PHYSICS 2T C Programming Under Linux

Linux Lab 5 Regular Expressions and GNU Make

INTRODUCTION

This lab is all about Git and GNU Make. Although previous labs have guided you through individual steps and offered advice, this lab comes with no tutorial and you are expected to do your own research to complete the questions.

All of the topics covered in this lab are extremely well documented in lectures, online, in books and on the internet. It is your responsibility to find these yourself.

As with previous labs, if you get stuck don't hesitate to seek help from lab demonstrators, lectures and other students. As before please supply your answers in and answer.txt file.

QUESTIONS

1. You's a web browser to navigate to: https://bitbucket.org/glaphysp2t/lab5-example

   a) What command would you use to clone the repository to your account on brutha? Clone the repository so you can work on it. (**NOTE:** you will need to use the https://bitbucket.org/glaphysp2t/lab5-example.git URL to clone the repository, DO NOT use the ssh URL).

   b) What command would give you a list of commit messages all on oneline? What is the message associated with the hash 2a65f62?

   c) Build the code using the provided makefile, run it with the make test command. After running the program edit the README.md file to include a description of what the code does.

   d) What is the output of git status?

   e) What commands would you use to commit your modified file to you local repository (Hint: you'll need to add the file to the commit first!), with an appropriate commit message. Do this and copy in the results of git log.

   f) Create a new branch called myfeature (note the command you used).

   g) Change into that branch (what command did you use?). What is the output of:

      git branch --list

   h) Make any modification to the code, commit your changes and note the output of git log.

2. Give short descriptions of the following automatic make variables:
   a) **`$@`**
   b) **`$^`**
   c) **`$<`**
   d) **`$?`**
3. Examine the code in the **`simulation`** directory, spend a few minutes getting to know it before continuing. **Make sure you are able to compile the program for the command line before continuing (HINT: compile main.c and simulation.c and link together).**
   a) Write targets for **`main.o`** and **`simulation.o`** in a **`makefile`**. You must make use of at least some of the automatic variables provided by **`make`**.
   b) Write a "Phony" target called **`clean`** which removes any object files generated by **`gcc`**.
   c) Write the body of a function (**`kinetic_energy)`** in **`simulation.c`** which returns the kinetic energy of an object given its mass and relativistic velocity (a skeleton is provided for you). Use this function and add a third column of data to the lookup table.
   d) Use **`make`** to compile your edited source code. Run the program to make sure it works then redirect the output to **`sim.data`**.
   e) Display the results you have produced using **`gnuplot`** using the provided **`graph.plot`** file. You can do this by running the command:

      gnuplot graph.plot

   f) In the simulation **`makefile`**, what library needed to be linked and why? Which C function used in the lookup table requires it?
   g) How would you enable debugging symbols and compiler optimisations in **`gcc`**? Edit the **`makefile`** and enable them.