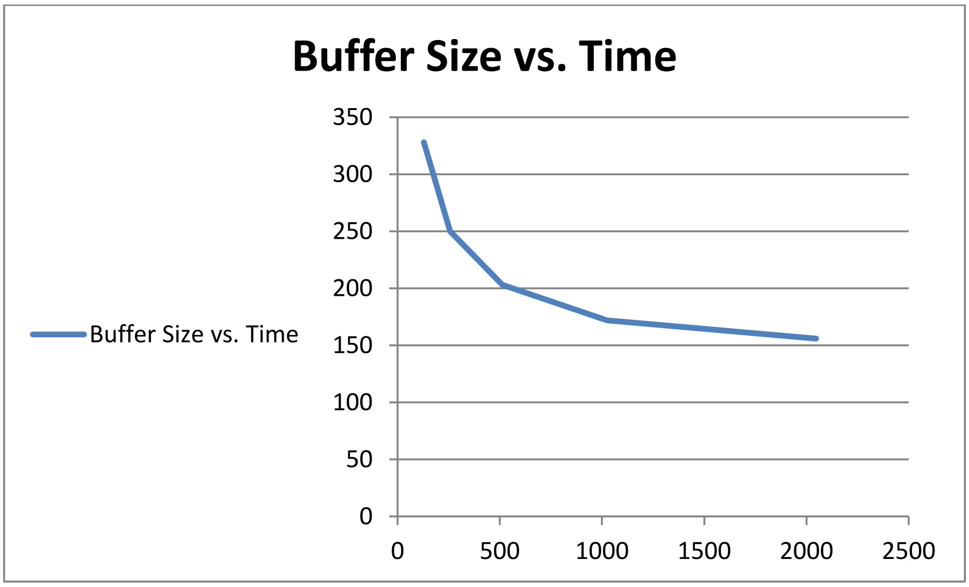
Operating Systems - Exercise 1

Nadav Glickman, 200336436

Part 2:

1.



2. The graph isn't straight because as we use a bigger buffer size, we make less system calls to read the file, thus reducing the overall runtime of the program.

Each system call we don't make saves a significant amount of run time. System calls go through the operating system and are very slow, compared to local operations the program makes, that do no require the operating system.

3. Yes. This will add another system call every time we call for a read() operation, thus effectively doubling the amount of system calls we make, which will greatly reduce the run time of the entire program.

Also, the lower the buffer size, the more times it will have to be reloaded, meaning we'll have to run more print commands. So we can conclude that the smaller the buffer size, the slower the overall run time will get, once we add the print command, as it will be called many more times in this case.

Part 3:

1. False. Printing any string to the screen requires a system call in order to access the monitor device. This call must go through the operating system, otherwise the operating system will block it.

2. False. Pressing the key will send a hardware interrupt to the CPU, without passing through the operating system. However, handling the interrupt will be done by the operating system.

3. False. Hardware interrupts are signals sent from the external devices to the CPU, signaling that the CPU should give it immediate attention and process the data coming from it.

4. False. Applications that run in user mode are allowed to invoke system calls. The system ensures that the call is safe and executes it. As evident by you reading this document. The application you are using runs in user mode, but you are looking at it through the screen - a request that was sent from the application to the operating system to show the information.

5. False. Some programs that come with the operating system are installed as user mode applications, in order to save space and increase the speed and security of the operating system kernel.

6. False. The OS can't disable interrupts. Only the CPU can block them. The OS, however, may choose to ignore them.

7. False. Running a program on a virtual machine adds another layer between the program and the hardware itself. The commands pass from the program to the VM, from it to the CPU or to the OS if a system call is required.

8. False. The program can (and should) run in user mode and make system calls in order to access the CD-ROM.

9. False. Every system call adds a context change to the program, which slows it down significantly. The LESS system calls a program has, the faster it will run (assuming the rest of the program remains unchanged).

10. False. External devices access the OS using interrupts. They send an interrupt signal to the CPU and the OS handles it accordingly. Only software can issue system calls.