MIKE, PHOEBE, GRACE

TYPES OF DATA REPRESENTATION

COMPUTATIONAL THINKING

Decomposition

Pattern Recognition

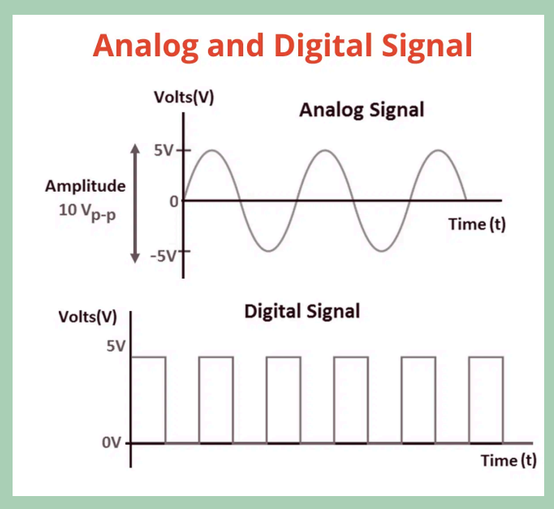
Abstraction

Algorithmic thinking

Real World EX.
Planning a CAS project

DATA AND INFORMATION

Analog data/ digital data



Real World EX.
Analog data - the voice of a person singing
digital data - binary code translated to electrical signals mimicking the person's voice

LAYERS OF COMPUTING SYSTEMS

Real World EX.
the way your computer think

i. Physical layers
ii. Data link
iii. Network
iv. Transport
v. Session
vi. Presentation
vii. Application

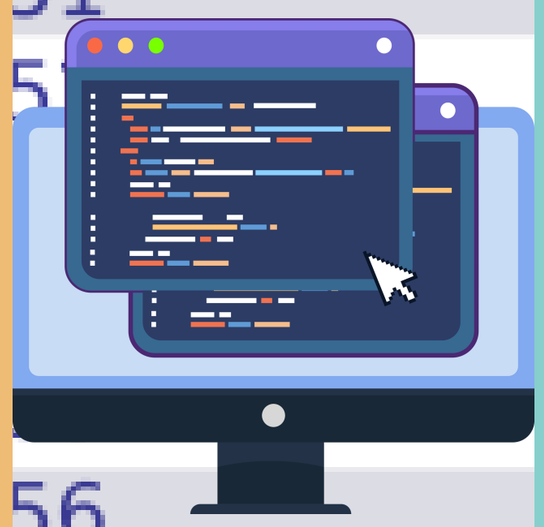
COLOR REPRESENTATION

RGB = Red Green Blue, each correspond 8 bit = maximum 256 value for each color, together form 24 bit hexadecimal code, can present up to 16 millions unique colors!

Real world EX. if you see #FFFFFF = FF= RGB(intensity) = 255 = White

BINARY, DECIMAL, HEXADECIMAL

Bit-smallest unit of data, representing a binary value of either 0 or 1
Byte-8 bits
Binary-base 2 numbering system (fundamental language)
Hexadecimal-base 16, values from 0 to 9, A to F
Real world Ex. decimal 10, binary 1010, hexadecimal A (can be converted)



TWO'S COMPLEMENT

-Negative notation of an integer
0 1 0 0 0 1 0 0
1 0 1 1 1 0 1 1 (inverse)
+1 (add 1)
1 0 1 1 1 1 0 0

2^5+2^4+2^3+2^2+2^1+2^0=60
-(2^7)+60=-68

TEXT ENCODING

ASCII-7 bits, 128 unique characters (primarily covering English languages)
Unicode-address more comprehensive encoding (multiple languages and symbols)

Real World Ex.-UTF-8, UTF-16, UTF-32: different forms->more bytes can represent more characters)
-A is 65 (dinary)

STRINGS AND INTEGERS

-Strings: storage space depends on its length. Each character may take different number of bytes. Longer strings require more storage.

-Integers: fixed size depends on its length

e.g. 200 in string (at least 1 byte per character)
200 in 8-bit integer requires 1 byte