

98-026

Nintendo

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Today

- Announcements
- Assignment 3
- Sound
- Making a Good Box and Manual

Assignment 3

- Complete game
- Box art, Manual (digital images only)
- Don't violate copyright laws
- I would love to fail you if you don't do this
- Due by Monday, April 26, to be shown in class that Wednesday

nesmus changes

- In case you haven't gotten a new version since the first one, you may want to:
- Rewrote in-game interpreter
- Looping and song ending are fixed
- Prefixed all function calls with **nesmus_**
- **nesmus_song_over** variable
- Bb bug should hopefully be fixed soon

Sound:

WTF is nesmus doing?

- call `nesmus_loop` each frame
- nesmus binary format
 - Types: start/end loop, note data
 - Which channels are affected
 - 4 bytes data per channel

Music Channels

- I will give a decent overview
- In-depth technical details (by Brad Taylor) are available on the resources page

Music Channel Enable

- Use bitmask to register to enable/disable sound channels
- `set $4015 %1111`
enables all four channels
- `set $4015 %11111`
enable all five channels (DMC PCM)
- `set $4017 %10000000`
probably want this, for correct pitch

Music Channels 0-1

- Square waves (\$4000-\$4003, \$4004-\$4007)
- Important things to note:
 - volume (byte 0, bits 0-3)
 - length counter enable (byte 0, bit 5)
 - length counter load (byte 3, bits 3-7)
 - wavelength (11-bit value)

Music Wavelength

- Wavelength is an ugly 11-bit value based on clock cycles.
- 8 LSB of wavelength (byte 2)
- 3 MSB of wavelength (byte 3, bits 0-2)

Pitch to Wavelength

- Clock cycles are counted at 1.79 MHz
- Sound uses the internal 60 Hz LFO for clock, instead of internal 240 Hz LFO
- This and other funkiness magically gives us a sound-specific clock rate of $1.79 \text{ MHz} / 16$

Pitch to Wavelength

- Musicians are likely to want a specific frequency (in Hz). We need an easy formula to convert to the ugly 11-bit wavelength.
- ugly number = $(1.79 \text{ MHz} / 16) / \text{freq} - 1$
= $(111875 / \text{freq}) - 1$

Demonstration

- calculate
 - A 440
 - $111875 / 440 - 1 = 253.261$
 - $\text{binary}(253) = \%11111101$
- use sndtest.nes to test

Box Art and Manual

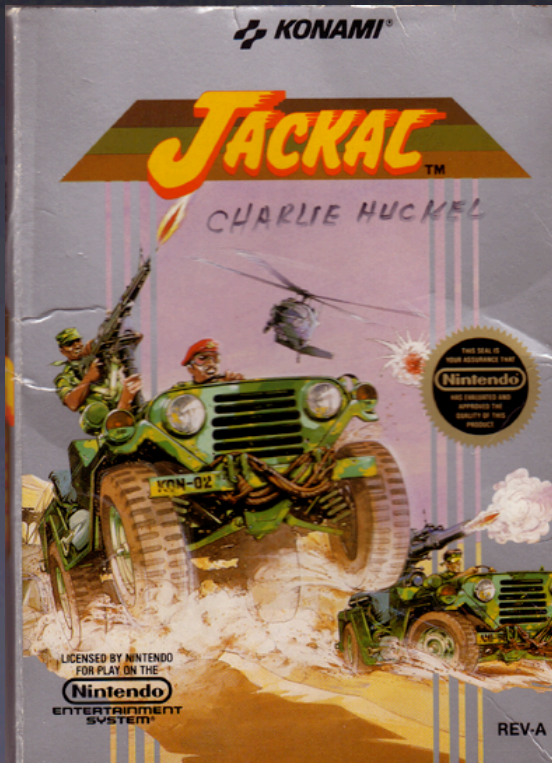
- You'll need to make some of this for the final project
- Make it good
- Physical objects not required

Box and Manual

- Make it hi-res (maybe 300dpi), and scale it down later for the web
- Official NES game manuals are 5x4 inches
- NES boxes are 5x7 inches

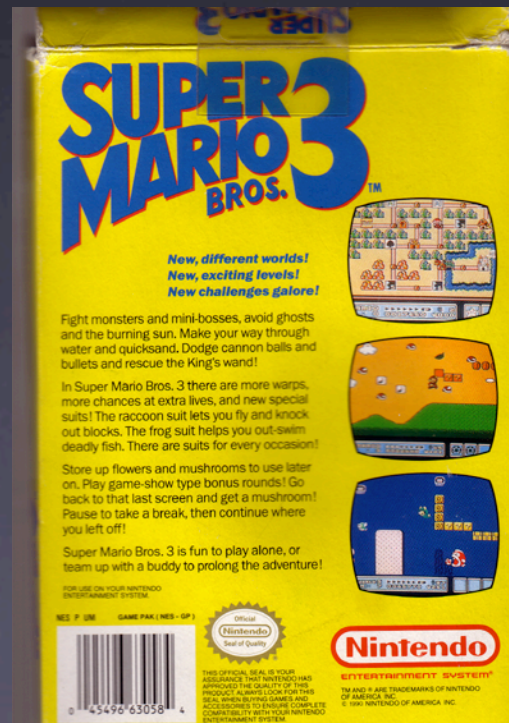
Box Front

- Mainly just a picture and the game name
- What makes your game fun or different?
- Entice people to buy it
- Seal of quality?



Box Back

- Game name
- Exciting prose!
- Screenshots (usually 3)
- Seal of quality?
- SKU, Copyright info



Seal of Quality

- Nintendo issued seals of quality to 3rd party developers, to indicate that a game met their quality standards.
- You're obviously not be allowed to use Nintendo's seal
- But you can apply to use mine! (not yet designed, various quality levels planned)

User Manual

- Table of Contents (optional)
- Story / Plot
- Characters (usually drawn cartoon style)
- Controller operation / How to play
- Levels of the game (optional)

GAME OVER