Midi Audio

• **Musical Instrument Digital Interface** – Before there was a wide use of mp3 and high bandwidth network, MIDI format audio is popular when an audio is required to be put on a website. – Provides a standardized and efficient means of conveying musical performance information as electronic data. – Is a easiest and quickest way to compose our own score. • (provided we have knowledge of musical instrument and composing) – It is in the form of music score and not samples or recording.

Midi Audio: Requirements • To make MIDI score, we need: 1. Midi keyboard / Midi keyboard software 2. Sequencer software 3. Sound synthesizer (built-in in to sound card). MIDI information is transmitted in "MIDI messages", which can be thought of as instructions which tell a music synthesizer how to play a piece of music. – The synthesizer receiving the MIDI data must generate the actual sounds.

MIDI files can be generated: – by recording the MIDI data from a MIDI instrument (electronic keyboard) as it is played. – by using a MIDI sequencer software application. Audio File Formats • MIDI – *.MID, *.KAR, *.MIDI, *.SMF • AUDIO DIGITAL – WINDOWS ◊ *.WAV – MACINTOSH ◊ *.AIFF – UNIX ◊ *.AU – REALAUDIO ◊ *.RA – MPEG3 ◊ *.MP3

Summary • There are two main types of digital audio – Sampled audio • Captured by sampling an analogue waveform at a set rate – MIDI data • Instructions on how to perform some musical composition • Sampled audio requires more storage space than MIDI information.

Video Files

Types of Colour Video Signals

Component video - each primary is sent as a separate video signal.

- The primaries can either be RGB or a luminance-chrominance transformation of them (e.g., YIQ, YUV).
- Best colour reproduction.
- Requires more bandwidth and good synchronization of the three components

- **Composite video** - colour (chrominance) and luminance signals are mixed into a single carrier wave. Some interference between the two signals is inevitable.
- **S-Video** (Separated video, e.g., in S-VHS) - a compromise between component analog video and the composite video. It uses two lines, one for luminance and another for composite chrominance signal.

▪ Multimedia Streaming

➢ Multimedia streaming is the overlapping the playout of the data at the receiver with the transmission by the sender.

❖ A video stream consists of a sequence of images or frames.

- A frame consists of a grid of pixels.

❖ An audio stream consists of a sequence of audio samples.

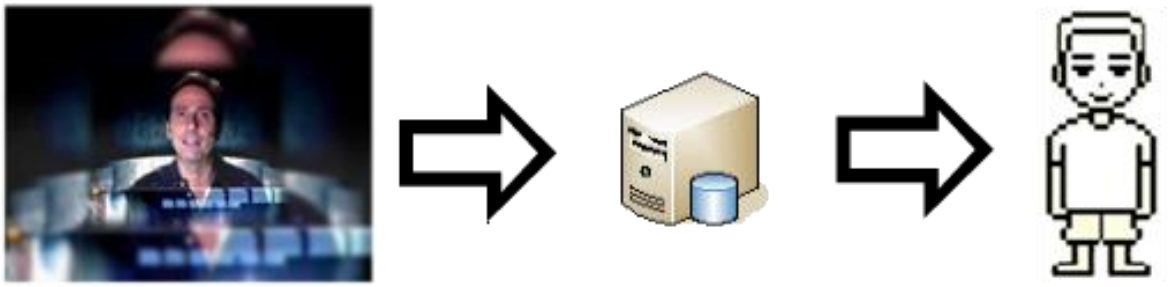
Table 1. Hierarchy of multimedia content

Term	Definition
Pixel	**Picture element**
Frame	**Two-dimensional grid of pixels**
Stream	**Sequence of frames over time**
Session	**Synchronized set of streams**
Presentation	**Set of multimedia sessions**

- The advantage of streaming is that it can enable easier access to multimedia resources.
- Another possibility is the integration of video and audio with other web-based applications, such as chat and other real-time collaboration tools.

Streaming vs. downloading

- **What is The Difference Between Downloading and Streaming?**
  - When you download a video, you have to copy the entire file to your hard disk before you can play it.



  - When the video is streamed, there is a small wait as the stream 'buffers' but there is no need to save the file.
  - Streaming is the act of sending media files (audio and/or video) over the Internet from one computer to another computer so that the media plays as it is being delivered.

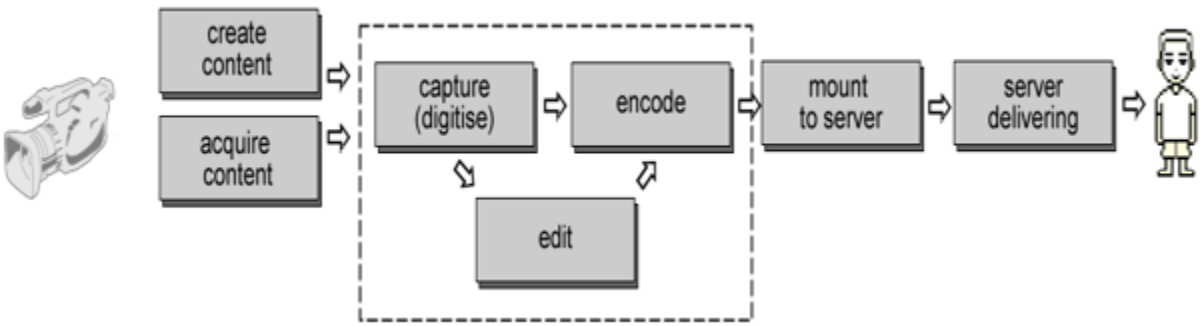
- A media stream proceeds through the following stages before it is displayed to a recipient:
  - Capturing
    - The audio or video stream must be captured from an analog device, such as a microphone or a video camera, and converting to a digital form.
    - 25 fps (frame per second) for video and 16-bit for audio is suitable.
  - Encoding
    - An encoder converts the raw digital data into a particular audio or video format.
  - Storing
    - A server may store the encoded stream for future transmission.
  - Delivering
    - The stream is transmitted to one or more recipients. A live stream may be transmitted as it is captured and encoded, whereas a prerecorded stream is transmitted by a server.
  - Decoding
    - The receiver decodes and displays the data as they arrive. Alternatively, the receiver may store the entire stream before initiating playback.
- **There are two different types of streaming:**
  - **Progressive download**
    - The client begins playback of the multimedia file as it is delivered. The file is ultimately stored on the client computer.
    - Use standard web server
    - Quality is better than real-time streaming

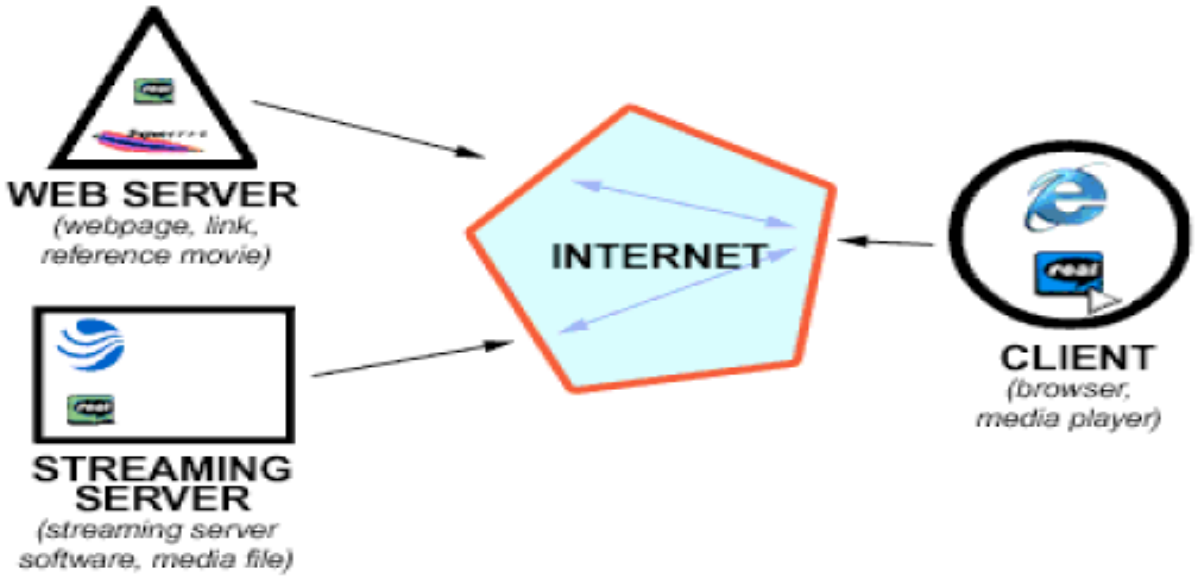
- **Real-time streaming**
  - The multimedia file is delivered to the client computer but the file is not stored on the client computer.
  - Require a special streaming server

- **Two different types of real-time streaming:**
  - **Live streaming**
    - used to deliver a **live** event while it is occurring. Examples: live soccer game, live concerts, live radio, and videoconferences.
  - **On-demand streaming**
    - used to deliver archived media streams. Examples: video clips, movies, and lectures.

- **Why Streaming Media?**
  - No waiting for complete downloads.
  - Streamed files are not written to disk.
  - Presentation of live events is possible.

- How does streaming work?





- **RTSP States**
  - SETUP - the server allocates resources for a client session.
  - PLAY - the server delivers a stream to a client session.
  - PAUSE - the server suspends delivery of a stream.
  - TEARDOWN - the server breaks down the connection and releases the resources allocated for the session.