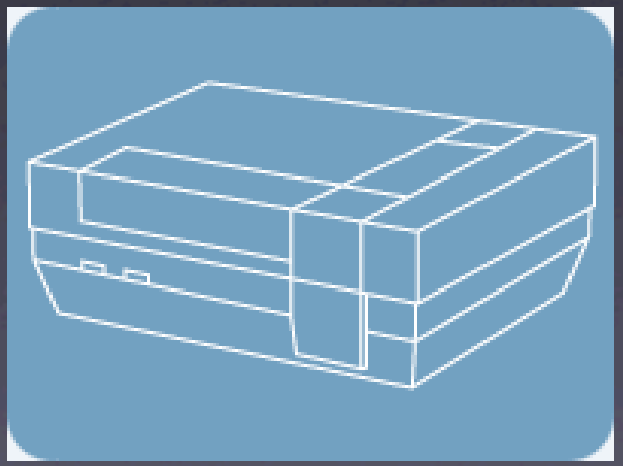
98-026
Nintendo

Bob Rost
February 4, 2004



Today

- Pre-Show (with special contestant)
- NES Music
  (for musicians. programmers can suck it)
- Announcements
  (after latecomers have arrived)
- Assignment 2 Stuff and Teams
- From Photoshop to NES

Ira Fay!!!

Come on down!!

Ben Rotskoff's Full-Contact Bowling

- Seeking an artist
- Seeking a programmer (maybe two)
- Sound designers and others are welcome
- Contact ira@cmu.edu who will serve as your producer and designer

NES Music

- Computer Music
- NES Capabilities
- nesmus
- Using nesmus data in your game

Computer Music

- MIDI
  - Stores note lengths, pitch and timing
  - Instrument channels, standard patches (General MIDI)
  - One instrument, multiple notes per channel at a time
- MOD / S3M / various others
  - Stores note lengths, pitch and timing
  - Sound channels, custom samples
  - One sample, one note per channel at a time

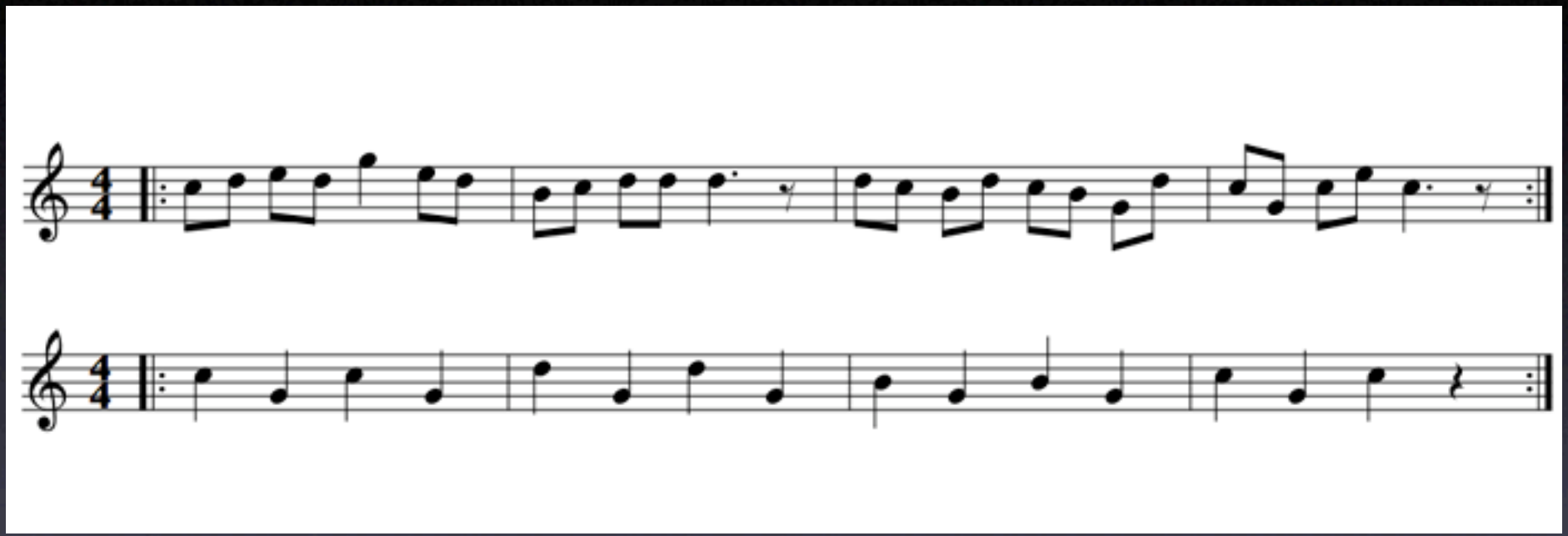
NES Music Capabilities

- Program note lengths, pitch, timing, other effects
- One sound per channel at a time
- 6 Octave range
- 4 Music Channels
  0: Square wave 1
  1: Square wave 2
  2: Triangle wave
  3: Noise channel

nesmus

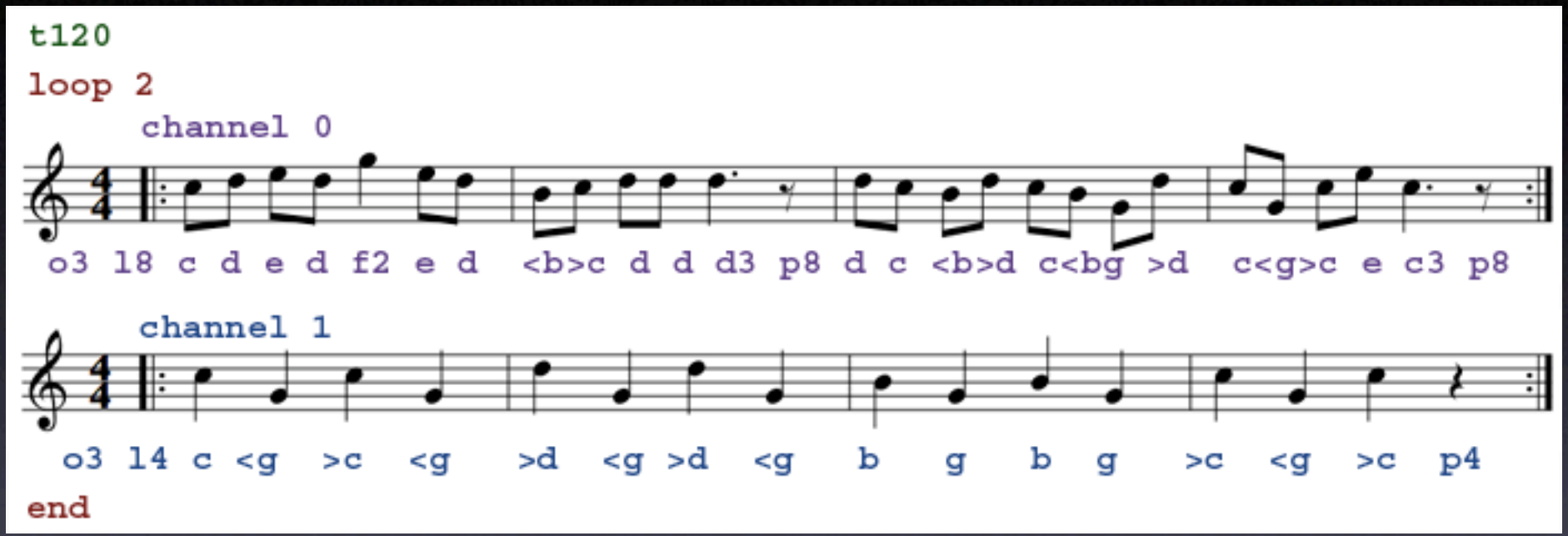
- Music programming language derived from QBasic
- Code written with a standard text editor
- Translated into a nesmus data file
- Data may be interpreted by game

From Score to Text



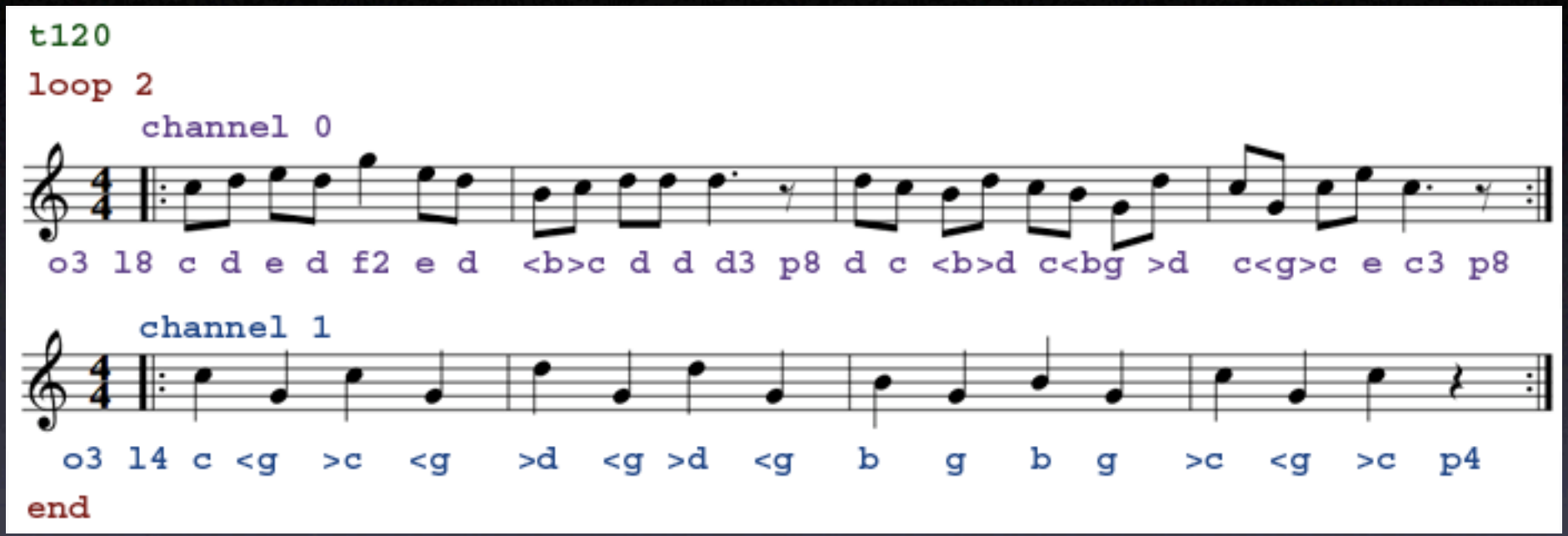
- Two simultaneous parts
- Repeat
- 120 bpm, just for fun

From Score to Text



- Music notation translates directly to nesmus notation
- Now put it all together to make nesmus code

From Score to Text




```
t120
loop 2
channel 0
o3 l8 cdedf2ed <b>cddd3p8 dc<b>dc<bg>d c<g>cec3p8
channel 1
;changed to o2 so it becomes a bass part
o2 l4 c<g>c<g >d<g>d<g bgbg >c<g>cp4
end
```

Listening

- Compile to “music.dat”, then assemble to “music.nes”

```
nesmus test.mus music.dat
nesasm music.asm
```

- Listen with a Nintendo emulator

Using nesmus Data

- Include nesmus binary data in your game
- Include nesmus interpreter in your game
- Webpage Resources section
- RTFM

Announcements

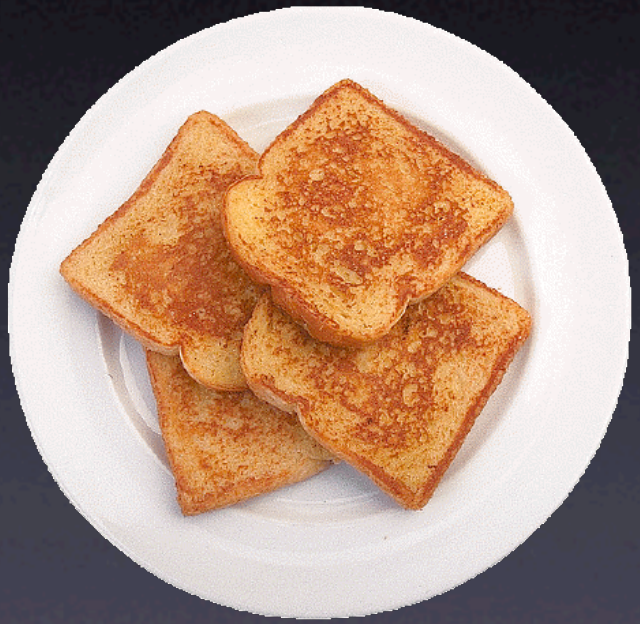


fig. 1: French toast

Bugs in the Dev Tools

- If you find a bug in the development tools, let me know
- For nbasic, send me minimal source code that demonstrates the bug. Extra crap is not good.
- For any of the tools, make sure you describe exactly what you did, what you expected to happen, and what actually happened. Include attachments when appropriate.

Wanted: Programmers

To Work on Commercial Game Demos in the ETC

contact me or gcklug@andrew

- Two projects looking for help
- Hardcore skills required
- Excellent understanding of games required
- No slackers!

Assignment 2

- Stuff
- Things
- Groups

Assignment 2 Options

- Development Tool
- Full Game
- Partial Game
- Check the web page for details (make sure I do this now)

Dev Teams

- Individuals
- Groups that already know their team members
- Idea pitches, people looking for workers
- Unmatched

Creating NES Graphics

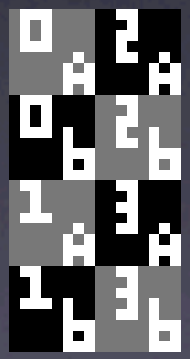
- Step 1: Get a drawing application
  Photoshop (expensive or "free")
  MS Paint (free with Windows)
  The Gimp (free)
- Step 2: ???
- Step 3: Profit

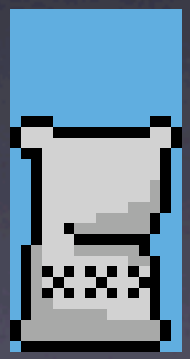
Drawing Sprites

- 3 colors, plus transparent
- Multiples of 8x8 pixels, often of 8x16
- Sack of Flour is 16x32, drawn as four sprites (8x16 each)

Stretching Sprites

- Sprites must be prepared for the pattern table (tiles laid out horizontally) before they can work.
- bmp2sprite handles the layout for you





Sprite Tiles in the Pattern Table

- Tile pairs (8x16 sprites) must be even aligned
- If top drawn tile is n^{th} from pattern table, matching bottom tile is $(n+1)^{th}$.
- *IN EASY ENGLISH:* Tiles 0 and 1 can make a sprite pair. Tiles 1 and 2 can't.

The Pattern Table

- Remember, there are 256 tiles per table
- Each tile is 8x8 pixels, max of 4 colors
- For convenience, we use a square table 16x16 tiles, 128x128 pixels
- Tiles are counted row order, 0 to 255
- In 8x16 mode, all sprites must begin on even-number tiles

Converting to 4 Colors

- Draw in full color for creation
- Reduce to 4-color palette for storage
- Apply full color palette in game

Original Color Palettes

CHR Storage Sub Palette

Applied In-Game Sub Palettes

Sticking it in the Game

- bmp2chr
- 128x128 pixels
- 4 colors (black, white, red, blue)
- Creates NES CHR ROM pattern table

In-Game Palette

- black/white/red/blue to on-screen colors
- Setting colors
- Multiple sprites with different colors
- Palette index (2nd sub palette is index 4)
- Palette swapping (zelda ring, mario fire)

Live Demo

- Make a sprite
- Convert to NES graphics
- Put it in a game

If There's Time

- Questions about Assignment 2
- Feasibility of certain kinds of games?

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