



Intro to Graphics



Topics

1. Raster vs vector graphics
2. File formats
3. Purpose of use
4. Decreasing file size

Vector graphics

- Object-oriented graphics or drawings
- Consist of a series of mathematically defined points that are joined together by a line
- Object:
 - independent unit
 - characterised by e.g. colour and shape.
 - independent of other objects



What is a Bitmap Graphic

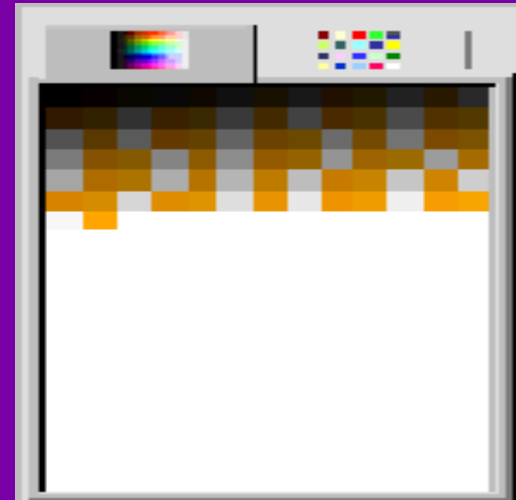
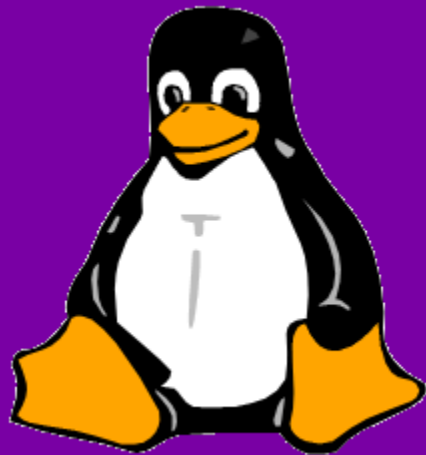
- Also called a raster image
- Created by forming a grid
- Fill in squares of the grid with a color
 - Squares are called pixels
 - Programs like Fireworks allow you to modify the pixels
- Enlarging a bitmap will often produce ragged edges and poor quality

Bitmap Image Formats

- GIF
- JPEG
- PNG

GIF Format

- Graphics Interchange Format
- Allows for small file sizes to download quickly
- Allows for compression without loss of quality



GIF Qualities

- Limited to 256 Colors
- Best with limited colors
 - No shading
 - Solid colors
- Can make portions of an image transparent
- Can be animated



GIF at a Glance

- **Stands for**
 - Graphics Interchange Format
- **Pronounced**
 - Jiff (like the peanut butter)
- **File extension**
 - .gif
- **Inventors**
 - Bob Berry and team at Compuserve
- **Created**
 - 1987, updated in 1989
- **Standards**
 - File spec free and open release by Compuserve
- **Colors**
 - 256
- **Transparency**
 - One color may optionally be 100% transparent
- **Animated GIFs**
 - Don't. Just don't. The *only* legitimate use we know of for an animated GIF is as a movie where each frame has to be perfect. Oh, all right, you can use *one* on your site. If it's clever. Or if it's an animated GIF of a train. We like trains.
- **Compression**
 - Lossless - LZW (Abraham Lempel, Jacob Ziv, Terry Welch)
- **How it works**
 - Uses a palette, and instead of putting 24-bit values in its map for the image, it puts palette values. So it starts off with 3:1 compression. The LZW compression on top of that can raise it to 5:1 or even 10:1.

JPEG Format

- Joint Photographic Experts Group
- Developed to reduce file size of photos but still maintain quality
- Best for the following types of images
 - Smooth transitions, shadows or complex colors possible
 - Excellent format for photographs
- Can't do animations
- Can't do transparencies

JPEG at a Glance

- **Stands for**
 - Joint Photographic Experts Group
- **Pronounced**
 - JAY-peg
- **File extension**
 - .jpe, .jpg, .jpeg
- **Inventors**
 - Eric Hamilton, Joint Photographic Experts Group, Tom Lane, Independent JPEG Group
- **Created**
 - 1990 (JPEG), 1991 (JFIF)
- **Colors**
 - 16,777,215
- **Transparency**
 - None
- **Compression**
 - Lossy - JPEG compression (lossy discrete cosine transform followed by Huffman coding). Other file formats (e.g., compressed TIFF, some Adobe PDF documents) also use JPEG compression. Virtually every file you see called "foo.jpg" will actually be a JPEG File Interchange Format (JFIF) file. Impress your friends with this useless information!
- **How it works**
 - JPEG compression is designed to reduce things that don't make a noticeable difference in the picture. It's based on studies of human perception, and it throws away data you won't notice.

Sample JPEG Graphic



JPEG Format is Great for Photos

PNG Format

- Portable Network Graphics
 - Default format for Fireworks files
- Developed as an alternative to older GIF graphic formats
 - Images even smaller than GIFS
 - Can display more colors
 - Allows more than one color to be transparent
 - Combines attributes of Bitmap and Vector images
 - Has not yet gained wide acceptance from Web developers

PNG at a glance

■ Stands for

- Portable Network Graphics (or "PNG's Not GIF")

■ Pronounced

- Ping

■ File extension

- .png

■ Inventors

- Tom Boutell, Tom Lane, Greg Roelofs, others (see [RFC 2083](#))

■ Created

- Version 1.0, 1996; Version 1.1, 1998

■ Colors

- 2-256 (palette mode) or 16,777,215

■ Transparency

- Single color 100% transparent (like GIF), variable transparency (256 levels of transparency per pixel)

■ Compression

- Lossless - "deflation"

■ How it works

- "For each image line, a filter method is chosen which predicts the colour of each pixel based on the colours of previous pixels and subtracts the predicted colour of the pixel from the actual color. An image line filtered in this way is often more compressible than the raw image line would be. On most images, PNG can achieve greater compression than GIF, but some implementations make poor choices of filter methods and therefore produce unnecessarily large PNG files."

Sample .PNG Image



Bitmap vs. Vector Images

Bitmap	Vector
Larger File Size	Smaller File Size
Good for Real World Images	No Real world images
Browsers recognize GIF's and JPEG without the need for a Plug-in	Plug-in's generally needed to view Vector based images on the web
Easier to learn to create	Harder to learn to create
Don't scale very well	Scale very well with little distortion

Considerations for Format Selection

- Decide how you will use the image
- Use will impact how to minimize the file size
- Decide the height/width of the image before you put it on the page
 - Resizing the image on the page is not good

Example of Raster Graphics

- Also called bitmaps
- The image consists of many pixels.
- Each pixel has its own colour.
- Pixels are arranged that a pattern is formed.



Original image



Same image 4x its original size



Original image is enlarged 6x.

Resolution

- “Frequency” at which samples are taken from the original image during the process of scanning.
- Expressed as dpi (dots per inch) or ppi (pixels per inch)
- Capture image at appropriate resolution.

What is Your Purpose of Use

- Print
- On-screen
- Long-term preservation

Decreasing file size

- Cropping: Selecting part of the image
- Resizing : Decreasing dimensions of the image
- File compression

Cropping

Select the part of the image you want to display

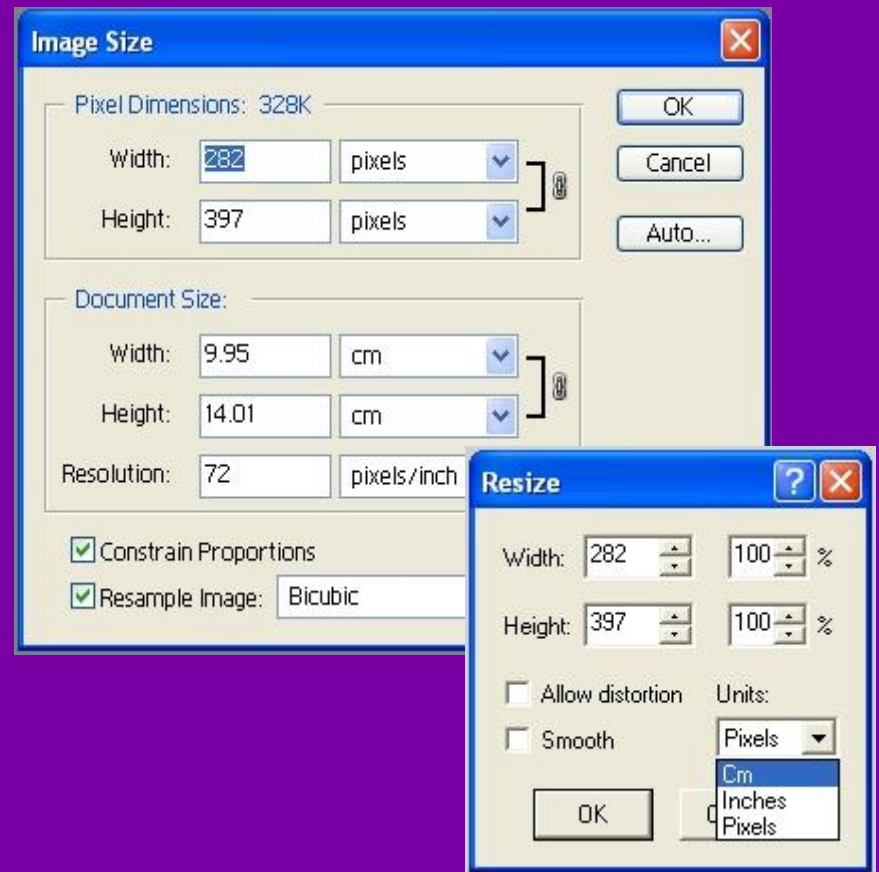


Resizing

Don't drag image



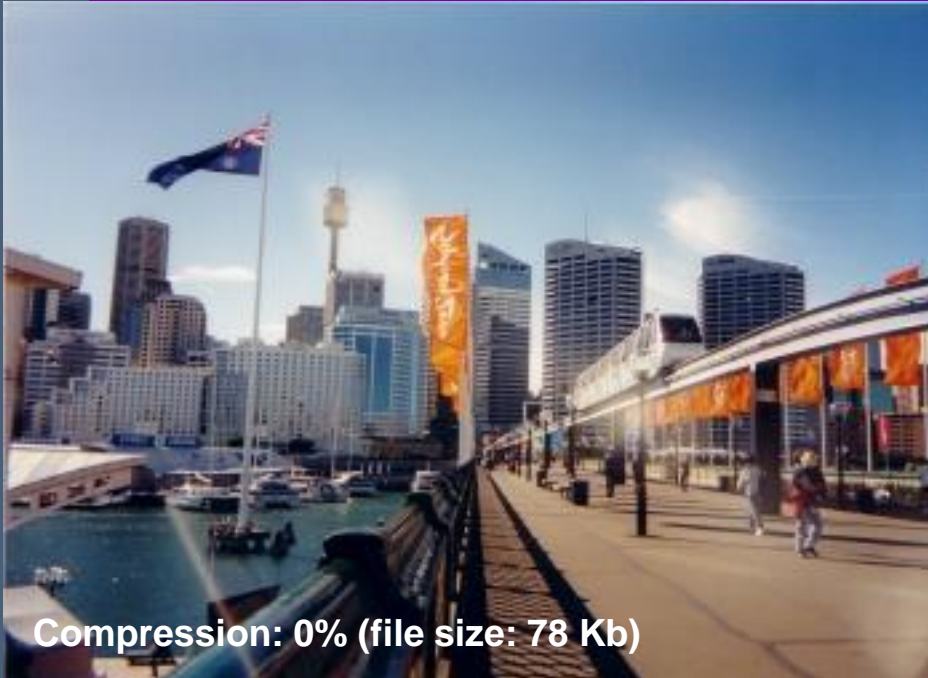
Use software's resize option



Compression

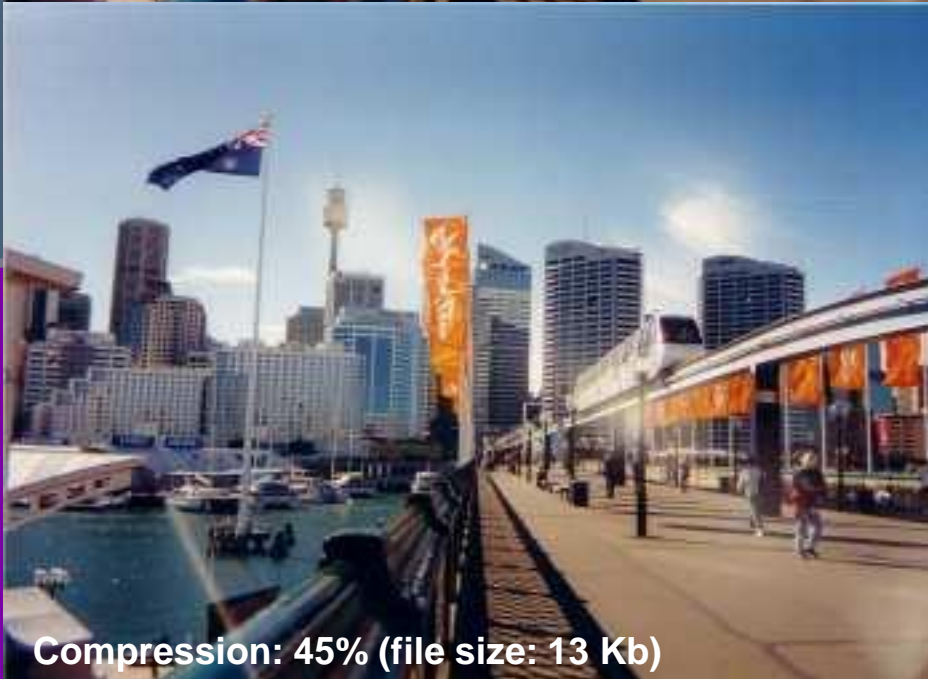
- Reducing the file size of the image while still maintaining image quality
- Different forms of compression
 - Lossy – some information is discarded (JPEG)
 - Lossless – all image information is preserved (GIF, PNG)

JPEG: Compression

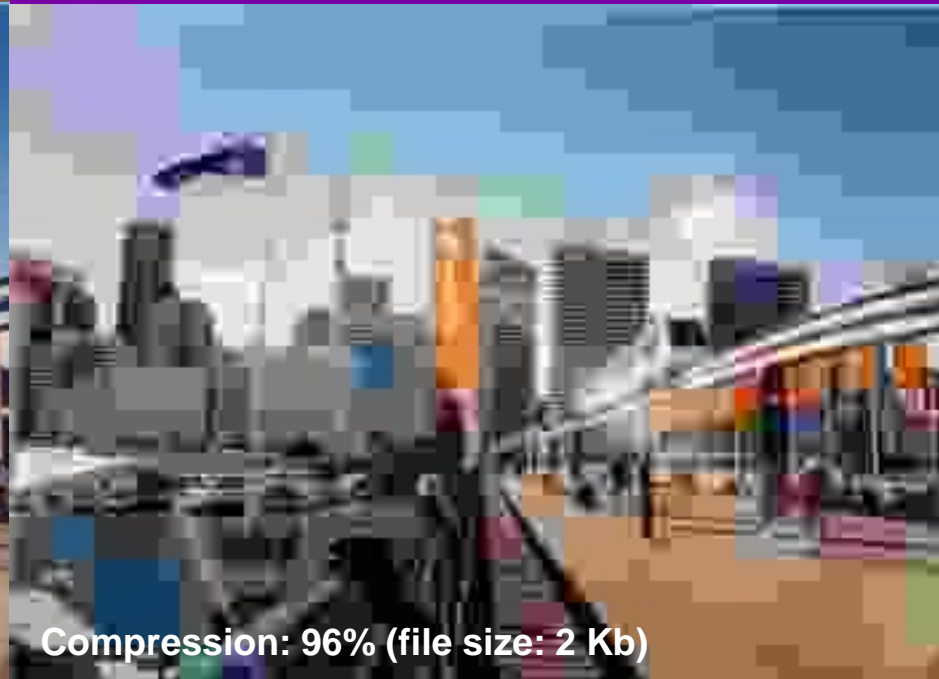


Compression: 0% (file size: 78 Kb)

- Lossy compression, i.e. data not necessary for on-screen display filtered out
- Loss of image quality through compression



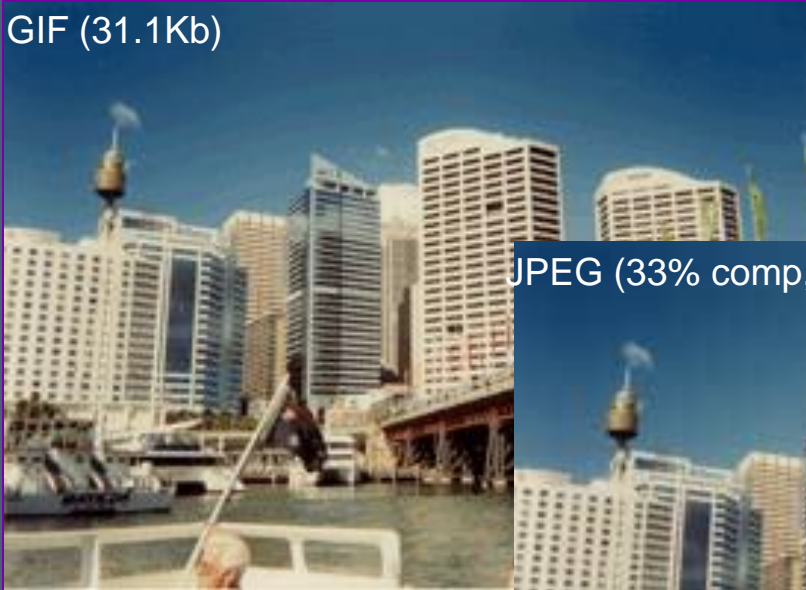
Compression: 45% (file size: 13 Kb)



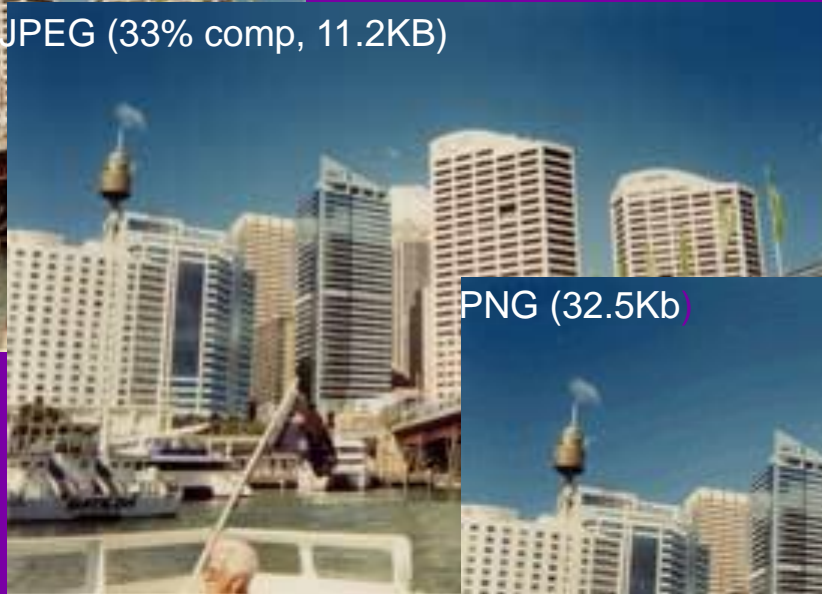
Compression: 96% (file size: 2 Kb)

Comparison: GIF, JPEG, PNG

GIF (31.1Kb)



JPEG (33% comp, 11.2KB)



PNG (32.5Kb)

