CS 240
Fall 2019

Project 6
McDOS

Assigned: Monday, October 14, 2019
Due: 10:00 p.m., Thursday, October 31, 2019

MS-DOS permits the modification of various operating systems tasks through the chaining of interrupt handlers. In this assignment, you will master how to "hook" the DOS keyboard handler to catch and respond to various keystrokes.

The DOS programming environment is awfully tedious to use. In this assignment, you will explore interrupts and terminate-stay-resident (TSR) programs. You are to develop a keyboard macro facility, called `McDOS`. `McDOS` will install a keyboard interrupt handler that will allow you to record keyboard macros and assign them to a key. After which, whenever the key is pressed, the key is replaced with recorded keystrokes.

Such a program would be pretty worthless unless you could use it throughout DOS. So, the second part of this assignment is to install the keyboard handlers so they can run in the background after the program has terminated. This is done through the TSR system in DOS.

The design of your `McDOS` system is completely up to you. It must, however, do the following:

- Record new keyboard macros interactively and assign them to a key.
- Replay a macro when the key is pressed. is up to you).
- Run in the background as a TSR service so you can use it throughout DOS.
- "hook" and "unhook" interrupts manually (without the use of DOS routines).
- Implement the system without the use of DOS functions (except termination functions).
- Implement persistent macros by saving them in a file.
- Must be able to unload the macro package by "unhooking" interrupts and freeing memory.
- Must disallow double-loading of the program.

Your `McDOS` may other things to garner more credit. Here are some ideas, but you should think about other features for your system:

- Have a way to disable a keyboard macro
- Have a way to disable all keyboardf macros
- Slick user interaction.

`McDOS` will need to run under DOS and interact exclusively with BIOS. You'll need to find a bunch of information about BIOS. You will need to use the following DOS and BIOS functions, among others:

- Get BIOS data segment (location 40h), keyboard flag location, and keyboard input

- Terminate, but stay resident (21h/31h)
- Teletype output (10h/0Eh)
- Get cursor position (10h/3)
- Set cursor position (10h/2)
- Get screen contents (10h/8)
- Set screen contents (10h/0Ah)
- Keyboard interrupt (9)
- Read character from keyboard buffer (16h)
- Timer interrupt (1Ch)

In addition, you will need to know something about the way the keyboard scan codes work for the IBM PC/AT/XT keyboard. You'll need to find an online reference and do some significant experimentation.

How to submit. Submit the file `mcdos.asm` using the standard course submission procedure below.

1. At the DOS prompt, remove the flash drive.
2. Reboot the computer into Windows (or your operating system)
3. Reinsert the flash drive.
4. Transfer the files to `gemini.cs.hamilton.edu` (if you don't know how to do this, you'll need to research it).
5. Log in to `gemini.cs.hamilton.edu`
6. `[user@gemini ~]$ cs240`
7. `[user@gemini ~]$ submit`

Submit will not be open until 24 hours before the assignment is due. You may submit as many times as you want up to the deadline. Your final submission will be used in grading.