

Assignment 5.1: WriteUp

Code Description

- Since the coding had to be done in the 32 bit protected mode, firstly the A-20 line had to be enabled by calling the A20-Gate Activation function.
- VGA text mode was also set to the safe mode(3)
- Global Descriptor Table was set up to enable access to 32 bit registers
- GDT pointer structure is defined to actually access the GDT
- From that the VGA text buffer is used to actually print hello world.
- On similar lines, the value of CR0 register was loaded and printed in Big Endian.
- For the bootloader to run, it was ensured that last 2 bytes were equal to 0xAA55 and so that the BIOS could jump to 0x7C00. Thus transferring control to the bootloader.
- Reference: <http://3zanders.co.uk/2017/10/16/writing-a-bootloader2/>

```
mov ax, DATA
mov esi, val
mov ebx, 0xb8000

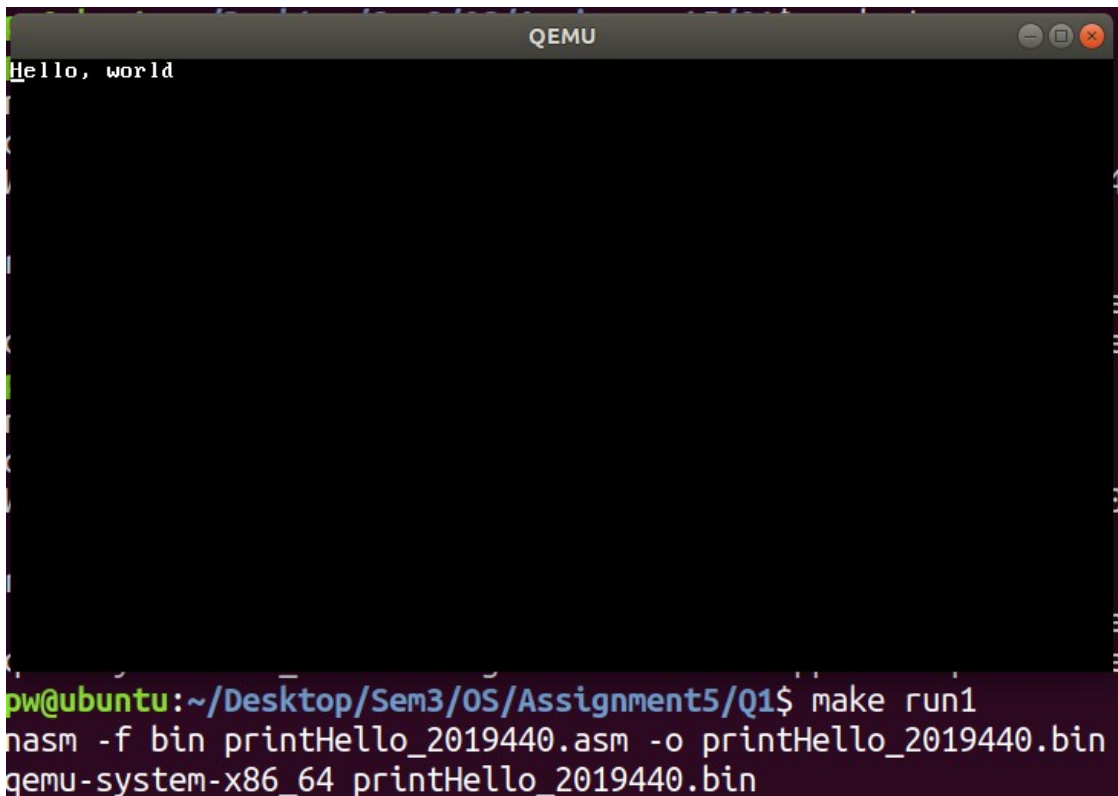
.loop:
    or eax, 0x0F00
    lodsb
    mov word [ebx], ax
    or al, al
    jz .print_cr0_contents
    add ebx, 2
    jmp .loop

.print_cr0_contents:
    mov edx, cr0

.print_cr0_contents_loop:
    or edx, 0x0
    jz halt
    mov eax, edx
    and eax, 0x1
    add eax, 48
    or eax, 0x0F00
    mov word [ebx], ax
```

Instructions to boot the image:

- All the commands to load and run the image have been loaded into the Makefile
- To run the Hello World bootable image, just enter: make run1

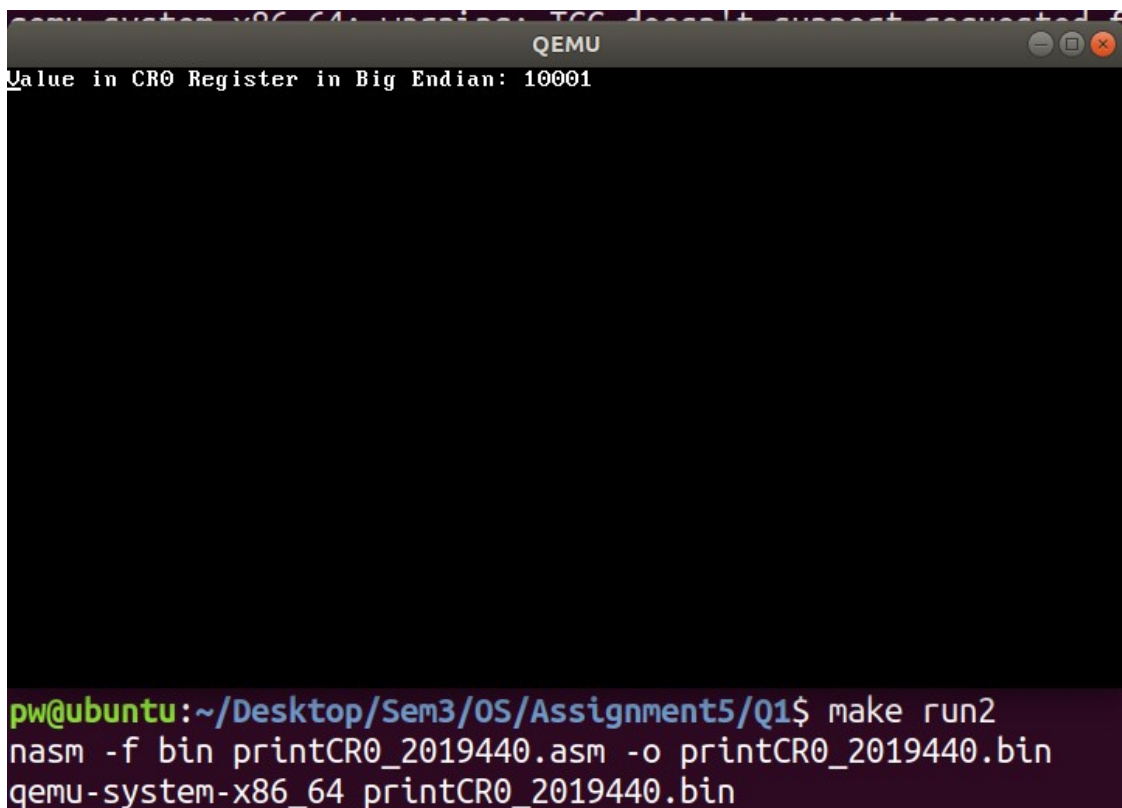


A screenshot of a QEMU terminal window. The window title is "QEMU". The terminal output shows "Hello, world" on the first line. Below the terminal window, a terminal window from the host system is visible, showing the following commands and output:

```
pw@ubuntu:~/Desktop/Sem3/OS/Assignment5/Q1$ make run1
nasm -f bin printHello_2019440.asm -o printHello_2019440.bin
qemu-system-x86_64 printHello_2019440.bin
```

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run the bootable image of printing the CR0 register, enter: make run2



A screenshot of a QEMU terminal window. The window title is "QEMU". The terminal output shows "Value in CR0 Register in Big Endian: 10001" on the first line. Below the terminal window, a terminal window from the host system is visible, showing the following commands and output:

```
pw@ubuntu:~/Desktop/Sem3/OS/Assignment5/Q1$ make run2
nasm -f bin printCR0_2019440.asm -o printCR0_2019440.bin
qemu-system-x86_64 printCR0_2019440.bin
```