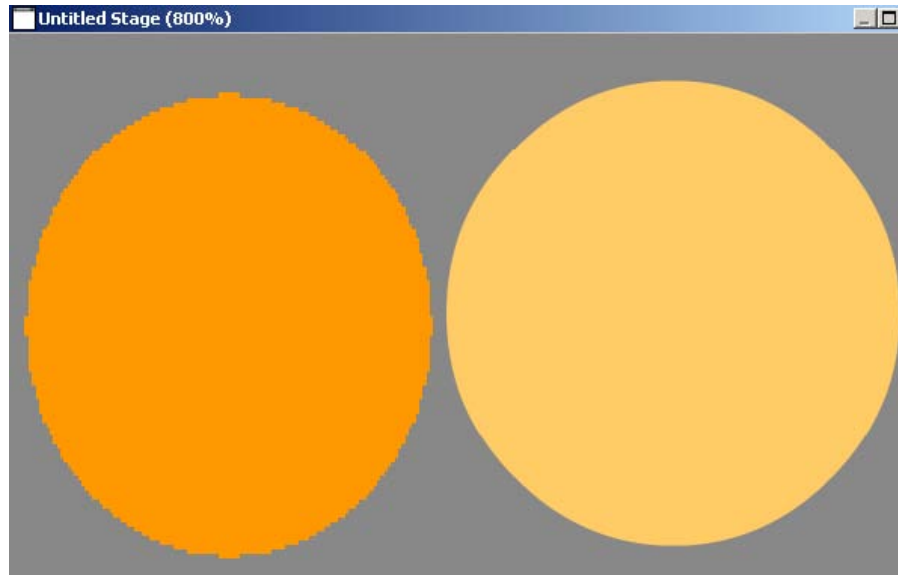


# Technical Information on Digital Images

---

**Multimedia** is the presentation of a computer application, incorporating media elements such as text graphics, video, animation, and sound, on a computer. Working with graphics There are two types of graphics used in multimedia application: vector and bitmap.



## Bitmapped graphic

A rectangular array of pixels. The pixel (a word invented from "picture element") is the basic unit of programmable colour on a computer display or in a computer image.

## Vector graphic

A set of mathematical instructions for drawing and filling geometric shapes.

## Functionally bitmapped and vector graphics differ in two major ways

### File size:

A bitmapped graphic file has to store information about each individual pixel in the image. As the dimension of a bitmapped graphic increase, the file size increases rapidly. (For example, a 10 \* 10 pixel image contains 100 pixels, but a 20 \* 20 pixel image contains 400 pixels.) A vector graphic file contains only mathematical formulas and it remains the same size regardless of the size of the image.

### Scalability:

When you enlarge a bitmapped image, the image-editing software has to make guesswork on where and how to insert pixels. The result of this guesswork is usually roughness and jagged edges – called jaggies. When a vector graphic is enlarged there is no guesswork. So vector image remains its quality at any size.

## Understanding graphic image file sizes

### Screen resolution:

It is measured in horizontal and vertical pixels with 640 \* 480 being the lowest standard. The larger pixel count means better quality and high resolution.

Image Size is determined by the number of pixels making up the image. The screen resolution and the image size determine how much of the screen is occupied by the image. For example, if the image size is 640 \* 480 and the screen resolution is 640 \* 480, then the image will occupy the entire screen.

### Colour Depth:

Each pixel can display from one colour to millions of colour. The number of colours is determined by information associated with the pixel. (8 bit for 256 colour, 16-bit for 65,000 colour, and 24 bit for 16.7 million colours). The range of colours available for pixels is called the colour depth.

The information is coded in bits, which means binary digits. Computers operate on the basis of the flow of electricity and the sensing of electrical impulses. The symbols used to represent this are 1 for “on” and 0 for “off”. Because there are two symbols (1 and 0), this is a binary system. Everything that is done by the computer can be represented by this binary system – including determining how many colours can be displayed by a pixel.

Let’s say that you want to use 16 different colours in your graphic. Each pixel in the graphic would need to be able to display each of 16 colours. Each colour could be assigned a number ranging from 0 to 15 (16 total colours). The question becomes, “How many bits are needed to represent 16 colours?” Using a binary system, 4 bits in different combinations of “on” and “off” can represent 16 different colours.

**Table 1 How 4 bits can represent 16 colours**

Bit Values				Pixel Colour
8	4	2	1	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	10
1	0	1	1	11
1	1	0	0	12
1	1	0	1	13
1	1	1	0	14
1	1	1	1	15

## File Size:

The file size of a bitmap graphic is related to the image size and colour depth. It can be estimated using the formula: Image size in pixels \* colour depth in bits / 8 You divide by 8 because the file size is measured in bytes and there are 8 bits per byte.

Image Size in Pixels	Colour Depth in bits	Number of available colours	File Size in bytes
640 * 480	8	256	307,200
320 * 240	8	256	76,800
1024 * 768	24	16.7 million	2,359,296

## File Formats:

Graphic images can be saved in a variety of file formats. The popular formats include:

- **TIFF** (Tagged Image File Format)
- **BMP** (Bitmap)
- **PCX** (Windows Paint)
- **PICT** (Macintosh picture format), which are the standard file formats for multimedia development;
- **JPEG** (Joint Photographer Experts Group)
- **GIF** (Graphics Interchange File format)
- **PNG** (Portable Network Graphics), are the standard file formats for the World Wide Web.

## SVG (Scalable Vector Graphics) code Example:

```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"
"http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">

<svg width="300" height="300" version="1.1"
xmlns="http://www.w3.org/2000/svg">
  <rect x="120" y="20" width="240" height="240">
    <animateColor id="a1" attributeName="fill"
from="red" to="grey"
dur="3s" fill="freeze"/>
  </rect>
  <rect x="160" y="80" width="90" height="60">
    <animateColor id="a2" attributeName="fill"
from="orange" to="yellow"
begin="a1.end" dur="3s" fill="freeze"/>
  </rect>
  <rect x="90" y="220" width="90" height="60">
    <animateColor id="a3" attributeName="fill"
from="yellow" to="green"
begin="a2.end" dur="3s"/>
  </rect>
  <rect x="180" y="2" width="50" height="40">
    <animateColor id="a4" attributeName="fill"
from="yellow" to="white"
begin="a3.end" dur="3s" fill="freeze"/>
  </rect>
</svg>
```