

COMP 4000: Distributed Operating Systems

Winter 2015 Mid-Term Exam

March 2, 2015

Instructor: Anil Somayaji

80 minutes, Open Book

Answer 3 out of the following 7 questions. You may omit four, but you must answer the question marked as mandatory (the first one). If you answer more than three 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 anil.somayaji@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: Answer each question with a small essay. When the question has multiple parts (e.g., asking for you to discuss two or three separate systems), please do not answer them separately; instead, use them to help structure your small essay answer. Be specific but also make appropriate generalizations. Be concise—the essays will be long enough if you really answer the questions and time is short.

If you prefer, you may answer your questions using one essay (e.g., you write one essay covering questions 1, 3, and 7). If you do so, please indicate which questions you are attempting to answer with your essay.

Above all, show me what you understand, not what you remember.

Good luck!

1. **(mandatory)** What is a distributed operating system? Does a distributed operating system exist (at Internet scale)? Explain.
2. `{filesystem}` is the solution to what problem? How does it attempt solve that problem? And how effectived does thi solution appear to be? Answer for at least **two** filesystems discussed in class.
3. “UNIX compatibility is 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. What are two fundamental challenges in distributing processes across multiple hosts (all running the same “distributed OS”)? Consider the problems in the context of resource allocation, resource access (e.g., files, network connections), inter-process communication, and shared memory.
6. “The scalability of distributed operating systems is constrained on their ability to name and reserve resources.” Explain this statement, arguing for or against, by comparing and contrasting how naming and resource reservation are handled in at least three systems discussed in class.
7. Make up a question that addresses key ideas we discussed in class and answer it.