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Homework 2

char magic8ball[8][8][8] is an 8x8x8 3D array of chars. The given starting position is at 0x7fffffffe000. For 3D arrays, the address of magic8ball[x][y] can be found by adding the size of the data type times (x \* 8 \* 8 + y \* 8) to the starting address of the array (multiply x and y by powers of 8 because it is an 8x8x8 3D array). Here, because the data type is an array of chars, each element in the 3D array is only 1 byte large. Therefore, the element at magic8ball[3][4] is located at 1 \* (3 \* 8 \* 8 + 4 \* 8), or 224 bytes away from the starting position of the magic8ball array, which is 0x7fffffffe000. Adding 224 in decimal, which is 0xe0 in hexadecimal, to 0x7fffffffe000, yields 0x7fffffffe0e0, which should be the starting address of element [3][4]. Looking at the output produced by gdb, 0x7fffffffe0e0 has the following contents: 0x57 0x72 0x6f 0x6e 0x67 0x00 0x00 0x00. Since this machine uses little endian architecture, looking at the ASCII table, 0x57 translates to ‘W’, 0x72 translates to ‘r’, 0x6f to ‘o’, 0x6e to ‘n’, and 0x57 to ‘g’ while the remaining 3 bytes contain null characters. Therefore, the application should return “Wrong”.