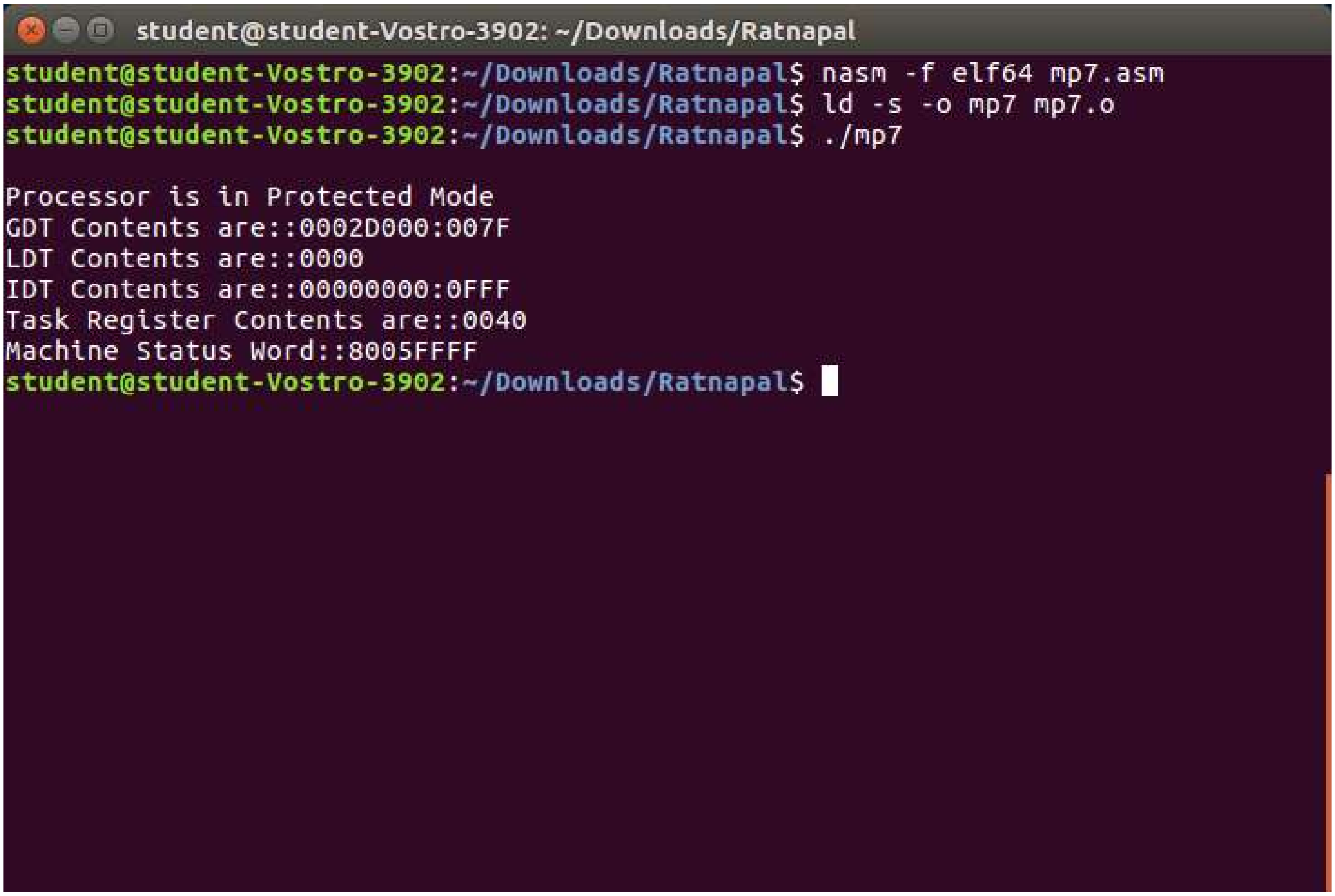
Program No.7

```
;Write X86/64 ALP to detect protected mode and display
the values of GDTR, LDTR, IDTR,
TR and MSW Registers.

section .data
    rmodemsg db 10,'Processor is in Real Mode'
    rmsg_len:equu $-rmodemsg

    pmodemsg db 10,'Processor is in Protected Mode'
    pmsg_len:equ $-pmodemsg

    gdtmsg db 10,'GDT Contents are::'
    gmsg_len:equ $-gdtmsg

    ldtmsg db 10,'LDT Contents are::'
    lmsg_len:equ $-ldtmsg

    idtmsg db 10,'IDT Contents are::'
    imsg_len:equ $-idtmsg

    trmsg db 10,'Task Register Contents are::'
    tmsg_len: equ $-trmsg

    mswmsg db 10,'Machine Status Word::'
    mmsg_len:equ $-mswmsg

    colmsg db ':'

    nwline db 10
;-------------------------.bss section------------------------------
section .bss
    gdt resd 1
        resw 1
    ldt resw 1
    idt resd 1
        resw 1
    tr  resw 1

    cr0_data resd 1

    dnum_buff resb 04

%macro print 2
```

```
    mov rax,01
    mov rdi,01
    mov rsi,%1
    mov rdx,%2
    syscall
%endmacro

;------------------------.text section -------------------------
----
section .text
global _start
_start:
    smsw eax        ;Reading CR0. As MSW is 32-bit cannot use
RAX register.

    mov [cr0_data],rax

    bt rax,1        ;Checking PE bit, if 1=Protected Mode, else
Real Mode
    jc prmode
    print rmodemsg,rmsg_len
    jmp nxt1

prmode: print pmodemsg,pmsg_len

nxt1:   sgdt [gdt]
    sldt [ldt]
    sidt [idt]
    str [tr]
    print gdtmsg,gmsg_len

    mov bx,[gdt+4]
    call print_num

    mov bx,[gdt+2]
    call print_num

    print colmsg,1

    mov bx,[gdt]
    call print_num

    print ldtmsg,lmsg_len
    mov bx,[ldt]
    call print_num

    print idtmsg,imsg_len
    mov bx,[idt+4]
    call print_num

    mov bx,[idt+2]
    call print_num

    print colmsg,1

    mov bx,[idt]
    call print_num

    print trmsg,tmsg_len

    mov bx,[tr]
    call print_num

    print mswmsg,mmsg_len

    mov bx,[cr0_data+2]
    call print_num

    mov bx,[cr0_data]
    call print_num

    print nwline,1


exit:   mov rax,60
    xor rdi,rdi
    syscall

print_num:
    mov rsi,dnum_buff   ;point esi to buffer

    mov rcx,04      ;load number of digits to printlay

up1:
    rol bx,4        ;rotate number left by four bits
    mov dl,bl       ;move lower byte in dl
    and dl,0fh      ;mask upper digit of byte in dl
    add dl,30h      ;add 30h to calculate ASCII code
    cmp dl,39h      ;compare with 39h
    jbe skip1       ;if less than 39h skip adding 07 more
    add dl,07h      ;else add 07
skip1:
    mov [rsi],dl    ;store ASCII code in buffer
```

```
inc rsi            ;point to next byte
loop up1           ;decrement the count of digits to printlay
                   ;if not zero jump to repeat

print dnum_buff,4    ;printlay the number from buffer

ret
```

Output :



```
student@student-Vostro-3902:~/Downloads/Ratnapal$ nasm -f elf64 mp7.asm
student@student-Vostro-3902:~/Downloads/Ratnapal$ ld -s -o mp7 mp7.o
student@student-Vostro-3902:~/Downloads/Ratnapal$ ./mp7

Processor is in Protected Mode
GDT Contents are::0002D000:007F
LDT Contents are::0000
IDT Contents are::00000000:0FFF
Task Register Contents are::0040
Machine Status Word::8005FFFF
student@student-Vostro-3902:~/Downloads/Ratnapal$
```