CS492 homework 1 – Processes & Threads

The due date for this assignment is *11:59pm Friday, February 9th, 2018*. This assignment is worth 5% of your final grade. No handwritten submissions will be accepted, or graded. Your submission must be doc, or pdf file with the typed solutions to the 5 problems included in this description.

This is an individual assignment. Individual assignments, as the word indicate, are to be done INDIVIDUALLY. Any sign of collaboration will result in a 0 and being reported to the Honor Board.

Problem 1. (20 pts)
A computer system has enough room to hold five programs in its main memory. These programs are idle waiting for I/O half the time. What fraction of the CPU time is wasted?

Problem 2. (20 pts)
On all current computers, at least part of the interrupt handlers are written in assembly language. Why?

Problem 3. (20 pts)
Assume we have a system with a single-core CPU. Multiple jobs can run in parallel (multiprogramming) and finish faster than if they had run sequentially. Suppose that two jobs, each needing 20 minutes of CPU time, start simultaneously. How long will the last one take to complete if they run sequentially? How long if they run in parallel? Assume 50% I/O wait.

Problem 4. (20 pts)
If a multithreaded process forks, a problem occurs if the child gets copies of all the parent's threads. Suppose that one of the original threads was waiting for keyboard input. Now two threads are waiting for keyboard input, one in each process. Does this problem ever occur in single-threaded processes?

Problem 5. (20 pts)
Assume that you are trying to download a large 2-GB file from the Internet. The file is available from a set of mirror servers, each of which can deliver a subset of the file's bytes; assume that a given request specifies the starting and ending bytes of the file. Explain how you might use threads to improve the download time. Are there any possible bottlenecks in your proposed solution?

Late assignment (even by 2 seconds) will be given a -25% decrease penalty per day, for the first 2 days after the deadline. So, if you send an assignment 1 second late, you will receive 75% of your grade for the assignment. If you send it, 25 hours late, you will receive 50% of your grade for the assignment etc. After 48hrs from the deadline there will be a -90% decrease penalty, so you will receive 10% of your grade.