CS402 Assignments

Note: There is a pdf document on moodle in the lecture slides folder entitled 2018 Development Environment Installation Details which explains how to install components in Eclipse for most aspects of coding that we have or will cover in the course. I have spent a long time solving the configuration problems and dependencies that are needed for several different programming problems and environments so that you don't have to. So take a look at it and it may help bootstrap and accelerate the development of several of these assignments and also allow you test some of the parallel programming ideas covered in class in the second half of term later if you wish.

These are the CS402 assignments, each worth 15 marks. You only need to do any two from the choice of six assignments for full marks in continuous assessment. Maximum CA mark is 30. All assignments are due at the latest by the end of term, May 4th.

In the last week of term Monday 30th April - 4th May, I hope to do marking of your coursework assignments. I will propose a selection of timeslots and you can sign up to one of the slots by email. I will come to your desk and look at your work for a couple of minutes and give you your marks. Simple as that.

All the assignments are relatively straightforward and should not take too long to complete. The idea is to give you a safety buffer going into the exam and take some pressure off. Whatever ones you choose, please try to understand and do the work yourself and this will help you explain and operate the code when being marked. There is nothing wrong with helping each other out with understanding or problems in completing these assignments, but you must do your own work and copying or production of the same software without evidence of your own input and understanding may result in poor marks.

Assignment 1

Create a SOAP based Web Service and Client, showing the WSDL and demonstrating the service working. Try to be more innovative than hello world for better marks. You could look on the Internet and see if you could incorporate any existing XML based Web Service.

Tutorials here for how to do it with Eclipse
http://www.java2blog.com/2013/03/soap-web-service-example-in-java-using.html
Easy to find more on the net, also check youtube videos.

You are not restricted to using Eclipse/Java/Glassfish, you might use Visual Studio and IIS, but it must be a SOAP based web service, you must have a WSDL file to show the server contract and you must demonstrate it working.

Assignment 2

Create a simple Grpc Client and Server application using Protocol Buffers. It doesn't matter what the service does as long as you can build it and run it in Eclipse. Follow the installation notes in the moodle document and the service should be different to that example, perhaps demonstrating a streaming or bidirectional feature of Grpc.

Assignment 3

Implement a simple chat client which transmits user messages to a multicast address and receives messages sent from other clients on other machines sent to the same multicast address.

When implementing the chat client, as a minimum, you will need to implement the transmitter code and the listener code as separate threads so that live messages from other sources may be received and displayed while the user is also typing a new message to be sent.

The basic components of the code for communicating in Java are given in the lecture notes on the topic of multicast communication. Java threads were used in CS240 in second year, we will also look at them again after the midterm break. Put the two together.

Assignment 4

Implement a program that can communicate a HTTP GET request to a web server to retrieve and save the HTML payload of the web page. Parse the HTML for additional embeded hypertext URLs and fetch and save each of those also.

The Apache HttpComponents packages provide a toolset of low level Java components focused on HTTP protocol processing for anyone building HTTP-aware client and server applications such as web browsers, web spiders, HTTP proxies, web service transport libraries, or systems that leverage or extend the HTTP protocol for distributed communication. A small piece of code which used these tools was included in the slides on the HTTP protocol in lectures.

The components can be downloaded from https://hc.apache.org/, drag them into Eclipse and add to the build path to use them in applications.

You can use any other HTTP toolset package instead if you wish.

Assignment 5

The following URL returns an XML document containing realtime information about Bus Times from the bus stop 103381 (Supervalu Enfield).

https://data.dublinked.ie/cgi-bin/rtpi/realtimebusinformation?stopid=103381&format=xml

Write a program that can fetch this realtime xml feed for your chosen bus stop id, parses it and displays the bus times in a more readable tabular form (in a HTML perhaps) with Due Time, the Route Number, Destination, Origin and Operator clearly indicated. This page that I created produces a HTML table to display the XML data using a google script www.enfieldonline.net/public-transport

Other stop numbers can be found here:- http://www.buseireann.ie/inner.php?id=403

Use XML document processing tools in eclipse or some other environment to make this straightforward and short to implement.

Assignment 6

Create a Java socket based client-server style application where the server implements a threadpool for executing incoming requests. You must demonstrate the service working. The service doesn't have to do anything significant, for example a simple calculation of some kind would suffice. The server should print out details of incoming client connections as well as returning results to the client.

NB: We have not yet covered thread pools in lectures but you could build this as a single threaded server first and then alter the server code later to operate a threadpool when we get to that topic shortly in the second half of term. It is quite short.