WRA201 Experimental Report Writing Exercise

ALL plagiarism checked submissions to be via Moodle

Refer to Experimental Report Planner & Moodle for Due dates

The objective of this task is to practice effective research and academic report writing skills. The contents of the report will be examinable. The report is to describe the experimental work done during practical sessions on a set of 4 assigned sorting algorithms (see distributed list in Experimental Report Planner). The 4 algorithms form a subset from the following 13 algorithms: BubbleSort (recursive and non-recursive); SelectionSort (recursive and non-recursive); InsertionSort (recursive and non-recursive); Bidirectional BubbleSort; Double InsertionSort; Double SelectionSort; BucketSort; MergeSort; QuickSort & CountingSort. For each of your 4 allocated algorithms (1 basic sorting algorithm and its associated recursive version, 1 optimised basic sorting algorithm which you have to teach yourself from the provided paper, and 1 advanced algorithm), your report should address at least each of the following questions:

- What process does the algorithm use to sort a list of objects (description – no code)?
- What are the strengths and weaknesses of the algorithm (discussion)?
- How efficient is the algorithm (ie what is its performance under specific conditions) – don't make comparisons with other algorithms in this discussion

NOTE: all sorting algorithms must be applied to arrays/arraylists initialised to consist of elements of the following data type:

- **Random alphanumeric data items (strings) consisting of a combination of 3 alphabetic characters and 6 numerical values (in any order); and**
- **Duplicate values should be catered for in the list of values.**

An appropriate title is to be given to the report. Before commencing with the draft of your report, familiarise yourself with the rubrics so that you are clear as to what is expected from you. The expected deliverables of this exercise are the following, which will contribute 12% towards your class mark. Marks for this assignment depend on the successful completion of all the required deliverables:

1. Draft individual report that has been reviewed by your chosen peer reviewer (refer to Moodle Peer Review Workshop for instructions). The report should be reviewed according to the rubric (Worksheet 1) provided over the page (2%). **Submission of the draft is 3-May**. **Due date for peer reviews is 9-May**.
2. Individual report (maximum of 4 A4 pages, typed in Times New Roman, 11 pt) **submitted by 20-May** (refer to Experimental Report Planner for individual allocation). The report will be evaluated according to the rubric (Worksheet 2) provided over the page (8%).
3. For reviewing a draft report and giving meaningful feedback, you will receive recognition (2%).

References: At least 5 references, of which ***at least 2 must be from recognised published journals*** in the computing sciences discipline (these must be IN ADDITION to those provided by your lecturer during the lectures), ***1 a book*** (not your text book) and a total of ***at most 2 web sites***. 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. YOU MAY BE ASKED TO PRODUCE REFERENCE MATERIALS. FAILURE TO PRODUCE THESE MATERIALS WILL RESULT IN A PENALTY OF 50% ON YOUR FINAL REPORT MARK.

All reports (draft and final) have to be submitted to Turnitin for detection of any evidence of plagiarism PRIOR to submission (refer to the relevant Moodle activity for further instructions). Any evidence of plagiarism in a 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.**

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 will result in a penalty on your classmark****.*

		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, related work on the 3 sorting algorithms, experimental method, results & discussion of results on the 3 sorting algorithms, logical conclusion derived from the results presented, and bibliography).**	*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.	**Clearly stated relevance of experiment and focus thereof in the introduction of the report.**	*No reasons for sorting are given. No overview of the report contents is provided in terms of what the report is about.*	*Very high level reasons for the need for sorting are provided. No overview of the report contents are provided.*	*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.*	*Good reasons for need for sorting is given, specifically in terms of finding the quickest 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.*	

		Very low quality	*Low quality*	*High quality*	*Very high quality*	*Not done*
3.	**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. Accompanying narrative does not refer to the results in any way.*	*Results 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 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.*	
4.	**Discussion effectively highlights comparative results of the 3 sorting algorithms.**	*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.*	
5.	**Presents clear conclusion based on results and discussion. Contribution of report is clearly evident.**	*Conclusion is repetition of discussion.*	*Conclusion presents an argument of contribution of only the findings of the experiment.*	*Conclusion provides discussion on the contribution of the report (ie which algorithm is the fastest, and does this conflict or confirm what the literature says).*	*Conclusion provides discussion on the contribution of the report (ie which algorithm is the fastest, and does this conflict or confirm what the literature says). Provides possible arguments for the confirmation/ contradiction.*	

		Very low quality	*Low quality*	*High quality*	*Very high quality*	*Not done*
6.	**Uses appropriate scientific language in a logical manner. The report is obviously the work of the author[1].**	*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.*	
7.	**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.*	
8.	**All references are cited. Correct citation style used (like Harvard system). Variety of references is correct and representative (ie. At least 5 references: 2 journals in addition to the provided one; 1 book (not WRA201 text book); at most 2 web sites). 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%

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

Worksheet 2: Scientific Report Marking Rubric

		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).	___ **5**

<u>Introductory materials</u>: **What you need to do to meet basic requirements for WRA201/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.

		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 data structures 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 WRA201/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.	------ **10**
<u>Experimental method</u>: **What you need to do to meet basic requirements for WRA201/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.		

		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?	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 WRA201/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 data structures 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	**___** **10**

						further investigations.
<u>Closure materials</u>: **What you need to do to meet basic requirements for WRA201/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.	

		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? Are there a minimum of 2 journal, 1 book and 2 online references?	Missing at least 2 journals, 1 book (not prescribed book) and maximum of 2 online 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.	------ **5**
<u>Bibliography</u>: **What you need to do to meet basic requirements for WRA201/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.		

		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	------ **5**
<u>Delivery</u>: **What you need to do to meet basic requirements for WRA201/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.		

		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.	------ **5**
<u>Technical aspects, flow & appearance</u>: What you need to do to meet basic requirements for WRA201/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.		

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: _____

_____