

Template Week 1 – Bits & Bytes

Student number: 587707

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

Bits	A single place or symbol in a binary number is called a bit.
Bytes	a group of 8 bits form a byte.

What is a nibble?

Nibble (nybble or nyble)	A 4-bit number, half a byte.
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What relationship does a nibble have with a hexadecimal value?

One nibble represents one symbol of the hexadecimal number system. for example, 0b0000 = 0x0 or 0b1111 = 0xF.

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

Using hexadecimal helps overcome two difficulties: 1. Dealing with 16 or more bits is tedious and error prone for humans. Using hexadecimal makes it more easy to read. 2. Converting between decimal and binary isn't easy. But with hexadecimal, conversions to binary are much more straightforward, as one nibble represents one hexadecimal symbol and vice versa.

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

Every four bits in binary correspond to one symbol in hexadecimal. Four bits is a nibble (half a byte). Therefore a byte can be represented with two hexadecimal symbols.

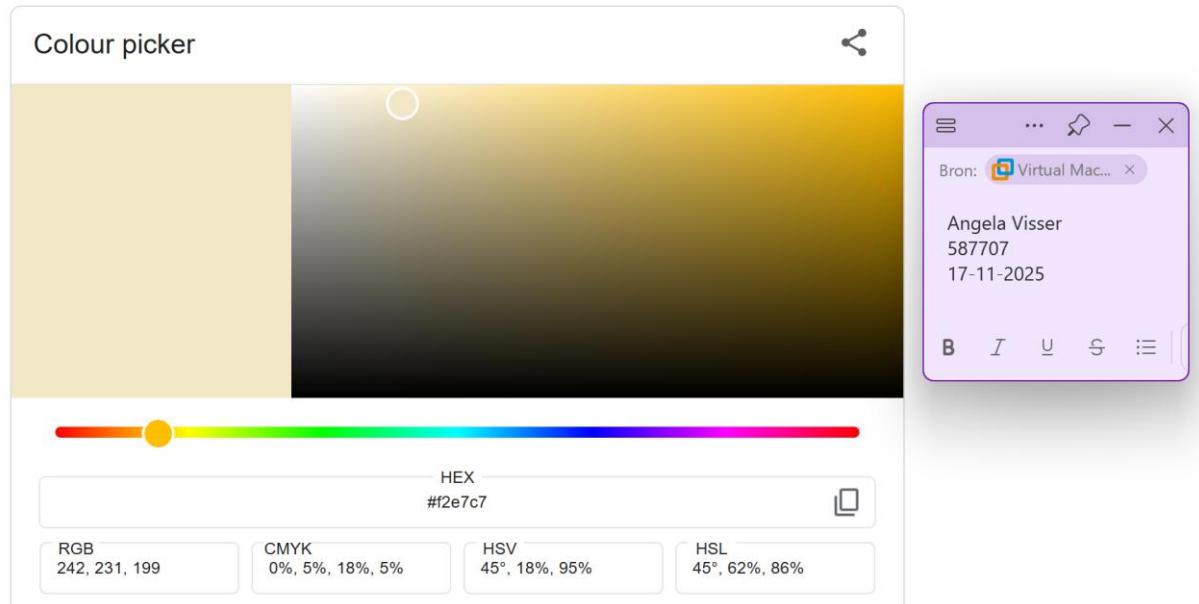
An IPv4 subnet is 32-bit, show with a calculation why this is the case.

An IPv4 exists of 4 octet's (00000000.00000000.00000000.00000000). Each octet is 8 bits (1byte). 8bits + 8bits + 8bits + 8bits = 32bits.

For example: If the IPv4 address is 255.255.255.255 255 = 0b11111111 The IPv4 address in binary is 11111111 11111111 11111111 11111111. This binary number exists of 32 bits.

Assignment 1.2: Your favourite color

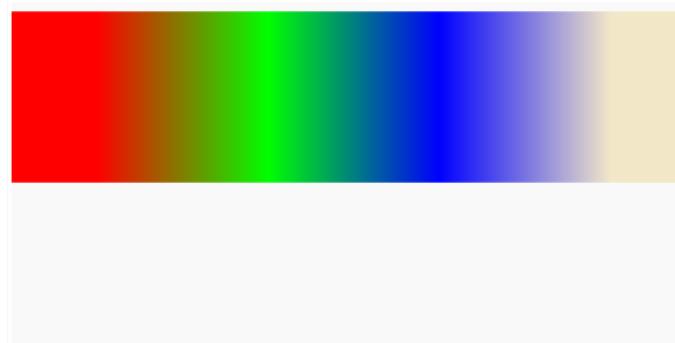
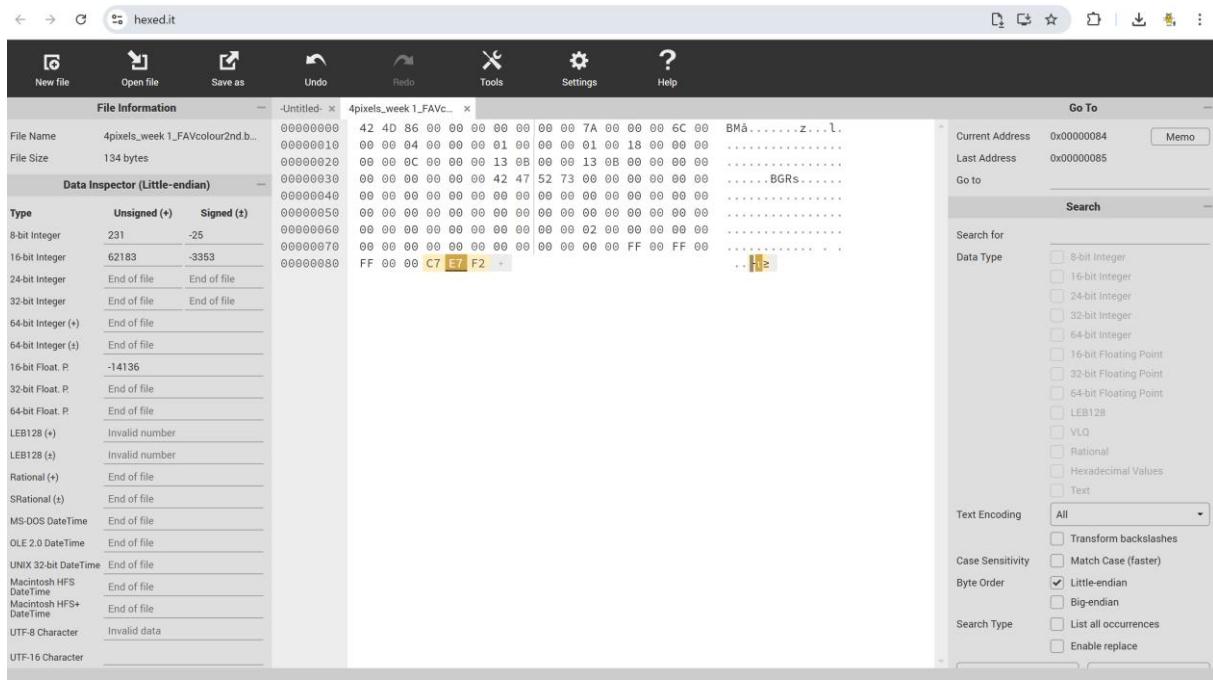
Hexadecimal color code:



Assignment 1.3: Manipulating binary data

Color	Color code hexadecimaal (RGB)	BigEndian	LittleEndian
RED	#FF0000	#FF0000	0000FF
GREEN	#00FF00	00FF00	00FF00
BLUE	#0000FF	0000FF	FF0000
WHITE	#FFFFFF	FFFFFF	FFFFFF
Favourite (previous assignment)	F2E7C7	F2E7C7	C7E7F2

Screenshot modified BMP file in hex editor:



4pixels_week 1_FAVcolour2nd

This item is not shared

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Details

Type	BMP File
Size	0 bytes
File location	C:\Saxion\One Drive Saxion\...
Modified by	Angela Visser
Created by	Angela Visser
Dimensions	4 x 1

Assignment 1.4: Student number to HEX and Binary

Convert your student number (587707) to a hexadecimal number and a binary number.

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

Hexadecimal:

Eerst 587707 omzetten naar binary, dat is 1000 1111 0111 1011 1011
in de volgende tabel valt het volgende af te lezen:

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Binary	Decimal	Hex
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	10	A
1011	11	B
1100	12	C
1101	13	D
1110	14	E
1111	15	F

1000 = 8
1111 = F
0111 = 7
1011 = B
1011 = B

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Lees van boven naar beneden en zet het achter elkaar van links naar recht: 8F7BB.

Binary:

Getal delen door 2, wanneer het antwoord met een 0,5 op het eind is dan heeft het een rest (R) 1. Wanneer het een heel getal is heeft het een R0. Herhaal het proces tot het getal 0 is (of geen heel getal meer kan delen door 2). Lees nu de rest getallen van onder naar boven, gezien onder het most significat bit(M) is en de bovenste de least significant bit is (L).

5	8	7	7	0	7	/	2	=	2	9	3	8	5	3	R	R	1	L
2	9	3	8	5	3	/	2	=	1	4	6	9	2	6	R	R	1	
1	4	6	9	2	6	/	2	=	7	3	4	6	3		R	0		
7	3	9	6	3	1	/	2	=	3	6	7	3	1		<u>R</u>	1		
3	6	7	3	1	1	/	2	=	1	8	3	6	5		<u>R</u>	1		
1	8	3	6	5	1	/	2	=	9	1	8	2			<u>R</u>	1		
9	1	8	2	1	2	/	2	=	4	5	9	1			<u>R</u>	0		
4	5	9	1	1	2	/	2	=	2	2	9	5			<u>R</u>	1		
2	2	9	5	1	2	/	2	=	1	1	4	7			<u>R</u>	1		
1	1	1	4	9	7	/	2	=	5	7	3				<u>R</u>	1		
5	7	3	1	1	2	/	2	=	2	8	6				<u>R</u>	1		
2	8	6	1	2	1	/	2	=	1	4	3				<u>R</u>	0		
1	4	3	1	1	2	/	2	=	7	1					<u>R</u>	1		
7	1	1	1	2		=	3	5							<u>R</u>	1		
3	5	1	1	2		=	1	7							<u>R</u>	1		
1	7	1	1	2		=	8								<u>R</u>	1		
8	1	1	2			=	4								<u>R</u>	0		
9	1	1	2			=	2								<u>R</u>	0		
2	1	1	2			=	1								<u>R</u>	0		
1	1	2				=	0								<u>R</u>	1	m	

1 0 0 0 1 1 1 1 0 1 1 1 1 0 1 1 1 0 1 1

In decimal 587707 = in binary 1000 1111 0111 1011 1011

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