

# Computersystemen: DosBox

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## 1 INTRODUCTION

DOSBox is a DOS machine emulator. It emulates an Intel<sup>®</sup> 80286/80386 CPU in both real and protected modes, handles XMS and EMS memory, provides emulation of the common graphics adapters used in DOS machines (CGA, EGA, VGA and VESA) and is able to emulate sound cards such as SoundBlaster<sup>™</sup> and UltraSound<sup>™</sup>. On top of this, it provides a modernized, but compatible, DOS emulation layer for the operating system.

The assembly language exercises and project for this course will take place inside the DOSBox emulated machine environment. This helps you to focus on learning x86 assembly language and machine designs, without having to worry about the extra complexities of today's modern hardware and software environments. For this purpose, we created a package, called ASMBBox, that contains all the necessary tools for the practicum course.

### 1.1 ASMBBox ZIP PACKAGE (ONLY MAC AND WINDOWS)

1. Download the ASMBBox zip-file from the course page at <http://pointcarre.vub.ac.be/> and extract it.
2. Find and execute ASMBBox.bat (Windows) or ASMBBox.app (Mac OS X). When everything is working correctly, you should be greeted with a message that states "DOSBox ASM dev environment ready.", followed by a C:\> prompt (notice the character C) and a blinking cursor, as shown in figure 1.1.
3. In DOSBox, try the commands: help, dir, cd <directory>, cd .., ...
4. The c\_disk folder contains the content that is visible in DOSBox as a node of a tree with C:\ as the root. When making updates to that folder from outside DOSBox (e.g. via a file editor), use CTRL-F4 in DOSBox to notify its cache about the changes. This does NOT happen automatically!

**IMPORTANT:** *ASMBBox is just the name of the package that we provide to the students. It is just DOSBox + a set of DOS tools (Assembler, Linker, Debugger), and nothing more. As such, it is also possible to install DOSBox by means of the original installer and configure it completely to your own likings. In fact, as we noticed, the provided ASMBBox package does not always work without problems on some systems. Therefore, this document provides some further guidelines on how to install and configure DOSBox and get the assembly tools up and running. Every student should be capable of getting a working instance of DOSBox + assembly tools.*

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They can be changed in the keymapper.
ALT-ENTER : Go full screen and back.
ALT-PAUSE : Pause DOSBox.
CTRL-1~4 : Use normal/full/dynamic/simple core.
CTRL-= : Maximize CPU cycles.
ALT-F11 : Unlock/Lock speed.
CTRL-F1 : Start the keymapper.
CTRL-F4 : Update directory cache for all drives! Swap mounted disk-image.
CTRL-ALT-F5 : Start/Stop creating a movie of the screen.
CTRL-F5 : Save a screenshot.
CTRL-F6 : Start/Stop recording sound output to a wave file.
CTRL-ALT-F7 : Start/Stop recording of OPL commands.
CTRL-ALT-F8 : Start/Stop the recording of raw MIDI commands.
CTRL-F7 : Decrease frameskip.
CTRL-F8 : Increase frameskip.
CTRL-F9 : Kill DOSBox.
CTRL-F10 : Capture/Release the mouse.
CTRL-F11 : Slow down emulation (Decrease DOSBox Cycles).
CTRL-F12 : Speed up emulation (Increase DOSBox Cycles).
ALT-F12 : Unlock speed (turbo button/fast forward).

DOSBox ASM dev environment ready.
C:\>_

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Figure 1.1: The welcome screen of DOSBox with the assembly tools package ready and correctly configured.

## 1.2 DOSBOX AND CUSTOM CONFIGURATION (FOR ANY OS)

This section describes how to install DOSBox yourself and manually configure the assembly tools, without relying on the provided ASMBBox package (see section 1.1).

1. Download DOSBox from <https://www.dosbox.com/> for your operating system of choice.
2. Install DOSBox. It should run and start with some text showing `Z:\>` at the bottom of the window. Close it for now.
3. At this stage, you have a working DOSBox environment, but without access to the required assembly programming tools. These tools are packaged inside an ISO file<sup>1</sup> which is provided on PointCarré.
4. Create a folder on your system (i.e., DOSBOX in your personal folder) to hold DOSBox-related content.
5. Download `asm_dev_disk.iso` from PointCarré and place it in the DOSBox folder you just created.
6. Create an empty `c_disk` folder inside the DOSBox folder. This folder will become the virtual C drive inside DOSBox where all your work is stored. It represents the "gateway" between the host operating system and the emulated DOS environment running inside DOSBox. Files inside this folder will be visible inside DOSBox.
7. Start DOSBox (again).
8. Run the following commands in DOSBox, but replace `full_path_to_your_DOSBOX_folder` with the specific path on your host operating system:

- `mount C "full_path_to_your_DOSBOX_folder/c_disk"`

This command mounts the `c_disk` folder on your host operating system as a `C:` drive inside DOSBox.

- `imgmount Y "full_path_to_your_DOSBOX_folder/asm_dev_disk.iso" -t iso`

This command mounts the ISO file as the `Y:` drive inside DOSBox. It provides access to the required assembly tools, as well as a set of examples with assembly code.

- `Y:\UTILS\DOSBOX\INIT.BAT Y`

<sup>1</sup>The ISO file is a simple container file that contains a huge set of DOS programs, such as the required assembly tools for building code into DOS executables. It cannot be used outside of DOSBox, because all these programs are in fact DOS executables themselves.

This command sets up the environment variables, such as PATH, inside DOSBox, in order to make all assembly tools directly available and usable.

- **C:**

This command changes the current active drive in DOSBox to your virtual C: drive.

9. In order to automatically execute these 4 commands when starting DOSBox, it is **highly advised** to place them in the "[autoexec]" section of your dosbox.conf file. More info on how to edit the conf file is available at <http://www.dosbox.com/wiki/dosbox.conf>. This conf file allows further customization, like setting the correct keyboard layout etc. Alternatively, it is possible to provide these commands as arguments when starting the DOSBox executable (via a script or Windows shortcut).

The end result of manually installing and configuring DOSBox with the assembly tools should also provide the "DOSBox ASM dev environment ready." message and a C:\> prompt as shown in figure 1.1. If not, then something went wrong along the way.