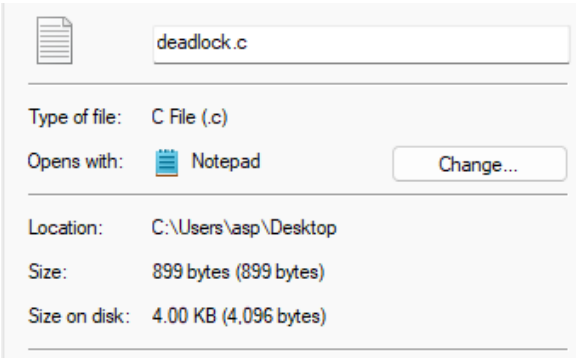
No E-Mail submissions will be accepted.
Submission formats and file naming:
File name: firstName_lastName_lab_3
File format: pdf or MS Word format
e.g. Jim_Carrey_lab_3.pdf

1. Given the following details about a file:



1. What is the actual size of the file?

   4,096 Bytes

2. How many disk blocks does the file occupy?

   1 Block

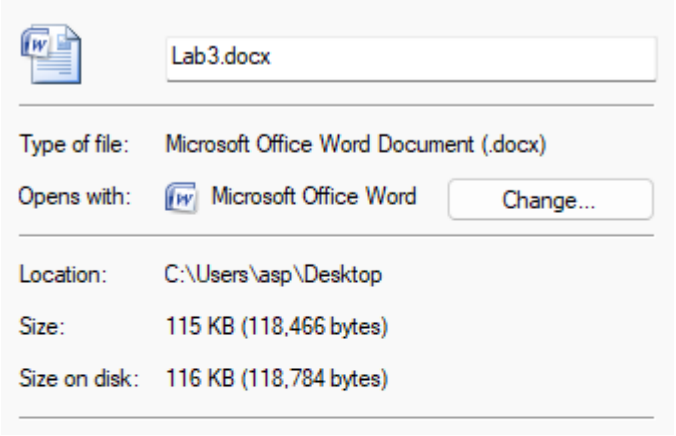
3. Is there any unused space in the last disk block (Y/N)? Explain your answer.

   Yes, because the file only contains 899 Bytes but occupies 4,096 Bytes on the disc

4. What is the size of each disk block?

   4.00KB

Using the information above, calculate:



A. The total number of disk blocks used by the file.

29 Disc Blocks

B. The amount of wasted space in the last disk block.

318 Bytes

Hint: 1 KB = 2^{10}

2. In a multiprogramming operating system, processes are scheduled using a fixed time quantum of 50 milliseconds. The system timer is driven by a clock with a tick interval of 2 nanoseconds.

Tasks:

1. Calculate the duration of the time quantum in clock ticks.

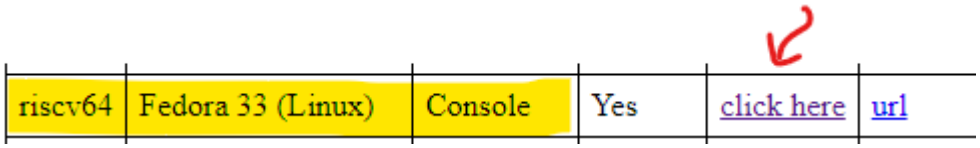
   0.05 * 10^9 / 0.000000002 = 25,000,000 ticks

2. Determine the value that must be loaded into a 32-bit timer register to represent a 50 millisecond time quantum.

   25,000,000

Assume the timer register counts down in units of clock ticks and triggers a context switch when it reaches zero.

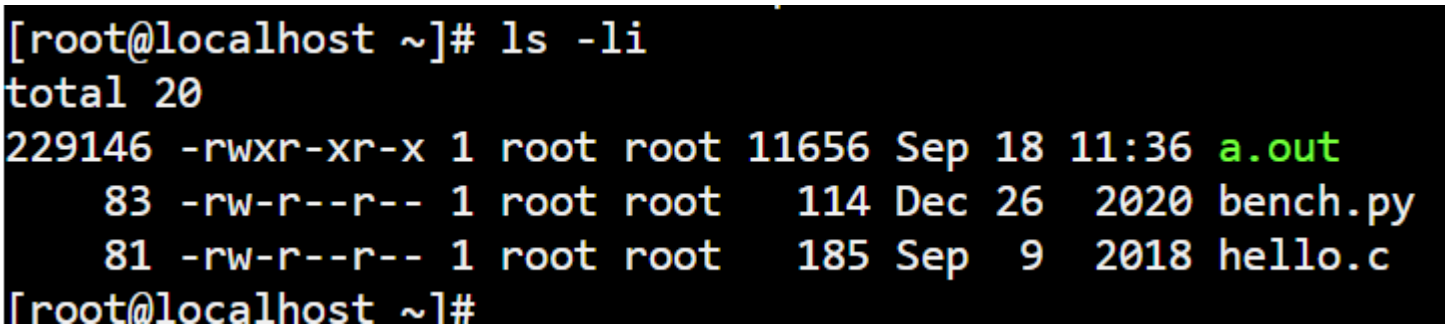
3. Use the online Linux emulator available at:
https://bellard.org/jslinux/



a) Compile the file hello.c to generate the a.out executable. Then, complete the table below.

	i-number	File permissions (in Octal format)
hello.c	81	644
bench.py	83	644
a.out	229146	755

b) Take a screenshot clearly showing the terminal output where you retrieved the above information and attach it as part of your submission.



c) Execute the following command in the terminal: chmod -x a.out, then attempt to run a.out. Were you able to run a.out (yes/no)? Provide an explanation for your answer.

No.
Permission is denied because we changed the execution permission with the command so running the file is not allowed.

4. Given a clock with a frequency of 100 Hz, calculate the clock period in milliseconds (ms) and then fill out the following table.

Clock register # of Bits	Max register value	New clock period (in second) generated by counter	New clock frequency (Hz)
4	2^4 - 1 = 15	10ms * 16 = 160ms	100Hz / 16 = 6.25Hz
16	2^16 - 1 = 65,535	10ms * 65,536 = 655,360ms	100Hz / 65,536 = 0.00153Hz