|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  | | --- | --- | --- | | **Different types of data** | |  | | --- | |  | | | |  |  |  | | --- | --- | --- | | |  |  | | --- | --- | | **#** | There are two main types of data that we are going to discuss here: **# 1. Analogue Data # 2. Digital Data** | | | | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | https://www.ictlounge.com/Images/one.gif | **Analogue Data** | | | | | | |  |  | | --- | --- | | **Definition:** | ***"Analogue data use values that change very smoothly*."** | | | | Smoothly changing hands of an analogue clock. | | **#** | A good example of this is an **analogue clock**. An analogue clock shows the time with a **smoothly moving seconds hand**. The change is continuous. | https://www.ictlounge.com/Images/red_arrow.gif | | **#** | **Sound** is also a good example of analogue data. Sound waves change in a very smooth way. | | | |  |  | | --- | --- | | This image shows you an example of a smoothly changing sound wave: | https://www.ictlounge.com/Images/sound_waves.gif | | | | https://www.ictlounge.com/Images/blue_divide.gif | | | | | **Analogue Devices** | | https://www.ictlounge.com/Images/analogue_devices.gif | | | **#** | All analogue devices use analogue data. Examples of analogue devices include:   * **Microphone** * **Headphones** * **Loud Speaker** * **Sensors (temperature, pressure etc)** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | https://www.ictlounge.com/Images/two.gif | **Digital Data** | | | | | | |  |  | | --- | --- | | **Definition:** | ***"Digital data jumps from one value to the next in a step by step sequence*."** | | | | Digital clocks 'jump' from one second to another. | | **#** | A good example of this is a **digital clock**. A digital clock **jumps from one second to another in clear steps**. | https://www.ictlounge.com/Images/red_arrow.gif | | **https://www.ictlounge.com/Images/blue_divide.gif** | | | | | **Digital Devices** | | https://www.ictlounge.com/Images/digital_devices.gif | | | **#** | All digital devices use digital data. Examples of digital devices include:   * **Computers/Laptops/IPads** * **Mobile Phone** * **MP3 Player** * **Digital Camera** | | **#**  **#** | The name **"Digital"** is given to all devices that **store and process data** in the form of **'digits'** (numbers).  These digits are known as **'Binary'**. | | https://www.ictlounge.com/Images/blue_divide.gif | | | | | **What is Binary?** | | | | | |  |  |  | | --- | --- | --- | | **#**  **#  #** | **All computer data** is really a **number** known as a **Binary Digit** (often shortened to just binary).  Binary is represented by the **numbers 1 and 0**.  Different combinations of these 1's and 0's are used to represent all the different kinds of data that can be stored and processed within a digital device (such as a computer).  **For example**:- The word **'Hello'** is stored as the binary combination of **0100100001100101011011000110110001101111** | https://www.ictlounge.com/Images/binary_example.gif | | | | | | |
| **https://www.ictlounge.com/Images/blue_divide.gif** |
| |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Analogue and Digital Conversion** | |  |  |  |  | | --- | --- | --- | --- | | |  |  | | --- | --- | | https://www.ictlounge.com/Images/key1_web.gif | **Key Words:** | | ADC, DAC, Conversion. | | | | |  |  |  | | --- | --- | --- | | |  |  | | --- | --- | | **#**  **#**  **#** | Analogue values can only be used by analogue devices.  Digital values can only be used by digital devices.  If we want to use **analogue values with a digital device** or **digital values with an analogue device** we need to use **data conversion**.  There are two types of data converters: **# 1. Analogue to Digital Converter (ADC) # 2. Digital to Analogue Converter (DAC)** | | | | | |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | https://www.ictlounge.com/Images/one.gif | **Analogue to Digital Converter (ADC)** | | | | | **#** | If we try to attach an analogue device (like a microphone) to a computer we will need to **convert the analogue data to digital** before the computer can use it. | |  |  |  | | --- | --- | --- | | |  |  | | --- | --- | | **NOTE!** In this example the **ADC** that converts the analogue values to digital would be the computer's **sound card**. | https://www.ictlounge.com/Images/sound_card_small.gif | | | | **#** | The microphone is used to pass the analogue sound waves through the **ADC** which will convert the **sound from analogue to digital**. | | **#** | The ADC then passes the converted digital data into the **computer** where the **sound can be stored and edited**.  The image below will help explain this process: | | https://www.ictlounge.com/Images/adc_example.gif | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | https://www.ictlounge.com/Images/two.gif | **Digital to Analogue Converter (DAC)** | | | | | **#** | If we want to listen to digital music (like mp3's) we would need to attach an analogue device such as loud speakers or headphones to our computer. | |  |  | | --- | --- | | |  | | --- | | **NOTE!** Computer sound cards can **perform both types of data conversion** (ADC and DAC). | | | | **#** | The computer will pass the digital sound values through a **DAC** (located on a sound card) which will **convert the digital data to analogue**. | | **#** | The DAC then passes the converted anologue data onto the analogue loud speaker which we would then **hear as sound waves**.  The image below will help explain this process: | | https://www.ictlounge.com/Images/dac_example.gif | | | | |
| **https://www.ictlounge.com/Images/blue_divide.gif** |
| |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | **Another example of Data Conversion** |  | | |  |  | | --- | --- | | **#**  **#** | Imagine we had a **greenhouse** and we wanted a way to **control the temperature inside automatically**. We could do this using a range of **analogue and digital devices** and **ADC's/DAC's** to convert all of the data.  This is how it would work: **#1.**Analogue thermometer is used to gather smoothly changing temperature data **#2.**Analogue data is converted to digital using a ADC and fed into a digital computer **#3.**Computer reads the digital data and decides if the temperature is too hot or too cold **#4.**Computer sends data to a DAC built into a heater with 1 of 2 instructions: **####**If the temperature is too hot, the heater will be turned off ###**#** If the temperature is too cold the heater will be turned on. | | **#** | Look at the image below for an example: | | https://www.ictlounge.com/Images/greenhouse_example.gif | | | | | |