COMP 4000: Distributed Operating Systems

Winter 2014 Mid-Term Exam

February 27, 2014

Instructor: Anil Somayaji

80 minutes, Open Book

Answer 3 out of the following 7 questions. You may omit three, but you must answer the question marked as mandatory (the last one). If you answer more than 3 questions, clearly indicate which ones should be graded. Please write your answers in a separate exam booklet, or, alternately type them on a computer and email them to `anilsomayaji@connect.carleton.ca` or submit them on a provided USB key.

The exam is open book, open note, open Internet. The only thing you may not do is discuss questions with other individuals. In other words, no emailing/IM/texting/whatever with other people during the exam!

How to Answer the Questions: Please do not simply answer the sub-questions individually and sequentially! Instead, please write a small essay that addresses all of these questions. Be specific where possible but make appropriate generalizations. Be concise—the essays will be long enough if you really answer the questions and time is short.

While you may structure your essays around the given questions, you are not obligated to do so; instead, what is important is for you to construct a coherent argument on the topic that roughly addresses the specific sub-questions. I will be grading each question holistically. A coherent essay that leaves out a few minor points will get a better grade than one that completely answers each sub-question but doesn't connect those answers together to form a larger argument. Above all, show me what you understand, not what you remember.

Good luck!

1. {$filesystem} is the solution to what problem? How does it solve that problem? Explain. Answer for **two** filesystems discussed in class.

2. The servers of distributed OS services are typically organized using a mix of hierarchical (e.g., master/slave) and peer-to-peer strategies. Why are both strategies used? When are they ignored in favor of single server solutions? Explain, using at least one example from each case (hierarchical, peer-to-peer, and single server).

3. "UNIX compatibility is sacrificed sacrificed in order to improve scalability." Argue for or against, using specific examples discussed in class.

4. Describe three strategies used to increase scalability in distributed operating systems. Give and explain specific examples of each.

5. Describe three data consistency models that have been used in the systems we have discussed in class. Why are there different ones, and what are the trade-offs? Give at least one example of each.

6. Describe three ways (tasks/use cases) that computers were envisioned to be used in the Mother of All Demos. For each, how are these use cases addressed in current systems? Does current usage fit within Englebart's vision?

7. **(mandatory)** What is a distributed operating system? Does a distributed operating system exist (at Internet scale)? Explain.