Computer Graphics Software and Data Base

Computer Graphics Software

In computer graphics, graphics software refers to **a program or collection of programs that enable a person to manipulate images or models visually on a computer.** It can be 2D/3D. Examples: AutoCAD, Autodesk 3d Max, Adobe Photoshop, CorelDRAW.

OR

It is a program or collection of programs written to make it convenient for a user to operate the computer graphics system.

- It includes programmes to generate images on screen of graphics terminal and to accomplish various types of interaction between the user and the system.

- The graphics software for a particular computer graphics system is very much a function of the type of hardware used in the system. The software must be written specifically for the type of graphics terminal and the types of input devices used in the system.

Computer Graphics Software and Data Base

Computer Graphics

Vector graphics are digital art that is rendered by a computer using a mathematical formula. Raster images are made up of tiny pixels, making them resolution dependent and best used for creating photos. This means that if you scale a vector image, it will maintain a smooth, un-pixelated appearance, whereas a raster image will become pixelated.

Vector graphics are also known as scalable vector graphics (SVG). These graphics consist of anchored dots and connected by lines and curves, similar to the connect-the-dot activities you may have done as a kid. Because these graphics are not based on pixels, they are known as resolution independent, which makes them infinitely scalable. Their lines are sharp, without any loss in quality or detail, no matter what their size. These graphics are also device-independent, which means their quality doesn't depend on the number of dots available on a printer or the number of pixels on a screen. Because they consist of lines and anchor points, the size of the files are relatively small.

Raster Images are made of pixels, or tiny dots that use color and tone to produce the image. Pixels appear like little squares on graph paper when the image is zoomed in or enlarged. These images are created by digital cameras, by scanning images into a computer or with raster-based software (Continued on next page).

Computer Graphics Software and Data Base

Computer Graphics

Each image can only contain a fixed number of pixels; the amount of pixels determines the quality of the image. This is known as resolution. More pixels results in better quality at the same or larger sizes of the original, but this also increases the size of the file and the amount of space it takes to store the file. The lower the number of pixels, the lower the resolution. Resolution limits the size the image can be scaled up without being able to see pixels. However, a high resolution image printed at a small size will cause the pixels to "cram" together and will make the image look as unprofessional as not having enough pixels in a large image.

Computer Graphics Software and Data Base
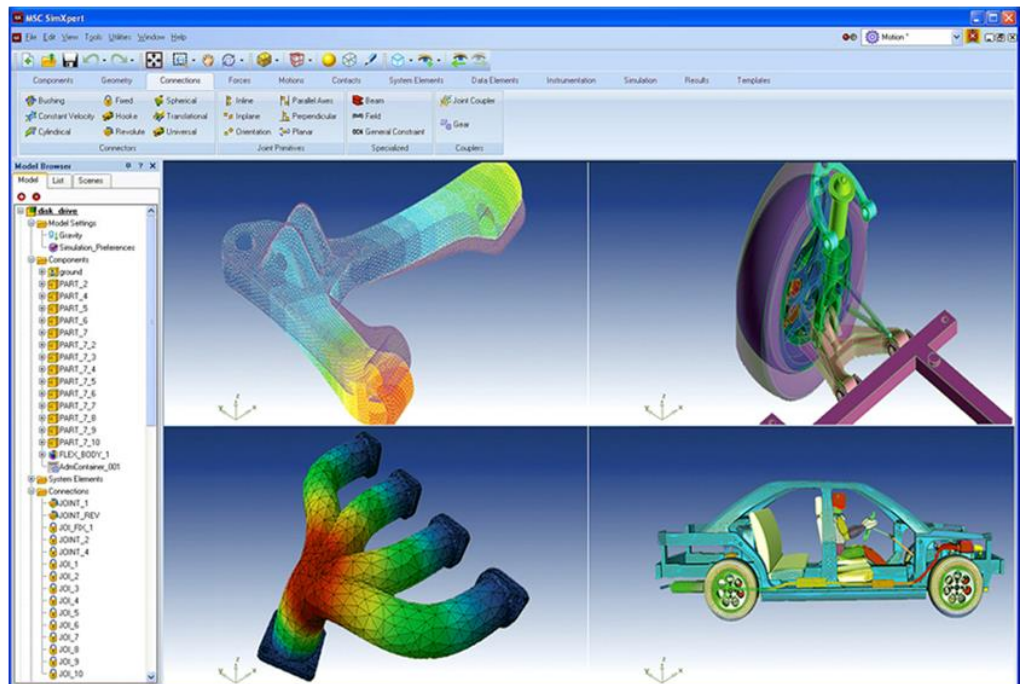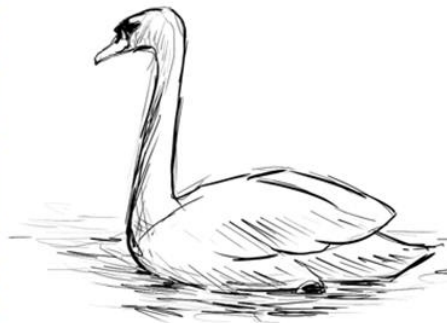
__Computer Graphics__

__When to choose vector versus raster?__

A vector graphic's small file size and scalability makes it uniquely suitable for use in digital printing from business cards to billboards. They're also used in lower thirds for videos, web-based objects and rendering 2D or 3D computer animation. Their native files are needed for coin designs, laser engraving, t-shirts, patches, etc. Raster images are best for digital photos and print materials. If your project requires scalable shapes and solid colors, vector is the best choice, but if your project requires complex color blends, raster is the preferred format.

	Vector Image	Raster Image
Resolution	scalable	pixel, device dependent
File Size	small	large, depends on exported resolution
Usage	•Fonts •Logos •Coin designs •laser engravings •T-shirts •Patches •Digital printing (e.g., business cards, billboards) •Lower thirds for video •2D or 3D computer animation	•Photography •Print Materials
File Formats	•EPS •SVG •AI	•BMP •GIF •JPG •PNG •TIFF
Software	•Vector-based software (e.g., Adobe Illustrator)	•Raster-based software (e.g., Adobe Photoshop) •Digital cameras •Scanned images

Computer Graphics Software and Data Base

- Graphics software is an intermediary between an application program & the graphics hardware. The output primitives and the interaction devices that a graphics software supports can range from rudimentary to extremely rich.

- Graphics Package is used for creating and manipulating images. There are two major types of graphics packages:

  - Painting graphic packages

  - Drawing graphic packages

Computer Graphics Software and Data Base

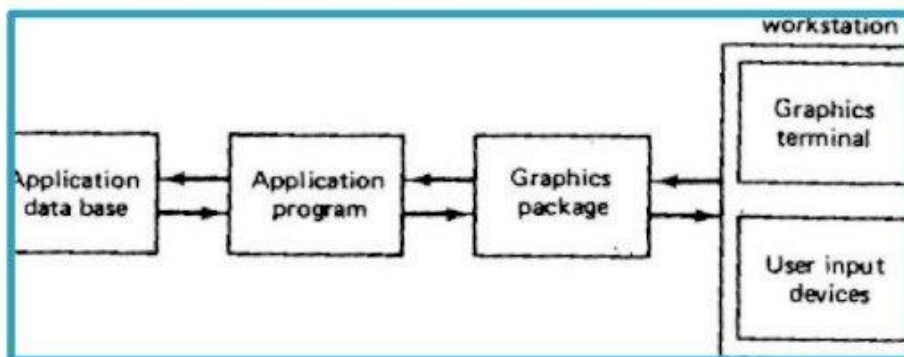## Software Configuration of a Graphics System

Principally it has 3 parts:

Application database: Data base of software into which all the relevant data is stored. It contains mathematical, numerical, and logical definitions of application models such as buildings, electronics circuits, machines etc. Also the properties data etc is available in form of alphanumeric information.

Application program: it controls the storage and retrieval of data from application database. User uses them to make models and pictures (it is field specific, engineering, architecture etc)

The graphics package: it is software support between user and graphics terminal, it manages graphical interface between user and application software.

THE GRAPHICS SOFTWARE CAN BE DIVIDED INTO THREE MODULES

according to a conceptual model suggested by Foley and Van Dam:
1. The graphics package
2. The application program
3. The application data base

Computer Graphics Software and Data Base

Software Configuration of a Graphics System

Application Program: The central module is the application program. It controls the storage of data into and retrieves data out of the application data base. The application program is implemented by the user to construct the model of a physical entity whose image 'is to be viewed on the graphics-screen. Application programs are written for particular problem areas. Problem areas in engineering design would include architecture, construction, mechanical components, electronics, chemical engineering, and aerospace engineering.

Graphics Package: It is the software support between the user and the graphics terminal. It manages the graphical interaction between the user and the system It also serves as the interface between the user and the application software. The graphics package consists of input subroutines and output subroutines. The input routines: accept input commands and data from the user and forward them to the application program. The output subroutines: control the display terminal and convert the application models into two-dimensional or three-dimensional graphical pictures.

Computer Graphics Software and Data Base

Functions of a Graphic Package

To fulfill its role in the software configuration, the graphics package must perform a variety of different functions. These functions can be grouped into function sets. Each set accomplishes a certain kind of interaction between the user and the system. Some of the common function sets are:

- **Generation of graphic Elements**

- **Transformations**

- **Display Control and windowing functions**

The method of selecting and enlarging a portion of a drawing is called windowing. The area chosen for this display is called a window.

- **Segmenting functions**

To view an entire image or a part of image with various attributes, we need to organize image information in a particular manner since existing structure of display file does not satisfy our requirements of viewing an image. To achieve this display, file is divided into Segments. Each segment corresponds to a component and is associated with a set of attributes and image transformation parameters like scaling, rotation. Presence of Segment allows :

  - Subdivision of picture.

  - Visualization of particular part of picture.

  - Scaling, rotation and translation of picture.

- **User input functions**

Computer Graphics Software and Data Base

Data Base in a Graphic Package

Database is an organized collection of graphics & non-graphics data related to each other in the support of a common purpose and is stored in a computer.

The data base contains mathematical, numerical, and logical definitions of the application models, such as electronic circuits, mechanical components, automobile bodies, and so forth. It also includes alphanumeric information associated with the models, such as bills of materials, mass properties, and other data. The contents of the data base can be readily displayed on the display screen or plotted out in hard-copy form.