

COP4610 Spring 2006 Homework Assignment 1

The material for this homework assignment covers Chapters 1 to 2.

1. Think about all computer systems that you and your family has owned in the past such as PCs, Laptops, and handhelds, but also iPods, cell phones, digital wrist watches, DVD players, TiVO, and other consumer electronics. For all of these systems, find out via product manuals and the Internet which ones are running an operating system (not a simple monitor) and what “brand” of operating system. Indicate if any one of these systems is based on a Java virtual machine.
2. For you favorite CLI shell (e.g. sh, csh, tcsh) on Linux, find out if the “rm” command is built-in or an OS service program. Use the “man” pages and/or the “which” command and/or change the \$PATH variable to investigate. You can change the \$PATH variable using the “setenv” command. Run “rehash” after “setenv PATH” to let the changes take effect.
3. Describe the major innovations of Vista compared to Windows XP. What are the three “pillars” on which Vista is built?
4. Virtualization is a hot topic. In certain situations the OS virtualization layer maps one system call into multiple calls in the host OS. Consider stacking N virtual OS layers. How would this affect the overall performance of the system assuming that a system call at each layer is translated into two calls in the layer beneath it? Is the speed-down of a system call in the guest system linear in N ?
5. Consider a simple system with CPU, memory, and a disk. Suppose hardware interrupts are not supported and the CPU has to poll the devices for status information. Assuming that the polling rate is 50 polls per second and that a 1KB block is transferred by the disk controller from its local buffer to memory via DMA. Before the new block can be written the previous one has to be removed by the CPU (detected by polling the controller). For this system, what is the maximum throughput in KB per second between the CPU and disk? What if there are two disks and the CPU handles one controller per poll?