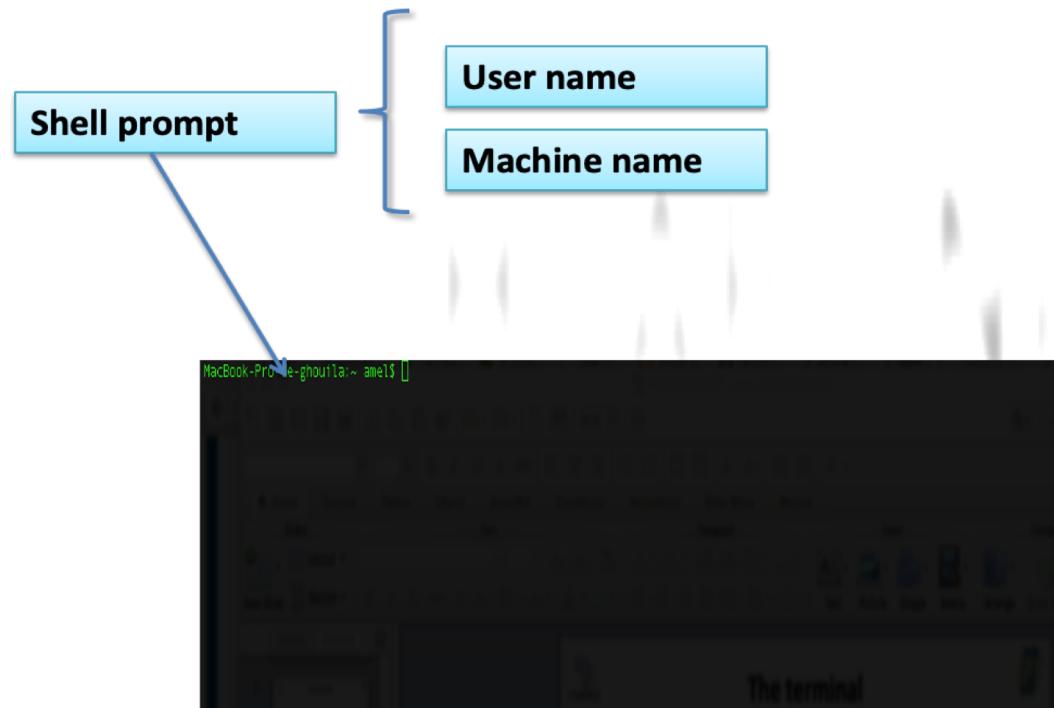


https://en.wikipedia.org/wiki/Operating_system

Why Linux?

- Unix is particularly suitable for working with big files and has several powerful and flexible commands that can be used to process and analyse this data.
- One advantage of learning Unix is that many of the commands can be combined in an almost unlimited fashion
- Unix is the standard operating system on most large computer systems in scientific research, in the same way that Microsoft Windows is the dominant operating system on desktop PCs
- Linux is free and the most popular distributions are Ubuntu, Fedora/Red Hat, Mandriva, etc.
- Very stable, secure and fast developing OS (many developers)
- Best multi-user and multi tasking OS, this is why it is the preferred operating system for large-scale scientific computing.

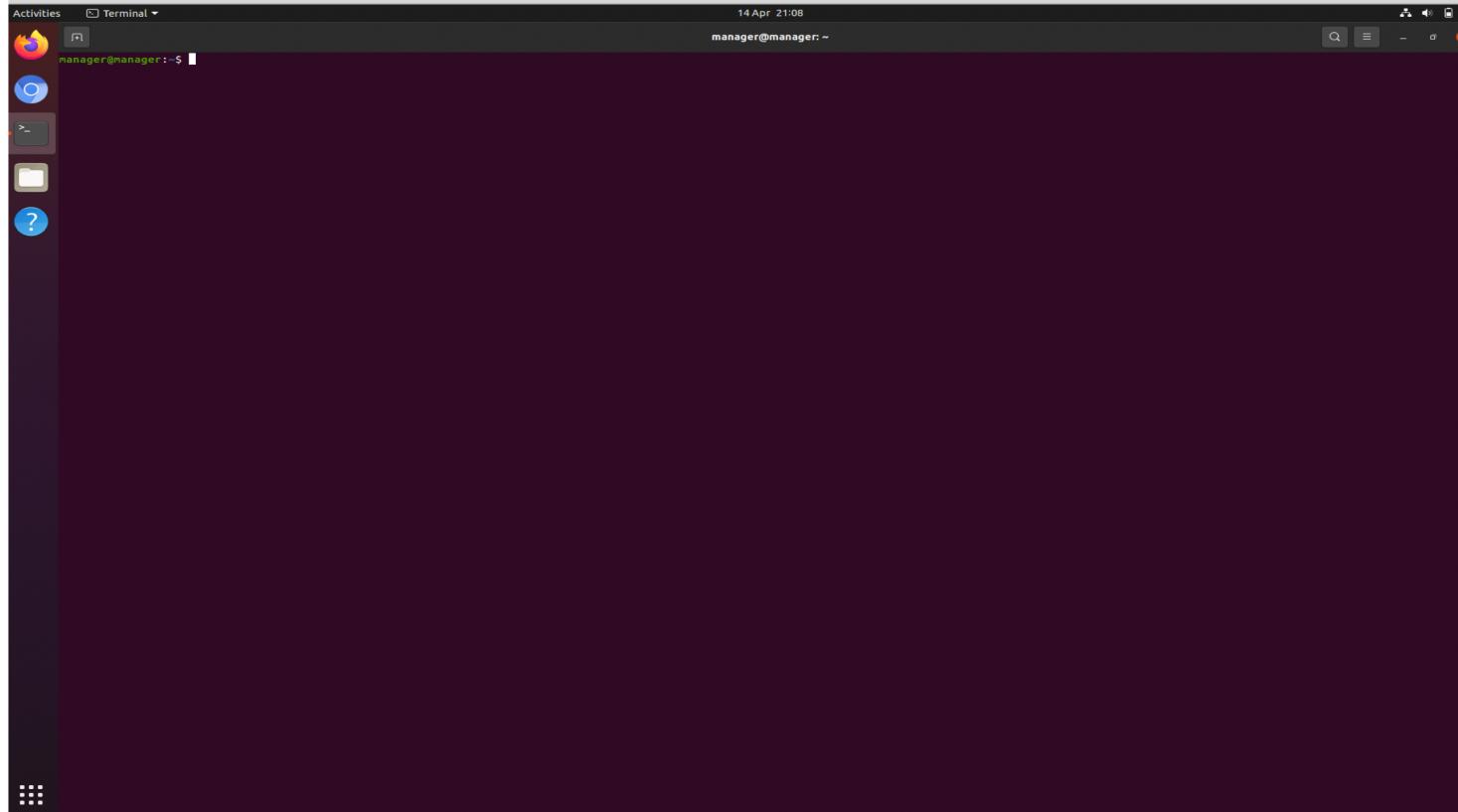
Using the terminal



A **terminal** refers to a wrapper program which runs a shell

There are many different Unix shells, the most popular shell for interactive use include **Bash**: the default on most Linux installations

The terminal on the VM



First test of the terminal

- Open the Terminal on your system
- The shell prompt will appear

Ok, let's try some typing !

- Type:

echo introduction to the terminal



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file structure under Unix



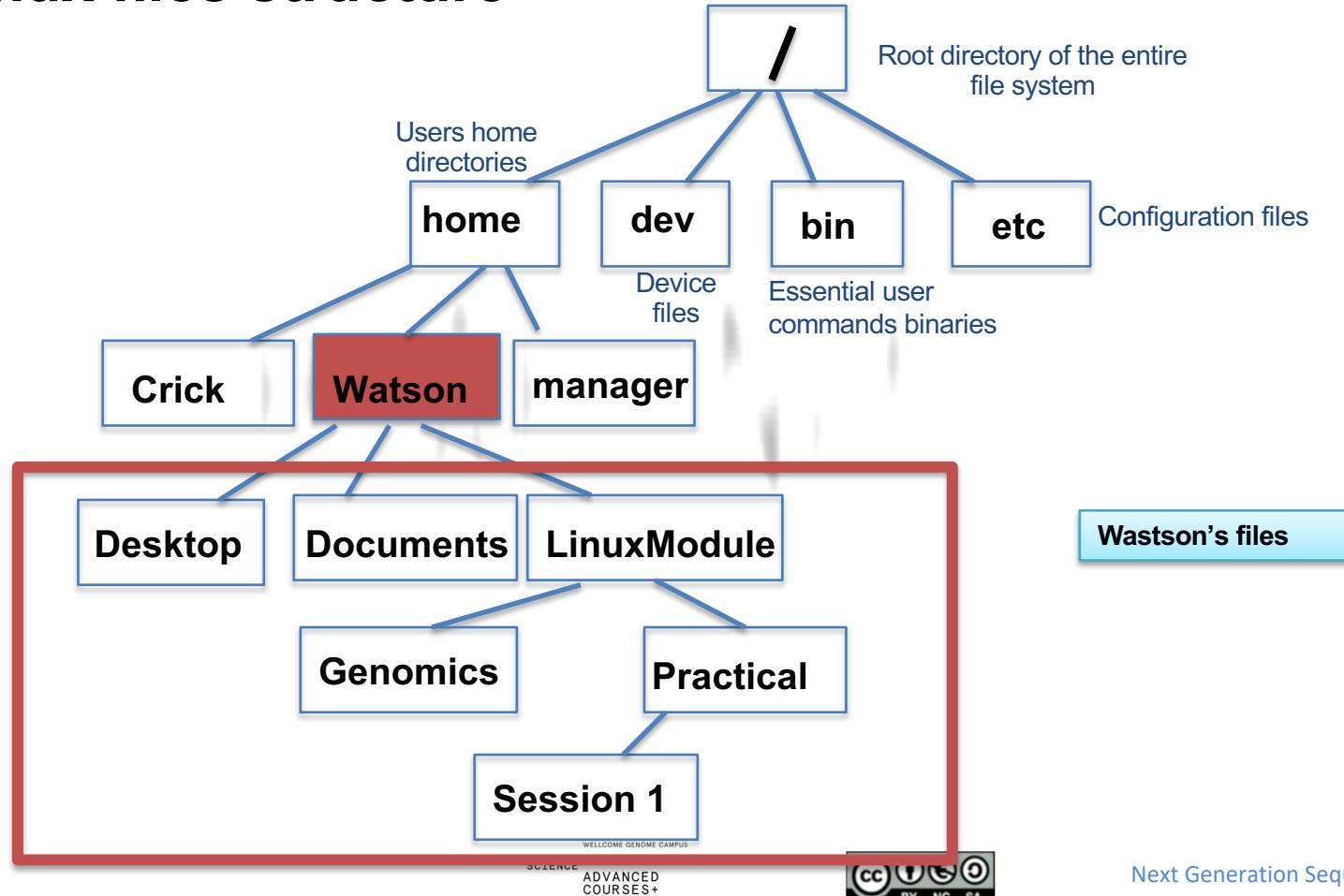
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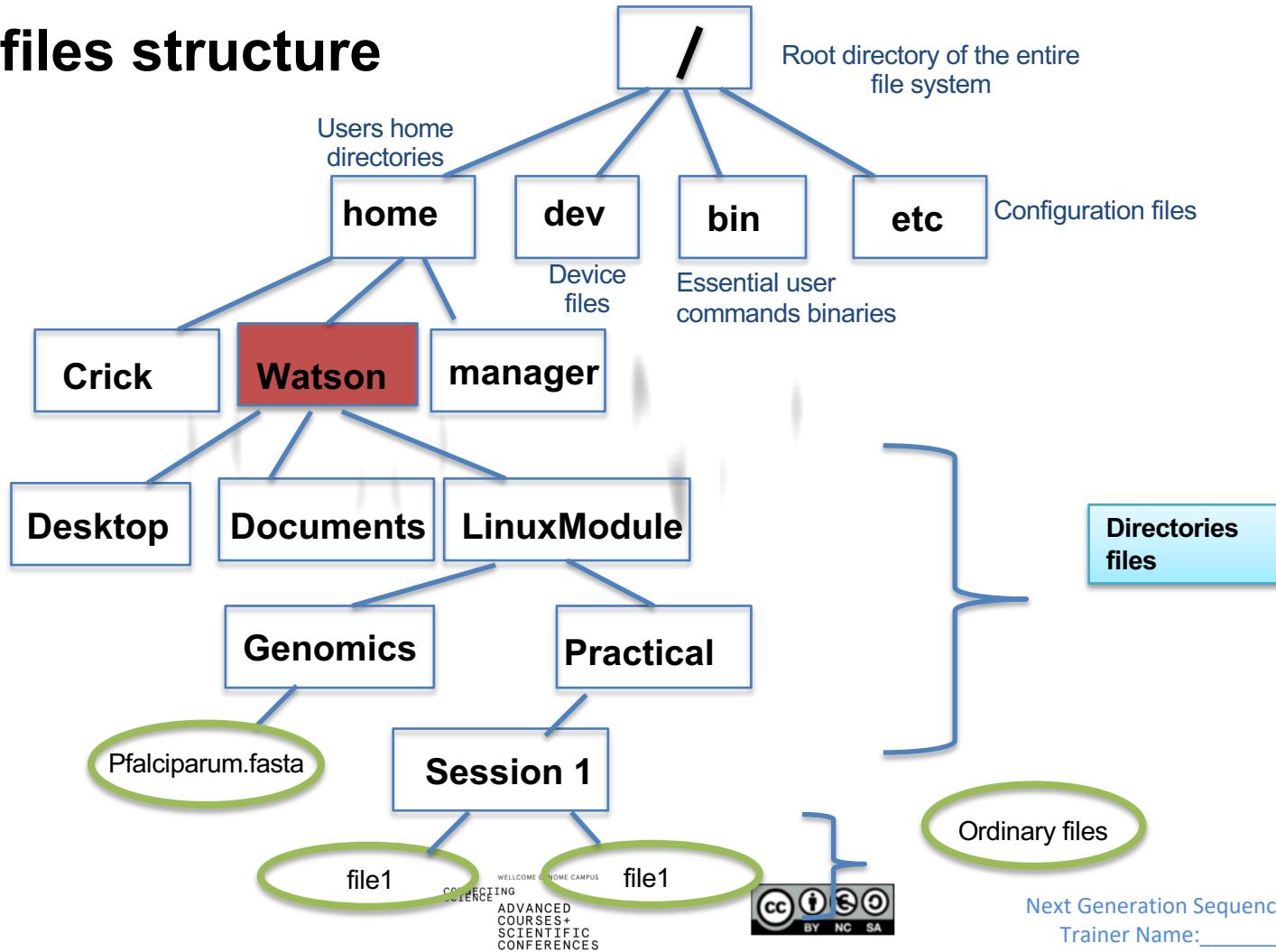
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Linux files structure



Linux files structure



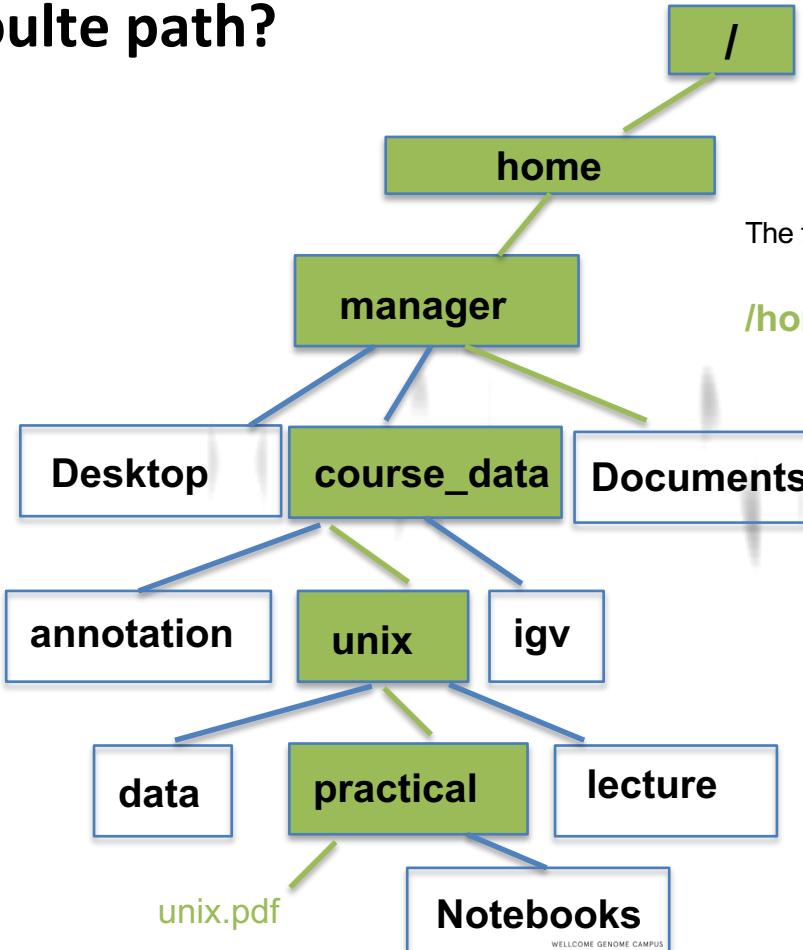
Home directory and working directory

- When you first log in on a UNIX system, the working directory is your **home** directory.
- While working you will be associated to one directory called the **working directory** or the **current directory**
- An abbreviation of the working directory is displayed as part of the prompt on your terminal
- The command **pwd** gives the absolute path of the working directory

What is a path or a pathname?

- A path locates a given file in the system hierarchy
- An **absolute path** in the file system hierarchy for a given file or folder describes the parents all the way up to the root
- A **relative path** describes the path to the file starting from the **current working directory**

Absoulte path?



The full path to unix.pdf is:

/home/manager/course_data/unix/practical/unix.pdf



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~ (your home directory)

- ~ refers to the home directory in a given file system
- The tilde ~ character can be used to specify paths starting at your home directory



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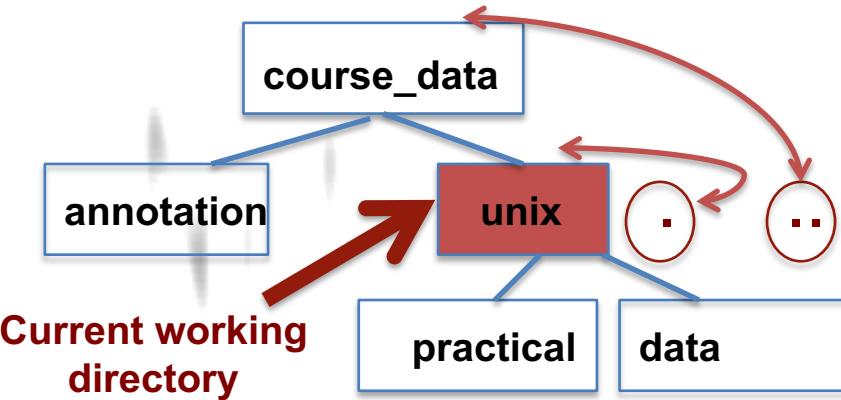
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Refer to the parent and current directories

Every directory has two special sub-directories:

- ◆ . (dot): the current working directory
- ◆ .. (dot-dot): the parent directory



Creating directories and navigating through the file structure



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Key commands for handling directories

mkdir	Make directory: creates a new directory
rmdir/rm -r	Removes a directory
pwd	Displays the absolute path of the current working directory
cd	Change directory: allows moving from one directory to another
ls	Lists a directory content



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pwd command

- **pwd:** print working directory
- Displays the absolute path of your current location in the file system
- Try **pwd** on your terminal
- You should see: /home/YourUsername

ls command

- ls lists the content of the current directory by default
- Command structure **ls** [OPTION] [dirname]
- Some useful options:
 - -l: shows sizes, modified date and time, file or folder name and owner of file and permissions
 - -a: List all files including hidden file starting with ‘.’
 - -lh: shows sizes in easier readable format
 - -R: recursively lists sub-directories
 - -ls: sorting by file sizes



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Create a directory

- `mkdir`: makes a directory
- Command structure: `mkdir dirname [path]`
- `mkdir dirname`: would create a directory with the specified `dirname`
- The new created directory will be created in your current working directory
- If you want to create it elsewhere, you have to specify the path: `mkdir dirname path`

Commands basic structure

command [-options] [arguments]

Examples:

```
ls -lh /home/manager/course_data  
pwd
```

```
mkdir Session1
```

Learn more about commands

man commandname

What you should know about file names in Linux

- No real distinction between the names of ordinary files and the names of directory files.
- No two files in the same directory can have the same name.
- Files in different directories can have the same name.
- Linux is case-sensitive: **course_data**, **course_Data** and **Course_data** are **different** and would represent three distinct files.
- In most cases, file extensions are optional (.txt, .exe, etc.)

Move in the files system

- **cd**: change the working directory
- Command structure: **cd <path>**
- The path name of the directory you want to move to should be specified
- You can specify either the absolute path or the relative path



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Remove a directory

- **rmdir**: removes a directory
- Command structure: `rmdir dirname [path]`
- It would remove the `dirname` directory
- The directory should be in your current working directory
- If you want to remove it from elsewhere, you have to specify the path: `rmdir dirname path`
- **rmdir** works if there is no contents in the directory

Remove a directory

- **rmdir** works if there is no contents in the directory
- If the directory contains files or sub-directories, an error message will appear: “**Directory not empty**”
- In this case, you can use rm with option **-r**, which stands for **recursive**, that will **recursively** remove a directory and its contents

Practical 1



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Instructions

1. Open your terminal
2. Create directories Session1 and Session2 under the directory practical
([/home/manager/course_data/unix/practical](#))
To do that, you can either move under practical and then create Session1 and Session2 or specify the path when using mkdir command
3. Create 3 directories: Practical1, Practical2 and Practical3 under Session1
4. Create Part1 and Part2 under Practical1
5. Remove Part2

