Template Week 1 – Bits & Bytes

Student number: 589871

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bytes consist of 8 bits. Allowing for 256 values.

What is a nibble?

4 bits or half a byte.

What relationship does a nibble have with a hexadecimal value?

On hexadecimal digit is equal to one nibble

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

Because most binary is stored in multiplicative values of 2. With one byte storing 256 values which is the result of 2^8 would be represented as ff in hexadecimal. There for large values can easily be represented by hexadecimal values. For instance the max value of 16bits is 65535 or #ffff in hex.

It also makes it easier to read the split points of bytes by reading in steps. For instance color codes are represented in 24bits #ffffff but in this instance these have to be read as 3 separate values. This can be easily done by reading the hex code in steps of 2 #B:ff G:ff B:ff.

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

One hexadecimal value represents the full range of a byte.

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

Every number can be one of 256 values (255 + the zero). 8 bits represent each of these values and there are 4 total. Wich gives us the calculation of 4 x 8 giving us a total of 32bits.

Assignment 1.2: Your favourite color

Hexadecimal color code:

#00ff45

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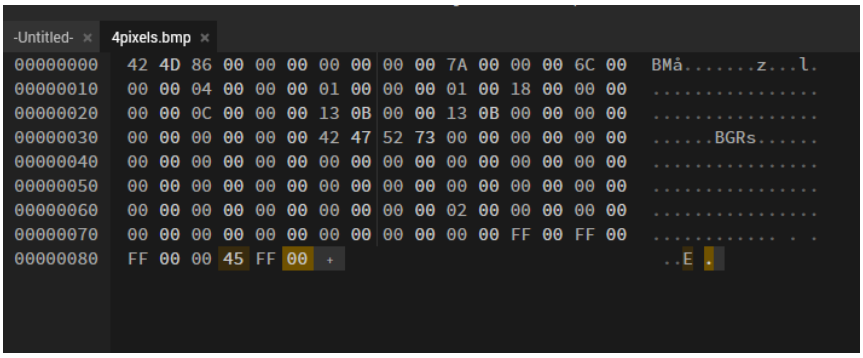
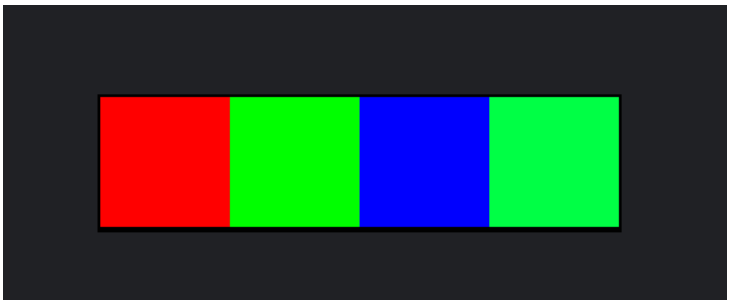
Assignment 1.3: Manipulating binary data

Color	Color code hexadecimaal (RGB)	Big Endian	Little Endian
RED	#ff0000	#ff0000	#0000ff
GREEN	#00ff00	#00ff00	#00ff00
BLUE	#0000ff	#0000ff	#ff0000
WHITE	#ffffff	#ffffff	#ffffff
Favourite (previous assignment)	#00ff45	#00ff45	#45ff00

Screenshot modified BMP file in hex editor:





Assignment 1.4: Student number to HEX and Binary

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.

To Hex:

589871 / 16 = 36866 left f
36866 / 16 = 2304 left 2
2304 / 16 = 144 left 0
144 / 16 = 9 left 0
9 / 16 = 0 left 9

#9002f

To Binary:

9 0 0 2 f
1001 0000 0000 0010 1111

Proof:

To proof the calculation is correct I will use the binary to decimal equation to convert the binary number acquired from the hexadecimal number back to the decimal student number.

2^19 + 2^16 + 2^5+ 2^3 + 2^2 + 2^1 + 2^0 = 589871