

Multimedia Production for Elearning with Open Source / Linux

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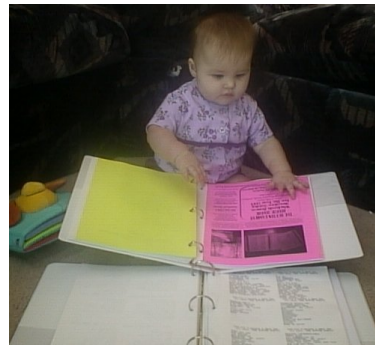
Rechnernetze und
verteilte Systeme

R|V|S

Rechnernetze und
verteilte Systeme

Learning - Cognitive

Knowing, or apprehending by the understanding

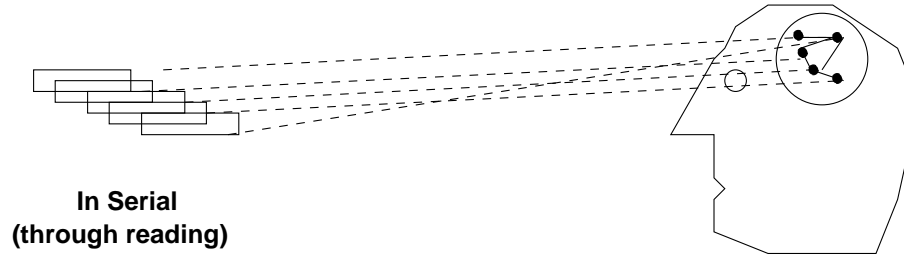


the awareness with perception, reasoning, judgement, intuition and memory, the mental process by which knowledge is acquired

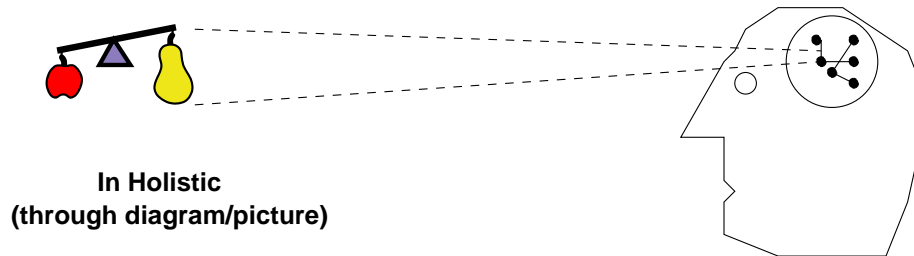
Learning - Cognitive

- Learning :
accumulation and organization of knowledge structure
- Hypertext-structure :
reflect a map of knowledge in human brain
- As we learn :
we gain new structures and links in semantic memory

As We Learn



In Serial
(through reading)



In Holistic
(through diagram/picture)

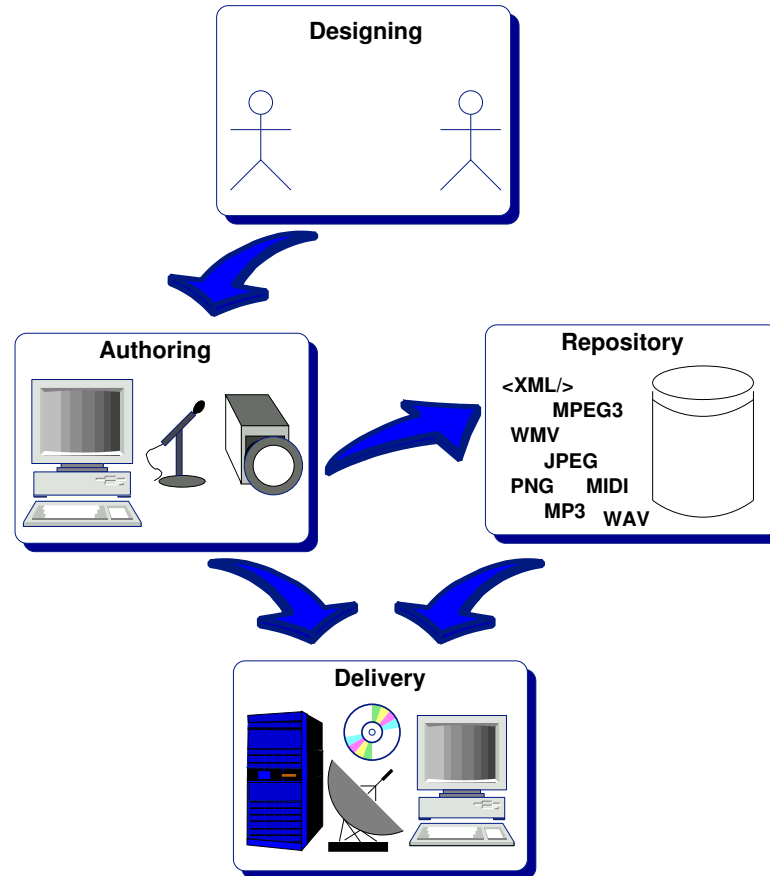
Multimedia ?

Combination of both Holistic and Serial

Combined materials in text, graphic art, sound, video, and animation which are delivered via digital computer systems or other electronic means

Good eLearning platform should include multimedia

Stages in Multimedia Production



Stages in Designing Multimedia

■ Information Design

■ Objectives - Audiences - Organisation -
FlowCharts & Information Maps

■ Interaction Design

■ User involvement - Usability - Navigation Tools -
Storyboard

■ Presentation Design

■ Visual Style - Layout - Interface Design - Con-
tent (Text, Graphs, Audio, Video)

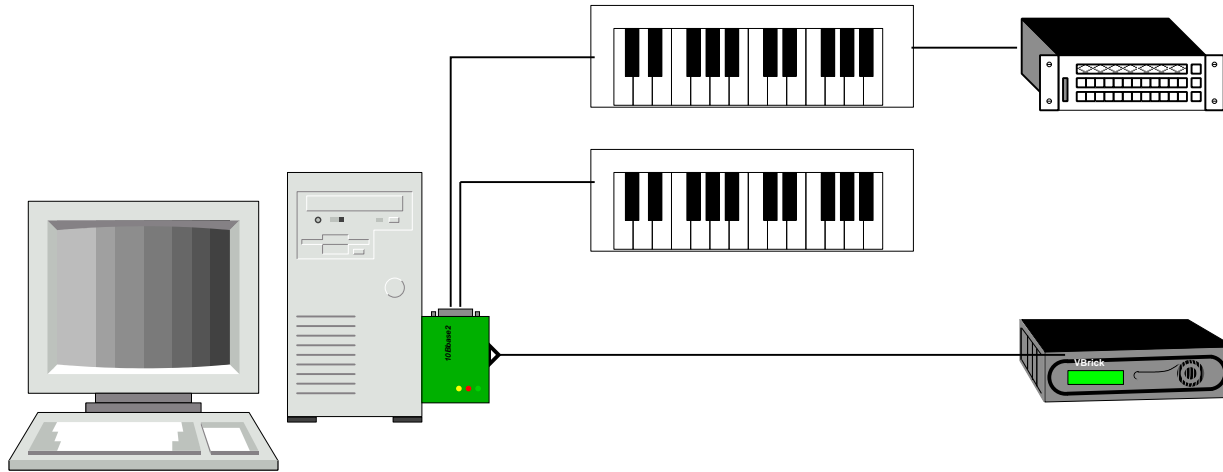
Authoring

- Audio
 - MIDI & Sequencing
 - Multi Track
- Video (non linear editing)
 - Video Capturing
 - Video Editing / Composing
- Animation
- Interactive Program

Audio: MIDI & Sequencing

- MIDI : Musical Instrument Digital Interface
- Standards for communicating MIDI capable instruments for exchanging time sequenced song data (notes & events)
- Sequencer : programs which records / playback notes from / to MIDI devices
- Example : Rosegarden, Jazz, Brahms, etc

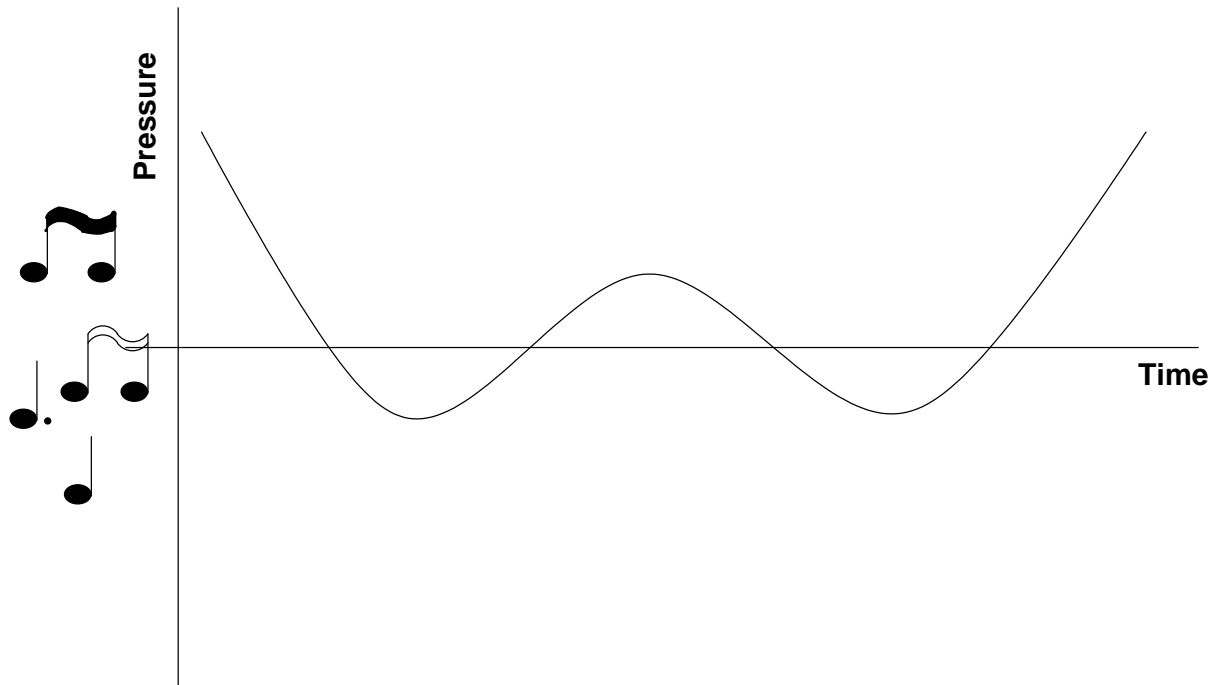
... MIDI & Sequencing



- Data transmitted are notes and their properties (velocity, note-on, note-off), control (instruments, pitch, damper, sustain, etc)

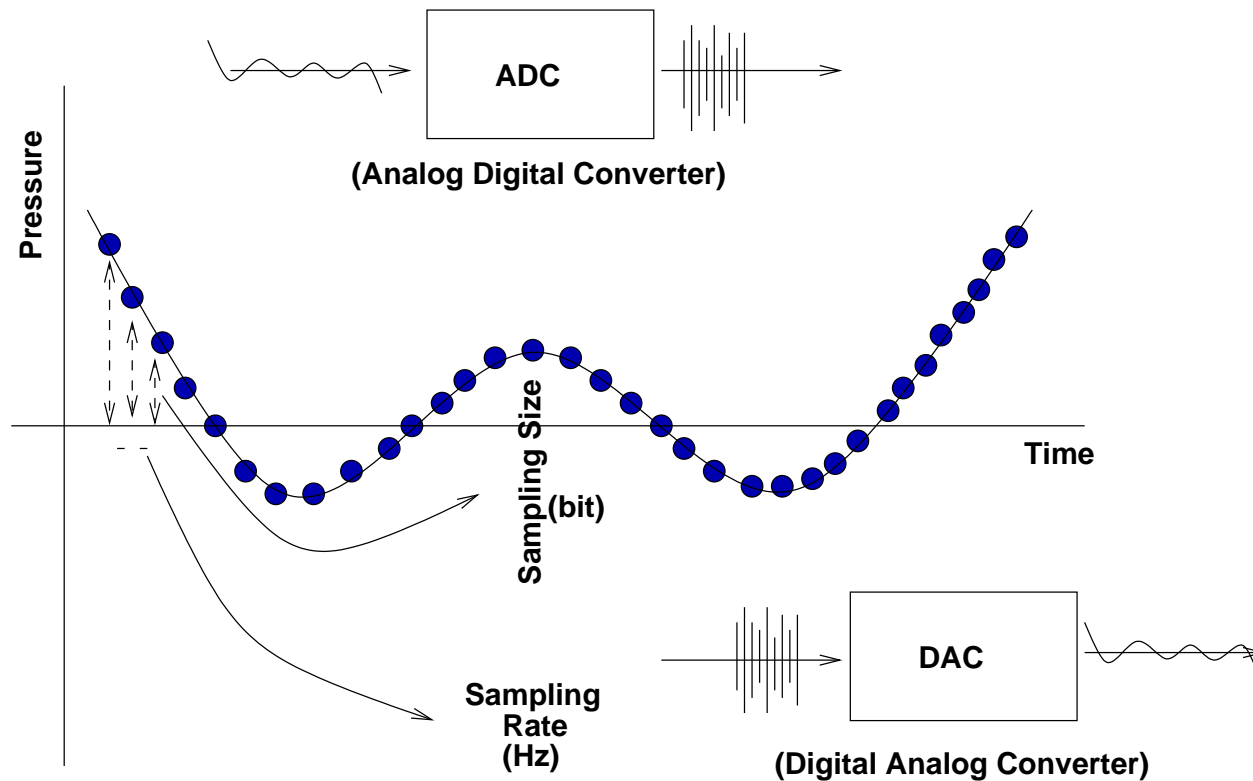
Audio, some basics

life was beautiful ...



Audio, some basics

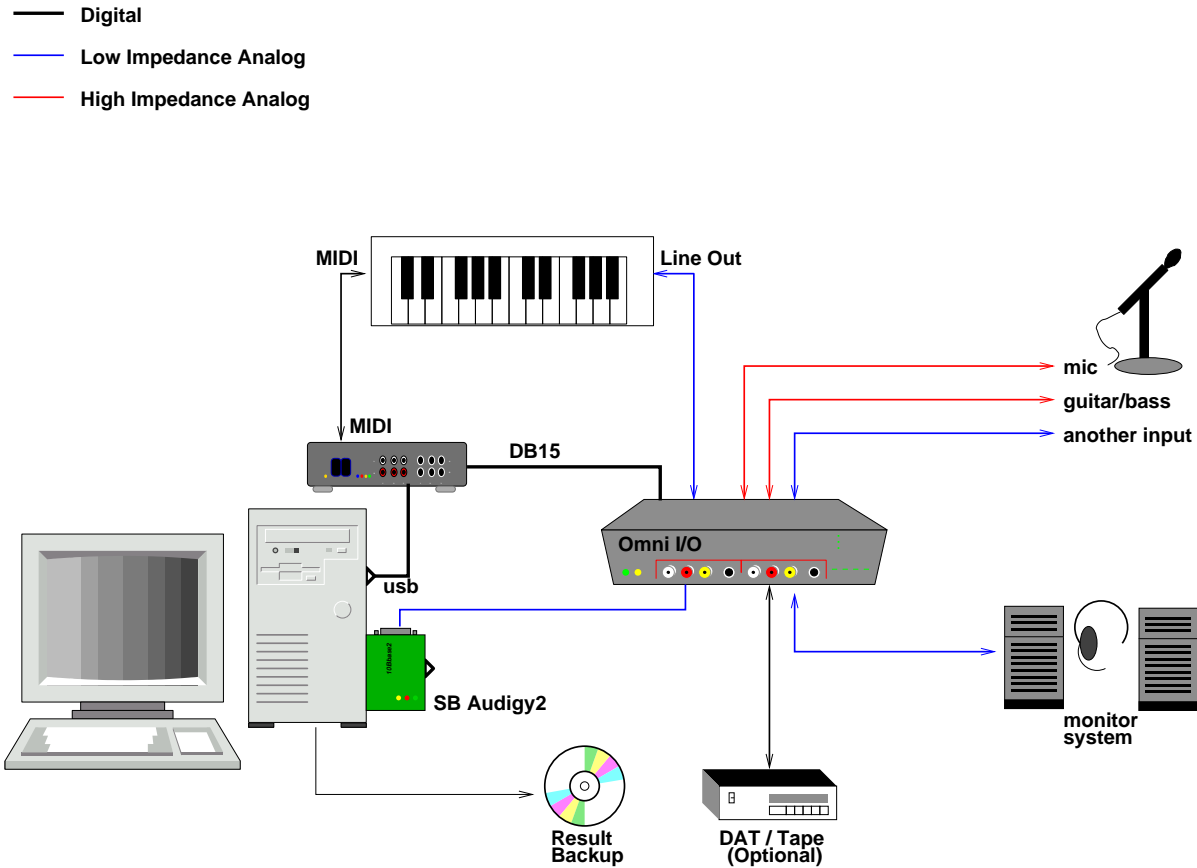
but after computer ...



Audio: Multitrack (Direct to Disk)

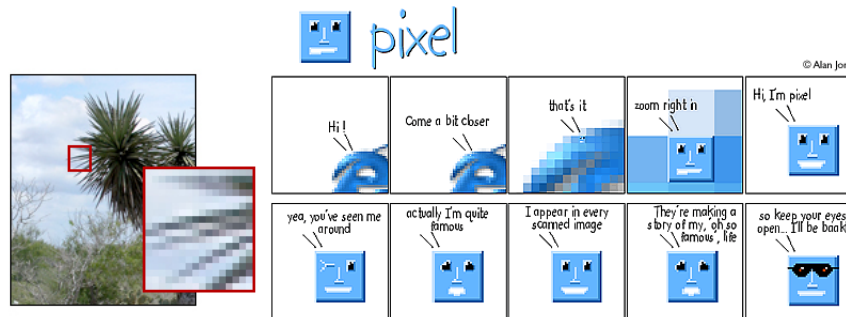
- Simulating real professional studio in a box :
Performing recording, processing, mixing sounds,
and digital sound processing (DSP)
- Sounds are recorded in multitrack direct to hard-disk
- Set of software : ALSA, Jack, LADSPA, Ardour, Audacity

Digital Studio



Digital Image, basics

Pixels, who they are ?



each has colors values : **Red Green Blue** in bit

resolution : how many (square) pixels in an image

properties of an image : color depth & resolution

Digital Video, basics

Basically, video is sequence of images (frames)



and ofcourse sounds too ...

Digital Video, basics

Thus properties of a video should be :

- Image resolution : resolution + color depth
- Rate : how many frame per second (fps)
- Sound : sampling rate (Hz) + sampling size (bit)

Digital Video, basics

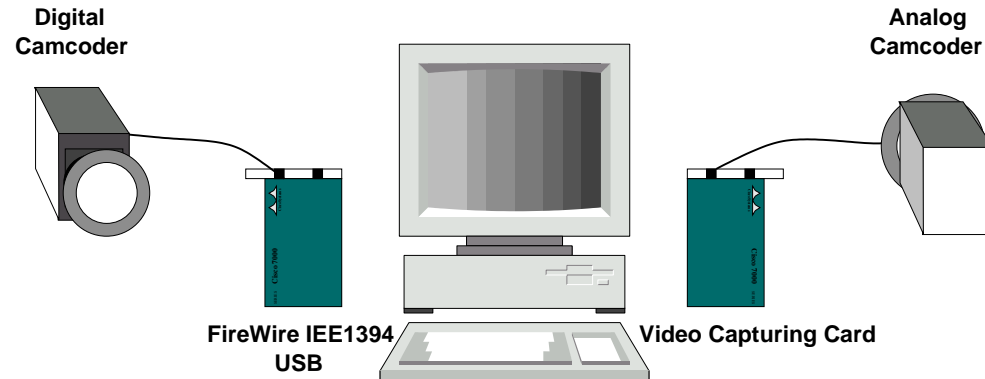
Some video encodings and compression :

- AVI, MPEG-1, MPEG-2, MPEG-4, DivX

Some standards :

- VCD : MPEG-1, NTSC-352 x 240 at 30 fps | PAL-352 x 288 at 25 fps | Bit rate at 1.15 Mb/sec
- SVCD : MPEG-2, NTSC-352 x 480 at 30 fps | PAL-352 x 576 at 25 fps | Bit rate at 2.4 Mb/sec
- DVD : MPEG-2, NTSC-704 x 480 at 30 fps | PAL-704 x 576 at 25 fps | Bit rate at 4.8 MB/sec

Video: Capturing



- Analog : through video capturing card
- Digital : USB or Firewire
- Recorded as DV format: AVI - MOV - MPEG
- App : *DVGrab*, *MainCapture*, *Cinelerra* capture

Video: Editing & Composing

- Non-linear editing
- Performing composing, video transition, effect, mixing, encoding
- App : *Cinelerra, Kino, MainActor*

Synchronization

- When video, audio, MIDI are gathered together : need time synchronization
- SMPTE timecode (SMTPE : Society of Motion Picture and Television Engineers)
- Every source of data carries SMPTE, played together to get final result

Animation

■ Modelling tools

Creating Wireframe objects, room, lights, and their movement

Example : *Blender*

■ Rendering Machine

From wireframe to picture / videoframes

Example : *PovRay* -> run on top of Linux cluster

Interactive Program

- Giving users control over what elements to present and when
- Embedded into Web Application
- Example :
 - Simple interactive web application (*PHP, Python, etc*)
 - *JAVA* applets / scripts
 - *Macromedia flash*

Repository : format & compression

- Depends on what purpose:
 - Further authoring : original quality
 - Delivery : good compression & widely readable
- Beware :
 - higher compression ratio means lost in quality

... format & compression

Appliance	Main Requirements	Format of Choice
Share through CDs	Quality, Player Availability	MP3, MPEG
Share through internet	Quality, Compression	MP3, MP3PRO, MPEG, WMA, WMV
Portable players	Compression, Quality	MP3PRO, MPEG
Broadcasting through internet	Player Availability, Compression	MPEG, WMA, RA-G2

Repository : cataloging

- Giving text which semantically associated to each content
- Indexing and categorizing functions
- Providing searching, directory, thumbnails, and preview model for the users

Delivery : Offline Media

- Most common used : CDROM based media
(format : Audio CD, Data CD, VCD, SVCD, DVD)
- Interactive application :
shall be runnable in many platform : *Windows, Mac, Unix, Linux*
- Tools : *K3B*: wrapper for : *cdda2wav, cdrdao, cdrecord, lame*, and other video/audio encoder

Delivery : Online Media

- Direct download & Play
 - When offline playing is required
 - When data is not too big & legal to download
- Streaming
 - Transmitting sequence of data which will be played in sequence

Delivery : Streaming

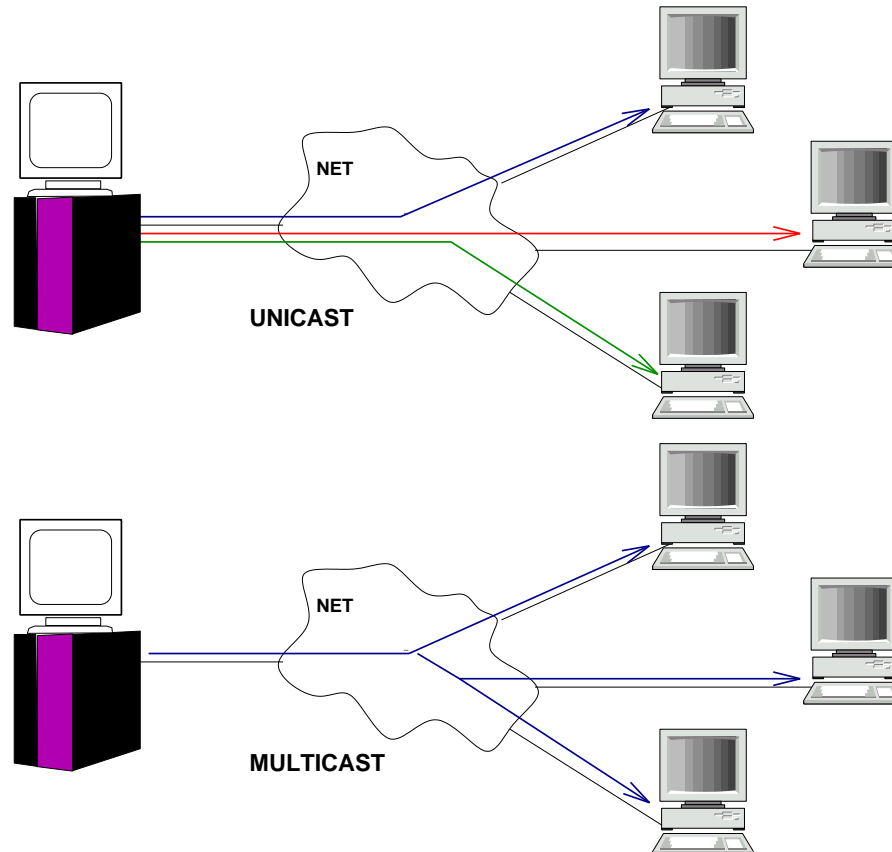
■ Unicast

- Transmitted One to one : client-server
- Can be done by normal TCP/IP network & nodes

■ Multicast

- Transmitted One to many : one server to group of clients sharing same multicast address
- Must have network devices & nodes capable in multicasting

Delivery : Streaming



Delivery: Streaming

■ Audio streaming :

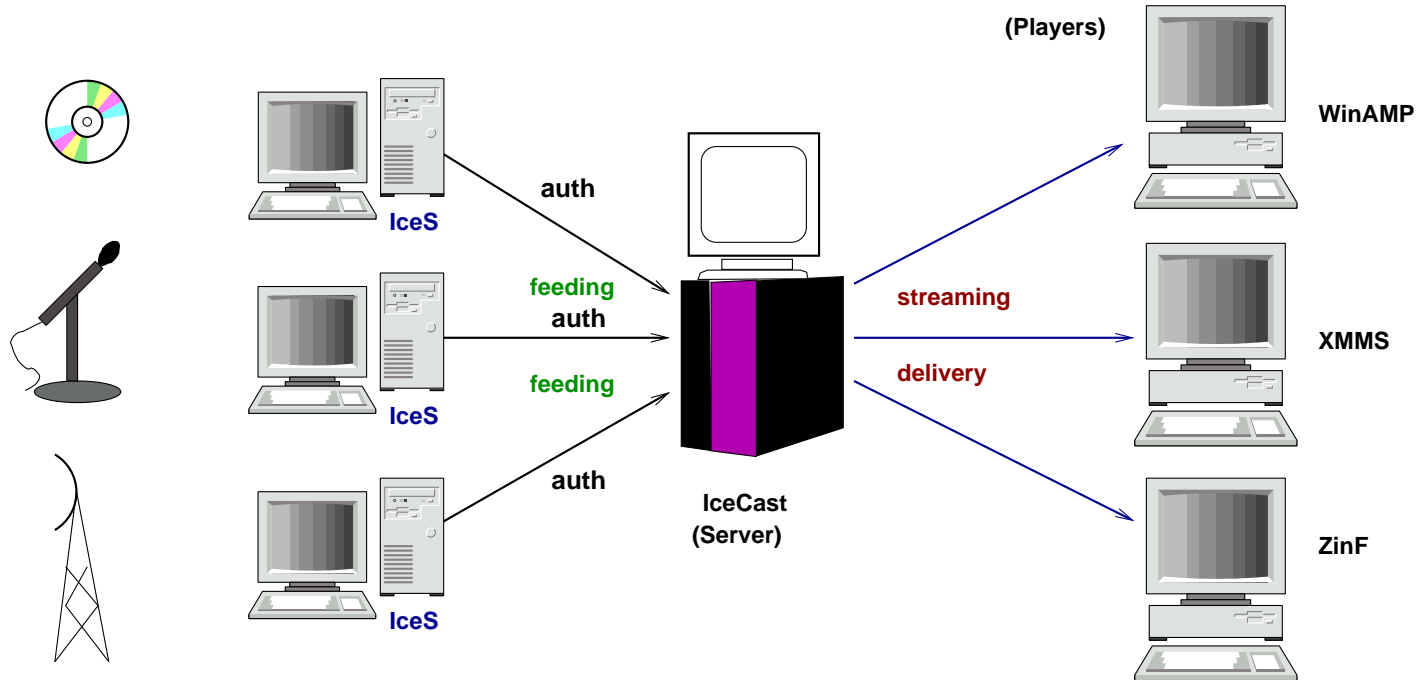
- *IceCast* : set of application, in Ogg Vorbis

■ Video streaming :

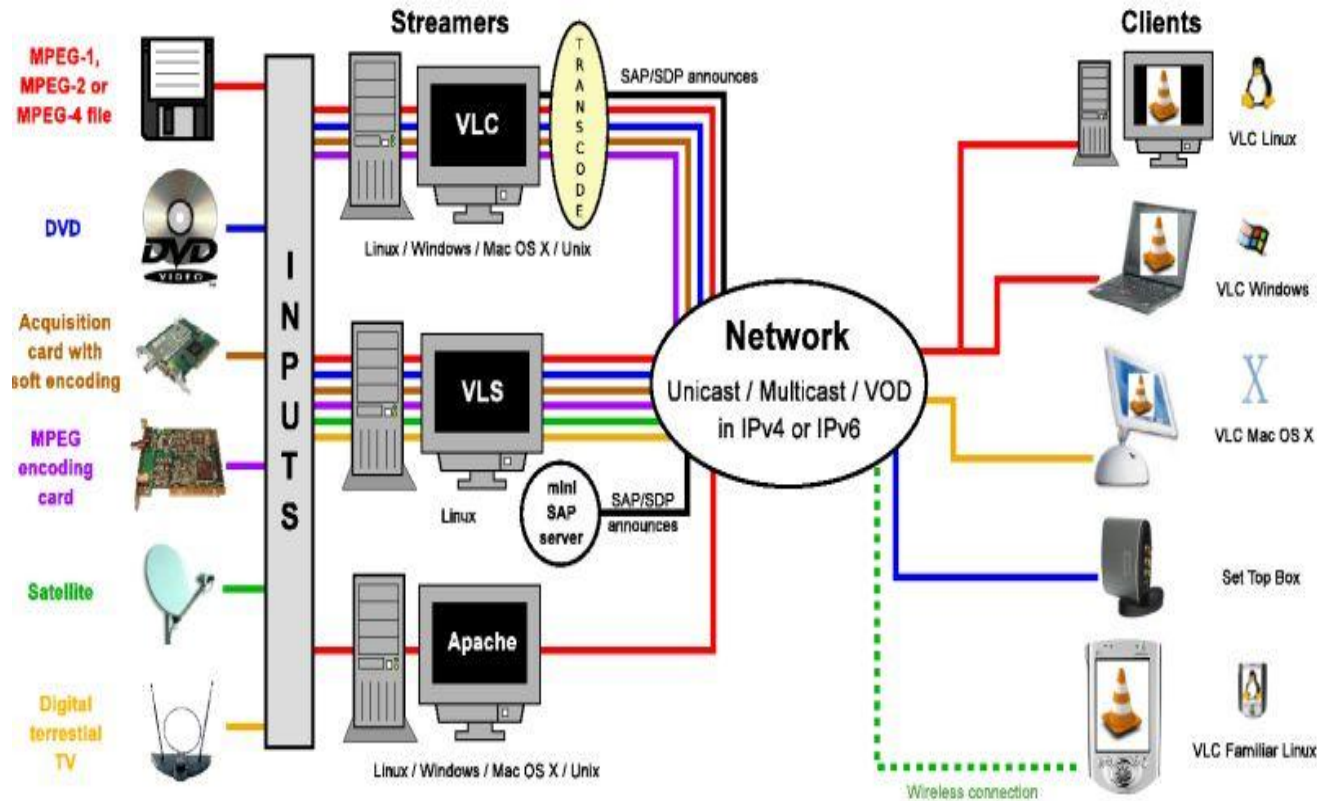
- *Helix* -> OpenSource (RealNetworks Licence)

- *VideoLAN* -> OpenSource

Audio Streaming with IceCast



Video Streaming with VideoLAN



Conclusion

