

COMP 4000/5102: Distributed Operating Systems

Fall 2018 Test 1

October 17, 2018

Instructor: Anil Somayaji

80 minutes, Open Book

Answer 3 out of the following 5 questions. 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 submit them via cuLearn or email them to anil.somayaji@carleton.ca.

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.

Show me what you understand, not what you remember.

Good luck!

1. While individual networked hosts have long used the process abstraction, early distributed OSs experimented with varied models for distributing computation and I/O. Discuss how at least two systems we discussed in class (such as LOCUS, Sprite, Amoeba, or Clouds) built on or changed the process abstraction in order to provide operating system services in a distributed context. (Be sure to explain the standard process model as implemented in UNIX or similar systems.)
2. Caching is a key strategy for improving performance in computer systems, particularly distributed systems. What are three systems discussed in class that make use of caching as a strategy for improving performance? For each of these systems, what was cached, what benefit did this provide, and what were the downsides (in terms of complexity, reliability, consistency, or other challenges) of implementing caching?
3. Distributed operating systems are always composed of some mix of trusted and untrusted components. Compare and contrast three distributed systems discussed in class that made different choices in which components were trusted or untrusted. How did these choices impact the performance, scalability, and security of these systems?
4. To what extent does the vision of computation put forth in Englebart's Mother of All Demos and the Alto motivate the development of distributed operating systems (from the perspective of the systems we discussed in class)? Discuss at least three systems, analyzing to what extent they helped implement the MOAD/Alto vision. Be sure to explain what that vision was!
5. Concurrent access to data is one of the key tasks for any distributed operating system. Discuss how concurrent data access was addressed by at least three systems that we studied in class. For each, what was the approach, what were the advantages of that approach, and what were the disadvantages? Please compare and contrast.