CAPSTONE ASSIGNMENT PLANNER 2020

PROJECT	CAPSTONE ASSIGNMENT ON SORTING ALGORITHMS (*contributes 25% towards the class mark*)
DUE DATE	DRAFT[1] VERSION & IMPLEMENTATION: 30-MAR / 6-APR / 14-APR / 20-APR FOR PEER REVIEW: 20-APR PEER REVIEWS: 28-APR FINAL VERSION & IMPLEMENTATION: 4-MAY

REFER TO THE LIST OF ALLOCATIONS TO SEE WHICH SPECIFIC ALGORITHMS YOU ARE REQUIRED TO REVIEW, IMPLEMENT & REPORT ON FOR INDIVIDUAL MARKS AND WHICH COMPONENTS OF THE ASSIGNMENT IS FOR GROUP MARKS.

CASE STUDY TEST DATA: REFER TO ATTACHED TASK SHEET FOR DETAILS (PAGE 3 OF THIS DOCUMENT)

REPORT PHASE	START	END
DRAFT REPORT (3% OF CLASS MARK) TITLE; INTRODUCTION; DESCRIPTION OF THE CRITERIA AGAINST WHICH THE SORTING ALGORITHMS WILL BE COMPARED; REVIEW BASIC SORTING ALGORITHM AND ITS EQUIVALENT RECURSIVE VERSION; DESCRIBE PROCESS TO BE FOLLOWED IN ORDER TO COLLECT AND ANALYSE PERFORMANCE DATA OF ALL 8 IMPLEMENTED ALGORITHMS[2]; OUTLINE OF REMAINDER OF REPORT, I.E. INCLUDE ALL SECTION HEADINGS WITH A SENTENCE PER HEADING DESCRIBING WHAT THE SECTION WILL CONTAIN[3]; PRESENTATION OF RESULTS (NO DISCUSSION REQUIRED) COMPARING PERFORMANCE OF ITERATIVE AND RECURSIVE VERSIONS OF BASIC SORTING ALGORITHM; BIBLIOGRAPHY USED TO DATE **IMPLEMENTATION COMPONENT (5% OF CLASS MARK)** IMPLEMENT ALGORITHM TO POPULATE LISTS FOR SORTING AS PER CASE STUDY DESCRIPTION; IMPLEMENT BASIC SORTING ALGORITHM (BOTH ITERATIVE AND RECURSIVE VERSIONS) ON SPECIFIED CASE STUDY[4] (EVIDENCE INCLUDED IN APPENDICES ACCOMPANYING DRAFT & PROOF OF ACCURACY IN QUIZ)	19-Feb	**30-Mar** (1st draft review submission of selected students available on 25-Mar)

REPORT PHASE	START	END
DRAFT REPORT (3% OF CLASS MARK) AS FOR 30-MAR SUBMISSION *PLUS* DISCUSSION OF COMPARISON OF PERFORMANCE OF ITERATIVE AND RECURSIVE VERSIONS OF BASIC SORTING ALGORITHM **IMPLEMENTATION COMPONENT (5% OF CLASS MARK)** AS FOR 30-MAR SUBMISSION	19-Feb	**6-Apr** (2nd draft review submission of selected students available on 1-Apr)
DRAFT REPORT (3% OF CLASS MARK) AS PER PREVIOUS 2 DRAFT SUBMISSIONS *PLUS* CONCLUSION COMPONENTS RELEVANT TO THE PRESENTED RESULTS OF THE BASIC SORTING ALGORITHM ONLY (INCLUDING HOW THE RESULTS SUPPORT/CONTRADICT WITH THE LITERATURE REVIEW PRESENTED OF THE BASIC SORTING ALGORITHM) **IMPLEMENTATION COMPONENT (5% OF CLASS MARK)** AS FOR 30-MAR SUBMISSION	19-FEB	**14-Apr** (3rd draft review submission of selected students available on 8-Apr)

[1] Refer to your customised capstone assignment submission activity on Moodle and pp 4 – 5 of this document to see the minimum required contents for your draft submission. Refer to the sample template report provided to guide the structure of the report.
[2] This description must include a concise but comprehensive description of the case study (see page 3 of this document, green highlighted section).
[3] In your own words – penalties apply for plagiarising from the provided report template.
[4] Include in bibliography any references to source code on which your implementation is based, including online resources and names of class mates

REPORT PHASE	START	END
DRAFT REPORT (3% OF CLASS MARK) AS PER PREVIOUS 3 DRAFT SUBMISSIONS ***PLUS*** REVIEW AND PRESENTATION OF RESULTS OF 3 OPTIMISED SORTING ALGORITHMS AND SOME DISCUSSION THEREOF; CONCLUSION COMPONENTS RELEVANT TO THE PRESENTED RESULTS (INCLUDING HOW THE RESULTS SUPPORT/CONTRADICT WITH THE LITERATURE REVIEW PRESENTED OF THE OPTIMISED SORTING ALGORITHMS) **IMPLEMENTATION COMPONENT (5% OF CLASS MARK)** AS PER PREVIOUS 3 DRAFT SUBMISSIONS ***PLUS*** IMPLEMENT OPTIMISED SORTING ALGORITHMS ON SPECIFIED CASE STUDY (EVIDENCE INCLUDED IN APPENDICES ACCOMPANYING DRAFT & PROOF OF ACCURACY IN QUIZ)	19-Feb	**20-Apr** (ALL groups to submit for peer review activity)

REPORT PHASE	START	END
REVIEW 2 PEER REPORTS (2% OF CLASS MARK)	20-APR	**28-APR**
FINAL REPORT (6% OF CLASS MARK) AS PER PREVIOUS 4 DRAFT SUBMISSIONS ***PLUS*** REVIEW AND PRESENTATION OF RESULTS OF 3 ADVANCED SORTING ALGORITHMS AND SOME DISCUSSION THEREOF; CONCLUSION COMPONENTS RELEVANT TO THE PRESENTED RESULTS (INCLUDING HOW THE RESULTS SUPPORT/CONTRADICT WITH THE LITERATURE REVIEW PRESENTED OF THE ADVANCED SORTING ALGORITHMS) **IMPLEMENTATION COMPONENT (9% OF CLASS MARK)** AS PER PREVIOUS 4 DRAFT SUBMISSIONS ***PLUS*** IMPLEMENT 3 ADVANCED SORTING ALGORITHMS ON SPECIFIED CASE STUDY (EVIDENCE INCLUDED IN APPENDICES ACCOMPANYING DRAFT & PROOF OF ACCURACY IN QUIZ)	28-APR	**4-May** (ALL groups to submit for final assessment)

WRAV201 Assignment (Group)

ALL plagiarism checked submissions to be via Moodle

Refer to Report Planner & Moodle for due dates & minimum required contents for each submission

Penalties apply for neglecting to follow instructions precisely

The objective of this task is to practice effective collaborative research and communication skills, at the same time developing and practicing appropriate experimental and coding skills in a team environment. These skills (amongst others) are sought after skills in the employment context. The contents of the report as well as all implementation is examinable. The assignment period will be 19-Feb until 4-May, both dates inclusive. The assignment (incorporating a report and associated implementation component) contributes 25% towards your class mark. ***Maximum length of the report is 6 (and only 6!) A4 pages (excluding appendices and bibliography). Appendices may only contain code extracts, no tables or figures. Refer to the provided report template document to guide you in the structure and contents of the assignment deliverable***. Each group member will be allocated specific portions of work to complete for individual assessments and some portions will require group collaboration for group assessment. The mark split for group and individual work is as follows:

Participant	Report Contribution	Implementation Contribution
Group	36%	0%
Individual X	21%	33%
Individual Y	21%	33%
Individual Z	21%	33%

When submitting the report, only one submission per group is permitted. The person responsible for this submission with be the person nominated as **Individual X**. The aim of the report is to consolidate and describe the experimental work done during and outside of practical sessions on a set of 8 assigned sorting algorithms (refer to Moodle Assignments page to confirm your assigned algorithms – ONLY these algorithms need to form a part of your group assignment). The 8 algorithms form a subset from the following 19 algorithms: BubbleSort (recursive and non-recursive); SelectionSort (recursive and non-recursive); InsertionSort (recursive and non-recursive); Bidirectional BubbleSort; Magnetic BubbleSort; Optimised BubbleSort; Double InsertionSort; Enhanced InsertionSort; Improved InsertionSort; Enhanced SelectionSort; Double SelectionSort; Improved SelectionSort; BucketSort; MergeSort; QuickSort & CountingSort. For each of the 8 allocated algorithms (1 basic sorting algorithm and its associated recursive version, 3 optimised basic sorting algorithms which you have to teach yourself from provided papers, and 3 advanced algorithms which are covered during lectures), a review citing relevant and provided literature is required.

NOTE: as part of the experimental work, all sorting algorithms must be applied to a variety of sizes (small/medium/large/very large) of arrays/arraylists initialised to consist of randomly sorted integers in the range 0 – int.MaxValue. At least 30% of the integers in the list should be duplicated at least 5 times. Sorting algorithms must sort the lists in descending order. To provide evidence of accuracy of sorting algorithms, your main program must also be able to sort an unknown number of integers sourced from a provided text file (1 integer per line).

An appropriate title is to be given to the report. Before commencing with the draft of your report, familiarise yourself with the minimum required contents for your draft (see next page, the provided report template and the rubrics) so that you are clear as to what is expected from you BEFORE you commence the assignment. The expected deliverables of this exercise are the following, which will contribute a total of 25% towards your class mark. Marks for this assignment depend on the successful completion of all the required deliverables:

1. Draft group report to be reviewed by Charmain via appropriate Moodle activity (to be provided nearer the time) as per distributed schedule (3%), with associated implementation component (5%). ALL DRAFTS MUST HAVE BEEN PROOFREAD AND SIGNED OFF AS BEING PROOFREAD BY A WRAV201 PEER WHO IS ***NOT*** IN YOUR GROUP. Penalties apply if this is not done. Penalities apply if the report is in any way plagiarized.
2. Draft group report to be reviewed by your allocated peer reviewers via appropriate Moodle activity (to be provided nearer the time). The report should be reviewed according to the rubric (Worksheet 1) provided over the page (neglecting to submit this draft version for peer review will incur a penalty of 2% on your class mark).
3. For reviewing 2x draft reports and giving meaningful feedback, you will receive recognition (2%).
4. Final group report (maximum of 6 A4 pages, single spacing, typed in Calibri, 11 pt) assessed by Charmain via appropriate Moodle activity (to be provided nearer the time). The report will be evaluated according to the rubric (Worksheet 2) provided over the page (6%), with associated implementation component (9%).

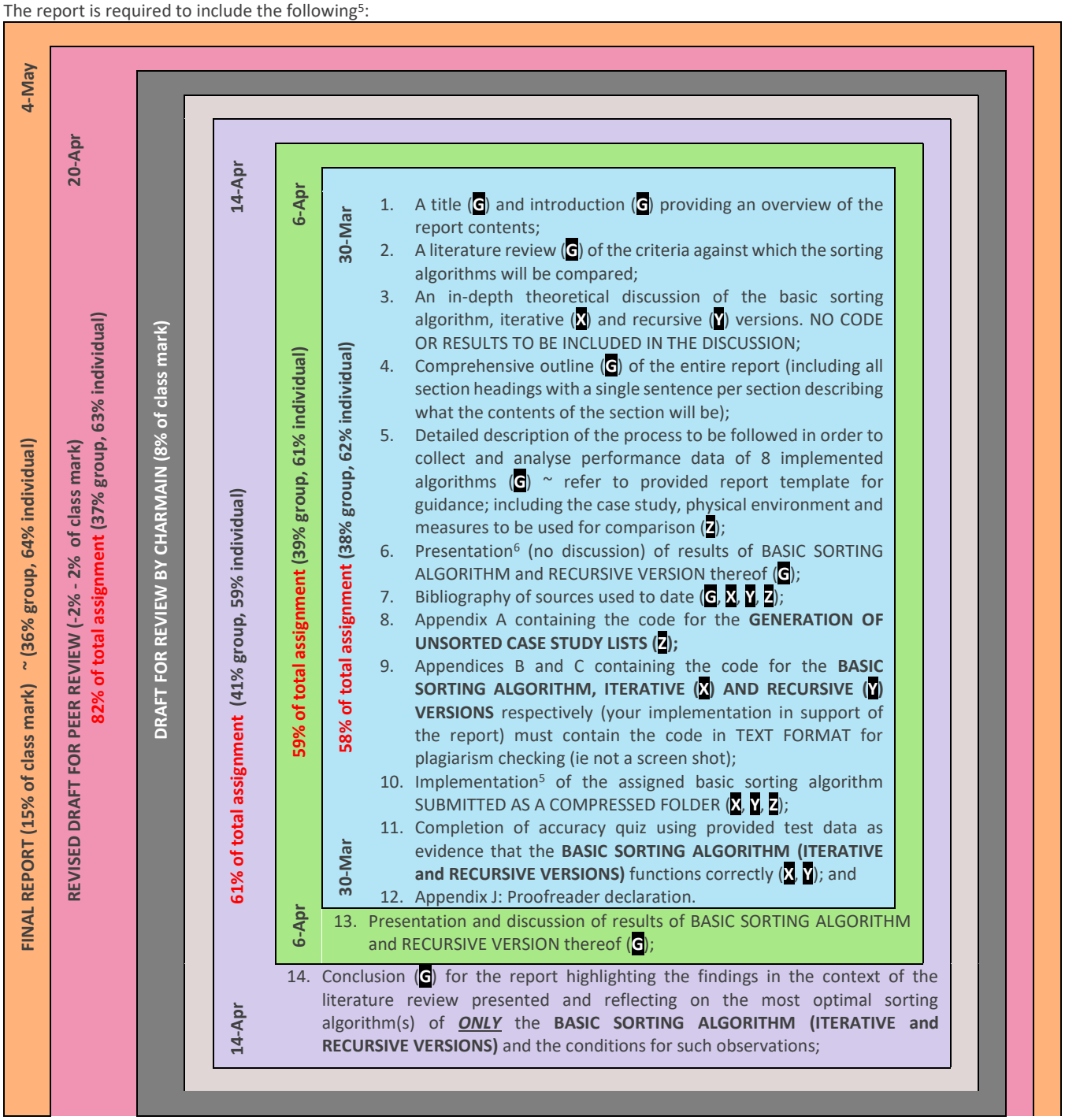
You should make use of **ALL and ONLY** the following references in your bibliography (penalties will apply for incorrect extracting of facts from the given list of references or use of unapproved references):

1. For a description of the criteria upon which the comparisons must be based
   a. Section 2 in the provided report template
   b. http://www.funlist123.com/page/en/Comparison_sort
   c. https://www.tutorialspoint.com/data_structures_algorithms/sorting_algorithms.htm
   d. http://www.cengage.com/resource_uploads/downloads/1111822700_283628.pdf pp 2 - 13
2. For descriptions of basic and advanced sorting algorithms: Essential Algorithms: A Practical Approach to Computer Algorithms by Rod Stephens
3. For the description of your allocated optimised sorting algorithms, refer to the relevant research papers provided in the Optimised Basic Sort folder on the Moodle Assignments page.
4. For general information on the topic of your assignment, the 2 additional papers available on the Moodle Assignments page.
5. Optional references which may NOT replace any of the above references: On-line sources referred to while developing your implemented solution and/or the names of any class mates that assisted you with developing your sorting algorithms

You are expected to follow the Harvard system when citing (reference **http://libweb.anglia.ac.uk/referencing/harvard.htm**). NEVER QUOTE OR CITE any reference YOU have not read AND/OR have not made notes on. ALL listed references MUST be cited at least once in your report.

All reports (draft and final) will automatically be submitted to Turnitin for detection of any evidence of plagiarism PRIOR to submission (review the plagiarism report and eliminate any evidence of plagiarism in excess of 20%). Any evidence of plagiarism in a draft submission will result in a written warning and a mark of 0 for the submission. Evidence of plagiarism in the final submission may result in disciplinary action being instituted against you. **If you neglect to submit on the specified date, you receive 0 for your submission. No late submissions will be marked.**

The report is required to include the following[5]:



[5] G = Group contribution; X = individual X contribution; Y = individual Y contribution; Z = individual Z contribution;

[6] This component will grow as subsequent algorithms are investigated and implemented.

20-Apr	15. An in-depth theoretical discussion of the optimised basic sorting algorithms based on the provided research papers (X, Y, Z). NO CODE OR RESULTS TO BE INCLUDED IN THE DISCUSSION; 16. Appendices D, E and F (X, Y, Z) containing the code for the **OPTIMISED SORTING ALGORITHMS** (your implementation in support of the report) must contain the code in TEXT FORMAT for plagiarism checking (ie not a screen shot). 17. Incorporation of the implementation of the optimised basic sorting algorithms into the submission for 10. above (X, Y, Z); 18. Incorporation of the performance of the optimised basic sorting algorithms into 13. above (G). 19. Incorporation of the discussion on the optimised basic sorting algorithms into 14. above (G). 20. Completion of accuracy quiz using provided test data as evidence that the **OPTIMISED BASIC SORTING ALGORITHMS** function correctly (X, Y, Z);
4-May	21. An in-depth theoretical discussion of the advanced sorting algorithms (X, Y, Z). NO CODE OR RESULTS TO BE INCLUDED IN THE DISCUSSION; 22. Appendices G, H and I (X, Y, Z) containing the code for the **ADVANCED SORTING ALGORITHMS** (your implementation in support of the report) must contain the code in TEXT FORMAT for plagiarism checking (ie not a screen shot; 23. Incorporation of the implementation of the advanced sorting algorithms into the submission for 10. above (X, Y, Z); 24. Incorporation of the performance of the advanced sorting algorithms into 13. above (G); 25. Incorporation of the discussion on the advanced basic sorting algorithms into 14. above (G); 26. Completion of accuracy quiz using provided test data as evidence that the **ADVANCED SORTING ALGORITHMS** function correctly (X, Y, Z).

Worksheet 1: Peer Review Rubric

Your reviewer must complete a worksheet in Moodle similar to this one. ***Failure to submit the peer review and/or draft report for peer review will result in a penalty of 2% on your class mark****.*

		Very low quality	***Low quality***	***High quality***	***Very high quality***	***Not done***
1.	**Correct format of report – all components are present and correctly labelled (title, introduction, discussion of assessment criteria, related work on the 5 sorting algorithms, experimental method, results & discussion of results on the 5 sorting algorithms and bibliography). Code in appendices.**	*No clear separation of report components. Format and flow of report not logical.*	*Components separated but not clearly labelled. Report has logical order and flow.*	*Components separated and clearly labelled. Order and flow of report is logical.*	*Report shows good logical order. Components are clearly and well labelled (using author's own headings).*	
2.	**Choice of title is appropriate and focussed. Clearly stated relevance of experiment and focus thereof in the introduction of the report.**	*Poor choice of title. No reasons for sorting are given. No overview of the report contents is provided in terms of what the report is about.*	*Title not relevant to focus of report. Very high level reasons for the need for sorting are provided. No overview of the report contents are provided.*	*Appropriate title. Reasons for the need for sorting are provided. A brief overview of the report contents is provided, providing insight into the anticipated contribution in terms of results observed.*	*Appropriate title. Good reasons for need for sorting is given, specifically in terms of finding the most efficient algorithm. The focus is clearly spelt out in terms of an overview of the type of experiment that will be done and what the contribution of the report will be.*	
3.	**Accurate description of the assessment criteria and how they will be applied.**	*Criteria are poorly described.*	*An attempt has been made at the accurate description of the criteria.*	*The description of the criteria is accurate.*	*Logical, brief and precise description of criteria provided..*	
4.	**Accurate description of the 5 sorting algorithms**	*Algorithms are poorly described.*	*An attempt has been made at the accurate description of some of the algorithms.*	*The description of the 3 algorithms is accurate.*	*Logical, brief and precise description of 3 algorithms provided, supported by a discussion of the relevant assessment criteria.*	
5.	**Clearly stated experimental process.**	*Description of experimental process does not flow logically and/or is missing much detail.*	*An attempt has been made to describe an experimental process but it lacks sufficient detail to be properly replicated by someone else.*	*The experimental process has been described in a logical fashion but lacks some minor details.*	*Sufficient details presented in a logical fashion so that it is possible and easy to replicate the experiment with another set of sorting algorithms.*	

		Very low quality	*Low quality*	*High quality*	*Very high quality*	*Not done*
6.	**Clearly presented results including appropriate graphics with descriptive label and legend.**	*Results are not presented in a way that shows easy comparison. There is no narrative accompanying the results.*	*Results are poorly presented or missing details (i.e. less than 3 algorithms data is included). Accompanying narrative does not refer to the results in any way.*	*Results for all 3 algorithms are presented in a form that shows easy comparison (graph rather than a table). No duplication of results in table & graph. Results are clearly labelled. Narrative accompanying the results is too vague and requires direct reference to the presented results.*	*Results for all 3 algorithms are presented in a form that shows easy comparison (graph rather than a table). No duplication of results in table & graph. Results are clearly labelled & referred to in accompanying narrative.*	
7.	**Discussion effectively highlights comparative results of the 5 sorting algorithms in terms of the relevant assessment criteria.**	*Discussion merely repeats what appears in the presented results.*	*Discussion highlights best and worst algorithm. No reference made to how experimental findings compare with related work.*	*Discussion highlights the best and worst algorithm. Vague reference as to how experimental findings compare with related work is provided.*	*Discussion highlights the best algorithm and the worst algorithm with direct reference to the presented results. Includes and compares with findings reported on in related work in detail.*	
8.	**Uses appropriate scientific language in a logical manner. The report is obviously the work of the author[7].**	*The language used is too informal and is unsuitable for an academic report.*	*Parts of the report are informal, with other parts being more formal.*	*The language used is understandable and suitable for an academic report.*	*The language used closely resembles that found in academic articles.*	
9.	**Minimal grammatical and spelling errors. Sections are correctly and logically labelled. Text is justified. White space correctly and effectively used. Page numbers are used.**	*The report is full of grammatical and spelling errors. A professional proof reader is recommended. Poor layout. Inconsistent use of font size, etc. Text is not justified. Poor use of spacing. No page numbers.*	*There are many grammatical and/or spelling errors in the report. Text is not justified. Inconsistent layout. No page numbers.*	*Very few spelling and/or grammatical errors. Minor inconsistencies in labelling of sections, tables, graphics. Text is justified throughout the document. Page numbers used.*	*No grammatical or spelling errors. Labelling of sections, tables and graphics are consistent and well done. The text is justified throughout the document. Consistent use of editing facilities (eg boldface, font size, etc). Page numbers used.*	

[7] If there are any doubts about authorship of the report that you are reviewing, please bring this to the attention of Prof Cilliers.

		Very low quality	*Low quality*	*High quality*	*Very high quality*	*Not done*
10.	**All references are cited. Correct citation style used (like Harvard system). References are suitable and relevant to report. References are appropriately sorted.**	*No references are cited. No references appear in bibliography.*	*Some references cited do not appear in the list of references. Some references appearing in the list of references have not been cited. Some statements are made without citing a relevant reference. Less than half of the required variety of references is present.*	*All references listed in the bibliography have been cited. All cited references appear in the bibliography. All statements are supported by relevant references. At least half of the required variety of references is present.*	*All references listed in the bibliography have been cited. All cited references appear in the bibliography. The bibliography is representative: there is at least one book, 2 journals and a maximum of 2 online references. All statements are supported by relevant references.*	

Impression mark: 0% – 25% 26% – 40% 41% – 45% 46% – 50% 51% – 65% 66% – 74% 75% – 84% 85% – 94% 95% – 100%

Worksheet 2: Capstone Assignment Marking Rubric (for draft[8] and final version)

		BENCHMARK	MILESTONES		CAPSTONE	
	Unacceptable; No or very little evidence **(0%)** **0**	**Inadequate; needs improvement to meet standards (1 – 49%)** **1 – 2**	**Acceptable; meets basic requirements** **(50 – 59%)** **3 – 5**	**Exceeds basic requirements; some indications of excellence (60 – 74%)** **5**	**Excellent. Top quality. Distinction** **(75 – 90%)** **5**	**Superior evidence** **(> 90%)** **5**
Introductory materials: Is there an introduction? Is the purpose of the report clearly articulated (primary goal/focus)? Are any relevant assumptions and limitations presented?	No attention or awareness of context/purpose/ goal/focus of report on comparison of sorting algorithms. No attention or awareness of assumptions (in terms of case study applied to sorting algorithms) and limitations of report (in terms of timing mechanism).	Demonstrates minimal attention to context/purpose/ goal/focus of report on comparison of sorting algorithms. Minimal attention to assumptions (in terms of case study applied to sorting algorithms) and limitations of report (in terms of timing mechanism).	***Demonstrates awareness of context/purpose/ goal/focus of report on comparison of sorting algorithms. Awareness of attention to assumptions (in terms of case study applied to sorting algorithms) and limitations of report (in terms of timing mechanism)***	Demonstrates adequate consideration to the context/purpose/ goal/focus of report on comparison of sorting algorithms. Adequate consideration to assumptions (in terms of case study applied to sorting algorithms) and limitations of report (in terms of timing mechanism)	Demonstrates clear understanding of context/purpose/ goal/focus of report on comparison of sorting algorithms. Clear understanding of assumptions (in terms of case study applied to sorting algorithms) and limitations of report (in terms of timing mechanism)	Demonstrates a thorough understanding of context/purpose/ goal/focus of report on comparison of sorting algorithms. Thorough understanding of assumptions (in terms of case study applied to sorting algorithms) and limitations of report (in terms of timing mechanism).
<u>Introductory materials</u>: **What you need to do to meet basic requirements for WRAV201/next level**	Specify clearly the context of the report in terms of what it will report on, how the experiment will be conducted and data collected, how comparisons will be made and what the envisaged contribution of the report will be		Elaborate on the assumptions made for the report in terms of data property used for sorting, size of lists and measurements taken.	Consider limitations associated with reporting on comparison of algorithms in terms of a measure that is constrained by C# implementation. Consider limitations associated with what data is sorted in terms of type of property.	Highlight complexities associated with reporting on comparison of algorithms in terms of a single measure that is constrained by C# implementation. Highlight limitations associated with what data is sorted, and how random (or not) the input lists are and how this may affect the results.	

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[8] The rubric will be amended to suite your draft contents.

		BENCHMARK	MILESTONES		CAPSTONE		
	Unacceptable; No or very little evidence **(0%)** **0**	**Inadequate; needs improvement to meet standards (1 – 49%)** **1 – 10**	**Acceptable; meets basic requirements** **(50 – 59%)** **11 – 20**	**Exceeds basic requirements; some indications of excellence (60 – 74%)** **21 – 30**	**Excellent. Top quality. Distinction** **(75 – 90%)** **30**	**Superior evidence** **(> 90%)** **30**	
Evidence of related work: Is evidence of relevant related work presented? Are relevant technologies considered? Have each of the required sorting algorithms been addressed? Is there any evidence of plagiarism?	No or very little evidence of consultation with available literature. Lack of awareness to description of algorithms and discussion of expected performance.	Uses relevant and appropriate content to develop simple ideas in some parts of the work.	Uses relevant and appropriate content and argument to develop and explore ideas through most of the work.	***Uses relevant and appropriate content and argument to develop and explore ideas within the context of comparison of sorting algorithms to shape the entire report.***	Uses relevant and appropriate content and argument to illustrate knowledge of the subject. High quality of evidence shows writer's understanding of discipline relevant content.	Uses relevant, appropriate and compelling content and argument to illustrate mastery of the subject. High quality of evidence shows writer's deep understanding and synthesis of the content.	------ 30
<u>Evidence of related work</u>: **What you need to do to meet basic requirements for WRAV201/next level**	Ensure that you have described and discussed each sorting algorithm applied in the experiment. Description should describe what the algorithm does. The discussion should highlight the expected performance for each algorithm. All of this must be derived from available literature and be referenced appropriately.			Illustrate an in-depth knowledge derived from available literature of the limitations of each algorithm in terms of the measurements collected by the experiment.	Provide evidence of thorough understanding of how the algorithms work, what their limitations are and how these limitations could be addressed in the experimental work to follow.		

		BENCHMARK	MILESTONES		CAPSTONE	
	Unacceptable; No or very little evidence **(0%)** **0**	**Inadequate; needs improvement to meet standards (1 – 49%)** **1 – 3**	**Acceptable; meets basic requirements** **(50 – 59%)** **4 – 6**	**Exceeds basic requirements; some indications of excellence (60 – 74%)** **7 – 10**	**Excellent. Top quality. Distinction** **(75 – 90%)** **10**	**Superior evidence** **(> 90%)** **10**
Experimental method: Is there an appropriate description of the experimental method used? Are the assumptions clearly articulated? Is there evidence of the measurement criteria?	No evidence of an experimental plan to be followed.	Demonstrates an attempt to develop an experimental technique for the collection of data.	Demonstrates an experimental technique for the collection and presentation of data that has deficiencies in terms of specified detail.	***Demonstrates a sufficiently detailed experimental technique for the collection and presentation of data.***	Demonstrates an awareness of the assumptions/ limitations relevant to the selected experimental technique for the collecting, analysis and presentation of data for comparison purposes.	Demonstrates a thorough understanding of the assumptions and limitations relevant to the selected experimental technique for the collecting, analysis and presentation of data for comparison purposes.
<u>Experimental method</u>: **What you need to do to meet basic requirements for WRAV201/next level**	Ensure that sufficient details are provided in the experimental procedure so that the experiment can be replicated exactly by another researcher. Explain how data will be collected, analysed and presented.			Highlight any limitations/ assumptions relevant to the experimental procedure described.	Elaborate on the effect of any assumptions/ limitations of the experimental procedure.	

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		BENCHMARK	MILESTONES		CAPSTONE		
	Unacceptable; No or very little evidence **(0%)** **0**	**Inadequate; needs improvement to meet standards (1 – 49%)** **1 – 10**	**Acceptable; meets basic requirements** **(50 – 59%)** **11 – 20**	**Exceeds basic requirements; some indications of excellence (60 – 74%)** **21 – 30**	**Excellent. Top quality. Distinction** **(75 – 90%)** **30**	**Superior evidence** **(> 90%)** **30**	
Evidence of experimental work: Is evidence of all required sorting algorithms in an experimental mode presented? Have testing considerations been presented? Are the provided code extracts in the Appendix accurate solutions?	No evidence of data collection, data analysis and/or data presentation in an appropriate comparative format.	Demonstrates an attempt to apply the experimental procedure to some data sets.	Demonstrates an application of experimental technique for the collection, analysis and presentation of results for some of the algorithms.	***Demonstrates adequate application of experimental technique for the collection, analysis and presentation of results for all of the algorithms.***	Results relevant to most sorting algorithms for most list sizes have been collected, analysed and presented strictly according to the experimental procedure described.	Results relevant to all sorting algorithms for all list sizes have been collected, analysed, synthesised and appropriately presented according to the experimental procedure described.	------ 30
<u>Evidence of experimental work</u>: **What you need to do to meet basic requirements for WRAV201/next level**	Provide evidence of following the prescribed experimental procedure rigidly. Give not only the results collected for all algorithms for all list sizes, but also a comparative version of the results in the form of an appropriate graphic (eg line graph).			Draw some comparisons between the algorithms based on the results.	Synthesis the results to provide a coherent understanding of the findings of the experimental work.		

		BENCHMARK	MILESTONES		CAPSTONE	
	Unacceptable; No or very little evidence **(0%)** **0**	**Inadequate; needs improvement to meet standards (1 – 49%)** **1 – 3**	**Acceptable; meets basic requirements** **(50 – 59%)** **4 – 6**	**Exceeds basic requirements; some indications of excellence (60 – 74%)** **7 – 10**	**Excellent. Top quality. Distinction** **(75 – 90%)** **10**	**Superior evidence** **(> 90%)** **10**
Closure materials: Is the conclusion appropriate? What evaluation was performed to determine the success of the experiment(s)? Is the envisaged contribution of the experiment clearly articulated? Are all sorting algorithms compared with each other in a satisfactorily fashion?	No attention or awareness of contribution of report in terms of comparison of sorting algorithms. No attention or awareness of comparison of experimental results with that in available literature.	Demonstrates minimal attention to contribution of report in terms of comparison of sorting algorithms. No or minimal attention is devoted to comparison of experimental results with that in available literature.	Demonstrates awareness of contribution of report in terms of comparison of sorting algorithms. Demonstrates an awareness of comparison of experimental results with that in available literature.	***Demonstrates adequate consideration to contribution of report in terms of comparison of sorting algorithms. Adequate attention is devoted to comparison of experimental results with that in available literature.***	Demonstrates clear understanding of contribution of report in terms of comparison of sorting algorithms. Demonstrates clear understanding of comparison of experimental results with that in available literature. Demonstrates an awareness of the value and limitations associated with the experiment conducted.	Demonstrates a thorough understanding of contribution of report in terms of comparison of sorting algorithms. Demonstrates thorough understanding of comparison of experimental results with that in available literature. Draws relevant and appropriate conclusions as to the value of the experiment conducted as well as to the limitations thereof. Recommendations are made for further investigations.
<u>Closure materials</u>: **What you need to do to meet basic requirements for WRAV201/next level**	Draw conclusions from the experimental work in terms of which algorithms are more efficient and why. Argue the relevance of the results in terms of results from available literature.			Highlight the effect that assumptions and limitations of the experiment might have had on the results.	Comment on the value of the results to the disciple in terms of existing research. Make recommendations for future work.	

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		BENCHMARK	MILESTONES		CAPSTONE	
	Unacceptable; No or very little evidence **(0%)** **0**	**Inadequate; needs improvement to meet standards (1 – 49%)** **1**	**Acceptable; meets basic requirements** **(50 – 59%)** **2 – 3**	**Exceeds basic requirements; some indications of excellence (60 – 74%)** **4**	**Excellent. Top quality. Distinction** **(75 – 90%)** **5**	**Superior evidence** **(> 90%)** **5**
Bibliography: Are the references current and relevant?	Missing some references. Insufficient evidence of use of appropriate and relevant current sources.	Demonstrates an attempt to use appropriate and relevant sources to support ideas in the report.	Demonstrates an attempt to use high-quality, credible, current, relevant sources to develop majority of ideas for application in the report.	Demonstrates consistent use of high-quality, credible, current, relevant sources to develop majority of ideas for application in the report. An attempt is made at citing sources correctly.	***Demonstrates consistent use of high-quality, credible, current, relevant sources to develop all ideas for application in the report. Citations correctly applied.***	Demonstrates skillful use of high-quality, credible, current, relevant sources to develop ideas for application in the report. Citations correctly applied.
Bibliography: **What you need to do to meet basic requirements for WRAV201/next level**	All statements, if not derived from experimental work, must be correctly cited. Sources must be credible, relevant and current. A variety of sources must be used, with a minority being online, and a majority being journals and/or books.				Ideas and arguments must be supported by appropriate sources.	

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		BENCHMARK	MILESTONES		CAPSTONE	
	Unacceptable; No or very little evidence **(0%)** **0**	**Inadequate; needs improvement to meet standards (1 – 49%)** **1 – 2**	**Acceptable; meets basic requirements** **(50 – 59%)** **3 – 5**	**Exceeds basic requirements; some indications of excellence (60 – 74%)** **5**	**Excellent. Top quality. Distinction** **(75 – 90%)** **5**	**Superior evidence** **(> 90%)** **5**
Delivery: Is the language suitable for the audience? Is the topic explained in clear and simple terms?	No attempt to use any kind of system for basic organisation and/or presentation.	Attempts to use a consistent system for basic organisation and presentation.	***Demonstrates an awareness appropriate to the computing discipline and/or writing tasks for basic organisation, content and presentation***	Follows expectations appropriate to the computing discipline and/or writing tasks for basic organisation, content and presentation.	Demonstrates consistent use of important conventions particular to the computing discipline and writing tasks including organisation, content, presentation and stylistic choices.	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to the computing discipline and/or writing tasks including organisation, content, presentation, formatting and stylistic choices
<u>Delivery</u>: **What you need to do to meet basic requirements for WRAV201/next level**	Organise and present the report into a form that is similar to that in papers that you have read. Include in the report content relevant to the experimental work reported on.		Provide appropriate section headings illustrating a storyline that focuses on the report requirements.	Replicate the objective scientific writing style and conventions apparent in related work that you have read.	Apply the conventions found in a variety of scientific manuscripts. Apply appropriate formatting and presentation styles.	

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		BENCHMARK	MILESTONES		CAPSTONE	
	Unacceptable; No or very little evidence **(0%)** **0**	**Inadequate; needs improvement to meet standards (1 – 49%)** **1**	**Acceptable; meets basic requirements** **(50 – 59%)** **2 – 3**	**Exceeds basic requirements; some indications of excellence (60 – 74%)** **4 – 5**	**Excellent. Top quality. Distinction** **(75 – 90%)** **5**	**Superior evidence** **(> 90%)** **5**
Technical aspects, flow & appearance: Are there many errors and omissions? Does the information follow a logical path from introduction of the topic to conclusion? Is the format appropriate for the subject matter and purpose? Is the information presented in a clear way? Is there evidence of creativity? Are there relevant and sufficient graphics to support the discussion?	Many grammatical and spelling errors. Manuscript is in need of being proofread by a language professional prior to submission. Language used is not appropriate or is illogical.	Uses language that mostly impedes meaning because of errors in usage.	Uses language that sometimes impedes meaning because of errors in usage.	***Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.***	Uses straightforward language that generally conveys meaning to readers. The language has few errors.	Uses graceful language that skilfully commuicates meaning to readers with clarity and fluency, and is virtually error-free.
<u>Technical aspects, flow & appearance</u>: What you need to do to meet basic requirements for WRAV201/next level	Write in a way that is clear. Use short sentences. Use grammar and spelling checker. If need be, have manuscripts proofread by a professional language editor/practitioner.			Use language that suites the audience. Be clear to convey the meaning of the report content.	Use descriptive and flowing language to convey the meaning of the report concisely.	

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Mark awarded: _____ %

A mark of at least 71% reflects the achievement of the basic requirements of report writing expected at 2nd year level. Anything less than this is indicative of a significant amount of improvements required.

Additional comments: _____

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