

Week 1 – Bits & Bytes

Student number: 564530

Assignment 1.1: Bits & Bytes Intro

What are Bits & Bytes?

A bit is the smallest unit of information. It can represent either 0 or 1. A byte is 8 bits together. This was done to represent more information and be more precise. As it gives more different unique combinations. We can also use more bytes to represent bigger values.

What is a nibble?

It is a unit that consists of four bits.

What relationship does a nibble have with a hexadecimal value?

You can represent four bits with one hexadecimal digit, because when it comes to the different possible variations of 4 bits, it is 2^4 , and the result will be 16 unique digits. In addition, when we simply want to convert binary to hexadecimal, we must use a nibble.

Why is it wise to display binary data as hexadecimal values?

For instance, a byte includes 8 bits and can be easily represented by two hexadecimal digits. When people must work with Photoshop or enter binary code into a processor, it is easier to use hexadecimal values rather than type all the bits.

What kind of relationship does a byte have with a hexadecimal value?

When representing RGB values, in most photoshops, you simply define one RGB value using two hexadecimal numbers. In addition, sometimes you must enter binary code into a processor or program something is OS or even OS, then again you can use the hexadecimal system to enter those codes into the system.

An IPv4 subnet is 32-bit, show with a calculation why this is the case.

255.255.255.0 && 255.255.0.0 these are subnet masks.

The subnet masks are consisted of four numbers varying from 0 to 255. Thus, in total, there are 256 unique combinations. In the subnet mask, the maximum number will be 255. So yes, we can represent each number by a byte. At the end, we have four different numbers. So, $4 * 8 \text{ bits (1 byte)} = 32 \text{ bits}$ or $2^8 * 2^8 * 2^8 * 2^8 = 2^{32}$ which also means that there are 32 bits will be used.

Assignment 1.2: Your favourite colour

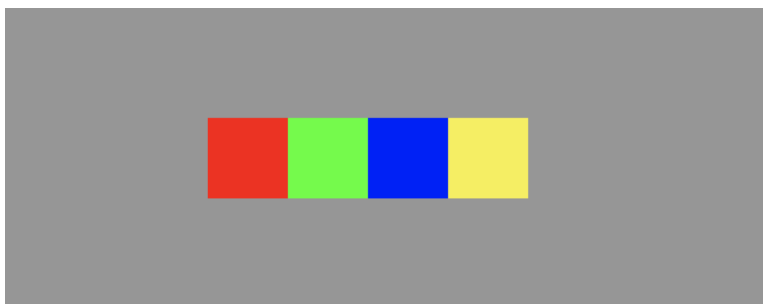
Hexadecimal colour code:

#f5ef42

Assignment 1.3: Manipulating binary data

Colour	Colour code hexadecimal (RGB)	Big Endian	Little Endian
RED	#ff0000	#ff0000	#0000ff
GREEN	#00ff00	#00ff00	#00ff00
BLUE	#0000ff	#0000ff	#ff0000
WHITE	#FFFFFF	#FFFFFF	#FFFFFF
Favourite (previous assignment)	#f5ef42	#f5ef42	#42eff5

Screenshot modified BMP file in hex editor:



Bonus point assignment – week 1

Convert your student number to a hexadecimal number and a binary number.

Explain in detail that the calculation is correct. Use the PowerPoint slides of week 1.

564530 is my student number.

To hexadecimal value: (0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F)

$564530 / 16 = 35283$ remainder 2

$35283 / 16 = 2205$ remainder 3

$2205 / 16 = 137$ remainder 13 -> D

$137 / 16 = 8$ remainder 9

$8 / 16 = 0$ remainder 8

My student number in hexadecimal is 89D32