

Template Week 1 – Bits & Bytes

Student number: 544483

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

A bit can only be a 0 or 1, a byte can be 8 values

1 byte is 8 bits

What is a nibble?

A nibble is 4 bits or half a byte.

What relationship does a nibble have with a hexadecimal value?

1 nibble = 1 hexadecimal digit = 4 bits

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

Hex values are easier to change and manipulate by humans.

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

A hexadecimal digit is half a byte.

Byte = 8 bits

Hexadecimal = 4 bits

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

255.255.0.0

Byte 1: 255 = 11111111 (8 bits)

Byte 2: 255 = 11111111 (8 bits)

Byte 3: 0 = 00000000 (8 bits)

Byte 4: 0 = 00000000 (8 bits)

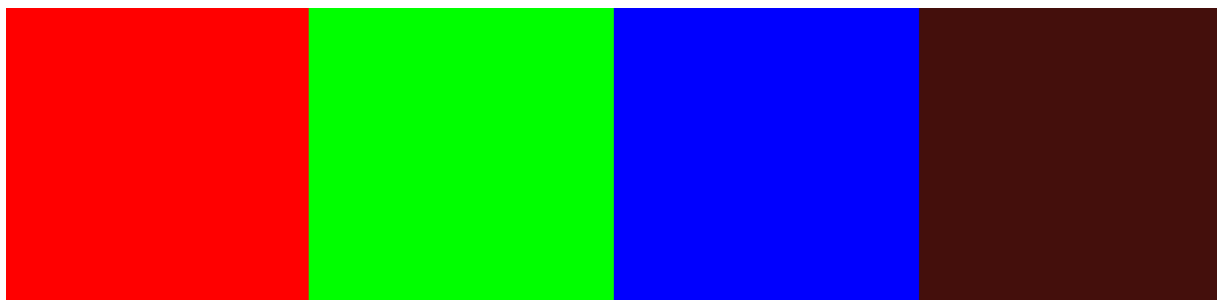
Assignment 1.2: Your favourite colour

Hexadecimal colour code: #440f0c

Assignment 1.3: Manipulating binary data

Colour	Colour code hexadecimal (RGB)	Big Endian	Little Endian
RED	#ff000	0F F0 00 00	00 00 F0 0F
GREEN	#00ff00	00 FF 00 00	00 00 FF 00
BLUE	#0000ff	00 00 FF 00	00 FF 00 00
WHITE	#ffffff	FF FF FF 00	00 FF FF FF
Favourite (previous assignment)	#440f0c	44 0F 0C 00	00 0C 0F 44

Screenshot modified BMP file in hex editor:



Bonus point assignment – week 1

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

Given:

St.No: 544483

Binary solution:

$$544,483/2= 272,241 \text{ remainder} = 1$$

$$272,241/2= 136,120 \text{ remainder} = 1$$

$$136,120/2= 68,060 \text{ remainder} = 0$$

$$68,060/2= 34,030 \text{ remainder} = 0$$

$$34,030/2= 17,015 \text{ remainder} = 0$$

$$17,015/2= 8,507 \text{ remainder} = 1$$

$$8507/2= 4,253 \text{ remainder} = 1$$

$$4,253/2= 2,126 \text{ remainder} = 1$$

$$2,126/2= 1,063 \text{ remainder} = 0$$

$$1,063/2= 531 \text{ remainder} = 1$$

$$531/2= 265 \text{ remainder} = 1$$

$$265/2= 132 \text{ remainder} = 1$$

$$132/2= 66 \text{ remainder} = 0$$

$$66/2= 33 \text{ remainder} = 0$$

$$33/2= 16 \text{ remainder} = 1$$

$$16/2= 8 \text{ remainder} = 0$$

$$8/2= 4 \text{ remainder} = 0$$

$$4/2= 2 \text{ remainder} = 0$$

$$2/2= 1 \text{ remainder} = 0$$

$$1/2= 0.5 \text{ remainder} = 1$$

Going from bottom to top we get: 1000 0100 1110 1110 0011

From this we can easily convert to hexadecimal like so:

$$1*2^3 + 0*2^2 + 0*2^1 + 0*2^0 = 8$$

$$0*2^3 + 1*2^2 + 0*2^1 + 0*2^0 = 4$$

$$1*2^3 + 1*2^2 + 1*2^1 + 0*2^0 = 14 \text{ (E)}$$

Same as the above calculation= 14 (E)

$$0*2^3 + 0*2^2 + 1*2^1 + 1*2^0 = 3$$

Putting all these together we get: 84EE3

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

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