A Virtual Disk for Geek OS

This assignment is the first step in adding a virtual memory (VM) or a file system (FS) to the Geek OS.

1. The characteristics of the disk device such as block size, number of blocks, number of tracks, track capacity, etc. would be set at boot time by processing a configuration file. You are permitted to set/change the characteristics to make the disk both realistic and contemporary.

2. Read and write operations on the disk will be performed through system calls which will be designed and implemented by you.

3. The disk will be represented by a simple *disk model* that calculates the I/O wait time for a read or write operation performed on the disk as a function of the number of tracks by which the disk head has to move. The I/O operation should be deemed to be complete only at the end of that much time, hence we need an arrangement to raise an I/O interrupt at that time.

4. The OS will keep a queue of "scheduled interrupts". Each entry in the queue will have a tuple: <time, kind of interrupt, details of interrupt > where <details of interrupt> will be specific to the kind of interrupt. This queue will be maintained in the ascending order by time.

5. An arrangement should be made such that the occurrence of an I/O interrupt will be simulated when the time in the OS clock matches with the time in the first entry in the queue. It will load values from <details of interrupt> in appropriate CPU registers or memory locations at the time of the interrupt.

Key issues in this assignment:

1. Note that a process under GeekOS is actually a C program. This process would make a system call to initiate a read/write operation on the virtual disk *Sim_disk*.

    - Hence we must insert these system calls in the C program that is to be executed as a process.

2. GeekOS should "block" the process that initiates an I/O operation until an I/O interrupt indicates that the I/O operation has completed. Hence we should mark an appropriate process state transformation for the process that initiates an I/O operation. You would have to add this feature to GeekOS.

Work to be done in this assignment

Prepare your own version of the GeekOS, which you will carry through this entire design project. Add the following features to GeekOS:

1. Add the I/O interrupt capability in the simulated machine of GeekOS.

2. In GeekOS, add the feature to block a process that initiates an I/O operation until its I/O operation completes.

It would be useful for each group to split into two halves to perform the first two functions.

Disclaimer:
Right to make additions/modifications to this lab specification is reserved.