Introduction to Multimedia Technology

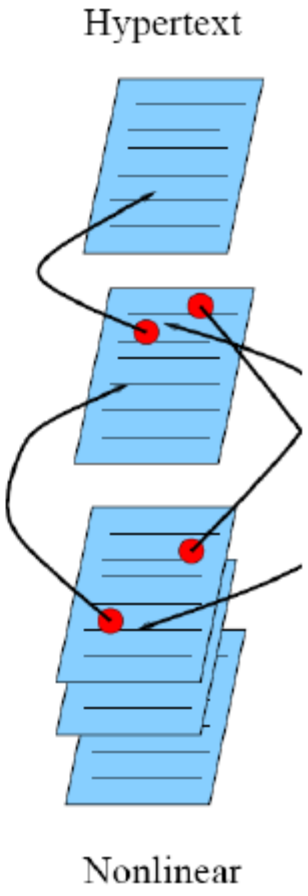
Lecture 2: Introduction to Multimedia (ch1)
A Taste of Multimedia (ch2)

Dr. Hossam Mahmoud Moftah

Assistant professor – Faculty of computers and information – Beni Suef University

1.2 Hypermedia, WWW, and Internet

❑**A hypertext system**: meant to be read nonlinearly, by following links that point to other parts of the document, or to other documents .



1.2 Hypermedia, WWW, and Internet

❑ **HyperMedia:** not constrained to be text-based, can include other media, e.g., graphics, images, and especially the continuous media, sound and video.

- **The World Wide Web (WWW)** —the best example of a hypermedia application.

❑ **Multimedia** means that computer information can be represented through audio, graphics, images, video, and animation in addition to traditional media.

World Wide Web

- **Universal access of web resources (by everyone every where).**
  - **HTML**: a language for publishing Hypermedia on the World Wide Web
  - **XML**: a markup language for the WWW in which the user or application can be able to define the tags
  - **XSL:** basically CSS for XML.
  - **SMIL**: synchronized Multimedia Integration Language, that allows for interaction among any media types and user input,

Multimedia in the New Millennium

- **2001 The first peer-to-peer** file sharing system. First commercial 3G wireless network.
- **2003 Skype:** free peer-to-peer voice over the Internet.
- **2004** Web 2.0 promotes user collaboration and interaction. Examples include **social networking, blogs, wikis.**
  - Facebook founded.
  - Flickr founded .
- **2005 YouTube** created. Google launched online maps

Multimedia in the New Millennium (cont.)

❑ 2006

- **Twitter created:** 500 million users in 2012, 340 million tweets per day.
- **Amazon** launched its cloud computing platform.
- Nintendo introduced the **Wii** home video game console --can detect movement in three dimensions.

❑ 2007

- **Apple launched iPhone,** running the iOS mobile operating system.
- **Google launched Android** mobile operating system.

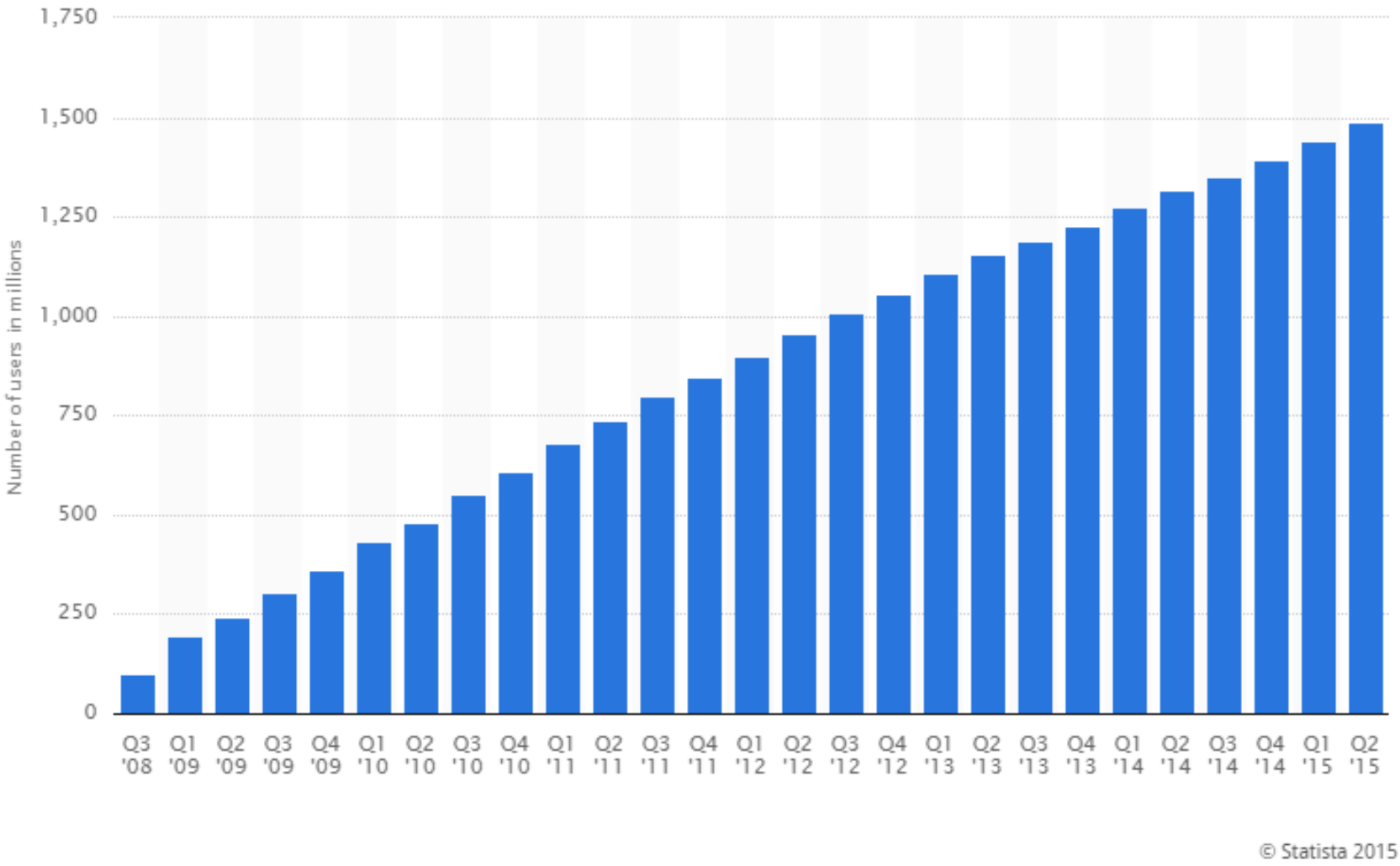
Multimedia in the New Millennium (cont.)

- **2009**
  - The first LTE (Long Term Evolution) network was set, an important step toward **4G wireless networking.**
  - James Cameron's film, Avatar, created a surge on the interest in **3D video.**
- **2010**
  - Netflix migrated its infrastructure to the **Amazon's cloud computing platform.**
  - Microsoft introduced **Kinect,** a horizontal bar with full-body 3D motion capture, facial recognition and voice recognition capabilities, for its game console Xbox 360.

Multimedia in the New Millennium (cont.)

- **2012**
  - **HTML5** subsumes the previous version, HTML4. HTML5 is a W3C "Candidate Recommendation"; it is able to run on low powered devices such as **smartphones and tablets.**
- **2013**
  - **Twitter offered Vine,** a mobile app that enables its users to create and post short video clips.
  - Sony released its **PlayStation 4** a video game console, which is to be integrated with Gaikai, a cloud-based gaming service that offers streaming video game content.
  - **4K resolution TV** started to be available in the consumer market. (4k: 4096 x 2160 pixels)

Number of monthly active Facebook users worldwide



1.3 Overview of Multimedia Software Tools

- software tools available for carrying out tasks in multimedia are:
  1. Music Sequencing and Notation
  2. Digital Audio
  3. Graphics and Image Editing
  4. Video Editing
  5. Animation
  6. Multimedia Authoring

Music Sequencing and Notation and Digital audio

- **Cakewalk**: now called **Pro Audio.**
  - Recording and editing audio; burning and ripping CD's; cleaning and converting albums to CD or MP3.
  - It is also possible to insert WAV files and Windows MCI commands (for animation and video) into music tracks
- **Cubase:** another sequencing/editing program, with capabilities similar to those of Cakewalk. Used by star producers and musicians for composing, recording, mixing and editing music
- **Adop Soundedit:** mature program for creating audio for multimedia projects and the web that integrates well with other Adop products such as Flash and Director.

Digital Audio

- **Cool Edit:**
  - A very powerful and popular digital audio toolkit, including digital signal processing effects
- **Sound Forge:**
  - a sophisticated PC-based program for editing audio WAV files.
- **Pro Tools:**
  - a high-end integrated audio production and editing environment

Graphics and Image Editing

- **Adobe Illustrator:**
  - A powerful publishing tool from Adobe. Uses vector graphics; graphics can be exported to Web.
- **Adobe Photoshop:**
  - The standard in a graphics, image processing and manipulation tool.
- **Adobe Freehand:**
  - A text and web graphics editing tool that supports many bitmap formats such as GIF, PNG, and JPEG.

Video Editing

- **Adobe Premiere:**
  - A simple video editing tool i.e., putting video clips into any order
- **Adobe After Effects:**
  - a powerful video editing tool that enables users to add and change existing movies. Can add many effects: lighting, shadows, motion blurring; layers.
- **Final Cut Pro:**
  - A video editing tool by Apple; Macintosh only.

Animation

- **Multimedia APIs:**
  - **Java3D:** API used by Java to construct and render 3D graphics
  - **DirectX :** Windows API that supports video, images, audio and 3-D animation
  - **OpenGL:** The highly portable, most popular 3-D API.

Rendering Tools

- **3D Studio Max:** Rendering tool that includes a number of very high-end professional tools for character animation, game development, and visual effects production.
- **Softimage XSI:** A powerful modeling, animation, and rendering package used for animation and special e effects in films and games.
- **Maya:**
- **Render Man:**
- **GIF Animation Packages:** Asimpler approach to animation, allows very quick development of effective small animations for the web.

Multimedia Authoring

- Tools that provide the capability for creating a complete multimedia presentation, including interactive user control, are called authoring programs.
- **Adobe Flash:** allows users to create interactive movies
- **Adobe Director:** uses a movie to create interactive presentations
- **Authorware:** A well-supported authoring product based on the Iconic/Flow-control metaphor.
- **Quest:** similar to Authorware in many ways, uses a type of flowcharting metaphor.
- **Adobe Captivate**
- **dominKnow Claro**

1.4 Multimedia in the Future

- **Innovations now or in the near future:**
  1. Better camera-based **object tracking technology**
  2. **Video shot detection**—finding where scene changes exist in video—and video classification
  3. **3D capture technology**; multiple views from several cameras; or a single camera under differing lighting
  4. Multimedia applications aimed at **handicapped persons**
  5. **Crowdsourcing** : example: if you're looking for a logo design, you can tell a crowd of designers what you want, how much you will pay, and your deadline.
  6. Deployment of "**Digital fashion**" + Wearable computing

1.4 Multimedia in the Future (cont.)

- **"Grand challenge" problems, which act as as type of state-of-the-art for multimedia interests:**
  1. **Social Event Detection for Social Multimedia:** discovering social events planned and attended by people.
  2. **Search and Hyperlinking of Television Content:** finding relevant video segments for a particular subject and generating useful hyperlinks for each of these segments.
  3. **Geo-coordinate Prediction for Social Multimedia:** estimating the GPS coordinates of images and videos.
  4. **Violent Scenes Detection in Film:** automatic detecting.

1.4 Multimedia in the Future (cont.)

5. **Preserving Privacy in Surveillance Videos:** methods obscuring private information (such as faces on Google Earth).
6. **Spoken Term Web Search:** searching for audio content within audio content by using an audio query.
7. **Question Answering for the Spoken Web:** a variant on the above, specifically for matching spoken questions with a collection of spoken answers.
8. **Soundtrack Selection for Commercials:** choosing the most suitable music soundtrack from a list of candidates.

Fundamentals of Multimedia

2nd Edition 2014
Ze-Nian Li
Mark S. Drew
Jiangchuan Liu

Chapter 2 : A Taste of Multimedia

2.1 Multimedia Tasks and Concerns

- Multimedia content is ubiquitous in software all around us, including in our phones.
- We are interested in making interactive applications (or "presentations"), using:
  - video editors such as **Adobe Premiere** or **Cyberlink PowerDirector**
  - still-image editors such as **Adobe Photoshop** in the first instance,
- but then
  - combining the resulting resources into interactive programs by making use of "authoring" tools such as **Flash** and **Director** that can include sophisticated programming.

2.2 Multimedia Presentation

- What effects to consider for multimedia presentation
- Guidelines for content design

2.2 Multimedia Presentation (cont.)

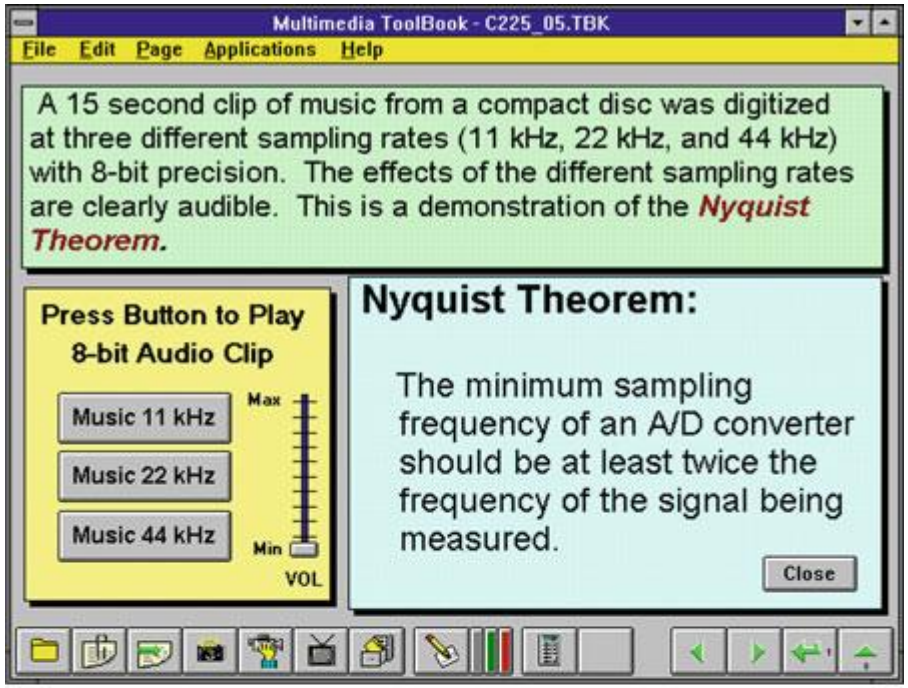
❑ Graphics Styles

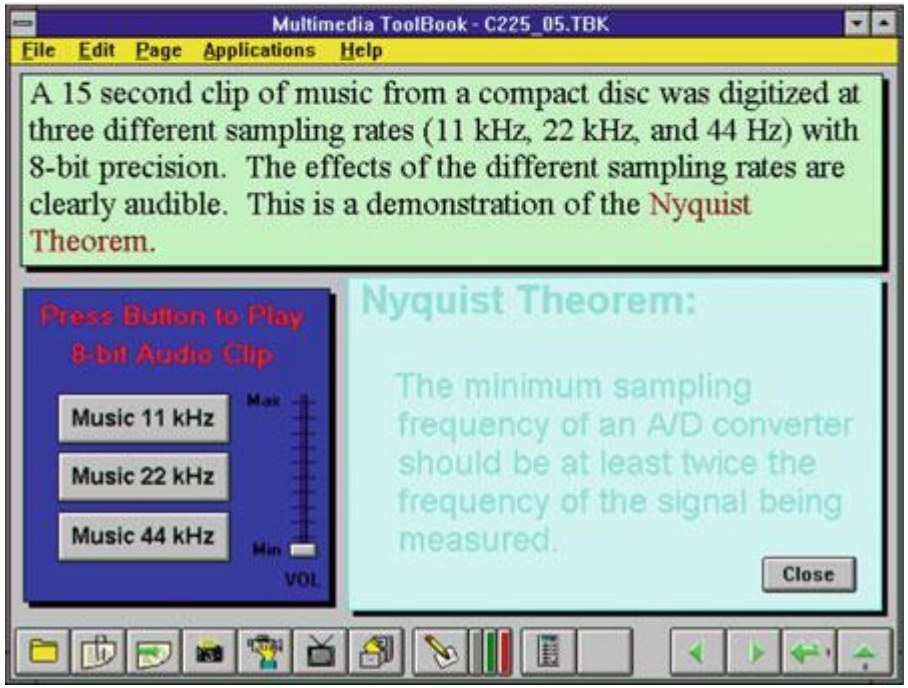
- ❑ Careful thought has gone into combinations of color schemes and how lettering is perceived in a presentation.

- ❑ When constructing presentation then the Human visual dynamics should be considered.

2.2 Multimedia Presentation (cont.)

- **Color Principles and Guidelines**
  - (See figure in next slide)
  - Some color schemes and art styles are best combined with a certain theme or style.
  - A general hint is to not use too many colors, as this can be distracting.


Multimedia ToolBook - C225_05.TBK
File Edit Page Applications Help
A 15 second clip of music from a compact disc was digitized at three different sampling rates (11 kHz, 22 kHz, and 44 kHz) with 8-bit precision. The effects of the different sampling rates are clearly audible. This is a demonstration of the Nyquist Theorem.
Press Button to Play 8-bit Audio Clip
Music 11 kHz
Music 22 kHz
Music 44 kHz
Max
Min
VOL
Nyquist Theorem:
The minimum sampling frequency of an A/D converter should be at least twice the frequency of the signal being measured.
Close


Multimedia ToolBook - C225_05.TBK
File Edit Page Applications Help
A 15 second clip of music from a compact disc was digitized at three different sampling rates (11 kHz, 22 kHz, and 44 Hz) with 8-bit precision. The effects of the different sampling rates are clearly audible. This is a demonstration of the Nyquist Theorem.
Press Button to Play 8-bit Audio Clip
Music 11 kHz
Music 22 kHz
Music 44 kHz
Max
Min
VOL
Nyquist Theorem:
The minimum sampling frequency of an A/D converter should be at least twice the frequency of the signal being measured.
Close

2.2 Multimedia Presentation (cont.)

1. Fonts

- For effective visual communication,:
  - large fonts (18 to 36 points) are best,
  - with no more than six to eight lines per screen.

- (See Figure in previous slide.)
- Upper part is good, while bottom one is poor.
  - (Why do you think?)

2.2 Multimedia Presentation (cont.)

2. A Color Contrast

- The simplest approach to making readable colors on a screen is to use the principal complementary color as the background for text.
- For color values in the range 0–1(or, effectively, 0–255), if the text color is some triple (Red, Green, Blue), or (R,G, B) for short, a legible color for the background is likely given by that color subtracted from the maximum:

$$(R, G, B) \Rightarrow (1 - R, 1 - G, 1 - B) \text{ or}$$
$$(R, G, B) \Rightarrow (255 - R, 255 - G, 255 - B)$$

2.2 Multimedia Presentation (cont.)

- **A Color Contrast**
  - Another way to make reasonable color on a screen is the color “opposite”
  - Also if the text is bright, the background is dark, and vice versa.

2.2 Multimedia Presentation (cont.)

- **3. Graphics (2-D and 3-D):**
  - **A. Vector graphics**
    - Vector graphics is the use of geometrical primitives such as points, lines, curves, and shapes or polygons all of which are based on mathematical expressions to represent images in computer graphics.
    - Your company logo and brand graphics should be created as a vector.

2.2 Multimedia Presentation (cont.)

- **B. Raster images**
  - Bitmap (or raster) images are stored as a series of tiny dots called pixels. Each pixel is actually a very small square that is assigned a color.
  - JPEGs, GIFs and PNGs are common raster image types.

References

- *Textbook: Fundamentals of Multimedia, Li & Drew*

The End