

TA: Jade Cheng
ICS 312
Quiz Solution #2
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Program Structure

Question: Reproduce slide 2 of set 4, i.e. provide the overall structure of Assembler programs

```
Answer:      .model small
                .586          ; allows Pentium instructions to be used
                .stack 100h

                .data
                :              ; put data definitions here

                .code
main   proc
                :              ; put instructions for main procedure here
main   endp

sub1   proc
                :              ; include additional procedures after main
sub1   endp

end    main      ; end directive ends program
                ; label used with end directive matches
                ; label of first instruction to be executed in
                ; the code segment.
```

Question: Write a complete program which outputs "Go Warriors!" using a single `int 21h` function performed only once, then use additional `21h` instructions to output the line feed and carriage-return control codes.

Answer:

```
.model small
.stack 100h
.data
msg db 'Go Warriors!$' ; the message to be printed.
LF CR db 13, 10, '$' ; line feed, carriage return.
.code
prog proc
mov ax, @data
mov ds, ax
lea dx, msg ; outputs 'Go Warriors!'.
mov ah, 9h
int 21h
lea dx, LF CR ; move cursor to a new line.
mov ah, 9h
int 21h
mov ah, 4ch ; return code of 0
int 21h ; function code to exit to os
prog endp
end prog
```

Or:

```
.model small
.stack 100h
.data
msg db 'Go Warriors!$' ; the message to be printed.
.code
prog proc
mov ax, @data
mov ds, ax
lea dx, msg ; outputs 'Go Warriors!'.
mov ah, 9h
int 21h
mov dl, 0Dh ; outputs carriage return.
mov ah, 2h
int 21h
mov dl, 0Ah ; outputs line feed
mov ah, 2h
int 21h
mov ah, 4ch ; return code of 0
int 21h ; function code to exit to os
prog endp
end prog
```