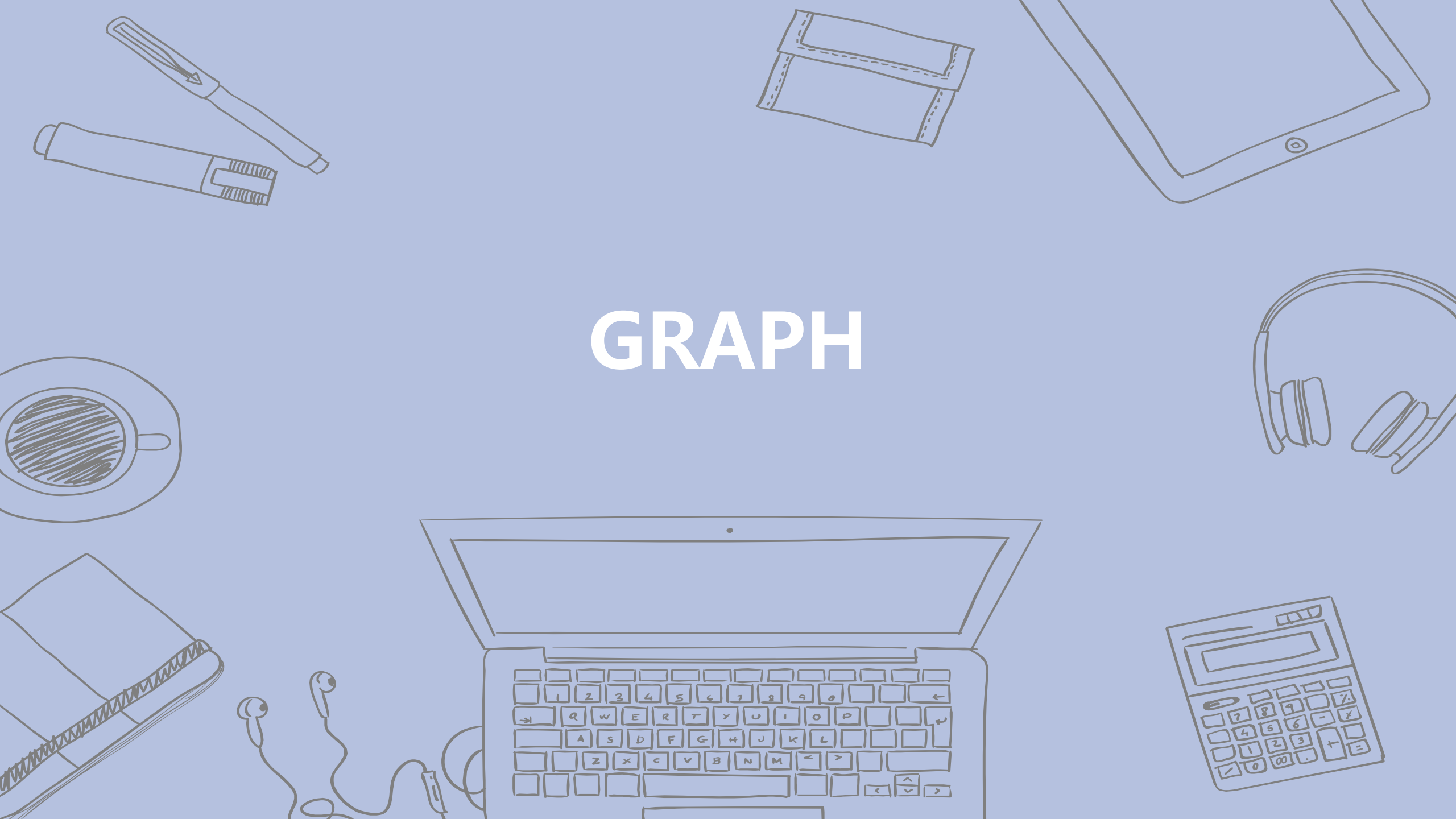
GRAPH



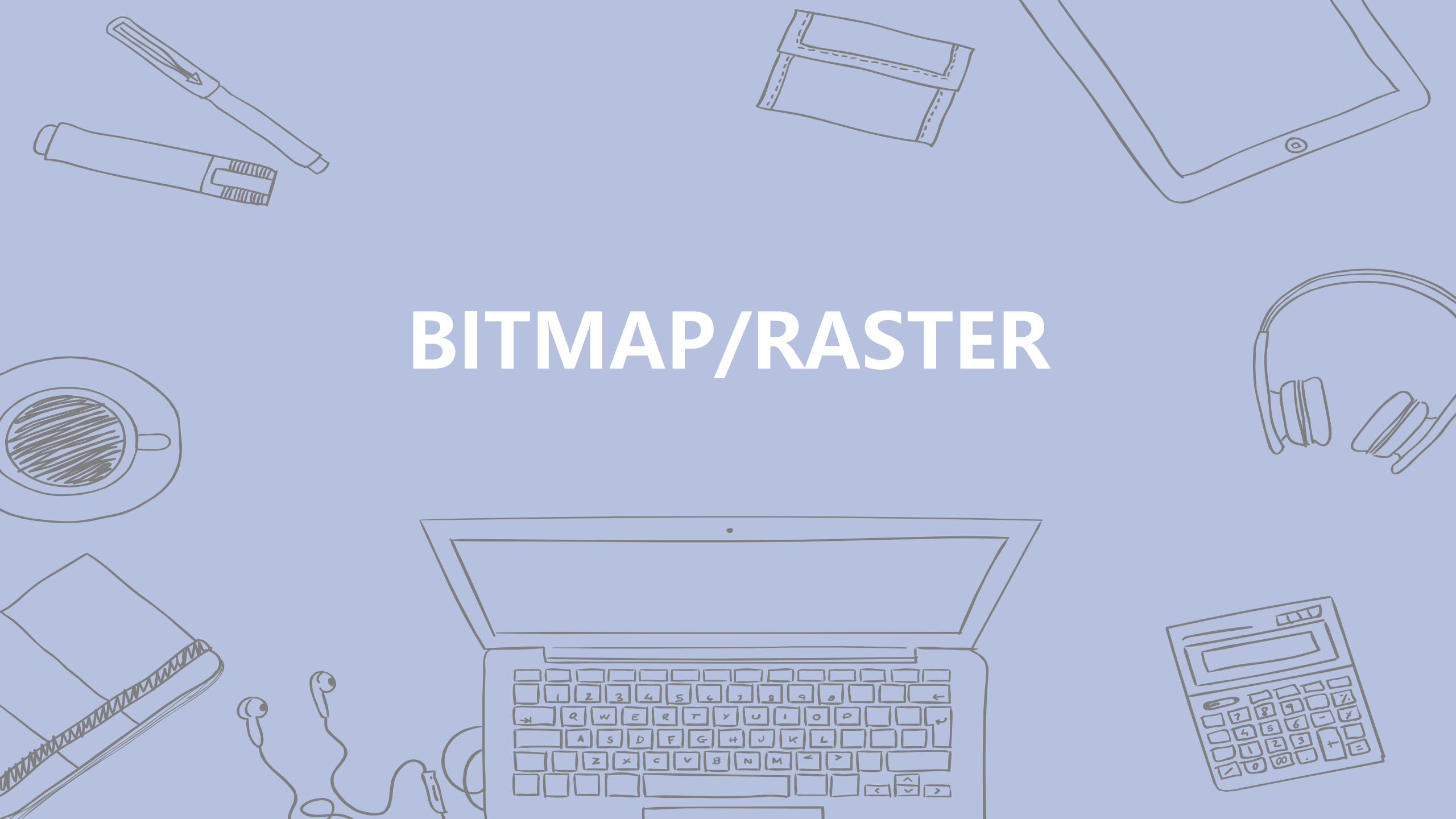
Graph

Representasi spasial dari suatu objek dalam pandangan 2D maupun 3D.

Gambar digital diperoleh dengan cara:

- Ditangkap dari kamera, lensa, scanner, dll
- Dibuat dari aplikasi-aplikasi pengolah grafis

BITMAP/RASTER



Bitmap/Raster

- A set grid of dots called pixels where each pixel is assigned a color.
- Picture Element (pixel)
- Resolution Dependent (exist at one size)
- For photographs, digital artwork and web graphics (such as banner ads, social media content and email graphics)

Bitmap/Raster

- Aplikasi grafis: Adobe Photoshop, Corel Photo-Paint, Paint Shop Pro, Gimp, Autodesk Sketchbook (now FREE!), Krita
- Format Gambar Digital
    1. Spatial Resolution (pixel x pixel)
    2. Color Depth (bit)

Color Depth

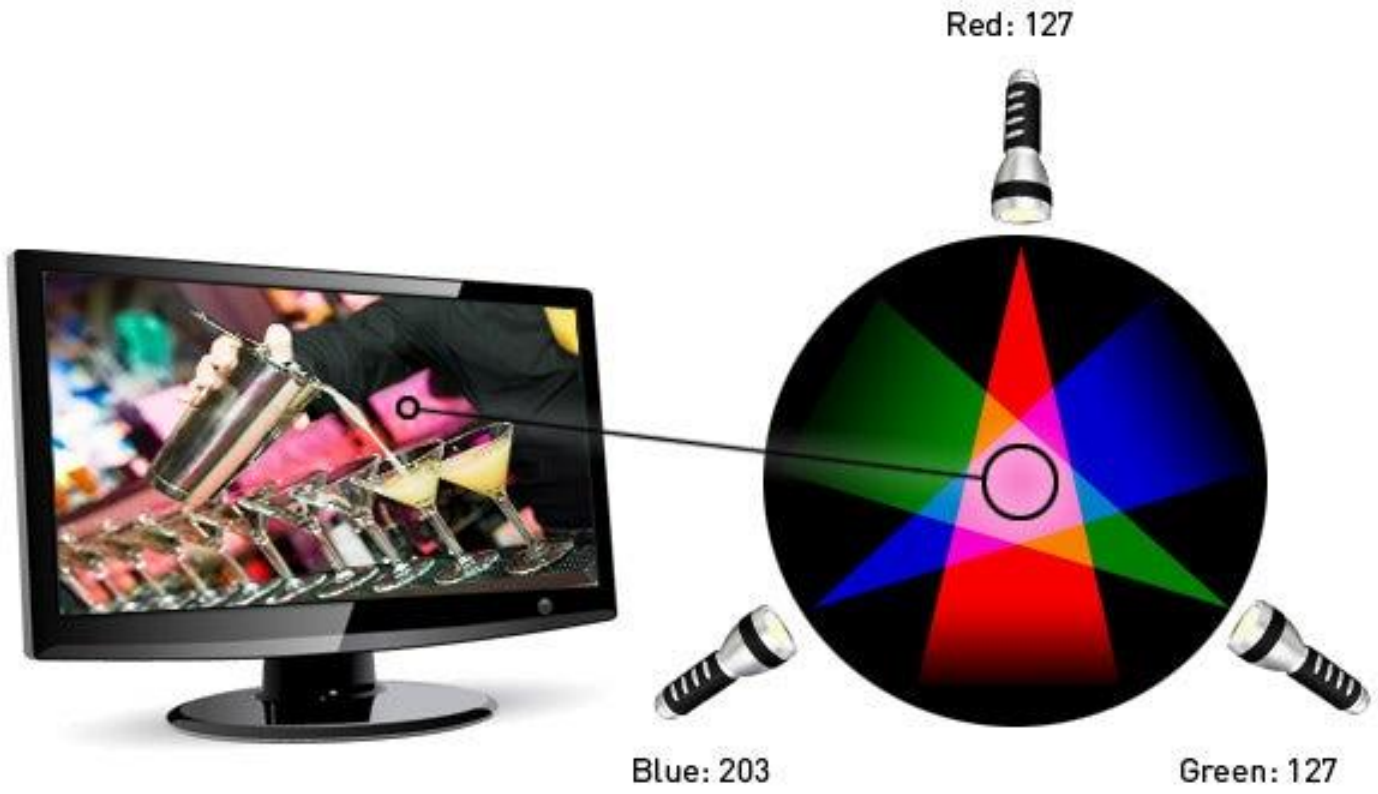
Nilai intensitas warna pada suatu pixel

- 1-bit : Monochrome (Black & White)
- 4-bit : 16-Color/palettized
- 8-bit : 256-Color/Grayscale
- 12-bit : 4096-Color
- 16-bit : High-Color (2^{16} → 65K)
- 24-bit : True-Color RGB (2^{24} → 16 Million)
- 32-bit : True-Color CMYK (2^{32} → 4 Billion)
- 48-bit : True-Color RGB with 16-bit/channel

RGB Color Model

1. A technology for mixing (R)ed, (G)reen and (B)lue light in order to produce any imaginable color.
2. Used by all computer screens and electronic devices.
3. The higher the values, the brighter the colors (just like turning on more lights gives you a brighter room)
4. Use PNG, GIF, or PSD file formats to deliver RGB artwork
5. Never use TIFF, EPS, PDF or BMP file formats to deliver RGB artwork

RGB Color Model



CMYK Color Model

1. A technology for mixing ink colors — (C)yan, (M)agenta, (Y)ellow and (K)ey (Black) – in order to produce thousands of different shades and hues on paper.
2. When the artwork is being printed.
3. The higher the values, the darker the colors (just like turning on more ink gives you a darker white paper)
4. Use PDF file formats to deliver CMYK artwork

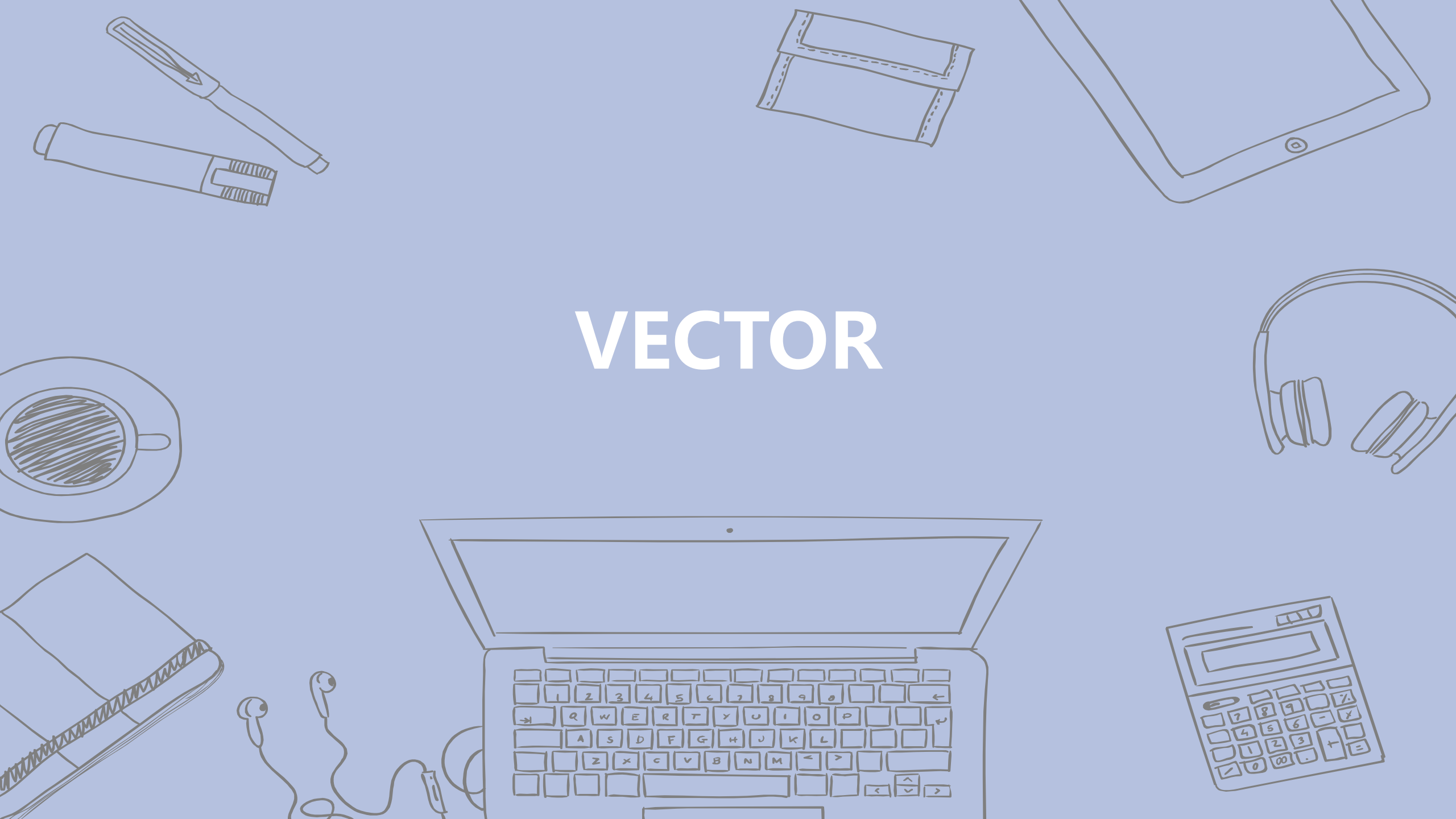
CMYK Color Model

RGB and CMYK

RGB version

CMYK result

VECTOR



Vector

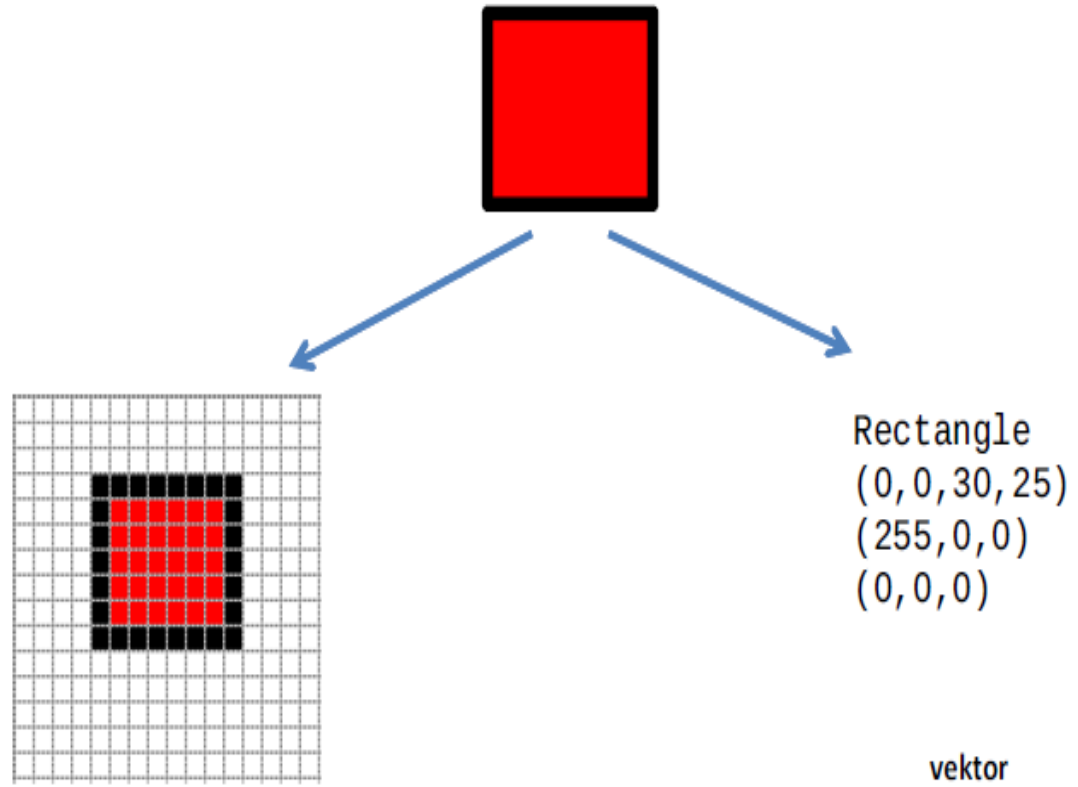
- Kumpulan titik, garis, & curva yang membentuk sebuah pola gambar (image)
- Direpresentasikan & disimpan dalam titik-titik sumbu pembentuk vektor beserta parameter-parameter yang menyertainya (direpresentasikan menggunakan rumusan matematika).
- Resolution Independent (Scalable)
- Illustration-used

Vector

Dihasilkan dari aplikasi-aplikasi grafis

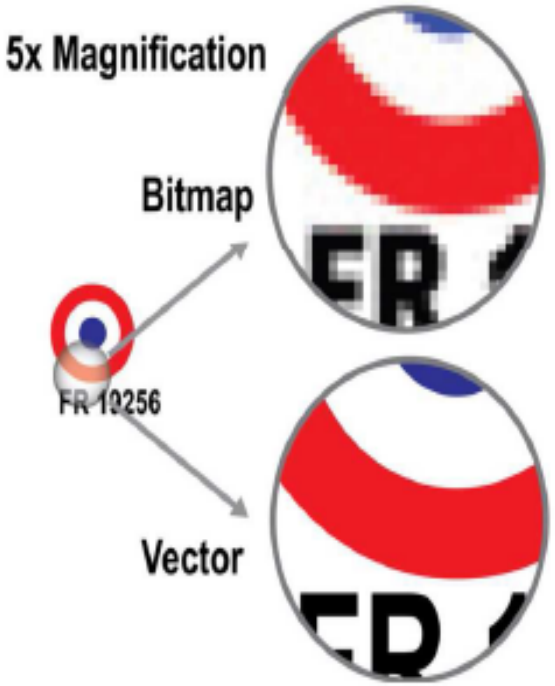
- 2D : Adobe Illustrator, Corel Draw, Adobe Flash, Inkscape
- 3D : Blender, 3D Max, AutoCAD

Bitmap vs Vector



Bitmap vs Vector

courtesy: www.logoants.com



courtesy: www.internetmodeler.com

Bitmap vs Vector

Bitmap	Vector
1 Menyimpan nilai intensitas setiap piksel pada masing-masing koordinatnya	1 Menyimpan informasi gambar dalam bentuk representasi masing-masing objek (koordinat)
2 Ukuran file : tergantung pada resolusi citra	2 Ukuran file : tergantung pada banyaknya objek dan informasinya pada citra
3 Elemen-elemen citra tidak dapat dipindah-pindahkan dan citra akan terdistorsi saat dilakukan transformasi.	3 Citra tidak mengalami distorsi ketika dilakukan transformasi.

Konversi Gambar

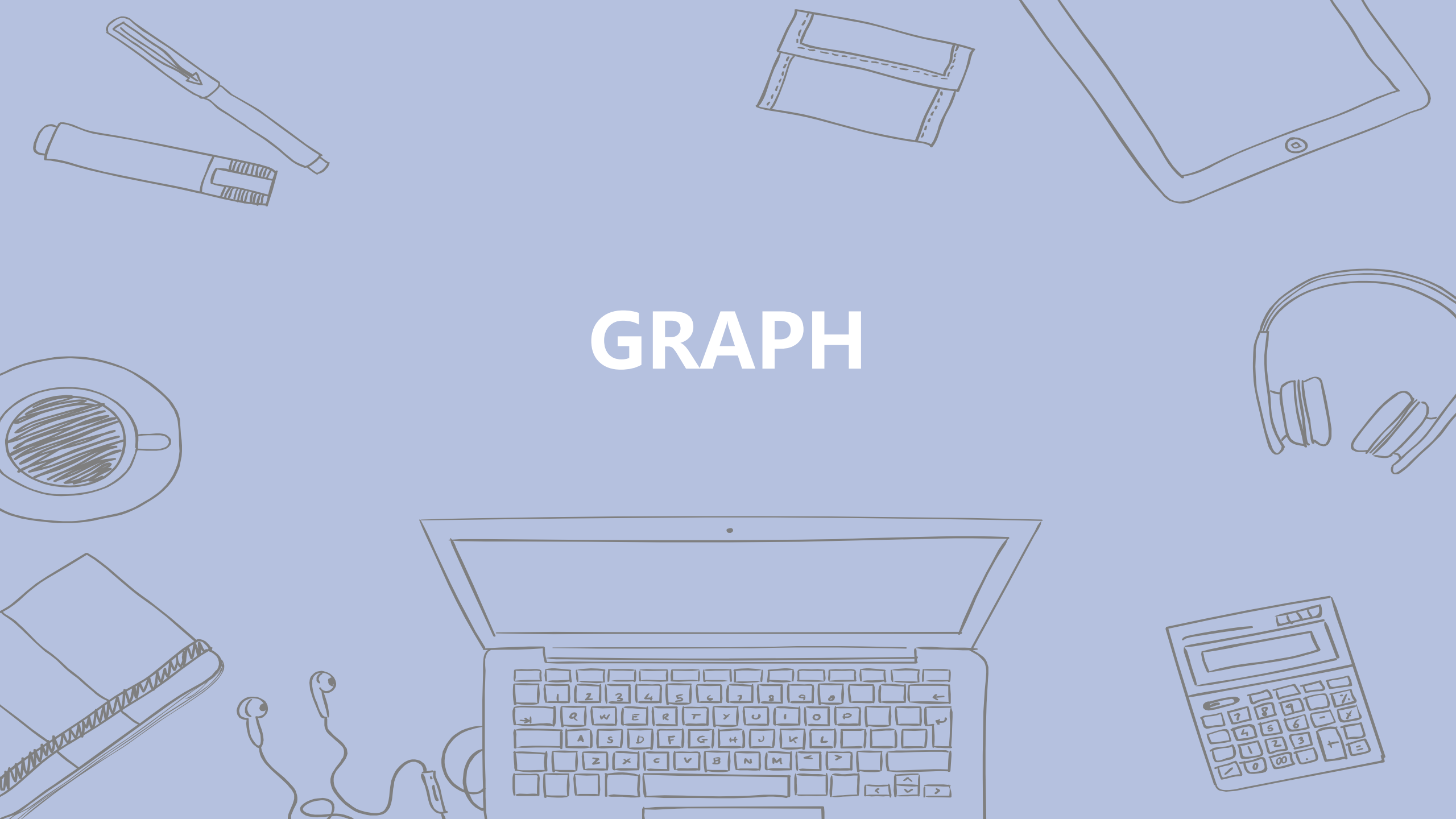
Vector → Bitmap

- Render / Rasterizing
- Mudah

Bitmap → Vector

- Vectoring / Tracing
- Sulit
- Manual
- Automatic (Software)

GRAPH



Graphic System

- There are six major elements in our system:

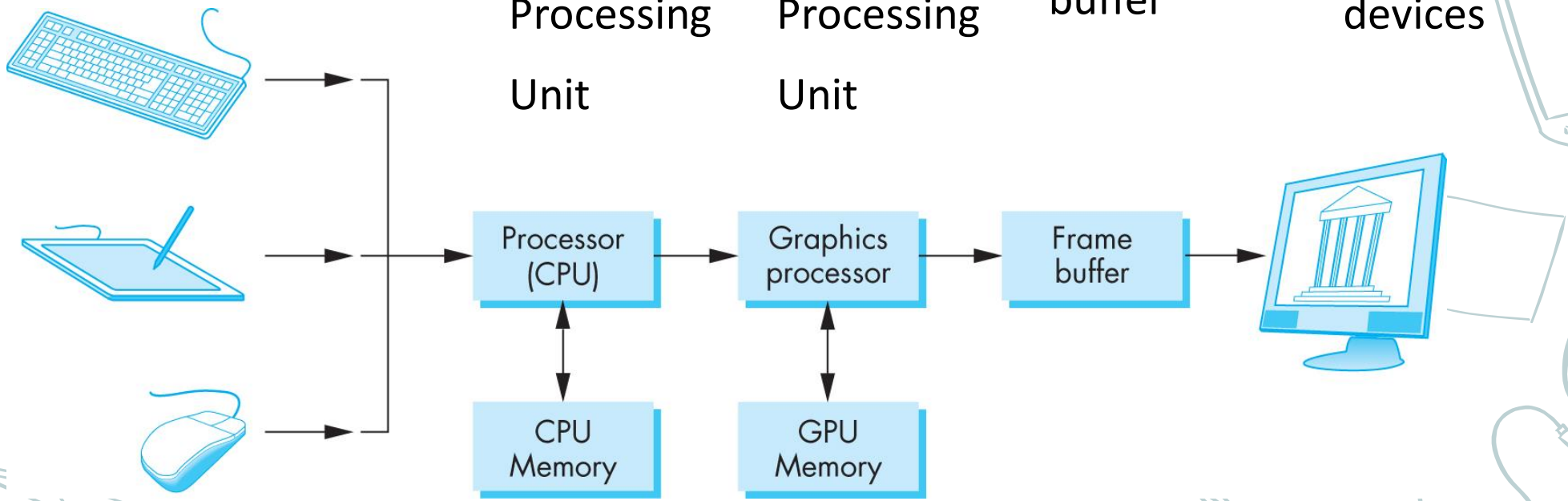
1. Input devices

2. Central Processing Unit

3. Graphics Processing Unit

5. Frame buffer

6. Output devices



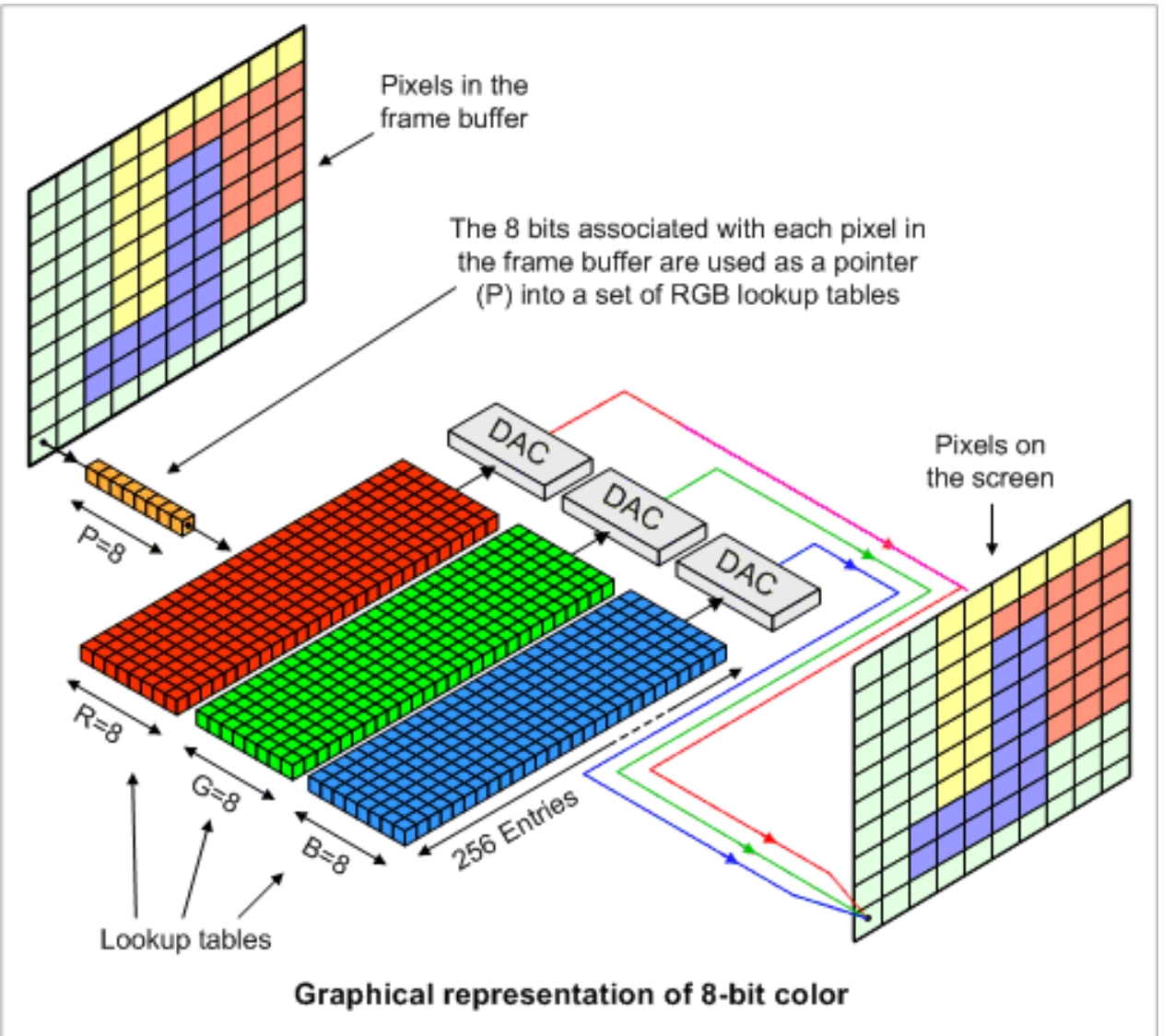
4. Memory

GPU

- GPU = Graphical Processing Unit
  - Sering disebut juga Visual Processing Unit (VPU)

- A specialized electronic circuit designed to rapidly **manipulate** and **alter memory** to accelerate the **creation of images** in a **frame buffer** intended for output to a display device

Frame Buffer

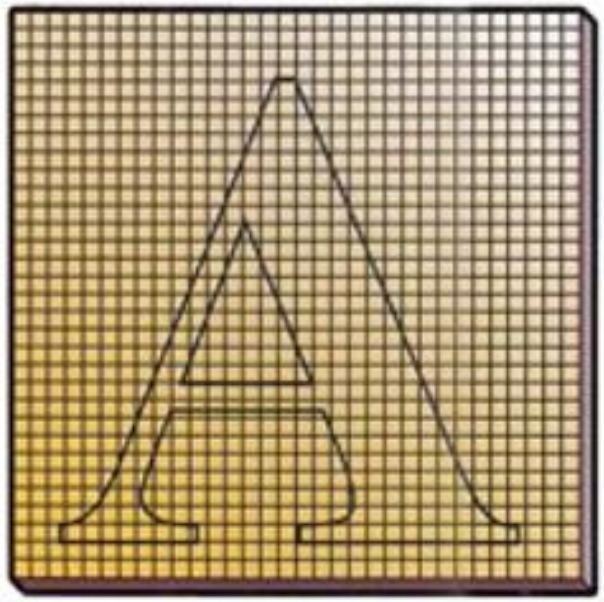


Graphical representation of 8-bit color

- A portion of RAM
- Containing a bitmap that drives a video display
- It is a memory buffer containing a complete frame of data
- This circuitry converts an in-memory bitmap into a video signal that can be displayed on a computer monitor.

Rasterisasi

Task of taking an image described in a vector graphics format (shapes) and converting it into a raster image (pixels or dots) for output on a video display or printer, or for storage in a bitmap file format.



0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
0	0	0	0	0	1	0	1	1	1	0	0	0	0	0
0	0	0	0	0	1	0	1	1	1	0	0	0	0	0
0	0	0	0	1	0	0	1	1	1	0	0	0	0	0
0	0	0	0	1	0	0	0	1	1	1	0	0	0	0
0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
0	0	0	1	0	0	0	0	0	1	1	1	0	0	0
0	0	1	0	0	0	0	0	0	1	1	1	0	0	0
0	1	1	1	0	0	0	0	1	1	1	1	1	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

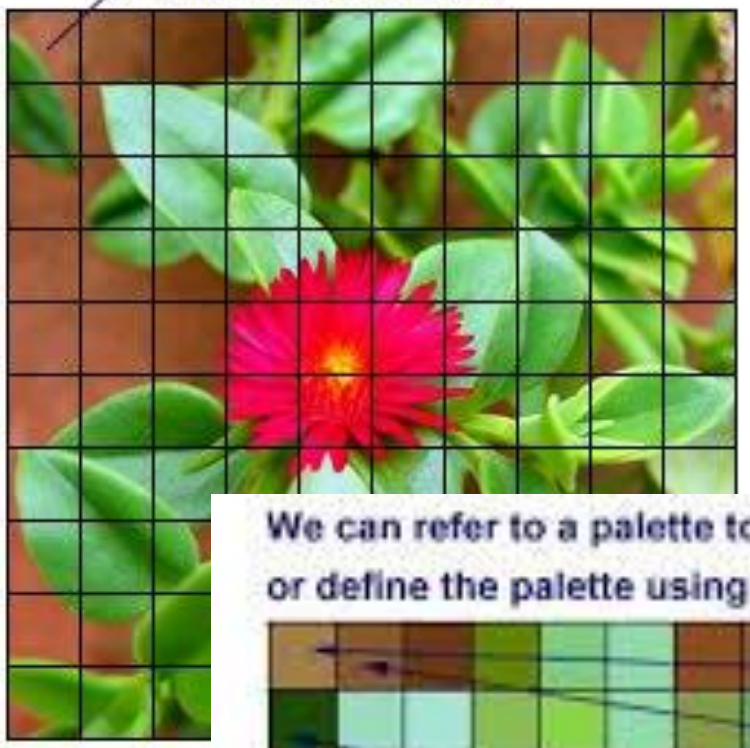
DIGITALISASI GAMBAR

DIGITIZATION

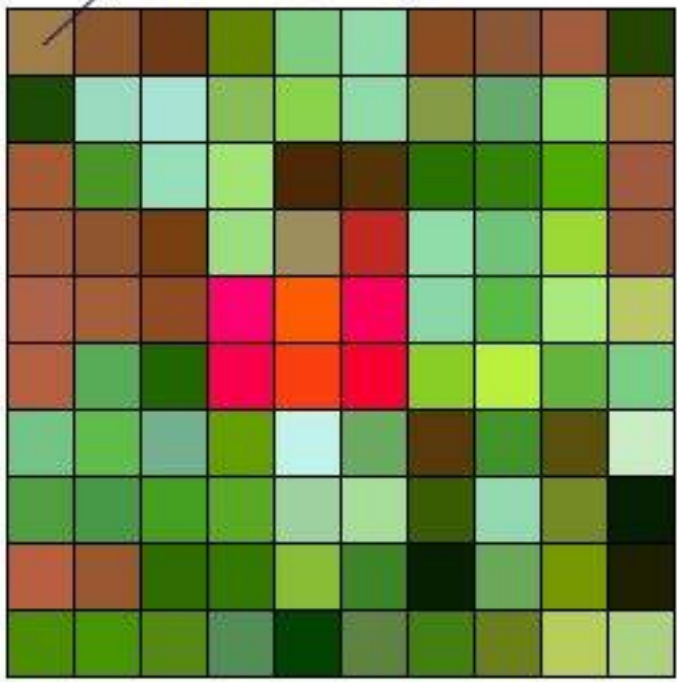
- Process of converting analog data to digital format
- Digitization begins with sampling
- Digitized by sampling their color at many different points
- The re-created image is grid of picture elements or pixel, each having a particular color
- If the grid is fine enough, the pixels blend together producing the appearance of continuous areas of color

DIGITIZATIO

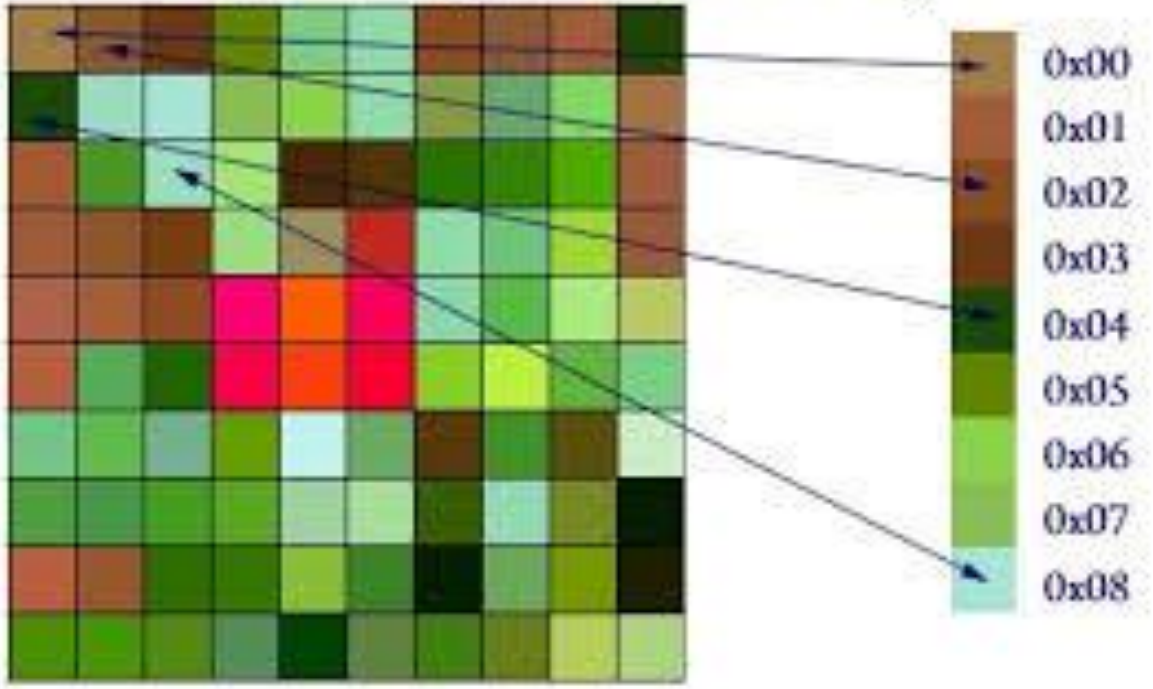
The picture is overlaid with a 10x10 grid



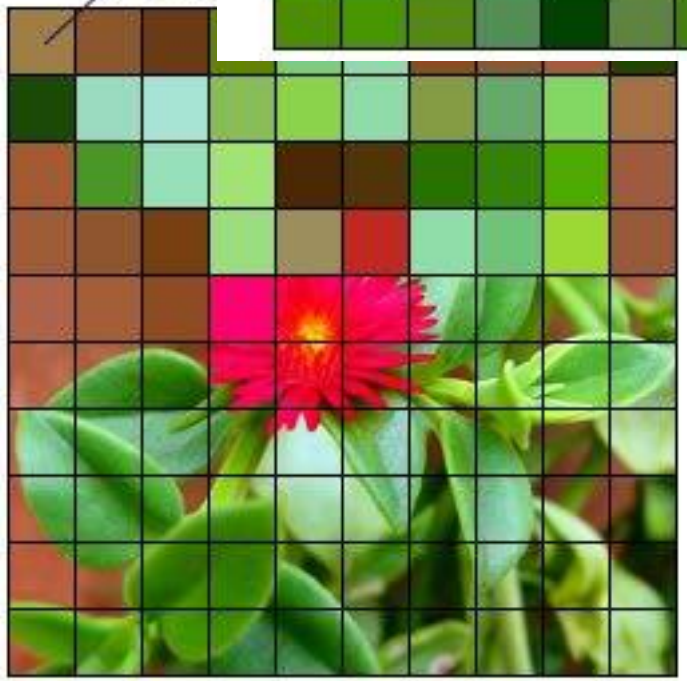
Until we have sampled the whole image



We can refer to a palette to define the colours, or define the palette using the colours in the image.



Eac
for a

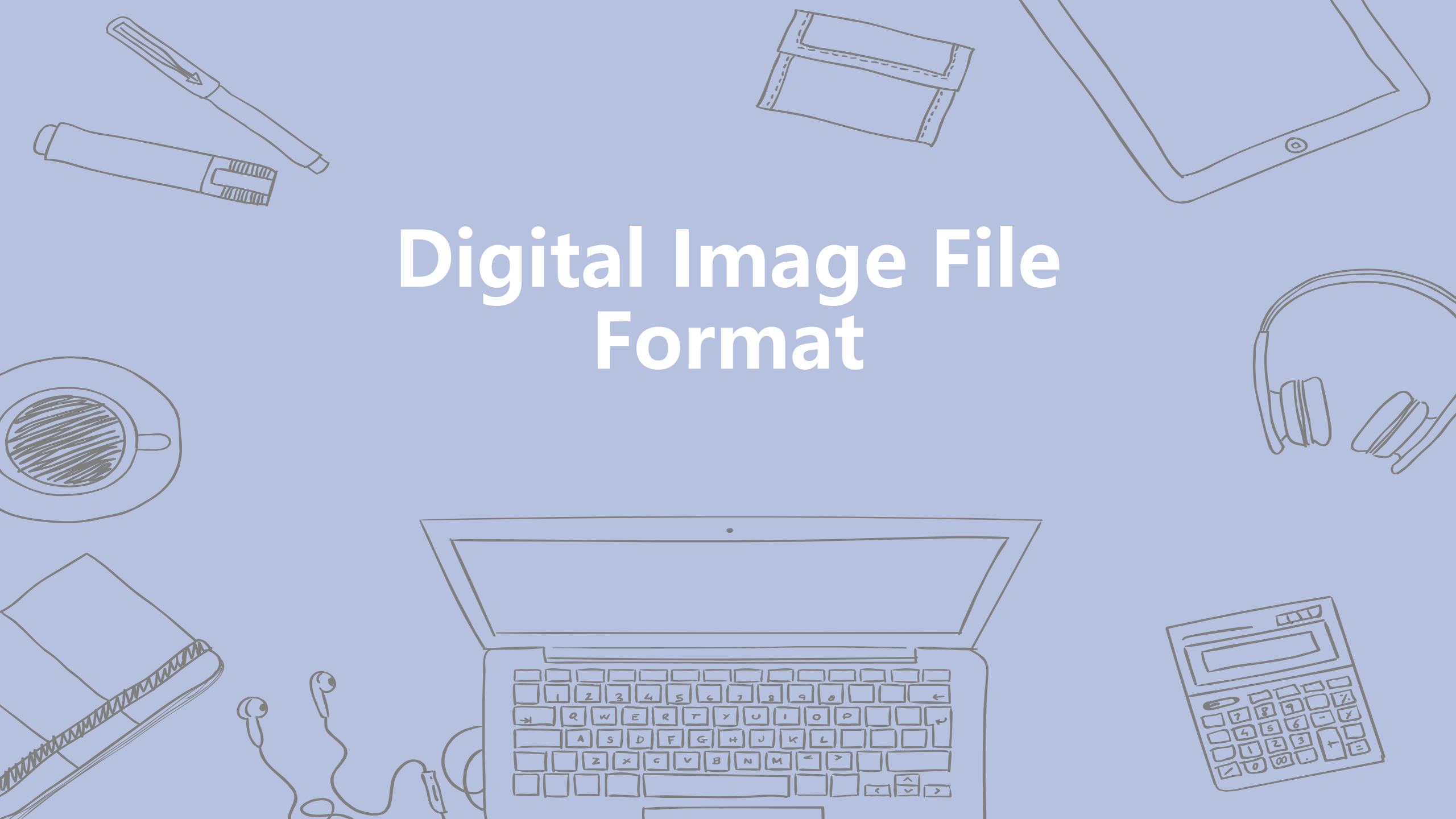


DIGITIZATION

- Contoh : suatu citra berukuran 512 x 512 pixel dengan intensitas beragam pada tiap pixelnya, direpresentasikan secara numerik dengan matriks terdiri dari 512 baris dan 512 kolom.

$$\begin{bmatrix} 0 & 134 & 145 & \dots & \dots & 231 \\ 0 & 167 & 201 & \dots & \dots & 197 \\ 220 & 187 & 189 & \dots & \dots & 120 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 221 & 219 & 210 & \dots & \dots & 156 \end{bmatrix}$$

Digital Image File Format



Digital Image File Format

- Standardized means of organizing and storing digital images.
- Each is optimized for a specific use
- Using the right type for the right job means your design will come out picture perfect
- Data store in: uncompressed, compressed, or vector formats

Digital Image File Format

Perbedaannya terletak pada:

- Teknik Kompresi
    1. Lossless Compression : Tanpa menghilangkan informasi (kualitas (hampir) tidak berubah)
    2. Lossy Compression : Menghilangkan beberapa informasi (kualitas turun)
- Color Depth

Digital Image File Format

Using the wrong (or suboptimal) file format could result in:

- Low image/video/audio quality
- Unnecessarily large file sizes
- Slow delivery of large files
- Inaccessibility of data within the file

Tugas:

Bitmap → Vector

(Tracing)

Install Inkscape (free & open source, yaaay!!!)

Cari gambar kartun bebas

Pelajari fitur Trace Bitmap pada Inkscape

Lalu trace gambar kartun yg sudah kalian pilih

Setelah menjadi vector, ubah-ubahlah warnanya

(Misal gambar Doraemon biru menjadi hijau (shiny Dora))

Referensi

- Savage, T. M., & Vogel, K. E. (2013). *An introduction to digital multimedia*. Jones & Bartlett Publishers.