

# Template Week 1 – Bits & Bytes

Student number: 563634

## Assignment 1.1: Bits & Bytes intro

### What are Bits & Bytes?

A bit is the smallest unit where data can be stored or transferred in a computer. A bit unit consists of only either 0 or 1.

A byte is a group of 8 bits. It's a larger unit where data can be stored or transferred in a computer.

### What is a nibble?

A nibble is a group of 4 bits. If we need smaller chunks of data, we use nibble.

### What relationship does a nibble have with a hexadecimal value?

a single nibble can represent exactly one hexadecimal digit.

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

Because displaying binary data as hexadecimal values makes the information easier to read, write or change.

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

A byte and a hexadecimal value are connected because a byte contains exactly two hexadecimal digits.

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

Well, an IPv4 subnet has four groups of 8 bits, so that's  $8 * 4 = 32$

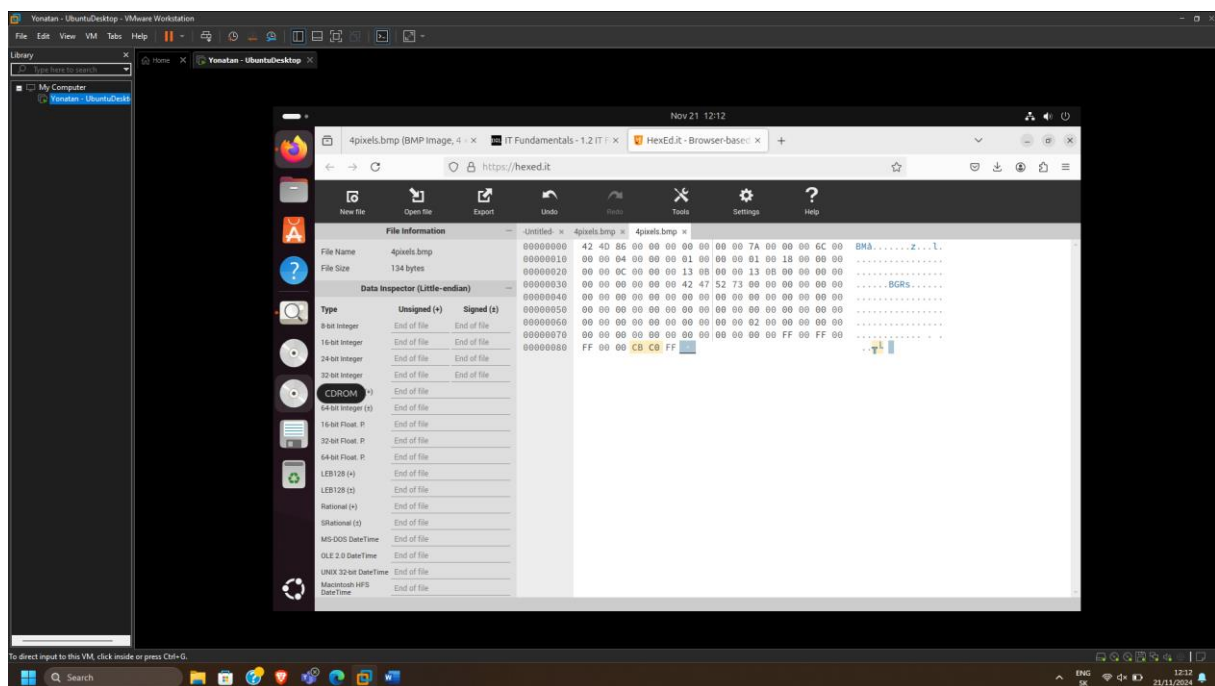
## Assignment 1.2: Your favourite colour

Hexadecimal colour code: #808080

### Assignment 1.3: Manipulating binary data

Colour	Colour code hexadecimal (RGB)	Big Endian	Little Endian
RED	#FF0000	#FF0000	0000FF#
GREEN	#00ff00	#00ff00	00ff00#
BLUE	#0000FF	#0000FF	FF0000#
WHITE	#FFFFFF	#FFFFFF	FFFFFF#
GRAY	#FFC0CB	#FFC0CB	#CBC0FF

**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.

$$563634 / 2 = 281817 == \text{remainder } 0$$

$$281817 / 2 = 140908 == \text{remainder } 1$$

$$140908 / 2 = 70454 == \text{remainder } 0$$

$$70454 / 2 = 35227 == \text{remainder } 0$$

$$35227 / 2 = 17613 == \text{remainder } 1$$

$$17613 / 2 = 8806 = \text{remainder } 1$$

$$8806 / 2 = 4403 = \text{remainder } 0$$

$$4403 / 2 = 2201 = \text{remainder } 1$$

$$2201 / 2 = 1100 = \text{remainder } 1$$

$$1100 / 2 = 550 = \text{remainder } 0$$

$$550 / 2 = 275 = \text{remainder } 0$$

$$275 / 2 = 137 = \text{remainder } 1$$

$$137 / 2 = 68 = \text{remainder } 1$$

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

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

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

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

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

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

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

**The binary answer is: 1000 1001 1001 1011 0010.**

Hexadecimal calculation:

$$563634 \div 16 = 35227 \text{ remainder } 2$$

$$35227 \div 16 = 2201 \text{ remainder } 11$$

$$2201 \div 16 = 137 \text{ remainder } 9$$

$$137 \div 16 = 8 \text{ remainder } 9$$

$$8 \div 16 = 0 \text{ remainder } 8$$

**The hexadecimal answer is : 899B2**

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