Template Week 1 – Bits & Bytes

Student number: 592964

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

bit (b) is smallest unit of data which can have value either 0 or 1 and nothing else, which could be compared to “True/False” or “On/Off”.

Byte (B) consists of 8 bits and is standardly used to measure size of file. More often we see it as kB, MB, GB or more. A single byte represents 256 different values.

What is a nibble?

Nibble (N) can be considered as a half of Byte because it consists of only 4 Bits.

What relationship does a nibble have with a hexadecimal value?

Hexadecimal system uses 16 symbols from 0-9 and A-F and **each Hex is represented by 4 Bits - Nibble.**

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

For normal people it is way **easier and faster to read and write** value in hexadecimals, because it is way shorter. For example, instead “11010110” it’s simplified and shortened to simple hex “D6”.

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

As mentioned in previous question, a hexadecimal value consists of hexes, **each hex consists of 4 Bits**.

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

IPv4 consists of 4 parts (called octets), **each octet has 8 bits value** (meaning 4*8=32 Bits).

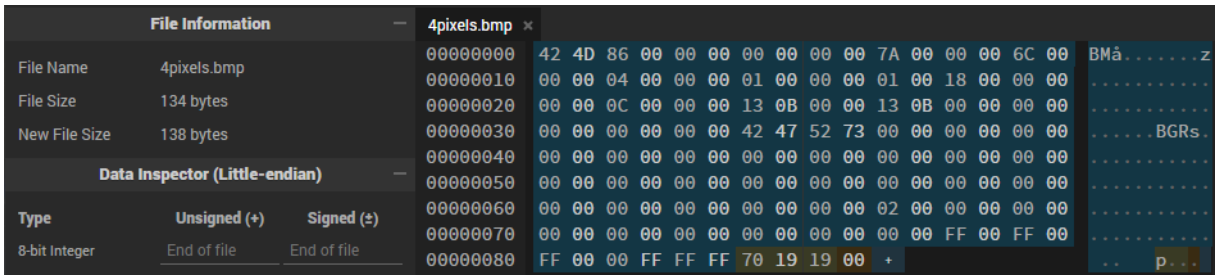
Assignment 1.2: Your favourite colour

Hexadecimal colour code: **#191970 (Midnight Blue)**

Assignment 1.3: Manipulating binary data

Color	Color code hexadecimaal (RGB)	Big Endian	Little Endian
RED	FF 00 00	FF 00 00	00 00 FF
GREEN	00 FF 00	00 FF 00	00 FF 00
BLUE	00 00 FF	00 00 FF	FF 00 00
WHITE	FF FF FF	FF FF FF	FF FF FF
Favourite (previous assignment)	19 19 70	19 19 70	70 19 19

Screenshot modified BMP file in hex editor:



(I added the values + one empty value so it is 4 bytes and not 3, but I still do not see the color once I save the file.)

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.

Decimal: **592964**

Hexadecimal: **90C44**

(Explanation – keep dividing by 16, write down the reminder which can be from 0 to F, then flip the result and this gives result. 37060 r=4, 2316 r=4, 144 r=C, 9 r=0, 0 r=9)

Binary: **10010000110001000100**

(Explanation – There are 2 possible ways, either by repeated division by 2 until we get to 0 or use previous hexadecimal and convert each character to binary. 9=1001, 0=0000, 12=1100, 4=0100 4=0100)

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