University of Technology, Jamaica

School of Computing and Information Technology

Data Structures

CMP2006

Course Outline

Academic Year 2019/20 SEM 1

Module Overview:

This module addresses aspects of the development and use of data structures and algorithms in computer applications. It emphasizes the specification of data structures as abstract data types using pseudo-code. It introduces data structures such as linked lists, stacks, queues and trees, while examining the complexity of commonly used algorithms.

Syllabus: https://drive.google.com/open?id=1cPt8hv_C51qYWfICZ-BWEhrVSL9pJjEq

Course Content:

Google Drive:

Direct Link: https://drive.google.com/open?id=0BymQnRg6tuQ4d0psNS1IYjcyYjA

- Includes, lectures, labs, tutorials, past course material and other samples

Facilitators:

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***Preferred for student enquiries

**Consultation times will be provided by lecturers when available. Consultation by appointment only: https://goo.gl/dGGzfT

Selected Tools/Technologies/Resources to be incorporated:

- Primary Programming Languages: C++, Java (students are only required to utilize ONE programming language and are welcome to utilize other languages)
- [Java students] Eclipse (latest)- http://eclipse.org/downloads
- [C++ students]Visual Studio for C++ (latest - Community Edition) - https://visualstudio.microsoft.com/downloads/
- [Java students] Java Runtime Environment And Java Development Kit, min version 1.7 - http://www.oracle.com/technetwork/java/javase/downloads/index.html or http://www.oracle.com/technetwork/java/javase/downloads/index.html
- Additional resources will be provided where necessary

- Git (latest recommended) - https://git-scm.com

Required Text and Recommended Readings:
Required Text

- *Weiss, M. (n.d.). Data Structures and Algorithm Analysis in Java*. Pearson Education, Inc.

Recommended Text:

- *Deitel, P., &Dietel, H. (n.d.). C++ How to Program,* Latest Edition.Prentice Hall.

- *Gilberg, G., Forouzan, B. Data Structures: A Pseudocode Approach with C/C++*, Latest Edition. PWS Publishing Company.

- *Weiss, M. Data Structures and Problem Solving Using C++, 2nd Edition*. Pearson Education.

Additional Code Resources:
https://github.com/ggordonutech

Assessment Breakdown:

Assessment	Issued	Due	Breakdown
[002] Theory Test 1	Week 6		10%
[004] Theory Test 2	Week 12		10%
[003] Lab Test 1	Week 6		10%
[005] Lab Test 2	Week 12		10%
[001] Participation (Weekly Lab)	Week 2	Week 11	10%
Group Project	Week 2	Week 10	20%
Final Examination	SEE EXAM SCHEDULE		30%

Weekly Breakdown:

Week	Lecture and Tutorial	Lab
1	Unit 1 - Course Overview, Introduction to Abstract Data Types	Debugging, Programming Refresher, OOP,
2	UNIT 2 - Iteration and Recursion	← Same
3	UNIT 3 - Introduction to Complexity Analysis	← Same
4	UNIT 4 - Searching and Sorting	← Same
5	UNIT 5 - Introduction to Linked List ADT	← Same
6	UNIT 5 - Continue Linked List ADT	← Same
7	Lecture Test 1- Unit 1-5	Lab Test 1 (Linked List)
8	UNIT 6 - Stack ADT	← Same
9	UNIT 7 - Queue ADT	← Same
10	UNIT 8 - Introduction to Tree ADT	← Same
11	UNIT 8 - Expression Trees	← Same
12	UNIT 9 - Search Trees	Group Project Interviews
13	Lecture Test 2 - Unit 6-9	Lab Test 2 (Stacks & Queues)
	STUDY WEEK - Studying is a difficult choice which may impact your final grade	
	FINAL EXAM - 30% seems small until you need 1% out of the 30%	

Exam (30%)
Duration : 2 hours
Exam Format:

Section 1 - Multiple Choice
Section 2 - Short Answer (Linked List/Stack/Queue Code)
Section 3 - Short Answer (Trees + Code)
All scenario type questions based on a background

Group Project (20%) – Welcome To Jamaica, Patois (Patwa) and the Di Good Place Dem!

GROUP SIZE : NO MORE THAN 3 Persons

[NB. This project is not endorsed by any of the aforementioned entities and is a project proposed for the course delivery of Data Structures (CMP2006) in the School of Computing and Information Technology at UTECH, Ja]

The Jamaica Cultural Development Agency working with the Jamaica Tourist Board and Sangsters International Airport has decided that with the increase of AirBnB experiences available, tourists should have easy access to this information. Moreover, they have agreed that this is a wonderful opportunity to re-engage our linguistic culture. To prototype this project, the agencies have agreed to encourage visitors and returning residents to engage Kiosks during the waiting times.

Your system will take as input a series of Jamaican Creole (Patois) statements and produce a listing of recommended places. Each place has a system generated ID, Name, Description, Address, Parish Code (see table below), Cost for Entry and Opening Hours, Contact Number, Photo (or link to photo) and main attraction. Your role is to not only develop a prototype of the application, but to design and implement the database index(es) (YOU ARE NOT ALLOWED TO USE A DATABASE OR OTHERWISE DEVELOPED DATABASE LIBRARY IN YOUR IMPLEMENTATION) to optimize information retrieval.

Code	Parish
1	Kingston & St. Andrew

2	St. Thomas
3	Portland
4	St. Mary
5	St. Catherine
6	Clarendon
7	Manchester
8	St. Ann
9	St. Elizabeth
10	St. James
11	Hanover
12	Westmoreland
13	Trelawny

The requirements have been provided uses SCRUM User Stories below:

1) As a Jamaica Tourist Board Administrator, I should be able to add a place to the system.
2) As a Jamaica Tourist Board Administrator, I should be able to view all places in the system.
3) As a visitor, I should be able to view a list of at least five (5) Jamaican Creole phrases and their English translations.
4) As a visitor, I should be able to request a listing of places in a parish by typing the following creole statement : **“Gimmi all a di place dem inna [Parish Name]”**.
5) As a visitor, I should be able to request the name, address, contact number and main attractions by typing the following creole statement : **“Which part have di cheapest [Attraction Name]”**. Sample attractions include “jerk chicken”, “river tours”, “water slides”
6) As a visitor, I should be able to request additional details on an attraction offered by a place. Each request should include my first name, last name, email, attraction generated id, attraction name and message, request id, date and time (id, date and time should be system generated).
7) As a Jamaica Tourist Board Administrator, I should be able to view the set of visitor requests in the order they were made.
8) As a Jamaica Tourist Board Administrator, I should be able to process the visitor requests in the order they were made. When a visitor request is identified as processed it is

removed from the set of visitor requests awaiting to be processed and added to the processed log.

9) As a Jamaica Tourist Board Administrator, I should be able to view the process log in the order of most recently processed first. The process log contains the set of visitor requests which have been processed.
10) As your Development Lead, I would like to see the data structure(s) created to store the database index based on cost for records optimized for retrieval for the following query: **"Which part have di cheapest [Attraction Name]". (Hint:** Carefully decide what data and how to store this data in a separate file on disk before retrieving it in a data structure in memory that will provide faster access to the data needed to provide a response to this query)

The following are the non-functional requirements:

1. System Name: **Di Good Place Dem!**
2. Appropriate exception handling and validation
3. Creativity
4. Appropriate data structures for respective features
5. Persistence using Files
6. Worst-case asymptotic analysis of all code
7. In addition to other ADTs (if necessary), at least one Tree ADT must be incorporated

Bonus

- GUI
- Images for each place can be viewed
- Live or Interactive Map
- Creativity
- Audio

Deliverables:

All deliverables except youtube video should be uploaded to a private repository on https://github.com . The private repository on Github should grant access to @ggordonutech .

You may upload files using git or
https://help.github.com/en/articles/adding-a-file-to-a-repository

- Source Code
- Executable application (eg. executable jars/exes - in github repo)
- User manual (observe
https://nciphub.org/collections/post/478/download/IEEE_Standard1063.pdf)

- Video Demonstration (upload to youtube, video needs not be available in general youtube listing)
- Written Report (who did what?)
- Declaration of authorship (collected at interviews)

Assessment Pieces:
- Source Code
- User Manual + Video
- Interview

<u>Final Submission Guidelines</u>
Due Date : Friday of Week 11 @ 11:59 pm.

A google form will be made available to submit links to each deliverable that you made available online.

Each interview will be 25 minutes and will be conducted based on a given schedule.