Template Week 1 – Bits & Bytes

Student number: 561004

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

A bit is a single binary number (0 or 1).

A byte is a group of 8 bits.

What is a nibble?

A nibble is half a byte or a group of 4 bits.

What relationship does a nibble have with a hexadecimal value?

One nibble equals one hexadecimal character.

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

It's easier to read.

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

A byte can be represented as 2 hexadecimal digits.

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

Each value in an IPv4 subnet is an octadecimal value:

2^8 * 2^8 * 2^8 * 2^8 = 2^32

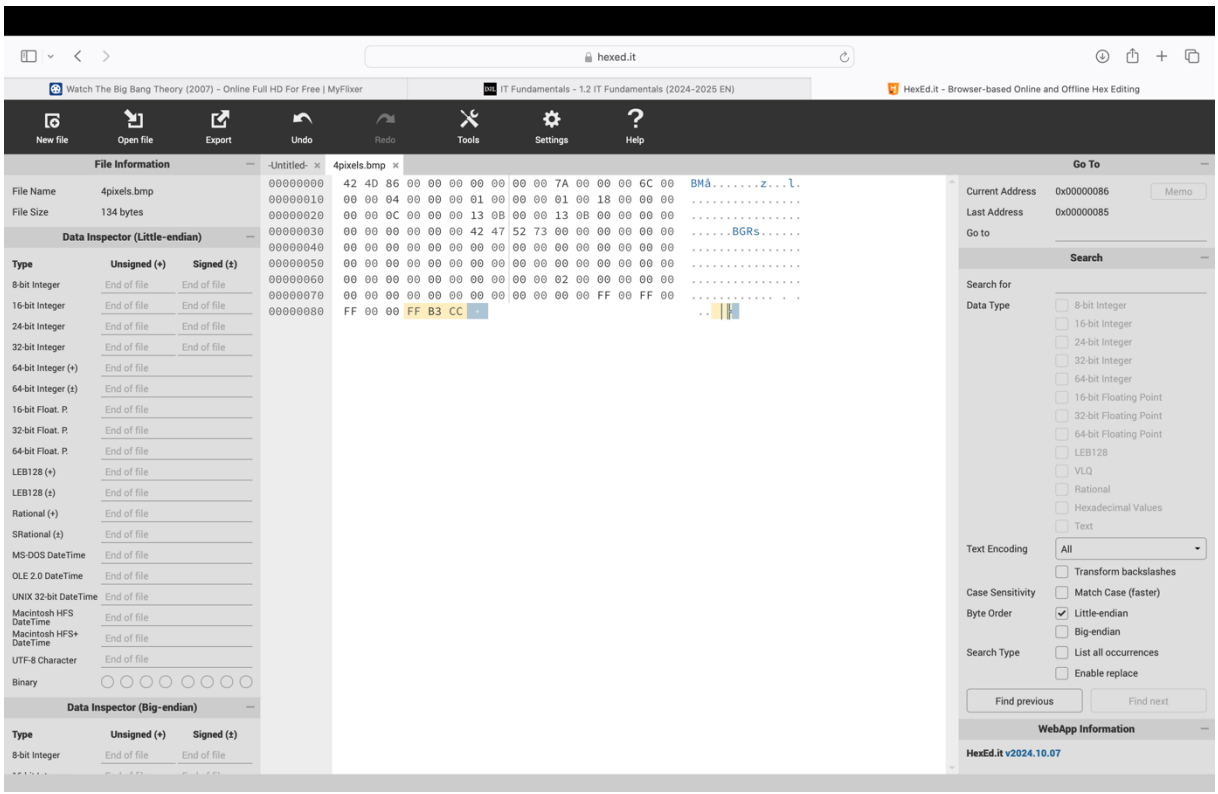
Assignment 1.2: Your favourite colour

Hexadecimal colour code: #ccb3ff

Assignment 1.3: Manipulating binary data

Colour	Colour 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)	CCB3FF	CCB3FF	FFB3CC

Screenshot modified BMP file in hex editor:



Bonus point assignment – week 1

Convert your student number to a hexadecimal number and a binary number.

561004 (10) = 10001000111101101100 (2)

561004 (10) = 88F6C (16)

Explain in detail that the calculation is correct. Use the PowerPoint slides of week 1.

561004 (10) = ? (2)

561 004 : 2 = 280 502, remainder 0

280 502 : 2 = 140 251, remainder 0

140 251 : 2 = 70 125, remainder 1

70 125 : 2 = 35 062, remainder 1

35 062 : 2 = 17 531, remainder 0

17 531 : 2 = 8 765, remainder 1

8 765 : 2 = 4 362, remainder 1

4 382 : 2 = 2 191, remainder 0

2 191 : 2 = 1 095, remainder 1

1 095 : 2 = 547, remainder 1

547 : 2 = 273, remainder 1

273 : 2 = 136, remainder 1

136 : 2 = 68, remainder 0

68 : 2 = 34, remainder 0

34 : 2 = 17, remainder 0

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

561004 (10) = ? (16)

561 004 : 16 = 35 062, remainder C

35 062 : 16 = 2 191, remainder 6

2 191 : 16 = 136, remainder F

136 : 16 = 8, remainder 8

8 : 16 = 0, remainder 8

Reversing both numbers from bottom to top and we get:

561004 (10) = 10001000111101101100 (2) = 88F6C (16)