Media Object Production
- Hardware and Software Tools

- Concept of Media Object Production
- Process of CM Media Object Production
- Audio Production
- Video Production
  - Capturing
  - Editing
  - Compressing
  - Outputting
- Demos of Live Audio/Video Capture

Media Object

Media Object
component in a multimedia
document, presentation, etc.

  - Text
  - 2D graphics
  - 3D graphics
  - Animation
  - Still image
  - Audio clip
    * speech
    * music
    * other sound
  - Video clip

Media Production

Media production: process to produce a medium object

- ❑ Text
    - Language, font, size, color, shadow, blink, etc
    - Tools: LaTex, Word, HTML editors, …
- ❑ 2D/3D Graphics
    - Programming languages: Java2/3D, OpenGL, SVG, …
    - Tools: TrueSpace, LightWave3D, Inspire3D, …
- ❑ Animation
    - Programming language: Java, Java script, VRML, …
    - Tools: Infini-D, Flash, TrueSpace, …
- ❑ Still Image & Moving Images (Video)
    - Captured via scanner, camera, software, …
    - Tools: xv, Display, PhotoDraw, Photoshop, …

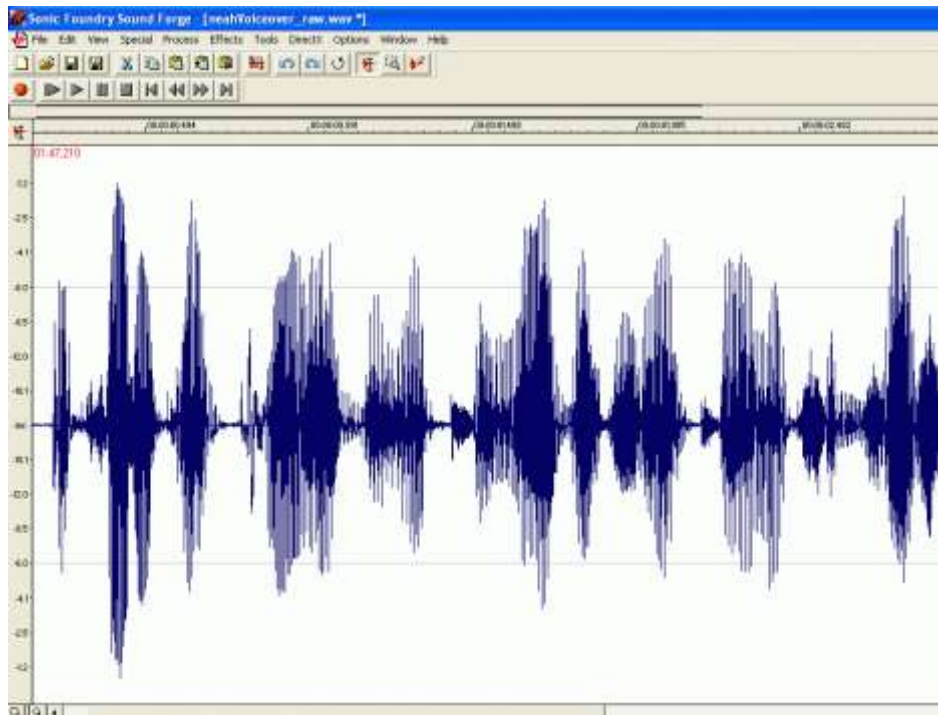- ❑ Audio – Continuous Media (CM) → special techniques for its production
- ❑ Video – Continuous Media (CM) → special techniques for its production

General Features of CM Production

❖ Features of CM
- - Change with time: samples/sec (audio) and frame/sec (video)
- - Large volume of data: proportional to the length
- - Realtime processing power

General Process of CM Production

Production Process

❑ **Pre-Production**
- Clarify intended application of CM to be produced
- Prepare hardware: mic, camera, CPU power, memory/disc size, board
- Determine OS: Unix/Linux, Windows 2000/XP/VISTA/7, and Mac
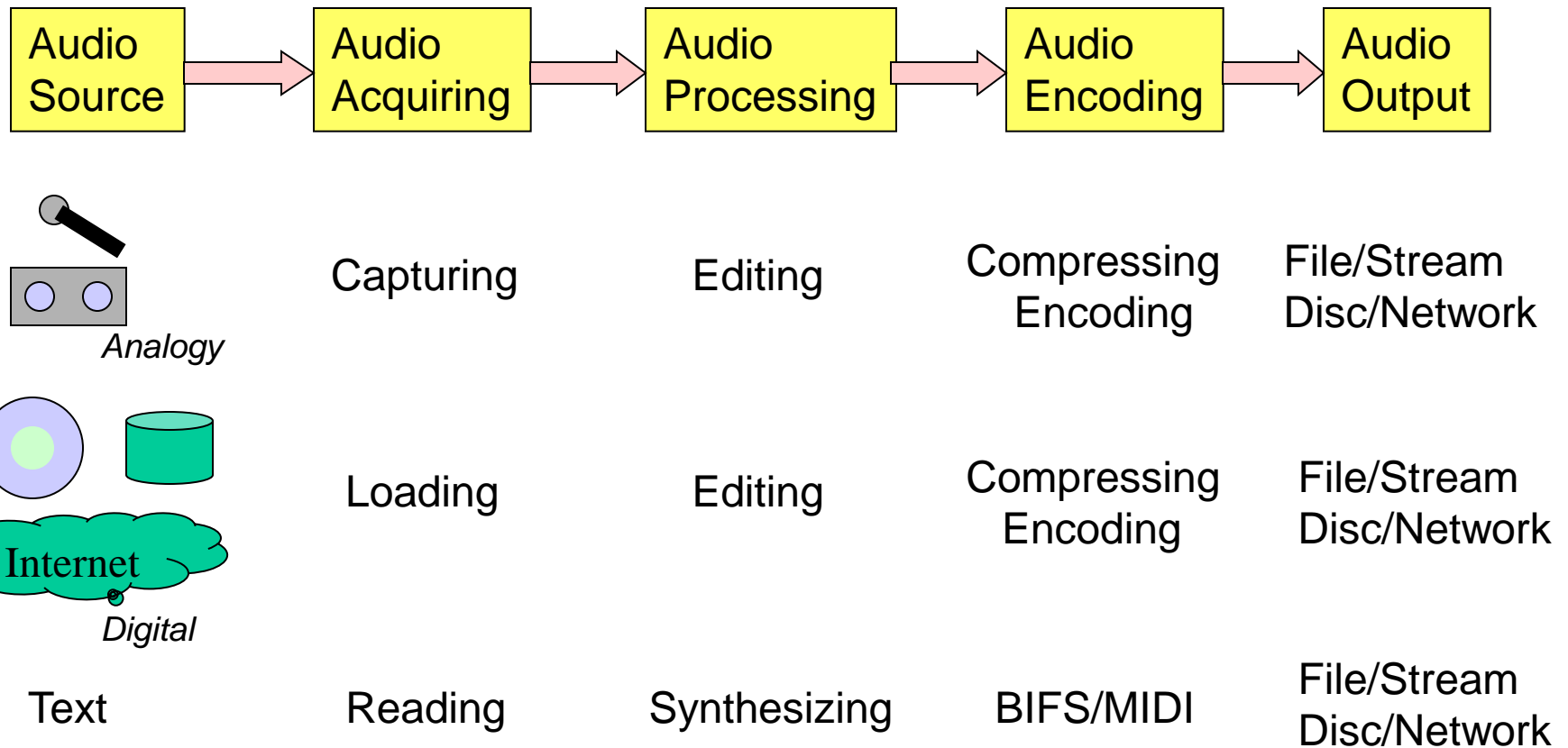- Purchase, download, install necessary software

❑ **In-Production**
- CM acquiring, processing/editing, encoding and output

❑ **Post-Production**
- Testing and refining when necessary

Audio Production Process

Audio Source	→	Audio Acquiring	→	Audio Processing	→	Audio Encoding	→	Audio Output

Analogy

	Capturing	Editing	Compressing Encoding	File/Stream Disc/Network

Digital

	Loading	Editing	Compressing Encoding	File/Stream Disc/Network

| Text	Reading	Synthesizing	BIFS/MIDI	File/Stream Disc/Network

Audio Pre-Production

- Basic Notice
  - Good source: good microphone, mixing desk
  - Signal processing: compressor, EQ unit
  - Proper recording environment

Audio Digital Samples and Sampling Rate

Sampling Rate/Frequency: number of samples per second

a. Original Analog Waveform   b. Sampling Rate N   c. Sampling Rate N/2   d. Sampling Rate N/4

Signal bandwidth: B
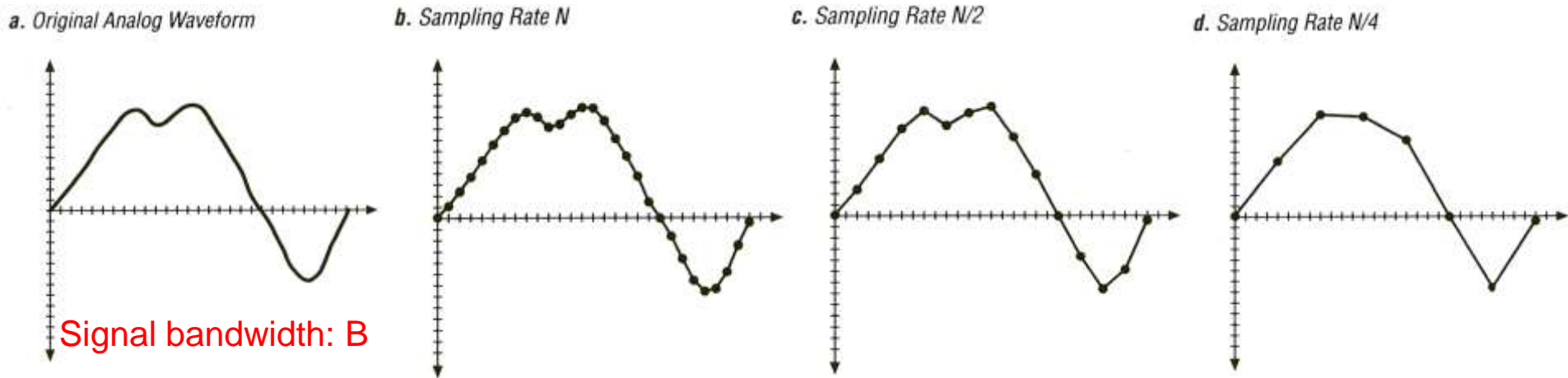
More samples, better quality but larger data

Nyquist sampling rate: N=>2B → No Distortion

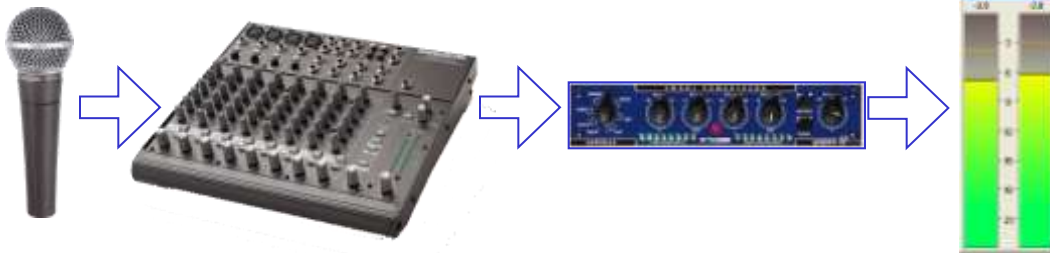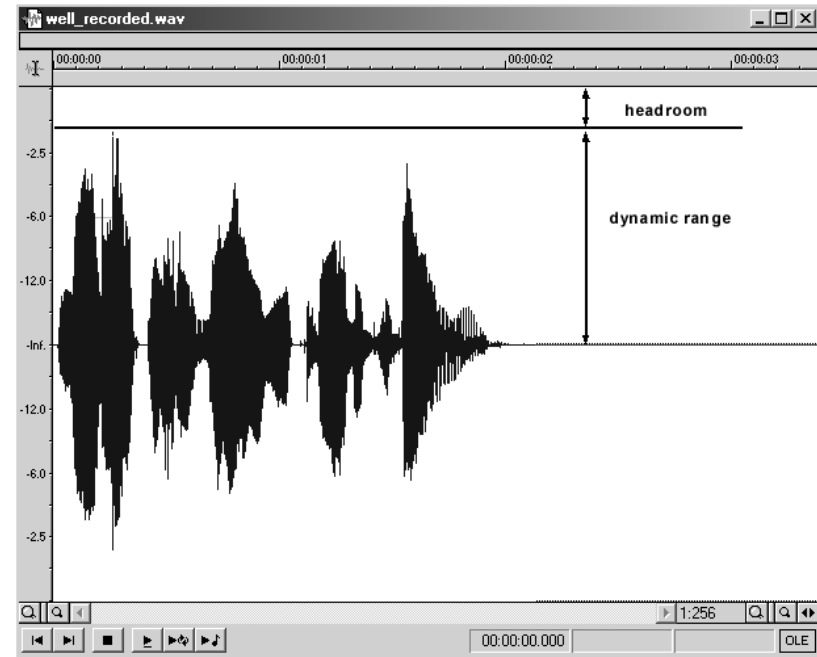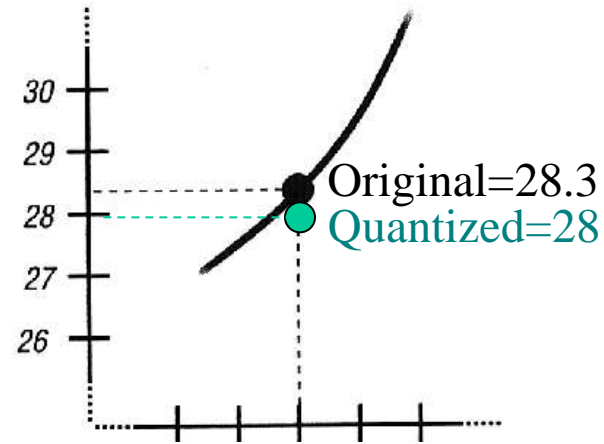# Audio Resolution and Quantization Levels

Samples are quantized into discrete values

Sample Resolution:

→ all possible values or bits per sample

- 256 values from 8 bits

- 65536 values from 16 bits

Setup "gain" carefully to
have a proper dynamic range

Original=28.3
Quantized=28

well_recorded.wav
headroom
dynamic range

Audio Frequency Features

FQ Range	Contents
20–60 Hz	Extreme low bass. Most speakers cannot reproduce this.
60–250 Hz	The audible low-end. Files with the right amount of low end sound *warm,* files without enough sound *thin.*
250 Hz–2 kHz	The low-midrange. Files with too much in the low-mids are hard to listen to and sound telephone-like.
2 kHz–4 kHz	The high-midrange. Where most speech information resides. In fact, cutting here in the music and boosting around 3 kHz in your narration makes it more intelligible.
4 kHz–6 kHz	The presence range. Provides clarity in both voice and musical instruments. Boosting 5 kHz can make your music or voiceover (not both!) seem closer to the listener.
6 kHz–20 kHz	The very high frequencies. Boosting here adds "air" but can also cause sibilance problems

General Rules in Audio Capturing

❑ Audio quality
- Target application: Disc, network no-live or live broadcast
- Set input level correctly
- Save as sound file format with no or small quality loss: au, wav, aif, …
- Choose certain sampling rate and resolution (8/12/16 bits)
    The higher rate and bits, the high quality but the more data
    Data amount = Channels x SamplingRate x Bits / 8 (Bytes)

❑ Capture interface and sound card
- Microphone input and line input
- Many different sound cards available

❑ OS and software
- Audio capture methods are similar for different OSs
- Capture software embed in OS: Windows Media
- Capture software bounded with sound card
- Capture API in programming languages like Java

Audio Editing

- Cropping: Select a peace/clip of audio from an audio file

- Cutting, copying and pasting

- Equalization

- Normalization

- Noise reduction

- Transition
  - Trimming silence
  - Fade

- Popular sound editing software
  - Sound Forge from Sonic Foundry
  - Cool Edit from Syntrillium
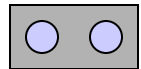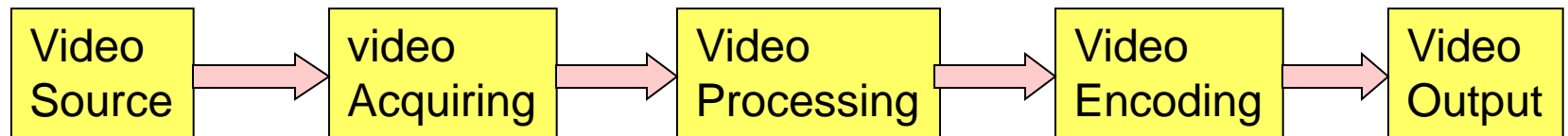 - SoundEdit from Macromedia

Audio Compressing/Encoding

- Audio editing is usually based on uncompressed audio: au, wav, aif

- Compression: reduce data size

  based on sound types and targeted applications
  Make a balance between quality and size
    - channels (channel converting)
    - sampling rate (re-sampling)
    - bit resolution

- Encoded audio file formats

  - wave (compressed), QuickTime (mov), MP3, GSM, DCR, …

- Encoded audio stream formats

  - RealAudio (ra, ram), Windows (asf), QuickTime (mov), MP3

- Music vs. speech codecs
  – Music and speech are fundamentally different
  – Codecs have been optimized for one or the other
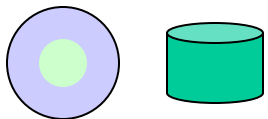 – When in doubt, use a music codec

Audio Output

- Audio output destinations

  - speaker

  - analogy storage device

  - digital storage device

  - network/Internet

- Network down loaded applications

  → stored in disc in compressed file format

- Network real time applications

  → outputted to a streaming server in stream format

Video Production

Video Source	→	video Acquiring	→	Video Processing	→	Video Encoding	→	Video Output

Analogy/digital

	Capturing compressing	Editing	Compressing Encoding	File/Stream Disc/Network

Internet

Digital

	Loading	Editing	Compressing Encoding	File/Stream Disc/Network

| Model & parameters	Reading	Rendering	models	File/Stream Disc/Network

Video Pre-Production

- Basic Notice
  - Good camera: DV is most cost-efficient
  - Buy the best tripod you can afford!
  - Lighting: 3-point lighting kit

Video Pre-Production - Lights

Three Point Lighting

- Key Light
- Fill Light
- Back Light or Hair Light

back light

key light

fill light

Hair Light

Key Light

Background Light

Fill Light
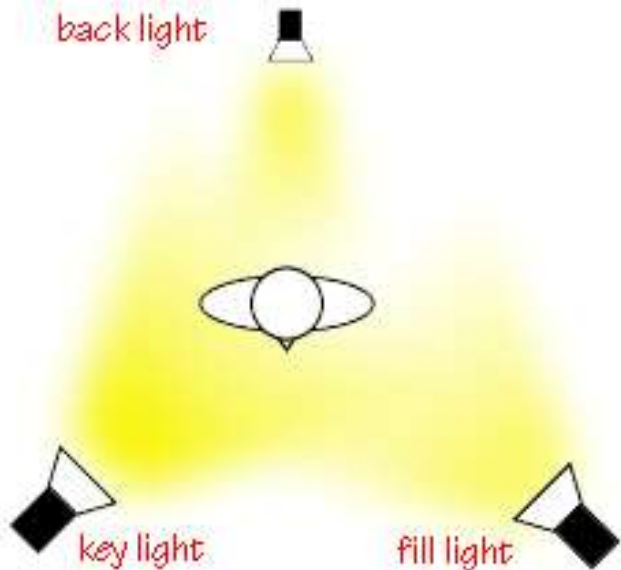
Video Capturing

❑ Video quality
- Target application: Disc, network no-live or live broadcast
- Select relative large image size: 640x480, 320x240
- Choose frame rate (fps) and true color (24 bits)
- Save as video file format with no or small quality loss: avi, mjpeg, …
- Leave enough memory and HD space

  Data amount
  = width x height x fps x bits x time / 8 (Bytes, no-compressing)
  = The_above / compress_ratio (with compressing)

❑ Capture interface and video capture card
- Analogy interface, digital IEEE1394 (i.Link), USB
- Video capture card: interface type and with/without hardware encoder
  # GGV-VCP2M/PCI (software encoding)
  # MEG-VC2
  # IFC-IL3/DV
  # EZDV II
  # DVStorm-RT Light

Video Editing - Traditional "A/B Roll" Analog Editing System

# Video Editing – Modern Digital Edit using Computer Software

Video Editing

- Specify the location of a video frame, called time code

- **SMPTE** (Society for Motion Picture Television Engineers, pron. "simptee")
  hours:minutes:seconds:frames
  00:04:26:05 → an image at the 4th minute, 26th second and 5th frame

- Nonlinear editing: arrange a video sequence in arbitrary order

- Special effects
  - Transition between two clips: fading, wiping, scrolling, …
  - Superimposing: superimpose one clip over another
  - Filtering: lens flare, zoom, twist, pan, …
  - Morphing: one image cross-fades into another

- Popular video editing software
  – Adobe's Premiere
  – Ulead's Video Studio
  – MediaStudio

An Example of Video Editing

One scene- 4 clips
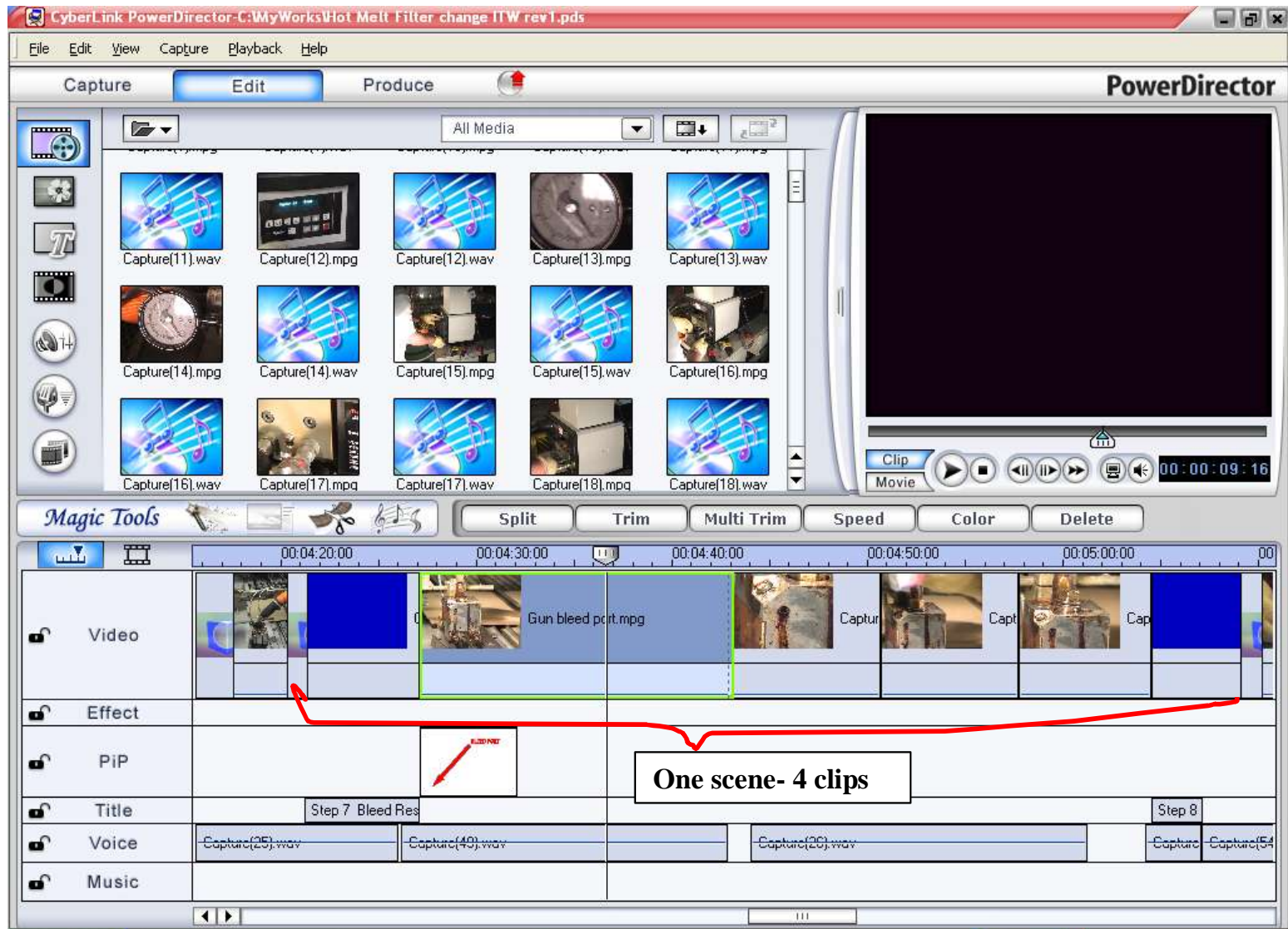
An Example of Video and Audio Mixing
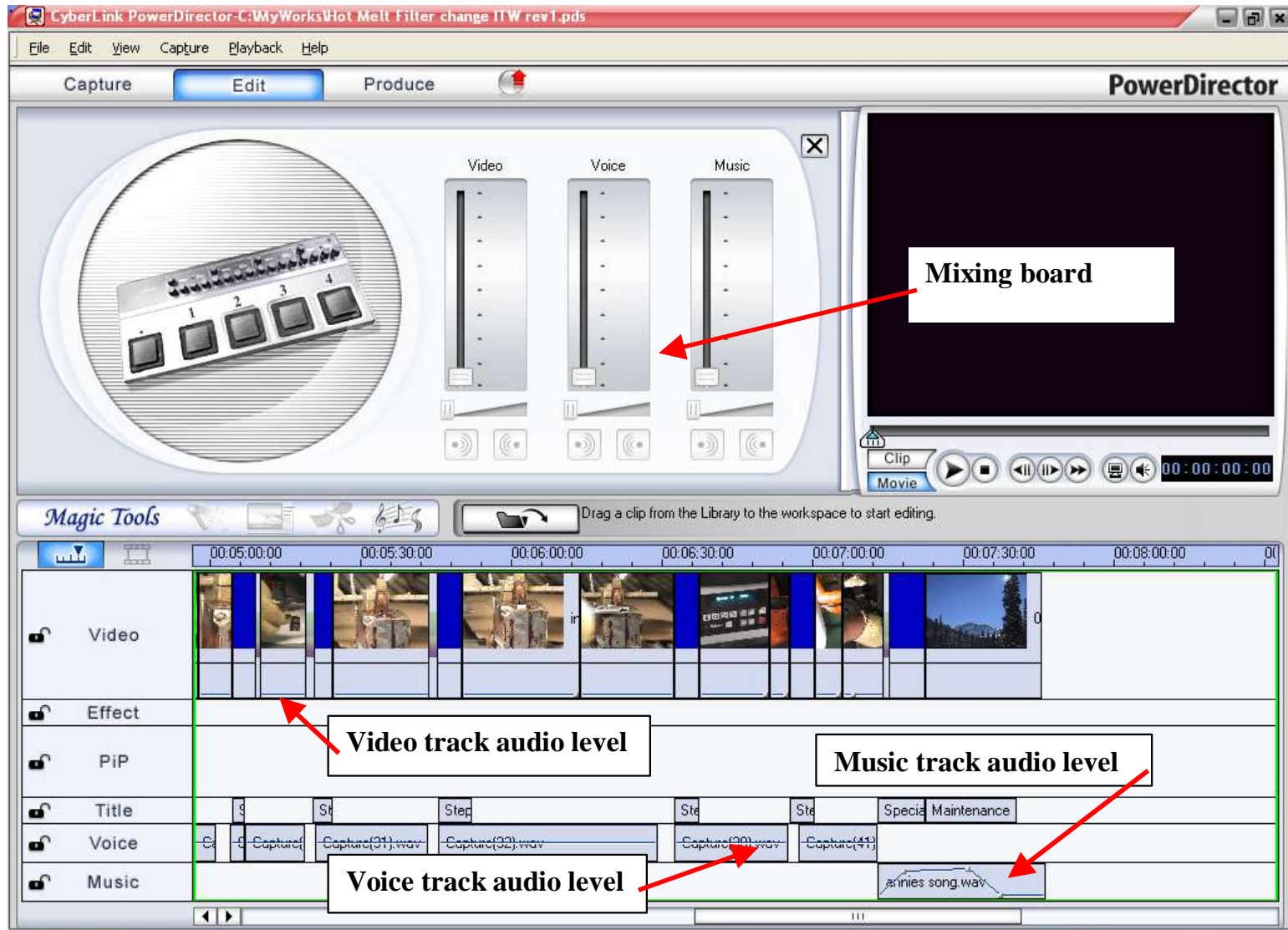
Video Compressing/Encoding

- Compression: further reduce data size for particular applications
  Make a balance between quality and size
    - Reducing image size (640x480, 320x240, 240x180, 176x132, …)
    - Reducing frame rates (15, 10, 5, …)
    - Coding with high compression ratio

- Encoded video file formats

  - H.263/264, MPEG-2, MPEG-4, QuickTime (mov), WAM, …

- Encoded video stream formats

  - RealVideo (ram), Windows (asf), QuickTime (mov)

Video Output

- Video output destinations

    - TV

    - analogy storage device

    - digital storage device

    - network/Internet

- Network down loaded applications

    → stored in disc in compressed file format

- Network real time applications

    → outputted to a streaming server in stream format

Demos of Live Audio/Video Capture

- ❑ Audio capture using Sound Recorder in Windows

- ❑ Video capture using Creative WebCam Plus

- ❑ Windows Media Player

- ❑ Windows Media Encoder