CS333 - Lab1

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1 Question 01

Number of CPU cores: 4 (from /proc/cpuinfo)

(from /proc/meminfo)
Amount of memory: 8146912 kB
Memory free: 6189080 kB (75.96%)

(from /proc/stat)
Number of context switches: 2798365
Number of forks: 5479

2 Question 02

For this part, the CPU utilization was obtained by observing the output of 'top' or 'htop'.
For getting the disk utilization, we used 'iostat -dx 1' and the last '%util' column gave the disk utilization. The data was observed at an interval of 1 second.
For getting the network statistics, we used 'sar -n ALL 1' and observed the entry corresponding to em1.

2.1 For cpu1.c

- One of the cores was at 100% utilization while the other 3 were close to 0%.
- Disk utilization varied between 0% - 1.2%. This observation was made over a time span of 20s.
- Network utilization was close to 0%.

This suggests that no disk or network operation is being done as is supported by the code.

2.2 For cpu2.c

- One of the cores was at 100% utilization while the other 3 were close to 0%.
- Disk utilization varied between 0% - 1.2%. This observation was made over a time span of 20s.
- Network utilization was close to 0%.

This suggests that no disk or network operation is being done as is supported by the code.

2.3 For disk.c

- One of the cores was at 15% utilization while the other 3 were close to 2%.
- Disk utilization was close to 97-98%. This observation was made over a time span of 20s.
- Network utilization was close to 0%.

This implies that the disk was heavily being used and this is supported by the code.

2.4 For disk1.c

- One of the cores was at 100% utilization while the other 3 were close to 2%.
- Disk utilization was initially around 5% but suddenly decayed to 0%.
- Network utilization was close to 0%.

This observation bolsters that the code was accessing just one file over all the iterations. Since the file was of size 2MB, it must have been cached. Since the data was available on main memory, the CPU was able to use it this accounting for the 100% core utilization.

2.5 For cpu1print.c

We used 'vmstat 1' to monitor the number of interrupts. The 'in' column in the 'system' section gave this information.

- All of the cores were under 20% utilization.
- Disk utilization was under 1%.
- Network utilization was 0%.
- Number of system interrupts as seen using **vmstat** was much higher than cpu1 or cpu2. Since these weren't disk I/Os, they must be from some other I/O device in use, most likely the monitor.

3 Question 03

In the file **/proc/[pid]/stat**, the **14th entry** was the time spent in **user mode** while the **15th entry** is the time spent in **kernel mode**.

3.1 For cpu1print.c

The time spent in kernel mode was much higher as compared to the user mode time. This is justified by the fact that the printf command is causing the program to enter kernel mode.

3.2 For cpu1.c and cpu2.c

The time spent in user mode is much higher than that spent in kernel mode. This is justified by the fact that not many syscalls are made by the program.

4 Question 04

The values were checked from the **/proc/[pid]/status** file.

The number of voluntary context switches for the disk.c file was much much higher than the involuntary context switch.
However, the number of voluntary context switches for the cpu1.c file was 0 but the number of involuntary context switch was much larger.
This is justified as the number of disk access made by disk.c was humongous but the same by cpu1.c was 0.