Computer Science 3A

Mini Project

2021-02-15

Deadline: 2021-05-04 12h00 Marks: 100

You are required to implement a practical project that will demonstrate your proficiency with data structures discussed during this course (especially the Graph ADT) using the theme discussed below. The practical mini project must be submitted on or before the deadline (**No Exceptions**). *Late submissions will not be accepted and the student will receive zero for any late assignments.* This practical project will count as part of the practical component of this course (and 25% of your semester mark).

Note: — *A signed plagiarism assignment submission form must be submitted alongside the practical assignment that will cover this assignment. The appropriate form will be made available on EVE and there will be a separate submission area.*

The mini project demonstrates your understanding and proficiency with the concepts discussed in class and how they can be applied within a specific domain to solve a problem. You might need to make use of data structures we have not yet covered in class. In this case you will need to research the implementation of the appropriate data structure. The practical mini project must meet the following requirements:

1. **Programming Language:** Java
2. **Submitted File Format:** Zip (Only!)
3. **Submitted File Naming Convention:** *studentnumber*_miniproject.zip
4. The ZIP file must contain the following directory structure:
   (a) `src` – that contains all of the Java source files.
   (b) `dist` – that contains a executable `jar` file.
   (c) `ss` – that contains PowerPoint or PDF Slideshow for your Mini Project.
5. The use of third-party libraries for **primary** functionally is strictly **prohibited**, however, third party libraries can be used for other functionality such as communications and visualisation (such as normal JavaFX, JFreeChart, GraphStream, JGraphT, Yworks, JUNG or JMonkey).
6. Your assignment must be executable from a `jar` file. If the assignment cannot be executed, you will receive zero.

7. If the assignment is too big to upload, please upload the source files to Eve and contact the lecturers for the alternative upload method.
8. Your assignment must make use of a **graph-based structure** at its core.
9. The use of other data structures for auxiliary operations is encouraged (List, Stack, Queue, Heap, Dictionary, Trees, etc.)
10. You must write the data structures yourself, you may use the textbook to guide you in the implementation of your data structures.
11. You may not do a practical implementation that has already been assigned during the course.
12. The assignment is an individual project and should not overlap with any other students (past or present) or source code found on the Internet. Each assignment will be checked and if found guilty will be sent up for disciplinary action.

Theme: Blockchains with Graphs

The theme for the Mini Project are network-based Blockchains. A blockchain is a collection of records (called blocks), where each block links to the previous block using cryptography. Each block contains cryptographic hash, timestamp and data relevant to its application. Think of it as a distributed ledger where instead of information being stored in a database it is stored on the blockchain. Some examples of solutions that use a blockchain at its core are:

1. Cryptocurrencies (however, for this project you may NOT do a cryptocurrency)
2. Smart contracts
3. Trading
4. Supply chain management
5. Anti-counterfeiting
6. Healthcare
7. Domain names
8. Proof of existence
9. Voting
10. and many others!

Your practical implementation **mus**t address a one of these or similar problems and solve it using the **Graph ADT** provided as a primary component of an application. You are free to choose which problem you want to address and how it uses a blockchain, it just needs to use the Graph ADT provided.

Examples of mini projects you may **NOT** implement include (i.e. the ban list that will result in you getting zero):

1. **A cryptocurrency** — where the blockchain only has a wallet and transactions (try and be a little more creative ok?).
2. **A Utility library** — where there is no user interface (remember we want to play with it and see it works).
3. **Anything copied from the Internet or a previous project** — This is plagiarism and the appropriate disciplinary action will follow should this occur (just don't do it).

You will receive marks based on the scope of your practical mini project, your use of the Graph-based blockchain, user interface, the required data communication to facilitate its use and the presentation video (you will get guidance on these throughout the semester).

You must confirm your individual project by **8 March 2021 at noon**. The method of confirming the project topic will be a Google Form (the URL will be provided closer to the time) and the outcome (out of 5, where 2 and below is a rejection of your project) will be shown on Eve for each student's topic.

Marksheet

1. **Abstraction** (Successfully translates problem domain and aspects to Blockchain) [15]
2. **Use of a Graph-based Blockchain** (CRUD of nodes and edges with block vetting) [20]
3. **Logic and Complexity** (Can facilitate solution processes, provides a dynamic graph and solves problem) [20]
4. **Look and Feel** (Aesthetics - A graphical user interface that facilitates the use of the Blockchain) [15]
5. **Data Communications** (A distributed client with network communication is created for each role and every individual blockchain is updated accordingly) [20]
6. **Video with slideshow** (An 8 minute video describing their project with a SS that depicts all the necessary aspects and provides screenshots for processes) [10]