8.

Byte Array Size	Average Time (Seconds)
4096 * 150	~0.3
4096 * 200	~0.31
4096 * 250	~0.78
4096 * 225	~0.63
4096 * 224	~0.62
4096 * 220	~0.47
4096 * 215	~0.3

Average Time dramatically changes around 150 times the size of a 4096 element array, then again at 220 times and 224 times.

Our approach follows the initialization of a 4096-element byte array, containing default values of zero, and iterating over the array via a loop() function. loop() is then called 10 times in the main() function, printing the amount of time taken for each array access, as well as the number of times every 4096th element of the array was counted. The value of the array size was increased exponentially each time the program was compiled, as drastic changes were mandated by the O(1) time to access an array in C.

The program at the hardware level requires compilation and execution via the computer terminal, and the BIOS abstracts the hardware layer, regarding the monitor display, the keyboard, and other computer peripheries for basic C coding.

With respect to software, the program was written in a Windows environment. Thus, interaction from the user’s perspective is accomplished through event handling, and the program “waits” until the user interacts with the console. Writing to the C file was further accomplished through the Win32 API procedure calls set, a decoupled equivalent of the one-to-one relationship between the system calls and library procedures that characterize a UNIX system. The “WriteFile” call allowed us to add content to the program file.