Chapter 4
Audio Recording Software
Digital Audio Production [IP3038PA]
By the end of the class, you should be able to:

1. List the different parts of the computer-based digital audio recorder, also known as the digital audio workstation (DAW).
2. List the commonly used digital audio interconnection cables.
3. State the different functions found in the Edit, Mix and Transport applications of the DAW.
4. State the concept of sampling rate and quantization as applied to digital audio.
Digital Audio Workstation (DAW) is a system designed to **record**, **edit** and **playback** digital audio.

There are 2 types of DAWs:

- **Integrated DAWs**
- **Computer-based DAWs**
Integrated DAWs consist of built-in:

- Mixing console
- Control surface
- Digital interface

- Used to be popular.
- Still used in radio & TV.
4.1.1. Parts of the DAW

4.1.1.1. Hardware

4.1.1.1.1. Interfaces and Converters

Interface: A go-between that connects one device to another

Converter: converts analogue sound to digital data and then reconverts the data back to analogue through the speakers or headphone.

4.1.1.1.2. Processors

The computer’s brain which performs all the necessary calculations in recording.
4.1.1.1.3. **RAM (Random Access Memory)**
- The temporary, working memory of a computer
- More RAM means *more available tracks* to record and playback and *more real-time effects* you can have active simultaneously

4.1.1.1.4. **Hard Drive**
- Hard drive *stores* the operating system, applications and files.

4.1.1.1.5. **CD Drive**
- It allows final product to be *output* as audio CD.
4.1.1.2. **Software**

Software is the means for *creating* and *shaping* your creative work.

Some examples of DAW software are Digidesign’s Pro Tools, Apple’s Logic and Steinberg’s Cubase.
4.2. Digital Audio Interconnection Cables

4.2.1. **SPDIF (Sony/Philips Digital Interconnect Format)**

- Used to transport stereo digital audio signals.
- It allows the transfer of audio from one file to another *without* the conversion to and from an analog format, which could degrade the signal quality.
- The most common connector used with an S/PDIF interface is the RCA connector.
4.2.2. **AES/EBU**

- AES/EBU is a 2 **channel** digital audio connection that supports most sampling rates.
- **AES/EBU** is one of the most typical connections that you will see on digital recorders like DAT decks and other hardware devices.
- Looks the same like XLR, but it is not the same!
4.2.3. Toslink (S/PDIF Optical)

- Toslink uses a special FiberOptic cable
- Can transmit **2 channels** of audio at a time.

- A very common connection for home electronics, such as DVD players, and can also be found on many audio cards and other musical equipment.
4.2.4. ADAT Lightpipe (ADAT Optical Interface)

- ADAT optical interface supports up to **8 channels** at **48 kHz, 24 bit**.

- Lightpipe's main advantage is, of course, the transfer of digital audio, which results in the **perfect** transfer of information.
4.2.5. **TDIF**

- TDIF uses a special *25 pin cable* for transferring digital audio and/or receive up to *eight channels* of digital audio between compatible devices.

- **TDIF is a proprietary format for **Tascam**, and so, it has not seen the widespread implementation that Lightpipe has, although there are several audio cards available that use it.**
4.3. Edit Window

- Commands Keyboard Focus
- Timeline Selections
- Zoom buttons
- Tab to Transients
- Graphic Tempo Editor
- Edit Mode buttons
- View Selectors
- Track List
- Timebase rulers
- Audio Track
- Track View selector
- Timebase selector
- Edit Group List
- Show/Hide Track List/Group List View
- MIDI Track
- MIDI Velocity View
- MIDI Notes View
- Event Edit Area
- Edit Selection indicators
- Grid and Nudge values
- Transport controls
- Studio Editor
- Region List
- Region Group
- Volume Automation View
- Audio Waveform View
**Track Area**

All the audio track will appear in this area.

**Track List**

All the tracks in your session, whether visible or hidden, are listed in this area.

**Track list button**

To view a list of options related to displaying and hiding each of the tracks in your session.

**Clips/Regions Lists**

A complete collection of all the regions (audio and MIDI) in your session, whether or not they’re being used actively in a track.

**Clips / Regions List button**

It displays a drop-down menu of region-related functions when you click on it.
**Edit Modes**

Shuffle, spot, slip and grid allow you to choose to determine the manner in which regions can be moved in time in your session.

**Zoom Tools**

These will allow you to zero in on a very brief section of your session or zoom out to view longer sections in your project.

**Basic Edit Tools**

The tools, Zoom, Trim, Selector, Grabber, Scrub, and Pencil operate directly on specific regions within your session.

**Main and Sub Display**

The ‘Start’, ‘End’, and ‘Length’ displays, show you the beginning, end, and duration of your selections.
Ruler and Tools Areas

The Ruler area allows you to view the passage of time in your session in a number of different ways.
- **Tracks list**

This area functions similarly in both the Edit and Mix windows. In the Mix window, as you toggle each track in your session, channel strips to the right will appear and disappear.

- **Mix Group area**

As you create mix groups, they will show up in this area.

- **Channel Strips area**

When you create any kind of track (audio, aux, master fader, MIDI, or Instrument), it will appear as a vertical strip.
4.5. Transport Window

The transport window has the following:

- Go to Beginning
- Rewind
- Stop
- Play
- Fast Forward
- Go to End
- Record
- Main Time Scale
- Sub Time Scale
**Expanded**

This option will add the main counter to the Transport window.

**MIDI Controls**

This option adds basic MIDI controls to the Transport window.

**Expanded**

In addition to functions like pre-roll and post-roll, this option adds the sub-location indicator below the main one and adds secondary MIDI controls below the primary ones.
The sampling rate of an audio signal refers to how many times per second the level of the signal is measured.

- CD audio - 44.1 kHz
- Digital audio tape (DAT) - 32, 44.1 and 48 kHz
- Multimedia application - 22.05 kHz
- Telecommunications - 11.025 kHz

The sampling rate must be at least twice as high as any frequency to be reproduced. Higher sampling rates allow you to reproduce higher frequencies.
What is Quantization?

- Refers to the resolution of the digitized audio.
- The number of available levels is referred to as bit depth.
  - 8-bit = 256 levels
  - 16-bit = 65536 levels
  - The more levels available, the higher the resolution of the audio.

Downsides of Quantization

- Small rounding errors that distort the signal
- Quantization distortion increases at lower levels: because the signal is using a smaller portion of the available range, any errors are a greater percentage of the signal.
Recording in the DAW

<table>
<thead>
<tr>
<th>pre-roll</th>
<th>1:01:000</th>
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<tbody>
<tr>
<td>post-roll</td>
<td>0:01:676</td>
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<tr>
<td>transport = Pro Tools</td>
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</table>

<table>
<thead>
<tr>
<th>Start</th>
<th>33:1:193</th>
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</thead>
<tbody>
<tr>
<td>End</td>
<td>33:1:193</td>
</tr>
<tr>
<td>Length</td>
<td>0:01:000</td>
</tr>
</tbody>
</table>