Introduction to Digital Audio

Analogue vs. Digital Sound

- Analogue
  - Physical changes are made to a recording medium
    - Grooves cut in wax (later plastic) for a record
    - Particles of iron oxide on a strip of tape (Mylar) are rearranged by an electro magnet
    - Each generation of recording experiences degradation
Analogue vs. Digital Sound

- Digital
  - Digital – information stored in a binary format – patterns of 1's & 0's
    - Advantage – since sound is stored as information, a copy is just as good as the original
    - But, we cannot hear digital sound, only analogue. Therefore, we need a device to convert the analogue sound to digital information -- The Sound Card

A Typical Sound Card

- Hears (input) voltage
- A/D Conversion -- voltage to numbers
- *WAV files
Digital Sampling

- Defining simple sine wave
- Converting sound waves to digital info

Sample rate

- Frequency of Sample
- The higher, the better
  - At least 2 x the normal high end of human hearing
- CD Quality = 44 kh
Sample Depth

- Corresponds to color depth in graphics programs
- 8 Bit
- 16 Bit
- 16 Bit = CD Quality

Channels

- Mono
- Stereo
Digital Sampling Options

<table>
<thead>
<tr>
<th>Sample Rate</th>
<th>Resolution</th>
<th>Channels</th>
<th>Size of File</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 kHz</td>
<td>8 bit</td>
<td>mono</td>
<td>664 KB/min</td>
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<tr>
<td>11 kHz</td>
<td>8 bit</td>
<td>stereo</td>
<td>1.3 MB/min</td>
</tr>
<tr>
<td>11 kHz</td>
<td>16 bit</td>
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<td>16 bit</td>
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<tr>
<td>44 kHz</td>
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<td>stereo</td>
<td>10.6 MB/min</td>
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</tbody>
</table>

- Cd Audio Quality = 44 KH 16 Bit Stereo
- Requires 11 Mb per minute disk space

House Keeping

- DEFRAg -- run this program to organize hard disk data into discrete areas
- Hard drive must be able to read/write 750 kb per second
- Buy as big of hard drive as you can afford
- Cheap sound cards are noisy!
MIDI

• Musical Instrument Digital Interface
• As opposed to being a recording of an actual sound, a midi file is a set of instructions describing a sound
• We will not explore midi files in this course
• Midi files can send instruction to a variety of devices
  – Lighting
  – Special Effects

Recording & Editing Software

• You need Recording and Editing Software to accompany your sound card
• We will be using GoldWave