

COAL LAB 07 - 29 Mar 2025

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Task 1:

```
include irvine32.inc
.data
    source DWORD 10, 20, 30, 40, 50, 60, 70, 80, 90, 100
    destination DWORD 10 DUP(0)
    index DWORD 0
.code
main PROC
    ;push all source elements to stack
    mov ecx, 10
    mov esi, OFFSET source
L1:
    mov eax, [esi]
    push eax
    add esi, 4
    loop L1
    ;pop them into destination array
    mov ecx, 10
    mov edi, OFFSET destination
L2:
    pop eax
    mov [edi], eax
    add edi, 4
    loop L2
    ;display destination array
    mov ecx, 10
    mov esi, OFFSET destination
L3:
    mov eax, [esi]
    call WriteDec
    call Crlf
    add esi, 4
```

```

loop L3
exit
main ENDP
END main

```

The screenshot shows a Visual Studio IDE with two windows. The 'Source.asm' window displays the following assembly code:

```

1  include irvine32.inc
2  .data
3      source DWORD 10, 20, 30, 40, 50, 60, 70, 80, 90, 100
4      destination DWORD 10 DUP(0)
5      index DWORD 0
6  .code
7  main PROC
8      ;push all source elements
9      mov ecx, 10
10     mov esi, OFFSET source
11 L1:
12     mov eax, [esi]
13     push eax
14     add esi, 4
15     loop L1
16     ;pop them into destination
17     mov ecx, 10
18     mov edi, OFFSET destination
19 L2:
20     pop eax
21     mov [edi], eax
22     add edi, 4
23     loop L2
24     ;display destination

```

The 'Microsoft Visual Studio Debug Console' window is open, showing the following output:

```

100
90
80
70
60
50
40
30
20
10
C:\Ibrahim\Personal\University Stuff\COAL\Labs\Practice\Practice\Debug\Practice
To automatically close the console when debugging stops, enable Tools->Options->
le when debugging stops.
Press any key to close this window . . .

```

Task 2:

```

include irvine32.inc

.data
    num1 WORD 15
    num2 WORD 25
    num3 WORD 35
    result DWORD ?

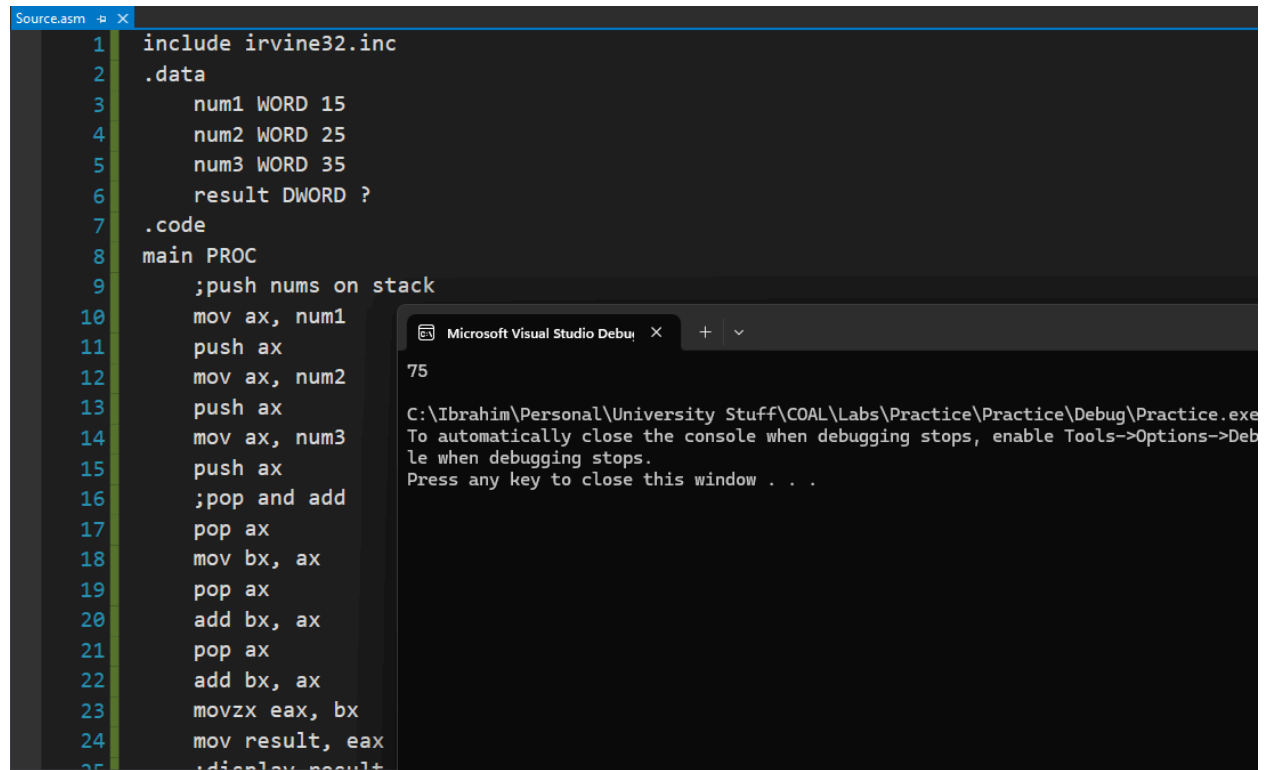
.code
main PROC
    ;push nums on stack
    mov ax, num1
    push ax
    mov ax, num2
    push ax
    mov ax, num3
    push ax
    ;pop and add

```

```

    pop ax
    mov bx, ax
    pop ax
    add bx, ax
    pop ax
    add bx, ax
    movzx eax, bx
    mov result, eax
;display result
    mov eax, result
    call WriteDec
    call CrLf
    exit
main ENDP
END main

```



The screenshot shows the Visual Studio IDE with a source file named 'Source.asm' open. The assembly code is as follows:

```

1  include irvine32.inc
2  .data
3      num1 WORD 15
4      num2 WORD 25
5      num3 WORD 35
6      result DWORD ?
7  .code
8  main PROC
9      ;push nums on stack
10     mov ax, num1
11     push ax
12     mov ax, num2
13     push ax
14     mov ax, num3
15     push ax
16     ;pop and add
17     pop ax
18     mov bx, ax
19     pop ax
20     add bx, ax
21     pop ax
22     add bx, ax
23     movzx eax, bx
24     mov result, eax
25     ;display result

```

Below the code editor, the 'Microsoft Visual Studio Debug Console' is open, displaying the output of the program:

```

75
C:\Ibrahim\Personal\University Stuff\COAL\Labs\Practice\Practice\Debug\Practice.exe
To automatically close the console when debugging stops, enable Tools->Options->Debu
le when debugging stops.
Press any key to close this window . . .

```

Task 3:

```

include irvine32.inc
.data
    array1 DWORD 1, 2, 3, 4, 5
    array2 DWORD 6, 7, 8, 9, 10
    sum1 DWORD ?

```

sum2 DWORD ?

total DWORD ?

totalMsg BYTE "total sum of both arrays is: ", 0

.code

main PROC

call SumArray1

call SumArray2

call SumBoth

;result

mov eax, total

call WriteString

mov edx, OFFSET totalMsg

call WriteString

mov eax, total

call WriteDec

call Crlf

exit

main ENDP

SumArray1 PROC

mov ecx, 5

mov esi, OFFSET array1

xor eax, eax ;clearing eax to accumulate sum

L1:

add eax, [esi]

add esi, 4

loop L1

mov sum1, eax

ret

SumArray1 ENDP

SumArray2 PROC

mov ecx, 5

mov esi, OFFSET array2

xor eax, eax

L2:

```
add eax, [esi]
add esi, 4
loop L2
mov sum2, eax
ret
```

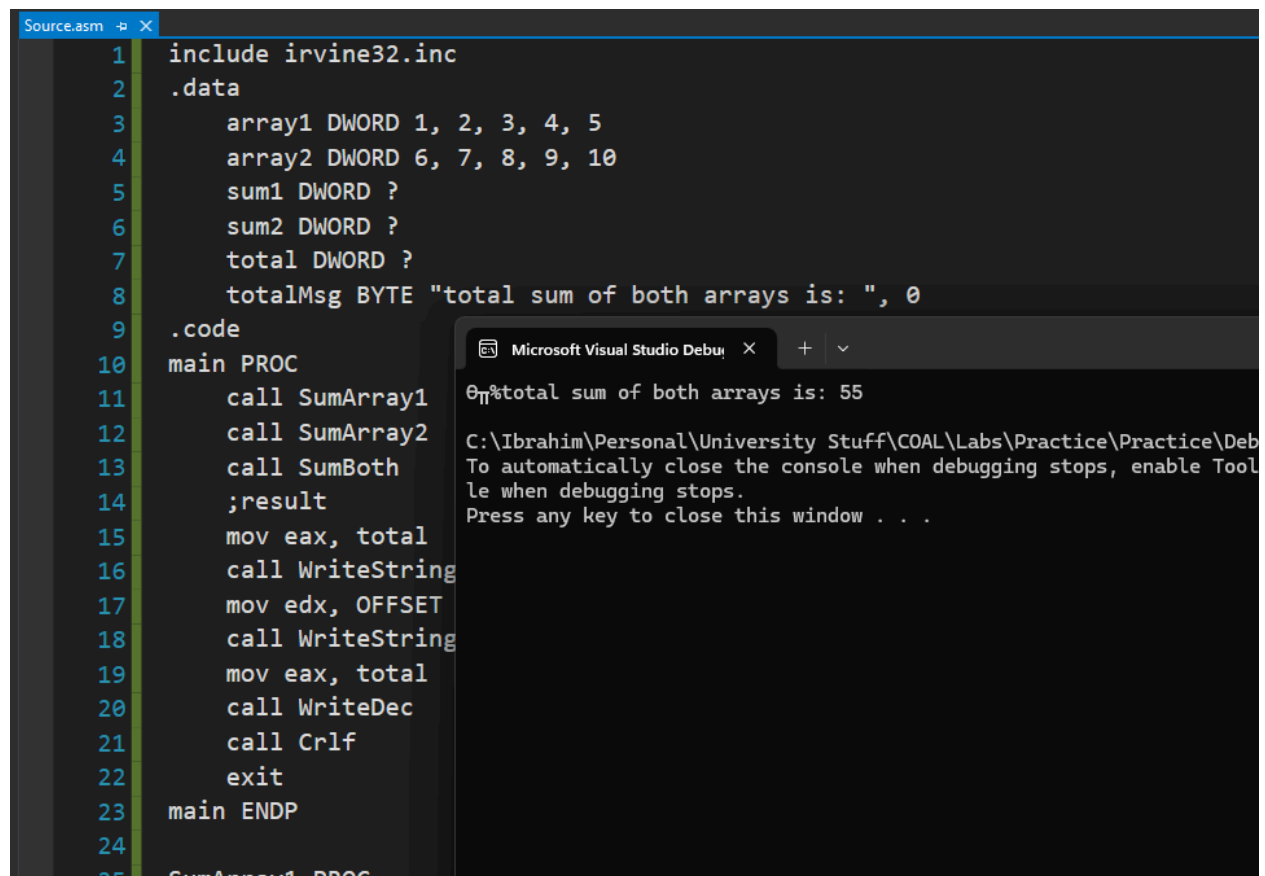
SumArray2 ENDP

SumBoth PROC

```
mov eax, sum1
add eax, sum2
mov total, eax
ret
```

SumBoth ENDP

END main



The screenshot displays the Microsoft Visual Studio IDE. On the left, the 'Source.asm' file is open, showing assembly code. The code defines two arrays, 'array1' (1, 2, 3, 4, 5) and 'array2' (6, 7, 8, 9, 10), and variables 'sum1', 'sum2', and 'total'. It defines three procedures: 'SumArray1', 'SumArray2', and 'SumBoth'. The 'main' procedure calls these procedures and uses 'WriteString' and 'WriteDec' to output the results. On the right, the 'Microsoft Visual Studio Debug Console' window shows the output of the program: 'total sum of both arrays is: 55'. Below the output, there is a message about automatically closing the console when debugging stops, with a prompt to 'Press any key to close this window . . .'.

```
1 include irvine32.inc
2 .data
3     array1 DWORD 1, 2, 3, 4, 5
4     array2 DWORD 6, 7, 8, 9, 10
5     sum1 DWORD ?
6     sum2 DWORD ?
7     total DWORD ?
8     totalMsg BYTE "total sum of both arrays is: ", 0
9 .code
10 main PROC
11     call SumArray1
12     call SumArray2
13     call SumBoth
14     ;result
15     mov eax, total
16     call WriteString
17     mov edx, OFFSET
18     call WriteString
19     mov eax, total
20     call WriteDec
21     call Crlf
22     exit
23 main ENDP
24
25 SumArray1 PROC
```

Microsoft Visual Studio Debug Console

total sum of both arrays is: 55

C:\Ibrahim\Personal\University Stuff\COAL\Labs\Practice\Practice\Deb
To automatically close the console when debugging stops, enable Tool
le when debugging stops.
Press any key to close this window . . .

Task 4:

```
include irvine32.inc
```

```
.data
```

```
    star BYTE "*", 0
```

```
    space BYTE " ", 0
```

```
    input BYTE "enter num of columns: ", 0
```

```
    col DWORD ?
```

```
.code
```

```
main PROC
```

```
    mov edx, OFFSET input
```

```
    call writestring
```

```
    call readdec
```

```
    mov col, eax
```

```
    call crlf
```

```
    call patternPrint
```

```
    call crlf
```

```
    exit
```

```
main ENDP
```

```
patternPrint PROC
```

```
    mov ecx, col
```

```
    mov eax, 1
```

```
L1:
```

```
    push ecx
```

```
    mov ebx, ecx
```

```
    mov ecx, ebx
```

```
L2:
```

```
    mov edx, OFFSET space
```

```
    call writestring
```

```
    loop L2
```

```
    mov ecx, eax
```

```
L3:
```

```
    mov edx, OFFSET star
```

```
    call writestring
```

```
    loop L3
```

```
    inc eax
```

```

    call crlf
    pop ecx
    loop L1
    ret
patternPrint ENDP

```

```

    exit
END main

```

The screenshot shows a Visual Studio IDE with two windows. The top window, titled 'Source.asm', displays assembly code with line numbers 25 through 45. The code includes instructions like 'mov ecx, ebx', 'L2:', 'mov edx, OFFSET space', 'call writestring', 'loop L2', 'mov ecx, ebx', 'L3:', 'mov edx, ebx', 'call writestring', 'loop L3', 'inc ebx', 'call writestring', 'pop ecx', 'loop L3', 'ret', 'patternPrint', and 'exit'. The bottom window is a 'Microsoft Visual Studio Debug Console' showing the program's output. It prompts 'enter num of columns: 6' and displays a pattern of asterisks: a single row of 6 asterisks, followed by two rows of 5 asterisks each, and then three rows of 4 asterisks each. Below the pattern, the console shows the file path 'C:\Ibrahim\Personal\University Stuff\COAL\Labs\Practice\Practice\Debug\Practice.exe' and instructions: 'To automatically close the console when debugging stops, enable Tools->Options->Debugging->Close console when debugging stops.' and 'Press any key to close this window . . .'. The console also shows the text 'le when debugging stops.' and 'Press any key to close this window . . .'.

Task 5:

```
include irvine32.inc
```

```
.data
```

```
    n DWORD ?
```

```
    msg byte "enter a num: ", 0
```

```
    msg2 byte "sum of numbers from 1 till your num: ", 0
```

```
.code
```

```
main PROC
```

```
    mov edx, offset msg
```

```
    call writestring
```

```
    call readdec
```

```
    call sumN
```

```
    mov edx, offset msg2
```

```
    call writestring

```

```
    call writedec
    exit
main ENDP
```

```
sumN PROC
```

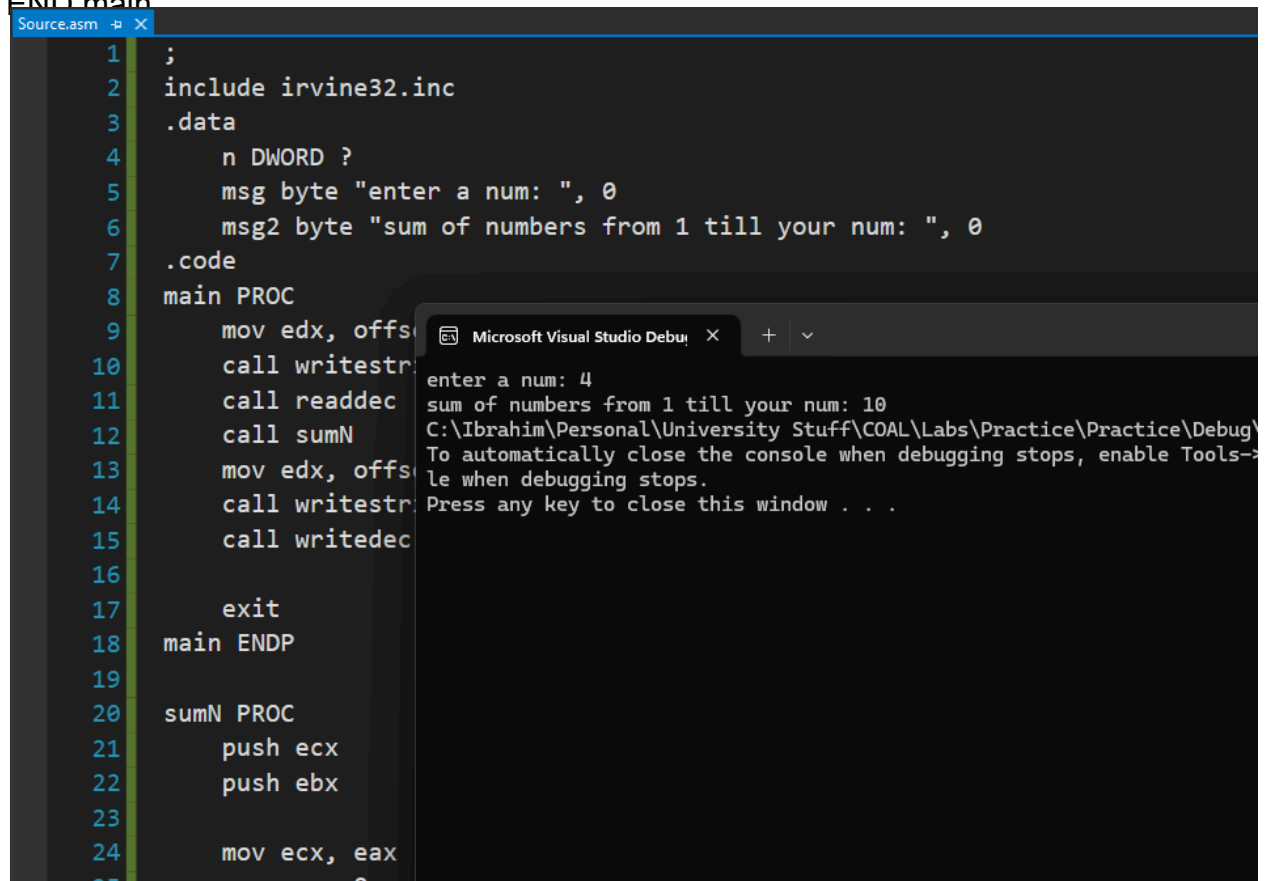
```
    push ecx
    push ebx
    mov ecx, eax
    mov eax, 0
    mov ebx, 1
```

```
L1:
```

```
    add eax, ebx
    inc ebx
    loop L1
    pop ebx
    pop ecx
    ret
```

```
sumN ENDP
```

```
END main
```



The screenshot shows a Visual Studio IDE with two windows. The 'Source.asm' window displays assembly code for a program that calculates the sum of numbers from 1 to a user-input number. The code includes Irvine32.inc, defines two messages, and contains two procedures: 'main' and 'sumN'. The 'main' procedure prompts the user for a number, calls 'sumN', and displays the result. The 'sumN' procedure uses a loop to calculate the sum. The 'Microsoft Visual Studio Debug Console' window shows the program's execution: it prompts 'enter a num: 4', calculates the sum as 10, and displays 'sum of numbers from 1 till your num: 10'. It also includes standard debugging instructions.

```
1 ;
2 include irvine32.inc
3 .data
4     n DWORD ?
5     msg byte "enter a num: ", 0
6     msg2 byte "sum of numbers from 1 till your num: ", 0
7 .code
8 main PROC
9     mov edx, offset msg
10    call writestr
11    call readdec
12    call sumN
13    mov edx, offset msg2
14    call writestr
15    call writedec
16
17    exit
18 main ENDP
19
20 sumN PROC
21     push ecx
22     push ebx
23
24     mov ecx, eax
25     mov eax, 0
```

Microsoft Visual Studio Debug Console

```
enter a num: 4
sum of numbers from 1 till your num: 10
C:\Ibrahim\Personal\University Stuff\COAL\Labs\Practice\Practice\Debug\
To automatically close the console when debugging stops, enable Tools->
le when debugging stops.
Press any key to close this window . . .
```