

# Operating Systems PhD Qual

Fall, 2005

Do all problems.

1. Answer either of 1a or 1b. You need not answer both.
  - (a) Explain how UNIX finds the correct device driver for a device starting from the device's name in the file system.
  - (b) Explain what it means for NFS to be a "stateless" protocol. Explain the primary why in which statelessness makes the set of NFS protocol messages differ from the calls in the file system interface.
2. Explain the sequence of actions taken by hardware and the operating system to respond to a page fault in a demand-paged virtual memory system. Explain what happens from the moment of the reference until the moment when the reference completes successfully. Make the following assumptions: - Hardware has a TLB and a single-level page table. - The reference is to a portion of the virtual address space that can be legally referenced. - The page replacement algorithm maintains a list of free page frames, and the list contains plenty of page frames. Be as specific as possible in describing the hardware facilities and operating system data structures used to respond to the page fault.
3. Explain the major advantage and major disadvantage of file system block caching. How is the disadvantage remedied?
4. What is the difference between "local" and "global" page replacement algorithms? Which type generally works better, and why? What advantage or extra capability is possessed by the other type of algorithm (i.e., the type that works less well)?