Template Week 1 – Bits & Bytes

Student number: 561444

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?
A bit is the smallest unit of data in a computer, representing a 0 or 1. A byte is a group of 8 bits, often used to represent a character or a small amount of data.

What is a nibble?
A nibble is 4 bits, or half of a byte.

What relationship does a nibble have with a hexadecimal value?
A nibble can represent a single hexadecimal digit. For example, the binary value 1010 equals A in hexadecimal.

Why is it wise to display binary data as hexadecimal values?
Hexadecimal values are shorter and easier to read than long binary strings. For example, 11110000 in binary becomes F0 in hexadecimal.

What kind of relationship does a byte have with a hexadecimal value?
One byte can be represented by two hexadecimal digits. For example, 11111111 in binary equals FF in hexadecimal.

An IPv4 subnet is 32-bit, show with a calculation why this is the case.
IPv4 uses four groups of 8 bits to form an address: 8 x 4 = 32 bits.

Assignment 1.2: Your favourite colour

Hexadecimal colour code: #0080FF

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)	#0080FF	0080FF	FF8000

Screenshot modified BMP file in hex editor:

Bonus point assignment – week 1

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

My student number is 561444

Hexadecimal: 89124

561444 / 16 = 35090 remainder 4
35090 / 16 = 2193 remainder 2
2193 / 16 = 137 remainder 1
137 / 16 = 8 remainder 9
8 / 16 = 0 remainder 8

Binary: 10001001000100100100

561444 / 2 = 280722 remainder 0
280722 / 2 = 140361 remainder 0
140361 / 2 = 70180 remainder 1
70180 / 2 = 35090 remainder 0
35090 / 2 = 17545 remainder 0
17545 / 2 = 8772 remainder 1
8772 / 2 = 4386 remainder 0
4386 / 2 = 2193 remainder 0
2193 / 2 = 1096 remainder 1
1096 / 2 = 548 remainder 0
548 / 2 = 274 remainder 0
274 / 2 = 137 remainder 0
137 / 2 = 68 remainder 1
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

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

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