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19/20(2) XICO1921 Programming Proiect (34869)   Learning Resources   Programming proiects

Second project planning stage

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Introduction

This whole project is worth 70% of the module grade.

You should choose one of the 4 topics described below.

Work on this project is **individual**. You are free to discuss your work with other students but the code you submit should be your own.

You have to submit a short design plan and test plan for your project on Minerva.

The final project report is submitted on Minerva in Semester 2.

Your code is submitted on Minerva in Semester 2.

The demonstration of your work will take place in Semester 2.

Submission dates will be confirmed soon.

Project 1 - a chatbot

What is this project about?

A chatbot is a program that tries to have a conversation with you.

The most famous chatbot is Eliza - [try it here](#)

What does it involve?

You will write a program that can have a conversation with the user.

This does not have to be perfect - even the best chatbots are not very good at this.

There is a open problem in Artificial Intelligence called the [Turing test](#) (his photo is in the lab), with a famous prize, if your chatbot is perfect.

Description

There are 2 parts to the project:

1 Reading input from the user and trying to understand it

2 Writing a reply to the user that makes sense

In both cases you will have to decide how to do this.

You can use String operations to break up the input, and design your own functions to decide how to respond.

You can make rules for your program or try to search for patterns in the user input.

Note

There is code online for chatbots, some in C, some in other languages. If you choose to use some other code as a starting point you must include the reference to this code in your report.

You must also be clear what is the code that you have written and what is code that you found online.

Project 2 - a library information system

What is this project about?

A library has to store information about the books it keeps, the students who use the library, and a record of books that are borrowed.

You will design software that manages the library information and allows:

- books to be added and removed from the library
- students to register with the library
- students to search the library for books
- students to borrow and return books.

What does it involve?

You will create software for the library, including:

- a data structure for books
- a data structure for registered students
- a command-line interface for using the library.

Description

You must use C data structures (struct) and dynamic memory allocation (malloc) for this task.

You must implement the following functionality:

1 There should be one member of staff (librarian) who can add and remove books from the library, list all books and list all registered users.

2 A student can register with the library, list all books, search for books, borrow a book and return a book.

3 The library and student data is written to a file when the program is closed. When starting the program the data file is read and used to reset the application data.

You can implement any further useful functionality that you decide on.

Note

There is code online for similar information systems, some in C, some in other languages. If you choose to use some other code as a starting point you must include the reference to this code in your report. You must also be clear what is the code that you have written and what is code that you found online.

Project 3 - Route finding

Attached Files:　📄 Final_Map.map　　(615.293 KB)
　　　　　　　　　📄 map.jpeg　　(134.467 KB)

What is this project about?

This project asks you to compute the best path between 2 points on a map.

You are given a large data set that represents all the footpaths on the Leeds University Campus that you can use to test your application

What does it involve?

Data input from a file - the data file is quite complex and you have to read it in

Data structures - you have to decide how to store the data, there are suggestions below

Algorithms - you have to create a function to find a path between 2 points, there are standard algorithms for this that you read about

More information

Given a data set in the form of a set of locations (Nodes) and paths connecting them (Links) you should implement an algorithm to compute the best route between 2 given locations.

"Best" could, for example, be the shortest route, but you may wish to consider other measures.

The data set is attached in the file 'Final_Map.map' and represents footpaths on campus. A jpeg image, also attached, shows what the path network looks like.

The following requirements are essential:

1. You should create a suitable data structure for the problem - a suitable candidate would be an Adjacency List which stores a list of points in the data, and for every point a list of points that are connected to it with edges.

https://www.khanacademy.org/computing/computer-science/algorithms/graph-representation/a/representing-graphs

2. You should consider how to import the data into your data structure.

3. You should consider a suitable visualisation of the data - for example edges can be plotted in Gnuplot in a similar manner to the quadtree (see attached jpeg).

4. You should implement at least one algorithm that finds a path between 2 given points.

Note

The data file contains several lists of different types of data.

The most basic is the "node" which is a point in space with coordinates defined by (lat,lon) - you can use them as (x,y). Each node has a defined "id".

The next is the "link" which is a line defined by 2 node id's.

Those 2 data-types are enough to define the map of the network. ie. you can plot each link to get the picture I attach above.

There is extra data in that file that you can use or ignore.

Reading in the data file. There are several ways to achieve this. One way, as described in your text book (p71-72) uses fgets() and sscanf().

That is probably the easiest. Each line has a fixed format once you know if it is etc.

Project 4 - The SDL library

Attached Files: 📄 texture.zip   (14.459 KB)

What is this project about?

SDL is a library that you can use to create 2D graphics. It is often used to create computer games.

You will have to learn how to program with SDL. I have provided a tutorial with an example program. There are links below to online tutorials explaining what SDL can do.

The SDL library

SDL - the Simple DirectMedia Layer - is a high level library giving access to the multimedia hardware on your device.

The SDL library

SDL tutorials

In particular it is a useful framework for game development in C.

The SDL2 libraries and headers are installed on the linux machines in the standard locations.

For your project you should develop an application using SDL.

There are many existing C applications online that use SDL - if you choose to base your code on one, you must be able to clearly distinguish your work from the original code.

Note that many applications use C++, this course requires a C implementation using SDL.

Installing SDL yourself

My general advice for linux and mac is to install from source and compile on your machine.

It is described on the wiki and is quite simple. Download the C source code and extract. Run './configure','./make','./make install' (as root) and it should work.

Some extensions, eg. SDL_image, have to be downloaded and built separately.

Building code with SDL:

They can be compiled directly into your code using the standard approach for libraries, as required

ie. -lSDL2 -lSDL2_image -lSDL2_ttf

An example is attached above.

Tutorial: Programming with the SDL library

Attached Files: 📄 Modular eatModular.zip   (4.853 KB)
                     📄 Basic eatSquares.zip   (4.514 KB)
                     📄 prog-11.pdf   (41.653 KB)

SDL libraries and data structures; Basic structure of an SDL application; Example application

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Second project - planning report

The planning report is worth 20% of the module grade.

You should write a design and test plan for your chosen project with the following structure:

Title

A chosen title for your project, your name, your username

Summary

A short description of your project. Which project choice it is? What your project will do?

Design plan

A **large-scale** design plan - what is the aim of your project? What is the input? What is the output? What problem does it have to solve?

A **medium-scale** design plan - what code modules are required for your application? What will each module do as part of your application.

Iterations of design - what is the simplest application you will develop? What is the next step? How any iterations are required for your application and what are they?

Test plan

How will you test your application? What are the tests you can design for each iteration of your project? What are the tests for each module?

You should describe tests at the medium and large scale. Low-level tests and debugging will take place during code development.

Schedule

It is important that you have a realistic plan for how much time you will spend on the project and on each iteration of design. Write a plan for what will you do in each week until the project is submitted. This should include time off required for revision and exams and your holidays.

For each week write 1-2 sentences describing what you will do.