ECE 650 – LINUX & GIT TUTORIAL

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Connecting to ecelinux from home

- Open up an SSH client, eg PuTTY
(http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html)
- Connect to `ecelinux4.uwaterloo.ca` with your Quest username and password
- Once connected, type `ssh –X eceLinux`**N** to connect to one of the ecelinux work machines to do work (N = 1 to 11)

- If at any point it asks you something about RSA key fingerprints or authenticity, just accept them.

Basic Linux commands

Command	What it does
pwd	prints out the path to the current working directory you are in
cd *folder*	will change the current working directory to *folder*
ls	lists all the folders and files in your current working directory
ls -la	also lists all hidden files and directories
ls *folder*	same command but will list the contents of *folder*
mkdir *foldername*	creates a folder called *foldername* in your current directory
rmdir *foldername*	deletes the folder called *foldername*
touch *filename*	creates a blank file called *filename*
rm *filename*	removes the file called *filename*
rm -r *folder*	deletes *folder*, and all files and subfolders within *folder*

Basic Linux commands

Command	What it does
man *program*	display the help page for a particular command or program
more *filename*	display the contents of the file called *filename*, with controls to advance the contents page by page
less *filename*	display the last page of content of the file called *filename*, useful for inspecting log files for the most recent events

There's many more Linux commands, look them up on Google

File Editing

- There are various ways to create and edit files in Linux, but most commonly these will be text files
- Most popular command line text editors: `emacs`, `vi`, and `vim`
- Most popular graphical text editors: `gedit`
  - In `ecelinux` you won't be able to get a graphical user interface running, in your own Linux computers you can use graphical text editor tools

Vim (Vi Improved)

- Has 4 modes, normal, insert, visual, and ex mode, which you must switch between
  - Vim always launches in normal mode (for viewing)
- Basic tutorial: http://vim.wikia.com/wiki/Tutorial
- Advanced commands (search & replace, etc):
  - https://danielmiessler.com/study/vim/
  - http://derekwyatt.org/vim/tutorials/novice/
- To edit a file: type `vim filename` in command line to launch vim with that file opened
  - Press i to enter insert mode, start editing
- To save the file, from insert mode, press esc, then type :w and press enter
  - Press i again to go back to insert mode
- To quit the program, from insert mode press esc then type :q
  - Together: :wq will save and quit

Linux Shortcuts and Environment Variables

- ~ is a shortcut to your home directory (eg `cd ~`), on `ecelinux` this is /home/*yourUWID*
- You can create your own custom shortcuts (called environment variables) by editing the file ~/.bash_profile
- Eg add this to .bash_profile then save:
  - export ECE650=~/myCourses/ECE/650
  - export A1=$ECE650/assignment1
- Of course, you'll also have to create these folders using `mkdir`
- Run command `source .bash_profile` to add the environment variables to memory
- To see that it is in memory, use echo command: `echo $ECE650`
- You can then use `cd $A1` to jump right to /home/uwID/myCourses/ECE/650/assignment1 folder

Source Code Version Control Systems

- Software systems to help you manage and share source code and projects
  - Versions and version history
  - Team editing
- Two most popular systems: `Git`, `Hg`
- Two most popular hosting sites: Github.com (works with Git only), Bitbucket.org (works with both Git and Hg)
  - Create an account and a git project on one of these!
- `ecelinux` only has `Git` installed

Git System

- Keeps track of incremental updates to your source code and project via a series of **Commits**
  - repeat(make some file edits and changes, commit)
  - You can backtrack your commits to go to an earlier version of your project, and go forward again as well
- Keeps track of development work in parallel across team members using **Branches**
  - From some commit, we **Fork** into two branches, each branch then advances with its own series of commits, and some time later we **Merge** the branches
  - Each branch typically owned and worked on by 1 person
  - Merge will combine the work across team members

Basic Git project management

- To clone a project (including your own) from the web, use `git clone` command:
  - `git clone https://github.com/`*`youraccount`*`/`*`yourproject`*`.git`
- Committing:
  - Add all relevant files you want to the commit using `git add`
    - `git add /path/to/filename`
  - Then create a commit:
    - `git commit`
    - It will prompt you with a screen asking you to enter a commit message, the message describes the overall changes you did in this commit (eg added display functionality, changed x, removed y…)
  - To upload the commit to the server, use `git push`
- Full tutorial: http://rogerdudler.github.io/git-guide/

Virtual Machines

- A technology which allows you to run multiple virtual computers inside a single physical computer
- Each virtual machine is a virtual computer, has its own operating system
  - Host OS → The one installed directly onto the physical computer
  - Guest OS → The one installed inside the virtual machine
- There are both commercial and personal use virtual machine systems
  - VMware is the most popular commercial system
  - Oracle VM VirtualBox is the most popular personal use system

Getting Linux working inside a VM

- Download Oracle VM VirtualBox for your Host OS:
  - https://www.virtualbox.org/wiki/Downloads
- Download Linux installation ISO disk
  - Eg for Ubuntu: http://releases.ubuntu.com/15.04/ubuntu-15.04-desktop-amd64.iso
- In VirtualBox:
  - Create a Linux VM, make sure its 64 bits (or matching your Linux OS)
  - Adjust the settings of the VM for CPU, Memory, etc… and attach the ISO to the virtual CD drive
  - Power on the VM, proceed to install Linux
  - Once installation is completed, you can detach the ISO file using the same menus
  - Configure Linux to your likes
  - Enjoy!