Graphics File Format

- A graphics file format is the format in which graphics data – data describing a graphics image – is stored in a file.
- Graphics file formats have come about from the need to store, organize and retrieve graphics data in an efficient and logical way.
- Graphics files are just chunks of data.

Computer-Based Images

- Computer-based image come in two flavors: *vector images* and *bitmapped images*.
- A **vector image** is described mathematically as a set of curves. When a computer reads image, it evaluates the mathematical information and draws the resulting information on the screen.
- Because the image is defined mathematically, it is very compact.
- While vector images are very useful to describe shapes, lines and other forms of illustration, photographic and similar imagery are better described by a bitmap.

Computer-Based Images

- A **bitmap image** is specified as a collection of pixels of different color value
- Because of the larger number of pixels that may be in an image, as well as the color information that must be described, bitmaps can be very large.
- Bitmaps are the most common image formats. They include images made up of a collection of dots or pixels, such as photographs and television pictures.

Computer-Based Images

- The main problem with bitmaps is that the file sizes can be very large.
- Their excessive size makes it impractical to transmit raw bitmaps across a network like the Internet.

Image Compression

- One approach to dealing with the size problem is to compress the images.
- In general, there are two forms of image compression: *loss less* and *lossy*.
- Loss less image compression means that the compressed image is identical to the uncompressed image. Because all the data in the image must be preserved, the degree of compression, and the corresponding savings, is relatively minors.

Image Compression

- Lossy compression, on the other hand, does not preserve the image exactly, but does provide a much higher degree of compression.
- With lossy compression, the image quality is compromised for a smaller byte count. Because the human eye may barely notice the loss, the trade-off may be acceptable.

Image Compression

- Image compression depends on the image file format.
- There are varieties of image formats in the computer world.

Graphics File Formats

- GIF(Graphics Interchange Format)
- Microsoft Windows Bitmap (BMP)
- JPEG File Interchange Format
- MPEG
- TIFF (Tag Image File Format)
- PNG (Portable Network Graphic Format)

GIF

- GIF(Graphics Interchange Format) is a creation of CompuServe and is used to store multiple bitmap images in a single file for exchange between platforms and systems.
- In terms of number of files in existence , GIF in perhaps the most widely used format for storing multibit graphics and image data.

GIF

- Type
- Colors
- Compression
- Maximum size Image
- Multiple Images Per File
- Originator
- Platform

- Bitmap
- 1 to 8 bits
- LZW
- 64K * 64K pixels
- Yes
- CompuServe,Inc.
- MS –DOS , Macin UNIX, Amiga,others

Applications of GIF

- Originally designed to facilitate image transfer and online storage for use by CompuServe and its customers ,
- GIF is primarily an exchange and storage format , although it is based on, and is supported by , many applications.
- A well-defined, well-documented format in wide use, which is quick, easy to read, and reasonably easy to uncompress.
- It lacks, however, support for the storage of deep-pixel images.

Microsoft Windows Bitmap

- Also known as BMP, DIB, Windows BMP , Windows DIB, Compatible Bitmap
- The BMP file format is one of several file formats supported by the Microsoft Windows operating environment .BMP is the native bitmap format of Windows and is used to store virtually any type of bitmap data.

Microsoft Windows Bitmap

- Most graphics and imaging applications running under Microsoft Windows support the creation and display of BMP format files.
- BMP is also very popular in MS-DOS operating system.

Microsoft Windows Bitmap

Type	Bitmap
Colors	1-,4-,8-,16-,32-bits
Compression	RLE
Maximum Image Size	32K * 32 K and 2G*2G pixels
Multiple Images per File	No

Platform

- Intel machines running Microsoft Windows, Windows NT, Windows 95, OS/2 and MS-Supporting.

Application

- Used as the standard bitmap Storage format in the Microsoft Windows environment .Although it is based on Windows internal bitmap data structures,it is supported by many non-Windows and non-PC applications.
- A well-defined format for programmers having access to the Microsoft Developer's Network Knowledge Base and Software Development Kits (SDKs).
- Its simple RLE compression scheme is rather inefficient for complex images.

JPEG File Interchange Format

- Also known as JFIF,JFI,JPG,JPEG
- JPEG (**Joint Photographic Experts Group**) refers to standards organization , a method of file compression , and some times a file format.
- In fact , the JPEG specification itself does not define a common file interchange format to store and transport JPEG data between computer platforms and operating systems.

JPEG

- The JPEG File Interchange Format(JFIF) is used for the purpose of storing JPEG-encoded data.
- JFIF is designed to allow files containing JPEG-encoded data streams to be exchanged between otherwise incompatible systems and applications.

JPEG

- Type
- Colors
- Compression
- Maximum Image Size
- Multiple Images per File

- Bitmap
- UP to 24-bits
- JPEG
- 64K * 64K pixels
- No

Application

- Used primarily in graphics and image manipulation programs
- One of the few formats incorporating JPEG compression and as such offers superior compression for deep-pixel images.

MPEG

- Also known as MPG, MPEG-1, MPEG-2
- MPEG (pronounced "em-peg") is an acronym for the **Motion Picture Experts Group**, a working group of the International Standards Organization (ISO) that is responsible for creating standards for digital video and audio compression.

MPEG

- **Type** : Audio/video data storage
- **Colors** : Up to 24-bits
- **Compression** : DCT and block-based scheme with motion compensation
- **Maximum Image Size** : 4095x4095x30 frames/second
- **Multiple Images Per File** : Yes (multiple program multiplexing)
- **Numerical Format** : NA
- **Originator** : Motion Picture Experts Group (MPEG) of the International Standards Organization (ISO)
- **Platform** : All
- **Supporting Applications** : Xing Technologies MPEG player, others .

MPEG

- **Application :** Stores an MPEG-encoded data stream on a digital storage medium. MPEG is used to encode audio, video, text, and graphical data within a single, synchronized data stream.

- MPEG-1 is a finalized standard in wide use.
- MPEG-2 is still in the development phase and continues to be revised for a wider base of applications.

TIFF

- TIFF is an acronym for the Tag Image File Format .
- The TIFF specification was originally a standard method of storing black-and-white images created by scanners and desktop publishing applications.
- TIFF 4.0 added supports for uncompressed RGB color images and was quickly followed by the release of TIFF Revision 5.0.
- TIFF 5.0 was the first revision to add the capability of storing palette color images and support for the LZW compression algorithm.
- TIFF 6.0 new support added for CMYK and YCbCr color images and the JPEG compression method.

TIFF

- **Type** : Bitmap
- **Colors** : 1- to 24-bits
- **Compression** : Uncompressed, RLE, LZW, CCITT Group 3 and Group 4, JPEG
- **Maximum Image Size** : $2^{32}-1$
- **Multiple Images Per File** : Yes
- **Originator** : Aldus
- **Platforms** : MS-DOS, Macintosh, UNIX, others
- **Supporting Applications** : Most paint, imaging, and desktop publishing programs

TIFF

- Application:

  Used for data storage and interchange. The general nature of TIFF allows it to be used in any operating environment, and it is found on most platforms requiring image data storage.

- The TIFF format is perhaps the most versatile and diverse bitmap format in existence.
- Its extensible nature and support for numerous data compression schemes allow developers to customize the TIFF format to fit any peculiar data storage needs.

PNG

- PNG is an acronym for the **Portable Network Graphic Format .**
- PNG (pronounced "ping") is a bitmap file format used to transmit and store bitmapped images.
- PNG supports the capability of storing up to 16 bits (gray-scale) or 48 bits (true color) per pixel, and up to 16 bits of alpha data.
- It handles the progressive display of image data and the storage of gamma, transparency and textual information, and it uses an efficient and lossless form of data compression.

PNG

Type	:	Bitmap
Colors	:	1-bit to 48-bits
Compression	:	LZ77 variant
Maximum Image Size	:	2Gx2G pixels
Multiple Images Per File	:	No
Numerical Format	:	Big-endian
Originator	:	Thomas Boutell, Tom Lane, and many others
Platform	:	Any
Supporting Applications	:	Many shareware and commercial packages

PNG

- **Application :**
  PNG is capable of losslessly storing bi-level to 48-bits true color image data. It is designed specifically for network image data transmission and storage.

- PNG is a well-designed and well-developed file format that is intended to replace CompuServe's GIF file format.

PNG Vs GIF

- **The following PNG features are not found in GIF:**

- Storage of true color images of up to 48 bits per pixel
- Storage of gray-scale images of up to 16 bits per pixel
- Full alpha channel
- Gamma indicator
- CRC method of data stream corruption detection
- Standard toolkit for implementing PNG readers and writers
- Standard set of benchmark images for testing PNG readers

PNG Vs GIF

- **The following GIF features are not found in PNG v1.0:**

- Capability of storing multiple images
- Support of storage of animation sequences
- Payment of a licensing fee required to sell software that reads or writes the GIF file format

PNG Vs GIF

- Unlike most file formats, which are created by one or two programmers without much thought for the future expansion of the format, PNG was authored by a committee of interested implementers and GIF detractors (revision 1.0 of the PNG specification lists 23 authors) headed by Thomas Boutell.

- PNG also holds the distinction of being one of the better-designed file formats, allowing additional features to be added to the format without compromising existing functionality, and without forcing modifications to existing PNG-using software.