**Computational thinking**

**Decomposition**

-Breaking down

**Pattern recognition**

-Identify similarities of the smaller parts->efficiency

**Abstraction**

-Focus on essential details

**Algorithmic Thinking**

-Step by step rules, automation

**Layers of Computing System**

-Information, binaries, electrical pulses (machine language, data representation of text, image, audio, video etc.). put them together->function e.g. frequency mimic sound

-Hardware, chips, CPU, circuits (connect in a way, logic gate->output and result)

-Programming, instruction, procedural. Branching, if this then that (if step 1 gives a, then step 2, if step 1 gives b, then step 3). Looping, repeating, until certain conditions are satisfied.

-Object oriented programming (group related data and actions->object). Same actions but unique info.

-Operating systems, super manager software, dedicated software that will do certain things (e.g. process management, network management…specialized tasks), including switching memory, background tasks behind the scenes

[platform, between different applications

Applications->operating system->firmware->hardware

-Applications, make use of the computer’s abilities to solve specific real-world problems

-Communications, send and receive info across different systems (clients, server…)A diagram of a computer system

Description automatically generated

STLC

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Primary memory

RAM Random access memory (small amount that you can store, on your drive/operating system), application currently active

secondary memory

Recall, bigger in size, smaller in speed

-switching as you use

Layers: Physical, datalink, network, transport, session, presentation, application

Meta Data-“data about data”

-Descriptions of the data itself

Data representation:

CHARACTERS

-Each character is mapped into a unique binary representation (character encoding standard)

--ASCII (American Standard Code for information Interchange) has 7 bits, and can represent 128 unique characters

--Unicode extended this to UTF-8, UTF-16, UTF-32. Thus, capable of representing 65 thousand or more characters, fonts etc.

--By establishing a standard for data representation (all languages), data can be used, transported through many different systems.

COLORS

4 x 4

Red, green, blue (the combination can set a certain intensity)

-1 byte, 1 channel (for RGB)

0-255

Each pixel->3 additive primary color->mixed->color

Each color represented by 2 hexadecimal values (typically use 8 bits each, 2^8 unique colors), into a single hexadecimal code (e.g.#FF5733), 3 bytes in total (16 million unique colors)

-Data compression

Bit: smallest unit of data in computing, represented by 0 or 1 (on or off)

Byte: 8 bits, standard unit of measurement of data, often represents a single character in text.

Hexadecimal: base 16, 0-9. A-F. This makes binary more readable for humans.

-Strings: the storage space for a string depends on its length (each character requires a set of binary code)

-Integers: fixed size determined by data type

e.g. integer 1234567 in 32-bit integer requires 4 bytes. String 1234567 will require at least 8 bytes (1 byte per character), thus potentially uses ore storage space.

-Data-raw material, the numbers that computers work with

-Information-words, numbers and pictures that we can understand

Input->process->output

1. Analog data
2. Digital data