## Instructions:

## Software 2: Semester 1- 2024

## DSA Assignment 3

## Implement the structures as outlined below- Part 1 AND Part 2. You are then required to code Part 2 in a language of your choice. Work in groups of 2

## 2. The Assignment is to be presented in a report (1 report per group).

## This report is to contain:

## Part 1: Hash Table Application

## What is a Hash table?

## Description of application as specified below

## A table of data of example used

## Username, ASCII Integer, Index after Hash function applied

## Diagram of Hash table produced. Highlight any collisions which occurred.

## Part 2: Graph Application

## Description and diagram of the Graph used.

* A description (and diagrams) of underlying data structures used to solve the problem (how the graph is stored),
* pseudocode of the Algorithms used,
* a copy of the fully documented code,
* a one line description of all the methods/routines which have been used,
* Sample execution screenshots of outputs produced for each operation
* As part of the report also, produce the minimum spanning tree(MST) of your graph.. no need to code, just a paper version. Indicate which algorithm you used to calculate the MST and show the order of the chosen edges.

3. Report (.pdf format) , Code (.pdf format) and an executable file (.jar format or other) to be uploaded at this link: [Upload HERE](https://setuo365-my.sharepoint.com/:f:/g/personal/aine_byrne_setu_ie/EnYkujh_y4xHpwqUoCCMZT4BBvAElkI43ylsUr2fYjTjpA)  One of each per group.

Named as follows: Use first names of both students in file names. For example:

Report:  AineSimonReport.pdf

Java code: AineSimonCode.pdf

Executable: AineSimonExe.jar

## 4. Due Date: Tuesday Dec 10th 2024 12 noon (Week 13)

**Part 1: Hash Table Application**

Brief: Develop a Hash table for a Login application containing usernames. Each username (max 6 letters) needs to be converted to a number by adding the ASCII value of each character together. Use a hash table of size 20 and use mod 20 as the hash function. Use the hash table to store 8 names (of your choice) and in case of collision, use linear probing.

Submission: For each of the 8 usernames chosen, show the username, show their integer calculation (adding their ASCII values together) and the index produced after applying the Hash function.

Draw diagram of the completed Hash Table. Highlight any collisions which occurred.

**Part 2: Graph Application**

Create a map(graph) of tourist sites (minimum of 6) in your area to be used for a walking tour application. Each piece of data stored will contain the name of the site and the co-ordinates of it (expressed as x/y co-ordinates or longitude/latitude co-ordinates). Design a Data structure to store your map. Draw diagrams of your actual graph, and of the graph stored using your chosen method, to illustrate your answer.

Using the graph storage method you described; Write the algorithms for the following operations, using your graph example:

**Search (site):** will output full details of the given site

**Insert (site1, site2, weight):** adds an edge from site1 to site 2 with a given weight

**AllCons (site):** will output names of all sites connected to the given site

**Closest (site):** will output names of site which is closest to given site

Acknowledge, Describe, Evidence Document

Include a completed version of this document as an appendix to any submitted work.

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| Acknowledge  unchecked I did NOT use any AI Technology or online resource.  I acknowledge the use of <insert AI system(s) and link> or <weblink> for the following purposes:  unchecked to generate materials for background research and self-study in the drafting of this assessment.  unchecked to generate materials that were included within my final assessment in modified form. |
| Describe  Please provide a short summary of how you used generative AI/website in your assignment. You may wish to include the following information:   * What prompts did you use? * What outputs did you generate? * How did you use/adapt/develop the outputs?  |  | | --- | | Summary: | |
| Evidence  Please provide evidence of the outputs that you generated by copying and pasting below or by providing a screenshot.   |  | | --- | | Generative AI system/Website:  Prompt:  Output: | |
| Declaration  unchecked I confirm that no content created by generative AI technologies or website research has been presented as my own work. |