Template Week 1 – Bits & Bytes

Student number:

578848

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bits are the smallest piece of data and can either be 0 or 1, while bytes equal 8 bits and are used to represent characters.

What is a nibble?

One nibble is half a byte, so 4 bits.

What relationship does a nibble have with a hexadecimal value?

Because nibble is 4 bits, it can represent any of the 16 hexadecimal values.

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

Because hexadecimal values can hold 4 bits in one digit, so instead of using 4 different binary values, it could be represented with one hexadecimal value.

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

Because byte is 8 bits, it can be represented by two hexadecimal values.

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

IPv4 addresses have four numbers ranging from 255 to 0; So, since 255 is 11111111 in binary (eight bits), four sets of 8 bits multiplied by 4 is 32, hence it is 32-bit.


Assignment 1.2: Your favourite color
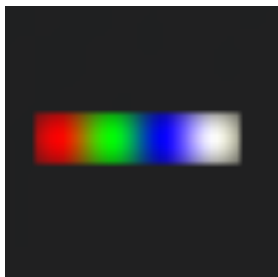
Hexadecimal color code**: #0ffc03**

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)	#0FFC03	0FFC03	03FC0F

Screenshot modified BMP file in hex editor:
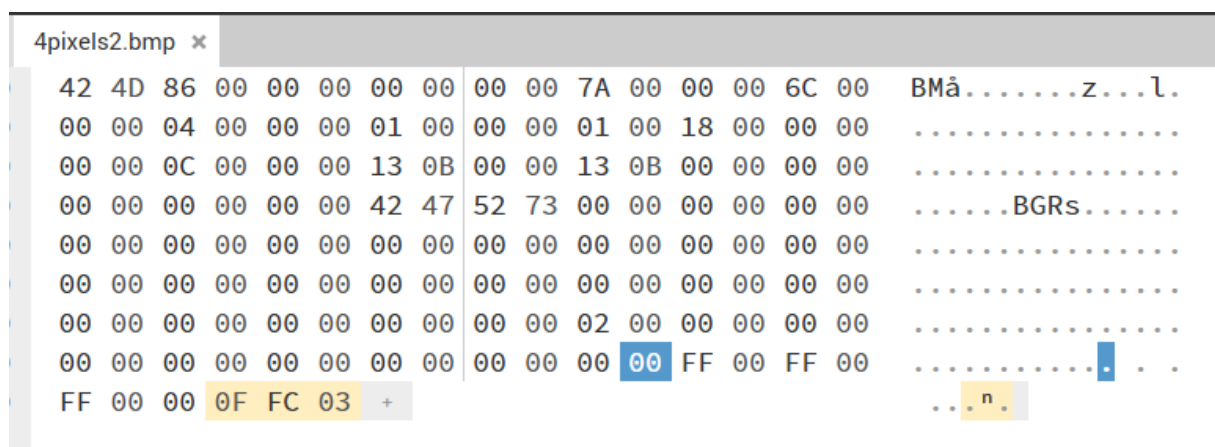
Was:

Now:

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.

578848

To HEX:

578848 / 16 = 36,178 (0)

36,178 / 16 = 2,261.125 (125 * 16 = 2)

2,261 / 16 = 141.3125 (0.3125 * 16 = 5)

141 / 16 = 8.8125 (0.8125 * 16 = 13 = D)

8 / 16 = 0.5 (0.5 * 16 = 8)

8D520

To binary

578848 / 2 = 289,424 (0)

289,424 / 2 = 144,712 (0)

144,712 / 2 = 72,356 (0)

72,356 / 2 = 36,178 (0)

36,178 / 2 = 18,089 (0)

18,089 / 2 = 9,044.5 (1)

9,044 / 2 = 4,522 (0)

4,522 / 2 = 2,261 (0)

2,261 / 2 = 1,130.5 (1)

1,130 / 2 = 565 (0)

565 / 2 = 282.5 (1)

282 / 2 = 141 (0)

141 / 2 = 70.5 (1)

70 / 2 = 35 (0)

35 / 2 = 17.5 (1)

17 / 2 = 8.5 (1)

8 / 2 = 4 (0)

4 / 2 = 2 (0)

2 / 2 = 1 (0)

1 / 2 = 0 (1)

1000 1101 0101 0010 0000

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