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Div: C Batch: C4 Course Code: BCE4302

Problem Statement:

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

Registers

Input:

;Assignment 5

;=====

section .data

nline db 10,10

nline_len equ \$-nline

colon db ":"

rmsg db 10,'Processor is in real mode..'

rmsg_len equ \$-rmsg

pmsg db 10,'Processor is in protected mode..'

pmsg_len equ \$-pmsg

gmsg db 10,'GDTR(Global Descriptor Table Register): '

gmsg_len equ \$-gmsg

imsg db 10,'IDTR(Interrupt Descriptor Table Register):'

imsg_len equ \$-imsg

lmsg db 10,'LDTR(Local Descriptor Table Register):'

lmsg_len equ \$-lmsg

tmsg db 10,'TR(Task Register):'

tmsg_len equ \$-tmsg

mmsg db 10,'MSW(Machine Status word): '

mmsg_len equ \$-mmsg

--

section .bss

GDTR resw 3

IDTR resw 3

LDTR resw 1

TR resw 1

MSW resw 1

char_ans resb 4

%macro Print 2

mov rax,1

mov rdi,1

mov rsi,%1

mov rdx,%2

syscall

%endmacro

```
%macro Read 2
```

```
mov rax,0
```

```
mov rdi,0
```

```
mov rsi,%1
```

```
mov rdx,%2
```

```
syscall
```

```
%endmacro
```

```
%macro Exit 0
```

```
Print nline,nline_len
```

```
mov rax,60
```

```
mov rdi,0
```

```
syscall
```

```
%endmacro
```

```
-----  
-----  
-----
```

```
section .text
```

```
global _start
```

```
_start:
```

```
smsw [MSW]
```

```
mov rax,[MSW]
```

```
ror rax,1
```

```
jc p_mode
```

```
Print rmsg,rmsg_len
```

```
jmp next
```

```
p_mode:
```

```
Print pmsg,pmsg_len
```

```
next:
```

```
SGDT [GDTR]
```

```
SIDT [IDTR]
```

```
SLDT [LDTR]
```

```
STR [TR]
```

```
SMSW [MSW]
```

```
Print gmsg,gmsg_len
```

```
mov ax,[GDTR+4]
```

```
call disp16_proc
```

```
mov ax,[GDTR+2]
```

```
call disp16_proc
```

```
Print colon,1
```

```
mov ax,[GDTR+0]
```

```
call disp16_proc
```

```
Print imsg,imsg_len
```

```
mov ax,[IDTR+4]
```

```
call disp16_proc
```

```
mov ax,[IDTR+2]
```

```
call disp16_proc
```

```
Print colon,1
```

```
mov ax,[IDTR+0]
```

```
call disp16_proc
```

```
Print lmsg,lmsg_len
```

```
mov ax,[LDTR]
```

```
call disp16_proc
```

```
Print tmsg,tmsg_len
```

```
mov ax,[TR]
```

```
call disp16_proc
```

```
Print mmsg,mmsg_len
```

```
mov ax,[MSW]
```

```
call disp16_proc
```

```
Print nline,nline_len
```

```
Exit
```

```

;-----
;-----
disp16_proc:
mov rsi,char_ans+3
mov rcx,4
mov rbx,16

next_digit:
xor rdx,rdx
div rbx

cmp dl,9
jbe add30
add dl,07h

add30:
add dl,30h

mov [rsi],dl

dec rsi
dec rcx
jnz next_digit

Print char_ans,4
ret
;-----
;-----

```

Output:



The screenshot shows a debugger's 'Output' window. At the top, there are tabs for 'input' and 'Output'. Below the tabs, the text 'Success #stdin #stdout 0s 5556KB' is displayed. The main content area lists several system registers and their values: 'Processor is in protected mode..', 'GDTR(Global Descriptor Table Register): 00001000:007F', 'IDTR(Interrupt Descriptor Table Register):00000000:0FFF', 'LDTR(Local Descriptor Table Register):0000', 'TR(Task Register):0040', and 'MSW(Machine Status Word): 0033'.

```

input  Output
Success #stdin #stdout 0s 5556KB

Processor is in protected mode..
GDTR(Global Descriptor Table Register): 00001000:007F
IDTR(Interrupt Descriptor Table Register):00000000:0FFF
LDTR(Local Descriptor Table Register):0000
TR(Task Register):0040
MSW(Machine Status Word): 0033

```