CSE 231 - Operating Systems
Assignment 5 : 20th December 2020

Q1.

- First we begin with 16-bit architecture and 0x7c00 memory location is for when BIOS finds a bootable sector, it is loaded into memory at this specific address.
- Next we try enable 32-bit instruction mode i.e. protected mode and set it's bit to 1
- Next we load the GDT and switch to 32 bit mode
- Here Hello World is printed on the screen fist, followed by CR0 register value.
- Then the interrupts are disabled and the process is on hault.

Command to run the file:

```
nasm -f bin Q1_2019096.asm -o Q1
qemu-system-x86_64 -fda Q1
```

Q2.

Implementation of Test Editor: I have implemented the text editor using file handling. The text editor can handle the following functions:

1. Takes user input to open the file by name.
2. It can open files by their name and extension. A name without an extension shows an error message and the program exits.
3. If the file exists, previous content of the file is displayed.
4. The user can append text at the end of the file which is opened.
5. The text editor does not recognise special characters like space and new like, only a single word can be given as input. If by mistake a space character is given as input, the file will only show characters before the space character.
6. The text editor implements advisory locks - a warning message is printed if the file being opened is already open.
7. I have implemented both conditions - where race condition is allowed and without race condition and have attached both in the submission.

Advisory locks have been implemented using flock() function with LOCK_EX(exclusive) and LOCK_NB (non-blocking) operations.

Shell script: I have made two shell scripts - testfast.sh and tester.sh
Format : (,...number..,)
testfast.sh → requests the binary file to append the text at double the frequency of tester.sh. It displays only the iterative variable.

tester.sh → requests for the binary file to append the text with a delay of 0.5 seconds. It displays the iterative variable followed by 2 exclamation marks.

We can distinguish using the exclamation marks to see who has appended what.

Command to run the shell script: bash tester.sh
bash testfast.sh

Error handling:

1. fdopen → if file is doesnot exist, it exits the program.
2. Check if the input given is in the limits of the space left in the file.
3. If flock() fails, errno is set and the program exits.