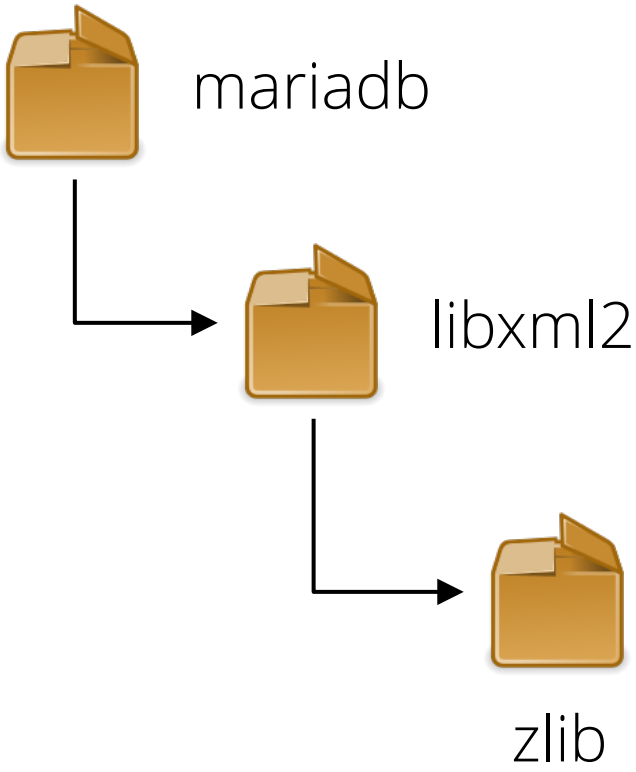
Package managers

COMS10012 / COMSM0085

Software Tools

Packages

Packages contain instructions for automatically installing software from repositories
they also keep track of dependancies as well
makes sure they're all installed




```
$ apt search . | wc -l
190508

$ apt search maria
mariadb-static-10.3.23-r0
mariadb-connector-c-dev-
3.0.10-r0
mariadb-bench-10.3.23-r0
mariadb-10.3.23-r0
mariadb-server-utils-10.3.23-
r0
mariadb-backup-10.3.23-r0
mariadb-doc-10.3.23-r0
mariadb-openrc-10.3.23-r0
mariadb-client-10.3.23-r0
...
```

APT

`apt`: Advanced Package Tool

`.deb` files (for Debian)

Debian/Ubuntu/Mint/...: **`apt`**

Alpine: **`apk`** (if you see us mistake **apt** for **apk** in any materials, it's because this course used to use Alpine.)

Red Hat: **`rpm`**

Arch: **`pacman`**

repositories

$ cat /etc/apt/sources.list

http://deb.debian.org/debian/

Index of /debian/dists/bookworm/main

Name	Last modified	Size
Parent Directory		-
Contents-all.gz	2023-12-10 17:34	31M
Contents-amd64.gz	2023-12-10 17:33	11M
Contents-arm64.gz	2023-12-10 17:33	11M
Contents-armel.gz	2023-12-10 17:33	9.2M
Contents-armhf.gz	2023-12-10 17:33	9.8M
Contents-i386.gz	2023-12-10 17:33	11M
Contents-mips64el.gz	2023-12-10 17:33	9.8M
Contents-mipsel.gz	2023-12-10 17:33	9.7M

Contents-<arch>.gz lists all packages for a system

finding packages

```
$ apt search [-v] [-d] STRING

$ apt info [-a] PACKAGE

$ apt list [-I] PACKAGE

$ apt [COMMAND] --help
```

update and upgrade

```
$ sudo apt update
```

Download the new list of packages, but don't install anything yet.

```
$ sudo apt upgrade
```

Upgrade all installed packages to the latest version.

installing

```
$ sudo apt install PACKAGE [PACKAGE...]
```

Installs one or more packages and their dependencies.

Vagrant:

```
$ cat /vagrant/Vagrantfile
    ...
    apt install emacs-nox
    ...
```

Find a command

By complete file path:

```
$ dpkg-query -S /bin/bash
```

The website:

http://deb.debian.org/debian/

File system Hierarchy Standard (FHS)

- Linux & other POSIX (Portable Operating System Interface) work on a single file hierarchy with a root folder '/'
- /bin was only for binaries required to start the system
- /usr/bin was where most binaries live which were available globally (all machines in an organisation)
- /usr/local/bin was for binaries installed by a local administrator.
- /usr is usually for read-only data such as config files. It contains sub-folders like /usr/bin & /usr/lib. These files, which were originally only at root are duplicate root files.
- Debians way of sorting this is to link these sub-folders to the root folders e.g

/bin → /usr/bin

Meaning of colours in file names

GREEN : Executable
BLUE : Link to another file

- Ls -L This is the long flag for the ls function, it shows the file type & all associated permissions.

An example output from my console :

drwxr-xr-x jamie Users 4096 Jan 19 12:44 text.txt

Let's break this down :
The first 10 chars is where the file type & permissions are shown :

1 Char 1 is file type
'd' - directory
'l' - soft link (pointer to another directory in the file system) (link at the end of listing)
'-' - a dash is a normal file

2-4 Chars 2-4 is the owner permissions
The three bits here are read write & execute (rwx)

5-7 Chars 5-7 is the group permissions (same bit structure)

8-10 Chars 8-10 is the others permissions (same bit structure)

- /etc stores system-wide config files and typically only users with root access (the administrator account) can change things here e.g system-wide config for SSH is at etc/ssh

- /lib contains dynamic libraries, Windows calls these .dll files - POSIX calls them .so e.g /lib/x86_64-linux-gnu/libc.so.6 is the library that contains the built in C function like printf.

- /home is the directory containing users' home directories e.g the default user vagrant gets is /home/vagrant. The exception is root (admin account) who gets /root

- /sbin is for system binaries which is another collection of programs, typically only ones that system admins will use e.g /fdisk allows admin's to manage disk partitions. Lots of programs with fs in their name deal with managing file systems
  /sbin/halt run with root access shuts down the system
  /sbin/reboot " restarts "

- /tmp is a temporary filesystem that may be stored in RAM instead of on disk - it does not survive a system reboot.

- /var holds files that vary over time such as logs or caches

- /dev, /sys & /proc are virtual file systems. They aren't like standard UNIX files. Instead, they provide interfaces to interact with various system components of kernal data.

  - /dev offers an interface to devices such as hard disks
  - /proc provides access to running processes / runtime system info - process related data.
  - /sys provides access to system functions e.g on some devices, writing to /sys/class/backlight/acpi_video0/brightness changes the screen brightness

Package Managers.

- A package manager is software that instals packages from a repository. The main point of a package manager is that it can monitor package dependancies & make sure they are all installed too.

Command for installing packages:

Sudo apt install PACKAGE

Sudo - 'superuser do', means command is being run with root access, this often triggers a password. It is recommended to use this method for system administration rather than logging as root directly. If this needs to be done, run Sudo bash. This prompts your cmd line with $ or # to show you are working with root access

apt - This is Debian's package manager

install PACKAGE - adds a package & its dependencies

- Repos you are using are recorded in /etc/apt/sources.list
- 2 commands that should be run regularly for security reasons:

  Sudo apt update

  fetches the new package list from the repo so APT can tell if any packages have been updated

  Sudo apt upgrade

  upgrades all installed packages to the latest versions.