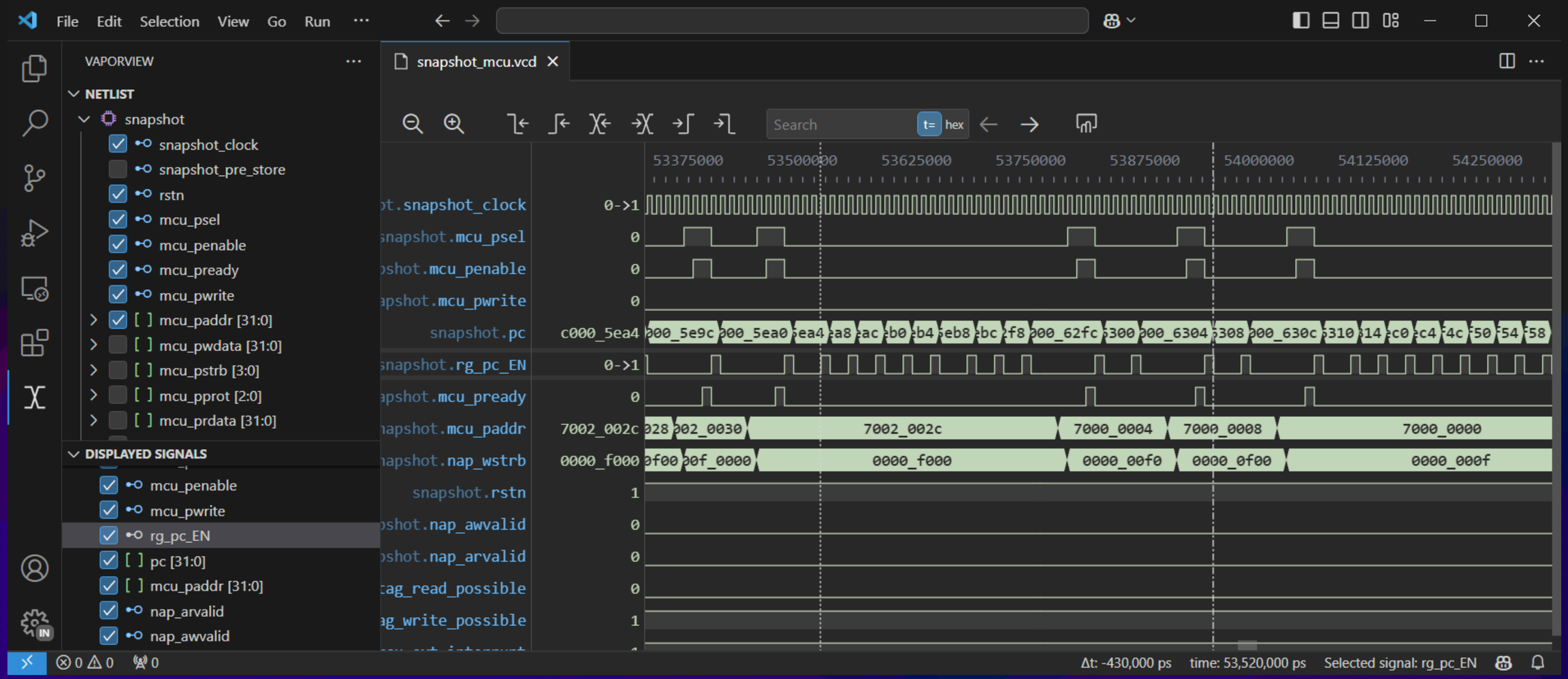
Vaporview
Bringing Hardware Design into the IDE

Lloyd Ramseyer, June 2025

Vaporview (Slightly outdated version)

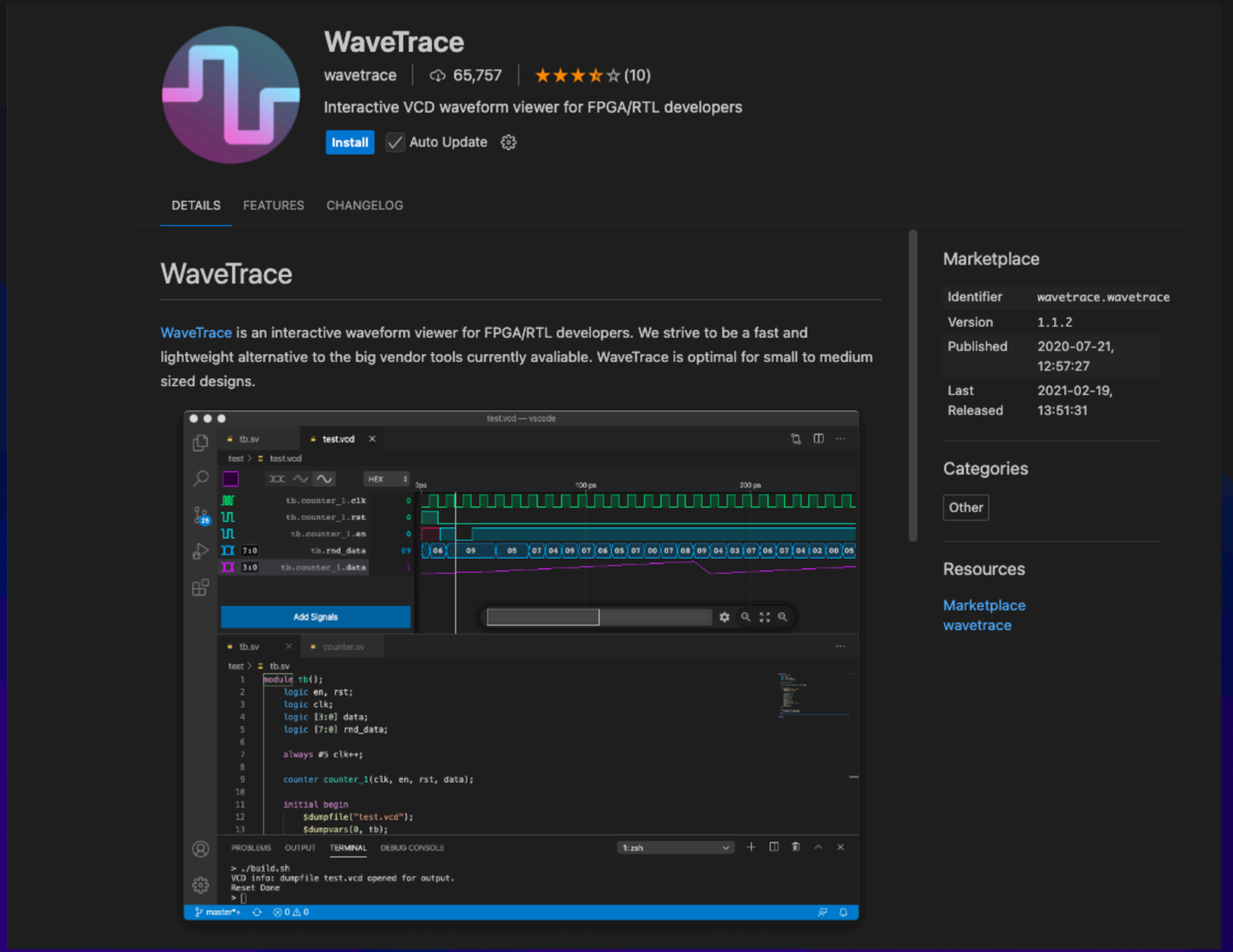


How It Started

- Previously worked for Achronix Semiconductor
- Tasked with debugging a soft logic MCU using a waveform dump
  - No GDB or ETM tracing
  - Waveform Viewer and .objdump file in 2 separate windows
  - One window was in a VNC
- There had to be a better way…

WaveTrace VCD

- WaveTrace VCD was the only option
- $15 if you want to view more than 8 signals
- I decided that these guys need to be put out of business



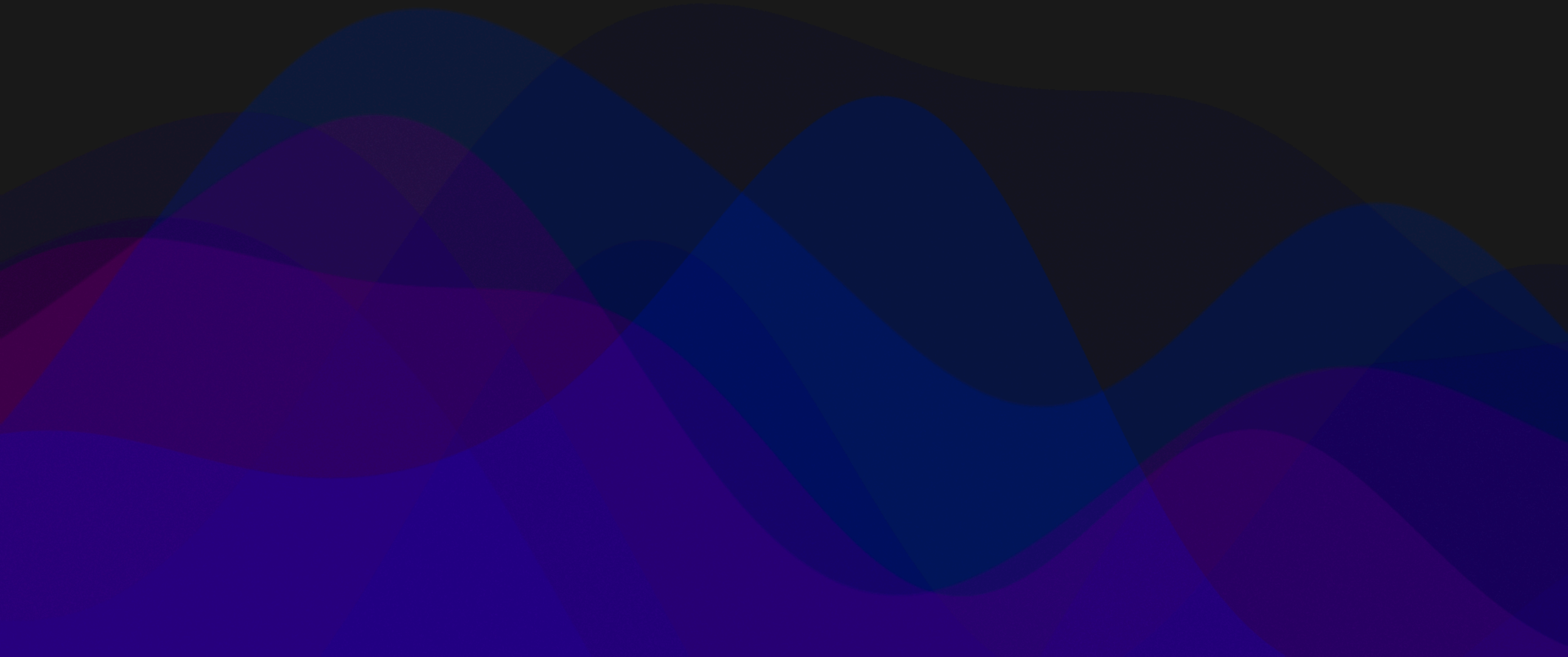
Why VScode?

- It’s *the* most popular text editor/IDE (besides Vim and Emacs)
- It supports a thin client/server and local standalone application model
- Extension ecosystem - System Verilog language server extensions exist
- It’s well designed, and nice to use

Design Principles

- It has to work
- It has to follow VScode design language
- It has to also look nice
- It has to feel natural
- It has to be interoperable and extendable

Demo



Vaporview is not an IDE

- Language Agnostic
- Simulator Agnostic
- All variable references link via instance path string
- Vaporview is extendable via the API to support advanced features

What makes Vaporview Unique

- Terminal Links
- Signal Value Links
- RTL Tracing
- Commands API
  - Adding Signals
  - Placing markers
  - Querying Waveform data
  - Event emitters
  - Context menus

Future Features

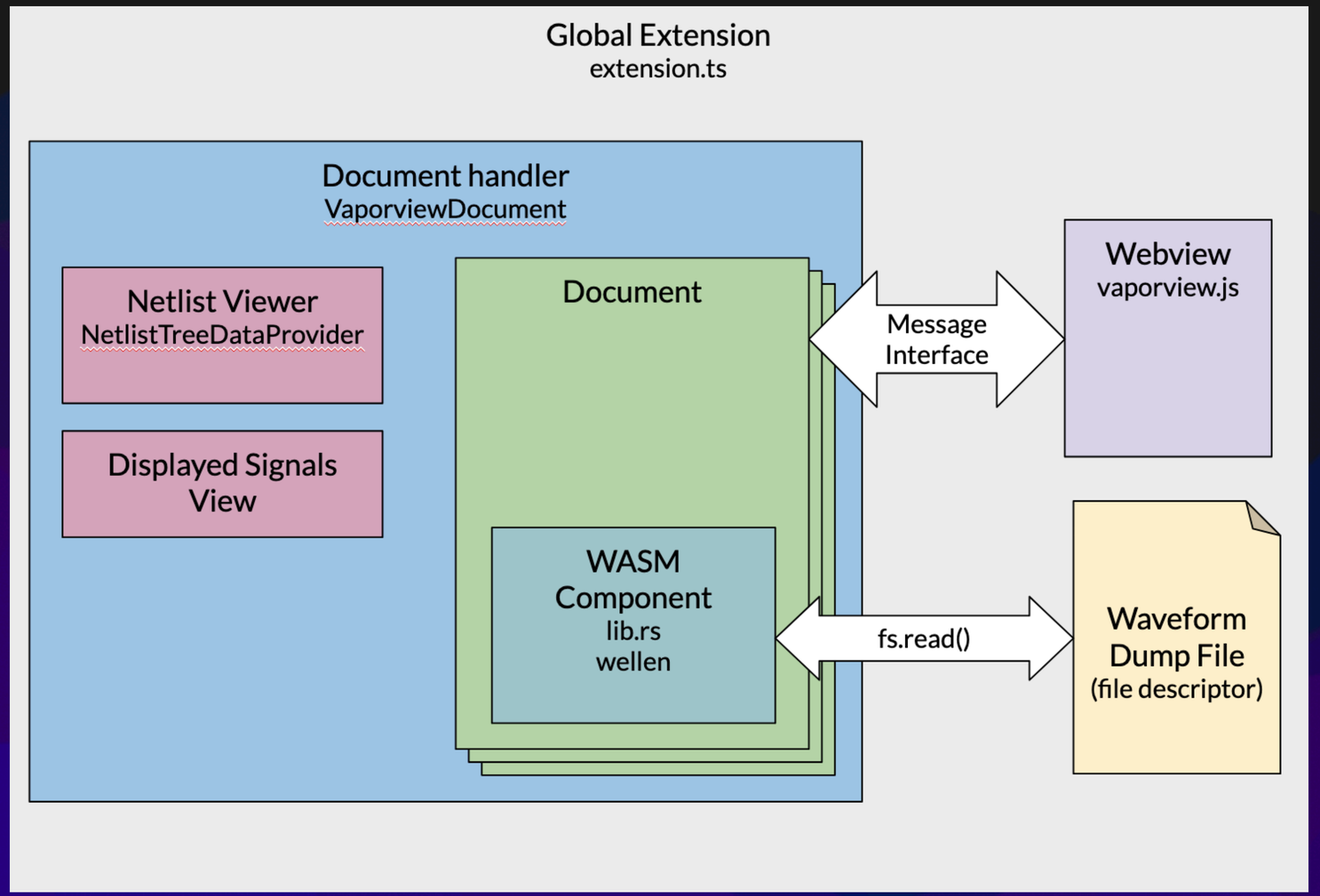
- Version 1.4
  - Finalize (baseline) API
  - Signal Groups
- Beyond 1.4
  - Transactions
  - Bit field slices
  - Value Change Data compression
  - Live updating waveforms

Questions?

LinkedIn

Github

Vaporview Architecture



Migrating Renderer from SVG to Canvas

- SVGs were initially promising, because I assumed that letting chromium do the heavy lifting with scrolling
- Surely having to draw each frame on the canvas would be expensive?
- DOM insertions and parsing is a heavy operation
- The DOM doesn’t like having too many objects
- Canvas is faster than you think!
- Frame render times max out at < 4ms with a 4K with a window full of waveforms
- Each waveform is a separate canvas in order to preserve event handling functionality

Migration to wellen

- wellen is a Rust library written by Kevin Laeufer designed to read VCD, FST, and GHW waveform dump files using a common interface
- Rust can be compiled to WebAssembly and used in VaporView
  - This would fix the 2GB limit, and support more filetypes