SC165

Assignment no. 7

Write X86/64 ALP to detect protected mode and display the values of   GDTR, LDTR, IDTR,TR and MSW Registers also identify CPU types using CPUID instruction.

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

section .data
msg1 db "System is in Protected mode.",10
len1 equ $-msg1
msg2 db "System is in real mode.",10
len2 equ $-msg2
msg3 db "GDTR contents are:",10
len3 equ $-msg3
msg4 db "LDTR contents are:",10
len4 equ $-msg4
msg5 db "IDTR contents are:",10
len5 equ $-msg5
msg6 db "TR contents are:",10
len6 equ $-msg6
msg7 db "MSW contents are:",10
len7 equ $-msg7
msg8 db "CPU identification:",10
len8 equ $-msg8
newline db 10

section .bss
result resb 8
gdt resd 1
resw 1
ldt resw 1
idt resd 1
resw 1
tr resw 1
CR0_data resd 1
id resw 1
```

```asm
section .text
global _start
_start:
SMSW eax
mov [CR0_data],eax
bt eax,0
jnc rmode
write msg1,len1
SGDT [gdt]
SLDT [ldt]
SIDT [idt]
STR [tr]
;Display GDTR

write msg3,len3
mov bx,[gdt+4]
call Display
mov bx,[gdt+2]
call Display

mov bx,[gdt]
call Display
write newline,1
;Display LDTR

write msg4,len4
mov bx,[ldt]
call Display

write newline,1
;Display IDTR

write msg5,len5
mov bx,[idt+2]
call Display

mov bx,[idt]
call Display
write newline,1
;Display TR

write msg6,len6
mov bx,[tr]
call Display
```

```asm
    write newline,1
    ;Display MSW
    write msg7,len7
    mov bx,[CR0_data]
    call Display
    write newline,1
    ;Display CPU Identi6ication
    write msg8,len8
    mov eax,0
    cpuid
    mov [id],eax
    mov bx,[id]
    call Display

    write newline,1
    ;Exit call
    mov rax,60
    mov rdi,0
    syscall
    ;Display procedure
Display:
    mov rbx,rax
    mov rdi,result
    mov cx,4

up3:
    rol bx,04
    mov al,bl
    and al,06h
    cmp al,09h
    jg add_37
    add al,30h
    jmp skip
    add_37:add al,37h

skip:
    mov [rdi],al
    inc rdi
    dec cx
    jnz up3
    write result,4
    ret

rmode:
```

```
write msg2,len2
mov rax,60
mov rdi,0
syscall
```



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hardware@hardware-System-Product-Name:~$ cd Desktop
hardware@hardware-System-Product-Name:~/Desktop$ nasm -f elf64 as7.asm
hardware@hardware-System-Product-Name:~/Desktop$ ld -o as7 as7.o
hardware@hardware-System-Product-Name:~/Desktop$ ./as7
System is in Protected mode.
GDTR contents  are:
001400040004
LDTR contents  are:
0014
IDTR contents  are:
00140004
TR contents are:
0011
MSW contents are:
0012
CPU identification:
001B
hardware@hardware-System-Product-Name:~/Desktop$
```