

CS 574
Midterm Exam
October 13, 2008

The following exam is open book and open notes. You may feel free to use whatever additional reference material you wish, but **no electronic aids** 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 Banner ID number, but not your name, on each sheet of paper you turn in

Also, please note the following:

- show your work whenever appropriate. There can be no partial credit unless you show how you derived your answers
- be succinct. You may lose points for facts that, while true, are not relevant to the question at hand

You have until 2:20 to finish the exam. The questions are equally weighted.

1. A virtual machine environment typically provides virtualized versions of common devices, such as video cards and network interface cards (among others). Give an advantage of providing as simple as possible a virtualized device (for instance, providing a very generic video card even if the underlying platform has sophisticated 3D acceleration)? Give an advantage of providing a very complex virtualized device (for instance, providing a network interface card with many levels of the TCP/IP stack implemented on the card, even if the underlying interface card is a very basic NIC that requires nearly all interaction in hardware)? If it is known in advance that a guest OS will be running in a virtualized environment, why can we reduce the number of drivers shipped with the guest? Does this affect the number of drivers shipped with the host OS?
2. A fellow student comes to you with a great new idea for an MS project: journalling the LogFS filesystem, much like ext3 is a journal added to ext2. Should the student propose this idea to his or her advisor, or go back to looking for a project?
3. Why is it generally a good idea for batch jobs to have a relatively long time quantum? I made the comment when presenting my solution to HW1 that it really didn't make much sense in that problem for the batch jobs to have a longer time quantum than the other tasks – why?
4. Would you expect software page coloring to be more helpful in reducing cache misses for a direct mapped cache, a four-way set-associative cache, or neither? Why is it possible software page coloring could cause more page faults (compared to a page replacement strategy that doesn't use page coloring)?