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Multimedia Systems

Algorithms, Standards, and Industry Practices

Chapter 5

Multimedia Authoring

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Multimedia Authoring

- This chapter explains how the media types can be individually or collectively put together to create multimedia content.
- Creating useful content can be viewed as a production, which need knowledge of media types, art and in many cases, programming and scripting.
- Multimedia production is a time consuming task depending on the amount of media information that needs to be captured or collected, the structural and temporal organization/layout requirements, and various means of interaction that need to be mapped out.
- This tasks is making use of authoring tools, which are software programs that help an author create and publish content.

Multimedia Authoring..

- Multimedia content can be created for a passive viewing or a passive experience when the users action has no effect.
- Examples of this include watching a video,reading a digital document,and watching a movie in theaters, where user can’t alter the planned flow of data,and result is a linear experience.
- Multimedia presantation also can also be authored so user have a more active participation.
- Example of this include a hyperlinked digital document such as web pages, a video game,or a DVD formatted video.
- In this case, action from user result in a different pathway where the media elements shown might change in position spatially and/or in time temporally. This result in non linear experience.

Multimedia Authoring...

- It is not easy to make powerful authoring tools.
- Tools are design to work on specific media type,such as Adobe Photoshop for image, Avid for video processing, Autodesk Maya which provide ways to create and render 2D and 3D animations.

1. Example of Multimedia

- The example might be a web page, an article to be published in an online magazine, or even a book.
- The interactive aspect make use of hypertext and hyperlinks, which allow the user to nonlinearly read through the presentation.
- We can also use programming and scripting to illustrate concept and interactivity.
- Another important aspect is related to the size of the multimedia files,as they need to match the specific bandwidth for delivery.

Example 1

Figure 5.1 Example of typical web Page with text, image and video Formatted together with hyperlink Setup.

Example 1 ..

- You can see from a website from figure 5.1 that compiling the text,images and video elements along with its formatting and interactive hyperlink setup can be cumbersome task.
- Website requires the spatial organization of text and media elements,formatting them appropriately so that they appears as they intended to be viewed.

Example 2

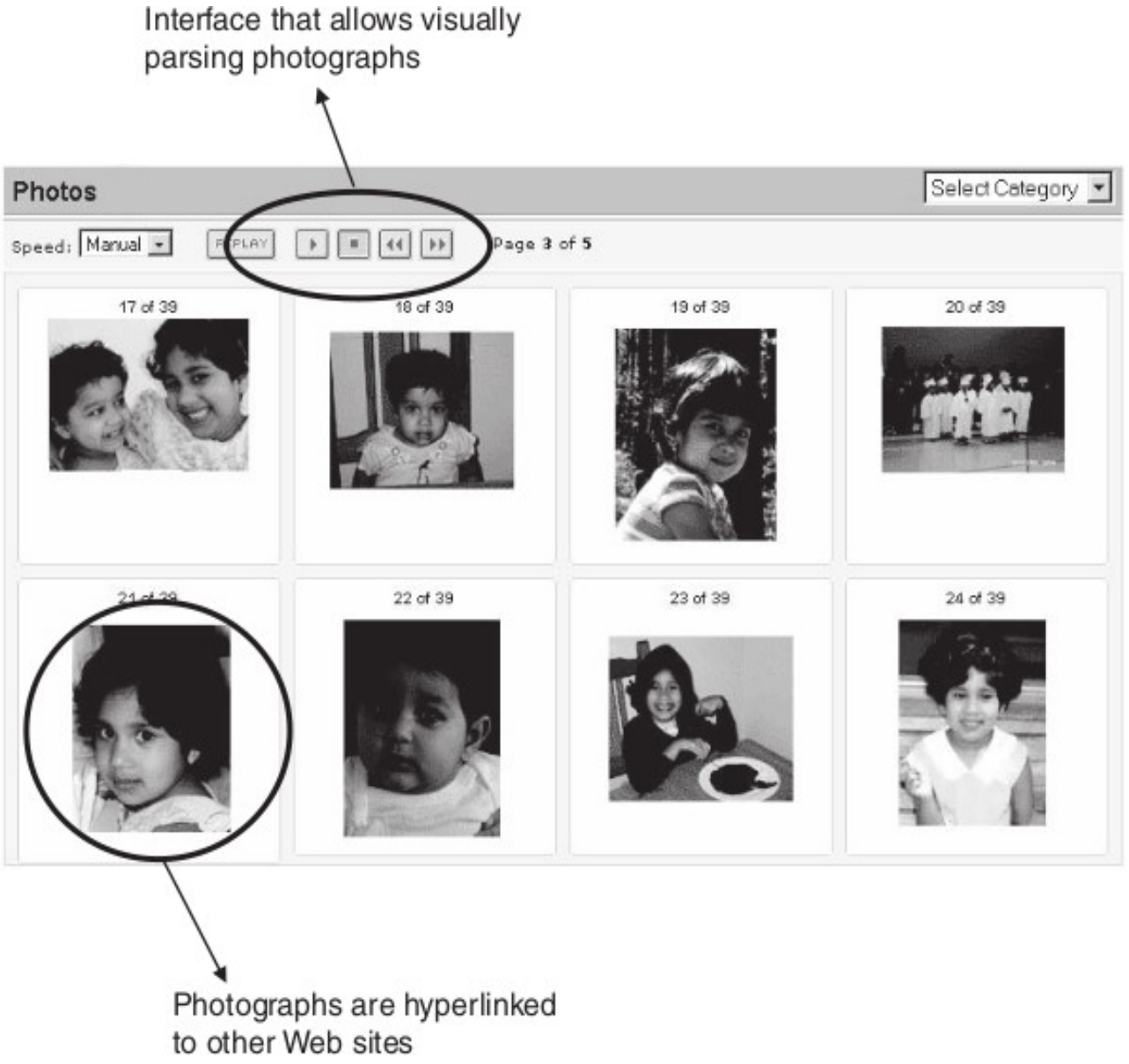

Figure 5.2 Photo Album: Here the user can manually or automatically browse pictorial information that is hyperlinked to more topical information. Depending on "interesting" choices, the user might choose to nonlinearly interact and view information

Example 2 ..

- The image is changing dynamically so does the hyperlinked.
- Quantative metric algorithms such as “most viewed images” or “most distributed or emailed images” and their corresponding hyperlinks are stored automatically.

Example 3

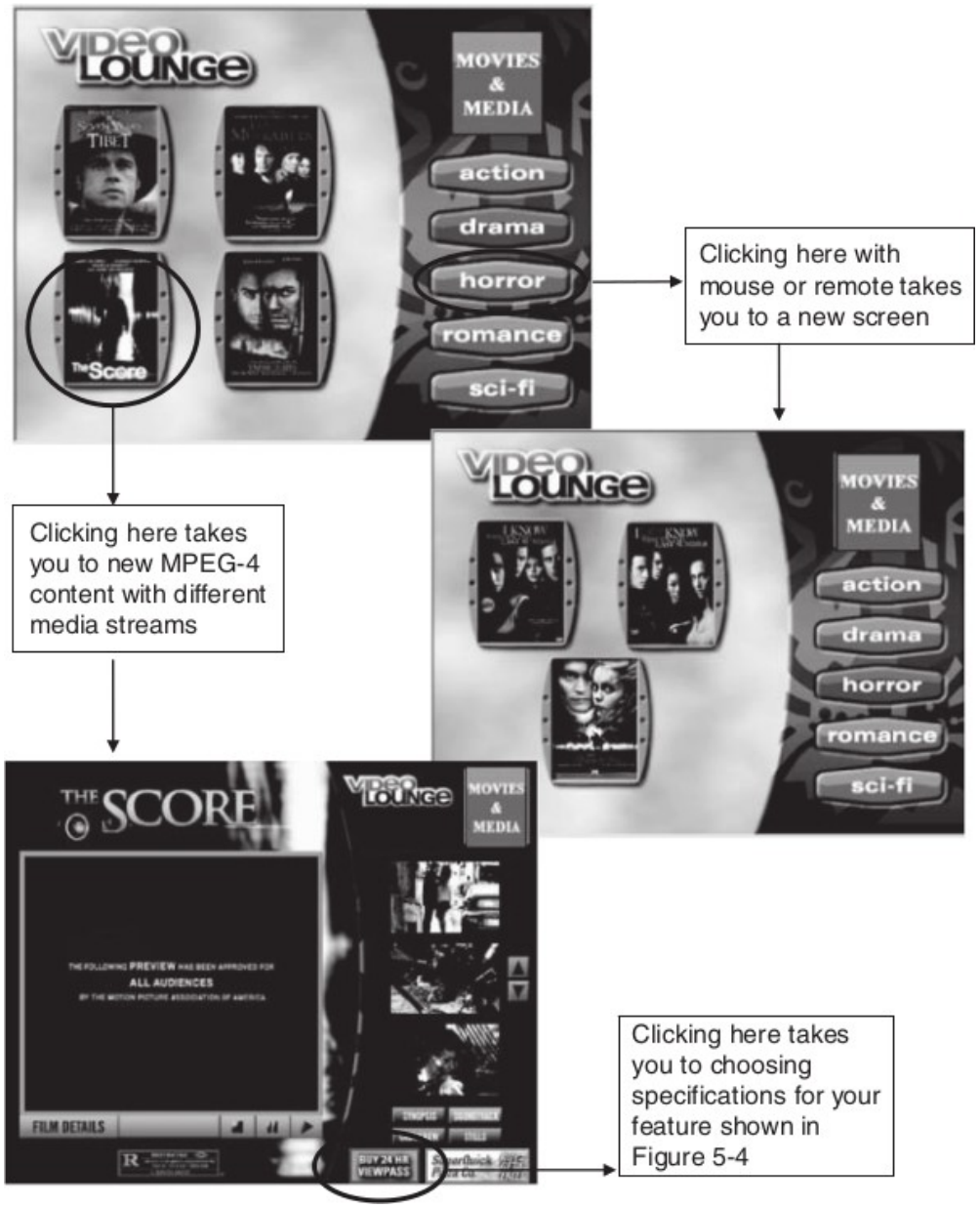

Figure 5.3 A Video on demand application authored and published in MPEG-4. The highlight circles illustrate the flow when that media item is clicked.

Example 3 ..

Figure 5.4 A Video on demand application authored and published in MPEG-4. Figure depicts a choice of encoding, video format, audio and other options.

Example 3 ..

- Need understanding on issue that relate to compression.
- Figure 5.4 shows the selection need to be done from a number of options such as high/ standard definitions, video format, audio language,etc.
- This options need to know user end device types and the network that used by the users.

2. Requirements for Multimedia Authoring Tools

- Think about the differences between writing a book and creating multimedia content.
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Requirements for Multimedia Authoring Tools..

- Variety of multimedia applications and presentations used today has different modes/means of interaction,different delivery platforms, and is meant for different market segments and audience.
- Common tasks to all multimedia authoring process can be enumerated as follows:
  - Creating,editing and making the individual media items that make up the presentations 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.

Requirements for Multimedia Authoring Tools..

- Authoring methodology do require dealing with media elements both individually and collectively.
- Digital images,video and audio cannot be used in their captured form and need to be edited and formatted.
- The process that refine, transform,edit and change individual media types deal with the *intramedia* aspect of authoring.
- Then, *Intermedia* aspect of authoring where the authoring tools assembles the different media elements together.

3.Intramedia Processing

- Intramedia issues deal with processing an individual media type so that it can be made production ready for authoring.
- It use dedicated software for that media.
- Digital video need to be edited out,digital images might need to be cropped,resized and filtered.
- There are variety of commercial and open source software used for editing individual media types.

3.1 Intramedia Issues Related to Images

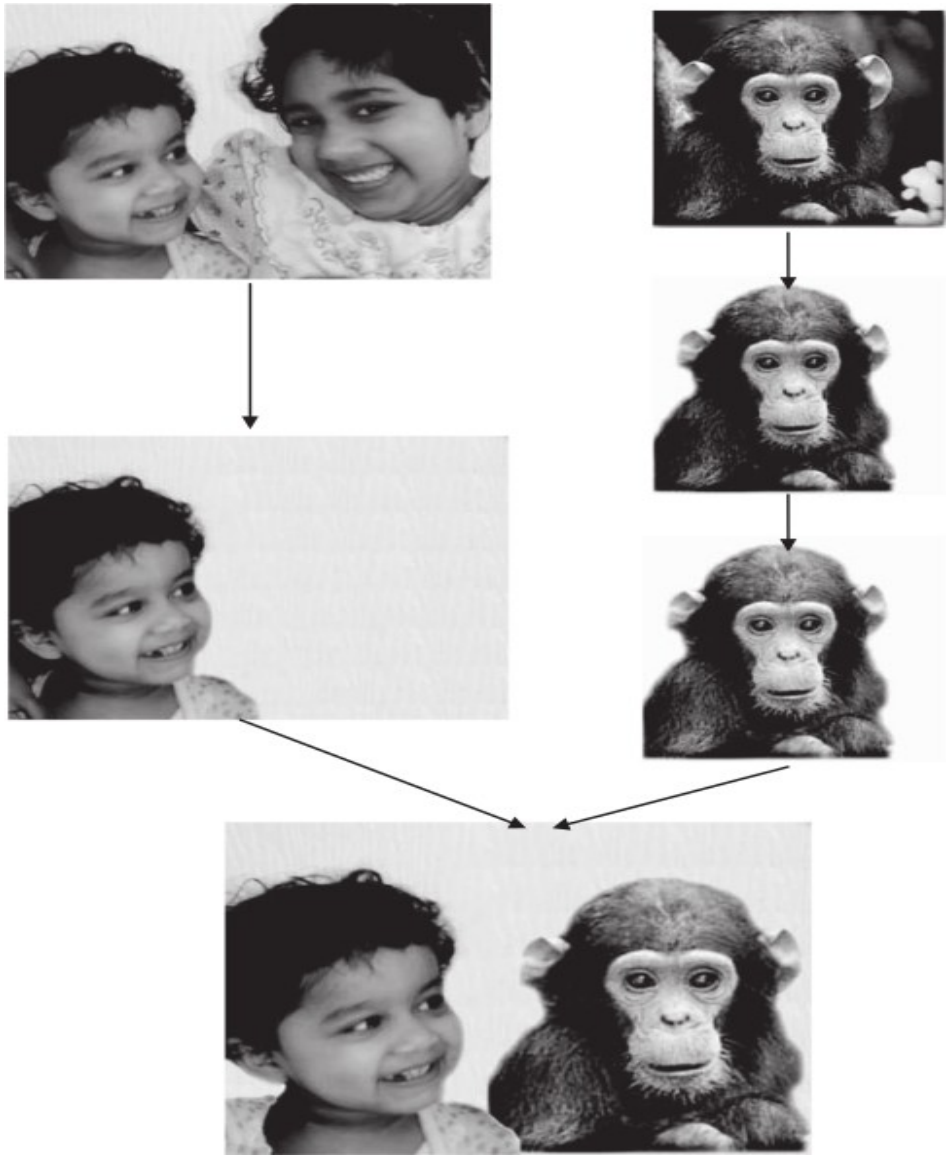

Figure 5.5 Image compositing example. The upper left image is retouched to remove the person on the right side. The right image is retouched to get the foreground element, whose color channels are adjusted to visually match the color distribution in the first image. Finally, both the altered images are composited to produce the bottom image.

3.1 Intramedia Issues Related to Images ..

- Process in figure 4.5 involved four sub-procedure 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 channel for compositing – An alpha channel was created for the second image that consist only for the monkey (foreground object).
  - Adjusting color channel for color to match better – The monkey original color distribution does not match the color distribution of the first image mainly because one is an indoor image and the other is an outdoor image. The RGB color channels were manually adjusted for better color matching.
  - Compositing – The two images were finally composited using alpha channel of the second image.

3.2 Intramedia Issues Related to Video

- Some standard operations performed during editing are as follows:
  - Changing the video properties such as width,height, interlacing properties,frame per second.
  - Cutting,editing out and combining parts of video into a tight,cohesive single video with smooth or abrupt transition 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. This graphic might be a company logo or an advertisement.
  - Synchronizing audio to video – this functionality goes beyond intramedia video issues, but is often provided by most video-editing tools to provide background music or to ensure lip synchronization.
  - Compressing video for a required bandwidth.

3.2 Intramedia Issues Related to Video..

Figure 5.6 Example of video editing in Adobe Premiere. Various video clips have been put together with transitions.

3.3 Intramedia Issues Related to Audio

- Usually the quality of audio is not good enough.
- For high quality productions, audio is recorded separately by stage hanging mikes.
- Most audio processing issues relate to cleanup and editing.
- Example is noise reduction or to produce smaller, down sampled and compressed versions.

3.3 Intramedia Issues Related to Audio..

Figure 5.7 Audio Editing Tool. These samples can be edited out,filtered, or attenuated depend on the desire effect.

3.4 Intramedia Issues Related to 2D/3D Graphic

- Many authoring tools allow you to create animations in a specific format.
- Common file formats used for animations are SWF (shockwave flash),SVG (Scalable Vector Graphics) and PNT(USAnimation).

4. Intermedia Processing

- After the individual media are ready, they are brought into a multimedia-authoring tool.
- Here all the individual media elements are assembled together to form a production.
- Some common requirements of intermedia authoring tools are needed to give the author a freedom of expressiveness, such as:
  - Spatial placement control
  - Temporal control
  - Interactivity Setup

4. Intermedia Processing ..

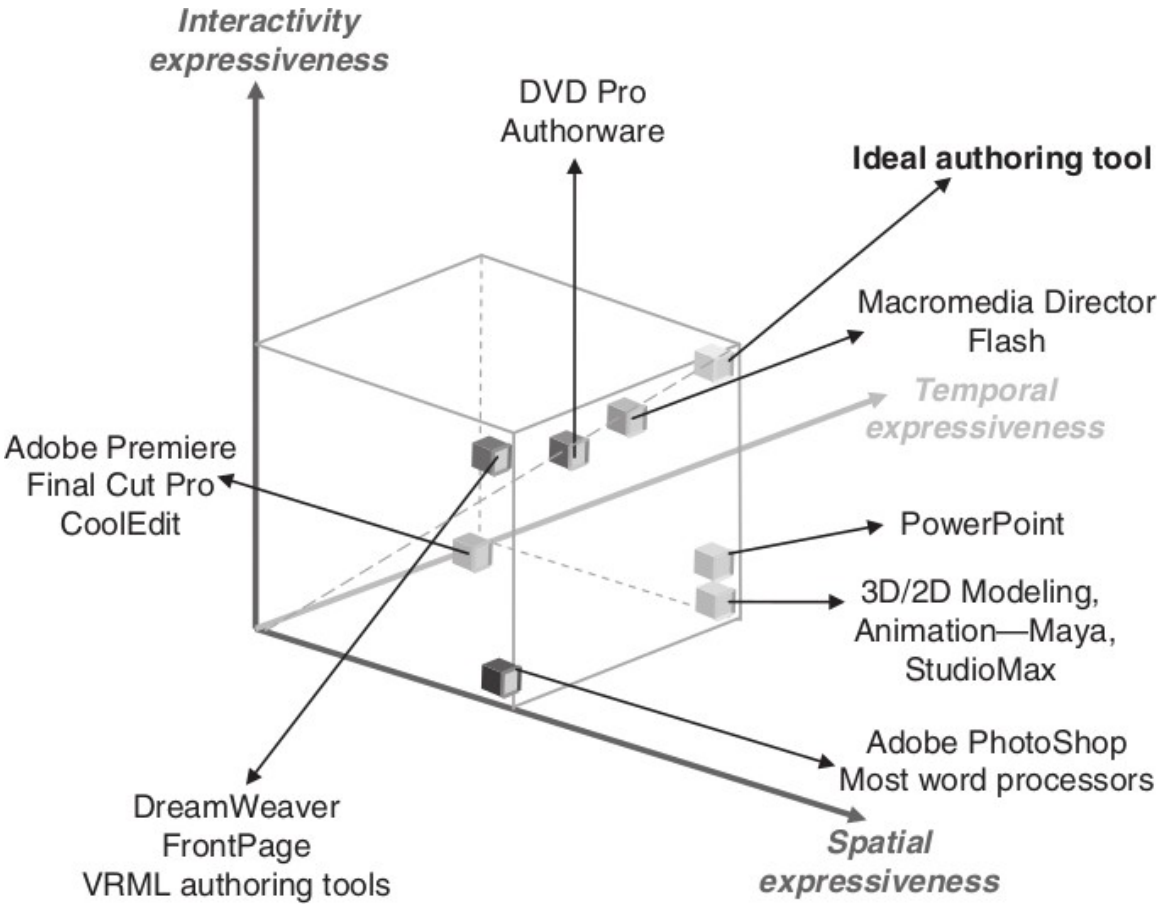

Figure 5.8 The authoring volume. Categorization of authoring tools based on spatial,temporal and interactivity expressiveness.

4.1 Spatial Placement Control

- This involves providing the ability to place the imported media types at various spatial locations.
- They need to have defined positions on a screen.
- The authoring tool need to provide an easy way to move and place media objects.
- Placement control is needed in specifying interactivity interface and user interfaces.

4.2 Temporal Control

- Multimedia authoring tools should provide a manner to temporally lay out and control, or schedule, media elements in a presentation.
- Multimedia types are dynamic by definition and change over time.
- Temporal control is required to coordinate the multimedia presentation of media objects with one another in time.
- Temporal schedule need to be setup.

4.3 Interactivity Setup

- This involved complex event handling that results in a variety of actions.
- An action needs to be executed on that event.
- In setup the interactivity element,you need to know what event to look and what action to execute.

4.3 Interactivity Setup ..

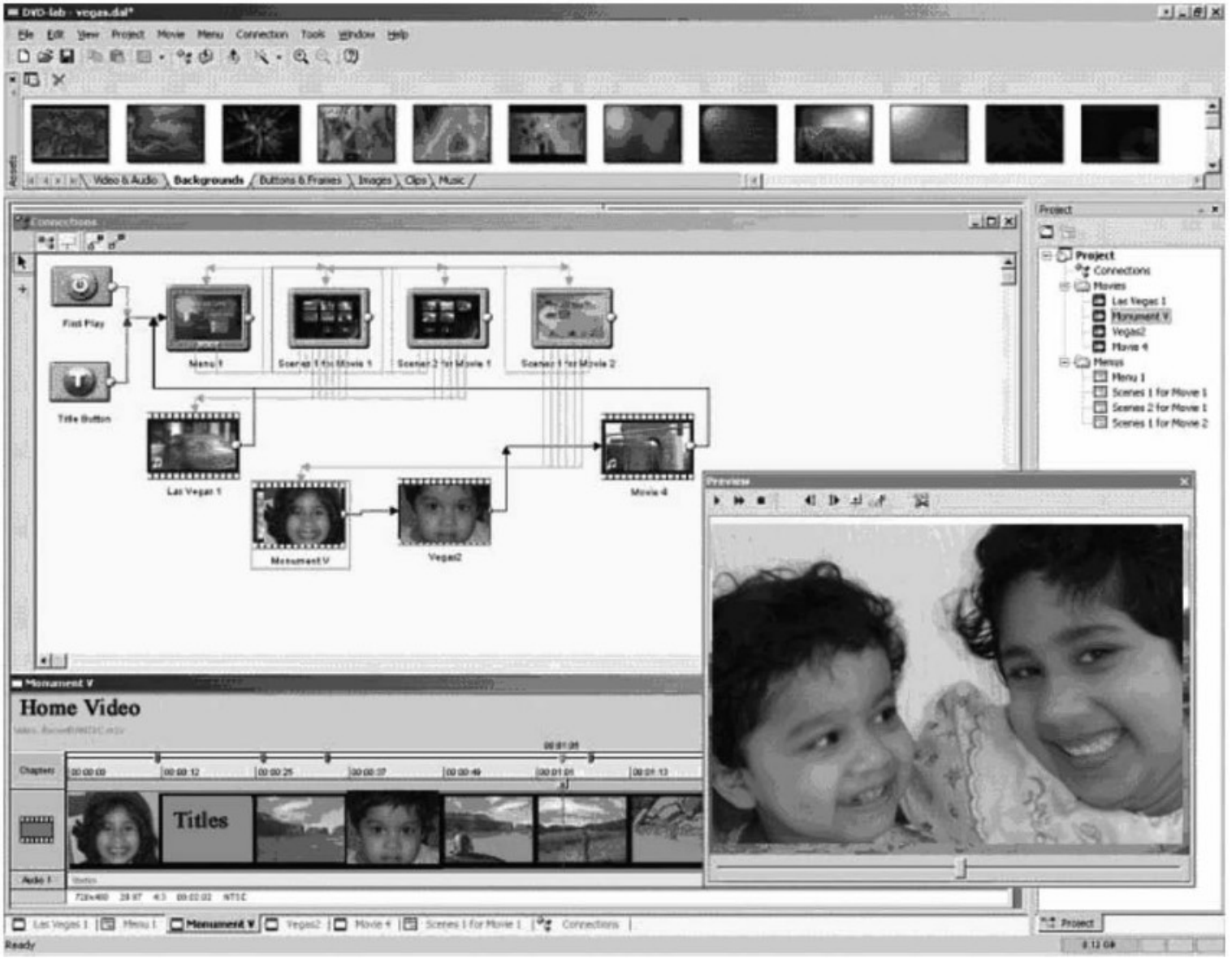

Figure 5.8 The graphical layout shows an instance of the flowchart in the DVD interactive navigation.

5. 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.
- Although there are many authoring paradigms, some of the commonly used ones such as the timeline metaphor, the scripting metaphor, and so on are described next.

5.1 Timeline

- This is where you are trying to associate media properties temporally by setting them on a timeline.
- Along with video and audio, a multimedia presentation might need the temporal control of graphical objects and animations.

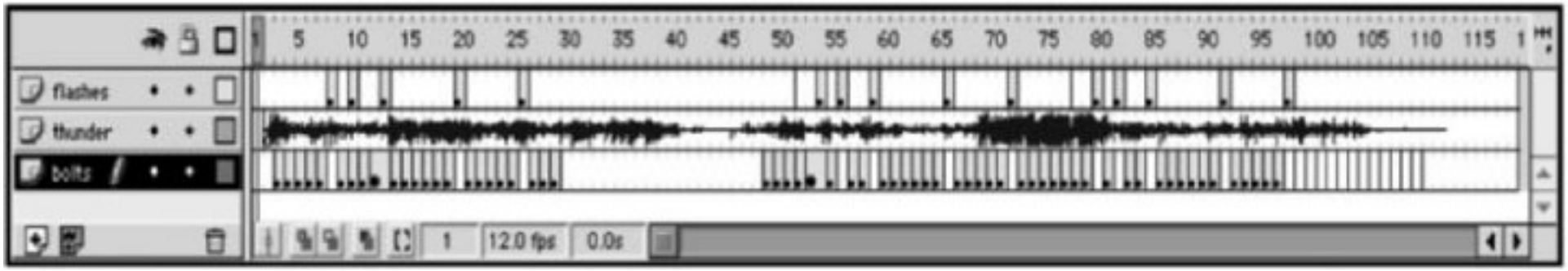

Figure 5.9 Multimedia Timeline

5.2 Scripting

- The scripting paradigm works just like traditional computer programming, which involves the execution of commands in a sequential manner.
- It requires the understanding of programming concepts and sequential execution and, hence, is not commonly used by production artists.
- 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.
- The paradigm normally involves the use of a scripting language to specify the spatial and temporal properties of multimedia elements, sequencing, hot spots, setting up synchronization, and interactivity.
- Examples of scripting languages specific to proprietary authoring environments include the Lingo scripting language of Macromedia Director and Assymetrix OpenScript for ToolBook.
- There is MEL scripting used in Autodesk Maya for creating 3D graphical content.
- 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

5.3 Flow Control

- In this paradigm, content creation and sequence flow are achieved much like a flowchart.
- The author or user drags pre programmed icons and organizes them into a flow line from a palette.
- An icon here represents a media element, each having properties such as spatial location, duration, and so forth.
- This paradigm offers very rapid prototyping setups to generate sophisticated content having sequential flow

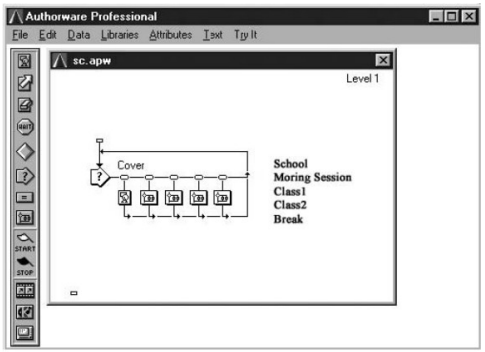

Figure 5.10 Multimedia Flow Control

5.4 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 HyperCard 1 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.

6. Role of User Interfaces

- To work with interactive content, the user has to be able to access and control how to interact with it.
- As multimedia presentations get complex, the role that hardware/software user interfaces play starts to get important.
- In this section, we discuss user interfaces to enhance user experience when consuming and interacting with complex interactive media presentations involving a large number of objects or when the content has to be consumed on devices where the spatial capabilities are seriously limited, for example, a cell phone when compared with a desktop.

6.1 User Interfaces on Mobile Devices

- The user experience that interfaces have to provide increases even further as the devices on which multimedia information is consumed get smaller and smaller.
- The small device size introduces area limitations on how user interfaces are designed,displayed for interaction, and used.
- A commonality in the evolution of mobile devices that have area limitations has been the use of touch screen technology.
- Three basic systems are used to build touch screen interfaces
  - Resistive
  - Capasitive
  - Acoustic

6.2 Multiple Devices as User Interfaces

- Future computing paradigms are likely to involve a combination of portable and personalized devices.
- For instance, you might use your cell phone or PDA to communicate and browse information during the day, but when you come home at the end of the day,you want to turn it into a remote for controlling your home entertainment system.
- Some guidelines are as follows:
  - Allow for the distribution of information across the appropriate devices
  - On the same token, the information-shared state must be synchronized and congruent.
  - The devices should be combined in ways such that collectively they are more
  - powerful

7. Device Independent Content Authoring

- In recent years, there has been a proliferation of different networks besides the Internet, such as cable networks, wireless networks, and satellite networks.
- This expansion has also standardized the expectation among consumers about the availability and consumption of the same or similar types of content on the different platforms.
- Device-independent authoring is usually addressed by publishing content in a well-known and accepted standard that is supported by multiple devices.
- Device-independent authoring also goes hand in hand with another device-

  agnostic authoring process—bandwidth scalability.
- Multimedia authors have to develop content that is universal and can be delivered for viewing and interacting on the different devices supported on a variety of networks.

8. Distributed Authoring and Versioning

- Many projects in various disciplines typically involve the services of a variety of people who have similar or complementary skills.
- 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.
- A common example of such a process occurs in the software industry where software code is developed by multiple software engineers who might even be at different geographic locations and need to collaborate on the development of a software product.
- Systems such as Revision Control System (RCS), Concurrent Versioning System (CVS), and Subversion (SVN) allow software engineers to concurrently collaborate on software development.

8. Distributed Authoring and Versioning..

- 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

8. Distributed Authoring and Versioning...

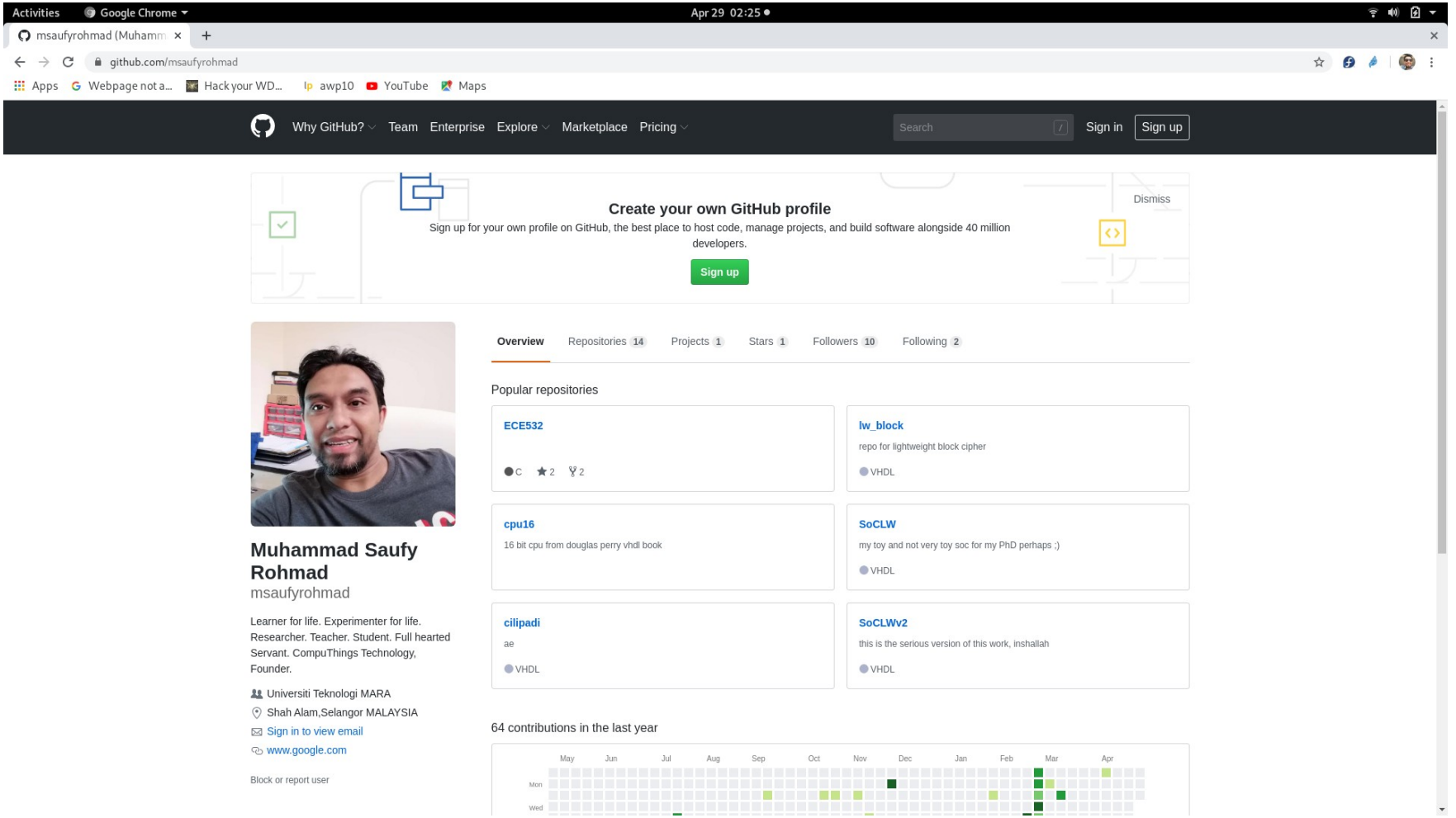

Figure 5.11 github.com for software versioning

9. Multimedia Service and Content Management

- Service and content management systems normally work by managing a piece of content from conception to destruction.

10. Asset Management

- 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.

Conclusion

- This chapter discuss various points related to multimedia authoring.
- This chapter close the introductory part of this textbook.

Conclusion

- Future is Multimedia
- We not only can search text. But audio, images and videos.
- Digital rights management issues.