Chip-8 Emulator

Technical reference by COWGOD: http://devernay.free.fr/hacks/chip8/C8TECH10.HTM

Other valuable links:

* https://raduangelescu.com/chip8emulatorjavascript.html
* http://mattmik.com/files/chip8/mastering/chip8.html
* http://blog.alexanderdickson.com/javascript-chip-8-emulator

Here's the simplified version:

**Memory:**

* Has 4096 bytes of memory; implemented using a JS array that is 4096-elements long and stores 8-bit integers
* Stores a list of opcodes (and other commands that draw sprites/graphics) from memory location 0x0000 to 0x01FF (the "interpreter" section of the memory)
* Stores the program loaded into the emulator from memory location 0x0200 to the end
* *Will not be big enough to hold all of the opcodes, if the program is too big*

**Processor**

* Runs at 500 Hz

**Registers:**

* The emulator has 16 registers that store 8-bit integers; implemented using 16 JS arrays that stores 8-bit integers.
* There is also a special I register.
* The registers are labeled from V0 to VF. VF is a special registers that is used for special stuffs (so we can't use that yet).
* These are used by the opcodes to perform VERY basic operations. For example, store the value in register Vx to register Vy.
* By manipulating the registers and using opcodes, we can do simple math operations and the like (just like a real processor).

**Program Counter (PC):**

* Shows which opcode we are currently executing when a program is running
* Increases by 2 each time to advance the program
* *Gives an error if the PC refers to a locked part of the memory*

**Stack Pointer:**

* Stores the old PC; useful when the PC is "jumping around" in the program and we need to backtrack the program when debugging

**Stack:**

* *Gives an error if the stack is full*

**Timers/Sounds**

* Chip-8 comes with two timers, a delay timer and a sound timer. Both timers hold an 8-bit number and will decrease by 1 at a rate of 60Hz when the value of the timers are non-zero.
* There are opcodes that can manipulate and retrieve the values of the timers.
* The registers can then use the values of the timers to make decisions, branching, and logic calculations.
* When the sound timer reaches 0, Chip-8 should make a "beep."
* *Is independent of the normal execution cycles and of the Fx0A opcode*

**Keyboard Buffer**

* There are 16 unique keys that can be used for input.
* Normally, each key has a unique hexadecimal value. However, this won't be implemented in this emulator version.
* *An error occurs if the value in Vx is too large.*

**Display/Sprites**

**Automated Testing**

* The timer nor the main cycle does not run during this part.
* Because it is very hard (and somewhat illegal) to simulate keyboard inputs in a web browser, opcodes which are related to keyboard inputs are not automatically tested. Instead, these opcodes are manually tested.

**Notes:**

* If the program is too large, the memory won't be big enough to hold all the opcodes.
* sprite\_loc() should only allow Vx values from 0 to F, or should we?
* 1nnn and 2nnn opcodes execute the opcode at location nnn.
* Adjust the way keyboard inputs are received.
* As of today, the compile function does not export programs as a portable binary file.