# Data Types

**Why do we need data types?**

- Data types are used so the appropriate facilities for processing and storing the data can be made available by the computer.

**Data Types**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data Type** | **Size (Bytes)** | **Notes** | **Example** |
| Character | 1 | Single ASCII character, 7 bits plus parity bit. | S |
| String | 1 per character | Several characters need to take into account maximum string length. | String |
| Boolean | 1 | Could be stored as a single bit but in most ASCII files will have to be 1 byte. | 1 |
| Integer | 1, 2, 4 or 8 | Languages may have many different types of int for example short or long. | -747 |
| Real | 4 or 8 | Number with decimal point. | -36.2 |
| Date | 4 |  |  |
| Time | 4 |  |  |
| Date and Time | 8 |  |  |
| Currency | 8 | May use real instead. |  |

Add 10% for metadata and overhead.

**Representing Text**

- All data stored by a computer is stored in binary.

- There are many ways to represent data but for data to be readable by all computer systems an agreed method representing characters and strings is important.

- One approach is ASCII which is where each character is represented by agreed binary patterns. Original had 128 characters but extended ASCII uses 256 separate characters.

- Unicode is an alternative that has 16 bits per character and thus can hold many more characters.

**Boolean Data**

- Data type that can only take two values TRUE or FALSE which are represented by 1 or 0.

- Only requires one bit but the values often are stored in one byte for convenience with a flag to see if an event has occurred.

**Revise how to represent numbers and practice**

**Images, Sound and Instructions**

- All data stored is done so in binary and all images, sound and instructions are represented by binary patterns.

**Images**

- Simple black and white graphics can be represented by a matrix of 1s and 0s representing black and white pixels.

- In reality images are for more complex and each pixel is represented by a larger number of bits.

- **Colour Depth:** the number of bits used for each pixel. The more bits the greater the number of colours that can be represented.

- **Resolution:** The number of pixels per inch.

- **Metadata:** The information about an image that allows the computer to interpret the stored binary accurately and reproduce the image. Must contain the width, height and colour depth.

**Sound**

- Sound is continuously changing (analogue data) but for a computer to store it the sound file must be stored in (digital) binary.

- The analogue sound data is sampled at set intervals and the values that are sampled