

1 Assignment

1. Screenshots for Task 1.

The N value is stored in the ebx register. sum(N) is stored in the eax register.

I renamed the submitted .asm files that you can see in the zip folder according to the task number.

Valid N cases:

<pre>start: mov ebx, 1 mov eax, 0 add eax, ebx</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. C:\Users\eve\Desktop>try4.exe 1</pre>
<pre>start: mov ebx, 5 mov eax, 0 add eax, ebx</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. C:\Users\eve\Desktop>try4.exe 15</pre>
<pre>start: mov ebx, 42 mov eax, 0 add eax, ebx</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. C:\Users\eve\Desktop>try4.exe 903</pre>
<pre>start: mov ebx, 999 mov eax, 0 add eax, ebx</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. C:\Users\eve\Desktop>try4.exe 499500</pre>
<pre>start: mov ebx, 12345 mov eax, 0 add eax, ebx</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. C:\Users\eve\Desktop>try4.exe 76205685</pre>
<pre>start: mov ebx, 40000 mov eax, 0 add eax, ebx</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. C:\Users\eve\Desktop>try4.exe 800020000</pre>

The screenshot shows a code editor with the following assembly code:

```
.code

start:
    mov ebx, 65535
    mov eax, 0
    add eax, ebx

    cmp ebx, 0
    jle warning

loop1:
    dec ebx
    add eax, ebx
    cmp eax, 2147483647
    jo warning
    cmp ebx, 0
    jne loop1

end_loop1:
    print str$(eax), 13, 10,
    ret

warning:
    print "the overflow occurred", 13, 10, 0
    print "sum(N) of this value can't be stored in 32bit", 13, 10, 0
    jo end_loop1
    ret

END start
```

Overlaid on the code editor is a command prompt window titled "C:\Windows\System32\cmd.exe" showing the following output:

```
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation. All rights reserved.

C:\Users\eve\Desktop>try4.exe
2147450880

C:\Users\eve\Desktop>_
```

Overflow and invalid N warning cases:

<pre>start: mov ebx, 65536 mov eax, 0 add eax, ebx cmp ebx, 0 jle warning</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. All rights reserved. C:\Users\eve\Desktop>try4.exe the overflow occurred: sum(N) of this value can't be stored in 32bit</pre>
<pre>start: mov ebx, 0 mov eax, 0 add eax, ebx</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. C:\Users\eve\Desktop>try4.exe N must be greater than 0</pre>
<pre>start: mov ebx, -1 mov eax, 0 add eax, ebx</pre>	<pre>C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6001] Copyright (c) 2006 Microsoft Corporation. C:\Users\eve\Desktop>try4.exe N must be greater than 0</pre>

2. Screenshots for Task 2.

<pre> strcreator PROTO :DWORD, :DWORD .data n dd 4294967295 .data? </pre>	<pre> C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6002.18005] Copyright (c) 2006 Microsoft Corporation C:\Users\eve\Desktop> t2.exe 4294967295 C:\Users\eve\Desktop>_ </pre>
<pre> strcreator PROTO :DWORD, :DWORD .data n dd 0 .data? </pre>	<pre> Microsoft Windows [Version 6.0.6002.18005] Copyright (c) 2006 Microsoft Corporation C:\Users\eve\Desktop>t2.exe 0 C:\Users\eve\Desktop> </pre>
<pre> strcreator PROTO :DWORD, :DWORD .data n dd 000123 .data? </pre>	<pre> C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6002.18005] Copyright (c) 2006 Microsoft Corporation C:\Users\eve\Desktop>t2.exe 123 C:\Users\eve\Desktop> </pre>
<pre> .data n dd 4444444 .data? </pre>	<pre> C:\Users\eve\Desktop>t2.exe 4444444 C:\Users\eve\Desktop> </pre>
<pre> .data n dd 10000000 .data? buf db 11 dup(?) </pre>	<pre> C:\Windows\System32\cmd.exe Microsoft Windows [Version 6.0.6002.18005] Copyright (c) 2006 Microsoft Corporation C:\Users\eve\Desktop>t2.exe 10000000 C:\Users\eve\Desktop>_ </pre>
<pre> .data n dd -1 .data? buf db 11 dup(?) </pre>	<pre> Microsoft Windows [Version 6.0.6002.18005] Copyright (c) 2006 Microsoft Corporation C:\Users\eve\Desktop>t2.exe N is less than 0 C:\Users\eve\Desktop>_ </pre>
<pre> .data n dd 98776655 .data? buf db 11 dup(?) </pre>	<pre> Microsoft Windows [Version 6.0.6002.18005] Copyright (c) 2006 Microsoft Corporation C:\Users\eve\Desktop>t2.exe 98776655 C:\Users\eve\Desktop>_ </pre>
<pre> .data n dd 3333888 .data? </pre>	<pre> Copyright (c) 2006 Microsoft Corporation C:\Users\eve\Desktop>t2.exe 3333888 C:\Users\eve\Desktop> </pre>
<pre> .data n dd -3333888 .data? </pre>	<pre> Copyright (c) 2006 Microsoft Corporation C:\Users\eve\Desktop>t2.exe N is less than 0 C:\Users\eve\Desktop>_ </pre>
<pre> .data n dd 5 .data? </pre>	<pre> C:\Users\eve\Desktop>t2.exe 5 C:\Users\eve\Desktop> </pre>

3. CPU, memory & I/O are the three main components of computer architecture. All three elements are connected and need each other to create a proper user experience.

- CPU – central processing unit – is used to process input data from a user and return the output. It processes the data according to code instructions and executes programs.
- Memory is a data storage unit with a limited capacity of data that can be stored (which is expressed in Bytes). Once a user enters data using input devices, the computer system stores this data in its memory unit. Users can also read information from memory, store and edit it. RAM – random-access memory – is a short-term memory where data is stored temporarily, while the processor needs it.
- I/O – input/output – is an umbrella term, unifying all kinds of devices designed either to receive data from the client to the computer (input), and to send the data from the computer to the client (output). It is a set of interfaces which allow clients communication with the computer.