NES Programming in Rust

Sydney Rust Meetup 2023-03-01

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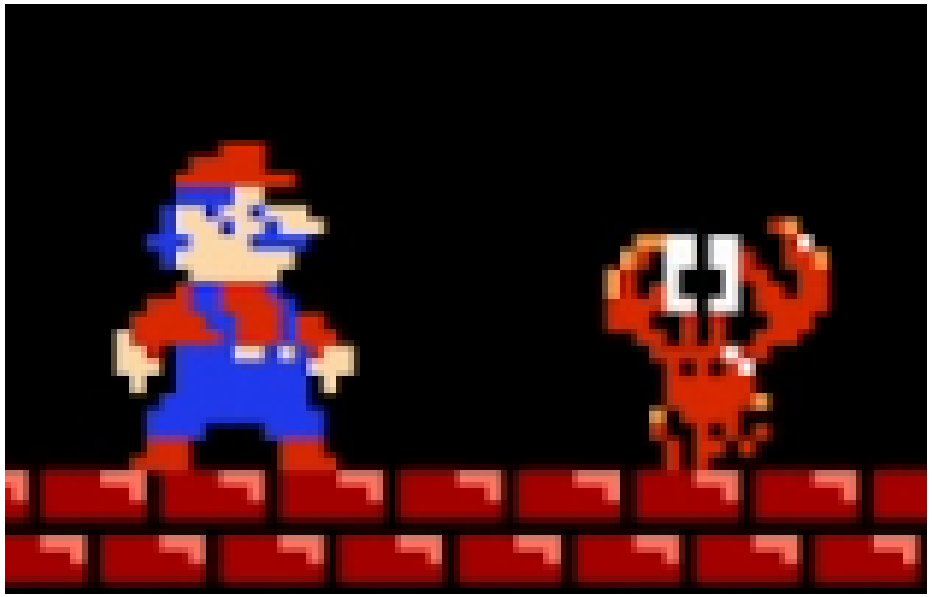

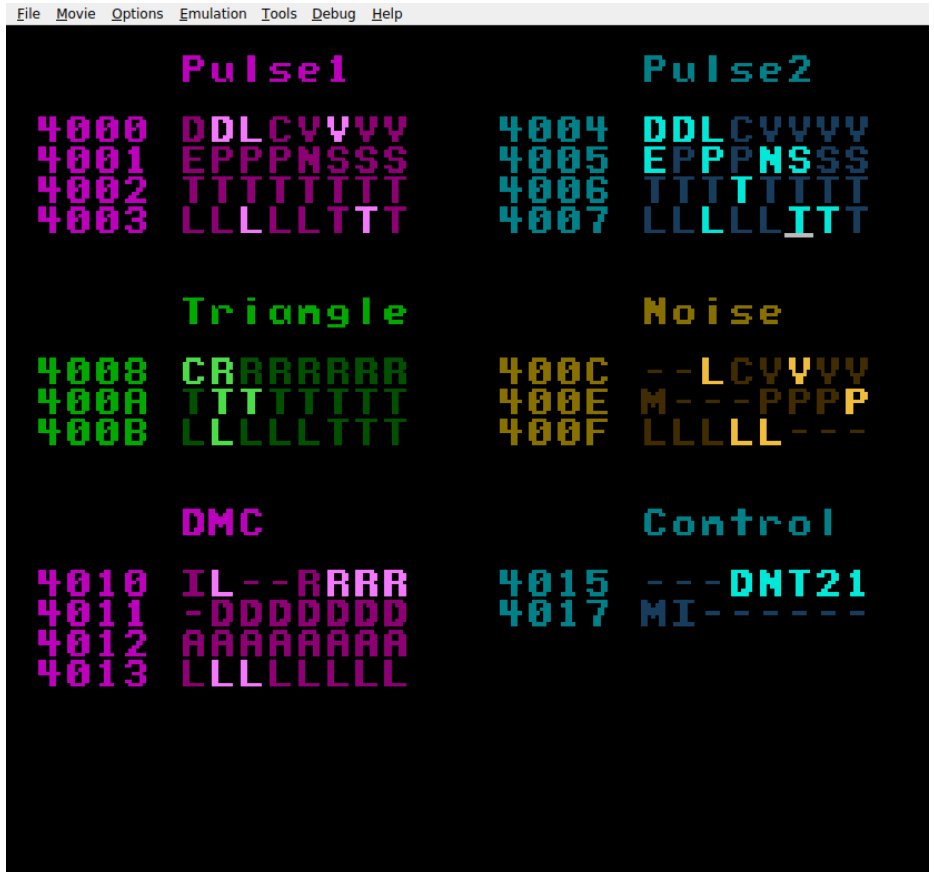

Demo (video) 🤞🤞🤞

https://youtu.be/QHoISiWdPXo

gridbugs / **nes-audio-playground** Public

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README.md

NES Audio Playground

A tool for generating NES ROM files give access to the Audio Processing Unit's registers. Move the cursor with the d-pad, press A to flip a bit, and hold B to defer any bit flips until after B is released. Releasing B also has the side effect of rewriting the current value of the register under the cursor.

About

Tool for generating NES ROM files giving control over the bits in the APU's registers

Readme

0 stars

1 watching

0 forks

Releases

No releases published

Packages

No packages published

Languages

Rust 99.7% Nix 0.3%

6502 Assembler Rust EDSL

Defining and calling a function with string labels:

```
b.label("set_cursor_to_tile_coord"); // define a function with a label
b.inst(Txa, ());                     // x component passed in X register
b.inst(Asl(Accumulator), ());  // multiply by 8 (width of tile)
b.inst(Asl(Accumulator), ());
b.inst(Asl(Accumulator), ());
b.inst(Sta(Absolute), Addr(var::cursor::X));
b.inst(Tya, ());                     // y component passed in Y register
...
b.inst(Rts, ());                     // Return from subroutine
...
// call a function
b.inst(Ldx(ZeroPage), var::bit_table_entry::TILE_X);
b.inst(Ldy(ZeroPage), var::bit_table_entry::TILE_Y);
b.inst(Jsr(Absolute), "set_cursor_to_tile_coord");
```

6502 Assembler Rust EDSL

Static data:

```
b.label("blink_colour_table");
const BLINK_COLOURS: [u8; 8] = [
    0x20,
    0x20,
    0x10,
    0x10,
    0x00,
    0x00,
    0x10,
    0x10,
];
for c in BLINK_COLOURS {
    b.literal_byte(c);
}
...
b.inst(Tax, ()); // transfer the blink index into X register
b.inst(Ldy(AbsoluteXIndexed), "blink_colour_table"); // read current blink colour
b.write_ppu_address(0x3F11); // write the blink colour to the palette
b.inst(Sty(Absolute), Addr(0x2007));
```

6502 Assembler Rust EDSL

Platform-specific extension:

```
trait BlockNes {
    fn init_ppu(&mut self);
    fn write_ppu_address(&mut self, addr: u16);
    fn write_ppu_value(&mut self, value: u8);
    fn set_ppu_nametable_coord(&mut self, col: u8, row: u8);
    fn set_ppu_palette_universal_background(&mut self, value: u8);
    ...
}

impl BlockNes for Block { ... }

fn program(b: &mut Block) {
    b.inst(...);
    ...
}
```

6502 Assembler Rust EDSL

Rust is a macro language!

```
// Read 8 consecutive bytes from a little-endian address stored
// at var::bit_table_address::LO into a buffer beginning at
// var::bit_table_entry::START.
b.inst(Ldx(Immediate), 0);
for i in 0..8 {
    b.inst(Lda(XIndexedIndirect), var::bit_table_address::LO);
    b.inst(Sta(ZeroPage), var::bit_table_entry::START + i);
    b.inst(Inc(ZeroPage), var::bit_table_address::LO);
}
```

6502 Assembler Rust EDSL

Addressing mode errors are type errors:

```
b.inst(Inc(AbsoluteYIndexed), 0x0000);
```

```
error[E0277]: the trait bound
`AbsoluteYIndexed: instruction::dec::AddressingMode`
is not satisfied
```

INC

Operation: M + 1 → M

Addressing Mode
Zero Page
Zero Page, X
Absolute
Absolute, X

Usage

```
use mos6502_assembler::Block;

fn prg_rom() -> Vec<u8> {
    // A Block is an intermediate representation that keeps track of labels
    // and a cursor so you can put code/data at specific addresses.
    let mut b = Block::new();
    // describe program
    b.inst(...);
    b.label(...);
    b.literal_byte(...);
    // ...etc

    // convert from intermediate representation to byte array
    // (this pass is needed to resolve labels)
    let mut prg_rom = Vec::new();
    b.assemble(/* start address */ 0x8000, /* ROM bank size */ 0x4000, &mut prg_rom)
        .expect("Failed to assemble");
    prg_rom
}
```