Template Week 1 – Bits & Bytes

Student number: 578688

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bits are the smallest representation of data in a computer whereas a byte is made up of 8 bits and is used to represent one of 255 possible characters.

What is a nibble?

A nibble is 4 bits.

What relationship does a nibble have with a hexadecimal value?

A nibble and a single hexadecimal have the same number of bits.

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

Converting between binary and hexadecimal is a very quick process and binary data can be stored in a much more compacted form as a hexadecimal.

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

A byte can be represented by 2 hexadecimal values.

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

255.255.255.255

Each 255 is 8 bits, since there are 4 of them, 8 x 4 = 32.

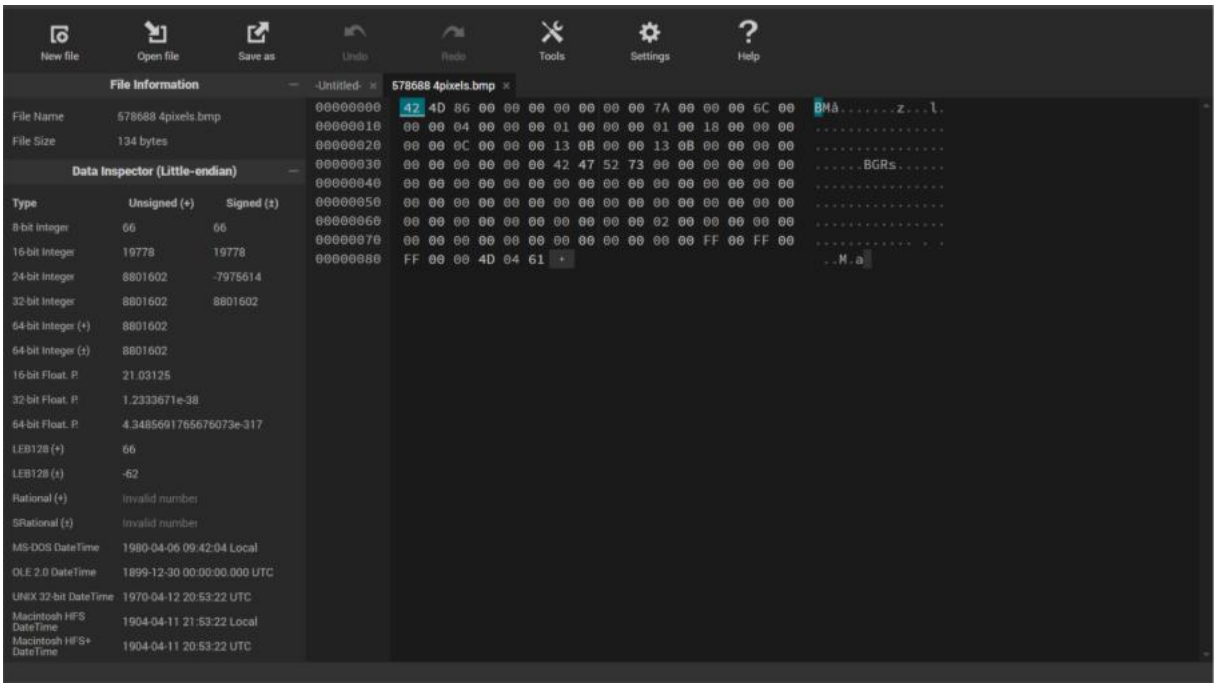
Assignment 1.2: Your favourite colour

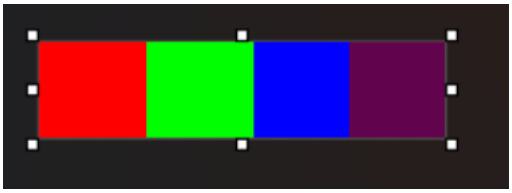
Hexadecimal colour code: #4d0461

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)	#4d0461	4d 04 61	61 04 4d

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.

Decimal to Binary

578688 / 2 = 289,344 remainder 0

289344 / 2 = 144,672 remainder 0

144672 / 2 = 72,336 remainder 0

72336 / 2 = 36168 remainder 0

36168 / 2 = 18,084 remainder 0

18084 / 2 = 9042 remainder 0

9042 / 2 = 4521 remainder 0

4521 / 2 = 2260 remainder 1

2260 / 2 = 1130 remainder 0

1130 / 2 = 565 remainder 0

565 / 2 = 282 remainder 1

282 / 2 = 141 remainder 0

141 / 2 = 70 remainder 1

70 / 2 = 35 remainder 0

35 / 2 = 17 remainder 1

17 / 2 = 8 remainder 1

8 / 2 = 4 remainder 0

4 / 2 = 2 remainder 0

2 / 2 = 1 remainder 0

1 / 2 = 0 remainder 1

Binary to Hexadecimal

1000 1101 0100 1000 0000

1000 = 8

1101 = D

0100 = 4

0000 = 0

10001101010010000000 in hexadecimal = 8D40

Decimal	Binary	Hexadecimal
578688	10001101010010000000	8D40

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