COMP8049 – Embedded Systems Engineering - Labs

Completion Date: 21th October 2019

Value: 15 marks

On completion please zip up your files and upload to Canvas.

Q1

Write a c program which sorts all the words in a text file and outputs them in alphabetical order.

Q2

Create a model for the traffic light simulation and state machine that is detailed in section 10.4 of the traffic-light-simulator.pdf also here

http://users.ece.utexas.edu/~valvano/Volume1/E-Book/C10_FiniteStateMachines.htm

This model is to run on your host machine. Your model can be built as a client/server application. See here for example:

http://www.binarytides.com/server-client-example-c-sockets-linux/

Note:-

1. this example uses pthreads you need to build it with:

gcc -pthread -o server server.c

2. This example as is blocks in the server waiting for a connection from a client. You will not be able to process the “sensor” readings unless you convert the server into non-blocking.

3. Each client can then emulate a button press by simple key presses on the keyboard. You can also model the key presses as discrete events on the client e.g. using a timer, random number generator etc.

Q3

Using your code in Q2 build a traffic light controller model and simulation that is cross compiled for an ARM based SOC.

You can use the qemu-system-arm emulator https://wiki.qemu.org/Documentation/Platforms/ARM.

See here for steps to build a binary for the qemu emulated versatilepb board.

https://balau82.wordpress.com/2010/02/28/hello-world-for-bare-metal-arm-using-qemu/

See emulating-arm-pl011-serial-ports.pdf for an example which emulates the serial communications to the qemu emulated `versatilepb board`.

https://balau82.wordpress.com/2010/11/30/emulating-arm-pl011-serial-ports/