

## COMP3911 Suggested Exercises #2b

These suggested exercises are not to be handed in for marking, but should be used as a study aid.

- 1) What is the benefit of having separate "administrator" and "user" accounts? Give an example of an activity which, when done as "administrator", poses a risk to the system.
- 2) Why is the POSIX standard important? What does this get us? What do standards in general buy us?
- 3) You are managing a machine that is running as a dedicated web server. There have been some complaints that the web server is slow when under heavy load and the boss is concerned since the load on the web server is expected to increase in the near future.

You run "vmstat 5" and "uptime" repeatedly on the machine when it is under a typical heavy load period and observe the following:

- On average the CPU is idle 20% of the time
- The machine always has a lot of free memory pages
- The SCSI disk is doing about 10 I/O operations/second.

Given the above, determine which of the following machine upgrades to recommend and how much additional load it will handle, giving the same or better performance as compared to the current system?

- A CPU that is twice as fast
- The addition of 256Mbytes more memory
- The replacement of the SCSI disk with one that has a 10,000RPM spindle instead of the current one with a 7,200RPM spindle.

### Hints:

Remember that  $P_0$  (the proportion of time a queue is empty) is equal  $1 - \rho$ , which is the load factor and equal to  $\lambda / \mu$ .

For the disk, you need to estimate the average time taken for an I/O operation in order to estimate how busy the disk is and what effect the faster spindle will have. In other words, for the disk, you will have to figure out how many I/O operations/second that it can handle and use that to estimate what effect the change will have on the server's load handling capacity. (A typical current generation SCSI disk has an average seek time of about 10msec.)

In general, the busiest device will saturate first, and is typically referred to as the bottleneck device. This device will end up with the long queue and will be the predominate factor in overall performance. (The only exception to this is when the system is balanced such that the queue lengths remain about the same length for all queues.)