NET103 Operating Systems Coursework

This is a group (pair) assignment. I would like you to work in pairs as there are two programs involved here. Larger groups must be cleared with the module leader first. As group working is not a module learning outcome there is no requirement that you must be in a group, however this is a naturally pair task.

This is mostly assessing LO5 " Produce simple programs that demonstrate the use of concurrency and how to manage concurrency safely.", however there are elements of networking in here. In particular, you will have to create an application layer protocol.

Write a networked traffic light simulation in C#.
You should use my pair of sample programs as a starting point. As usual, they have been hastily written, and are nothing more than a starting point. These are in the form of a client and a server (and a sort of proxy that you don't need to touch).

Please see the document alongside this one for an explanation of how the sample code works. The samples don't implement the functionality below; that is for you to do.

The Client
Displays the status of the traffic lights, red - amber - green. It also allows you to push a command button to indicate that a car has arrived and is waiting at the lights, which will remain at red until a command to change them is received from the server. Every time a car arrives a message is sent to the server alerting it.

The light will stay red until a message is received from the server to change. When the lights are changed to green the number of cars waiting at the lights becomes zero.

The Server
In a top solution the server will support a connection to many clients. At present is only supports one.

When the number of cars waiting at a client exceeds 10, the server sends a message to the client to change the status of its lights to green. At some point in the future, the server muse then send a message to the client to change the lights to red.

Advanced: You can make this as complicated as you want. This next part is out of scope but if you want to be ambitious have a go. You will need a map if the locations of your traffic lights and will have to have a strategy to route traffic about as efficiently as possible. Also, if you want to try to create animations of cars going past green lights, please ask how to do that.

Assessment

This is a very open ended piece of work, so the marking scheme is approximate.

Top grades will be awarded to a solution where the server can manage connections to many clients and switches the client to green when 10 cars are waiting, then returns them to red at some point.

Totally amazing grades will be awarded to solutions where the server can manage connections to many clients have some sort of routing algorithm and / or animations of cars going past green lights.

Pass grades will be awarded to solutions where the server manages a connection to a single client and can change the status if its lights to green when 10 vehicles arrive. Better than pass will be awarded if your server then changes the client's status to a red light. A2:1 can be achieved on a solution where the server only manages a single client if done well.

Demonstration (Part2 only)

A demonstration is optional but can only do you good. If you feel particularly pleased with your project and would like to demonstrate it to me, please email to arrange a time.

Hand in:

This year you will submit through the DLE electronic submission system.

Submit a single zip archive.

You will need to tell be your groups in advance so that I can set them up on the DLE before you can submit.

Create a single ".zip" archive and submit that. In that single archive, you should include.

- A folder containing your server project and your client project. The entire Visual Studio projects please, not just an executable or a .cs file. Also the sort of proxy if you have modified it (you don't have to)
- A brief write-up about your project. This isn't supposed to be a formal exercise in documenting software. Just give me enough information to understand what I'm looking at, and in particular what I do as a user to make it work.
- An evaluation of your solution. Don't feel shy about blowing your trumpet and please draw my attention to anything you are particularly pleased with!
- Who contributed what.

By default, all group members will be given an equal mark. I reserve the right to give unequal marks to different members of the same group, but I need to be given a reason for doing so….

Both Parts

The deadline is: Friday 22nd May 2016 @1600

Please Note: You don't have to wait until the last minute before submitting your work. Please try to submit it before the deadline, preferably quite some time before the deadline. The DLE can become very slow at busy times, and the slowness of the system at such times is not valid grounds for late submission.

Nigel Barlow 2016