COMPSCI 3SH3 Fall, 2022
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Assignment 3

CPU Scheduling

1a)

Time quantum of 1 millisecond:

Calculating CPU utilization: $1ms \times 11 = 11ms$

Every task must use the time quantum value. As such, I/O operation from I/O bound tasks return when its their turn. Non-utilizations must also be considered, namely the context switches of $11 \times 0.1ms = 1.1ms$.

CPU utilization: Total time is $1.1ms + 11ms = 12.1ms$ total time. $\frac{11ms}{12.1ms} = 0.91$ %.

b)

Time quantum of 10 milliseconds

I/O bound task takes $10 + 0.1 = 10.1$ ms. Adding to the time cycle through all processes in round robin: $10.1ms + 11ms = 21.1ms$

CPU utilization: $\frac{20}{21.1} \times 100 = 94.786$ %

Virtual Memory

Number of frames	LRU	FIFO	Optimal
1	20	20	20
2	18	18	15
3	15	16	11
4	10	14	8
5	8	10	7
6	7	10	7
7	7	7	7

Massive Storage

a. 750,000 drive-hours per failure divided by 1000 drives gives 750 hours per Failure about 31 days or once per month.

b. The human-hours per failure is 8760 (hours in a year) divided by 0.001 failure, giving a value of 8,760,000 "hours" for the MTBF. 8760,000 hours equals 1000 years. This tells us nothing about the expected lifetime of a person of age 20.

File Management

Direct: $9 \times 512 = 4608$

Double Indirect: $\frac{512}{4} \times \frac{512}{4} \times 512 = 8388608$

Max Size: $8388608 + 4608 = 8393216$