Practical – Assembly Language

Configure Visual studio for MASM and implement the following basic programs by following the instructions in the resources provided on Canvas:

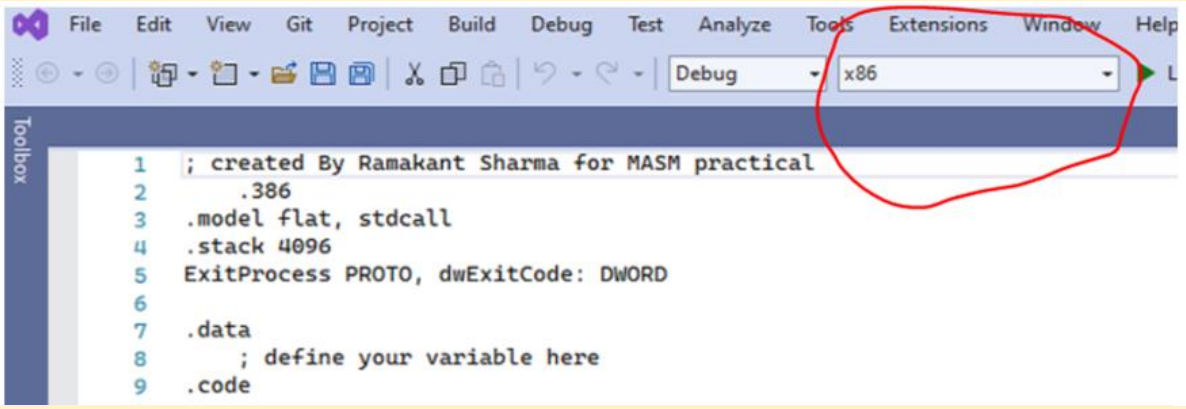
- Setting up Visual Studio for x86 Assembly language Programming.pdf
- Watch the video – "How to use Visual Studio for x86 Assembly Programming"

Update – January 2023

DO THIS BEFORE STARTING THE PRACTICAL LESSON

Visual Studio now includes the option to build for 32-bit and 64-bit platforms. The correct platform must be manually selected by the user.

Set the build platform to x86 to complete this practical lesson.



If you are getting compiler errors even with the blank MASM template, this is the reason why.

Part 1 - Arithmetic

Write the following C program in assembly language.

```
int a = 11;
int b = 3;
a = a + b;
a = a – b;
a--;
b++;
a = a * 2;
b = a % 3;
```

Here is some code to initialise the variables a and b:

```
main PROC
; write your assembly code here
mov dword ptr [ebp-4], 11 ; int a = 11
mov dword ptr [ebp-8], 3  ; int b = 3
```

Part 2 – Nested IF statements

Write the following C program in assembly language.

What is the final value for z?

Experiment with different values for x, y and z so that all paths are covered.

```
int x = 0;
int y = 1;
int z = 2;

if (x == y){
    if(z == 0){
        z=y+z;
    }else{
        z=y-z;
    }
}else{
    if(z == 0){
        z=x+z;
    }else{
        z=x-z;
    }
}
```

When implementing jump statements you need to provide a label.

For example, `jmp l1` will result in the program jumping to the line labelled `l1` e.g.

```
jmp l1

…

l1: # code jumps to here
```

See lecture notes for more examples.

Part 3 – For loops

Implement the following C program in assembly language.

What is the final value of j?

```
int i;
int j=0;

for (i = 0; i < 10; i++)
{
    j=j+i;
}
```

Part 4 – While Loops

Implement the following C program in assembly language.

What is the final value of p?

```
int p = 2;
int r = 3;
int n = 5;
int y = 1;

while (y <= n)
{
    p = p*(1+r);
    y++;
}
```