

# 01076566 Multimedia Systems

## Chapter 5: Multimedia Authoring

Pakorn Watanachaturaporn

*[pakorn.wa@KMITL.ac.th](mailto:pakorn.wa@KMITL.ac.th)*

Bachelor Program in Computer Engineering (B.Eng.)

Faculty of Engineering

King Mongkut's Institute of Technology Ladkrabang

# Outline

- Examples of Multimedia
- Requirements for Multimedia Authoring Tools
- Intramedia Processing
- Intermedia Processing
- Multimedia Authoring Paradigms and User Interfaces
- Role of User Interfaces
- Device-Independent Content Authoring
- Distributed Authoring and Versioning
- Multimedia Services and Content Management
- Asset Management

- From an authoring perspective, multimedia content can be created for a **passive viewing** or a **passive experience** where the user's action has no effect.
  - E.g., watching a video, reading a digital document, and even watching a movie in theaters.
  - The viewer cannot alter the planned flow of data, either **spatially** or **temporally**, and the result is a **linear experience**.

- Multimedia presentations can also be authored so as to have a more **active participation** of the viewer or reader.
  - E.g., a hyperlinked digital document such as a Web page, a video game, or a DVD formatted movie.
  - An action from the user results in a different pathway where the media elements shown might change in position **spatially** and/or in **time temporally**. This results in a **nonlinear experience**.
- Whether passive or interactive, the content is normally authored using software tools that help create, set up media elements, and combine them as per needs.

# Examples of Multimedia

- A digital document
  - E.g., a web page, an article in an online magazine, a book
  - Information presented using text, images, and perhaps video and graphics animations
  - The interactive aspects make use of **hypertext** and **hyperlinks**, which allow the user to nonlinearly read through the presentation.
  - May also use **programming** and **scripting** to illustrate concepts and interactivity

The screenshot shows the front page of The New York Times website. Several elements are highlighted with circles and arrows pointing to descriptive text:

- Formatted text columns with hyperlinks:** Points to the left sidebar containing various category links like "International", "Business", "Sports", etc.
- Images hyperlinked to new articles with other images:** Points to a large photo of a woman, likely related to the article "Rumsfeld's Support on Major Issues Tumbles in Poll".
- Image advertisement, which is also hyperlinked:** Points to the "RBS" advertisement in the top right corner.
- Image and graphics showing the current stock market status:** Points to the "Markets" section on the right, which includes a line graph and a table of stock indices.
- Information about current movie release:** Points to the "Movies" section at the bottom right, which lists upcoming films.

The main content area features several headlines, including "Rumsfeld's Support on Major Issues Tumbles in Poll", "Questions, Bitterness and Edginess for Queens Girl in Terror Case", and "Many Still Seek One Final Say on Ending Life".

- A digital document (Cont'd)
  - Needs to be published in a format that can be viewed in a standard manner using an **HTML browser** such as Microsoft Internet Explorer or in the Adobe PDF reader.
  - Text can be written in a variety of editor programs, the **formatting**, **typesetting**, and **hyperlink** setup can become more complex, requiring time on the part of the author
  - Importing other media elements, such as images also has its own issues such as support of various image formats, e.g., **gif** and **jpg**.
  - Also, the publishing aspect requires knowledge of the syntax and setup of the **Hypertext Markup Language (HTML)** or the **PDF binary** format.

- A photo album
  - E.g., Yahoo! Flickr, Google Picasa
  - A slide show of photographs is assembled to allow users to browse photographs in various categories.
  - Each photograph is hyperlinked to more information that relates to the photograph or a particular news topic.
    - E.g., clicking on the photograph may open a higher resolution photograph, a webpage or may even display a video.
  - Such applications allow users to “visually” parse information before deciding to invest more time into reading a detailed report pertaining to the topic.



- Video-on-demand
  - E.g., iVAST, Envivo, Series8-FC
  - Created by MPEG-4 authoring tools

- By the three different examples that authoring tools are necessary to create the rich interactive media content
- Some of multimedia authoring tools are **proprietary** and result in the author publishing multimedia documents that are in a proprietary format and, thus, need a proprietary viewer to view them, for example, Macromedia, Viewpoint, or Tribemedia.
- There are also others that are based on **open standards** and do not need dedicated and proprietary software for viewing, such as a DVD presentation or authoring tools based on the MPEG-4 format.

# Requirement for Multimedia Authoring Tools

- Common tasks to all multimedia authoring processes can be enumerated as follows:
  - **Creating, editing, and making** the individual media items that make up the presentation production ready
  - **Assembling** the items into a coherent presentation, including the specification of the temporal and spatial layout of the media elements
  - **Specifying the interaction** between the media elements, which often amounts to also delineating the flow of content as a viewer interacts with the presentation

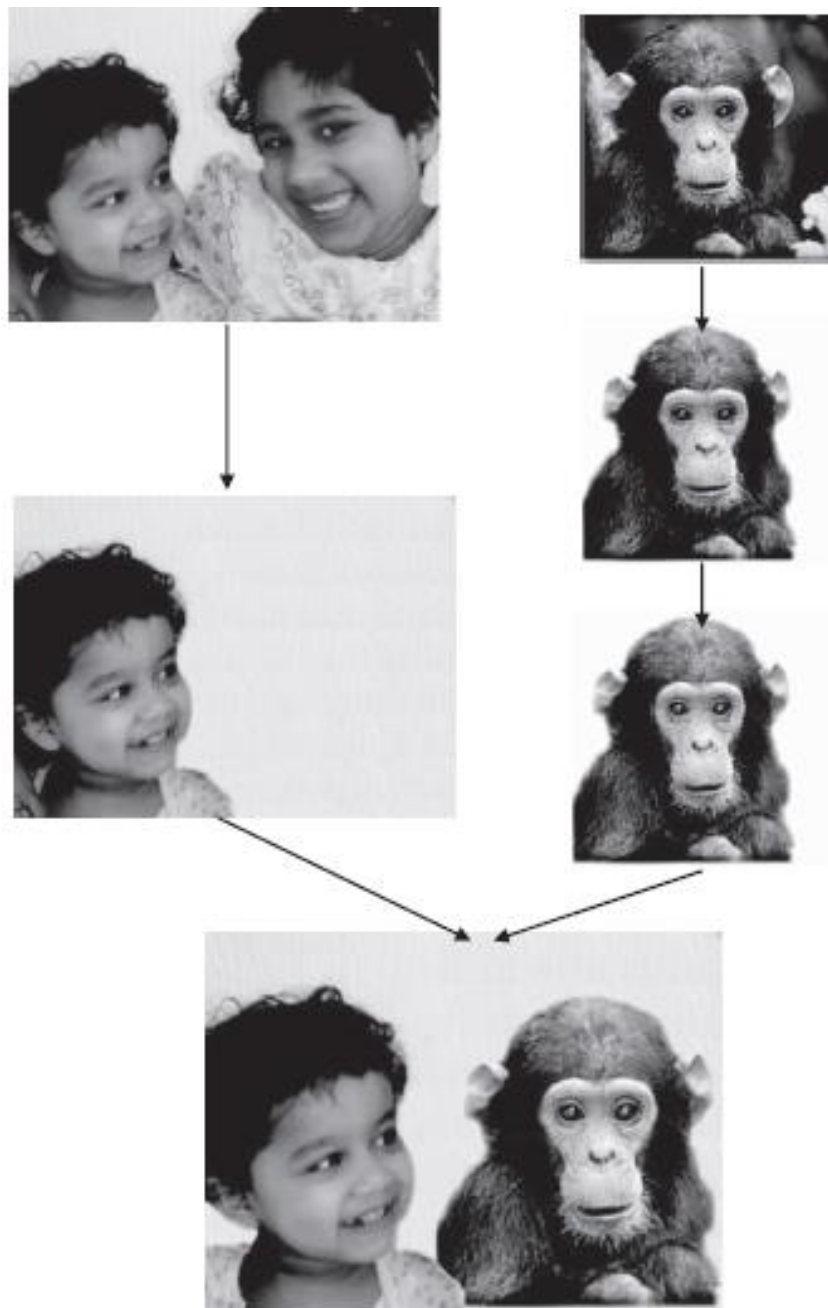
- The processes that refine, transform, edit, and change individual media types deal with the *intramedia* aspects of *authoring*
- *Intermedia* aspects of *authoring*, where the authoring tool assembles the different media elements together.

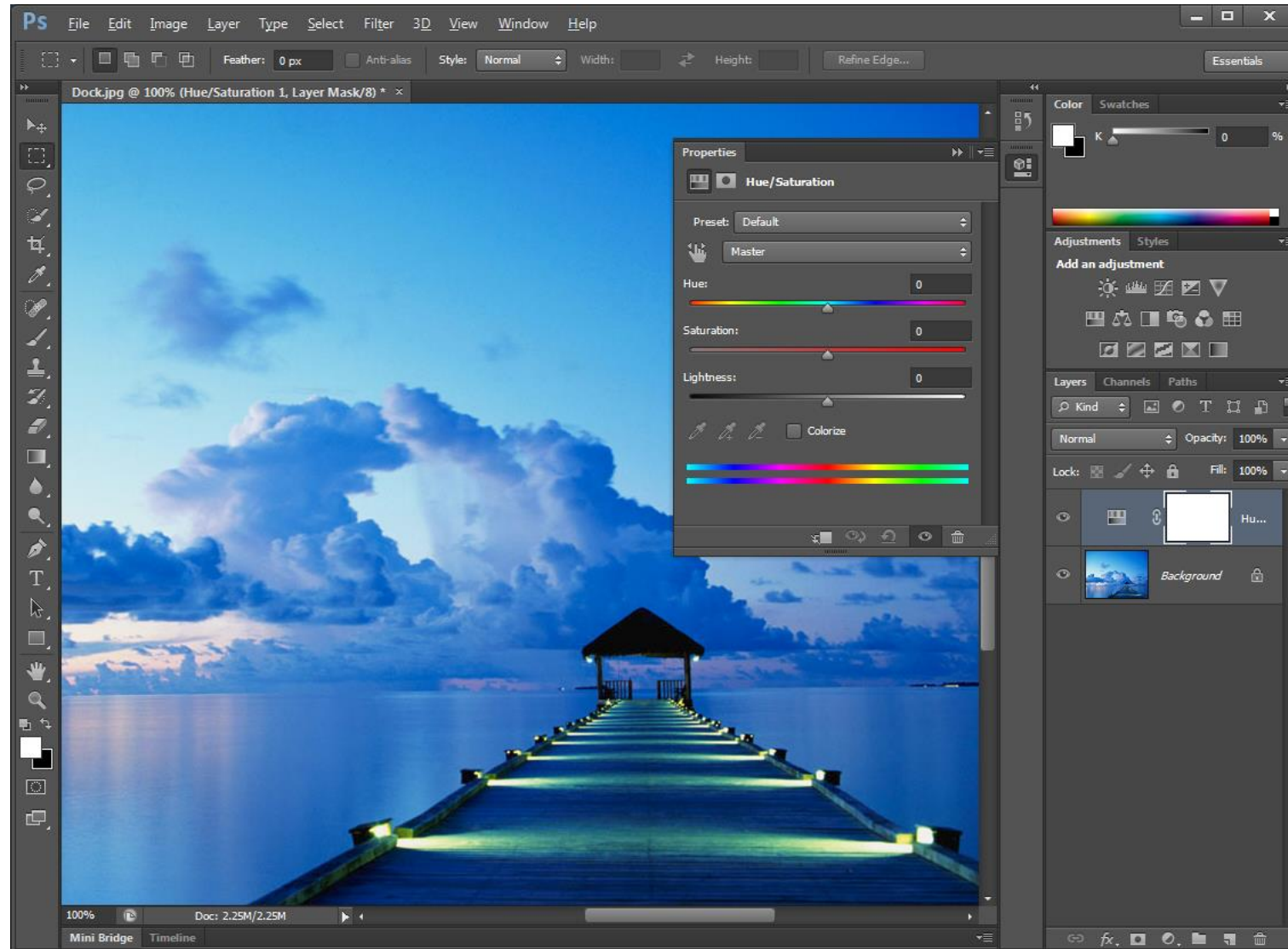
# Intramedia Processing

- The intramedia issues deal with processing an individual media type so that it can be made production ready for authoring.
- Depend on the media type and typically makes use of dedicated software related to that media.
  - Video – Adobe Premiere, Apple Final Cut Pro
  - Image – Adobe Photoshop,
  - Graphics/Animation – Autodesk Maya, 3ds Max
  - Audio – Adobe Audition

# Intramedia Issues Related to Images

- Images can be captured by digital cameras or scanned into digital form by a scanner.
- Images can also be created in software and filled with colors or shapes or composited with digitally captured images.







- The process involved four sub-procedures performed in Photoshop.
  - **Repainting areas in both images**—This was done to remove the subject on the right in the first image and the background in the monkey image.
  - **Creating alpha channels for compositing**—An alpha channel was created for the second image that consisted only of the monkey (foreground object).
  - **Adjusting color channels for color to match better**
  - **Compositing**—The two images were finally composited using the alpha channel of the second image.

# Intramedia Issues Related to Video

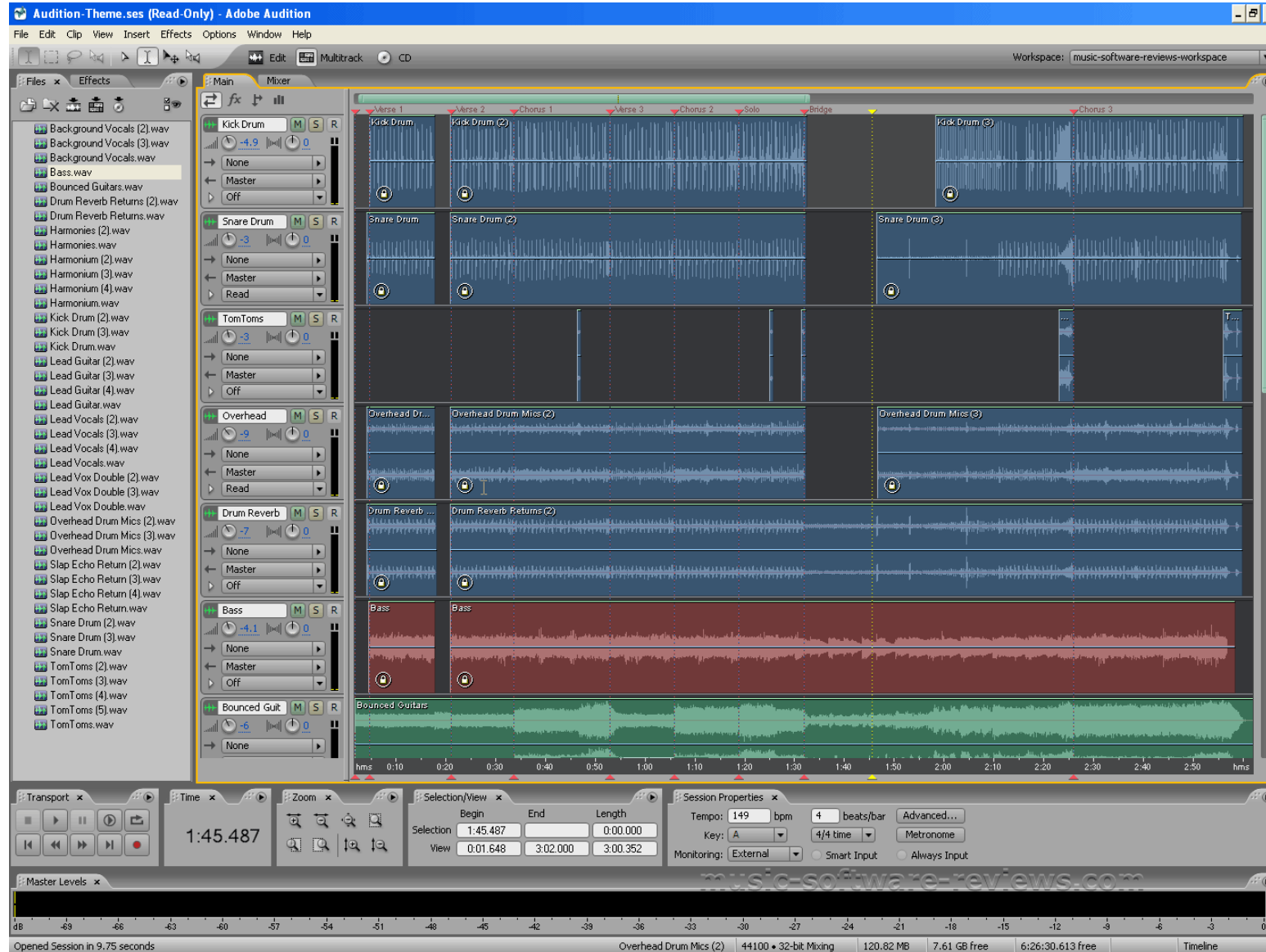
- Video images are traditionally captured by an analog/digital camcorder or created using a variety of software animation tools.
- Video captured by a camcorder often needs to be edited appropriately to fit the needs of production.
- Newer models of digital video camcorders now have onboard video-editing features to help you enhance the look of your recorded content.
- A number of commercial video-editing software tools are available.
  - The high-end tools include Adobe Premiere, Apple Final Cut Pro, Avid Media Composer, and Pinnacle Liquid (now part of Avid).
  - Low-end, consumer-level editing tools include Windows Movie Maker and Apple QuickTime

- Some standard operations performed during editing are as follows:
  - **Changing the video properties**, such as width, height, interlacing properties, the number of frames per second (also known as video retiming), NTSC to PAL.
  - **Cutting, editing out**, and **combining** parts of video into a tight, cohesive single video with smooth or abrupt transitions between sections.
  - **Creating titles** that can scroll on and off screen.
  - **Creating transitions** by fading or using dissolves or wipes.
  - **Using filters to adjust exposure or color-filming errors**, such as over- or underexposure or to make minor color correction.
  - **Using video overlays** to superimpose a graphic over the video.
  - **Synchronizing audio to video**—strictly speaking, this functionality goes beyond the intramedia video issue, but is often provided by most video-editing tools to provide background music or to ensure lip synchronization.
  - **Compressing video** for a required bandwidth.



# Intramedia Issues Related to Audio

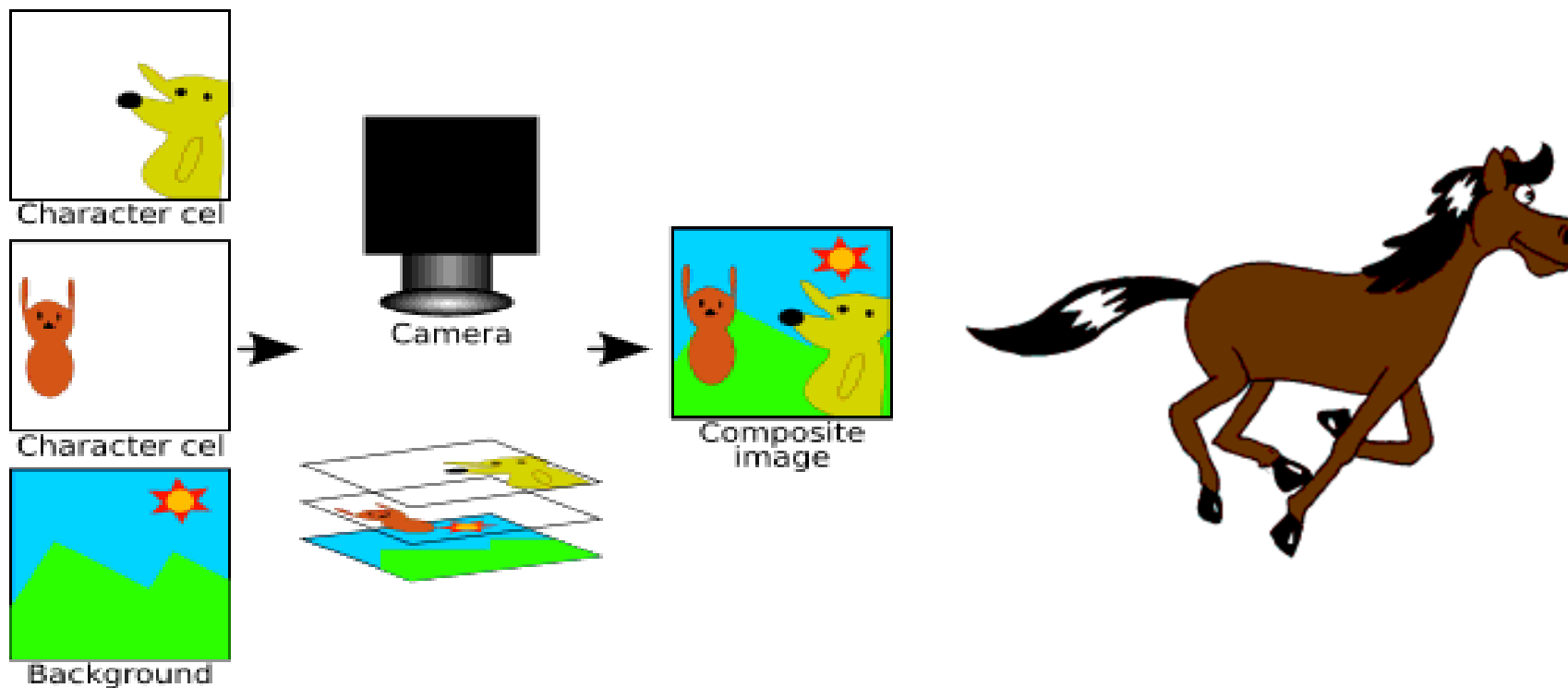
- Capturing digital audio can require significant post processing.
- For high quality productions, audio is recorded separately by stage hanging mikes or small mikes attached to the actor.
- Audio-video synchronization needs to be done in such cases
- Most audio-processing issues relate to cleanup and editing.
  - E.g., digital signal processing filters are always applied for noise reduction or to produce smaller, down sampled and compressed versions.
  - Editing techniques are also required to remove unwanted audio, create audio fade-ins and so on.





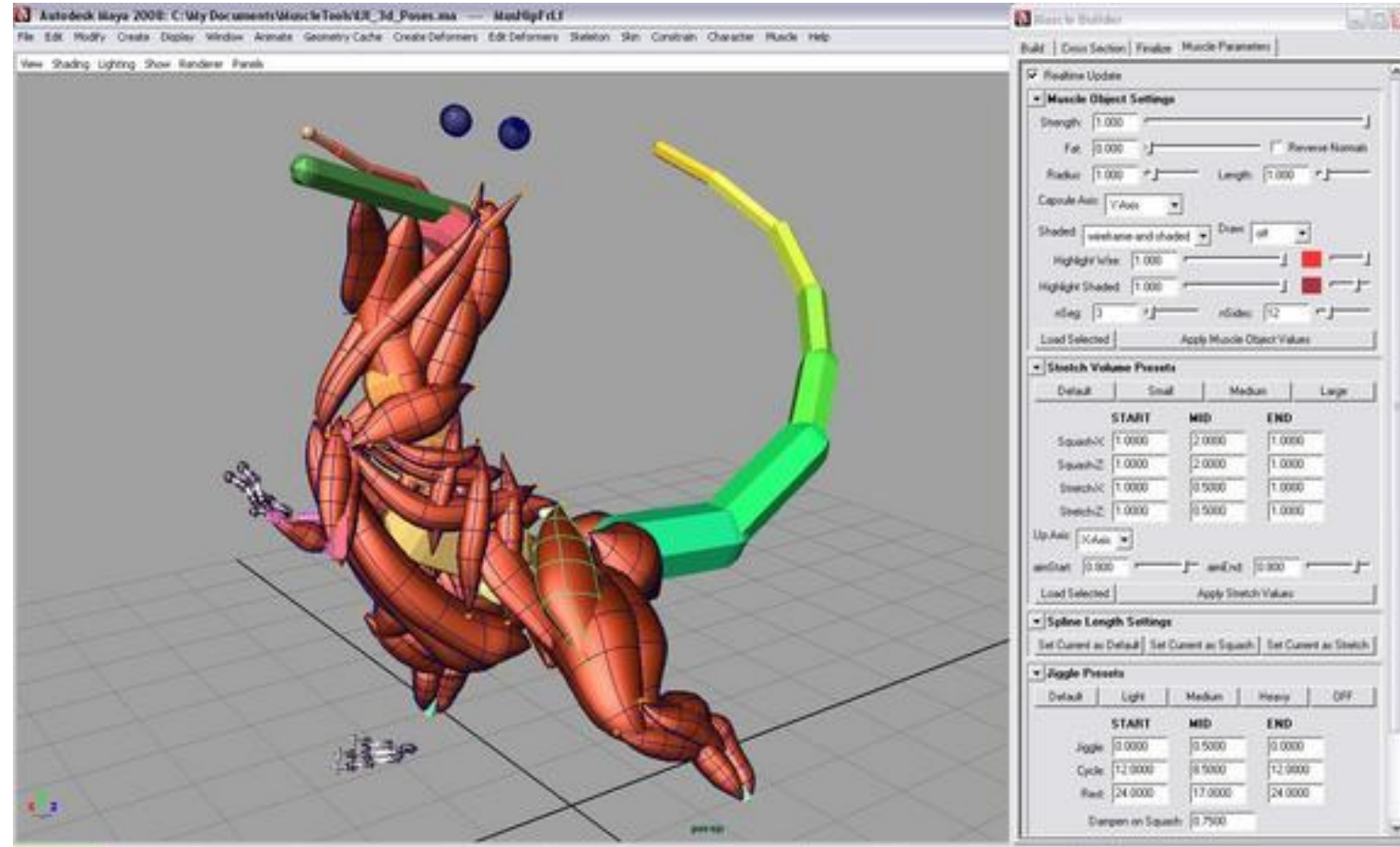
# Intramedia Issues Related to 2D/3D Graphics

- After the creation of static images on a computer, animations are created to generate a perception of motion
- Achieved by creating a sequence of images at which the object(s) are continuously changing their properties such as spatial location, color shading, or deformation.
- When these images are played successively at frame rate, as in a video, you get the effect of animation.
- First kind of animation is called cel animation.
- Now with computers, software tools are used to create images of objects in motion.





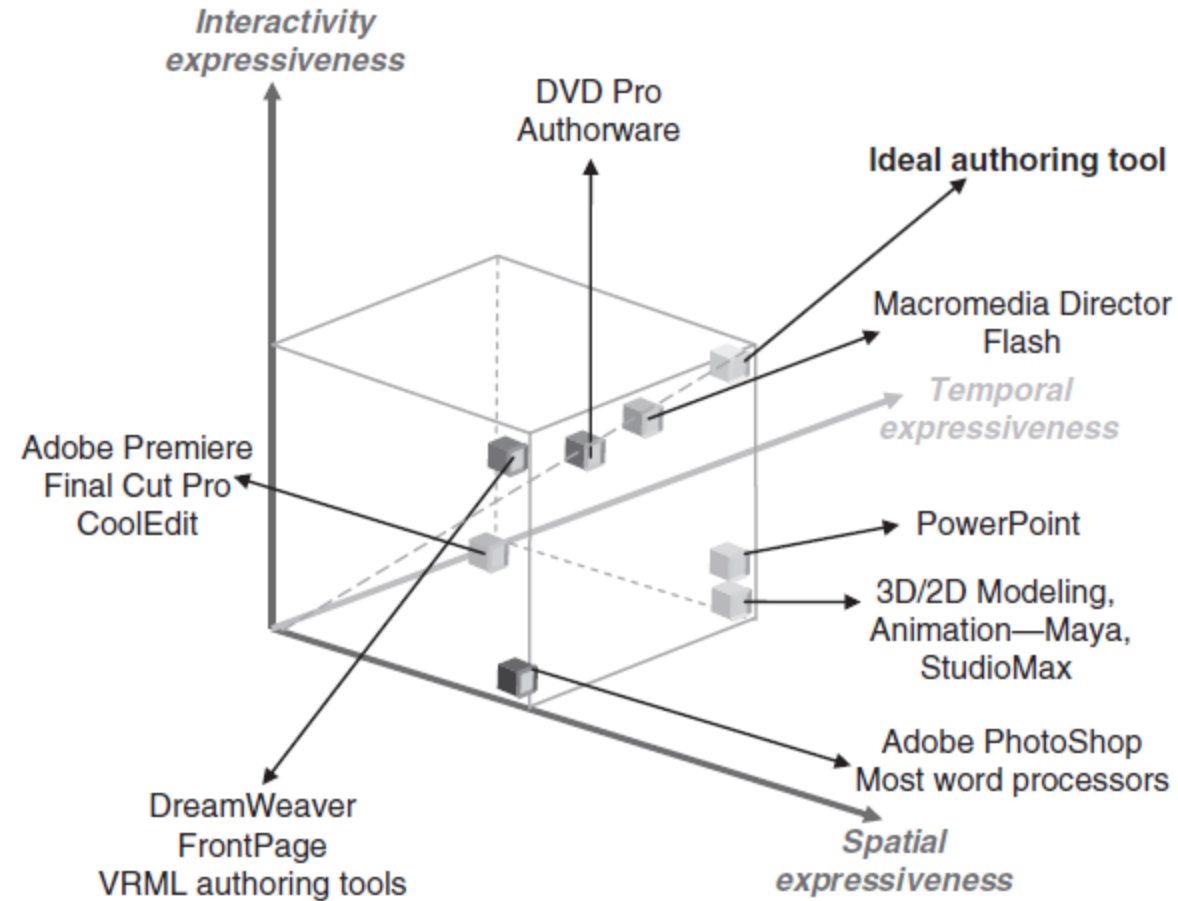
- Graphical animations are categorized mainly into two different types – **raster** animations and **vector** animations.
  - Rasters consist of images that simply display in the multimedia player as a video
  - Vector animations need a *rendering engine* that takes the vector format and converts it to a raster on the fly and does the animation



# Intermedia Processing

- Once the individual media types are available and production ready, they are brought into a multimedia-authoring tool.
- Here, all the individual media elements are assembled together to form a production.
- All authoring tools and processes ultimately publish the content in a specific format for viewing in a specific type of multimedia player.
  - **Proprietary formats** and players include Adobe Flash Player, Windows Media Player, Viewpoint Experience Technology, or even interactive 2D/3D game engines, such as Quake, Nintendo platforms, and SONY PlayStations.
  - **Standards-based multimedia formats** and players include DVD players and MPEG-4 players.
- The authoring tools that support exporting to these formats include commercial tools, such as Macromedia Director, DVD Studio Pro, Tribework iShell, iVAST iAuthor and iEncode, and so on.

- Some common requirements of intermedia authoring tools are needed to give the author a freedom of expressiveness, such as the following:
  - Spatial placement control
  - Temporal control
  - Interactivity setup



# Spatial Placement Control

- This requirement stems from a document model, and involves providing the ability to place the imported media types at various spatial locations.
- A good example to illustrate this is the workflow used in Macromedia Dreamweaver or Microsoft FrontPage, used to publish HTML content.
- The authoring tool needs to provide an easy way to move and place media objects.

# Temporal Control

- Any multimedia authoring tool should provide a manner to temporally lay out and control, or schedule, media elements in a presentation.
- Media types, such as sound, video, and graphical animations, are dynamic by definition and change over time.
- Should provide metaphors for temporal editing and control. Additionally, when considering intermedia issues, for example, putting together video and graphical animation that are both changing temporally, the temporal controls should provide more flexible ways to express media interaction temporally (just as they do spatially).

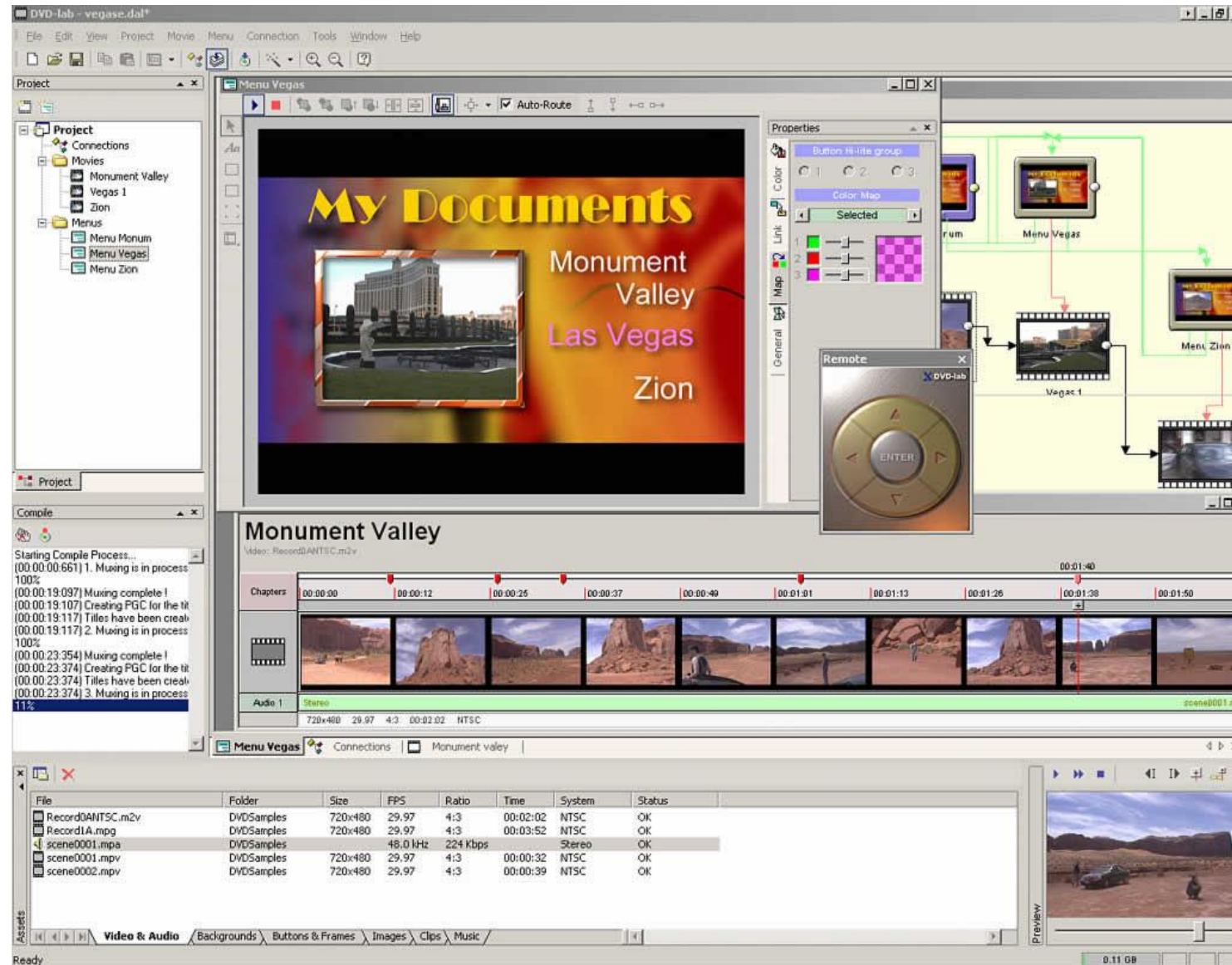
# Interactivity Setup

- The application specific functionality of multimedia documents is characterized by the way users interact with presentations and how the presentations are designed to react to the interaction.
- Setting up these types of interactivity involves complex event handling that results in a variety of actions.
- An event can be a mouse click or keyboard press by the user on a media item or media item part, such as part of an image or a video frame.
- An action needs to be executed on that event. The action might be starting, stopping, pausing, or entirely changing the media item being displayed



# Multimedia Authoring Paradigms and User Interfaces

- An **authoring paradigm** or an **authoring metaphor** can be referred to as the methodology by which an authoring tool allows an author to accomplish creation of content.
- The commonly used ones such as the timeline metaphor, the scripting metaphor



# Timeline

- Used by Macromedia Director for Flash content, and also by Adobe Premiere and Adobe After Effects
- Associate media properties temporally by setting them on a timeline.



# Scripting

- The scripting paradigm works just like traditional computer programming, which involves the execution of commands in a sequential manner.
- Thus, it requires the understanding of programming concepts and sequential execution
- It can be a very powerful metaphor that allows the author a freedom of expression that is not provided by the exposed user interfaces in any authoring tool.
- Examples of scripting languages specific to proprietary authoring environments include the **Lingo** scripting language of **Macromedia Director** and **Assymetrix OpenScript** for **ToolBook**, **MEL** scripting used in **Autodesk Maya** for creating 3D graphical content.
- Today, a variety of powerful open standards-based scripting languages are used to program multimedia setups, for example, JavaScript, HTML, SMIL, VRML, and XMT, JavaScript and HTML need no formal introduction

- **SMIL** (pronounced “smile”) stands for Synchronized Multimedia Integration Language and is a simple but powerful markup language for timing and controlling streaming media on the World Wide Web

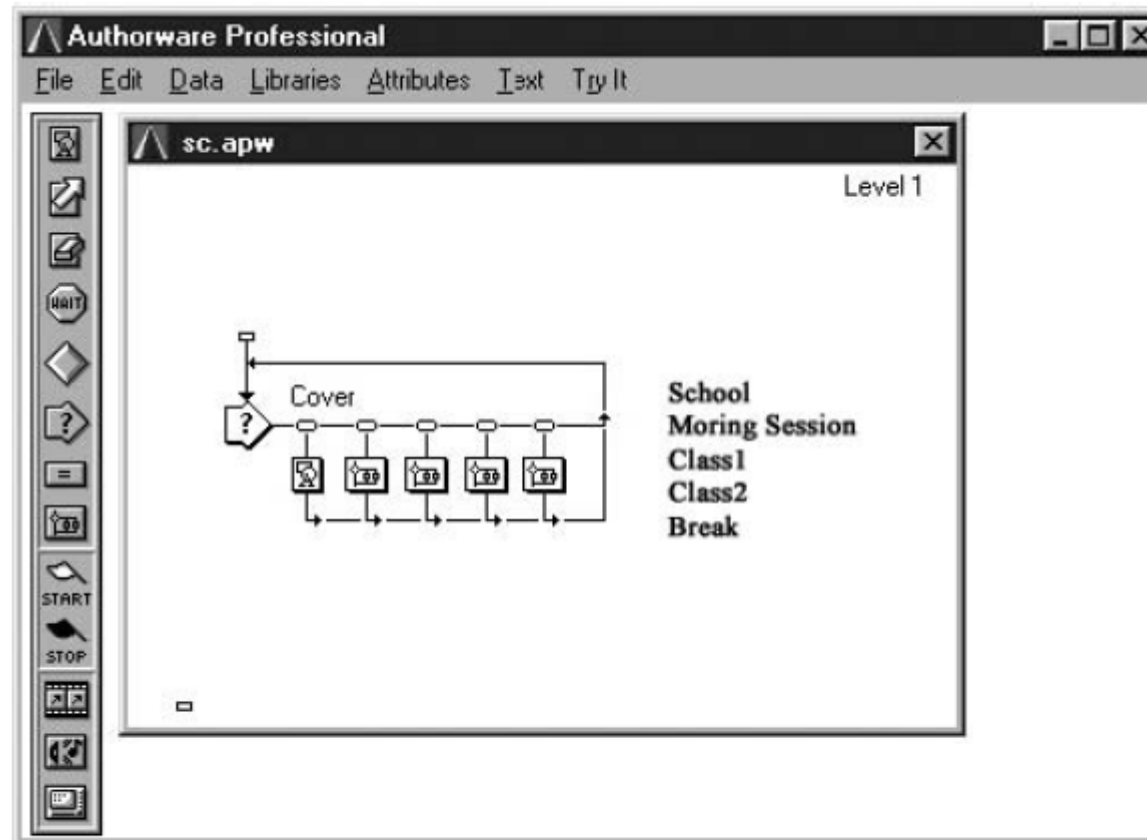
```
<smil>
  <head>
    <layout>
      <region id="Region1" top="5" left="20" />
      <region id="Region2" top="100" left="20" />
    </layout>
  </head>
  <body>
    <image region="Region1"
      src="http://www.mysite.org/logo.jpg"
      dur="10s" />
    <video region="Region2"
      src="http://www.mysite.org/myvideo.avi"
      clipBegin="10" clipEnd="20">
    </video>
  </body>
</smil>
```

*Example of a SMIL script that specifies a layout and displays video and image media elements*

# Flow Control

- Content creation and sequence flow are achieved much like a flowchart.
- The author or user drags preprogrammed icons and organizes them into a flow line from a palette.
- Parameters are set for each icon typically using dialog boxes.

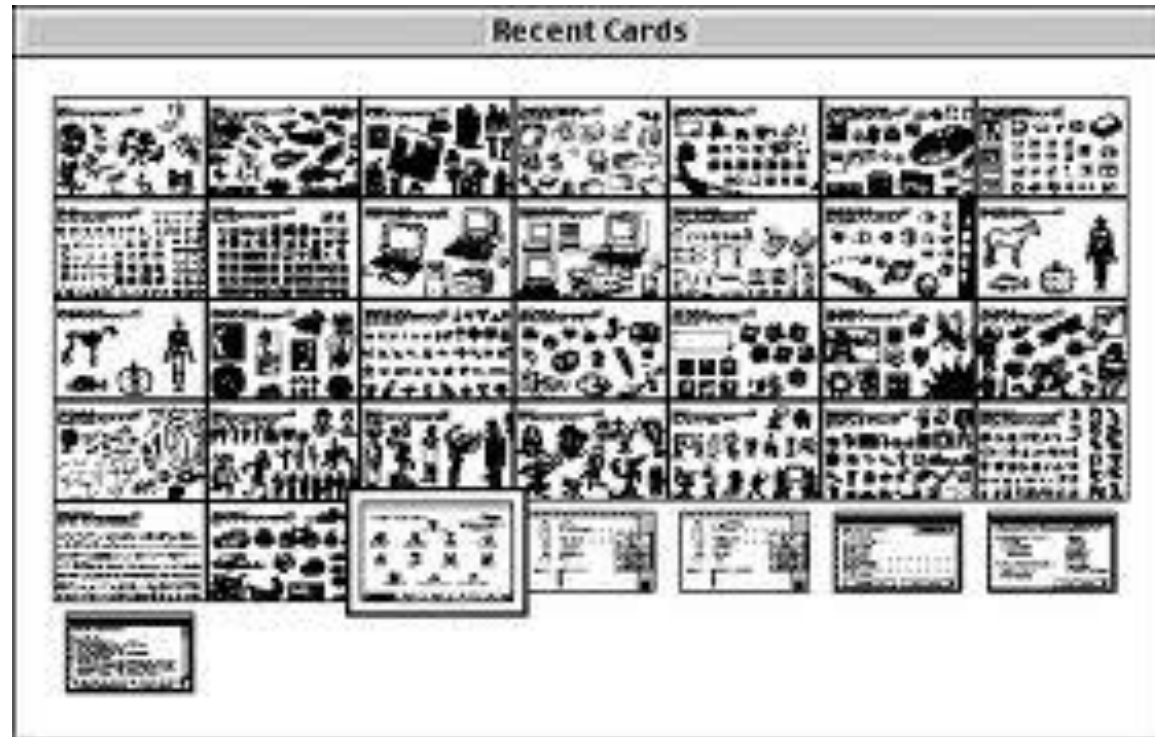




*Figure 5-12 Example of the Macromedia Authorware environment to depict the flow-control paradigm*

# Cards

- Card-based workflows are useful for spatial organization of media elements on a screen and the changes in your scene during a presentation.
- Commonly used tools that support the card paradigm are Apple's HyperCard1 and the SuperCard by Solutions Etcetera.
- Cards represent discrete screen displays, onto which buttons and graphics are added.
- Jumping to a new card in the stack refreshes the display, erasing previous elements and functions implicitly



# Role of User Interfaces

- User has to be able to access and control how to interact with it.
- User interfaces integrate the processing and consumption of heterogeneous media objects like text, graphics, video, and audio in a manner that enhances the user experience.

# User Interfaces on Mobile Devices

- The small device size introduces area limitations on how user interfaces are designed, displayed for interaction, and used
- All mobile devices have smaller screens but aim to preserve
- the same complexity of media interactivity and consumption that you would get from their larger counterparts, such as desktops and televisions with set-top boxes or even game consoles.

- Three basic systems are used to build touch screen interfaces:
  - *Resistive*
    - *The normal glass panel on top of a regular CRT or LCD monitor is covered with two layers, one conductive and the other metallic with an electrical running through them.*
    - When a user touches the screen, the two layers make contact, which changes the electrical field around the contact point.
    - This is sensed by the device to compute the coordinate where contact occurred.
  - *Capacitive*
    - *Layers that store a small electric charge (functioning like a small capacitor) is placed on the glass panel of the monitor.*
    - With a user's touch, some of the charge is discharged onto the user.
    - The change in charge is measured by sensors to interpolate a coordinate.

- Three basic systems are used to build touch screen interfaces:
  - *Acoustic*
    - *Acoustic waves are communicated through* layers on the glass screen in the x and y directions.
    - Transducers are placed to measure the incoming and outgoing waves.
    - In case of a touch, the change in the acoustic amplitudes is detected by the transducers, which can then interpret where the touch occurred.

# Multiple Devices as User Interfaces

- Future computing paradigms are likely to involve a combination of portable and personalized devices.
- Multiple coordinated computing devices will be used together in various configurations



- Some guidelines
  - Allow for the distribution of information across the appropriate devices :- the devices must be able to share their media information either using a wireless or wired connection
  - The information-shared state must be synchronized and congruent
  - The devices should be combined in ways such that collectively they are more powerful

# Device-independent Content Authoring

- **A device-independent authoring** is a concept of designing content that can be viewed and interacted with similarly on different devices and platforms
- **“Universal access”**

# Distributed Authoring and Versioning

- With multiple people working on the same set of data, it becomes imperative to have protocols and use processes that maintain and combine everyone's work into one product.
- Multiple media data elements are worked on by different people concurrently.
- A common paradigm used to concurrent authoring is a distributed client/server system implemented over a network that facilitates the collaborative manipulation and assembly of shared media elements.

- Such systems normally need to have the following:
  - *High network responsiveness*
  - *Maintenance of concurrent states across clients*
  - *Using consistency protocols*
  - *Real-time awareness*
- Standards are also being set for collaborative authoring.
- WebDAV, or simply DAV, is a Web-based distributed authoring and versioning standard that defines HTTP extensions to make Web authoring an interoperable and collaborative medium.

# Multimedia Services and Content Management

- Content management systems normally work by managing a piece of content from conception to destruction.
  - E.g., nomenclature rules to name data elements consistently, collections of data elements as records that can be indexed in a database, or even annotating the media elements with textual descriptions to which semantics can be attached.
- Content management systems can also be distributed across many different organizations—content providers, application builders, network service providers, and even the end consumer.
- By definition, the system needs to be scalable addressing large pieces of elements

# Asset Management

- Software authoring tools and paradigms are becoming more sophisticated.
- With this, the ability and need to create expressive and longer multimedia content have also increased
- It is a common trend now for multiple users and production companies to put together digital media elements and create longer, more interactive and voluminous content.

- One of the major organizational issues here is managing the various digital media elements, known as multimedia assets, which are bound to grow on a production.
- They are frequently revised and moved from production to production, or shared between productions and even simultaneously worked on by different people.
- The protocols used to help automate the control, distribution, versioning, storage, and retrieval of media elements are known as digital asset management.
- Although not strictly used to author content, it is a requirement to properly manage large-scale productions

Q & A