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HW#1 CS492 A

“I pledge my honor that I have abided by the Stevens Honor System”

1.

CPU Utilization is:

1-n^p = 1 – .4^6 = .996 (.995904 but I rounded)

2.1

There are two main benefits of using threads rather than processes. The first is creation overhead, which is a lot faster than creating a process because they share the same address space. Also, they are more efficient than processes because they can overlap I/O and use different cores or CPU’s.

2.2

There are a few advantages of implementing threads in user space. The biggest advantage is speed, which is that context switching and inter-thread communication. Processes are a lot slower switching and communicating than threads since they share the same data structure.

2.3

The greatest advantage is also its greatest disadvantage. The shared memory allows for a speed up, but one thread can negatively impact the entire system. If a thread is corrupted or blocked, then it could take down the entire system.

3.

If the jobs run sequentially then it will take 80 minutes to complete since each job will take 20/0.5 + 20/.05 = 40min. If they run in parallel, then we calculate the CPU utilization which would be 1 - .5^2 = .75. So, for the last job, it would take 20min/0.75 + 20min/0.75 = 53.3min.

4.

This cannot occur in a single threaded process since it will wait for the keyboard input before forking.

5.

One can use threads to increase the download time by creating many of them to fetch different parts of the file from each mirror server. The solution still has a bottleneck due to the network and the threads still would have to access the server through the same network and may not be able to handle multiple threads at the same time.

6.1

The operating system has two main functions. The first one is managing resources, which for example is memory management, CPU management, I/O etc.… The second is to make it easier to

interact with machine through a UI. It does not need to be user friendly; it just needs to be usable so you can execute functions on the machine without having to worry about the details.

6.2

The main function of a hypervisor is to allocate system resources to create and manage multiple virtual machines. This is done through creating multiple software versions of the machine's hardware.

6.3

The difference between a hypervisor and an OS are that operating systems run on top of hypervisors to allow multiple operating systems to run on one machine. Each OS can also go into kernel mode which is very useful to run applications.