Adding images

Web development I: Front-end engineering

Supported image formats

Format type	MIME type	File extension	Comments
JPEG	image/jpeg	.jpg, .jpeg	Photography
PNG	image/png	.png	Photography, allows transparency
GIF	image/gif	.gif	8 bit (256 colors), animations, transparency
SVG	image/svg+xml	.svg	Vector graphics, resolution-independent
WebP	image/webp	.webp	Both for photos and animations
AVIF	image/avif	.avif	Photos and animations, not widely supported

The <img> element

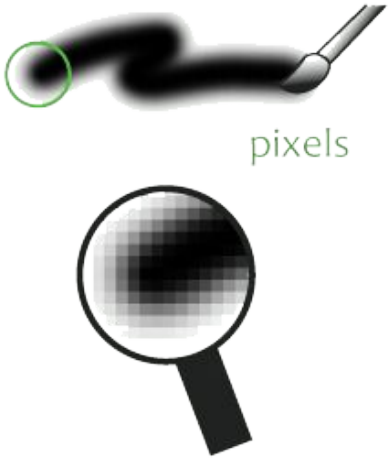
Inline by default

Not affected by CORS policy

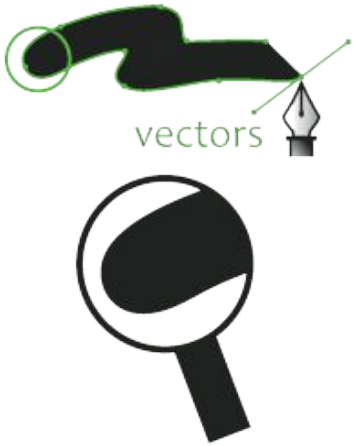
Attributes: `src` (required), `alt` (critical for **accessibility**), `width`, `height`, and more: https://developer.mozilla.org/en-US/docs/Web/HTML/Element/img

Raster *vs* Vector

Raster graphics are stored as a matrix of pixels



Vector graphics are stored as mathematical expressions

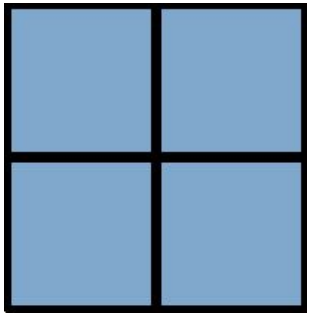


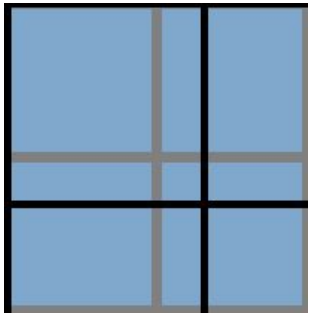
Pixel madness

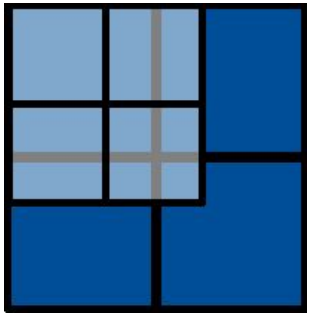
Hardware pixels are indivisible

Reference pixels are device-independent

Px density: “a pixel is a pixel is a pixel” or not?

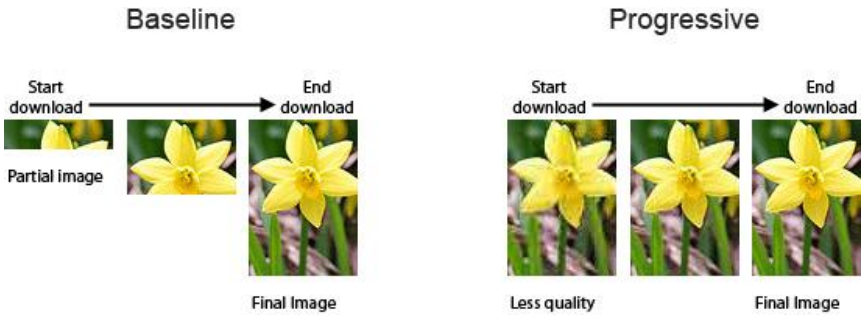






Interlacing

Interlaced graphics load in multiple passes (progressive download)



Compression

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Lossless compression

Is reversible

Preserves original quality

Larger file size

Lossy compression

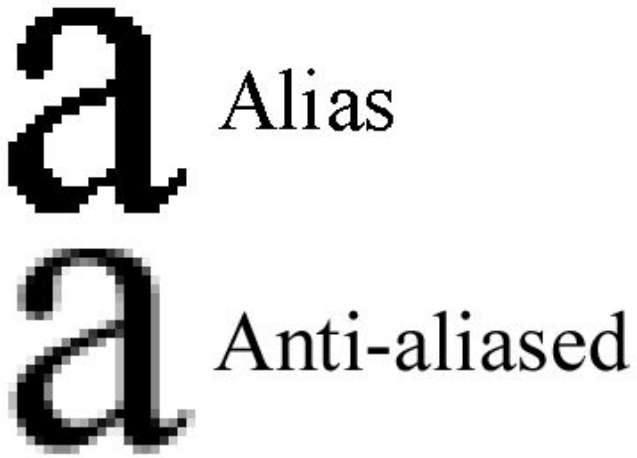
Irreversible

Eliminates redundancies but creates artifacts

Smaller file size

Anti-aliasing

Anti-aliasing



Indexed color palette

Dithering

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Reducing the color range

Original full-color photograph

Dithered to 256 colors

Transparency

Alpha channel *vs* indexed color

Image optimization

General tips:

- Limit dimensions
- Reuse and recycle
- Design for compression
- Use web graphics tools

https://www.smashingmagazine.com/2021/04/image-optimization-pre-release/

Optimizing GIFs

Limit the palette (number of colors)

Reduce dithering

Use flat colors, no gradients

Apply a “lossy” filter

Optimizing JPGs

Be aggressive with compression, but not too much

Soften the image: Blur/Smoothing

Try weighted (selective) optimization

Optimizing PNGs

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Limit the number of colors

Reduce dithering

Use flat colors

Avoid details

Further tips

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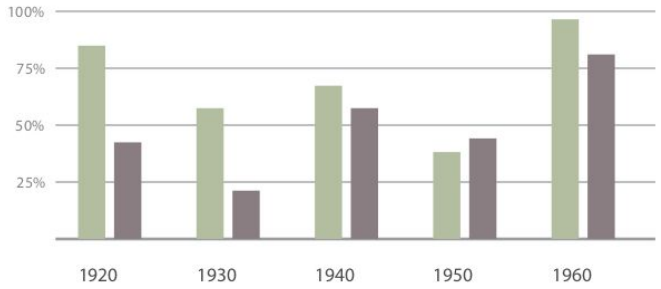
Eagerly vs **lazy** loading

Async decoding

CSS placeholders

Scalable Vector Graphics

The Noun Project



"ben", Open Clip Art

Ozer Kavak, Open Clip Art

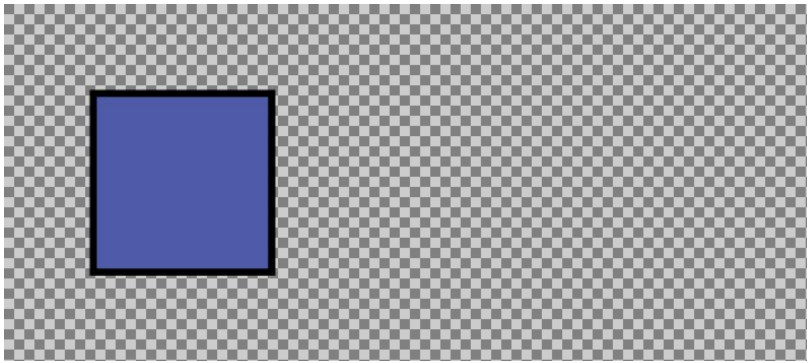
Ghostscript tiger

Scalable Vector Graphics

```
<?xml version="1.0" encoding="utf-8"?>
<svg version="1.1" width="450px" height="200px"
xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <rect x="50" y="50" width="100" height="100"
fill="#4F5AA8" stroke="#000000" stroke-width="4" />

</svg>
```



Scalable Vector Graphics

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<?xml version="1.0" encoding="utf-8"?>
<svg version="1.1" width="450px" height="200px"
xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <rect x="50" y="50" width="100" height="100"
fill="#4F5AA8" stroke="#000000" stroke-width="4">
    <animate attributeName="width"
values="0%;50%;0%" dur="2s"
repeatCount="indefinite" />
  </rect>

</svg>
```

Scalable Vector Graphics

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```
<?xml version="1.0" encoding="utf-8"?>

<svg version="1.1" width="450px" height="200px"
xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <defs>

    <filter id="my-blur" x="0" y="0" width="200%" height="200%">

      <feOffset result="offOut" in="SourceGraphic" dx="20" dy="20" />

      <feGaussianBlur result="blurOut" in="offOut" stdDeviation="10" />

      <feBlend in="SourceGraphic" in2="blurOut" mode="normal" />

    </filter>

  </defs>

  <rect x="50" y="50" width="100" height="100" fill="#4F5AA8"
stroke="#000000" stroke-width="4" filter="url(#my-blur)" />

</svg>
```