Template Week 1 – Bits & Bytes

Student number:

563790

Assignment 1.1: Bits & Bytes intro

What are Bits & Bytes?

A bit is the smallest unit of data in a computer, representing a value of either 0 or 1.

A byte consists of 8 bits and is the standard unit used to represent a character of data, such as a letter or symbol.

What is a nibble?

A nibble is four consecutive binary digits or half of an 8-bit byte.

What relationship does a nibble have with a hexadecimal value?

A nibble can be represented by a single hexadecimal digit and is called a hexadecimal digit.

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

Hex is useful because large numbers can be represented using fewer digits.

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

Two hex digits can represent a byte, since each hex digit represents a 4-bit pattern.

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

IPv4 consists of 4 section with range 0 – 255 (so 256 possible digits)

$$256 = 2^8$$

$$2^8 * 2^8 * 2^8 * 2^8 = 2^{32}$$

Assignment 1.2: Your favourite colour

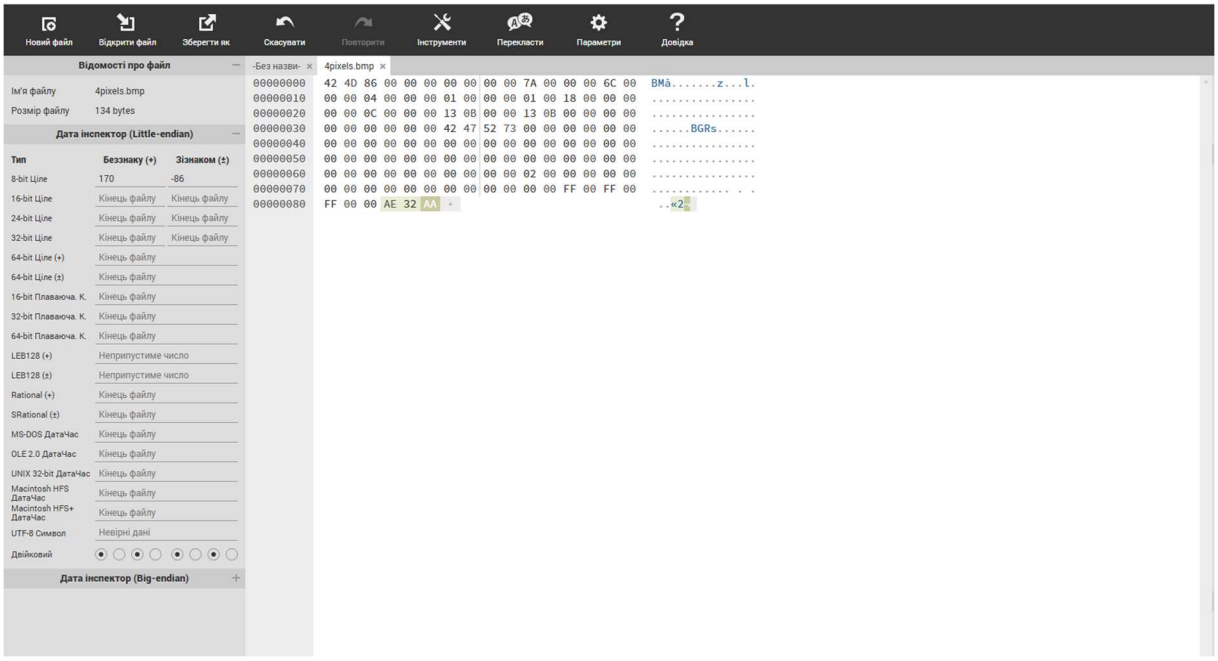
Hexadecimal colour code:

AE32AA

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)	AE32AA	AE32AA	AA32AE

Screenshot modified BMP file in hex editor:



Bonus point assignment – week 1

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

Hexadecimal

Steps:

563790/16 = 35236

35,236/16 = 2,202

2,202/16 = 137

137/16 = 8

8/16 = 0

Remainders:

14 - E

4

10 - A

9

8

89A4E

Binary

Steps:

563790/2 = 281,895	35236/2 = 17618	2202/2 = 1101	137/2 =68	8/2 = 4
281895/2 = 140947	17618/2 = 8809	1101/2 = 550	68/2 = 34	4/2 = 2
140947/2 = 70473	8809/2 = 4404	550/2 = 275	34/2 = 17	2/2 = 1
70473/2 = 35236	4404/2 = 2202	275/2 = 137	17/2 = 8	1/2 = 0

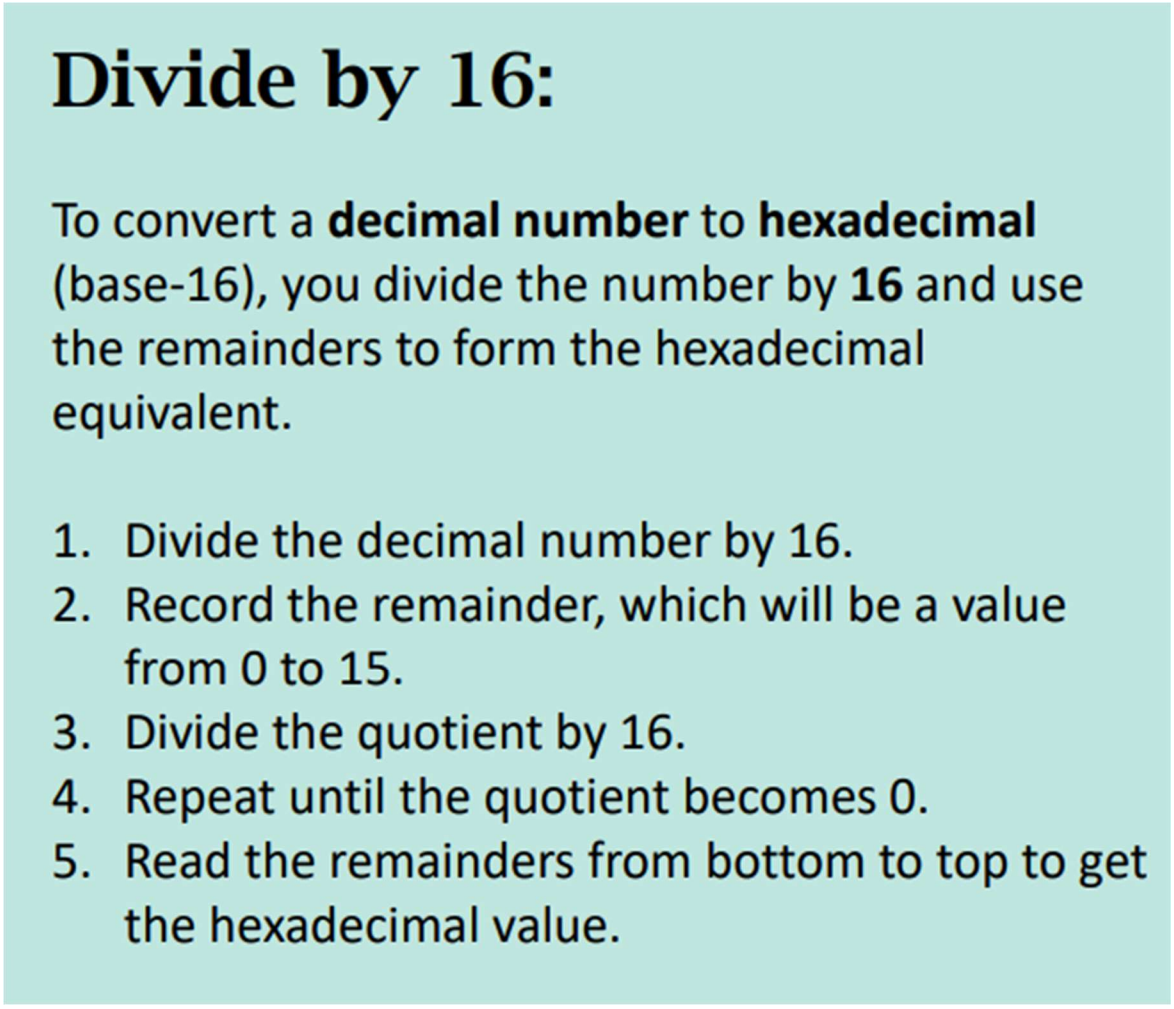
Remainders:

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

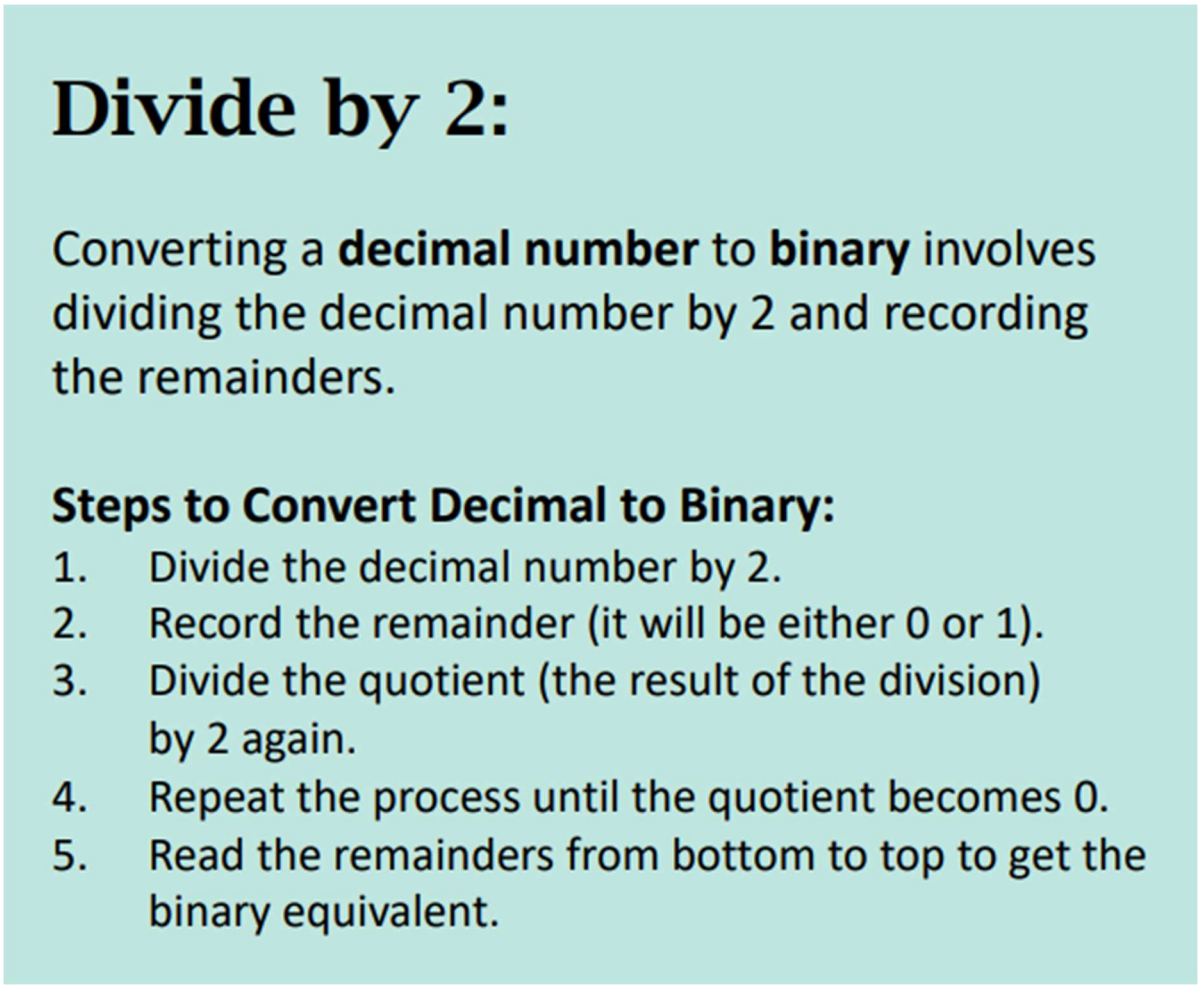
1000 1001 1010 0100 1110

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

For hexadecimal I followed this algorithm:



For binary I followed this algorithm:



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