

Lesson 2

```
7 /
8 SECTION .data
9 msg db 'Hello World!', 0Ah
10
11 SECTION .text
12 global _start
13
14 _start:
15
16     mov     edx, 13
17     mov     ecx, msg
18     mov     ebx, 1
19     mov     eax, 4
20     int     80h
21
22     mov     ebx, 0 ; return 0 status on exit - 'No Errors'
23     mov     eax, 1 ; invoke SYS_EXIT (kernel opcode 1)
24     int     80h
```

Output:

Hello World!

Lesson 3

```
7
8 SECTION .data
9 msg db 'Hello, brave new world!', 0Ah ; we can modify this now without having to update anywhere else in the prog
10
11 SECTION .text
12 global _start
13
14 _start:
15
16     mov     ebx, msg ; move the address of our message string into EBX
17     mov     eax, ebx ; move the address in EBX into EAX as well (Both now point to the same segment in memory)
18
19     nextchar:
20         cmp     byte [eax], 0 ; compare the byte pointed to by EAX at this address against zero (Zero is an end of string de
21         jz      finished ; jump (if the zero flagged has been set) to the point in the code labeled 'finished'
22         inc     eax ; increment the address in EAX by one byte (if the zero flagged has NOT been set)
23         jmp     nextchar ; jump to the point in the code labeled 'nextchar'
24
25     finished:
26         sub     eax, ebx ; subtract the address in EBX from the address in EAX
27         ; remember both registers started pointing to the same address (see line 15)
28         ; but EAX has been incremented one byte for each character in the message string
29         ; when you subtract one memory address from another of the same type
30         ; the result is number of segments between them - in this case the number of bytes
31
32     mov     edx, eax ; EAX now equals the number of bytes in our string
33     mov     ecx, msg ; the rest of the code should be familiar now
34     mov     ebx, 1
35     mov     eax, 4
36     int     80h
37
38     mov     ebx, 0
39     mov     eax, 1
40     int     80h
```

Output:

Hello, brave new world!

Lesson 4

```
7
8 SECTION .data
9 msg db 'Hello, brave new world!', 0Ah
10
11 SECTION .text
12 global _start
13
14 _start:
15
16     mov     eax, msg ; move the address of our message string into EAX
17     call    strlen ; call our function to calculate the length of the string
18
19     mov     edx, eax ; our function leaves the result in EAX
20     mov     ecx, msg ; this is all the same as before
21     mov     ebx, 1
22     mov     eax, 4
23     int     80h
24
25     mov     ebx, 0
26     mov     eax, 1
27     int     80h
28
29     strlen: ; this is our first function declaration
30     push    ebx ; push the value in EBX onto the stack to preserve it while we use EBX in this function
31     mov     ebx, eax ; move the address in EAX into EBX (Both point to the same segment in memory)
32
33     nextchar: ; this is the same as lesson3
34     cmp     byte [eax], 0
35     jz      finished
36     inc     eax
37     jmp     nextchar
38
39     finished:
40     sub     eax, ebx ; pop the value on the stack back into EBX
41     pop     ebx
42     ret ; return to where the function was called
```

Output:

HelloWorld.asm:30: error: instruction not supported in 64-bit mode

HelloWorld.asm:41: error: instruction not supported in 64-bit mode

Lesson 5

```

7
8  int slen(String message)
9  ; String length calculation function
10 * slen:
11      push    ebx
12      mov     ebx, eax
13
14 * nextchar:
15      cmp     byte [eax], 0
16      jz      finished
17      inc     eax
18      jmp     nextchar
19
20 * finished:
21      sub     eax, ebx
22      pop     ebx
23      ret
24
25
26 ;-----
27 ; void sprint(String message)
28 ; String printing Function
29 * sprint:
30      push    edx
31      push    ecx
32      push    ebx
33      push    eax
34      call    slen
35
36      mov     edx, eax
37      pop     eax
38
39      mov     ecx, eax
40      mov     ebx, 1
41      mov     eax, 4
42      int     80h
43
44      pop     ebx
45
46
47
48 %include      'functions.asm'                ; include our external file
49
50 SECTION .data
51 msg1 db      'Hello, brave new world!', 0Ah, 0h ; our first message string
52 msg2 db      'This is how we recycle in NASM.', 0Ah ; our second message string
53
54 SECTION .text
55 global _start
56
57 _start:
58
59     mov     eax, msg1 ; move the address of our first message string into EAX
60     call    sprint    ; call our string printing function
61
62     mov     eax, msg2 ; move the address of our second message string into EAX
63     call    sprint    ; call our string printing function
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65     call    quit      ; call our quit function
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```

Lesson 7:

```
7
8 ;-----
9 ; int strlen(String message)
10 ; String length calculation function
11 strlen:
12     push    ebx
13     mov     ebx, eax
14
15 nextchar:
16     cmp     byte [eax], 0
17     jz      finished
18     inc     eax
19     jmp     nextchar
20
21 finished:
22     sub     eax, ebx
23     pop     ebx
24     ret
25
26 ;-----
27 ; void sprintf(String message)
28 ; String printing function
29 sprintf:
30     push    edx
31     push    ecx
32     push    ebx
33     push    eax
34     call    strlen
35
36     mov     edx, eax
37     pop     eax
38
39     mov     ecx, eax
40     mov     ebx, 1
41     mov     eax, 4
42     int     80h
43
44     pop     ebx
45
46
```

Output:

```
HelloWorld.asm:1
HelloWorld.asm:2
HelloWorld.asm:3
HelloWorld.asm:3
HelloWorld.asm:3
HelloWorld.asm:3
HelloWorld.asm:3
HelloWorld.asm:4
HelloWorld.asm:4
HelloWorld.asm:4
HelloWorld.asm:5
HelloWorld.asm:6
HelloWorld.asm:6
HelloWorld.asm:6
```

```
7
8 %include    'functions.asm'
9
10 SECTION .data
11 msg1 db 'Hello, brave new world!', 0h ; NOTE we have removed the line feed character 0Ah
12 msg2 db 'This is how we recycle in NASM.', 0h ; NOTE we have removed the line feed character 0Ah
13
14 SECTION .text
15 global _start
16
17 _start:
18
19     mov     eax, msg1
20     call    sprintfLF ; NOTE we are calling our new print with linefeed function
21
22     mov     eax, msg2
23     call    sprintfLF ; NOTE we are calling our new print with linefeed function
24
25     call    quit
26
```

Output:

```
HelloWorld.asm
```

Lesson 8

```
7
8 %include    'functions.asm'
9
10 SECTION .text
11 global _start
12
13 _start:
14
15     pop     ecx ; first value on the stack is the number of arguments
16
17 nextArg:
18     cmp     ecx, 0h ; check to see if we have any arguments left
19     jz      noMoreArgs ; if zero flag is set jump to noMoreArgs label (jumping over the end of the loop)
20     pop     eax ; pop the next argument off the stack
21     call    sprintfLF ; call our print with linefeed function
22     dec     ecx ; decrease ecx (number of arguments left) by 1
23     jmp     nextArg ; jump to nextArg label
24
25 noMoreArgs:
26     call    quit
27
```

Output:

```
HelloWorld.asm:8:
```

Lesson 9

```
7
8 %include      'functions.asm'
9
10 SECTION .data
11 msg1      db      'Please enter your name: ', 0h      ; message string asking user for input
12 msg2      db      'Hello, ', 0h                      ; message string to use after user has entered their name
13
14 SECTION .bss
15 sinput:   resb     255                                ; reserve a 255 byte space in memory for the users input string
16
17 SECTION .text
18 global _start
19
20 _start:
21
22     mov     eax, msg1
23     call    sprint
24
25     mov     edx, 255      ; number of bytes to read
26     mov     ecx, sinput   ; reserved space to store our input (known as a buffer)
27     mov     ebx, 0        ; read from the STDIN file
28     mov     eax, 3        ; invoke SYS_READ (kernel opcode 3)
29     int     80h
30
31     mov     eax, msg2
32     call    sprint
33
34     mov     eax, sinput   ; move our buffer into eax (Note: input contains a linefeed)
35     call    sprint        ; call our print function
36
37     call    quit
```

Output:

HelloWorld.asm:

Lesson 10

```
8 %include      'functions.asm'
9
10 SECTION .text
11 global _start
12
13 _start:
14
15     mov     ecx, 0      ; ecx is initialised to zero.
16
17 nextNumber:
18     inc     ecx          ; increment ecx
19
20     mov     eax, ecx      ; move the address of our integer into eax
21     add     eax, 48        ; add 48 to our number to convert from integer to ascii for printing
22     push    eax           ; push eax to the stack
23     mov     eax, esp       ; get the address of the character on the stack
24     call    sprintfLF      ; call our print function
25
26     pop     eax           ; clean up the stack so we don't have unneeded bytes taking up space
27     cmp     ecx, 10       ; have we reached 10 yet? compare our counter with decimal 10
28     jne     nextNumber    ; jump if not equal and keep counting
29
30     call    quit
```

Output:

HelloWorld.asm: