Template Week 1 – Bits & Bytes

Student number: 575933

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes? : A bit which is short for binary digit is the smallest unit of data in computing. It represents data where it holds the value of either 0 or 1. A byte is a group of 8 bits, it is used to measure data sizes.

What is a nibble? : A nibble is a unit of data that is worth 4 bits. A nibble can represent values from 0 to 15 in decimal or 0 – f in hexadecimal.

What relationship does a nibble have with a hexadecimal value?: Hexadecimal is a 16-numbering system, each digit representing 0 to 15. While nibble represents values from 0 to 15 too.

Why is it wise to display binary data as hexadecimal values?: Because hexadecimal is more compact, practical and easier to understand. For example, binary showing 1011011011101110, in hexadecimal is B6EE.

What kind of relationship does a byte have with a hexadecimal value?: 1 byte = 8 bits and 2 hexadecimal = 8 bits. So 1 byte = 2 hexadecimals

An IPv4 subnet is 32-bit, show with a calculation why this is the case.: There are 4 parts in an IPV4 subnet and each part is 8 bits long so 4*8 = 32 bits

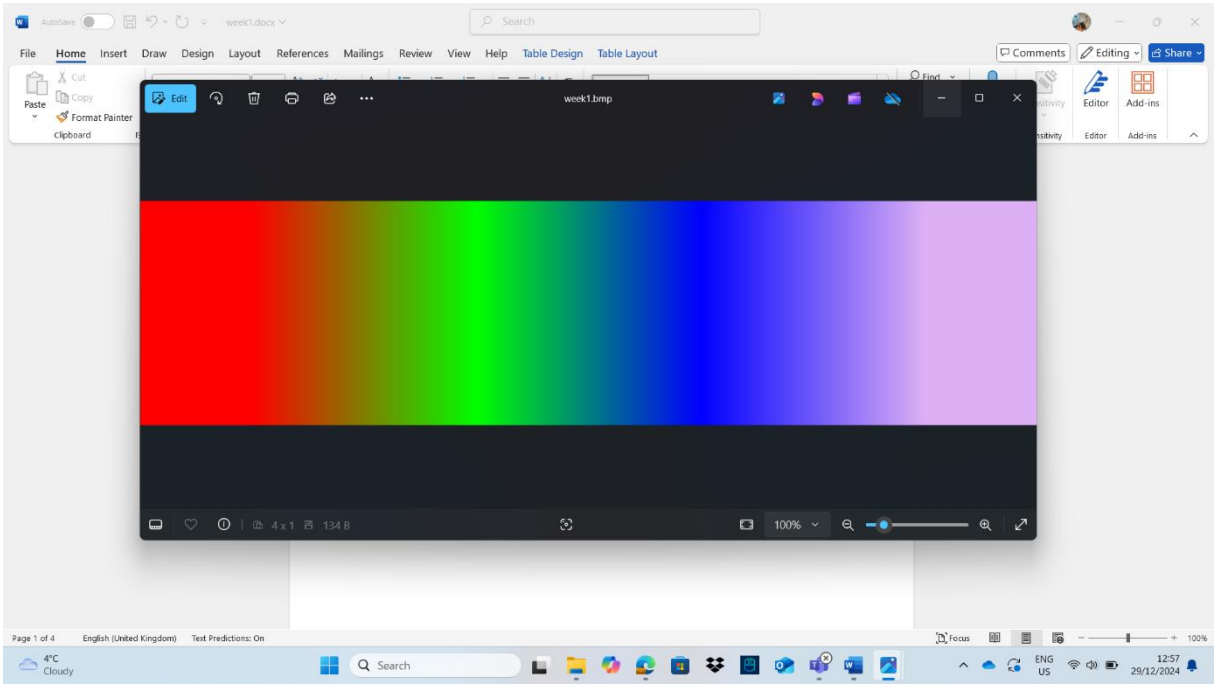
Assignment 1.2: Your favourite colour

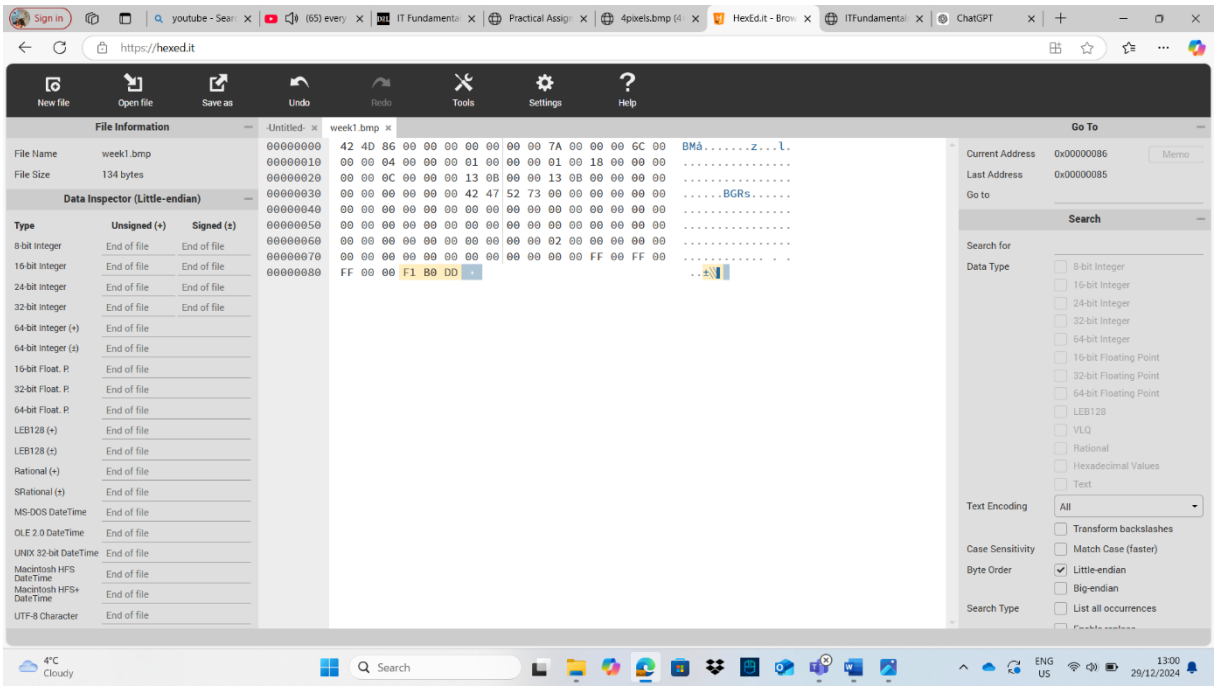
Hexadecimal colour code: #f5b0dd

Assignment 1.3: Manipulating binary data

Colour	Colour code hexadecimaal (RGB)	Big Endian	Little Endian
RED	FF 00 00	FF 00 00	00 FF 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)	F1 B0 DD	F1 B0 DD	DD B0 F5

Screenshot modified BMP file in hex editor:




https://hexed.it
New file
Open file
Save as
Undo
Redo
Tools
Settings
Help
File Information
File Name week1.bmp
File Size 134 bytes
Data Inspector (Little-endian)
Untitled
week1.bmp
00000000 42 4D 86 00 00 00 00 00 00 00 7A 00 00 00 6C 00 BMá.....z...l.
00000010 00 00 04 00 00 00 01 00 00 00 01 00 18 00 00 00
00000020 00 00 0C 00 00 00 13 0B 00 00 13 0B 00 00 00 00
00000030 00 00 00 00 00 00 42 47 52 73 00 00 00 00 00 00 ......BGRs......
00000040 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000050 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000060 00 00 00 00 00 00 00 00 00 00 02 00 00 00 00 00
00000070 00 00 00 00 00 00 00 00 00 00 00 00 FF 00 FF 00
00000080 FF 00 00 F1 B0 DD
Go To
Current Address 0x00000086
Last Address 0x00000085
Go to
Search
Search for
Data Type
Text Encoding All
Transform backslashes
Case Sensitivity Match Case (faster)
Byte Order Little-endian
Big-endian
Search Type List all occurrences
4°C Cloudy
Search
ENG US
13:00 29/12/2024

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 is 575933 so,

Hexadecimal

575933/16 = 35,995 remainder 13 (575,933 - (35,995*16) = 13), 13 = D

35,995/16 = 2,249 remainder 11, 11 = B

2,249/16 = 140 remainder 9

140/16 = 8 remainder 12, 12 = C

8/16 = 0 remainder 8

Therefore 575933 = 0x8C9BD while 0x is used to indicate that the number is written in a hexadecimal format

Binary

575933/2 = 287,966 remainder 1

287,966/2 = 143,966 remainder 0

143,966/2 = 71983 remainder 1

71983/2 = 35991 remainder 1

35991/2 = 17995 remainder 1

17995/2 = 8997 remainder 1

8997/2 = 4498 remainder 1

4498/2 = 2249 remainder 0

2249/2 = 1124 remainder 1

1124/2 = 562 remainder 0

562/2 = 281 remainder 0

281/2 =140 remainder 1

140/2 = 70 remainder 0

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

Therefore 575933 = 10001100100101111101

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