Template Week 1 – Bits & Bytes

Student number: 570750

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bit: *the smallest piece of information that a computer can use. It can either be 0 or 1*
Byte: *a byte is 8 bits together. A computer can use these bytes to store information like letters.*

What is a nibble?

Nibble: *a nibble is a group of 4 bits.*

What relationship does a nibble have with a hexadecimal value?

The relationship a nibble have with a hexadecimal value, is that 4 bits is equal to 1 hexadecimal digit.

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

It is shorter and simpler. Binary numbers are normally long and hard to read. Hexadecimal makes the numbers shorter and more easier to read.

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

A byte is 8 bits, and a hexadecimal uses 4 bits for each digit.
So 1 byte = 2 hexadecimal digits

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

An IPv4 subnet has 4 parts. For example: 192.168.0.1.
Each part is a number from 0 to 255, and each part is stored using 8 bits.

There are 4 parts, and 8 bits per part.

So 4 * 8 = 32.

Conclusion: an IPv4 subnet is 32-bit.

Assignment 1.2: Your favourite colour

Hexadecimal colour code:
#FFFF00

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)	#FFFF00	#FFFF00	#00FFFF

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.

Hexadecimal

In order to convert the student number *570750* to a hexadecimal number you have to divide it repeatedly by the number 16 and make sure to keep track of the remainders.

570750÷16=35671,875
0,875 x 16 = remainder **14** → Hex digit: **E**

35671,875÷16= 2229,49219
0,49219 x 16 = remainder **7** → Hex digit: **7**

2229,49219 ÷ 16 = 139,343262
0,343262 x 16 = remainder **5** → Hex digit: **5**

139,343262 ÷ 16= 8,70895388
0,70895388 x 16 = remainder **11** → Hex digit: **B**

8,70895388 ÷ 16 = 0,544309618
0,544309618 x 16 = remainder **8** → Hex digit: **8**

Write down the remainders in reverse order.

Hexadecimal: 8B57E

Binary

In order to convert the student number 570750 to binary, you have to divide it repeatedly by 2 while writing down the reminders.

570750 : 2 = 285375, remainder **0**

285375 : 2 = 142687, remainder **1**

142687 : 2 = 71343, remainder **1**

71343 : 2 = 35671, remainder **1**

35671 : 2 = 17835, remainder **1**

17835 : 2 = 8917, remainder **1**

8917 : 2 = 4458, remainder **1**

4458 : 2 = 2229, remainder **0**

2229 : 2 = 1114, remainder **1**

1114 : 2 = 557, remainder **0**

557 : 2 = 278, remainder **1**

278 : 2 = 139, remainder **0**

139 : 2 = 69, remainder **1**

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**

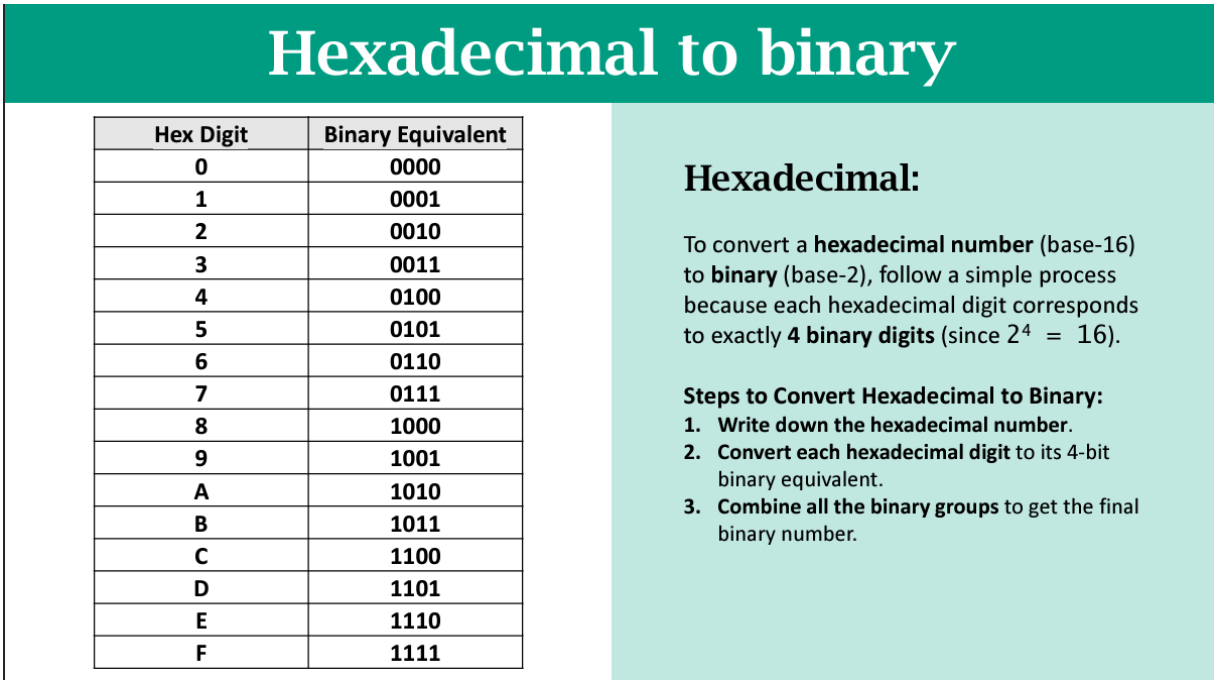
2 : 2 = 1, remainder **0**

1 : 2 = 0, remainder **1**

Write the remainders in reverse order:
10001011010101111110

This is the student number *570750* converted into binary :) !

(I used the following screenshot of a PowerPoint slide to help me out).



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