So, you have been learning multiple analysis, data structures, and algorithm design techniques. The final project is your chance to put all of them together into practice, to create and analyse an application software of your dream!!!

The final project of COMP3600/6466 requires you to develop a working application software of your choosing along with its time complexity analysis. Yes, you can choose to create any application software you like! However, it must contain at least three functionalities. The algorithms or data structures you use to implement each functionality must cover at least one unique topic covered in this class (i.e., the three functionalities must cover at least three different topics in this class). Moreover, they must satisfy the following:

- At least two functionalities must use the algorithms / data structures covered in point B.4 or greater.
- At least one functionality must use the algorithms / data structures covered in point B.7 or greater.

The above points refer to the points in section "Topics covered in this class" (pp. 2 of this document).
You are welcome to develop more than three functionalities, but we will only mark three of them and you will need to inform us which three you want us to mark.

Milestone-1: Project Proposal

- Due: 7 September 2020, 23:59 Canberra time.
- This milestone is worth 10pt of your final project mark.
- We will mark how logical the software application, functionalities, and assumptions are.

Milestone-2: Design Document

- Due: 5 October 2020, 23:59 Canberra time.
- This milestone is worth 20pt of your final project mark.
- Marking criteria:
  - Skeleton of the application software: 10pt
  - Two of the three functionalities @5pt per functionality. For each of these two functionalities, we will mark the suitability of the algorithm/data structures you propose to use along with your argument for selecting those algorithms/data structures.

Milestone-3: Final Deliverables

- Due: 9 November 2020, 23:59 Canberra time.
- This milestone is worth 70pt of your final project mark.
- Marking criteria:
  - Overall working of the application: 10pt, with the following breakdown:
    * A description on how to use your application 2.5pt
    * A description of what your application does and the functionalities provided: 2.5pt.
    * The overall program, i.e., it compiles, runs, and outputs the correct results: 5pt.
  - Each of the three functionalities is worth 20pt, with the following breakdown:
    * Arguments for why the particular algorithms is selected: 2.5pt
    * The program: 5 pt
    * Theoretical time complexity analysis: 6.5pt
    * Empirical time complexity analysis and their comparison against the theoretical results: 6pt

Topics covered in this class:

A. Analysis Framework:

1. Asymptotic Analysis
2. Loop-invariant for proving correctness
3. Recurrence Analysis
4. Probabilistic Analysis
5. Empirical Analysis
6. Introduction to complexity classes

B. Data structure / algorithm design:

1. Comparison-based sorting
2. Non-comparison-based sorting
3. Binary search tree
4. Heaps
5. AVL Tree
6. Red-black tree
7. Hashing
8. Dynamic Programming
9. Minimum Spanning Tree (MST) + Dijkstra
10. Convex hull + closest pair of points (tentative)

Notes:

- Milestone-1 of your final project (i.e, your project proposal) should be typed on a single sided A4 page. The minimum font size should be 11pt, assuming you use a typical font type, e.g., Arial, Times New Roman, and Helvetica. The top, bottom, left, and right margin should be at least 1cm.
- Please submit your project proposal as a single .pdf file, named FinalM1-[studentID].pdf, via Wattle before the due date.
- We provide 13 hours grace period. This means, there will be no penalty if you submit before the grace period ends. However, we will NOT accept assignment submission beyond this time. We strongly suggest you save your proposal as a draft before the due date. This way, you can still update your proposal until the grace period ends and by the time the grace period ends, the last saved draft will automatically become your submission.

In this milestone, you will need to write a project proposal describing the software application you will develop for the final project. Specifically, you need to submit the following:

1. A description of the software application you will develop, together with assumptions and at least three functionalities. You can provide more than three functionalities, but we will mark only three of them. Therefore, if you provided more than three functionalities, please identify three of them that you would like us to mark.
   As a project proposal, you need to write the description at a level that allows your fellow students in this class to understand the difficulty of the problem.
   We do understand that you might want to change functionalities as we cover more materials. You will still be able to update two of the three functionalities in Milestone-2, and to update one of the functionalities in the Final Deliverables.

2. The programming language you plan to use and whether the software will run on Windows or Linux.