Programming Assignment – Bit Manipulation

Background

You've seen how Java facilitates bit-level manipulation of data items (and presumably wrote code to reinforce your understanding) using the operators &, |, ~, <<, >>, and >>>. In this assignment you will perform compound tasks using the bit-level operations.

Specification

Create Java methods to perform the following tasks:

- Extract the left 4 bits (most significant nibble) of a byte. The bits should be returned in the right 4 bits (least significant nibble) of a byte and the remaining 4 bits must be 0. Example: 10101111 -> 00001010.
- Extract the right 4 bits (least significant nibble) of a byte. The bits should be returned in the right 4 bits (least significant nibble) of a byte and the remaining 4 bits must be 0. Example: 10101111 -> 00001111.
- Extract the left 6 bits (most significant bits) of a byte. The bits should be returned in the right 6 bits (least significant bits) of a byte and the remaining 2 bits must be 0. Example: 10101111 -> 00101011.
- Swap the most and least significant bytes in a word (short) value. Example: 1010101011111111 -> 1111111110101010

Use the following method definitions:

```
public static byte left(byte _byte)
public static byte right(byte _byte)
public static byte sixbits(byte _byte)
public static short lrswap(short _in)
```

Use the following main method to demonstrate your code. You should also test your code with additional values. Note that you may specify binary constants using 0b as a prefix.

```
public static void main (String[] args)
{
```

```
        byte b = (byte)0b10101111;
        System.out.println(bit2string(b, 8));
        System.out.println(bit2string(left(b), 4));
        System.out.println(bit2string(right(b),4));
        System.out.println(bit2string(sixbits(b), 6));
        System.out.println(
              bit2string(lrswap((short)0b1010101011111111),
              16));
  }
```

Use the `bit2string` method we developed in class to print your results.

Deliverables

- Source code (.java) files
- Screen shot of your running program showing requested (above) results
- Reflective essay describing
    - Successes
    - Difficulties (if any) and how you addressed them
    - Lessons learned