Template Week 1 – Bits & Bytes

Student number: 568670

Student Name : Patrick Santos

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bits: Smallest unit of data, 0 or 1 (binary).

Bytes: Group of 8 bits.

What is a nibble?

A computing term for a 4-bit unit, representing half of a byte

What relationship does a nibble have with a hexadecimal value?

A **nibble** can represent exactly one **hexadecimal digit** (0–F), since hexadecimal is base-16, and 4 bits can encode 16 possible values ($2^4 = 16$).

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

Displaying binary data as hexadecimal is wise because it is more compact, easier to read, and each hex digit directly represents 4 binary bits, simplifying interpretation.

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

A **byte** has a relationship with hex values because it can be represented by **two hexadecimal digits**. Each hex digit represents 4 bits, so two hex digits represent a full byte.

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

An IPv4 address is a 32-bit address divided into 4 octets (8 bits each, values from 0 to 255). Here's the calculation:

1. Each octet has 8 bits. (x . x . x . x)
2. There are 4 octets in an IPv4 address.
3. Total bits = 8 × 4 = 32.

So, an IPv4 subnet is **32-bit** because it uses 4 octets, each with 8 bits.

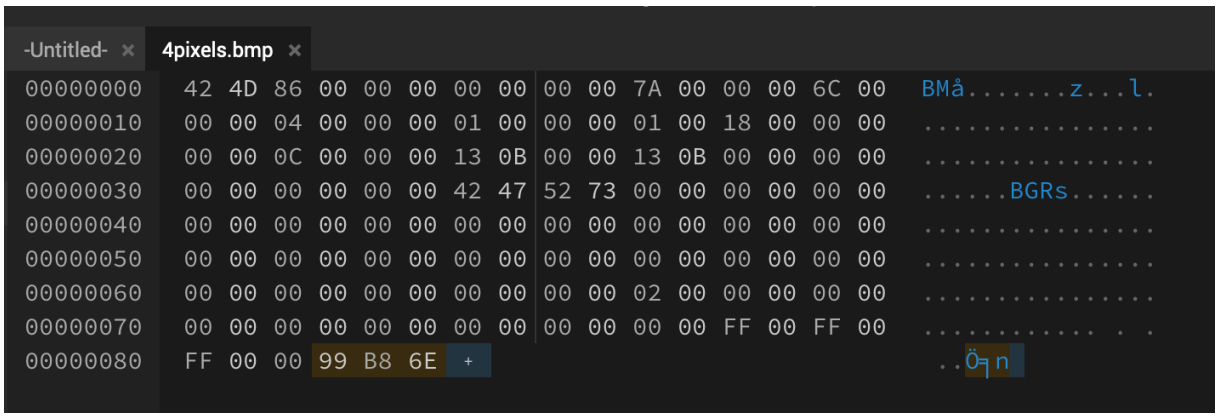
Assignment 1.2: Your favourite colour

Hexadecimal colour code: **6eb899**

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)	**6eb899**	6eb899	99b86e

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.

My student number in decimal: 568670

In binary:

568670 / 2 = 284335 (remainder 0)

284335 / 2 = 142167 (remainder 1)

142167 / 2 = 71083 (remainder 1)

71083 / 2 = 35541 (remainder 1)

35541 / 2 = 17770 (remainder 1)

17770 / 2 = 8885 (remainder 0)

8885 / 2 = 4442 (remainder 1)

4442 / 2 = 2221 (remainder 0)

2221 / 2 = 1110 (remainder 1)

1110 / 2 = 555 (remainder 0)

555 / 2 = 277 (remainder 1)

277 / 2 = 138 (remainder 1)

138 / 2 = 69 (remainder 0)

69 / 2 = 34 (remainder 1)

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)

Student number in binary : 1000 1010 1101 0101 1110

Using the table below to convert 10001010110101011110 from binary to hexadecimal.

Hex Digit	Binary Equivalent
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

First separate in groups of 4 bits

1000 | 1010 | 1101 | 0101 | 1110

And using the table above we have:

8. A. D. 5. E

My student number in hexadecimal: 8AD5E

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