

APT Session 1: Unix



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Tratt



Software Development Team
2017-10-13

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- ...*ask questions*.

3 **Respect the subject**

- Participate when asked.
- Ask questions of yourself: what? why? how?
- Be prepared to correct me (politely).

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- Homepage: <http://tratt.net/laurie/> Twitter: [@laurencetratt](#)

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and Lukas Diekmann:

- Leads work on the Eco language composition editor.

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- 4 Getting a GUI.
- 5 Starting a web server.

Prerequisites

You should have:

- 1 Turned virtualization support on in your laptop's BIOS. The option may be called "virtualization technology", "VT-X" or "AMD-V". [Most Macs have this enabled already; so do Win8/10 machines; and so do AMD machines. Other Intel machines need checking.]
- 2 Downloaded and installed VirtualBox <https://www.virtualbox.org/>
- 3 Downloaded either:
 - <http://mirror.bytemark.co.uk/OpenBSD/6.2/i386/install62.iso>
(if you're running a 32 bit OS)
 - <http://mirror.bytemark.co.uk/OpenBSD/6.2/amd64/install62.iso>
(if you're running a 64 bit OS — if in doubt, assume you're running a 64 bit OS)
- 4 Ensured your laptop can connect to one of the College's wireless networks.

What is Unix? (simplified)

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- First public release 1973. [Windows first release: 1985]

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- Unix users adapt easily to other OSs. The reverse is not true.
- Unix is free to download, use, and adapt.

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 - It has a strong emphasis on security.
 - It's been my favourite OS since 1999.

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- 2 Have Unix installed alongside another OS.
- 3 Buy a Unix 'virtual machine' on the internet.
- 4 Install your own virtual machine and install it there.

['Virtual Machine' is an overloaded term. In this context: software which can run a full OS inside another OS.]

OS-level virtual machines

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- They run as normal(ish) software on a *host* OS.
- Each can run multiple *guest* OSs.
- Each is given RAM to work in and disk space.
- We can also take an ISO file (i.e. a rip of a CD) and make it appear to the guest OS as a CD.
- After that, the OS-inside-an-OS should work as 'normal'.

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Exercises:

- 1 Install OpenBSD. When prompted for the 'root password', enter `aptpass`. Also add a user with your preferred username and password `aptpass` [This is an awful password, but please use it so that we can more easily help you in this session.]
- 2 When prompted to reboot, instead type `halt`.
- 3 Eject the CD from VirtualBox. Then reboot the VM.
- 4 Login as your user.

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- Execute commands, see their results etc.
- There are many shells. OpenBSD's default is `ksh`.
- We'll treat it as a given for the time being.
- Minimal keyboard shortcuts:
 - ↑ / ↓ Cycle through previous commands
 - Ctrl+A Move cursor to beginning of line
 - Ctrl+E Move cursor to end of line

Unix filesystem

- A *path* gives the location of a directory/file.
- The root path is at '/'. [Every other directory/file is a subdirectory/file of the root.]
- Paths starting with / are *absolute*; all other paths are *relative*.
- The shell always knows what the 'current working directory' is.
- Useful commands:
 - `cd x` changes directory to `x`.
 - `ls` displays the current directory's contents (`ls -l` for detailed output).
 - `less x` displays the contents of `x` ('q' quits `less`).
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Exercises:

- 1 What is your current working directory after logging in?
- 2 How many entries are there in the root directory?

Standard filesystem layout

There is a semi-standard layout:

<code>/bin/</code>	program binaries
<code>/dev/</code>	special files for interacting with hardware
<code>/etc/</code>	configuration files
<code>/lib/</code>	libraries
<code>/usr/local/</code>	locally installed software
<code>/tmp/</code>	temporary directory for everyone
<code>/var/</code>	storage area for long-running server programs

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Exercises:

- 1 Have a look at the man page for `ls`.
- 2 List all entries in the root directory in 'long format' (i.e. with dates and times).

Manipulating directories and files

Useful commands:

- `cp x y` copies the file `x` to `y` (overwriting `y` if it existed).
- `cp -r x y` copies the directory `x` to `y` (putting `x` into `y` if the latter already existed).
- `mkdir x` creates a directory called `x`.
- `mv x y` renames the file/directory `x` to `y` (putting `x` into `y` if the latter already existed).
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Exercises:

- 1 Create a blank file in `/tmp/` called `apt`.
- 2 What happens if you try and create a directory of the same name?
- 3 Rename `apt` to `apto`.
- 4 Delete `apto`.

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Useful commands:

`cat x` writes the contents of the file `x` to `stdout`.

`less` without a pathname specified, displays the contents of `stdin`.

`sort` read and sorts `stdin`'s contents, writing them to `stdout`.

`wc -l` writes the number of lines `stdin` contains to `stdout`.

Exercises:

- 1 How many words are in `/usr/share/dict/words`?
- 2 Sort the contents of `/etc/passwd` and scroll through them.

Other `stdin` / `stdout` manipulators

- `x | y` chain `x`'s `stdout` to `y`'s `stdin`.
- `x > y` `x`'s `stdout` is written to a file called `y` (and not to the terminal). `y` is overwritten if it previously existed.
- `x >> y` `x`'s `stdout` is appended to a file called `y` (and not to the terminal). `y` is created if it did not exist.
- `x < y` `x`'s `stdin` now reads from a file called `y` (and not from the terminal).

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Exercises:

- 1 Execute `cat /dev/zero`, and suspend it.
- 2 Put it in the background, run `top` ('q' quits `top`) to see what processes are active.
- 3 Put the command back to the foreground then ask it to exit.

Users

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- If you need to run commands as `root`, run them from your user account and prefix them with `doas`. We'll set that up shortly...

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Exercises:

- 1 What happens if you do `ls /root`? And what if you change to the root user and execute `ls /root`?

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Useful commands (note that ':' is significant!):

- `a` move to 'insert mode' (after current character).
 - `i` move to 'insert' mode (at current character).
 - `:q` exit.
 - `:q!` exit without saving.
 - `u` undo the last change.
 - `x` delete character under the cursor.
 - `:w` save.
-

Exercises:

- 1 Execute `vi /etc/doas.conf` to edit the `doas` config file.
- 2 Add a new line `permit :wheel` then save and exit.

doas

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Inter-box communication

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Exercises:

- 1 If you haven't done so already, [activate your Informatics account](#).
- 2 Run `ssh -l user bastion.nms.kcl.ac.uk` where `user` is your Departmental username.

Power control

- `reboot` reboots OpenBSD.
- `halt -p` turns the machine off.

Packages

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Exercises:

- 1 Run `doas vi /etc/installurl` and add the line:
`http://mirror.bytemark.co.uk/pub/OpenBSD/`
- 2 Run `doas pkg_add xfce`
- 3 Run `echo startxfce4 >> .xsession`
- 4 Logout or `reboot`
- 5 Run `doas pkg_add firefox` then run `firefox`.

A better shell

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Exercises:

- 1 Run `doas pkg_add zsh`.
- 2 Run `zsh -l` to launch a new instance of `zsh`
- 3 Run `chsh -s zsh` to change your shell for all subsequent logins.
- 4 Run `vi ~/.zshrc` and add these contents:

```
autoload -Uz compinit promptinit
compinit
promptinit
prompt walters
```

Save, logout, and log back in again.

Additional exercises

Try these (roughly in order):

- Configure `zsh` further. Try [configuring it](#).
- Experiment with file permissions & owners. [Try `chmod` and `chown`.]
- How to terminate arbitrary processes? [Try `kill`, `pkill`]
- Install a modern desktop. [Try KDE or Gnome.]
- Install an advanced editor. [Try VIM, though you will need to configure it. At a minimum start with something like [vim-sensible](#). You can try [my vimrc configuration if you'd like](#). Save it to `~/.vimrc`. The good stuff starts with plugins like [ctrlp](#).]
- How to run a website? [I use OpenBSD's [httpd](#).]
- How to handle mail? [Try an SMTP server like Postfix or OpenSMTPD.]