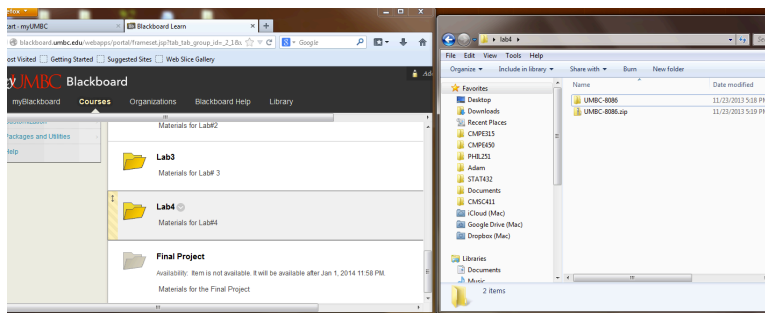


The UMBC trainer board takes Intel Hex program files over serial (RS232). Unfortunately, the files needed to convert the NASM .asm files into Intel .hex files are 16-bit DOS executables and will not run on Windows natively. The following shows a work-around to enable you to successfully produce .hex files given an .asm file. Essentially, a DOS emulator, DOSBox, is used to run the 16-bit DOS EXEs. Producing the hex files on your own will be helpful since it will give you warnings if it finds errors in your assembly file.

### Step 1: Downloading UMBC-8086 files

Download the UMBC-8086.zip from lab4 folder in the laboratory section on blackboard. Place the folder (and contents) contained in the zip file somewhere meaningful and take note of its path for a later step.



### Step 2: Downloading DOSBox

Download DOSBox (<http://www.dosbox.com>). The following is the link for the windows version.  
<http://sourceforge.net/projects/dosbox/files/dosbox/0.74/DOSBox0.74-win32-installer.exe/download>  
 (The remainder of this tutorial assumes you are using the windows version. Linux and Mac should be similar.)



### Step 3: Installing DOSBox

Install DOSBox onto your machine.

### Step 4 (optional): Setting up DOSBox

Locate and open DOSBox configuration file (dosbox-.74.conf). It should be in Windows -> All Programs -> DOSBox-0.74 -> Options.

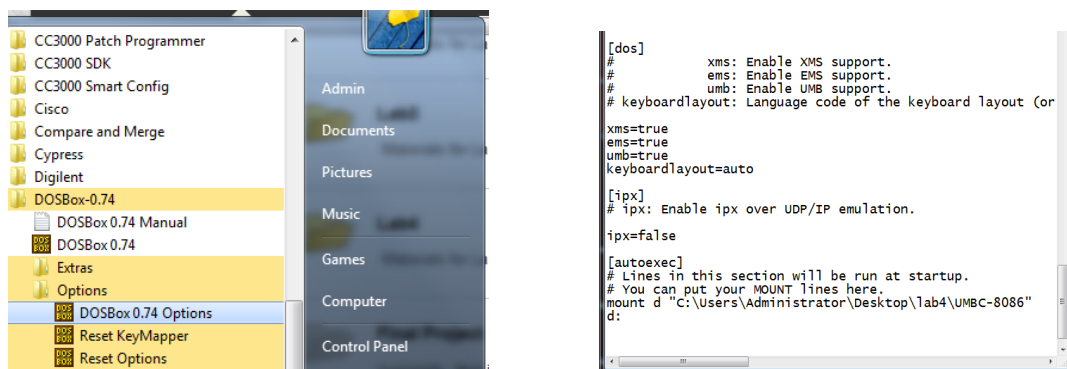
Add the following lines to the end of the file under [autoexec]:

```
mount d "UMBC-8086_directory "
```

```
d:
```

where UMBC-8086\_directory is the full path to the UMBC-8086 directory (keep the quotations).

This will automatically change the starting directory when DOSBox is launched.



### Step 5: Running DOSBox

Launch DOSBox. Two windows should appear. One simply gives the state of DOSBox and the other should give you a DOS command prompt. We will only be working with the DOS command prompt.

If you are not already in UMBC-8086 directory, then move to that directory.

List the contents of the directory using dir command.

The important files you care about are nasm.exe, LINK86.exe, OH86.exe, LOC86.exe, and run.bat.

```

DOSBox Status Window
DOSBox version 0.74
Copyright 2002-2010 DOSBox Team, published under GNU GPL.
CONFIG: Loading primary settings from config file C:\Users\Administrator\AppData\Local\DOSBox\dosbox-0.74.conf
MIDI: Opened device:win32
DOSBox switched to max cycles, because of the setting: cycles=auto. If the game runs too fast try a fixed cycles amount in DOSBox's options.

DOSBox 0.74 Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
Z:\>mount d "C:\Users\Administrator\Desktop\lab4\NUMBC-8606"
Drive D is mounted as local directory C:\Users\Administrator\Desktop\lab4\NUMBC-8606
Z:\>d:
D:\>DIRM.BAT LAB4
D:\>nasm.exe -f obj -I LAB4.lst LAB4.asm
Warning: cannot open swap file c:\nwedpmi.swap
D:\>LINK86.EXE LAB4.obj TO LAB4.lnk NOBIND
DOS 5.0 (638-N) 8686 LINKER, U2.7
Copyright 1984 Intel Corporation
D:\>LDC86.exe LAB4.lnk TO LAB4.exe AD(SM(PROGRAM(100000H), CONSTSEG(180000H)))
DOS 5.0 (638-N) 8686 LOCATER, U2.5
Copyright 1984 Intel Corporation
D:\>OH86.EXE LAB4.exe
DOS 5.0 (638-N) 8686 OBJECT TO HEX FILE CONVERTER, U1.0
CONVERSION COMPLETE, NO ERRORS
D:\>

```

## Step 6: Compiling .asm to Intel .hex file

To compile an .asm file, enter

```
RUN.BAT LAB4
```

where lab4 is the name of your NASM assembly file. (Do not include the .asm extension or else it will fail to compile). A simple .asm file is included named lab4.asm.

If there are no errors with your program you should get a *No Errors* message; otherwise, it will inform you of the errors it came across.

```

DOSBox Status Window
DOSBox version 0.74
Copyright 2002-2010 DOSBox Team, published under GNU GPL.
CONFIG: Loading primary settings from config file C:\Users\Administrator\AppData\Local\DOSBox\dosbox-0.74.conf
MIDI: Opened device:win32
DOSBox switched to max cycles, because of the setting: cycles=auto. If the game runs too fast try a fixed cycles amount in DOSBox's options.

DOSBox 0.74 Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
Z:\>mount d "C:\Users\Administrator\Desktop\lab4\NUMBC-8606"
Drive D is mounted as local directory C:\Users\Administrator\Desktop\lab4\NUMBC-8606
Z:\>d:
D:\>DIRM.BAT LAB4
D:\>nasm.exe -f obj -I LAB4.lst LAB4.asm
Warning: cannot open swap file c:\nwedpmi.swap
D:\>LINK86.EXE LAB4.obj TO LAB4.lnk NOBIND
DOS 5.0 (638-N) 8686 LINKER, U2.7
Copyright 1984 Intel Corporation
D:\>LDC86.exe LAB4.lnk TO LAB4.exe AD(SM(PROGRAM(100000H), CONSTSEG(180000H)))
DOS 5.0 (638-N) 8686 LOCATER, U2.5
Copyright 1984 Intel Corporation
D:\>OH86.EXE LAB4.exe
DOS 5.0 (638-N) 8686 OBJECT TO HEX FILE CONVERTER, U1.0
CONVERSION COMPLETE, NO ERRORS
D:\>

```