Template Week 1 – Bits & Bytes

Student number: 589020

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bit is a 0 or a 1.

A Byte is a group of 8 bits.

What is a nibble?

A nibble is a group of 4 bits.

What relationship does a nibble have with a hexadecimal value?

One nibble = one hexadecimal value.

Because a nibble has 4 bits there are 16 possible values for a nibble which is the same as a hexadecimal value. 2^4 = 16 possible values.

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

Because its easier for humans to read, because a hexadecimal value uses 4 bits so a binary number can be displayed four times smaller. For example: (binary)11110000 -> (hex)F0

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

A byte can contain 2 hexadecimal values. Byte(8 bits) hexadecimal or nibble(4 bits). So 1 Byte can look like this: F0

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

A IPv4 subnet contains 4 octets. Octet can store values from 0 to 255 and is 8 bits large

8 bits x 4 octets = 32 bits.

Example: Ipv4 subnet 255.255.255.0.

255: 11111111 (x3)

0: 00000000

This equals to the 32 bit binary number of: 11111111111111111111111100000000

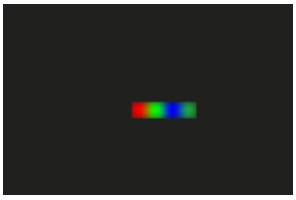
Assignment 1.2: Your favourite color

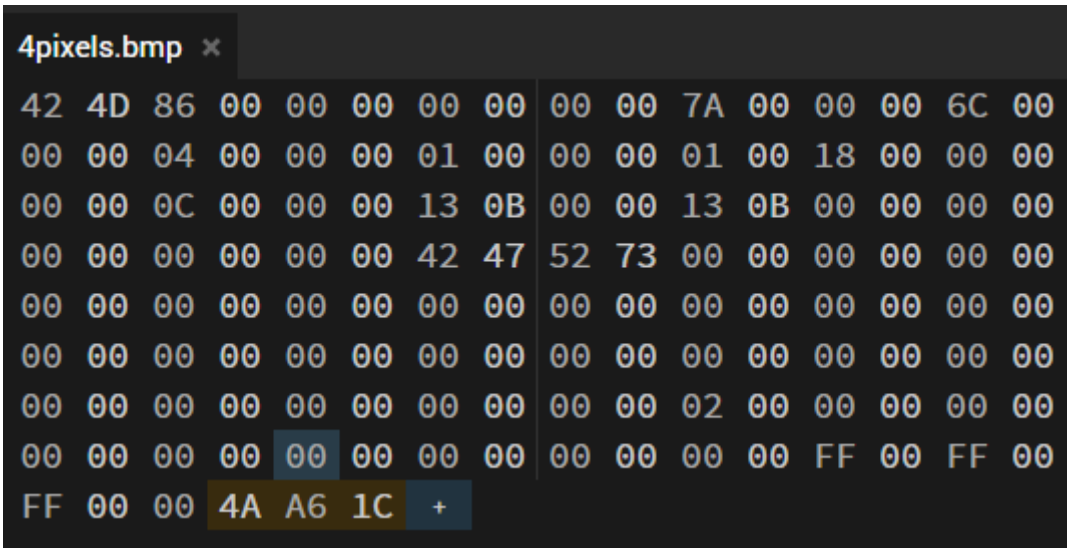
Hexadecimal color code: **#4aa61c**

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)	#4aa61c	4A A6 1C	1C A6 4A

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.

Student number: **589020**

Student number to hex: #**8FCDC**

Calculation:

Divide number by 16	**Multiply whole number by 16**	**Calculate remaining**	**HEX**
589020 / 16 = 36813,75	16 x 36813 = 589008	589020 – 589008 = 12 remaining	**C**
36813 / 16 = 2300,8125	16 x 2300 = 36800	36813 – 36800 = 13 remaining	**D**
2300 / 16 = 143,75	16 x 143 = 2288	2300 – 2288 = 12 remaining	**C**
143 / 16 = 8,9375	16 x 8 = 128	143 – 128 = 15 remaining	**F**
		8 remaining in total.	**8**

Turn that number around and I have the hexadecimal number of **8FCDC** from the decimal number of 589020.

Student number to binary: **10001111110011011100**

Calculation:

I already calculated the hexadecimal number from my student number so I will calculate hexadecimal to binary.

Given a hexadecimal is 4 bits I can easily calculate the binary number by splitting it in groups of 4.

8	F(15)	C(12)	D(13)	C(12)
1000	1111	1100	1101	1100

This equals to the binary number of **10001111110011011100.**

I checked an online calculator to verify that I have the right answers.

Ready? Save this file and export it as a pdf file with the name: **week1.pdf**