

These notes present a brief tutorial on the use of Keil μVision 5 using assembly language for an 8051 processor.

1. Begin by clicking on the μVision icon and get the screen shown in Figure 1. If your screen has an open project, close it by clicking on *Project*→*Close Project*.

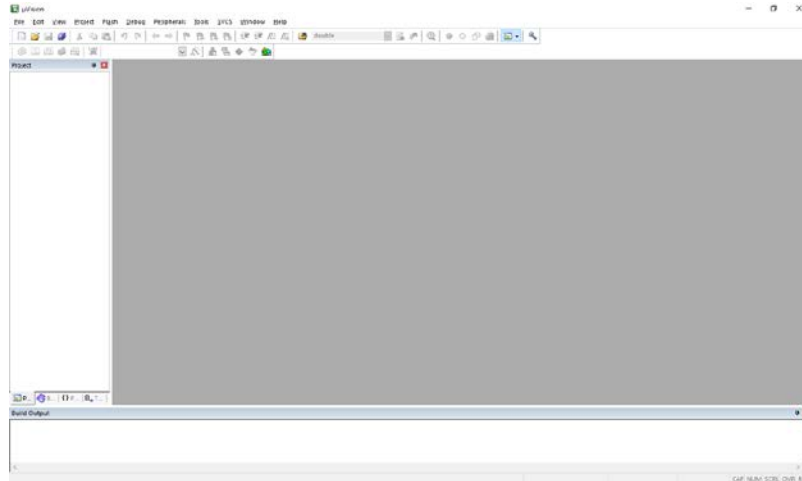


Figure 1
The opening screen of μVision 5

2. Create a new project by choosing *Project*→*NewProject* . Use the menu buttons to choose a directory to store your project. (C:\temp is OK but it's best to create a new folder for each project.) Choose a project name of *Port0* as shown in Figure 2. Click on *Save* to save the project.

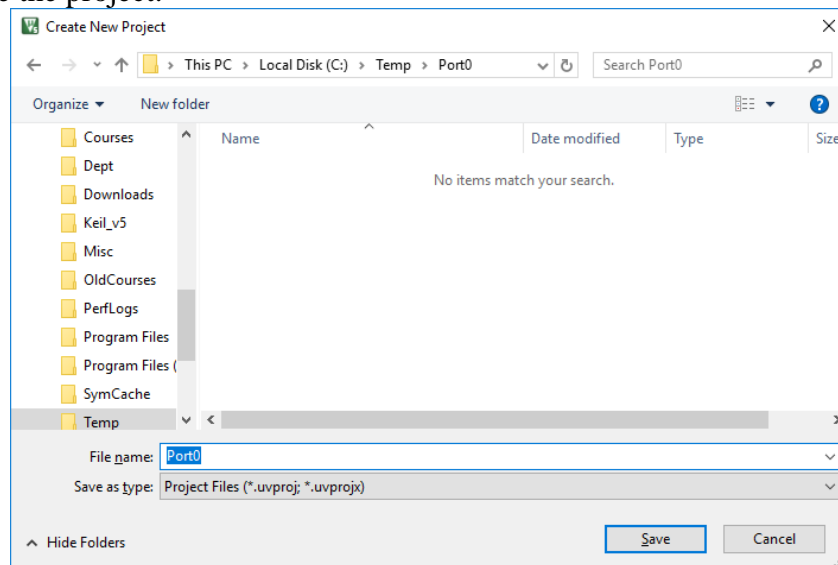


Figure 2
Create a new project and name it Port0. It is best to create a new folder for each project.

After naming and saving the project you will be asked to select the microcontroller for this project. From the list presented select *Legacy Device Database RTE* in the window at the top. Click on the Atmel library and select AT89C51CC03 from the list. This is shown in Figure 3.

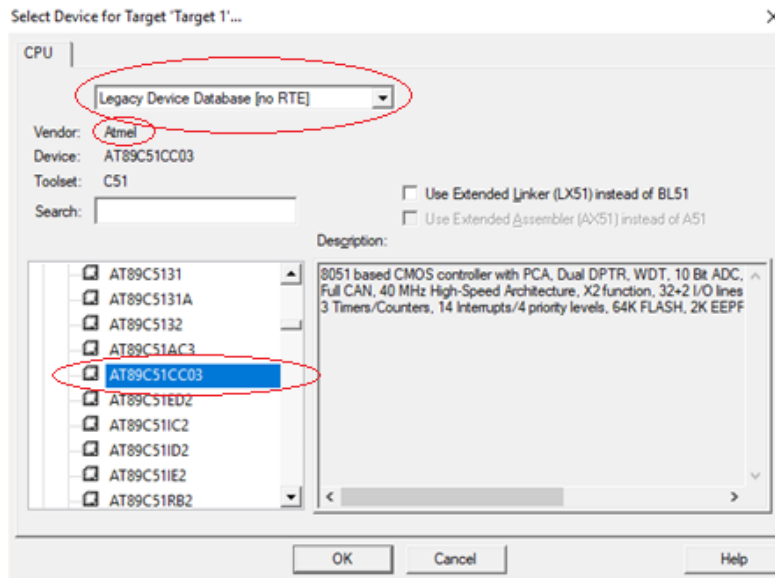


Figure 3

Select the target microcontroller for your project. In this case it's the AT89C51CC03.

4. Click OK. You will be asked if you want to include the startup file for this processor. Click on No.

5. You have created a new project but the project has no files in it. To create a new file for your project click on *File*→*New*. This will give you a screen containing a new *text* file as shown in Figure 4. Save this file using the *File*→*Save As* menu with the name `port0.a51`. The extension `.a51` means that this file will become a new assembly language source file.

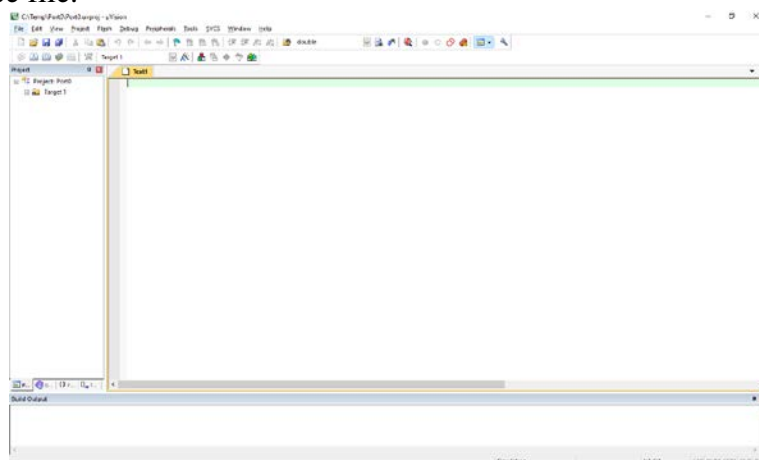


Figure 4

A new text file which will become a source file for your project.

6. Enter your assembly language program into the Port0.a51 file.

```
MainSeg SEGMENT CODE
;
;
CSEG at 0h
    ljmp Start
RSEG MainSeg
Start: inc P0
        sjmp Start

        END
```

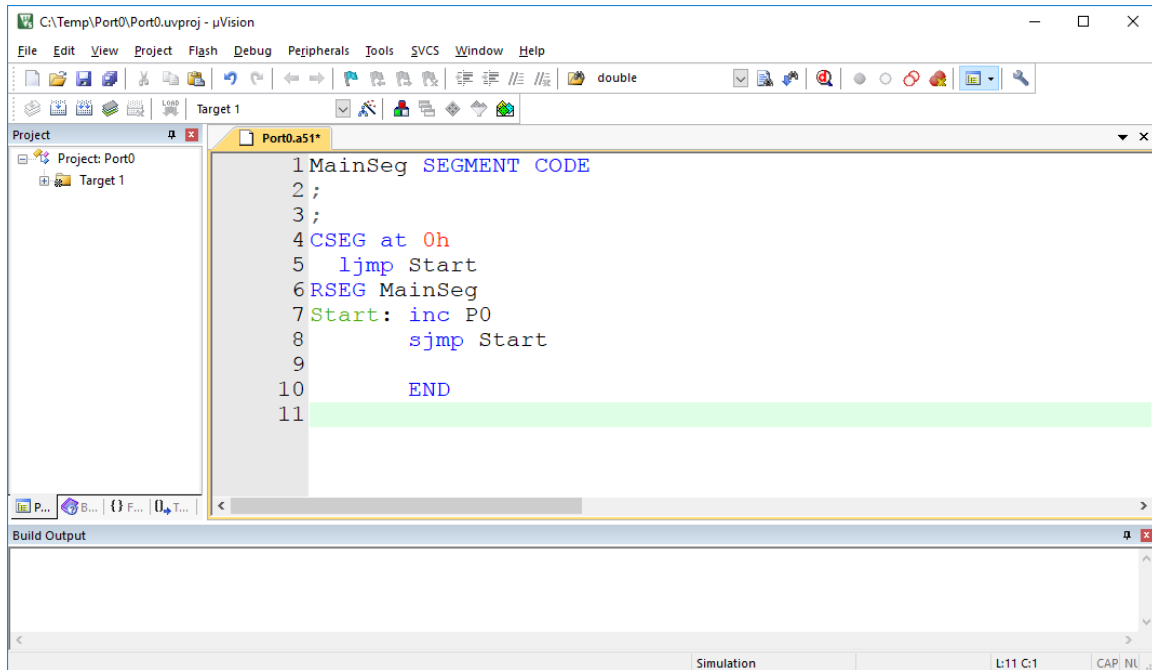


Figure 5

Enter the assembly language program shown into the file Port0.a51 and save the result.

7. Enter the program shown in Figure 5 and save the result. The source code has been entered but it is still not part of your project. To make it part of the project you must add it to Source Group 1. Do this by right clicking on *Source Group 1* in the Project window. this is shown in Figures 6. In the selection box for the files to add you will have to select files of type "ASM Source files". After selecting this file type select Port0.a51. Click on "Add" and then "OK". Figure 7 shows the results in µVision Project window after the file has been added.

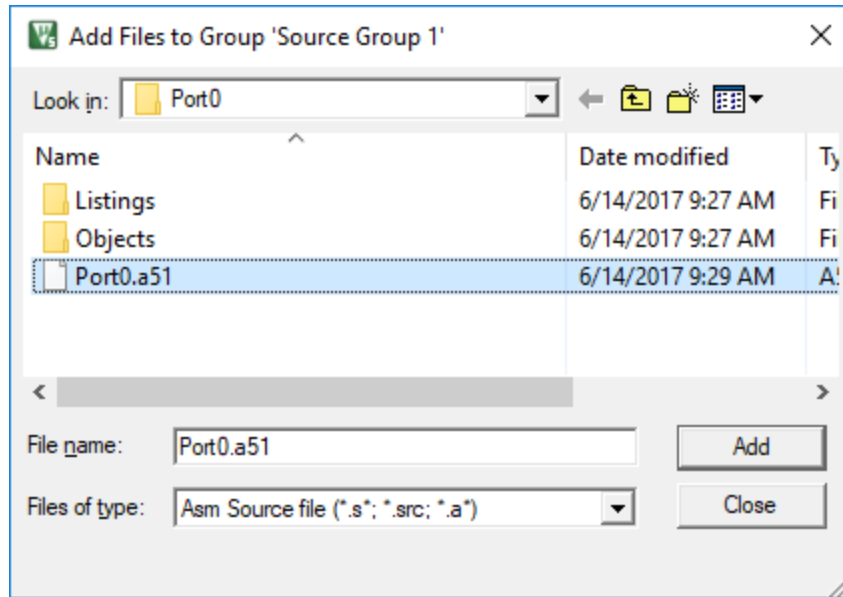


Figure 6

To add a source file to your project Right click on *Source Group 1* and select *Add files to Source Group 1*. Add Port0.A51 to the project.

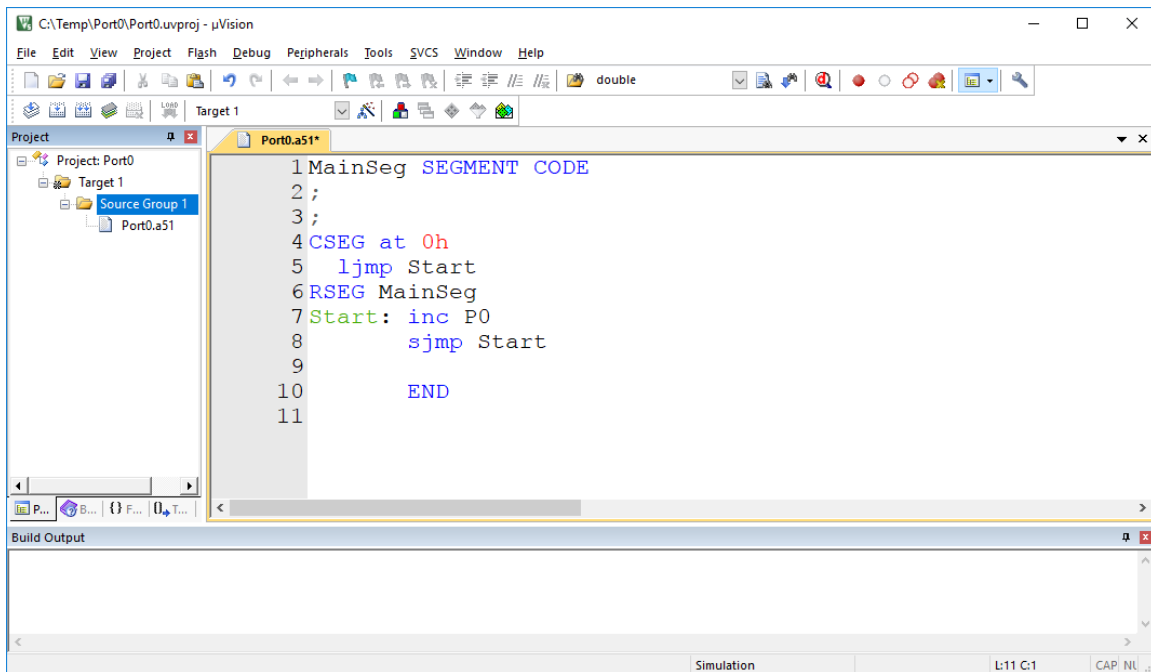


Figure 7

The project window shows that Port0.a51 has been successfully added to the project.

8. After entering the source code and adding it to your project you are ready to assemble the file. In most cases you will want the assembler to create a hex file for a result. The hex file is in an object file in a format that can be easily downloaded to the target microcontroller. To get a hex file output click on *Project*→*Options for Target 1*→*Output* and click the box that says "Create Hex File". This is shown in Figure 8.

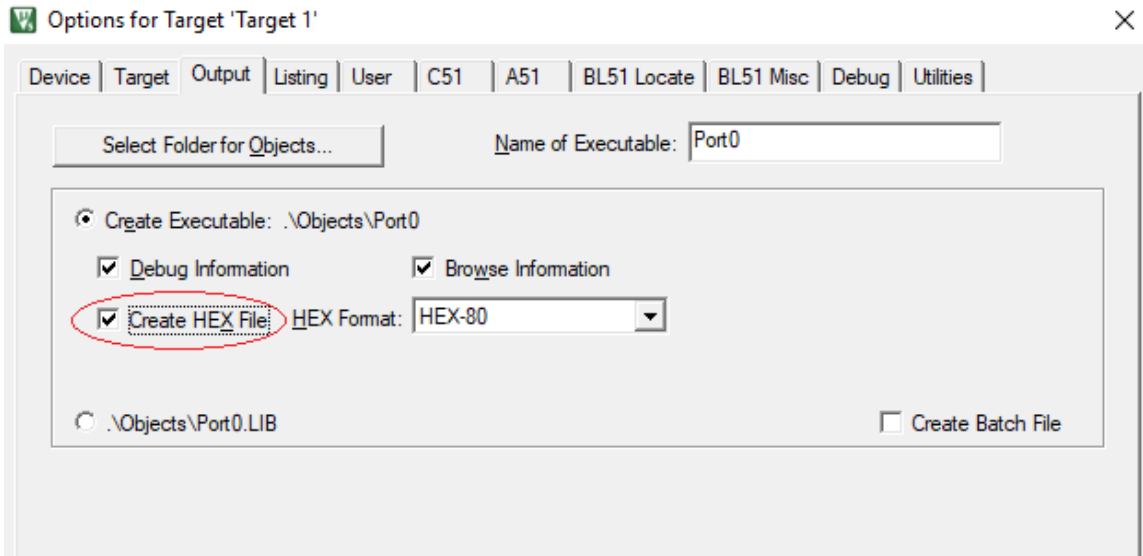


Figure 8

Use this menu to select "Create Hex file". This will cause the assembler to put the object code in a hex file format.

9. To assemble the program click on *Project*→*Build Target* or push function key F7. The debug window at the bottom of the screen should indicate that a hex file was created and that there were no errors and no warnings. If this is not the case you will need to make corrections to the source code. Correct your source code and repeat the build process until it is completed with no errors.

10. To run your program in a simulation environment click on *Debug*→*Start/Stop Debug Session*. Your screen will then look like that shown in Figure 9. Note that the debugger lists all of the registers and their contents in the window on the left.

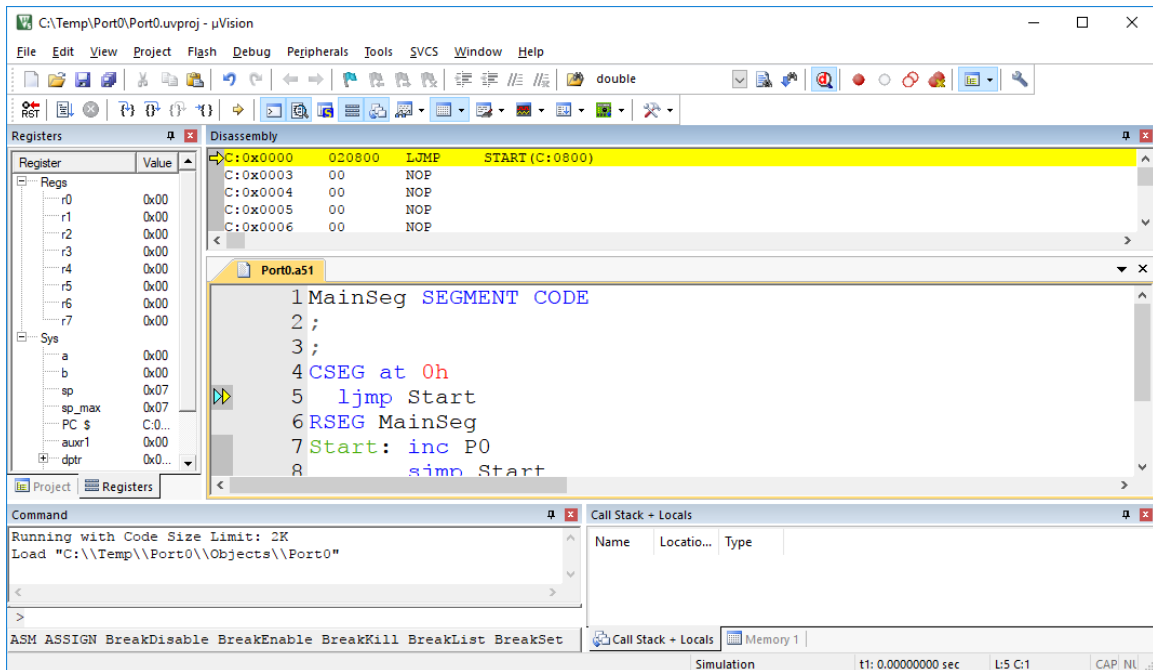


Figure 9

The debug window that is used to run the simulation.

The debug session has a register window on the left side which shows the contents of the registers. A yellow arrow points to the first statement of your program and indicates where the program will begin execution. This program exercises Port 0 and causes it to be incremented indefinitely. To see the port output you need to select the port. Do this by clicking on *Peripherals*→*I/O Ports*→*Port0*. This will produce a small window showing the contents of the port 0 (See Figure 10). If this window is in the middle of the screen drag it to the side.

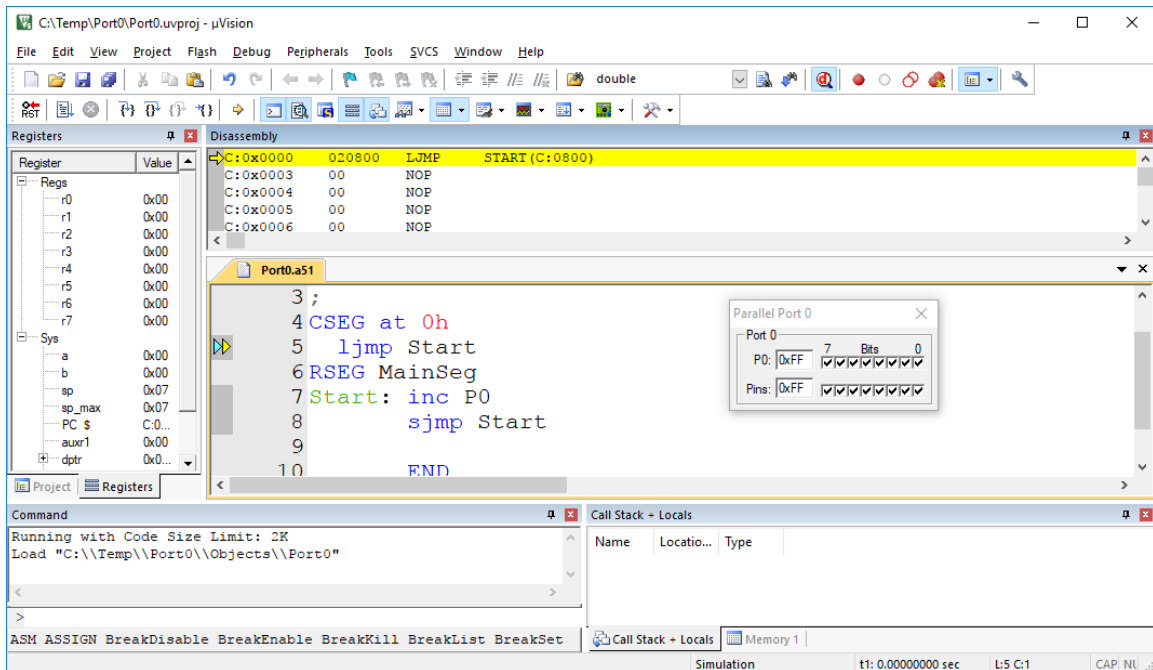


Figure 10

A window has been added from the *Peripherals* menu to show port 0.


If your screen does not contain the *Debug Toolbar* (shown in Figure 11) select it for viewing from the *View* menu.




Figure 11

The *Debug Toolbar*. Select it for viewing from the *View* menu if it is not present.

You can run your program by clicking on the run icon or *Debug*→*Run*. When you do this you will see the bits change on port 0. You can also go through your program one step at a time.

To single step through your program click on the *Step Into* icon. . Alternatively, you can push function key F11. Each time you click, the program will execute one more instruction. As the instructions execute you can watch the bits change on port 1. On the port 1 window, a checkmark indicates a 1 and no checkmark indicates a zero.

11. Single step through your program until you verify that it does indeed work (or until you get thoroughly bored with this very simple example). To exit click on  or select *Debug*→*Start/Stop Debug Session*.