

October 7, 2002

7th October 2002

The following exam is open book and open notes. You may feel free to use whatever additional reference material you wish, but **no calculators** are allowed. Please note the following instructions. There will be a ten point deduction for failure to comply with them:

- start each problem on a new sheet of paper
- write your social security number, but not your name, on each sheet of paper you turn in
- show your work whenever appropriate. There can be no partial credit unless I see how answers were arrived
- be succinct. You may lose points for facts that, while true, are not relevant to the question at hand

You have until 12:20 to finish the exam. The questions are equally weighted.

1. Two of the most important (arguably the two most important) subsystems of an OS are the virtual memory and disk driver. The virtual memory subsystem has a major impact on the number of disk accesses required, and the disk driver, by scheduling the disk accesses (both those requested by the virtual memory system and those requested by user programs), determines how quickly the accesses happen.

Consider these subsystems in the context of Plan 9, Mach, and Exokernel. For each of these operating systems (using the term a bit loosely in the case of Exokernel), how vulnerable are they to a poorly written user-level implementation? To what extent can a well-written user implementation improve system performance?

2. How do bare socket programming, RPC, CORBA, and MPI address the problem of interoperability between different computer architectures?
3. Compare the process of obtaining service in Kerberos and in a public-key system. What steps only exist in one system, and not the other? What steps are similar between the two? What steps are different? Why can the public-key system be so much simpler?

For five points extra credit, identify the following: 6029 920.