Fundamentals of Multimedia

2.1 Multimedia Tasks and Concerns

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

2.2 Multimedia Presentation

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

2.2 Multimedia Presentation

- **Graphics Styles**

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

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

  - Human visual dynamics :As soon as the eye moves (saccades ترمش) it re-adjusts its exposure both chemically and geometrically by adjusting the iris القزحيةwhich regulates the size of the pupil بؤبؤ.

- *Assignment*: define in more detail what is Human Visual Dynamics.

2.2 Multimedia Presentation

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

Fonts

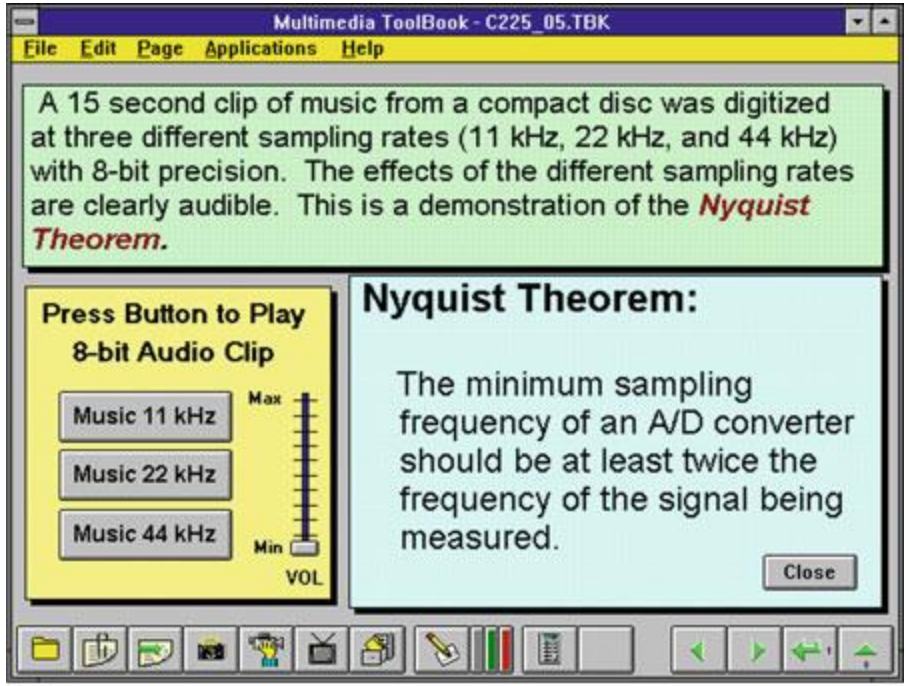
For effective visual communication,:

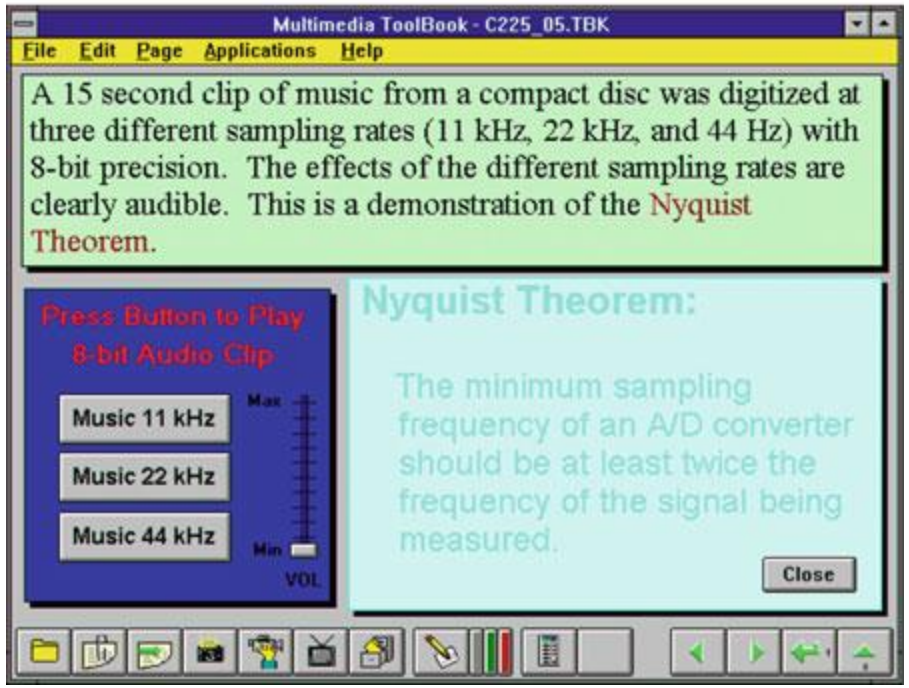
large fonts (18 to 36 points) are best,
with no more than six to eight lines per screen.

(*See Figure in next slide*.)

Upper part is **good**, while bottom one is poor.

(*Why do you think?*)


Multimedia ToolBook - C225_05.TBK
File Edit Page Applications Help
A 15 second clip of music from a compact disc was digitized at three different sampling rates (11 kHz, 22 kHz, and 44 kHz) with 8-bit precision. The effects of the different sampling rates are clearly audible. This is a demonstration of the Nyquist Theorem.
Press Button to Play 8-bit Audio Clip
Music 11 kHz
Music 22 kHz
Music 44 kHz
Max
Min
VOL
Nyquist Theorem:
The minimum sampling frequency of an A/D converter should be at least twice the frequency of the signal being measured.
Close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2.2 Multimedia Presentation

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

$$(R, G, B) \Rightarrow (1 - R, 1 - G, 1 - B) \ \ or$$

$$(R, G, B) \Rightarrow (255 - R, 255 - G, 255 - B)$$

2.2 Multimedia Presentation

- **A Color Contrast**

- Another way to make reasonable color on a screen is the color “opposite”

- Also if the text is bright, the background is dark, and vice versa.

2.2 Multimedia Presentation

- **Sprite (شبح) Animation**

- *Sprites are often used in animation.*
- the basic idea of sprite animation is simple.

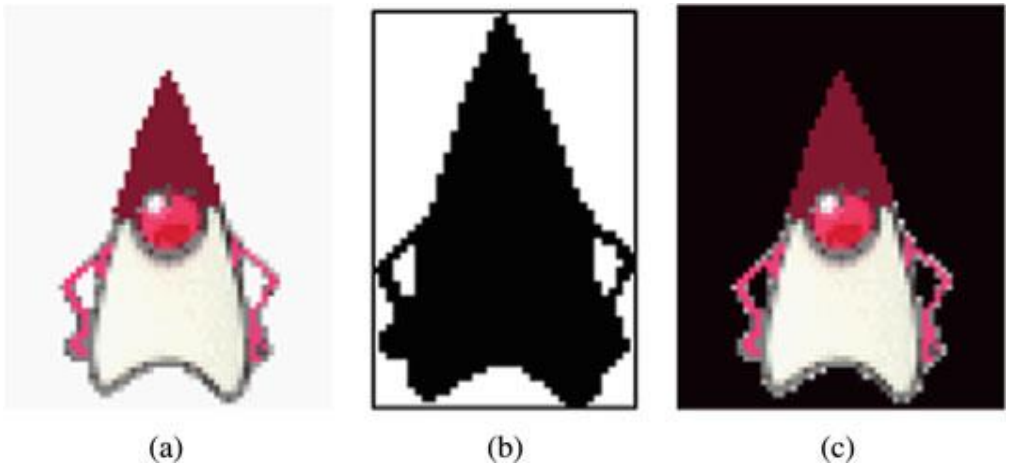


Fig. 2.4 Sprite creation: **a** original; **b** mask image *M*; and **c** sprite *S*.

Suppose we have produced an animation figure, as in Fig. 2.4a. Then it is a simple matter to create a 1-bit mask M, as shown in Fig. 2.4b, black on white, and the accompanying sprite S, as shown in Fig. 2.4c. Now we can overlay the sprite on a colored background B, as shown in Fig. 2.5a, by first ANDing B and M, then ORing the result with S, with the final result as in Fig. 2.5e. Operations are available to carry out these simple compositing manipulations at frame rate and so produce a simple 2D animation that moves the sprite around the frame but does not change the way it looks.

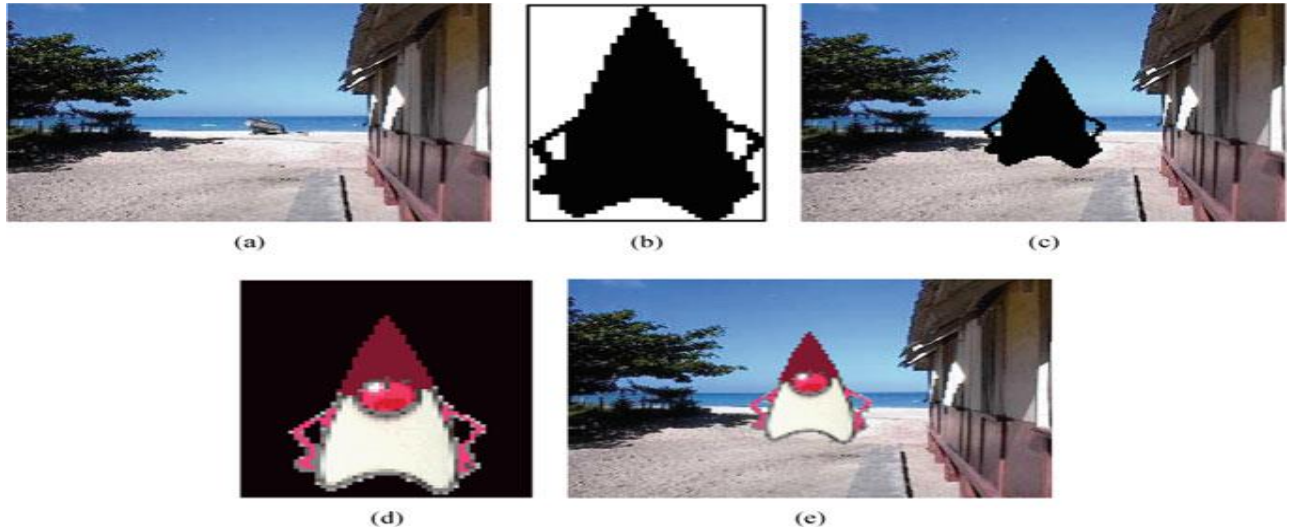
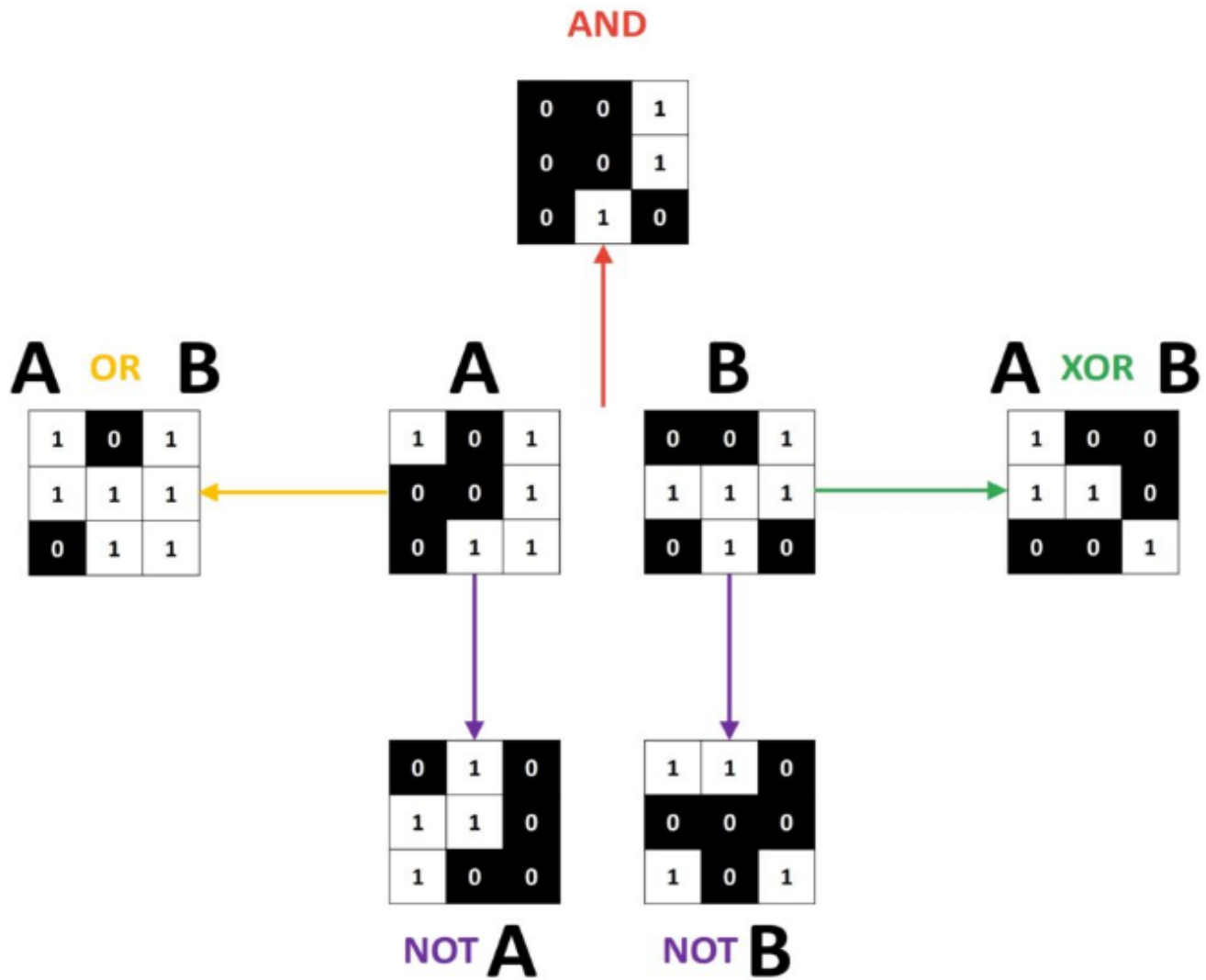


Fig. 2.5 Sprite animation: **a** Background *B*; **b** mask *M*; **c** *B* AND *M*; **d** sprite *S*; **e** *B* AND *M* OR *S*


AND
A OR B
A
B
A XOR B
NOT A
NOT B

2.2 Multimedia Presentation

- **Video Transitions**

- Video transitions are syntactic نحوي means to signal “scene changes” and often carry semantic دلالات لفظية meaning.

- Many different types of transitions exist; the main types are:
  - *cuts,*
  - *wipes,*
  - *dissolves,*
  - *fade-ins,*
  - *fade-outs.*

2.2 Multimedia Presentation

- **Types of Transitions:**

➢ **A cut:** carries out an abrupt مفاجيء change of image contents in two consecutive video frames from their respective clips.

- It is the:
  - simplest and
  - most frequently used video transition.

➢ **A wipe:** One shot replaces another following a 2-dimension pattern.

2.2 Multimedia Presentation

- **A dissolve احلال محل:** Also known as mix, cross dissolve, or cross fade. It’s the most commonly used transitions from one shot to another.
- Dissolve is the effect that, while the first shot gradually disappears, the second shot becomes more and more visible.

2.2 Multimedia Presentation

- **Fade-in**.
- **Fade-out.**

- Fade is eventually a dissolve between normal image shot and black screen. When you dissolve from image to black, it’s a fade out. When dissolving from black to image, it’s called fade in.

2.3 Data Compression

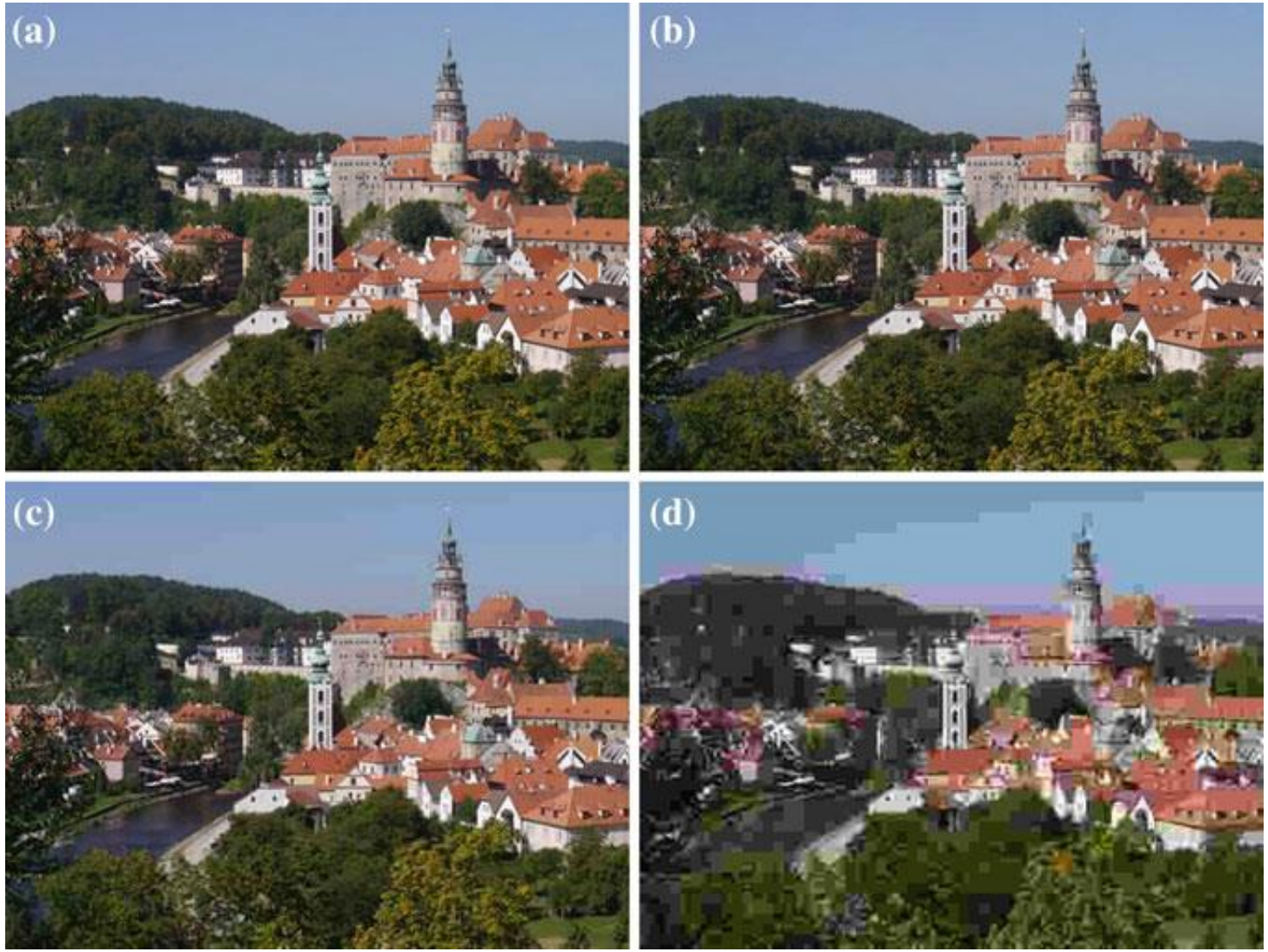
- One of the most evident and important challenges of using multimedia is the necessity to compress data.
- we need excellent and fast data compression in order to avoid such high data rates that cause problems for storage and networks. (*See* Table 2.1 for Uncompressed Video sizes)

Table 2.1 Uncompressed video sizes

Standard definition video	
640×480 full color	= 922 kB/frame
@ 30 frames/s	= 28 MB/s
	= 221 Mb/s
× 3,600 s/h	= 100 GB/h
High definition video	
1,920×1,080 full color	= 6.2 MB/frame
@ 30 frames/s	= 187 MB/s
	= 1.5 Gb/s
× 3,600 s/h	= 672 GB/h

- The more image compression is done, the worse the quality (Q) of that image is.

- Next slide Figure 2.9a shows an original, uncompressed image taken by a digital camera that allows full-accuracy images to be captured, with no data compression at all.
- In Fig. 2.9b,c that while Q = 75 and 25 are not terrible, if we insist on going down to a Quality Factor of Q = 5 we do end up with an unusable image Fig. 2.9d.


(a)
(b)
(c)
(d)

2.4 Multimedia Production

- multimedia production can easily involve a host of people with specialized skills:
  - an art director,
  - graphic designer,
  - production artist,
  - producer,
  - project manager,
  - writer,
  - user interface designer,
  - sound designer,
  - videographer, and
  - 3D and 2D animators,
  - as well as programmers.

2.4 Multimedia Production

- During the production timeline:
- The **programmer** is involved when the project is about 40% complete
- the **design** phase consists of:
  - storyboarding,
  - flowcharting,
  - prototyping, and
  - user testing, as well as
  - a parallel production of media.
- Programming and **debugging** phases would be carried out in consultation with marketing, and
- the **distribution** phase would follow.

- *Assignment*: describe what can be done in each part of the design phase.

2.5 Multimedia Sharing and Distribution

- Multimedia content, once produced, needs to be published and then shared among users:
  - Optical disks
  - USB
  - Internet
- Consider YouTube, the most popular video sharing site over the Internet, as an example.
- A user can easily create a Google **account** and channel (as YouTube is now owned by Google), and then upload a video, which will be shared to everyone or to selected users.
- YouTube **further** enables titles and tags that are used to classify the videos and link similar videos together (shown as a list of **related** videos).
- The link to this video can be fed into such other **social** networking sites such as Facebook or Twitter as well, potentially propagating to many users of interest in a short time

2.6 Some Useful Editing and Authoring Tools

- Since the first step in creating a multimedia application is probably creation of interesting video clips, we start off with looking at a video editing tool:

- **Premiere**: video editing program that allows you to quickly create a simple digital video by assembling and merging multimedia components

- **Director**: complete environment for creating interactive "movies" and animation.
- Traditional animation is created by showing slightly different images over time.

- **Flash**: is a simple authoring tool that facilitates the creation of interactive movies.