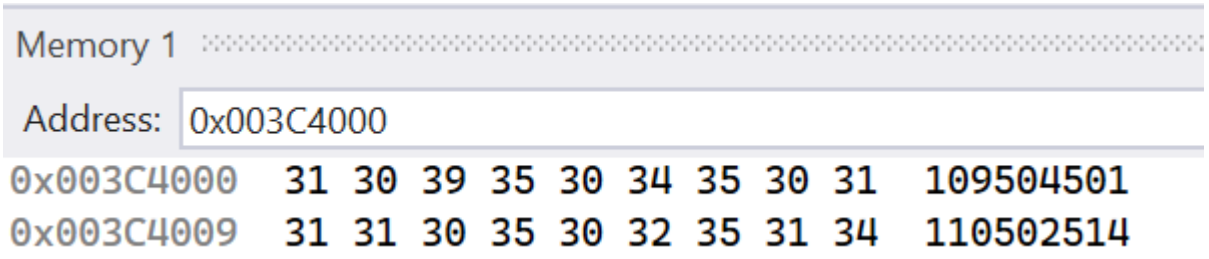
報告標題: lab4, 組別: 48, 姓名學號: 曾千芸109504501 賈子悅110502514

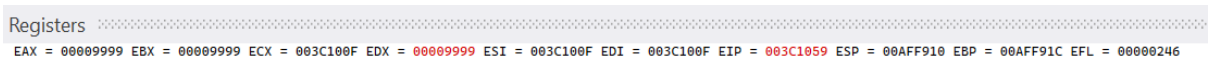
- **程式執行流程、記憶體 (暫存器) 狀態、截圖**說明、程式碼說明

```
1   TITLE Lab4
2   INCLUDE Irvine32.inc
3
4   .data
5       myID BYTE 31h, 30h, 39h, 35h, 30h, 34h, 35h, 30h, 31h
6       myID2 BYTE 31h, 31h, 30h, 35h, 30h, 32h, 35h, 31h, 34h
7       size_ID DWORD 9
8       size_ID2 DWORD 9
9
10  .code
11  Convert PROC USES eax
12  L1:
13      mov eax,[esi]           ;將myID定義為eax
14      add eax,11h             ;將eax加上11h (將eax數字轉為字母)
15      mov [esi],eax           ;傳回myID (the contents of the eax are copied to the memory location addressed by esi)
16      inc esi                 ;將esi加上1 (myID下個位置)
17      loop L1                 ;L1迴圈
18      ret                     ;bring the processor back to the point in the program where the procedure was called
19  Convert ENDP
20
21  Convert2 PROC
22      push eax                ;save eax
23  L2:
24      mov eax,[esi]           ;將myID2定義為eax
25      add eax,11h             ;將eax加上11h (eax數字轉為字母)
26      mov [esi],eax           ;將eax傳回myID2 (the contents of the eax are copied to the memory location addressed by esi)
27      inc esi                 ;將esi加上1 (myID2下個位置)
28      loop L2                 ;L2迴圈
29      pop eax                 ;restore eax
30      ret                     ;bring the processor back to the point in the program where the procedure was called
31  Convert2 ENDP
32
33  main PROC
34      mov eax,9999h           ;將eax定義為9999h
35      mov ebx,9999h           ;將ebx定義為9999h
36      mov edx,9999h           ;將edx定義為9999h
37      mov esi ,OFFSET myID    ;esi = address of myID
38      mov ecx,size_ID         ;將size_ID設為迴圈次數
39      call Convert            ;執行Convert
40      mov esi ,OFFSET myID2   ;esi = address of myID2
41      mov ecx,size_ID2        ;size_ID2設為迴圈次數
42      call Convert2           ;執行Convert2
43      exit
44  main ENDP
45  END main
```

initial memory:

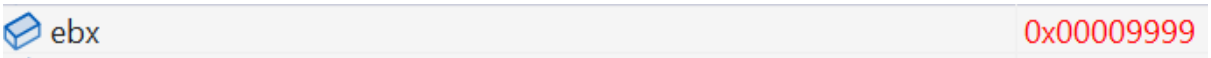


initial registers:



L34: 將eax定義為9999h

L35: 將ebx定義為9999h



L36: 將edx定義為9999h

edx 0x00009999

L37: esi = address of myID

esi 0x003c4000

L38: 將size_ID設為迴圈次數

ecx 0x00000009

L39: 執行Convert (go to line 11)

L15: 傳回myID (the contents of the eax are copied to the memory location addressed by esi)

Memory 1

Address: 0x003C4000

```
0x003C4000  42 30 39 35 30 34 35 30 31  B09504501
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 39 35 30 34 35 30 31  BA9504501
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 35 30 34 35 30 31  BAJ504501
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 30 34 35 30 31  BAJF04501
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 34 35 30 31  BAJFA4501
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 35 30 31  BAJFAE501
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 30 31  BAJFAEF01
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 41 31  BAJFAEFA1
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 41 42  BAJFAEFAB
0x003C4009  31 31 30 35 30 32 35 31 34  110502514
```

L17: loop 停止, 因為ecx = 0 (ecx is automatically used as a counter and is decremented each time the loop repeats)

ecx 0x00000000

L41: 將size_ID2設為迴圈次數

ecx 0x00000009

L42: 執行Convert2 (go to line 21)

L26: 將eax傳回myID2 (the contents of the eax are copied to the memory location addressed by esi)

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 41 42  BAJFAEFAB
0x003C4009  42 31 30 35 30 32 35 31 34  B10502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 41 42  BAJFAEFAB
0x003C4009  42 42 30 35 30 32 35 31 34  BB0502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 41 42  BAJFAEFAB
0x003C4009  42 42 41 35 30 32 35 31 34  BBA502514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 41 42  BAJFAEFAB
0x003C4009  42 42 41 46 30 32 35 31 34  BBAF02514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 41 42  BAJFAEFAB
0x003C4009  42 42 41 46 41 32 35 31 34  BBAFA2514
```

Memory 1

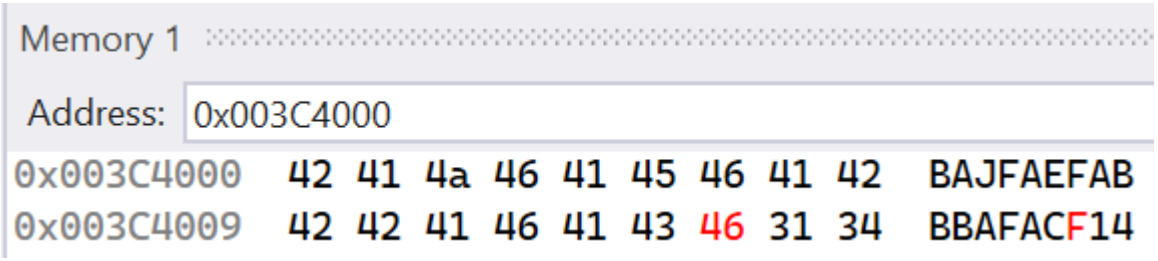
Address: 0x003C4000

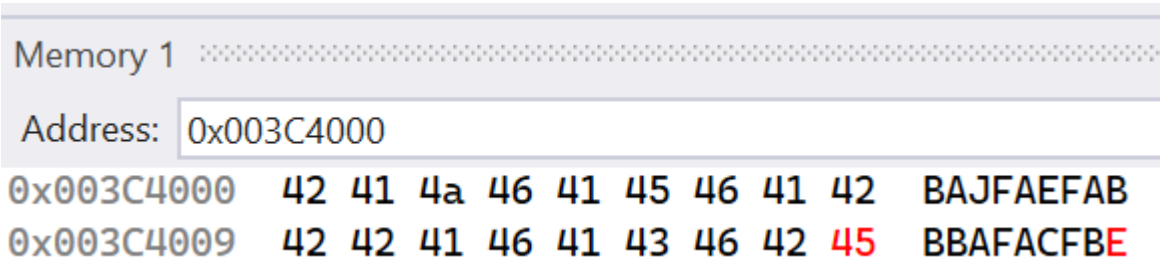
```
0x003C4000  42 41 4a 46 41 45 46 41 42  BAJFAEFAB
0x003C4009  42 42 41 46 41 43 35 31 34  BBAFAC514
```

Memory 1

Address: 0x003C4000

```
0x003C4000  42 41 4a 46 41 45 46 41 42  BAJFAEFAB
0x003C4009  42 42 41 46 41 43 46 42 34  BBAFACFB4
```





L28: loop 停止, 因為ecx = 0 (ecx is automatically used as a counter and is decremented each time the loop repeats)

L29: restore eax

L30: ret means bring the processor back to the point in the program where the procedure was called (go to line 43)

L43: exit

- 心得

在Lab4的實作中，複習了上禮拜所學的迴圈，並且利用大一學到的ASCII code結合，做出轉換學號成英文字母的程式，也是第一次在程式內運用兩個迴圈，幸好沒有搞混在一起，學到新的內容也包含USES的用法，省掉push,pop的過程，以結果來說受益良多。剛開始我和組員遇到不知道如何有效將數字轉換成字母，我們嘗試過加上11, 17, 65但最終都因為運算邏輯錯誤，無法在memory中呈現對應的字母，失敗收場。最終，我們找到問題出在起初定義myID, myID2錯誤，所以才導致在memory無法有效呈現轉換，改正錯誤之後，我們也很順利了完成這次的實驗。