

# Introduction to

# MULTIMEDIA

**part two of the e-portfolio series**

**Presentation Technology Department  
Kennesaw State University  
1000 Chastain Road  
Sturgis Library Rm 447  
Kennesaw, GA 30144  
770-423-6057  
[ptd.kennesaw.edu](http://ptd.kennesaw.edu)  
[training@ptd2.kennesaw.edu](mailto:training@ptd2.kennesaw.edu)**



#### Presentation Technology Department

<http://ptd.kennesaw.edu>  
Kennesaw State University  
Sturgis Library, Rm. 447  
770-423-6057  
Fax: 770-423-6433

**Lab Hours:**  
By appointment only

**Jennifer Leifheit**  
Instructional Technology Support Specialist  
[jleifhei@kennesaw.edu](mailto:jleifhei@kennesaw.edu)

**Ben Cope**  
Instructional Technology Support Specialist  
[bcope@kennesaw.edu](mailto:bcope@kennesaw.edu)

**Questions about training?**  
[training@ptd2.kennesaw.edu](mailto:training@ptd2.kennesaw.edu)

# Introduction to Multimedia

*This introductory course on multimedia basics familiarizes students with numerous high-end software applications, hardware, and equipment. We will focus attention on presentation planning and preparation. This course is a pre-requisite for all PTD workshops.*

## What is Multimedia?

The term **multimedia** describes a number of diverse technologies that allow visual and audio media to be taken and combined in new ways for the purpose of communicating. Applications include entertainment, education and advertising. Multimedia often refers to computer technologies. Nearly every PC built today is capable of multimedia because they include a CD-ROM drive, and a good sound and video card. But the term multimedia also describes a number of dedicated media appliances, from digital VCRs and interactive television, to advanced wireless devices, to public television screens. The meaning of multimedia will continue to expand as technology evolves and new applications are invented. (*Source: <http://www.scala.com/multimedia/multimedia-definition.html>*)

Multimedia is typically thought of as the presentation of text, graphics, audio, video, etc. OR the use of a computer to present text, graphics, video, animation, and sound in an integrated way. It can be designed specifically to what a user wants or needs it to be. Multimedia is all about *choices*.

**Media:** Books, newspapers, magazines, etc.

**Multimedia:** Movies, television, computer programs, websites; anything that uses more than one medium to deliver its information.

## Interactive Multimedia

**Interactive multimedia** may also use more than one medium, but gives a further option allowing the viewer / participant the control of paths, directions, and decisions about the way the presentation goes (e.g., DVDs, video games, interactive CD-ROMs, etc.) When a structure of linked elements is provided through which the user can navigate, interactive multimedia becomes **hypermedia**.

A project does not have to be interactive to be considered multimedia. Users can view it as they would a movie or television program. In such cases the project is **linear**, meaning starting at the beginning and continuing to an end. When users are given navigational control to view the content at will, multimedia becomes **nonlinear** and interactive.

Determining interface design and how a user will interact with and navigate through the content of a project requires planning, organization, and a navigation diagram or **storyboard**. As designing a project often takes a great deal of time, planning and programming, your storyboard should not only describe the graphics of each screen, but the interactive elements as well.

**Interactive multimedia** allows the user to control the paths of a presentation.

**Hypermedia** uses linked elements to navigate within a project.

**Linear projects** run from beginning to end.

**Non-linear projects** give the user navigational control.

**Storyboards** are navigational diagrams of a multimedia project including the layout, design and navigational elements of a project.

Authoring tools are used to compile and program navigation throughout multimedia projects.

Multimedia elements are brought together using **authoring** tools (i.e. Adobe Acrobat, Macromedia Director, DVD Studio Pro). These software tools are designed to manage individual multimedia elements and program user interaction.

### The Stages of a Project

Multimedia projects should be undertaken in stages. In most cases, each stage should be completed before the next stage is begun. There are four stages in a multimedia project.

1. **Planning:** The project should begin with an idea or a need that is refined through an outline and storyboard. Before you begin developing, plan what materials should be included (i.e. certificates, resume, letters of reference, graphic design, music, video, etc). The more time spent on this stage, the faster you will be able to build it. Plan your tasks in the order they should be completed.

2. **Designing and producing:** Perform each of the planned tasks to create a finished product.

3. **Testing:** Always test your project to ensure functionality and logic. Having another person perform the test often brings an objective outside opinion.

4. **Delivering:** Package and deliver the project to the end user. Be sure to include instructions for use if not clearly labeled within the project.

**Mac** refers to a computer manufactured by Apple, Macintosh.  
G4 refers to the computer's processor.

The **Dell** computers have Pentium 3 (P3) processors and are currently running the Windows 2000 operating system.

**DV** stands for Digital Video

**NLE** stands for Non-Linear Editing, and is also referred to as Digital Video Editing.

### What You Will Need

Most multimedia projects require high-end hardware and software to bring the projects to completion.

### Equipment

PTD's **Media Lab** is equipped with state-of-the-art equipment:

- \*15 High-end computers (9 **Mac G4** / 6 **Dell P3**)
- \*35mm Slide Scanners
- \*8 1/2 x 14 Flatbed Scanners
- \*CD Burners
- \*Tri-Media readers (for Flash cards and 3.5" Floppy Disks)
- \*ZIP Drives

PTD's **DV Room** contains specialized equipment for video projects:

- \*5 NLE Stations (Mac G4)
- \*S-VHS and DV-CAM input / output decks
- \*NTSC Monitors
- \*CD / DVD Burners

**Desktop Publishing** refers to the design and layout of complex documents for both electronic and print publishing. Examples include flyers, brochures, magazines, newsletters, etc.

**Graphic Manipulation** refers to designing, building, manipulating, or altering graphics in any way. For example, removing red-eye from a photograph with Photoshop or creating a logo with Illustrator.

**Web Design Software** includes Dreamweaver MX for building and managing complex websites; Fireworks MX for designing and optimizing web graphics as well as creating rollovers and animated GIFs; and BBEdit for working with HTML code.

**Flash MX** is capable of more than simple web animation; complex interactivity and multimedia content may also be created using Flash. Many interactive websites incorporate Flash content.

**Authoring Software** is used to link documents, graphics, audio, and video together as a presentation.

**Non-Linear Editors** use the computer to capture, import, edit, and export video footage. This method is popular because it is non-destructive.

**Audio Editing** includes recording, mixing, applying special effects, and converting file formats for use in multimedia projects.

**Video Compression / Decompression (CODEC)** Software is used to change video file size and formatting.

## Media Lab Software

The Media Lab is equipped with a variety of software to assist you in the development of your projects and presentations.

### *Desktop Publishing*

Adobe InDesign 2.0  
Adobe Pagemaker  
Quark Xpress



### *Graphic Manipulation*

Adobe Photoshop 7.0  
Adobe Illustrator 10.0



### *HTML Editing*

Macromedia Dreamweaver MX  
Macromedia Fireworks MX  
BBEdit



### *Animation*

Macromedia Flash MX (Web animation)  
Adobe After Effects (Video animation)



### *Authoring*

Microsoft PowerPoint  
Macromedia Director MX  
Adobe Acrobat 5.0  
Apple DVD Studio Pro



### *Non-Linear Editing (Digital Video Editing)*

Apple iMovie  
Adobe Premiere  
Apple Final Cut Pro



### *Audio Editing*

SoundEdit 16 (Mac only)



### *Video Compression / Decompression*

Media Cleaner Pro



Operating systems can be classified as:

\***multiuser**-Allows two or more users to run programs at the same time.

\***multiprocessing**-Supports running a program on more than one CPU.

\***multitasking**-Allows more than one program to run concurrently.

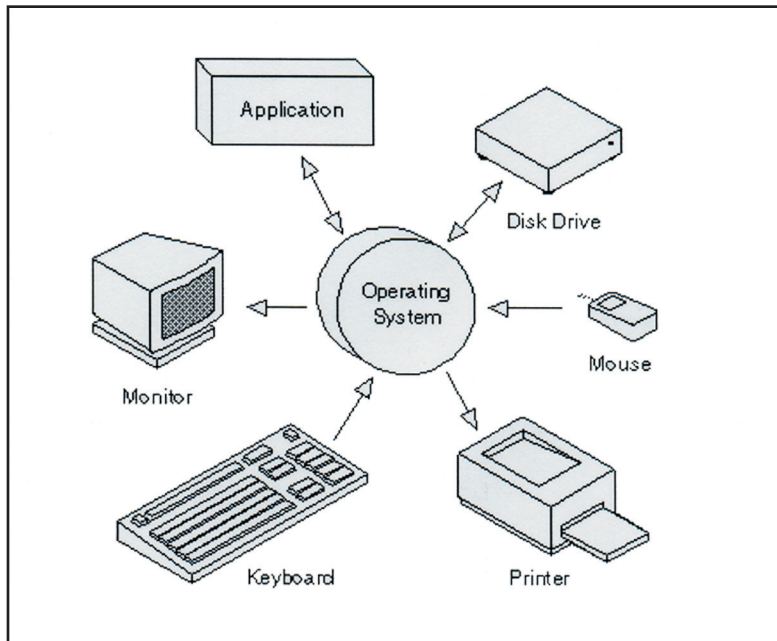
\***multithreading**-Allows different parts of a single program to run concurrently.

\***real time**-Responds to input instantly.

## Operating Systems

The operating system is the most important program that runs on a computer. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.

Operating systems provide a software platform on top of which other programs, called *applications*, can run. The operating system you choose determines which applications you can run.



## Mac vs. Windows

*The objective view:*

“Selection of the proper platform for developing your multimedia project may be based on your personal preference of computer, your budget constraints, project delivery requirements, and the type of material and content in the project. Many developers believe that multimedia project development is smoother and easier on the Macintosh than in Windows, even though projects destined to run in Windows must then be ported across platforms. But hardware and authoring software tools for Windows have improved: today you can produce many multimedia projects with equal ease in either the Windows or Macintosh environment.” (Vaughn, Tay. *Multimedia: Making It Work*. p 54.)

*The subjective view:*

Since its inception in 1984 the Macintosh computer has been considered a multimedia computer and has been continually designed and upgraded to maintain this. PTD primarily uses Mac computers for this very reason.

**Bitmap** files map out or plot the image on a pixel-by-pixel basis. The main benefit of bitmap images is photographic color, tone, and texture is accurately reproduced.

**Vector** images do not plot images on a pixel-by-pixel basis. Instead, vector files contain a description of the image expressed mathematically. Advantages of vector graphics include decreased file size and scalability.

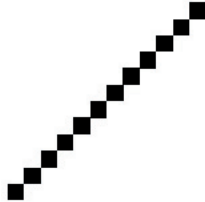
**Format** refers to the way information in a specific file is stored and compressed.

## Vector vs. Bitmap

There are two digital image types: vectors and bitmaps.

Bitmap instructions break a whole graphic into little dots and must tell the computer about each dot; vector instructions describe the graphic mathematically as a series of lines and arcs.

Bitmapped Line



Vector Line



In general, bitmaps are suitable for photographic images, and vectors for illustrations, line art, and logos.

## File Formats

A file format is identified by the three letter extension at the end of the file name. Every format has its own characteristics, advantages, and disadvantages. (Source: <http://www.learnthenet.com/english/html/34filext.htm>)

The most common graphics file formats on the *Web* are those with the extensions **.jpg** and **.gif**. The .jpg is short for JPEG, which is a popular compression standard for photographs and other images. The .gif extension stands for Graphics Interchange Format, a standard developed by CompuServe in the late 1980s. Both these graphics formats are platform-independent, which means you can use them on a PC, Mac or UNIX machine as long as you have a viewer for them.

For *video*, popular extensions are **.AVI** and **.RAM** for the PC, **.MPG** (short for MPEG), which is platform-independent, but requires its own player, and **.MOV** and **.QT** for QuickTime movies. QuickTime was initially developed just for the Macintosh, but now play on Windows and UNIX, too.

The most popular *sound* file format these days is **.MP3** for both Mac and PCs. Other file formats include **.AIFF** (for Mac); **.AU** for Mac and UNIX; **.WAV** for the PC; and **.RA** for Real Audio, a proprietary system for delivering and playing streaming audio on the Web.



**Macromedia Dreamweaver** is a visual web authoring tool used to create html documents.

**Adobe Acrobat** may be used to turn virtually any document into a PDF (Portable Document Format). Additionally, Acrobat allows the user to add interactivity and multimedia content to a document.

**JPG and GIF** are two standard image formats for graphics on the web. JPG is best for photographic images; GIF works better for black/white, line art, logos, and images with large areas of solid color.

## Common Multimedia File Formats

### **.html/.htm**

The language in which Web documents are authored. This file type requires a web browser, such as Netscape Navigator or Internet Explorer, for viewing.

### **.txt**

A plain (ASCII) text file. These files can be viewed with a word processor like Microsoft Word or a simple text editor like Simple Text or BBEdit for the Mac. For the PC you can use Notepad that comes with the Windows operating system.

### **.doc**

A common PC format for formatted text files. Although you may occasionally come across files with this extension that are not text documents, usually they are documents that were created using Microsoft Word or WordPerfect for Windows.

### **.pdf**

Portable Document Format, a proprietary format developed by Adobe Systems, Inc. that allows formatted documents (including brochures or other documents containing artwork) to be transferred over the Internet so they look the same on any computer. This file type requires the Adobe Acrobat Reader to view files and can be downloaded from the Adobe website.

### **.ps**

A PostScript file. Though it is technically a plain text file, it is essentially unreadable except by a Postscript printer or with the help of an on screen viewer like Ghostscript, which is available for Mac, Windows, and UNIX.

### **.gif**

The most common graphics file format on the Internet, it stands for Graphics Interchange Format. Most internet browsers have a built-in GIF viewer.

### **.jpg/jpeg/jiff**

A popular compression standard used for photos and still images. JPEG files can be viewed on any platform as long as you have a JPEG viewer. You can view JPEG files with most web browsers.

### **.tiff**

A very large, high-resolution image format. This format is used mostly for graphics that will be printed.

### **.aiff**

A fairly common sound format found on the Web. Although it is a Macintosh format, it can be used on other platforms as well.

### **.mp3**

The most popular file format on the Web for distributing CD-quality music. A 1 Mb file is equal to about one minute of music. This type of file requires an MP3 player, which is available for both Macintosh and Windows.

### **.ra**

A proprietary streaming audio format called RealAudio. Developed by RealNetworks, RealAudio allows you to play sound files in real-time. This type of file requires the RealPlayer, available for both Macintosh and Windows.

### **.wav**

The native sound format for Windows. On the Mac, you can use Sound App to play .wav files.

### **.avi**

The standard video format for Windows. These files need an AVI Video for Windows player (aviprox.exe) or the Windows Media Player from Microsoft.

### **.mov/.movie**

The common format for QuickTime movies, the Macintosh native movie platform. You can use a number of applications to play .mov files including Sparkle or MoviePlayer on the Mac, and QuickTime for Windows.

### **.mpg/mpeg**

A standard format for "movies" on the Internet, using the MPEG compression scheme. (MPEG = Moving Picture Experts Group)

**What's the difference?**

*Samples Per Inch (spi)* is how many pixels your scanner will create out of each inch in the original image.

*Pixels Per Inch (ppi)* is how large the pixels of an image will be when printed.

*Dots Per Inch (dpi)* describes the size of the dots your printer uses to reproduce your image.

**Recommended Resolution Settings**

Video / Web	72 dpi
Printing	300 dpi

**Pixel Properties**

Every pixel in a bitmap image has four basic properties: size, tonal value, depth, and location.

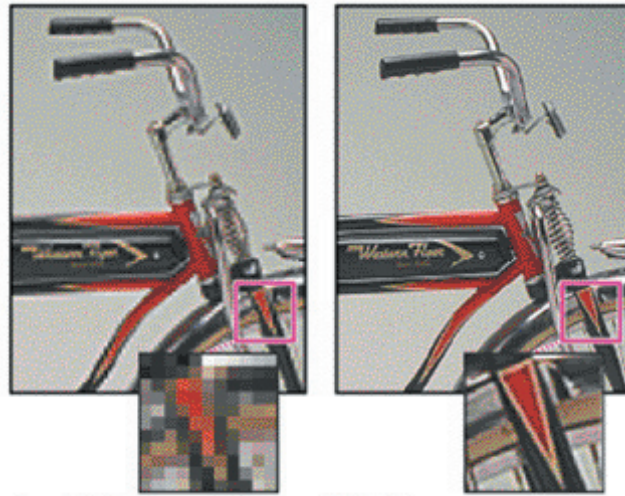
**Color Depth**

As the color depth of an image increases, so does its file size.

8 bit = 256 colors  
16 bit = thousands of colors  
24 bit = millions of colors

**About Resolution**

Resolution tells your scanner how many pixels to capture as it scans your image, and therefore how much space it will take up on your screen. Then, when you print the image, the resolution setting determines how large those pixels should be when you print them.



*Example of an image at 72 ppi and 300 ppi.*

**Pixel size:**

All pixels within the same image have a uniform size. Initially, pixel size is determined by the resolution at which an image is scanned or digitally captured. A scanning resolution of 600 ppi, for example, indicates that each pixel is only 1/600 inch. Higher input resolutions generate smaller pixels, which in turn mean more information and potential detail; lower resolutions mean larger pixels, less detail per unit of measurement, and a more jagged appearance. Together, the size and number of pixels in an image determine the total amount of information it contains.

**Color or tonal value:**

Scanners assign a single color or gray value to each pixel in an image.

**Color depth:**

While a single pixel can only have one value assigned to it, the bit depth or color depth of the digitizing device determines how many potential colors or tones are available to assign.

*Bitmap or line art* mode (1-bit) reproduces all the tones in the original artwork as either black or white.

*Grayscale* mode (8-bit) reproduces all the tones and colors in the original using 256 shades of gray.

*Indexed color* mode (also 8-bit) reproduces the image using a palette of 256 colors.

*RGB color* mode (24-bit) reproduces an image at 8 bits (256) per channel.

*CMYK color* mode (32-bit) reproduces images using four color channels at 8 bits per channel.

**Pixel location:**

A raster (bitmap) image is nothing more than a grid of discrete pixels, each of which has a definable horizontal and vertical position within the grid.



#### Color Gamuts

Gamut refers to the range of colors that are reproducible on a particular device (monitor, printer, etc.)

HLS = Hue, Lightness, Saturation  
HSB = Hue, Saturation, Brightness

RGB = Red, Green, Blue

CMYK = Cyan, Magenta, Yellow, Black

## Defining Color / Color Gamuts

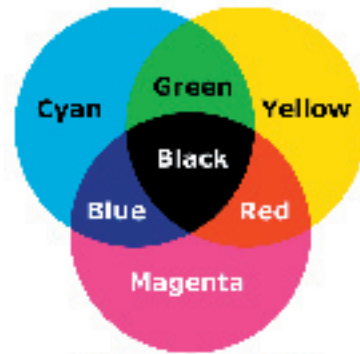
HLS or HSB color space: used by artists and designers

RGB color space: used by computer industry professionals

CMYK color space: the standard used by the commercial printing industry



*RGB Color Model.*



*CMYK Color Model.*

#### ZIP Disks

A ZIP Disk is recommended for working on virtually any multimedia project. The advantages are storage capacity (100MB and 250MB) and reusability.

## Storage Devices

3.5" Floppy Diskette (1.44 MB)

100 MB ZIP Disk

250 MB ZIP Disk

700 MB CD-ROM

4.7 GB DVD / DVD-R

## Project Planning and Preparation

#### What is a Storyboard?

A storyboard contains a rough sketch or outline of your project. A storyboard is essentially a timeline of your multimedia project. Creating a storyboard will help to ensure that you stay on track and that your intended audience understands your intent.

STORYBOARD

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