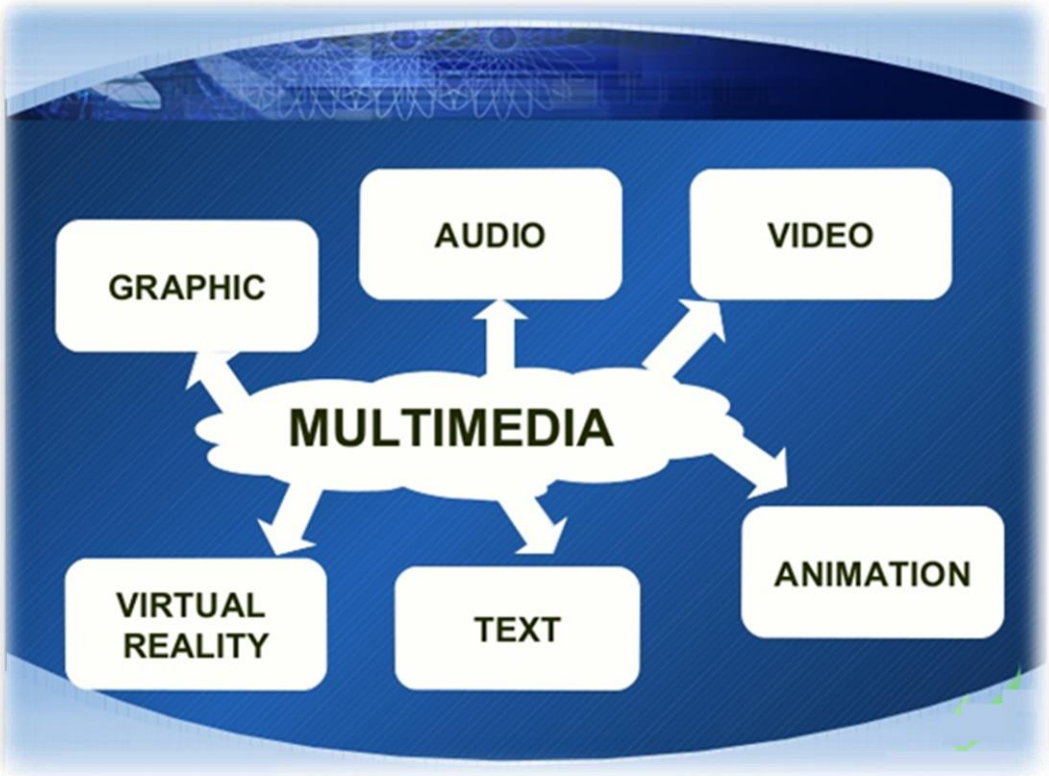

Tikrit University

Computer Science Dept.

Master Degree

Lecture 1

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- **Multimedia** is a representation of information in an attractive and interactive manner with the use of a combination of text, audio, video, graphics and animation. In other words, we can say that Multimedia is a computerized method of presenting information combining textual data, audio, video, graphics and animations. For examples: E-Mail, Yahoo Messenger, Video Conferencing, and Multimedia Message Service (MMS).

- Categories of Multimedia:

❖ **Linear Multimedia:**

It is also called non-interactive multimedia. In the case of linear multimedia, the end-user cannot control the content of the application. It has literally no interactivity of any kind. Some multimedia projects like movies in which material is thrown in a linear fashion from beginning to end. A linear multimedia application lacks all the features with the help of which, a user can interact with the application such as the ability to choose different options, click on icons, control the flow of the media, or change the pace at which the media is displayed. Linear multimedia works very well for providing information to a large group of people such as at training sessions, seminars, workplace meetings, etc.

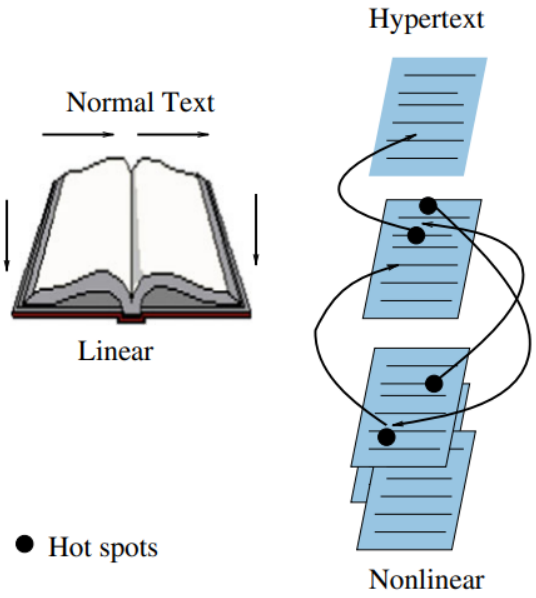

Figure 1: Linear and nonlinear Hypertext

❖ In Non-Linear multimedia, the end-user is allowed the navigational control to rove through multimedia content at his own desire. The user can control the access of the application. Non-linear offers user interactivity to control the movement of data. For example, computer games, websites, self-paced computer-based training packages, etc. Figure 1 describes the idea of Linear and nonlinear multimedia.

- Components of Multimedia (Multimedia consists of the following 5 components):

1. Text

Characters are used to form words, phrases, and paragraphs in the text. Text appears in all multimedia creations of some kind. The text can be in a variety of fonts and sizes to match the multimedia software's professional presentation. Text in multimedia systems can communicate specific information or serve as a supplement to the information provided by the other media.

2. Graphics

Graphics make the multimedia application attractive. Non-text information, such as a sketch, chart, or photograph, is represented digitally. Graphics add to the appeal of the multimedia application. In many circumstances, people dislike reading big amounts of material on computers. As a result, pictures are more frequently used than words to clarify concepts, offer background information, and so on. Graphics are at the heart of any multimedia presentation. The use of visuals in multimedia enhances the effectiveness and presentation of the concept. Windows Picture, Internet Explorer, and other similar programs are often used to see visuals. Adobe Photoshop is a popular graphics editing program that allows you to effortlessly change graphics and make them more effective and appealing. There are two types of Graphics:

- **Raster Images** (or bitmap) images: These are the types of images that are produced when scanning or photographing an object. Raster images are compiled using pixels, or tiny dots, containing unique color and tonal information that come together to create the image. Since raster images are pixel based, they are resolution dependent. The number of pixels that make up an image as well as how many of those pixels are displayed per inch, both determine the quality of an image. As you may have guessed, the more pixels in the image and the higher the resolution is, the higher quality the image will be. For example, if we scale a raster image to enlarge it, without changing resolution, it will lose quality and look blurry. This is because we are *stretching* the pixels over a larger area, thus making them look less sharp. This is a common problem but can be remedied by using raster image editing programs such as Photoshop to change resolution and properly scale images. Bitmap images require a large amount of memory. Figure 2 showing an example of Common Raster Image.

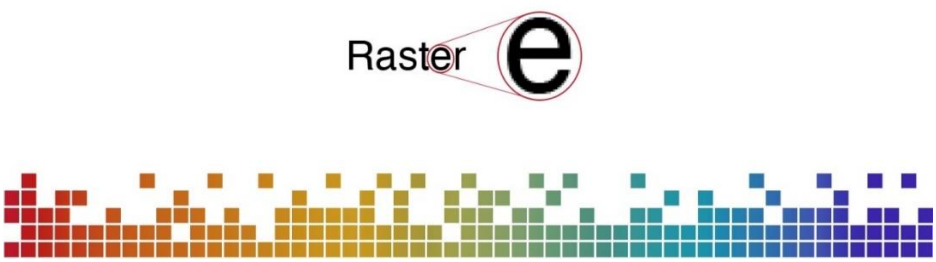

Figure 2: *Common Raster Image*

- **Vector Graphics**- Vector graphics are drawn on the computer and only require a small amount of memory. Instead of trying to keep track of the millions of tiny pixels in a raster image, vector images keep track of points and the equations for the lines that connect them. Generally speaking, vector images are made up of paths or line art that can infinitely scalable because they work based on algorithms rather than pixels.

Figure 3: *Example of Vector graphics*

One of the greatest things about vector images is that you can re-size them infinitely larger or smaller, and they will still print out just as clearly, with no increase (or decrease) in file size. If you remember back to your high school geometry, the equation for a circle of center (h,k) and radius r is $(x - h)^2 + (y - k)^2 = r^2$. If you want to make the circle bigger, you just increase the value of r - instead of having to keep track of tons more pixels, the computer just has to keep track of a different number. That takes almost no file space at all. Figure 3 showing an example of Vector Graphics.

3. Animations

Animation is a process of making a static image look like it is moving. An animation is just a continuous series of still images that are displayed in a sequence. The animation can be used effectively for attracting attention. Animation also makes a presentation light and attractive. Animation is very popular in multimedia application

4. Video

Photographic images that appear to be in full motion and are played back at speeds of 15 to 30 frames per second. The term video refers to a moving image that is accompanied by sound, such as a television picture. Of course, text can be included in videos, either as captioning for spoken words or as text embedded in an image, as in a slide presentation. The following programs are widely used to view videos: Real Player, Window Media Player, etc.

5. **Audio**- A multimedia application may require the use of speech, music and sound effects. These are called audio or sound element of multimedia. Speech is also a perfect way for teaching. Audio are of analog and digital types. Analog audio or sound refers to the original sound signal. Computer stores the sound in digital form. Therefore, the sound used in multimedia application is digital audio.

❖ **Multimedia Applications: -**

- **Multimedia in Business**

Marketing, advertising, product demos, presentation, training, networked communication, etc. are applications of multimedia that are helpful in many businesses. The audience can quickly understand an idea when multimedia presentations are used. It gives a simple and effective technique to attract visitors' attention and effectively conveys information about numerous products. It's also utilized to encourage clients to buy things in business marketing. The multimedia technology along with communication technology has opened the door for information of global wok groups. Today the team members may be working anywhere and can work for various companies.

- **Multimedia in Marketing and Advertising**-

By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.

- **Multimedia in Entertainment**

The entertainment sector makes extensive use of multimedia. It's particularly useful for creating special effects in films and video games. The most visible illustration of the emergence of multimedia in entertainment is music and video apps. Interactive games become possible thanks to the use of multimedia in the gaming business. Video games are more interesting because of the integrated audio and visual effects.

- **Multimedia in Education**

  In the subject of education, multimedia is becoming increasingly popular. It is often used to produce study materials for pupils and to ensure that they have a thorough comprehension of various disciplines. Edutainment, which combines education and entertainment, has become highly popular in recent years. This system gives learning in the form of enjoyment to the user. Consider an example of an educational game which plays various rhymes for kids. The child can paint the pictures, increase reduce size of various objects etc. apart from just playing the rhymes. Several other multimedia packages are available in the market which provide a lot of detailed information and playing capabilities to kids.

- **Multimedia in Bank**-

  Bank is another public place where multimedia is finding more and more application in recent times. People go to bank to open saving/current accounts, deposit funds, withdraw money, know various financial schemes of the bank, obtain loans etc. Every bank has a lot of information which it wants to impart to in customers. For this purpose, it can use multimedia in many ways. Bank also displays information about its various schemes on a PC monitor placed in the rest area for customers. Today on-line and internet banking have become very popular. These use multimedia extensively. Multimedia is thus helping banks give service to their customers and also in educating them about banks attractive finance schemes.

- **Multimedia in Hospital**

  Multimedia best use in hospitals is for real time monitoring of conditions of patients in critical illness or accident. The conditions are displayed continuously on a computer screen and can alert the doctor/nurse on duty if any changes are observed on the screen. Multimedia makes it possible to consult a surgeon or an expert who can watch an ongoing surgery line on his PC monitor and give online advice at any crucial juncture. In hospitals multimedia can also be used to diagnose an illness with CD-ROMs/ Cassettes/ DVDs full of multimedia-based information about various diseases and their treatment. Some hospitals extensively use multimedia presentations in training their junior staff of doctors and nurses. Multimedia displays are now extensively used during critical surgeries. It is beneficial to surgeons because they can rehearse intricate procedures such as brain removal and reconstructive surgery using images made from imaging scans of the human body. Plans can be produced more efficiently to cut expenses and problems.

- **Multimedia Pedagogues**

  Pedagogues are useful teaching aids only if they stimulate and motivate the students. The audio-visual support to a pedagogue can actually help in doing so. A multimedia tutor can provide multiple numbers of challenges to the student to stimulate his interest in a topic. The instruction provided by pedagogue have moved beyond providing only button level control to intelligent simulations, dynamic creation of links, composition and collaboration and system testing of the user interactions.

- **Multimedia Communication Technology and Services**

  The advancement of high computing abilities, communication ways and relevant standards has started the beginning of an era where you will be provided with multimedia facilities at home. These services may include:

  - Basic Television Services
  - Interactive entertainment
  - Digital Audio
  - Video on demand
  - Home shopping
  - Financial Transactions
  - Interactive multiplayer or single player games
  - Digital multimedia libraries
  - E-Newspapers, e-magazines

- **Fine Arts**

  Multimedia artists work in the fine arts, combining approaches employing many media and incorporating viewer involvement in some form. For example, a variety of digital mediums can be used to combine movies and operas. Digital artist is a new word for these types of artists. Digital painters make digital paintings, matte paintings, and vector graphics of many varieties using computer applications.

- **Engineering**

  Multimedia is frequently used by software engineers in computer simulations for military or industrial training. It's also used for software interfaces created by creative experts and software engineers in partnership. Only multimedia is used to perform all the minute calculations.

❖ Components of Multimedia (let us consider the Components Hardware and Software required for a multimedia system:

1) **Capture devices:** Video Camera, Video Recorder, Audio Microphone, Keyboards, mice, graphics tablets, 3D input devices, tactile sensors, VR devices. Digitizing Hardware.

2) **Storage Devices:** Hard disks, CD-ROMs, DVD-ROM, etc.

3**) Communication Networks:** Local Networks, Intranets, Internet, Multimedia or other special high speed networks.

4) **Computer Systems:** Multimedia Desktop machines, Workstations, MPEG/VIDEO/DSP Hardware.

5) **Display Devices:** CD-quality speakers, HDTV, Color printers etc .

❖ **Advantage of Multimedia.**

1. It is interactive and integrated: The digitization process integrates all of the numerous mediums. The ability to receive immediate input enhances interactivity.

2. It's quite user-friendly: The user does not use much energy because they can sit and watch the presentation, read the text, and listen to the audio.

3. It is Flexible: Because it is digital, this media can be easily shared. Adapted to suit various settings and audiences.

4. It appeals to a variety of senses: It makes extensive use of the user's senses while utilizing multimedia, for example, hearing, observing and conversing.

5. Available for all type of audiences: It can be utilized for a wide range of audiences, from a single individual to a group of people.

❖ **Disadvantage of Multimedia.**

1. Expensive: It makes use of a wide range of resources, some of which can be rather costly.
2. Overabundance of information: Because it is so simple to use, it can store an excessive amount of data at once.

3. The time it takes for your presentation to load is affected by large files such as video and music. If you add too much, you may need to utilize a larger computer to store the information.

4. Compilation Time: It takes time to put together the original draft, despite its flexibility.

❖ Multimedia Research Topics and Projects To the computer science researcher, multimedia consists of a wide variety of topics:

1. **Multimedia processing and coding:** This includes multimedia content analysis, content-based multimedia retrieval, multimedia security, audio/image/video processing, compression, etc.

2. **Multimedia system support and networking:** network protocols, Internet, operating systems, servers and clients, quality of service (QoS), and databases.

3. **Multimedia tools, end-systems and applications:** These include hypermedia systems, user interfaces, authoring systems, multimodal interaction, and integration, web-everywhere devices, multimedia education, including computer supported collaborative learning and design, and applications of virtual environments.

4. **Multi-modal interaction and integration:** "ubiquity" web-everywhere devices, multimedia education including Computer Supported Collaborative Learning, and design and applications of virtual environments