Week 1 – Bits & Bytes

Student number:578776

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bits and bytes are the basic building blocks of all digital technology, and you'll find them behind everything

What is a nibble?

group of 4 bits / Half of a byte

What relationship does a nibble have with a hexadecimal value?

One nibble maps perfectly to one hexadecimal digit

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

hexadecimal is much shorter and cleaner

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

byte matches exactly two hexadecimal digits.

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

IPv4 uses four octets, and each octet is 8 bits.

So the total size is

4 octets × 8 bits per octet = 32 bits

Assignment 1.2: Your favourite color

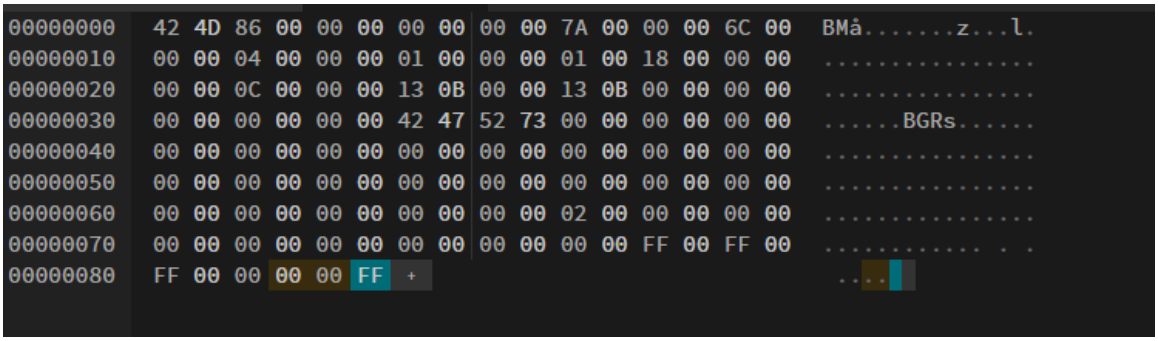
Hexadecimal color code:

#ff0000

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)	ff 26 26	ff 26 26	26 26 ff

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.

578776

HEX

578776 ÷ 16 = 36173 remainder 8

36173 ÷ 16 = 2260 remainder 13 → D

2260 ÷ 16 = 141 remainder 4

141 ÷ 16 = 8 remainder 13 → D

8 ÷ 16 = 0 remainder 8

Now read the remainders bottom to top:

8 D 4 D 8

Hex = 8D4D8

Binary

8 = 1000

D = 1101

4 = 0100

D = 1101

8 = 1000

Binary = 10001101010011011000

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