CITS4401 Software Requirements and Design
Research Essay
(worth 25% of total assessment)
Due: Thu, May 28th, 2015 @4pm

Learning Objectives: The research project provides the opportunity to study a topic of interest in more depth. The learning objectives are:
- To allow students to follow up on a topic of particular interest.
- To gain familiarity with the scientific literature on software engineering in an area of interest.
- To gain practice at distilling the main points, issues or steps in the development of a technique in a way that can be disseminated to others.

The Task: Your task is to select <u>two</u> papers from the scientific literature on a topic related either to **Software Requirements** or to **Software Design**. You will summarise the main contributions of these papers in a 1000 word essay. The two papers should be related in that: they form a sequence in which a system, technique, or theory is successively developed or improved, or they present arguments or results supporting alternative approaches to solving a problem in software requirements and design.

The papers must be published in recognised peer-reviewed journals, conference proceedings or books. Web sites other than refereed journal and conference archives are not acceptable. At least one of the papers must have been published in the last 10 years (2005 or later).

Guideline: To help you get started, please follow the suggested guideline below.

To start, choose ONE paper on software requirements and design that has been published in a peer-reviewed journal or conference proceedings. Complete a structured review of the paper using the following headings. The questions are taken from Bill Griswold's excellent guide on How to Read An Engineering Research Paper:

1. **What are the motivation for this work?** For a research paper, there is an expectation that a problem has been solved that no one else has published in the literature. This problem intrinsically has two parts. The first is often unstated, what I call the **people problem**. The people problem is the benefits that are desired in the world at large; for example some issue of quality of life, such as saved time or increased safety. The second part is the **technical problem**, which is why the people problem does not have a trivial solution; that is, why a new technological or engineering solution may be required. Implicitly there is implication that previous solutions to the problem are inadequate. Occasionally an author will fail to state either point, making your job much more difficult.
2. **What is the proposed solution?** This is also called the hypothesis or idea. There should also be an argument about why the solution solves the problem better than previous solutions. There should also be a discussion about how the solution is achieved (designed and implemented) or is at least achievable.
3. **What is the evaluation of the proposed solution?** An idea alone is usually not adequate for publication of a research paper. What argument and/or experiment is made to make a case for the value of the ideas? What benefits or problems are identified? Are they convincing?
4. **What are the contributions?** The contributions in a paper may be many and varied. Ideas, software, experimental techniques, and area survey are a few key possibilities.
5. **What are the future directions for this research?** Not only what future directions do the authors identify, but what ideas did you come up with while reading the paper?

6. Include a reference list of 2 or more papers and books you have found related to this work.

Next, choose ONE more paper related to the first paper above, from the refereed literature. Write a 1000 word essay on the two papers that addresses the following questions:
- ***Context:*** Why were the papers written? What was the <u>similar</u> problem that the system / method / theory conveyed in the papers was designed to address?
- ***Compare and Contrast:*** Outline the solution proposed in each paper and how it was evaluated. What were the new ideas or hypotheses that differentiated the two papers?
- ***Conclusions:*** What did they achieve? What were the limitations? Which of the papers do you think has the best solution? And why?

These questions can often be addressed by using a simple example to illustrate the points.

This is an exercise in *abstraction.* You need to choose a level of abstraction appropriate for conveying the story of the papers within the 1000 word maximum limit. Students sometimes find this a difficult skill to master, but it is well worth practising, as you will be required to do this often in almost any IT-related career you choose.

Make sure you use sections and sub-headings in your essay to help the reader follow the structure of your essay.

Sources: You should attempt to access the original source(s) of your essay topic. It is therefore worth looking up relevant literature before making a final decision on your topic. A good strategy is to approach the task a little bottom-up as well as top-down. Don't be too stubborn on topic before investigating the literature - find two or three good papers that form a logical sequence and tell a story that is easy to present in a logical fashion as described above, and *cultivate an interest* in that topic!

Papers must be published in recognised refereed conferences and journals, or books. This includes, for example, papers found on IEEE explore and the ACM portal. The reference lists at the end of text-book chapters are also a good source for suitable papers. If you are not sure whether a paper you have found is from "recognised peer-reviewed journals or conference proceedings" please see the course co-ordinator for clarification.

Some good sources of papers that are kept (in full or part) by our library include:
- [IEEE Transactions on Software Engineering](#)
- [ACM Transactions on Software Engineering](#) (see also [ACM Digital Library](#))
- [IEE Proceedings Software Engineering](#)
- [Proceedings of the IEEE International Symposium on Requirements Engineering](#)

These are major repositories for software engineering research and most of the topics and authors covered in the lectures will make an appearance. Many other journals and conference proceedings are also in the library.

Another excellent source of papers is the library's searchable electronic indices, such as [IEEE Xplore](#) and ACM portal: Try ieeexplore http://www.ieeexplore.ieee.org/ , and the ACM digital library and guide to computing literature http://portal.acm.org/. Many of the journals and conferences in these indices are subscribed to by the University, and you can download the papers from a browser operating from the UWA domain (or through a UWA proxy). Google scholar http://scholar.google.com/ is particularly useful for finding groups of related papers.

Citations and References: It is essential to support your research (assignment, report or thesis) with reference to your source material, whether from written sources, diagrams, maps or

recorded material. The reader must be able to confirm that an author has been correctly quoted and must be given sufficient information to identify and retrieve the references. You need to acknowledge the information you have found in the body of your work as well as providing a list of it at the end. This can take 2 forms: kept (in full or part) by our library include:

- a list of the sources you have directly quoted in number order - a **reference list** or endnotes, or
- an alphabetical list by author of all the material you consulted regardless of whether you used that material directly – **a bibliography**

For this assignment you should provide a **bibliography** of your sources.

There are many different styles for citing references in the body of the text. For this assignment, you should use the **Harvard citation style**. Details of this style (and others) can be found from the UWA library web site at http://guides.is.uwa.edu.au/harvard.

Highly Recommended Reading:

- ***Writing Good Software Engineering Research Papers (Minitutorial)*** in Proceedings of the 25th International Conference on Software Engineering, IEEE Computer Society, 2003, pp. 726-736. Mary Shaw Carnegie Mellon University.

Submission Requirements: Submit your 1000 word essay as a pdf to cssubmit by the due day and time. You should divide your essay into sections with proper section number and section heading.

Late Submission Policy: http://web.csse.uwa.edu.au/students/assessments/late-submissions