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       To:
     From: Diane Shankle <shankle@ee.stanford.edu>
  Subject: 2008 Quals Questions
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      Bcc:
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Attachments:

From: Philip Levis <pal@cs.stanford.edu>

1) Threads vs. Processes
   - What is the difference between a thread and a process?
   - What is the relationship between the two?
   - When a program creates a new thread, what state does this allocate?
   - When a program creates a new process, what state does this allocate?

2) Consider two simplistic cases of 2-way parallel hardware. SMP, where two concurrent execution contexts have separate caches, and SMT, where the two share a cache. We have two threads, A and B, and can schedule them two ways. In option 1, we run *only* thread A for 10ms, then run *only* thread B for 10ms. In option 2, we run *both* thread A and thread B for 20ms.
   - In an SMT system, when might option 2 run *slower* than option 1?
   - Describe a memory access pattern for which option 2 would run *slowest* with respect to 1 in an SMT system.
   - In an SMP system, when might option 2 run slower than option 1?
   - Describe a memory access pattern for which option 2 would run *slowest* with respect to 1 in an SMP system.
   - Pretend you're an OS implementer and you get some bits from hardware that tell you whether you're an SMP or an SMT. Based on the above observations, what simple rules might the scheduler use to try to improve performance?

3) What is a file system extent? Why do file systems use extent-based allocation? What are its drawbacks?

4) Describe how a kernel swap daemon frees memory pages. How does it know when a page can be freed?

Phil