SUSTECH CS202(2022s) Lab Assignment 1

Q1. Read a positive integer 'x' from the keyboard, print its bit-width while under the binary representation and the number of digits while under the hexadecimal representation.

NOTE: Input and output of your code should follow the following sample input and output.

Sample input and output (1)	1 Its binary bit-width is 1, its number of hexadecimal digits in hexadecimal is 1
Sample input and output (2)	3 Its binary bit-width is 2, its number of hexadecimal digits in hexadecimal is 1
Sample input and output (3)	27 Its binary bit-width is 5, its number of hexadecimal digits in hexadecimal is 2
Sample input and output (4)	65535000 Its binary bit-width is 26, its number of hexadecimal digits in hexadecimal is 7

Q2. Read a positive integer 'x' from the keyboard, suppose 'x2' is x in binary, 'x16' is x in hexadecimal, 'x2r' is the reverse order of 'x2', 'x16r' is the reverse order of 'x16', print them out.

NOTE:

1) x in binary(x2) and its reverse in binary(x2r):
    a. Suppose x is **3**, its **x2** is **2'b11**, its **x2r** is **2'b11**.
    b. Suppose x is **6**, its x2 is **3'b110**, its x2r is **3'b011**.
2) x in hexadecimal(x16) and its reverse in hexadecimal(x16r):
    a. Suppose x is **16**, its **x16** is **2'h10**, its **x16r** is **2'h01**.
    b. Suppose x is **27**, its **x16** is **2'h1b**, its **x16r** is **2'hb1**.
3) **Use syscall #34 to print x16 and x16r, use syscall #35 to print x2 and x2r.**
4) Input and output of your code should follow the following sample input and output.

Sample input and output (1)	1 x2: 00000000000000000000000000000001 x2r: 00000000000000000000000000000001 x16: 0x00000001 x16r: 0x00000001
Sample input and output (2)	3 x2: 00000000000000000000000000000011 x2r: 00000000000000000000000000000011 x16: 0x00000003 x16r: 0x00000003
Sample input and output (3)	16 x2: 00000000000000000000000000010000 x2r: 00000000000000000000000000000001 x16: 0x00000010 x16r: 0x00000001
Sample input and output (4)	27 x2: 00000000000000000000000000011011 x2r: 00000000000000000000000000011011 x16: 0x0000001b x16r: 0x000000b1

Q3. Read a positive integer 'x' from the keyboard, check if the x is binary palindrome, hexadecimal palindrome, print the check result and the numbers.

NOTE:

1) Suppose '**x2**' is x in binary, '**x16**' is x in hexadecimal, '**x2r**' is the reverse order of '**x2**', '**x16r**' is the reverse order of '**x16**'.
2) While x is **binary palindrome**, it means x2 is same with x2r. e.g.
   a. x is **3**, x2 is **2'b11**, x2r is **2'b11**
      x2 is **same** with x2r, **3 is binary palindrome**;
   b. x is **16**, x2 is **5'b10000**, x2r is **5'b00001**
      x2 is **different** from x2r, **16 is NOT binary palindrome**;
3) While x is **hexadecimal palindrome**, it means x16 is same with x16r. e.g.
   a. x is **16**, x16 is **2'h10**, x16r is **2'h01**
      x16 is **different** from x16r, **16 is NOT hexadecimal palindrome**;
   b. x is **17**, x16 is **2'h11**, x16r is **2'h11**
      x16 is **same** with x16r, **17 is hexadecimal palindrome**;
4) **Use syscall #34 to print x16 and x16r, use syscall #35to print x2 and x2r.**
5) Input and output of your code should follow the following sample input and output.

Sample input and output (1)	3 3 is binary palindrome, 3 is hexadecimal palindrome x2: 00000000000000000000000000000011 x2r: 00000000000000000000000000000011 x16: 0x00000003 x16r: 0x00000003
Sample input and output (2)	16 16 is NOT binary palindrome, 16 is NOT hexadecimal palindrome x2: 00000000000000000000000000010000 x2r: 00000000000000000000000000000001 x16: 0x00000010 x16r: 0x00000001
Sample input and output (3)	170 170 is NOT binary palindrome, 170 is hexadecimal palindrome x2: 00000000000000000000000010101010 x2r: 00000000000000000000000001010101 x16: 0x000000aa x16r: 0x000000aa