SCC 120 Introduction to Data Structures

Workshop Two : Binary, Arrays, and Strings

Q1.

i. Convert **-45** to an 8-bit binary using 2's complement representation.

ii. What is the decimal equivalent of the two's complement 8-bit binary 11011011?

Q2.

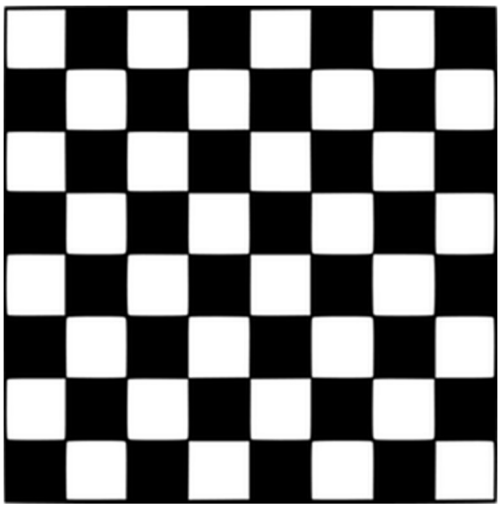
`recordArray` is a linear array of some type. Assume each element of `recordArray` occupies **6** bytes and each byte in the memory has its own address. Like arrays in C, the indices of `recordArray` start from 0.

Let's said the memory address of the first element of this array, i.e. `recordArray[0]`, is **n**. What is the memory address of `recordArray[i]`?

Q3. Below is a picture of a chess board and a declaration of an array `chessboard` to represent it:

```
# define WHITE 0
# define BLACK 1
# define SIDE_SIZE 8

static int chessboard [SIDE_SIZE][SIDE_SIZE];
```



Write an algorithm that assigns each square in `chessboard` the correct colour. Assume that `chessboard[0][0]` is the top left-hand square, and that the first index represents rows and the second index represents columns. You can give your answer in pseudo-code. You don't have to write syntactically correct C. However, if you do want to use C, the int '`%`' modulus operator will give you the remainder as follows: `number % divisor = remainder`

Q4. In C, the function `strcmp` takes two strings as parameters. `strcmp(s1, s2)` returns a negative integer if `s1` is less than `s2`, 0 if they are the same and a positive integer if `s1` is greater than `s2`. For the variables x and y in the following say whether their values are –ve, +ve or 0.

```
int x = strcmp("aardvark", "ant");
int y = strcmp("bob", "Bob");
```

Hint: the upper-case characters A .. Z have ASCII values in the range 65 .. 90 (Decimal) and the lower-case characters a .. z have ASCII values in the range 97 .. 122.

Q5. In C, what does the special character '\0' signify?

a. The end of a string.
b. An emoticon popular in parts of Galgate.
c. Uh-oh!
d. A null pointer.