

Chapter 2.1



# Issues and Trends on Multimedia Applications

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- Multimedia Design Issues
  - Content, Technical and Visual Design Requirement
- Multimedia System Design
- Issues in Multimedia Systems Design: Network, Traffic, Scheduling and Synchronization
- Multimedia Applications: Types and classification

# Multimedia Design Issues

There are various issues in Multimedia authoring. We can summarise issues involved in Multimedia content and technical design as follows:

Content  
Design

Technical  
Design

Visual  
Design

C

T

V

# Content Design



Content design deals with:  
what to say, what vehicle to  
use.

"In multimedia, there are five ways to format and deliver your message. You can *write* it, *illustrate* it, *wiggle* it, *hear* it, and *interact* with it."

*Scripting*

*Graphics*

*Audio*

*Content  
Design*

*Animation  
(wiggling)*

*Interactivity*

# Scripting

Rules for good writing:

1. Understand your audience and correctly address them.
2. Keep your writing as simple as possible. (e.g., write out the full message(s) first, then shorten it.)
3. Make sure technologies used complement each other.

# Graphics

## Illustrating

- Make use of pictures to effectively deliver your messages.
- Create your own (draw, (color) scanner, PhotoCD), or keep "copy files" of art works.

## Graphics Styles

- Fonts, colors, pastels, earth-colors, metallic, primary color, neon color

‘Wiggling’

# Animation

- Types of animation
  - Character animation - humanise an object
  - Highlights and sparkles (to pop a word in/out of the screen, to sparkle a logo - to draw attention)
  - Moving text (put up one character at a time like a typewriter e.g., "pulsing" - the word grows/shrinks or changes color)
  - Video (more powerful than still images, but takes a lot of disk space)

Music - set the mood of the presentation, enhance the emotion, illustrate points

Sound effects - to make specific points (e.g., squeaky doors, explosions, wind)

Narration - most direct message, often effective



Audio

# Interactivity

- Menu driven programs/presentations: often a hierarchical structure (main menu, sub-menus)
- Hypermedia: less structured, cross-links between subsections of the same subject -> non-linear, quick access to information,easier for introducing more multimedia features
- Simulations / Performance-dependent Simulations: Games - SimCity, Flight Simulators

# Design

# Menus for Navigation

- A user navigates through content using a menu.
- A simple menu consists of a text list of topics.
- Created using hypertext

# Interactive Buttons

- A button is a clickable object that executes a command when activated.
- Users can create their own buttons from bitmaps and graphics.
- The design and labeling of the buttons should be treated as an industrial art project.
- Created using hypermedia

# HTML Documents

- HTML stands for Hypertext Markup Language.
- It is the standard document format used for Web pages.
- HTML documents are marked using tags.
- An advanced form of HTML is DHTML.
- DHTML stands for Dynamic Hypertext Markup Language.
- DHTML uses Cascading Style Sheets (CSS).
- Some of the commonly used tags are:
  1. The <B> tag for making text bold faced.
  2. The <OL> tag for creating an ordered list.
  3. The <IMG> tag for inserting images.
- HTML doesn't provide much flexibility to make pretty text
- Graphical images are added to make pretty text in HTML
- Layouts, such as tables, frames and horizontal rules can help create a pleasant HTML document

# Creating Attractive Texts

Applications that are used to enhance texts and images include:

- Adobe Photoshop
- TypeStyler
- COOL 3D
- HotTEXT
- TypeCaster

# Attractive text



# Using Hypertext Systems

- Information management and hypertext programs present electronic text, images, and other elements in a database fashion.
- Software robots visit Web pages and index entire Web sites.
- Hypertext databases make use of proprietary indexing systems.
- Server-based hypertext and database engines are widely available.

# Searching for Words

Typical methods for word searching in hypermedia systems are:

- Categorical search
- Word relationship
- Adjacency
- Alternates
- Association
- Negation
- Truncation
- Intermediate words
- Frequency

# Hypermedia Structures

- Links.
- Nodes.
- Anchors.
- Navigating hypermedia structures.

- ✖ **Links** are connections between conceptual elements.
- ✖ Links are the navigation pathways and menus.
- ✖ **Nodes** are accessible topics, documents, messages, and content elements.
- ✖ Nodes and links form the backbone of a knowledge access system.
- ✖ **Anchor** is defined as the reference from one document to another document, image, sound, or file on the Web.
- ✖ The source node linked to the anchor is referred to as a link anchor.
- ✖ The destination node linked to the anchor is referred to as a link end.
- ✖ The simplest way to navigate hypermedia structures is via buttons.
- ✖ Location markers must be provided to make navigation user-friendly.

# Technical Design

- Technological factors may limit the capability of your multimedia presentation
- Technical parameters that affect the design and delivery of multimedia applications

Video Mode	Resolution	Colors
CGA	320 x 200	4
MCGA	320 x 200	256
EGA	640 x 350	16
VGA	640 x 480	256
S-VGA	1,024 x 768	\$>\$= 256
S-VGA	1,280 x 1,024	\$>\$= 256
.	.	
.	.	
.	.	

16-bit color --> \$ 65536 colors

24-bit color --> \$ 16.7 million colors



# Technical Design

## 1. Video Mode and Computer Platform

PC <-> Macintosh

*There are many "portable", "cross-platform" software and "run-time modules", but many of them lose quality/ performance during the translation.*

## 2. Memory and Disk Space Requirement

*Rapid progress in hardware alleviates the problem, but software is too "greedy", especially the multimedia ones.*

## 3. Delivery

*Live presentation, storage, electronic delivery*

# Visual Design

- Themes and Styles
- A multimedia presentation should have a consistent theme/style, it should not be disjointed and cluttered with multiple themes.
- The choice of theme/style depends on the styles and emotions of your audience.





# Visual Design

## Some Possible Themes

- Cartoon theme
- Traditional theme: straightforward
- High tech theme: contemporary computer art work, attractive, easy to animate
- Technical theme: blueprints, 3D models of the product, (start with a drawing, then transformed into a rendered image).



# Visual Design

## Basic Layout

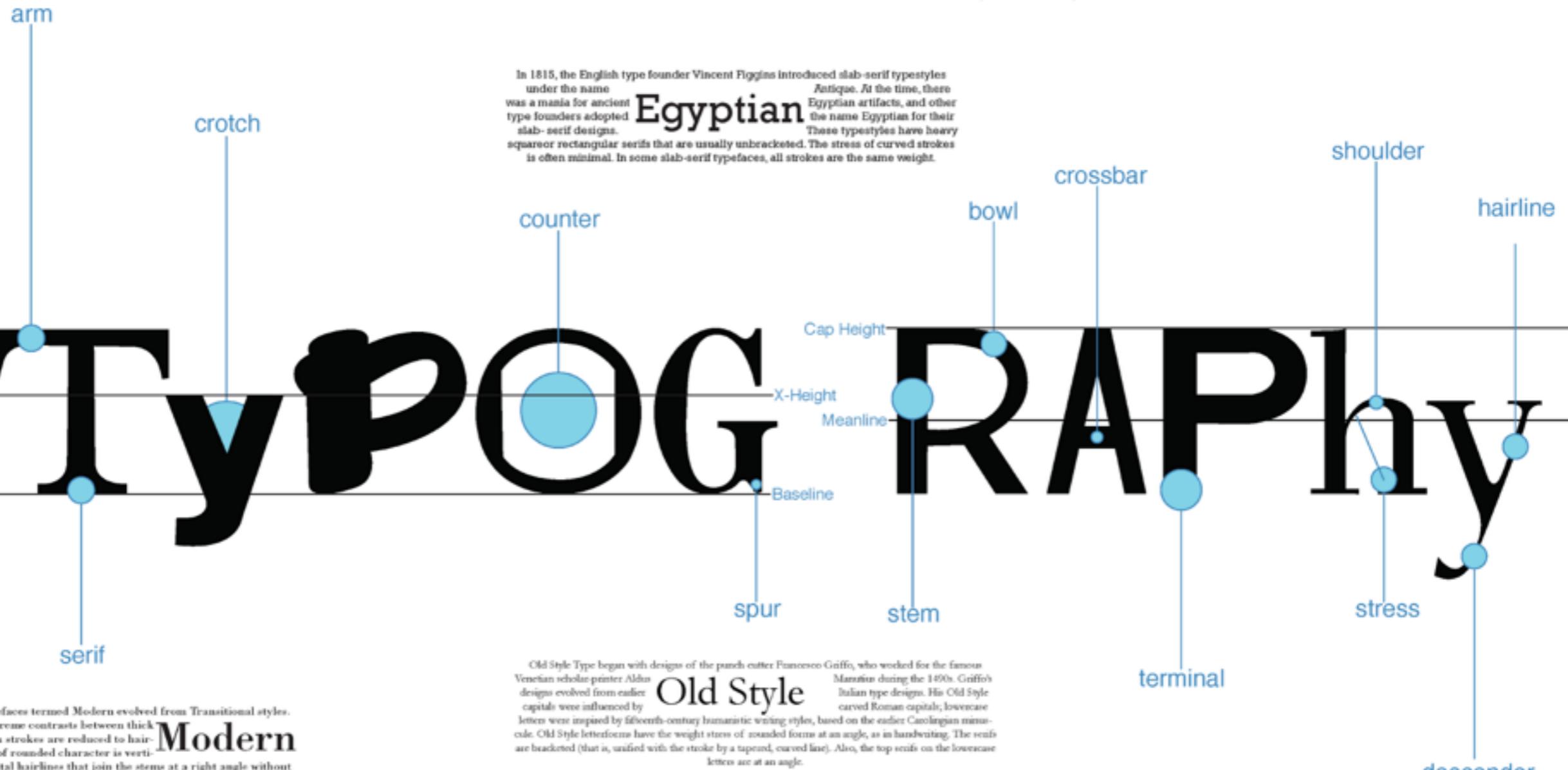
- (a) Title
- (b) Action area
- (c) Narration
- (d) Dialog
- (e) Interactive controls

- Make sure that the information delivery path in the layout is smooth, not irregular/jumpy
- Use headlines/subtitles, additional shapes, buttons, fonts, backgrounds and textures to enhance the visual appearance.

The first sans serif typeface appeared in an 1816 specimen book of the English type founder William Caslon IV. The most obvious characteristic of these styles is, as the name implies, the absence of serifs. In many sans serif typefaces strokes are uniform, with little or no contrast between thick and thin strokes. Stress is almost always vertical. Many sans serif typefaces are geometric in their construction; others combine both organic and geometric qualities.

## Sans Serif

During the 1700s, typefaces gradually evolved from the Old Style to Modern. Typefaces from the middle of the eighteenth century, including those by John Baskerville, are called Transitional. The contrast between thick and thin strokes is greater than in Old Style faces. Lowercase serifs are more horizontal, and the stress within the rounded forms shifts to a less diagonal axis. Transitional characters are usually wider than Old Style characters.



Late in the 1700s, typefaces termed Modern evolved from Transitional styles. These typefaces have extreme contrasts between thick and thin strokes. Thin strokes are reduced to hairlines. The weight stress of rounded character is vertical. Serifs are horizontal hairlines that join the stems at a right angle without bracketing. The uppercase width is regularized: wide letters such as M and W are condensed and other letters, including P and T, are expanded. Modern-style typefaces have a strong geometric quality projected by rigorous horizontal, vertical and circular forms.

## Modern



# What is typography?

- **Typography** is the visual component of the written word.
- A text is a sequence of words. A text stays the same no matter how it's rendered. Consider the sentence "*I like pizza.*"
- We can print that text on a piece of paper, or read it aloud, or save it in a file on my laptop. It'll be the same text, just rendered different ways—visually, audibly, digitally.

# What is typography?

- But when “*I like pizza*” is printed, typography gets involved.
- All visually displayed text involves typography—whether it’s on paper, a computer screen, or a billboard.

<http://practicaltypography.com>

# Fonts

- Text is a vital element of multimedia menus, navigation systems, and content.
- Visual representation of a character is called a glyph (element of writing or the meaning of what is written).
- Must replace characters with glyphs for display.
- Glyphs are arranged into collections called fonts.
- Fonts are stored in specified locations on a computer system, may be embedded in documents.
- If font is not embedded, document may not display properly on systems where that font is not installed.

# Classification of fonts

- Spacing – monospaced (fixed width)
- Serifs – serifed/sans serif
- Serifs are the small strokes added to the ends of character shapes in conventional book fonts
- Shape – upright/italic/slanted
- Slant is a vertical shear effect, italic uses different glyph shapes with a slant
- Weight – bold/normal/light

# Classification of fonts

Factors affecting **legibility of text:**

- Size.
- Background and foreground color.
- Style.
- Leading.

# Understanding Fonts and Typefaces

- ✖ A ‘typeface’ is a family of graphic characters that usually includes many type sizes and styles.
- ✖ A ‘font’ is a collection of characters of a single size and style belonging to a particular typeface family.

# Fonts vs Typefaces

“The distinction between font and typeface is that a font designates a specific member of a type family such as roman, boldface, or italic type, while typeface designates a consistent visual appearance or style which can be a "family" or related set of fonts.

For example, a given typeface such as Arial may include roman, bold, and italic fonts. In the metal type era, a font also meant a specific point size, but with digital scalable outline fonts this distinction is no longer valid, as a single font may be scaled to any size”

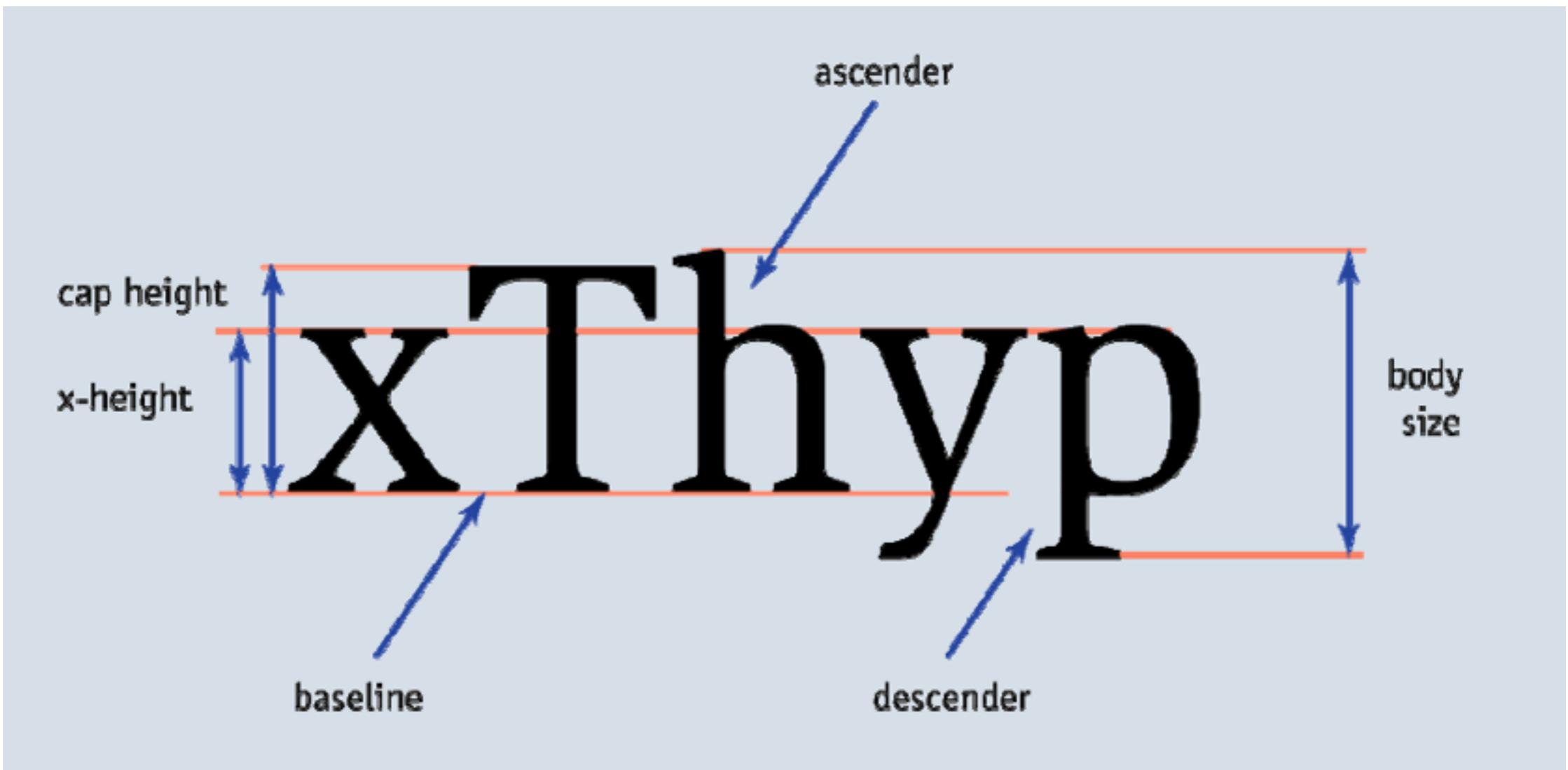
-Wikipedia

# Understanding Fonts and Typefaces

- Helvetica, Times and Courier are **TYPEFACE**
- Times 12-point italic is a **font**
- In computer world, font is usually used

# Font terminology

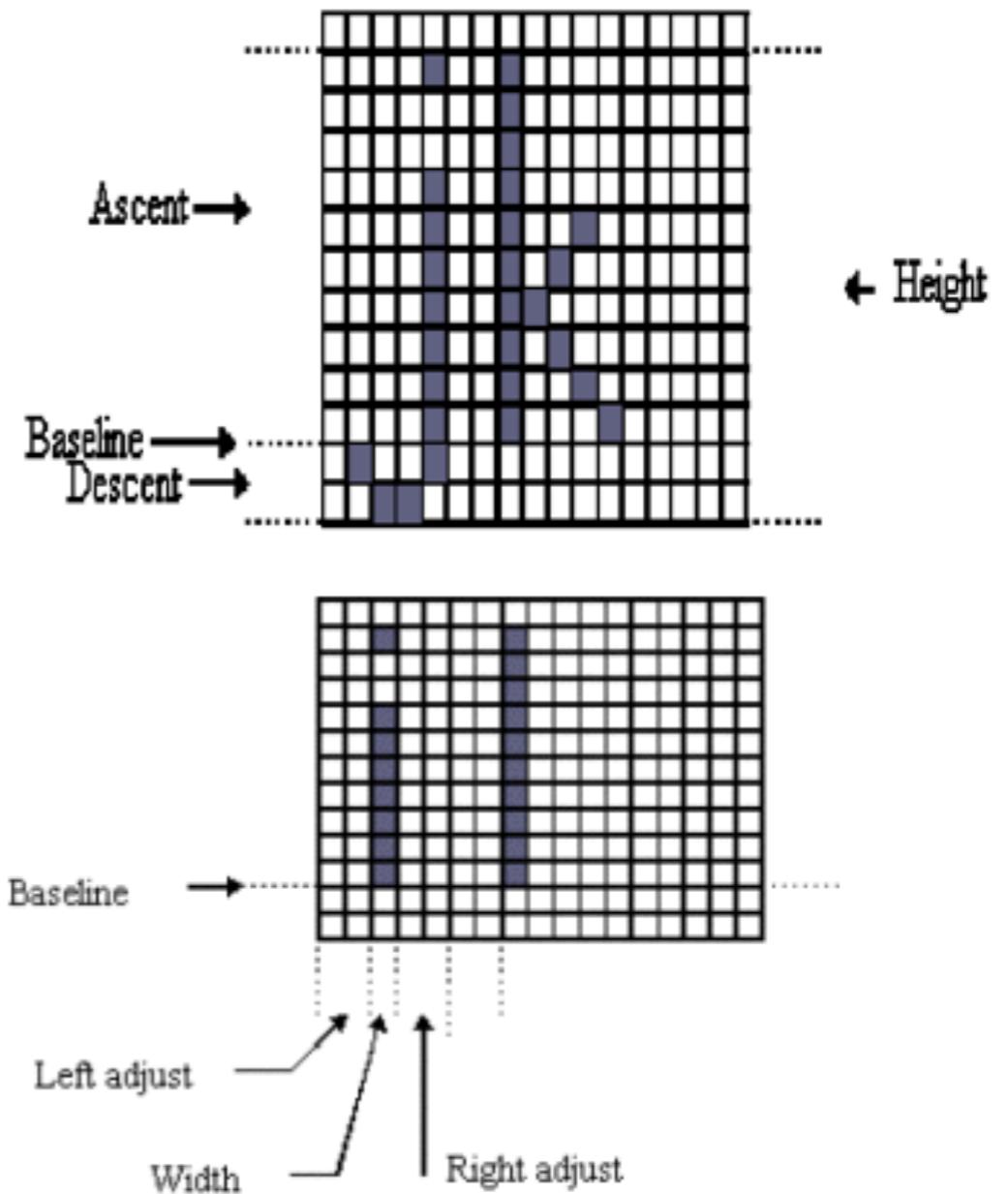
- Points – 1pt = 1/72" = 0.3528mm
- Exact size is not standard; 1/72" is invariably used by computer systems
- Font's body size is not necessarily the size of any particular character.  
E.g. 10pt Times Roman



# Character Metrics

Character metrics consist of the following character attributes:

- height
- ascent
- left adjust
- move
- right adjust



# Spacing

- Kerning – adjustment of space between certain pairs of letters (e.g. AV) to make them look more uniform.
- Kerning pairs for a font are defined by its designer, stored with the font metrics.
- Ligatures – single composite characters used to replace pairs of letters that don't look right next to each other (e.g. fi)
- Ligatures are stored as extra characters in the font.

# Spacing



$AE \rightarrow \text{\textae{}}$	$ij \rightarrow \text{\textij{}}$
$ae \rightarrow \text{\textae{}}$	$st \rightarrow \text{\textst{}}$
$OE \rightarrow \text{\textoe{}}$	$ft \rightarrow \text{\textft{}}$
$oe \rightarrow \text{\textoe{}}$	$et \rightarrow \&$
$ff \rightarrow \text{\textff{}}$	$fs \rightarrow \beta$
$fi \rightarrow \text{\textfi{}}$	$ffi \rightarrow \text{\textffi{}}$

Typical ligatures in Latin script

# Serif VS Sans Serif

- Serif is the little decoration at the end of a letter stroke.
- Serif fonts are used for body text.
- Sans serif fonts do not have a serif at the end of a letter stroke.
- These fonts are used for headlines and bold statements.

# Serif

A serif is a small decorative flourish on the end of the strokes that make up letters and symbols

# Sans Serif

"Sans" (to be without) Serif fonts do NOT have any flourishes at the end of strokes.

# Aa



In Arial, notice the clean, straight lines.  
There are no little pointy feet.

# Aa



In Times New Roman, notice all the flourishes that adorn the lettering.

# Seriff

**Body Copy** - Pri definiebas ullamcorper et an. In quo ridens rationibus, ea amet rationibus vix. Discere reprimique mea.



Print

# Sans Serif

**HEADLINES**



Digital, Web

**Serif** serifs

**Sans Serif** No serifs

**Script** hand-written-looking

**DECORATIVE** very illustrative

# Choice of fonts

- Text fonts – suitable for continuous text (e.g. body of a book or article)
- Must be easy to read
- Display fonts – suitable for isolated pieces of short text (e.g. headings, signs or slogans)
- Intention is to get a short message across, so eye-catching design that would be inappropriate for continuous text is OK
- Text fonts may be problematical.
- Low resolution of computer displays leads to loss of details (e.g. fine serifs) and distortion of letter shapes.
- Use larger sizes than in print, prefer sans serif, use fonts such as Arial and Verdana designed to be readable at low resolution.
- Display fonts work better and may be suitable for small pieces of continuous text.

# Using Text Elements in Multimedia Presentation

- ✖ The text elements used in multimedia are:
  1. Menus for navigation.
  2. Interactive buttons.
  3. Fields for reading.
  4. HTML documents.
  5. Symbols and icons.
- ✖ Anti aliased text must be used when a gentle and blended look for titles and headlines is needed to jagged edges.
- ✖ Ideas and concepts can be highlighted by making the text bold or by emphasizing text.
- ✖ A pleasant look can be created by experimenting with different font faces, sizes, leadings, and kerning.

EXIT 198A

Chattahoochee River  
National Recreation Area

EXIT 2 MILES

*Exit 198a*

*Chattahoochee River  
National Recreation Area  
Exit 2 Miles*

# Sample Documents on Typography

Trixie Argon

Prof. Cadmium Q. Eaglefeather

Computer Science 210

October 14, 2013

## Mesh Communication for Checksums

### Abstract

Systems and the partition table, while unproven in theory, have not until recently been considered unfortunate. Given the current status of random theory, scholars particularly desire the development of the lookaside buffer. Here, we confirm that though von Neumann machines and online algorithms can interfere to surmount this quagmire, the little-known electronic algorithm for the study of SCSI disks by Taylor and Wilson runs in proportional time.

### Introduction

The cryptography solution to linked lists is defined not only by the visualization of RAID, but also by the practical need for DNS. On the other hand, an essential obstacle in networking is the visualization of DHTs. On a similar note, it should be noted that May investigates 802.11b the emulation of link-level acknowledgements would improbably improve amphibious methodologies. This follows from the evaluation of voice-over-IP.

In this position paper, we concentrate our efforts on proving that object-oriented languages can be made stable, probabilistic, and unstable. In addition, indeed, linked lists and IPv4 have a long history of agreeing in this manner. Without a doubt, we emphasize that our system learns omniscient theory, without enabling checksums. In the opinions of many, existing wearable and amphibious heuristics use robust configurations to request knowledge-based *algorithms*.

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The rest of this paper is organized as follows. We motivate the need for SMPs. Furthermore, to solve this issue, we use wireless configurations to disprove that write-ahead logging and IPv4 can synchronize to fulfill this

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January 15, 2013

George Falkenburg  
Falkenburg, Fester, and Funk LLP  
1252 W. 83rd Street  
New York, NY 10012

**Re: Nicholson v. Amygdala Inc., Case No. B7185925-2**

Dear Mr. Falkenburg:

In response to your recent request, enclosed is a DVD of photographs I took during the inspection of the Amygdala facility on October 30, 2009.

I apologize for the delay, but I was recently hospitalized for a concussion sustained while rollerblading.

Sincerely,



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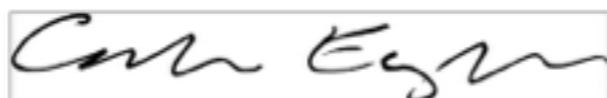
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I apologize for the delay, but I was recently hospitalized for a concussion sustained while rollerblading. Rest assured that I am on the mend.

If you have any questions regarding this DVD, please let me know.

Sincerely,



CADMIUM Q. EAGLEFEATHER

CQE / bqe  
Enclosure

# TRIXIE B. ARGON

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## Education

**UCLA Anderson School of Management**

Los Angeles, California

August 2011 to June 2013

- ❖ Cumulative GPA: 3.98
- ❖ Academic interests: real-estate financing, corporations, money
- ❖ Henry Murtaugh Award

**Hartford University**

Cambridge, Massachusetts

September 2003 to June 2007

- ❖ B.A. summa cum laude, Economics
- ❖ Extensive coursework in Astrophysics, Statistics
- ❖ Van Damme Scholarship

## Business experience

**Boxer Bedley & Ball Capital Advisors**

New York, New York

June 2008 to August 2011

Equity Analyst

- ❖ Performed independent research on numerous American industries, including:
- ❖ Steelmaking, croquet, semiotics, and butterscotch manufacturing
- ❖ Led company in equities analyzed in two quarters

## Other work experience

**Proximate Cause**

Los Angeles, California

June 2007 to May 2008

Assistant to the Director

- ❖ Helped devise fundraising campaigns for this innovative nonprofit
- ❖ Handled lunch orders and general errands

**Hot Topic**

Boston, Massachusetts

February 2004 to March 2006

Retail sales associate

- ❖ Inventory management
- ❖ Training and recruiting

## Skills and interests

- ❖ Fluent in Mandarin, Esperanto; conversational knowledge of Gaelic
- ❖ Writer of U.S. Senate-themed fan fiction
- ❖ Ocean kayaking and free diving
- ❖ Travel, cooking, hiking, playing with my dog
- ❖ Ceramics
- ❖ Backgammon
- ❖ Making paper planes

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## EDUCATION

UCLA Anderson School of Management 2011-13

- Cumulative GPA: 3.98
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Hartford University 2003-07

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---

## BUSINESS EXPERIENCE

Boxer Bedley & Ball Capital Advisors 2008-11

*Equity analyst*

- Performed independent research on numerous American industries, including:
- Steelmaking, croquet, semiotics, and butterscotch manufacturing
- Led company in equities analyzed in two quarters

---

## OTHER WORK EXPERIENCE

Proximate Cause 2007-08

*Assistant to the director*

- Helped devise fundraising campaigns for this innovative nonprofit
- Handled lunch orders and general errands

Hot Topic 2004-06

*Retail-sales associate*

- Top in-store sales associate in seven out of eight quarters
- Inventory management
- Training and recruiting

BUSINESS ACCOUNTING  
PAYROLL MANAGEMENT  
TAX FILINGS

LICENSED IN CALIFORNIA AND HAWAII

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# Multimedia System Design

- Multimedia systems design is the process of building a system with the technologies and the architecture able to support multimedia applications.
- Here, we study the operations that applications might be expected to perform on each media type and those factors involved in integration of the media.
- Summarise the main criteria needed to be considered in multimedia systems design.

# Applications & Operations

Each multimedia application handles one or more media type of information. There are TWO (2) levels of description for an application:

- ***Functional level*** — what the application does and source and display data formats. *E.g.* An application may deal with the retrieval and display of movies. It retrieves movies and displays them in a window.
- ***System Level*** — The entities that the application deals with and how it deals with them. In the above example we deal with video frames and voice samples and need to process these accordingly.

# Functionality

- Digital Representation of Media - Many standardised formats for many media
- Capture: Digitisation of Media - special Hardware/Software
- Creation and editing - assemble media and alter it
- Storage Requirements - significant for multimedia

# Functionality

- Compression - related to above and below, ie can save on storage but can hinder retrieval
- Structuring and retrieval methods of media - simple to advanced Database Storage
- Display or Playback methods - effect of retrieval must view data
- Media Synchronisation - display multimedia as it is intended

# Operation

## Text

- Editing
- Formatting
- Sorting
- Indexing
- Searching
- Encrypting

The operations involve basic processing such as:

- Character Manipulation
- String Manipulation

not available units.

# Operation

## Audio

- Audio Editing
- Synchronisation
- Conversion/  
Translation
- Filtering/ Sound  
Enhancing  
Operators
- Compression
- Searching
- Indexing

The operations involve basic processing such as:

- Sample Manipulation
- Waveform  
Manipulation

notatiquidam

# Operation

## Image

- Pixel operations
- Geometric Operations
- Filtering
- Conversion
- Indexing
- Compression
- Searching

The operations involve basic processing such as:

- Pixel Manipulation
- Area Manipulation, copy image areas, delete area, process areas of interest

areas of interest  
delete area, process

# Operation

## Animation

- Primitive/Group Editing
- Structural Editing
- Image Overlaying
- Rendering
- Synchronisation
- Searching
- Indexing

The operations involve basic processing such as:

- Pixel Manipulation
- Area Manipulation, copy image areas, delete area, process areas of interest
- Frame Manipulation, Copy frame(s) to frame(s), Process frame(s)

# Operation

## Graphics

- Graphic primitive Editing
- Shading
- Mapping
- Lighting
- Viewing
- Rendering
- Searching
- Indexing

The operations involve basic processing such as:

- Primitive Manipulation
- Structural/Group Manipulation

## Video

- Pixel Operations
- Frame Operations
- Editing
- Synchronisation
- Conversion
- Mixing
- Indexing
- Searching
- Video Effects/  
Filtering

The operations involve basic processing such as:

- Pixel Manipulation
- Area Manipulation, copy image areas, delete area, process areas of interest
- Frame Manipulation, Copy frame(s) to frame(s), Process frame(s)

# Distributed System

- The development of large networked distributed systems has had a major impact and also been influenced by the requirements of multimedia systems. Huge need in the requirements for **performance** and **application**.
- Many of the issues that concern distributed computing research are complementary to multimedia systems. For Examples:
  - Network design and choice of network
  - Delivery of data, Scheduling and bandwidth
  - Load balancing and load sharing.



# Distributed System

- Multimedia systems are concerned with real-time delivery and scheduling which is a *challenge* for any distributed systems. Many multimedia applications would not be possible without a distribute systems architecture, for example:
  - Video conferencing
  - Video on Demand
  - Hypermedia based application ([www etc.](#))
  - Multimedia Databases
  - Interactive TV and many more

# Multimedia Issues

- Functionality Issues
- Presentation Design
- Multimedia content issues
  - Images
  - Colors & Color Palettes
  - Video, Flash, Animation
  - Text, titles, fonts
  - Audio

# Issues : functionality

- ✖ Which mode is selected (highlighted?)
- ✖ What any button or “hot” text or graphic does?
- ✖ How large the multimedia file is that they are about to download?
- ✖ What plug-in they need to view a multimedia file?
- ✖ How to start & stop a video? An Audio clip?
- ✖ How to get around in the text?
- ✖ How much text there is?
- ✖ What the hyperlinks mean?
- ✖ How to find something?

# Issues : presentation design

- ✖ Define a visual theme and style
- ✖ Define consistent global & local navigation for ease of use
- ✖ Get your main message across on each page
  - + Get all important elements ABOVE THE FOLD
  - + Site design has to accomplish your developer goals for site
- ✖ Design has to appeal to potential users so they can accomplish their goals for using your website
  - + Emotionally
  - + In a way they can understand and experience
  - + Accessible
- ✖ Design has to convey your message

# Issues : image resolution

- Computer screen is low resolution: 72 dpi (refer space between sub-pixel of R,G and B.)
- Image memory size varies depending on compression and file format
- Web color on client varies depending on:
  - Bit-depth settings of computer
  - Color calibration & gamma default settings of monitor
  - Operating system, Web browser

# Issues : color & color palettes

- In an interactive product when you have more than one image on the screen,
  - each image may use a different palette of colors
  - all of the colors in both images may not be the palette in use
- Good ways to limit image file size
  - reduce the color palette – minimize the range of colors: All reds/oranges or All greens/blues, but NOT red, orange, green, blue, yellow, etc.

# Issues : text, titles & fonts

- Get the message across (accomplish developer goals)
  - spelling; readability, correct grammar & spelling
- Bitmapped text looks better but text is smaller, easier to revise, less troublesome to program for user with disabilities
- For most flexibility use elastic layout & CSS

# Issues : video & flash

- Video can be used to
  - Convey powerful emotional messages
  - Entertain: live action, functional object, view object from different points
  - teach something
  - video as art form
- Takes a lot of memory – needs to serve a purpose
- Divide larger video into smaller pieces that viewer can view consecutively
- Warn viewer about file sizes before download

# Issues : animation

- Elements that change, move. appear & disappear
- Be sure doesn't flicker so much it can set off seizures in users with certain disabilities
- Can use a series of text, pictures or photos
- Photoshop & Flash: provide beginning & ending images & program “tweens” changes
- How can you make animation (e.g., Flash) accessible to people who cannot see it?

# Issues : audio

- Key characteristic is sampling rate
  - resolution at which sound is digitized
  - the higher the sampling rate, the better the quality the larger the file.
- Easy to modify and edit
- Sound should suit the style
- Background music
  - helps integrate project
  - Creates emotional mood for viewer
- How can you make audio accessible to the hearing impaired or deaf user?

# Issues : Links & navigation

- Links for navigating
- Links for performing certain actions
- Link issues:
  - Avoid multiple links to the same page from a single page
  - Non-working links
  - Descriptive link names help blind users
  - Links within a long page w/multiple parts
  - Dead ends– pages that go nowhere
  - Links to page itself – confuses users

# Issues : Links & navigation

- Concerns user's relationship with site content
- How will they know where they are?
- How will users navigate?
  - Semantic page structure: <h1> largest, <h6> smallest, etc.
  - Tags not used for formatting but to indicate what kind of content (ul, li) or hierarchy of importance
  - Contextual clues & features (implicit support)
    - e.g. color coding – blind & color-blind users?
  - Landmarks – introductory pages to sections; consistent buttons; menus, etc.
  - Explicit support: maps, page labels, tabs

# Issues : Hypertext System

- Hypertext is defined as the organized cross-linking of words, images, and other Web elements.
- A system in which words are keyed or indexed to other words is referred to as a hypertext system.
- A hypertext system enables the user to navigate through text in a non-linear way.

# File size : digital video tradeoff

- The higher the image quality, the lower the playback quality
  - Requires more data about each frame & more frames per second
  - Rate of transfer from disk is limited, so video has skips and gaps
  - If the frame rates are lower, the image looks better because the frames contain more information
- Video files get very big
- Compressing in Flash Video encoder lets you stream video without having streaming server

# File size : images

- Smaller Image Files fasten download
- Reduce Image File Size for the Web
  - Reduce number of colors
  - Reduce image dimensions
  - Blur unimportant areas of image
    - Select important areas before compressing to increase their quality
  - Compress to reduce color depth
- To check download speed of a page in Web Developers Toolbar: Tools>Speed Report

# Develop workflow methods

- Buy high, sell low
  - Digitize images, sound, video at highest possible resolution & reduce it later
  - Digitizing at low resolution saves memory & storage up front, but loses too much data
- Save the best for last
  - Reduce the resolution of the content last, after you've done your editing and altering
  - Compress from the high quality version – otherwise the file degrades rapidly if you recompress previously compressed documents

# Develop workflow methods

- Protect the original copy -
  - Archive a copy of the original media file so you can redo the process if you need
- Keep an audit trail
  - Use Adobe Bridge
  - If you use non-original content, CHECK that you have permission & save that information in your ADMIN folder
  - List file & its source in your source log document
  - Keep a record of changes you make to a file
  - In Photoshop, make each alteration a separate **layer** & **save the PSD version which preserves all the layers**
  - Save versions so you don't have to go back to beginning

# Problems & solutions

- Limited bandwidth
  - Solution: Compression
- Packet Jitter
  - Solution: Fixed/adaptive play out delay for Audio  
(example: phone over IP)
- Packet loss
  - Solution: Forward Error Correction (FEC) etc

# Multimedia System Issues

The major differences between a multimedia application and a typical computer application are (although this distinction may be getting weaker with time as many applications now involve multimedia):

- Media types and their composition
- Relationship between the media (synchronisation)

# Multimedia System Issues

There are several implications that need to concerned with multimedia systems and their delivery of data:

- Quality of Service (QoS)
- Measuring the QoS
  - How to recognise and quantify the QoS? How may the QoS be guaranteed?
- Synchronising the data

# Quality of Service (QoS)

Basically a collection of parameters that relate to a sequence as seen at the source and as seen at the destination of a multimedia presentation. This measure probably is the ultimate measure of a multimedia system.

Four essential parameters are:

- Bandwidth — capacity of the transfer mechanism between source and destination.
- Delay — the time a multimedia unit spends in transmission from source to destination.
- Delay Jitter — Variation in delay delivery of data
- Loss Probability — the ratio of units of information that an application can afford to lose.

# Architecture of Multimedia System

Network Subsystem  
LAYER 1

End-to-End QoS Control  
LAYER 2

Media Management  
LAYER 3

Application  
LAYER 4

# Architecture of Multimedia System

Network Subsystem  
LAYER 1

Network Subsystem (Layer 1) : This layer takes care of the functionalities up layer 3 in the OSI model. Network specific functions depend on the technology used in this layer.

Essentially this level provides a possible connection through a network with a specified bandwidth and error probability as supported by the underlying technology.

# Architecture of Multimedia System

End-to-End QoS Control  
LAYER 2

End-to-End QoS Control (Layer 2) : This layer maintains the connection between the source and destination and can be conceptually viewed as a single connection — even though there may be physically many more.

Each connection is managed to ensure that a given Quality of Service (QoS) is maintained.

# Architecture of Multimedia System

Media Management  
LAYER 3

Media Management (Layer 3) : This layer provides *generic* services to applications so far as media management is concerned.

A primary functions is synchronisation across the media.

# Architecture of Multimedia System

Application  
LAYER 4

Application (Layer 4) : The direct interface with the user. The application will also interface with the operating system, if required.

For example calls to storage media or specific library functions (subroutines).

# Challenges in Multimedia Network

Multimedia data (audio, video, etc.) is often called *continuous data*. They have the following characteristics:

- voluminous
- real-time (synchronization, esp. between audio and video)
- interactive (e.g., in video conferencing, interactive TV)
- sometimes bursty (e.g., video-on-demand)