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**Algorithms Assignment**

## Requirements Specification

*The Higher Diploma in Computing and the Master’s Qualifier are postgraduate programmes in the School of Computer Science. Both are aimed at graduates of other disciplines to enable them to switch over to a career in Computer Science. These programmes are delivered conjointly, at the same time.*

*There are four different types of module which students can attend:-*

1. ***DT265A*** *– part-time Higher Diploma*
2. ***DT265C*** *– part-time Master’s Qualifier*
3. ***DT265B*** *– full-time Master’s Qualifier*
4. ***DT8900*** *– full-time International Master’s Qualifier*

*Admission numbers are as follows:*

* *DT265A – 13 students*
* *DT265C – 9 students*
* *DT265B – 14 students*
* *DT8900 – 6 students*

*This data is maintained in a single table or list for each module. The course has just been advertised and some students may join while others leave their courses.*

## Deliverables

1. Design a suitable data type for manipulating and storing the data having regard to the underlying changeability and the need for instant reporting. Explain your design.
2. In a flow-chart, write an algorithm that combines the four lists into one *main list* sorted by **surname** :
   1. You should attempt to modify a sorting algorithm you’re familiar with to do this.
   2. What is its Big O? Illustrate in detail why.
3. Using pseudo-code,
   1. Write an algorithm to search the main list for all full-time students.
   2. What is the order of growth of this algorithm – explain your answer with reference to Big O.
4. Using pseudo-code, write an algorithm to search the main list for a specific student by surname. The running time of your algorithm should be O (log(N) ). Explain how your algorithm meets this requirement.
5. Implement the algorithms derived in 1, 2, 3 and 4 in C. Show how you test your software by creating test data which matches that outlined in the Requirements specification ie. Lists of student names, programmes and programme type.

**Marking Breakdown**

|  |  |
| --- | --- |
| **Section** | **Mark** |
| Part ½ | 40% |
| Part 3 | 15% |
| Part 4 | 15% |
| Part 5 | 20% |
| Demo | 10% |

This assignment must be submitted before **9am on Monday 17th April**.

The project will be demonstrated in the lab in **Week 11** and **Week 12 – you can’t demo unless your project is submitted.**

What do I need to submit?

1. A project report (in pdf) with Parts 1-5. **//ONLY PDF WILL BE ACCEPTED Make sure your C code is readable with indents etc. in the file.**
2. C file(s) from Part 4 copied into a text file. Ensure your file has a dos cr-lf format.
3. Quiz (through brightspace, as shown below).

**QUESTION 1**

What algorithm(s) did you use in Part II?

### QUESTION 2

What is the Big O of Part II?

### QUESTION 3

What algorithm(s) did you use in Part III?

### QUESTION 4

What is the Big O of Part III?

### QUESTION 5

What algorithm(s) did you use in Part IV?

### QUESTION 6

What is the Big O of Part IV?

### QUESTION 7

 Please tick the elements that you submitted:

|  |
| --- |
| * Design for Part I * Flow chart for Part II |
| * Pseudo code for Part III |
| * Pseudo code for Part IV |
| * Code working for Part I |
| * Code working for Part II |
| * Code working for Part III |
| * Code working for Part IV |