MULTIMEDIA AND COMPUTER GRAPHICS

COURSE MATERIAL NO. 4

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Multimedia Elements: Digital Image, Text, and Audio

Learning Objectives:

Here's what I will teach you in this course material:

- Explain digital image and the underlying concepts of the digital image in multimedia applications
- Enumerate common file types of digital image for print, web, and general use.
- Explain text and the underlying concepts of text in multimedia applications.
- Enumerate ways of working with text.
- Explain audio and the underlying concepts of audio in multimedia applications.
- Enumerate ways of preparing and adding audio to multimedia.

Multimedia

- This lesson will explain digital images, texts, and audio and their underlying concepts in multimedia applications.
- Moreover, this lesson will also enumerate types and ways to apply digital images, texts, and audio in multimedia applications.

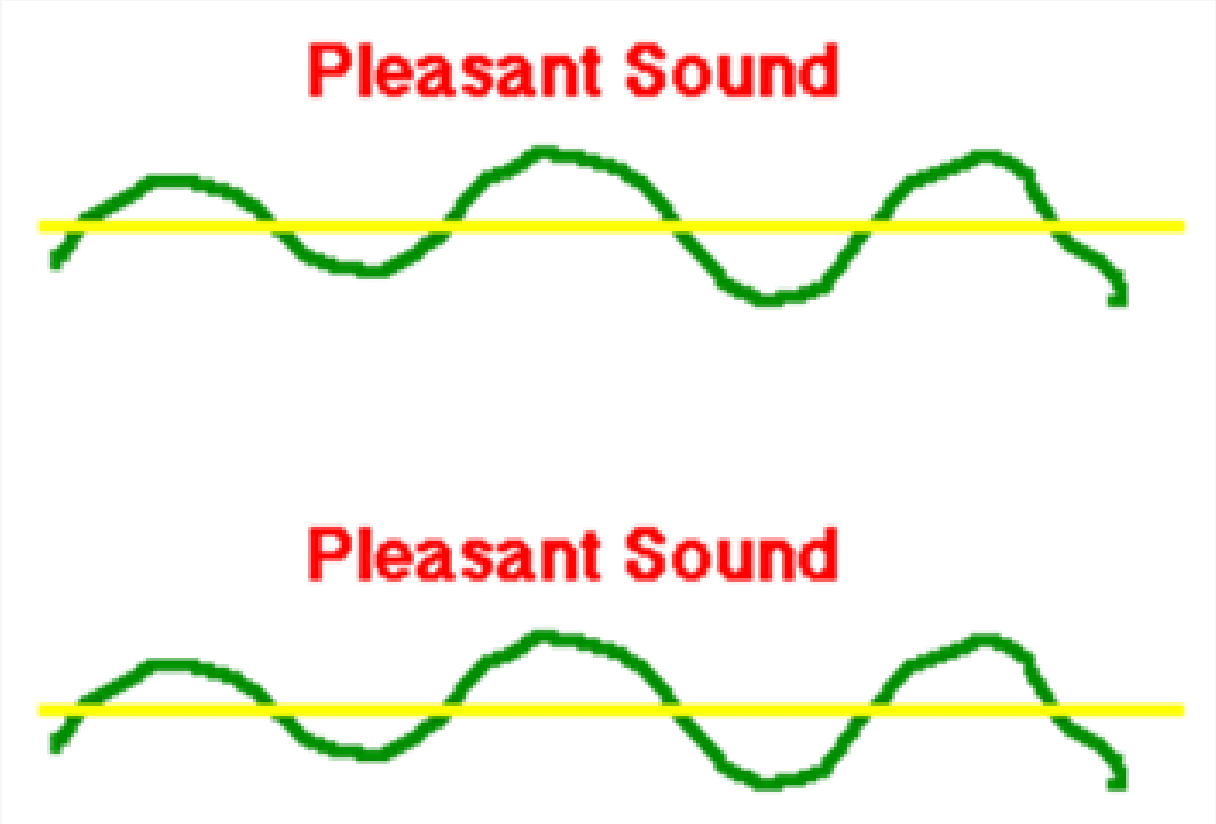
Multimedia Elements

AUDIO

- Vibrations in the air create waves of pressure that are perceived as sound, also known as *audio*.
- Sound comprises the spoken word, voices, music and even noise.
- Sound waves vary in sound pressure level (amplitude) and in frequency or pitch.
- Sound pressure levels (loudness or volume) are measured in decibels (dB). Sound travels as waves at 750 mph (at sea level).

AUDIO

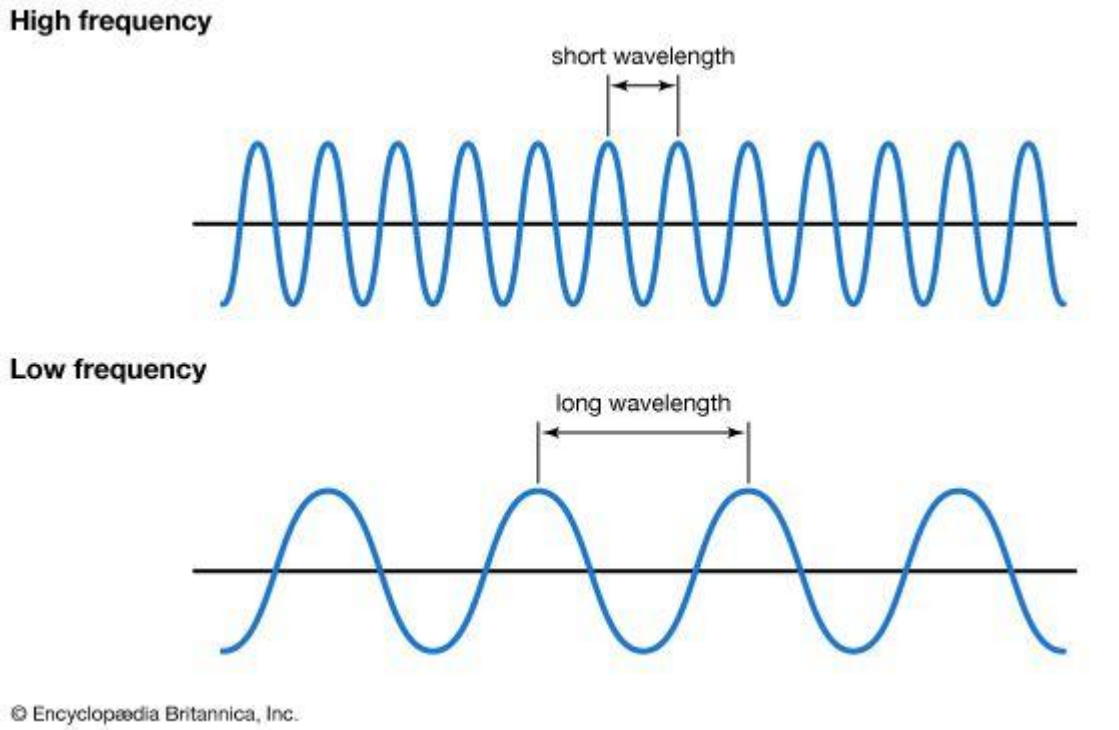
- A pleasant sound has a regular wave pattern. The pattern is repeated over and over.
- But the waves of noise are irregular. They do not have a repeated pattern.



CHARACTERISTIC OF SOUNDS

FREQUENCY

- Frequency is a measure of how many cycles occur in one second.
- The more frequent vibration occurs the higher the pitch of the sound.



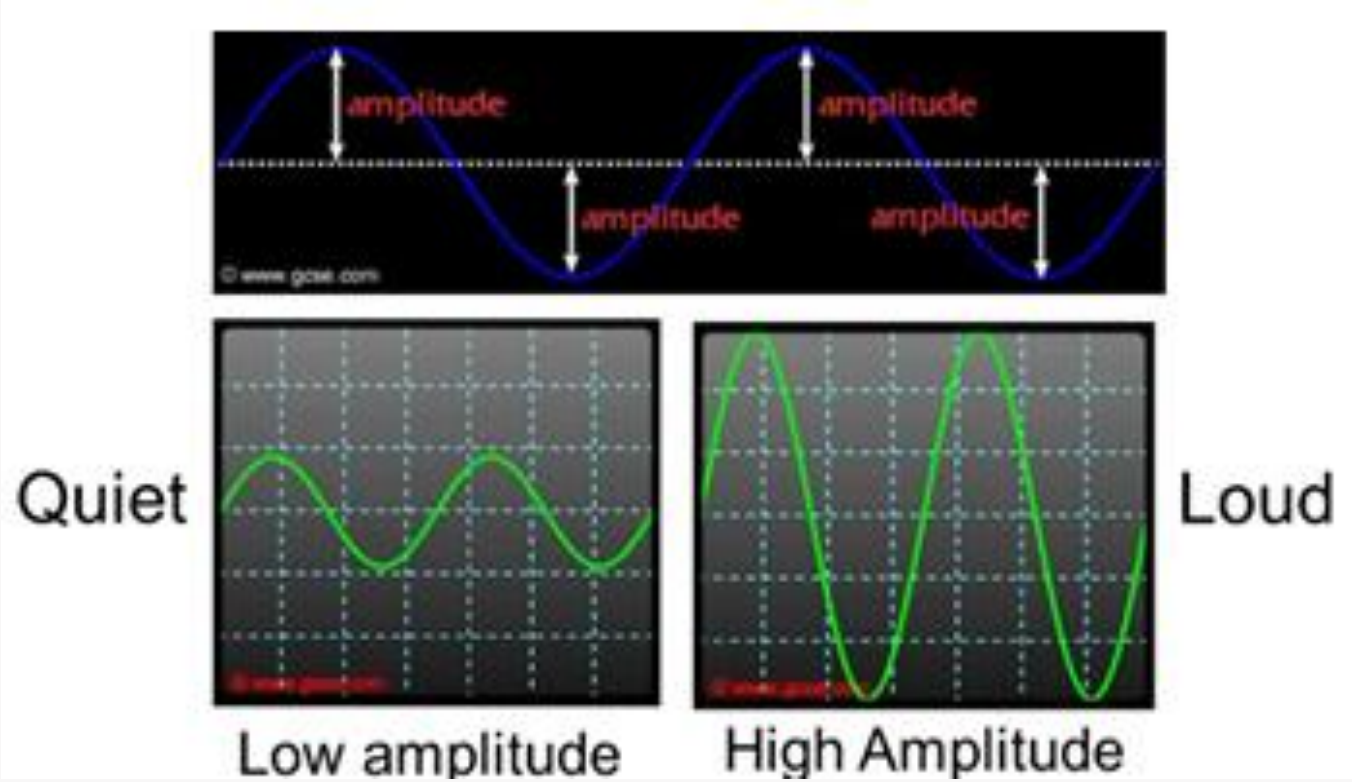
Optimally, people can hear from 20 Hz to 20,000 Hz (20 kHz)

✓Sounds below 20 Hz are **infrasonic**

✓Sounds above 20 kHz are **ultrasonic**

AMPLITUDE

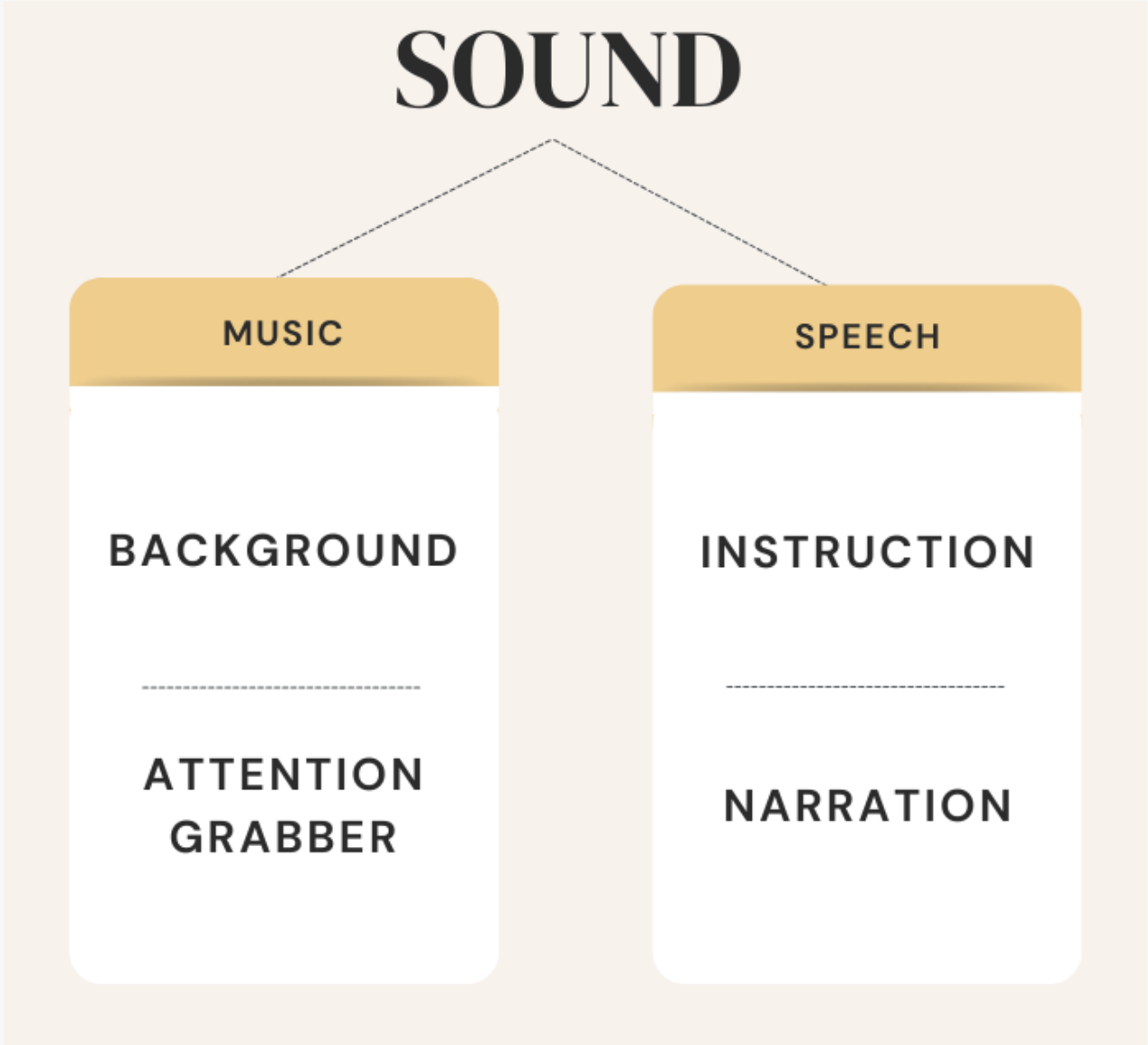
- **Amplitude** is how far a wave moves from its resting (equilibrium) position.
- The louder a sound, the more energy it has. This means loud sounds have a large amplitude. The amplitude relates to how loud a sound is.



WHY IS AUDIO IMPORTANT IN MULTIMEDIA?

- To reinforce message or theme
- To set the mood
- To catch the interest of the audience
- To alert the audience
- To include narration effective for training

TYPES OF SOUND


SOUND
MUSIC
BACKGROUND
ATTENTION GRABBER
SPEECH
INSTRUCTION
NARRATION

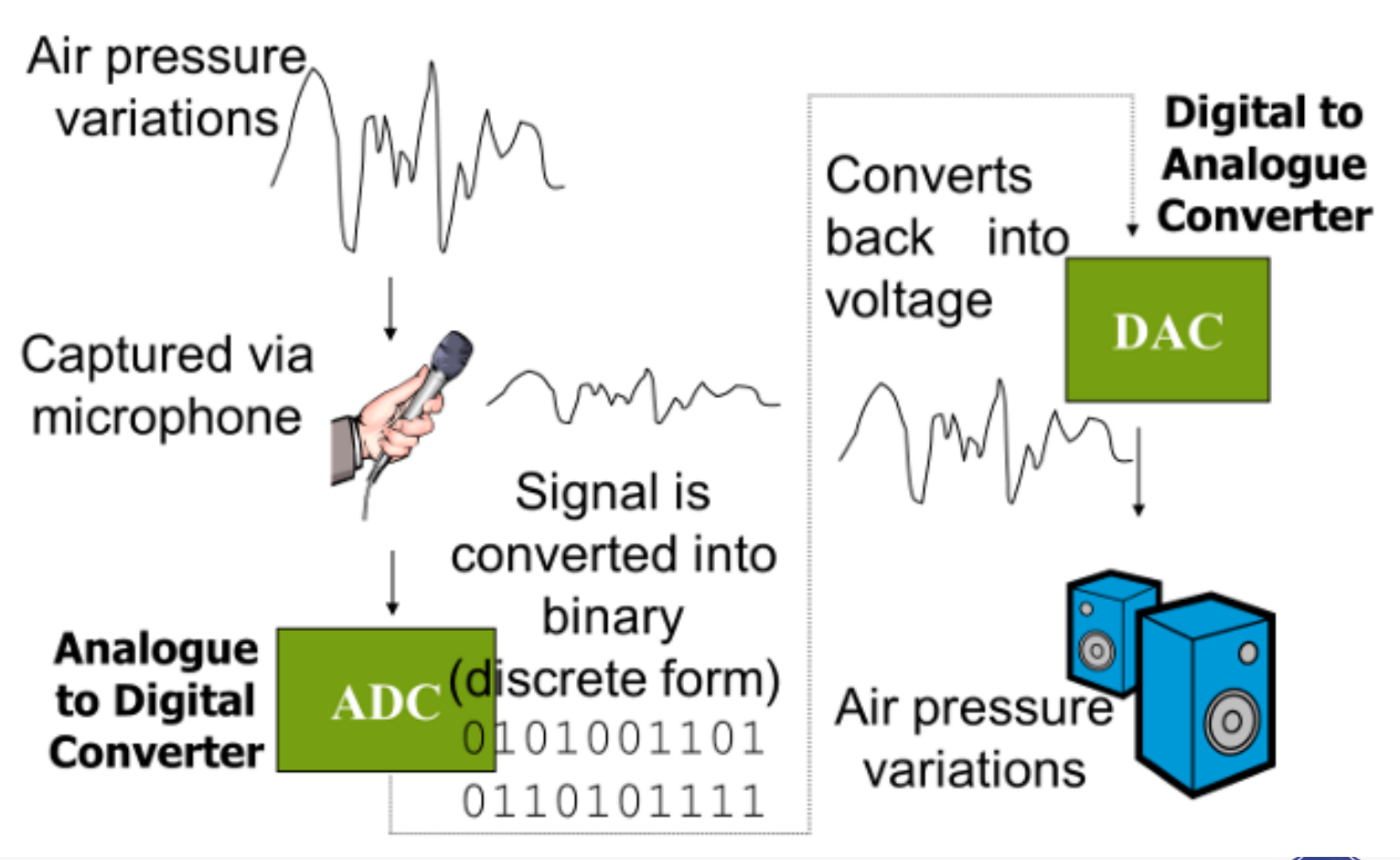
SOUND CONSIDERATION

- Use appropriate music to reflect the mood or theme.
- Give the users choice of turning off/on the sound.
- In cases where the content of a page depends on sound (speech), consider providing transcript as the alternative.

SOUND APPLICATION IN MULTIMEDIA

DIGITAL AUDIO

- Digital audio data is the actual representation of sound, stored in the form of samples.
- Samples represent the amplitude (or loudness) of sound at a discrete point in time.
- Quality of digital recording depends on the sampling rate, (or frequency) that is, the number of samples taken per second.


Air pressure variations
Captured via microphone
Signal is converted into binary (discrete form)
0101001101
0110101111
Analogue to Digital Converter
ADC
Converts back into voltage
Digital to Analogue Converter
DAC
Air pressure variations

EDIT THE RECORDING

- ✓ **Trimming**: removing blank space at the beginning or at the end of the recorded audio.
- ✓ **Splice**: remove unnecessary noise (touch up)
- ✓ **Assembly**: longer recorded audio can be build by cutting and pasting together a few shorter ones.
- ✓ **Convert**: change to another audio format
  - Macintosh : SND and AIF files format
  - Windows : WAV files format
- ✓ **Resampling or downsample**: resample recorded audio file to a lower audio resolution. e.g. resample / downsample a 16 bit recorded sound to 8 bit.
- ✓ **Fade-in and fade-out**: smooth out the very beginning and the very end of the sound file.
- ✓ **Time stretching**: alter the length of the recorded sound
- ✓ **Digital Signal Processing (DSP)**: add special effects to the recorded sound.

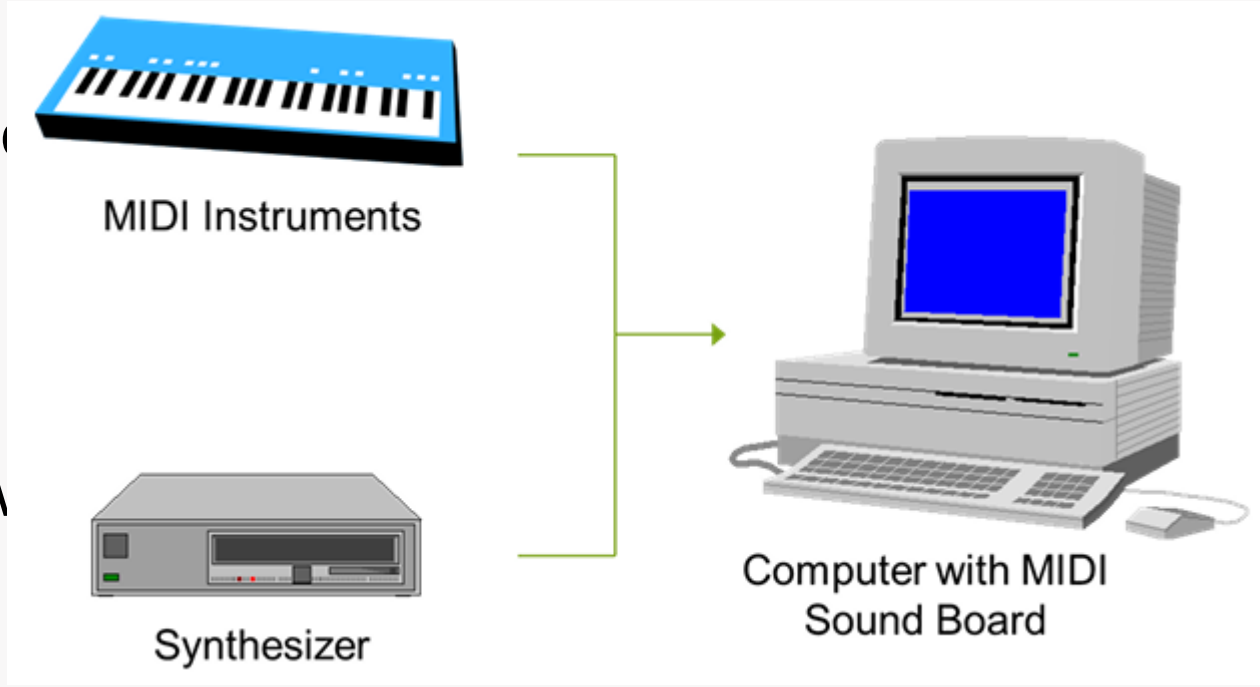
MIDI AUDIO

- MIDI is an acronym for Musical Instruments Digital Interface.
- MIDI is a protocol that enables computers, synthesizers, keyboards, and other musical devices to communicate with each other.
- MIDI is simply defined as a set of instructions how a computer should play musical instruments.
- MIDI file is not a digitized sound, it is the shorthand representation of music stored in numeric form (binary).
- MIDI file contains instructional data (notes, sequences of notes, which instruments etc.) to other devices on how to generate an appropriate sound.

PREPARING MIDI AUDIO

In preparing you MIDI Audio you need to:

- ✓ Hire Some musical talent artists.
- ✓ Acquire MIDI instruments keyboard)
- ✓ Use MIDI Sequencer softw to record, edit and save m by MIDI instruments)
- ✓ Have Sound Synthesizer Hardware attached to a computer



AUDIO FILE FORMAT

MIDI AUDIO	DIGITAL AUDIO
*.MID, *.KAR, *.MIDI, *.SMF	*.WAV, *.AIFF, *.AU, *.RA, *.MP3

MIDI vs DIGITAL AUDIO

Use MIDI data in the following circumstances:

- ✓ You only have small storage space, RAM, CPU processing power or bandwidth.
- ✓ You have high quality MIDI sound source.
- ✓ You have complete control over the playback hardware.
- ✓ You do not need spoken dialogue

Use digital audio in the following circumstances:

- ✓ You do not have control over the playback hardware
- ✓ You have the computing resources and bandwidth to handle digital files
- ✓ You need spoken dialogue

ADDING SOUND TO MULTIMEDIA

- ✓ What kind of sound is needed
- ✓ When and where to use audio
- ✓ Decide whether you want to use MIDI or digital
- ✓ Acquire the source material
- ✓ Edit the audio to suit your project
- ✓ Test the sound

COPYRIGHT ISSUES

- ✓ Before using audio or sound for your multimedia project, you must secure rights for all material you use and look for collections of royalty-free audio to avoid copyright issues, especially when publishing your work.

QUESTIONS?