SCSBC3 PRELIMS

Multimedia

- Derived from the word "**Multi**" and "**Media**"
    - **Multi**
    - Many, multiple
    - **Media**
    - Tools that is used to represent or do a certain thing, delivery medium, a form of mass communication—newspaper, magazine/tv.
    - Distribution tool & information presentation—text, graphic, voice, images, music and etc.
- Multimedia is the presentation of text, pictures, audio, and video with links and tools that allows the user to navigate, engage, create, and communicate using a computer.
- Multimedia is the media that uses multiple forms of information content and information processing to inform or entertain the user.

Categories of Multimedia

Linear Multimedia
- A type of a multimedia that is designed to be presented in a sequential manner.
- It is also called non-interactive multimedia.

Non-Linear Multimedia
- A non sequential type of multimedia where the person's participation is crucial.
- It is also called interactive multimedia.

Components of Multimedia

Text
- A broad term for something that contains words to express something.
- The text can have various types of fonts and sizes to suit the profession presentation of the multimedia software.

Graphic
- Two-dimensional figure or illustration
- Could be produced manually (by **drawing, painting, carving, etc.)** or by **computer graphics technology**.
- Used in multimedia to show more clearly what a particular information is all about (diagrams, picture).
    - **Bitmap** – pixelated, actual picture.
    - **Vector** – digital arts.

Audio
- Produced by vibration, as perceived by the sense of hearing.
- In multimedia, audio could come in the form of **speech, sound effects and music score.**

Video
- The term video refers to the **moving picture,** accompanied by sound such as a picture in television.
- Video element of multimedia application gives a lot of information in small duration of time.

Animation
- The illusion of motion created by the consecutive display of images of static elements.
- In multimedia, animation is used to further enhance/enriched the experience of the user to further understand the information conveyed to them.
    1. Story board
    2. Layout
    3. Animation
    4. Final

Advantages & Disadvantages of Multimedia

Advantages of Multimedia
- It is **interactive and integrated.**
- It's quite **user-friendly.**
- It is **flexible**
- It appeals to a variety of senses.
- Available for all types of audiences.

Disadvantages of Multimedia
- Expensive
- Information Overload
- It takes time to compile
- Compilation Time

Where to Use Multimedia?

Business
- **Interactive Multimedia Merchandising**
    - Online-shopping kiosks
    - Virtual Shopping/ Home shopping
- **Desktop Videoconferencing**
    - It enables professionals and individuals to attend meetings on short notice or to get in touch with stakeholders within a short span of time.
- **Multimedia Travel Systems**
    - These systems enable the travel agents to show their customers about where they will travel, what will be their accommodation like, and what they will be able to do at their destinations.
- **Real Estate**
    Multimedia systems enable buyers to visit hundreds of properties virtually, view on screen photos of homes, inspect floor plans, see street maps and study neighborhood demographics.
- **Corporate Training**
    Many corporations have use multimedia to reduce training cost and improve employee productivity.

- **Advertising and Electronic Brochures**
  The electronic brochure is an advertising and marketing tool that usually consists of single diskette or CD-ROM sent to targeted audiences. Corporations are also beginning to offer shareholders reports.

Government

- **Public Service Kiosks**
  - Multimedia kiosks convey public service information such as jobs and employment opportunities.
  - City Info kiosks offer to citizens and travelers the ability to find information on addresses, points of interest, shops, restaurants, public transportation, hours of opening, guided tour, city transport info.
- **Politics**
  Multimedia in general and internet in particular are playing a big role in politics and virtual campaigning where every political candidate contesting in an election has a web site.

Education

- **Computer Aided Learning**
  - To assist student through simulation for better understanding such as volcano eruption, corrosion, language pronunciations, etc.
- **Virtual Campus**
  - Learning takes place in a virtual classroom using video conferencing and online lecture so that the students all around the world can attend.

Broadcasting and Entertainment

- **Electronic Catalogue**
  Product features and descriptions are advertised through web, CD and mobile devices.
- **Interactive Movie**
  - Viewers can decide the direction of the plot of the movie and camera angle.
- **On-demand News or movies**
  - News, movies and TV series can be watched on demand through web and mobile devices.
- **3D or animated movies**
  - Movies created through advanced 3D technology and animation techniques.
- **Video Games**
  - Advances in the field of multimedia have led to more attractive video and computer games being available now in the consumer market.
- **Virtual Reality**
  - Virtual reality refers to the use of computer to immerse the user into a simulated experience that it seems real. Virtual reality systems often use special hardware to enhance the experience, including visual displays.

Health

- **Virtual Surgery**
  - Virtual surgery authoring system has been created for producing surgical training simulation.
  - Surgeons can use 3-D images created from magnetic resonance imaging (MRI) scans of the human body to practice complicated procedures.

Features of Multimedia

Multimedia Presentation

- It may be viewed in person on stage, projected, transmitted, or played locally with a media player.
- A **broadcast** may be a live or recorded multimedia presentation
- Digital Online Multimedia and Streaming Multimedia
- It refers to a method of conveying information or entertainment using a combination of different media types, such as text, images, audio, video, and interactive elements. These presentations can be delivered in various ways, depending on the context and audience preferences. Here's a further explanation of the statement you provided

Viewed in Person on Stage: In this scenario, a multimedia presentation is delivered live to an audience gathered in a physical location, such as a conference hall, classroom, or auditorium. The presenter interacts directly with the audience, using visual aids, slides, videos, and other multimedia elements to enhance the presentation and engage the viewers.

Projected: Multimedia presentations can be projected onto large screens using projectors. This allows for a larger audience to view the presentation simultaneously, making it suitable for conferences, seminars, workshops, and other events where participants are seated in a shared space.

Transmitted: With advancements in technology and the widespread availability of high-speed internet connections, multimedia presentations can be transmitted or broadcasted over networks. This includes live streaming of presentations, webinars, or video conferences, allowing remote participants to view the presentation in real-time from anywhere with internet access.

Played Locally with a Media Player: Multimedia presentations can also be played locally on electronic devices using media players or presentation software. This could involve distributing the presentation files (e.g., PowerPoint slides, video files) via email, USB drives, or online platforms for individuals to view at their convenience on their computers, tablets, or smartphones.

Digital Online Multimedia: Digital online multimedia just means any kind of stuff you see or hear online, like videos, pictures, articles, or interactive things. It's basically anything you come across while browsing the internet, whether it's a website, a video on YouTube, a post on social media, or an online magazine.

Streaming Multimedia: Streaming multimedia is like watching a video or listening to music online without having to download the whole thing first. Instead of waiting for the whole video or song to download, you can start watching or listening right away as it plays or streams over the internet. It's like watching a movie on Netflix or listening to songs on Spotify - you click play, and it starts playing instantly without you having to wait for it to finish downloading.

So, in simple terms, digital online multimedia is all the different kinds of content you see on the internet, and streaming multimedia is specifically about watching or listening to things online without waiting for them to download completely.

Multimedia Games and Simulations
- may be used in a physical environment with special effects, with multiple users in an online network, or locally with an offline computer, game system, or simulator.

Multimedia Games and Simulations are interactive experiences that use various forms of media like graphics, sound, and sometimes even touch or motion sensors. These are often used for entertainment, education, or training purposes. Here's how they can be used in different settings:

Physical Environment with Special Effects: This means these games or simulations can be set up in real-world locations, like theme parks or interactive exhibits, where special effects such as lighting, sound effects, or physical props enhance the experience. For example, a theme park ride might use multimedia elements like screens, sound effects, and animatronics to create an immersive experience.

Multiple Users in an Online Network: These games or simulations can also be played online with other people over the internet. Players can interact with each other, collaborate, or compete in virtual environments. Examples include multiplayer online games like Fortnite or virtual world platforms like Second Life.

Locally with an Offline Computer, Game System, or Simulator: Alternatively, these games or simulations can be played offline on a single computer, game console, or simulator device without needing an internet connection. Players interact with the game or simulation locally, without the need for online connectivity. This could include single-player video games, offline educational simulations, or training programs that run on standalone devices.

Stages of Multimedia Application Development

Planning and Costing
- This stage of multimedia application is the first stage which begins with an idea or need.
- It is also necessary to estimate the time needed to prepare all elements of multimedia and prepare a budget accordingly.

Designing and Producing
- The next stage is to execute each of the planned tasks and create a finished product.

Testing
- Testing a project ensure the product to be free from bugs.
- Apart from bug elimination another aspect of testing is to ensure that the multimedia application meets the objectives of the project.

Delivering
- The final stage of the multimedia application development is to pack the project and deliver the completed project to the end user.

Images

Creation of Multimedia Images
- Images obviously play a very important role in multimedia products. (Images may be photograph-like bitmaps, vector-based drawings, or 3D renderings)
- The type of still images created depends on the display resolution, and hardware and software capabilities.
- Access to the right tools and right hardware for image development is important!
(E.g., graphic designers like to have large, high-resolution monitors or multiple monitors)

Types of Still Images

Bitmaps
- Bitmap is derived from the words ‘bit’, which means the simplest element in which only two digits are used, and ‘map’, which is a two-dimensional matrix of these bits.
- A bitmap is a data matrix describing the individual dots of an image that are the smallest elements (pixels) of resolution on a computer screen or printer.

Bit: A bit is the simplest unit of data in computing. It can only have one of two values, typically represented as 0 or 1.
Map: In this context, a map refers to a two-dimensional arrangement of elements. Think of it like a grid or a matrix.
Bitmap: When you combine "bit" and "map", you get "bitmap". A bitmap is essentially a way to represent an image or graphical data using a grid of binary values (0s and 1s). Each binary value in the grid corresponds to a pixel in the image. A value of 0 might represent one color, while a value of 1 might represent another color, for example.

So, in simpler terms, a bitmap is like a grid where each square (pixel) can either be on or off, representing different parts of an image. It's a basic way of storing and displaying digital images.

- Bitmaps are an image format suited for creation of:
    - Photo-realistic images
    - Complex drawings
    - Images that require fine detail
- Bitmapped images are known as paint graphics
- Bitmapped images can have varying bit and color depths.
- More bits provide more color depth hence more photo-realism; but require more memory and processing power.

Bit Depth	Number of Colors Possible	Available Binary Combinations for Describing a Color
1-bit	2	0, 1
2-bit	4	00, 01, 10, 11
4-bit	16	0000, 0001, 0011, 0111, 1111, 0010, 0100, 1000, 0110, 1100, 1010, 0101, 1110, 1101, 1001, 1011

- **Monochrome** just require one bit per pixel, representing black or white
- **8 bits** per pixel allows 256 distinct colors
- **16 bits** per pixel represents 32K distinct colors (Most graphic chipsets now supports the full 65536 colors and the color green uses the extra one bit)
- **24 bits** per pixel allows millions of colors
- **32 bits** per pixel allows trillion of colors

- Bitmaps picture and their suitability of use:
    - Use the native Microsoft bmp format as a raw image that will later be processed. It faster to process.
    - Use JPEG, for photo sharing on the web because of its size and quality.
    - GIF is normally used for diagrams, buttons, etc., that have a small number of colours.
    - PNG is almost equal to gif except that it didn't support the animation format.

Bitmaps can be inserted by:
Using Clip Art Galleries
- A clip art gallery is an assortment of graphics, photographs, sound, and video.
- Clip arts are a popular alternative for users who do not want to create their own images.
- Clip arts are available on CD-ROMs and on the internet.
- Legal rights:
    1. Public domain image
    2. Royalty free image
    3. Right manages image

Using Bitmap Software
- The industry for bitmap painting and editing programs are:
    1. Adobe's Photoshop and Illustrator
    2. Macromediea's Fireworks
    3. Corel's Painter
    4. CorelDraw
    5. Quark Express

Capturing and Editing Images
- Capturing and storing images directly from the screen is another way to assemble images for multimedia.
- The PRINT SCREEN button in Windows and COMMAND-CONTROL-SHIFT-4 keystroke on the Macintosh copies the screen image to the clipboard.
- Clipboard: a temporary memory to store the COPY, CUT and PASTE data
- Image editing programs enable the user to:
    1. Enhance and make composite images
    2. Alter and distort images
    3. Add and delete elements
    4. Morph (manipulate still images to create animated transformations)

Low resolution photo
- Any picture found on the web normally are low resolution and not suitable for print quality.
- A picture that is low-resolution cannot be made into a high resolution photo.
High resolution photo
- A high resolution picture is determined by its number of pixels; more pixels improves the sharpness of the picture.
- This is print quality.

Scanning Images
- Users can scan images from conventional sources and make necessary alterations and manipulations

Applications of Vector-Drawn Images

Vector-drawn images
- Created from geometric objects such as lines, rectangles, ovals, polygons using mathematical formulas.
- Are used in the following areas:
    - Computer-aided design (CAD) programs.
    - Graphic artists designing for print media.
    - 3-D animation programs
    - Applications requiring drawing of graphic shapes

How Vector-Drawn Images Work
- A vector is a line that is described by the location of its two endpoints.
- Vector drawing makes use of Cartesian co-ordinates
- Cartesian coordinates are numbers that describe a point in two or three-dimensional space as the intersection of X, Y, and Z axis.

Vector-Drawn Images VS Bitmaps
- Vector images cannot be used for photorealistic images
- Bitmaps are not easily scalable and resizable
- Bitmaps can be converted to vector images using autotracing.

3-D Drawing and Rendering

- 3D graphics tools, such as Macromedia Extreme 3D, or Form-Z, typically extend vector-drawn graphics in 3 dimensions (x, y and z)
- A 3D scene consists of object that in turn contain many small elements, such as block, cylinders, spheres or cones (described in terms of vector graphics)
- The more elements, the finer the object's resolution and smoothness.
- Objects as a whole have properties such as shape, color, texture, shading & location.
- A 3D application lets you model an object's shape, then render it completely.

Features of a 3-D Application
Modeling
- involves drawing a shape, such as a 2D letter, then extruding it or lathing it into a third dimension.
  - **extruding** – extending its shape along a defined path
  - **lathing** – rotating a profile of the shape around a defined axis
- It also deals with lighting, setting a camera view to project shadows

Rendering
- produces a final output of a scene and is more compute-intensive.
- Animation, drawing, and rendering tools include:
  - Ray Dream Designer
  - Caligari True Space 2
  - Specular Infini-D
  - Form*Z
  - NewTek's Lightwave

Natural Light and Color
- Light comes from an atom where an electron passes from a higher to a lower energy level.
- Each atom produces uniquely specific colors.
- Color is the frequency of a light wave within the narrow band of the electromagnetic spectrum, to which the human eye responds.
- Eye can differentiate 80,000 different colors.
- Color and Culture
- Color and Emotion

Computerized Color
- The tools we use to describe color are different when the color is printed than from when it is projected

2 basic method of making color
Additive Color
- In the additive color method, a color is created by combining colored light sources in three primary colors – red, green, and blue (RGB).
- OLD TV and computer monitors use this method.

Subtractive Color
- In the subtractive color method, color is created by combining colored media such as paints or ink.
- The colored media absorb (or subtract) some parts of the color spectrum of light and reflect the others back to the eye.
- Subtractive color is the process used to create color in printing.
- The printed page consists of tiny halftone dots of three primary colors- cyan (complement of Red), magenta (complements of Green), and yellow (complement of Blue) (CMY).

Monitor-Specific Colors
- Colors should be used according to the target audience's monitor specifications.
- The preferred monitor resolution is higher 1024x768 pixels and higher.
- The preferred color depth is 24 bits or more which can display 16,777,216 different colors.

Computer Color Models
- Different ways of representing information about color.
- models used to specify color in computer terms are:
  - **RGB model** - A 24-bit methodology where color is specified in terms of red, green, and blue values ranging from 0 to 255.
  - **HSB and HSL models** – Color is specified as an angle from 0 to 360 degrees on a color wheel.
  - Other models include **CMYK, CIE, YIQ, YUV**, and **YCC**.

Color Palettes
- Palettes are mathematical tables that define the color of pixels displayed on the screen.
- Palettes are called 'color lookup tables' or CLUTs on Macintosh.
- The most common palettes are 1, 4, 8, 16, and 24-bit deep.

Dithering
- Dithering is a process whereby the color value of each pixel is changed to the closest matching color value in the target palette.
- This is done using a mathematical algorithm.

Images File Type used in Multimedia

Macintosh Formats
- On the Macintosh, the most commonly used format is PICT.
- PICT is a complicated and versatile format developed by Apple.
- Almost every image application on the Macintosh can import or export PICT files.

Windows Formats
- The most commonly used image file format on Windows is DIB or known as BMP.
- DIB stands for Device-independent bitmaps.

BMP - A Windows bitmap file.
- Native bitmap file format of the Microsoft Windows environment

TIFF - Extensively used in DTP packages.
- Used to exchange documents between different applications and platforms

PCX - Used by MS-DOS paint software.
- One of the oldest bitmapped formats popularized by MS-DOS paint programs that first appeared in the early 1980's

Cross-Platform Formats
- The image file formats that are compatible across platforms are:
  - **DXF, IGS or IGES** - Used by CAD applications.
  - **CDR – CorelDraw, PSD** – Photoshop n AI – Illustrator
  - **JPEG, PNG and GIF** - Most commonly used formats on the Web.

Most Popular Image File Formats
- **JPEG** (Joint-Photographic Experts Group)
  - For continuous tone images, such as full-color photographs
  - Supports more than 16 millions of color (24-bit)
  - Uses lossy compression (averaging may lose information)

- **GIF** (Graphical Interchange Format)
  - For large areas of the same color and a moderate level of detail.
  - Supports up to 256 colors
  - Allows transparency and interlacing
  - Uses lossless compression

- **PNG** (Portable Network Graphic)
  - lossless, portable, well-compressed storage of raster images
  - patent-free replacement for GIF
  - also replace many common uses of TIFF
  - Support indexed-color, grayscale, and true color images + an optional alpha channel for transparency

- Other formats: **BMP, PSD, TIFF/TIF, TGA, EPS, PCX, ICO**

Information Delivery

- Images or Graphics are used to convey information in multimedia products.
- Images or Graphics for information delivery include:
  - Drawn images
  - Charts and graphs
  - Maps
  - Scenery
  - People
- In each case, the image must be relevant to the overall product.
- Image size, color in respect to the application and other images, and positioning must all be considered when using images.

Good luck, CS 1-2!