

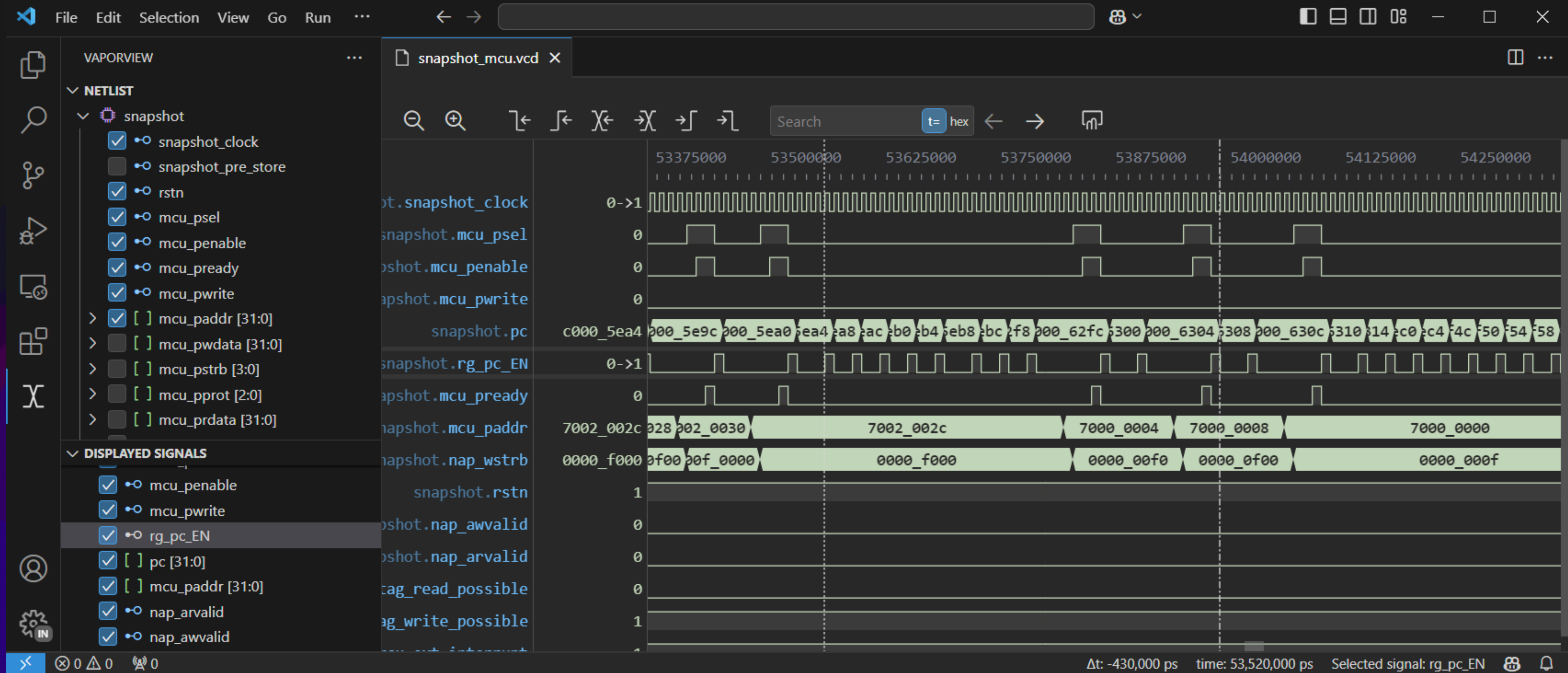
# Vaporview

## Bringing Hardware Design into the IDE

Lloyd Ramseyer, June 2025



# Vaporview (Slightly outdated version)





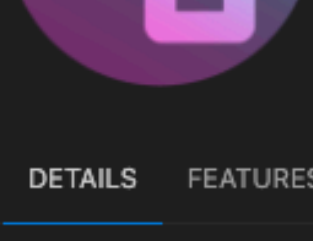
# How It Started

- 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 needed to be put out of business



# WaveTrace

wavetrace | 65,757 | ★★★★★ (10)

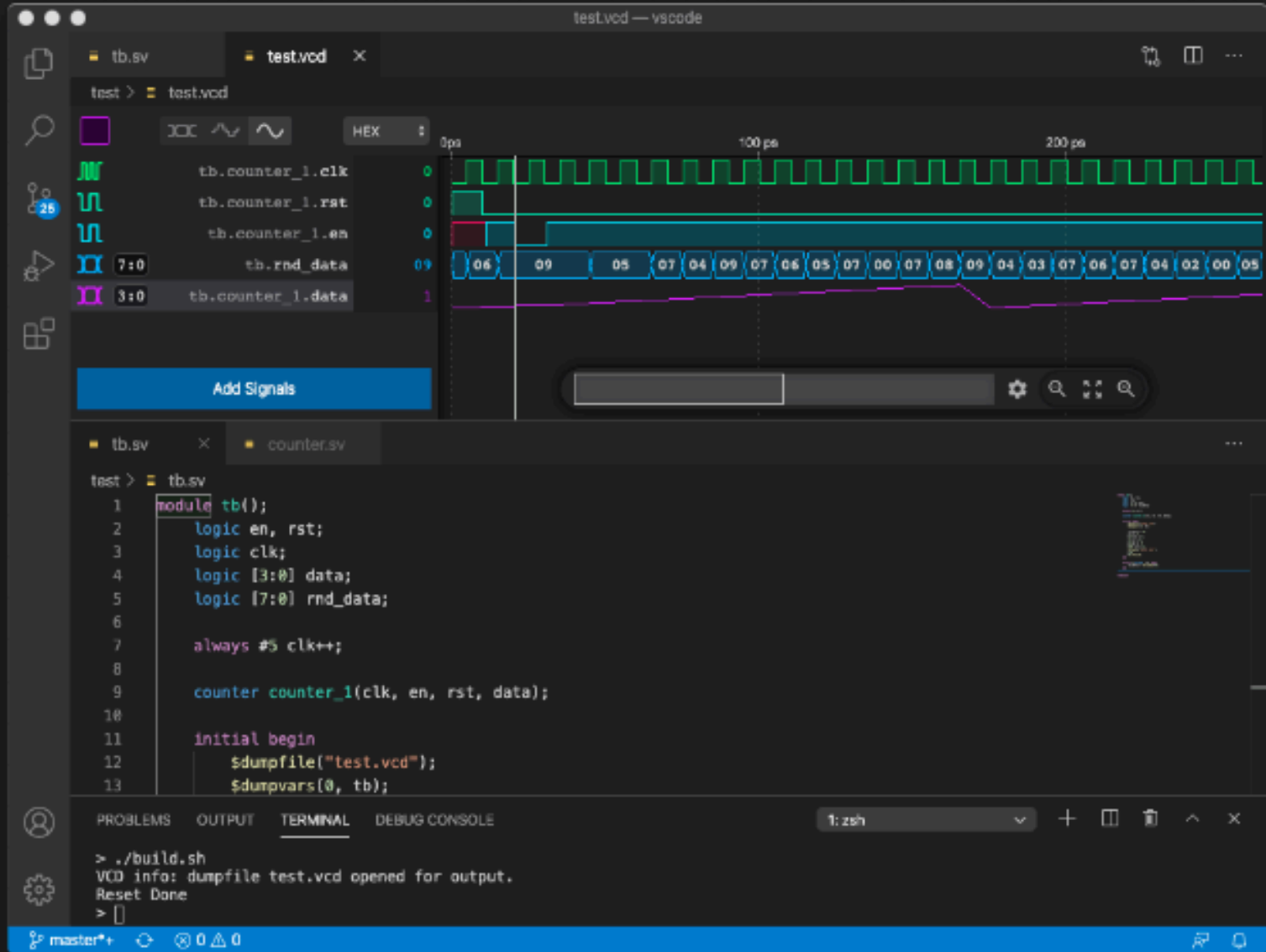
Interactive VCD waveform viewer for FPGA/RTL developers

[Install](#) ☒ Auto Update 

[DETAILS](#) [FEATURES](#) [CHANGELOG](#)

## WaveTrace

WaveTrace is an interactive waveform viewer for FPGA/RTL developers. We strive to be a fast and lightweight alternative to the big vendor tools currently available. WaveTrace is optimal for small to medium sized designs.



The screenshot shows the WaveTrace application interface. The top part is a waveform viewer displaying a digital signal trace. The bottom part is a code editor showing the Verilog code for the testbench. The code defines a testbench module that instantiates a counter module and generates a random data signal. The terminal at the bottom shows the command to run the build script and the output indicating that the VCD file was generated successfully.

### Marketplace

Identifier	wavetrace.wavetrace
Version	1.1.2
Published	2020-07-21, 12:57:27
Last Released	2021-02-19, 13:51:31

### Categories

Other

### Resources

[Marketplace wavetrace](#)



# 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

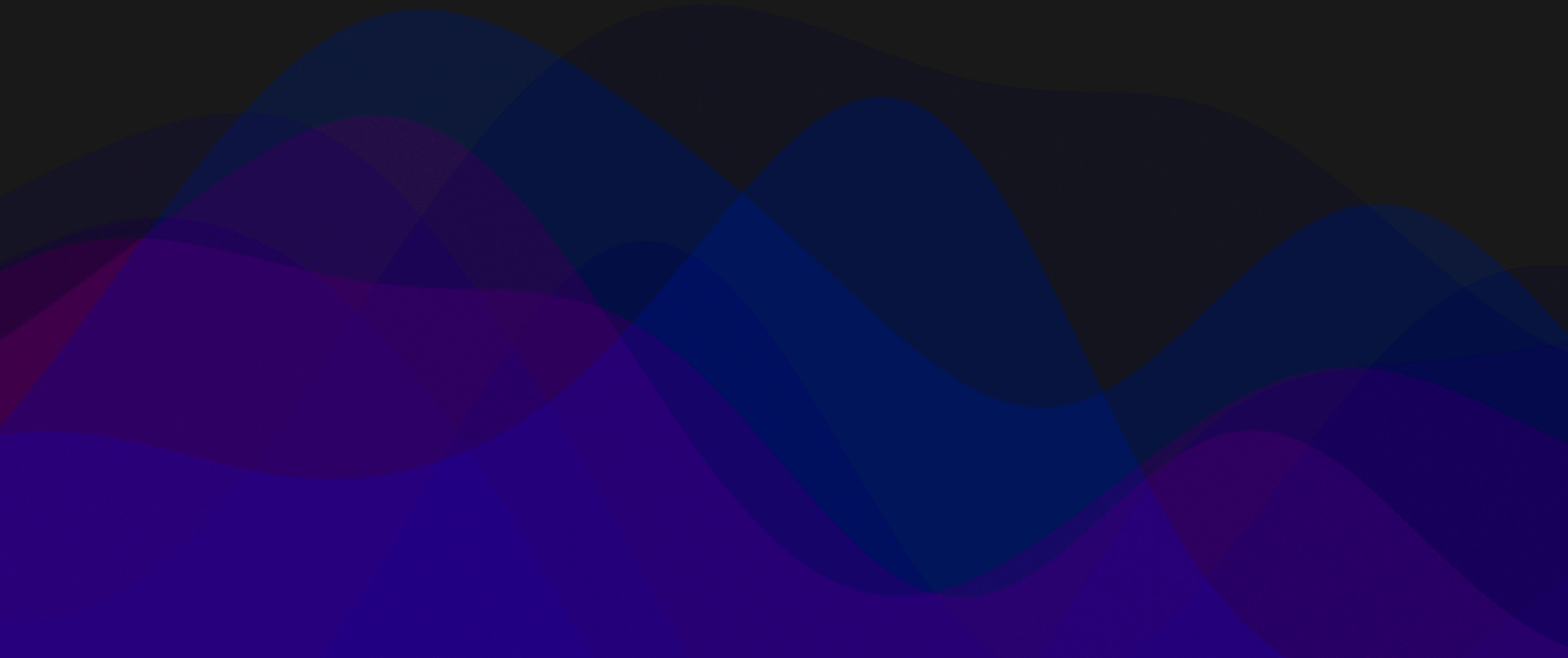


# Design Principles

- 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

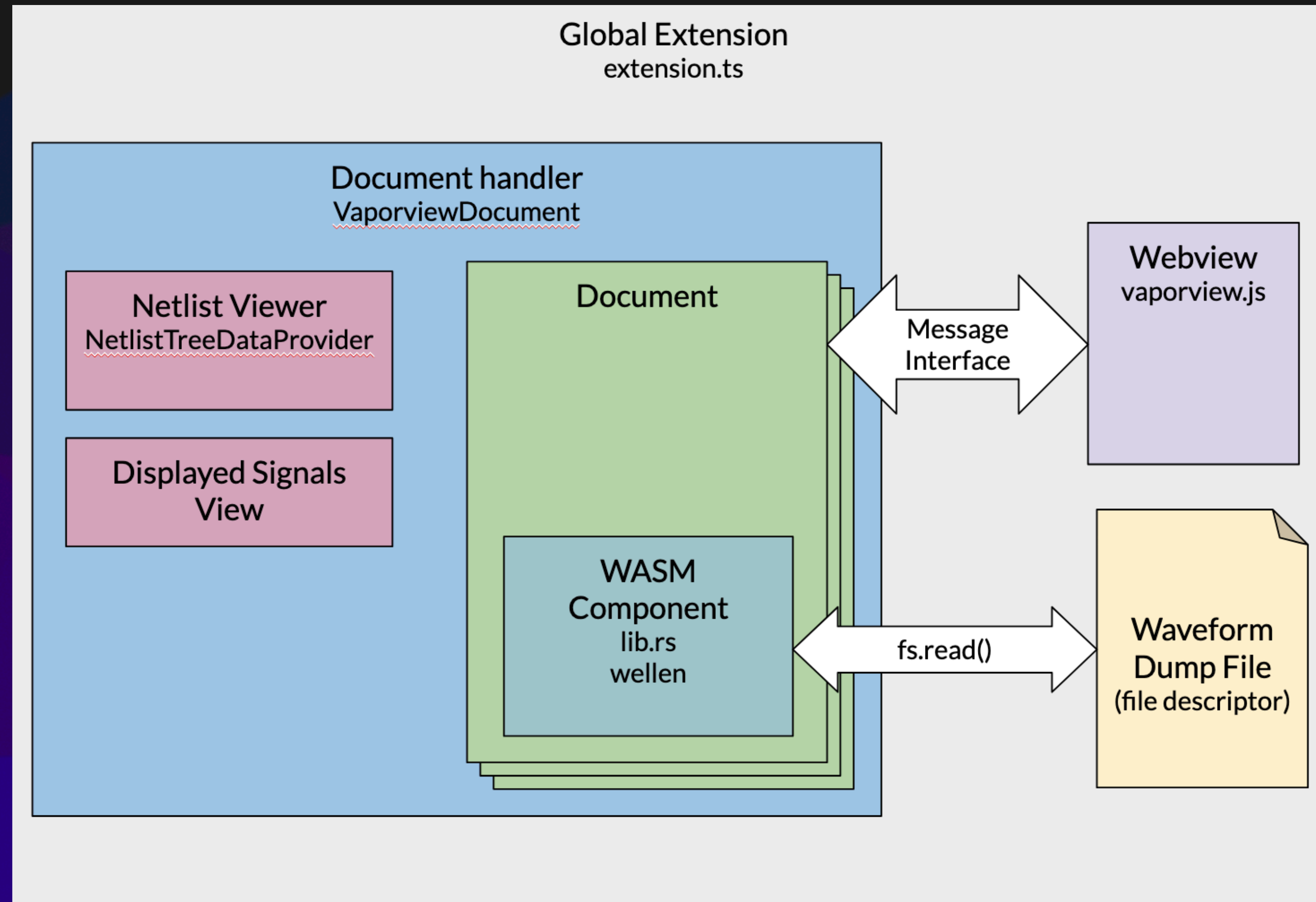


## Github





# 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  $< 4\text{ms}$  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 Laeuffer 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