Week 1 – Bits & Bytes

Student number: 581124

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bit is the smallest data holder that is used by computer (it can be 0 or 1).

Byte consists of 8 bits. It represents one character of data and can be in a range from 0 to 255 (256 values)

What is a nibble?

Nibble is a unit of data that holds 4 bits.

What relationship does a nibble have with a hexadecimal value?

One nibble can hold the exactly one hexadecimal value

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

Because it becomes much more readable and conversion between base16 and base2 is fast(1 nibble = 1 hexadecimal value, 1 byte = 2 hexadecimal values)

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

1 byte can be converted into 2 hexadecimal values

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

IPv4 subnet consists of 4 blocks and each one can hold 256 different values(0-255).

So each block can be perfectly represented by 1 byte or 8 bits. And if to calculate 4 blocks multiplied by 8 bits equal 32 bits.

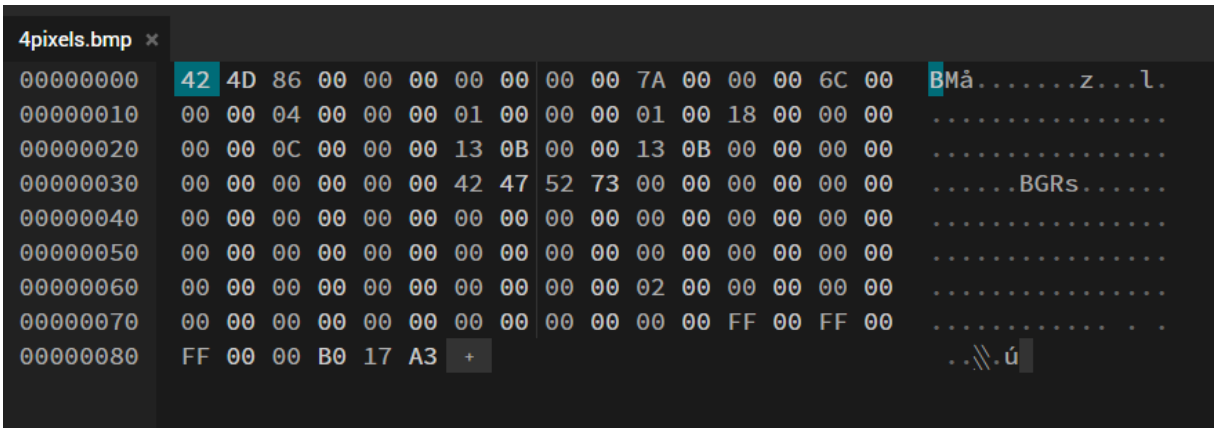
Assignment 1.2: Your favourite color

Hexadecimal color code: #A317B0

Assignment 1.3: Manipulating binary data

Color	Color code hexadecimaal (RGB)	Big Endian	Little Endian
RED	#FF0000	FF 00 00	00 00 FF
GREEN	#00FF00	00 FF 00	00 FF 00
BLUE	#0000FF	00 00 FF	FF 00 00
WHITE	#FFFFFF	FF FF FF	FF FF FF
Favourite (previous assignment)	#A317B0	A3 17 B0	B0 17 A3

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.

My student number is 581124

For this task I show remainder in the parentheses next to the calculation

a) **Hexadecimal number:**

1. 581124 / 16 = 36320 (4)
2. 36320 / 16 = 2270 (0)
3. 2270 / 16 = 141 (14 -> E)
4. 141 / 16 = 8 (13 -> D)
5. 8/ 16 = 0 (8)

We are reading the remainders from bottom to top, so **the hexadecimal number of 581124 is 8DE04**

I convert from hex to binary

b) Binary number:

1. 8 -> 1000
2. D -> 1101
3. E -> 1110
4. 0 -> 0000
5. 4 -> 0100

The binary number of 581124 is 10001101111000000100