Digital Audio Software

The DAW
Effects Plug-Ins
The DAW

• **Digital Audio Workstation**
  – A multi-track recording application
    • Allows recording, editing, processing, and mixing audio
    • Most DAWs also support MIDI sequencing
  – Some current DAWs:
    • ProTools
    • Logic
    • Digital Performer
    • Sonar
Common DAW Elements

- Transport
  - Modeled after traditional tape controls
    - Play
    - Stop
    - Pause
    - Rewind
    - Fast forward
    - Record
Common DAW Elements

• Time formats
  – Real time
    • Hours/minutes/seconds/tenths of seconds
  – SMPTE time
    • Hours/minutes/seconds/frames/sub frames
  – Musical time
    • Bars/beats/ticks
Time Windows
Common DAW Elements

• Tracks
  – Created separately for each audio input source
  – Also for imported audio and audio loops
  – Two views:
    • Edit - horizontal strip
    • Mix - vertical strip (modeled after hardware mixers)
  – Both views typically include mute, solo, play/record enable
Common DAW Elements

• Record Level
  – Vertical or horizontal meters
  – Scale is typically dB FS (decibels full scale)

“0” is the top level of dB FS (Full Scale) – anything over this will clip (distort).
  – A good average recording level is between -18 and -12 dB FS.
Effects

- DAWs typically come with a variety of effects plug-ins
  - Essentially applications within an application
  - Third-party plug-ins may be added
- Common effects:
  - Dynamics processors
  - EQ
  - Time-based effects
Dynamic Range Processors

• Compression is the most common
• A compressor reduces the difference between the loudest and quietest parts of a section of audio
  – automatically rides the gain (volume)
Compressors

- Important compressor controls
  - Threshold
  - Ratio
  - Attack
  - Release
Equalization (EQ)

• Boosts or cuts certain frequencies in a signal
  – May be thought of as an amplifier for a particular frequency
• Treble/bass on a home stereo are simple EQ controls
  • EQ employs filters to alter certain frequency levels
Equalization (EQ)

• Two main types:
  – Graphic
  – Parametric

• Three filter types:
  – Shelving (used in treble/bass on home stereo)
  – High-pass/low-pass (used in synths, mic low-cut)
    • High- and low-pass combined = band-pass
  – Peaking (used in graphic and parametric EQ)
    • Notch (band-reject)
Graphic Equalizer
Equalization (EQ)

• Important controls (peaking filter)
  – Center frequency
  – Bandwidth
  – Boost/Cut
Time-Based Effects

• Combining the original signal with delayed and modified copies
  – Delay
  – Flanging
  – Chorusing
  – Reverb
Delay

- Storing the audio signal for a period of time and then playing it back with the undelayed signal
  - **Double**: delays of < 50ms
  - **Slapback Delay**: delays of 50-300ms
  - **Echo**: Delays of > 300ms
- Shorter delays serve to thicken a sound
Flanging and Chorusing

- Flanging - mixing a signal with a slightly delayed copy of itself
  - The length of the delay is constantly changed by an LFO (low frequency oscillator)
- Chorusing – multiple varying delays mixed together
  - A much more subtle effect than flanging
**Reverb**

- Probably the most used effect
- Many delayed sounds added together to create a continuous wash of sound that decays over time
- Two main types of reverb plug-ins
  - Artificial - constructed from combinations of delays
  - Convolution – combines the signal with an impulse response recorded in a space
Echo vs. Reverb

• **Echo is not the same thing as reverb**
  – Echo implies a distinct, delayed version of a sound
  – With reverb each sound wave arrives in such a short period of time that we don’t perceive each reflection as a copy of the original sound