Template Week 1 – Bits & Bytes

Student number:570350

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

- Bit = This is the smallest part of data in computer. It represents a value 1 or 0. And the symbol of the bit is "b".
- Byte = 8 bits constitute 1 byte, and a standard unit can be used to represent a character of data, for instance letter or symbol. It represents 256 different values (0-255). Byte can be used for measuring file sizes and memory capacity. And the symbol of the byte is "B".

What is a nibble?

- A nibble is a unit of digital data equal to 4 bits, or half of a byte. It can represent 16 different values (0 to 15 in decimal, or 0 to F in hexadecimal).

What relationship does a nibble have with a hexadecimal value?

- A nibble (4 bits) corresponds directly to a single hexadecimal digit. Each hexadecimal digit can represent values from 0 to 15 (in decimal), which perfectly matches the 16 possible combinations of 4 bits.

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

- Displaying binary data as hexadecimal is wise because it is compact, easier to read, and directly maps 4 bits (1 nibble) to 1 hex digit, making debugging and interpretation simpler.

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

- A byte (8 bits) directly corresponds to two hexadecimal digits because each hexadecimal digit represents 4 bits (a nibble).

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

- An IPv4 address consists of 4 bytes.
- Each byte contains 8 bits.
- 8 bits / byte × 4 byte = 32 bits

Assignment 1.2: Your favourite colour

Hexadecimal colour code: #00FFFF

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)	#00FFFF	00FFFF	FFFF00

Screenshot modified BMP file in hex editor:
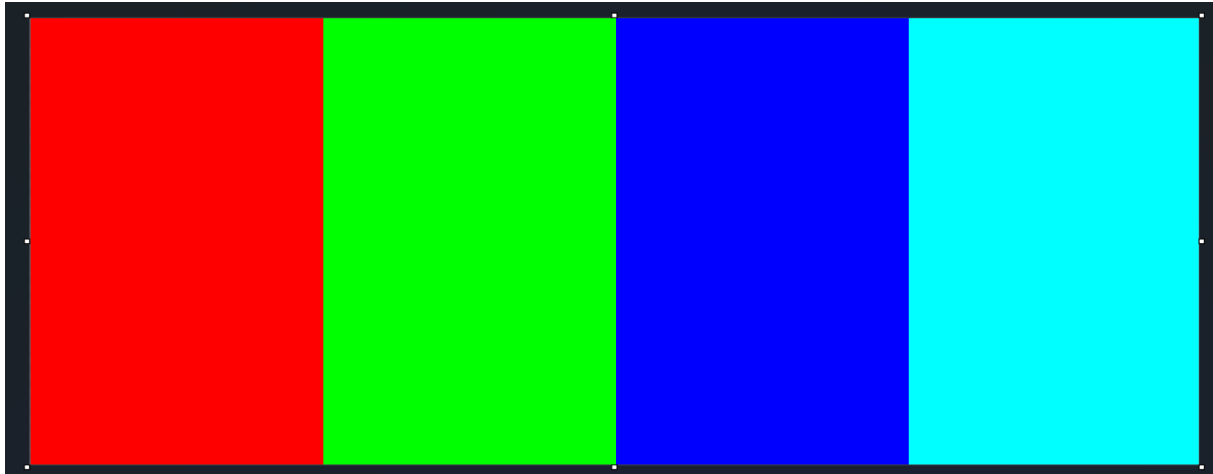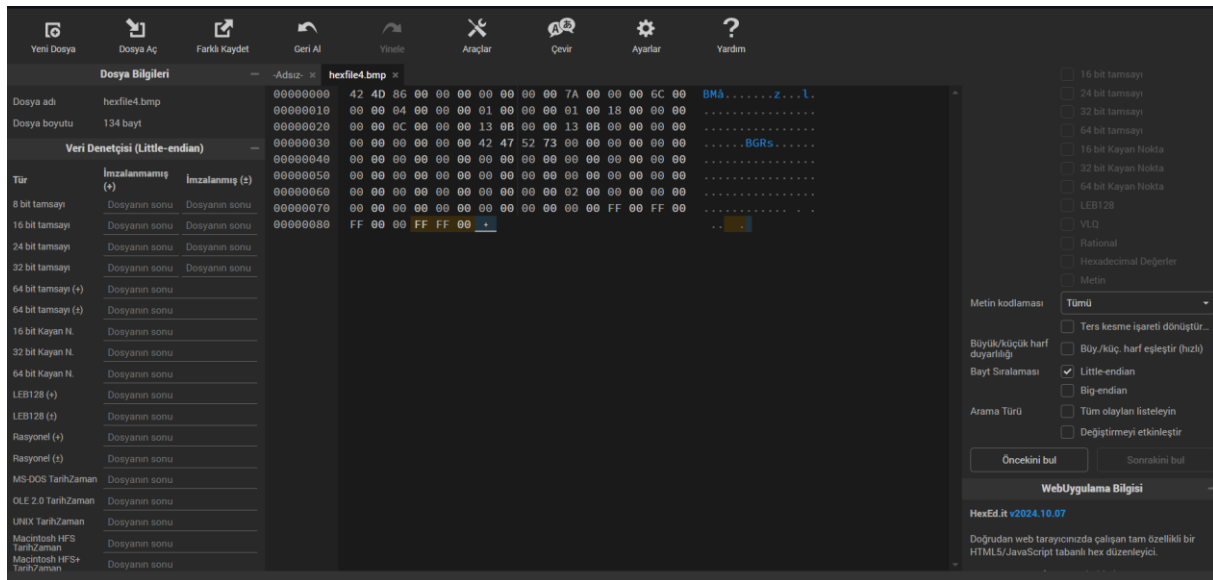
Bonus point assignment – week 1

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.

570350 to hexadecimal = 8B3EE

570350 to binary = 1000 1011 0011 1110 1110

570350 / 2	remainder 0
285175 / 2	remainder 1
142587 / 2	remainder 1
71293 / 2	remainder 1
35646 / 2	remainder 0
17823 / 2	remainder 1
8911 / 2	remainder 1
4455 / 2	remainder 1
2227 / 2	remainder 1
1113 / 2	remainder 1
556 / 2	remainder 0
278 / 2	remainder 0
139 / 2	remainder 1
69 / 2	remainder 1
34 / 2	remainder 0
17 / 2	remainder 1
8 / 2	remainder 0
4 / 2	remainder 0
2 / 2	remainder 0
1 / 2	remainder 1

1000 1011 0011 1110 1110

8   B   3   E   E

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