VSDOpen Conference
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Unleashing Open-Source Silicon

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Agenda

- Open-source silicon
  - challenges
  - status
- Cloud FPGAs
  - why they are so important
  - what they lack
  - our solution -- 1st CLaaS
  - *[demo video]*

Open-Source Silicon - What's holding us back?

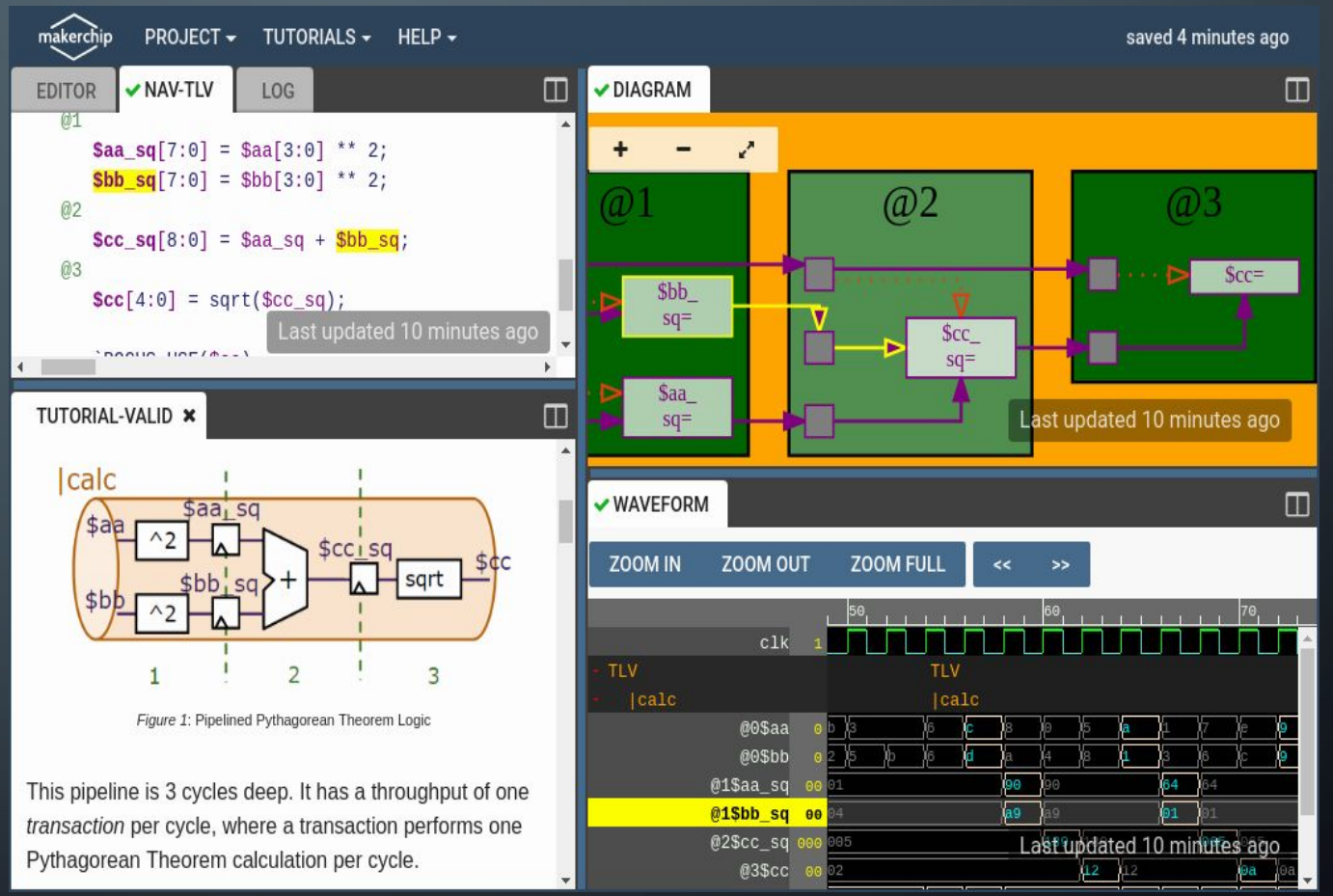
1. Implementation detail
2. Access to tools
3. Access to h/w

...and the Barriers are Breaking Down!!!

1. Implementation detail
   - HLS
   - Hardware construction
2. Access to tools
   - Complete open-source FPGA design flows now exist
   - US Government funding open-source EDA for ASICs and boards
3. Access to h/w
   - Cloud FPGAs are an answer!

I'm doing my part

1. Impl. detail
   - TL-Verilog
2. Access to tools
   - makerchip.com
3. Access to h/w
   - Integration w/ Cloud FPGAs



Impact of Open-Source Silicon and Cloud Silicon

- More dramatic transformation than open-source and cloud software
  - Silicon is BIG industry
  - Open-source software set the stage
- “Golden age of computing” -> demand for many new architectures
- The transformation:
  - ASICs: Chip makers => data center companies
  - FPGAs: Chip makers => startups
  - Open-source FPGA => open-source ASIC

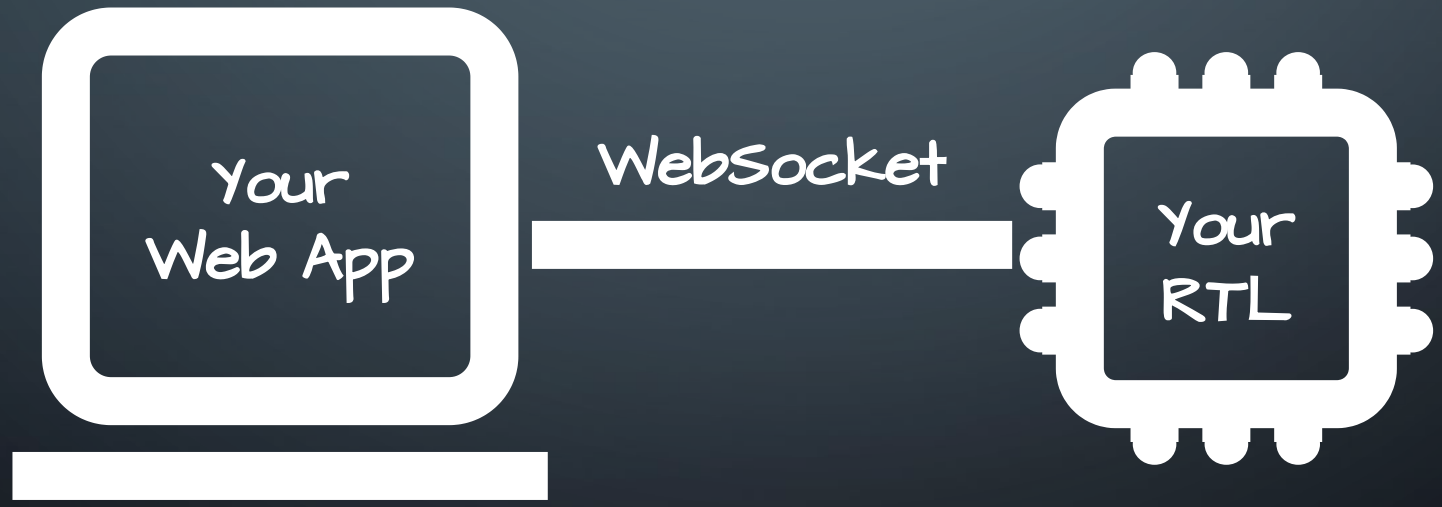
4th Barrier - Patents

Cloud FPGAs

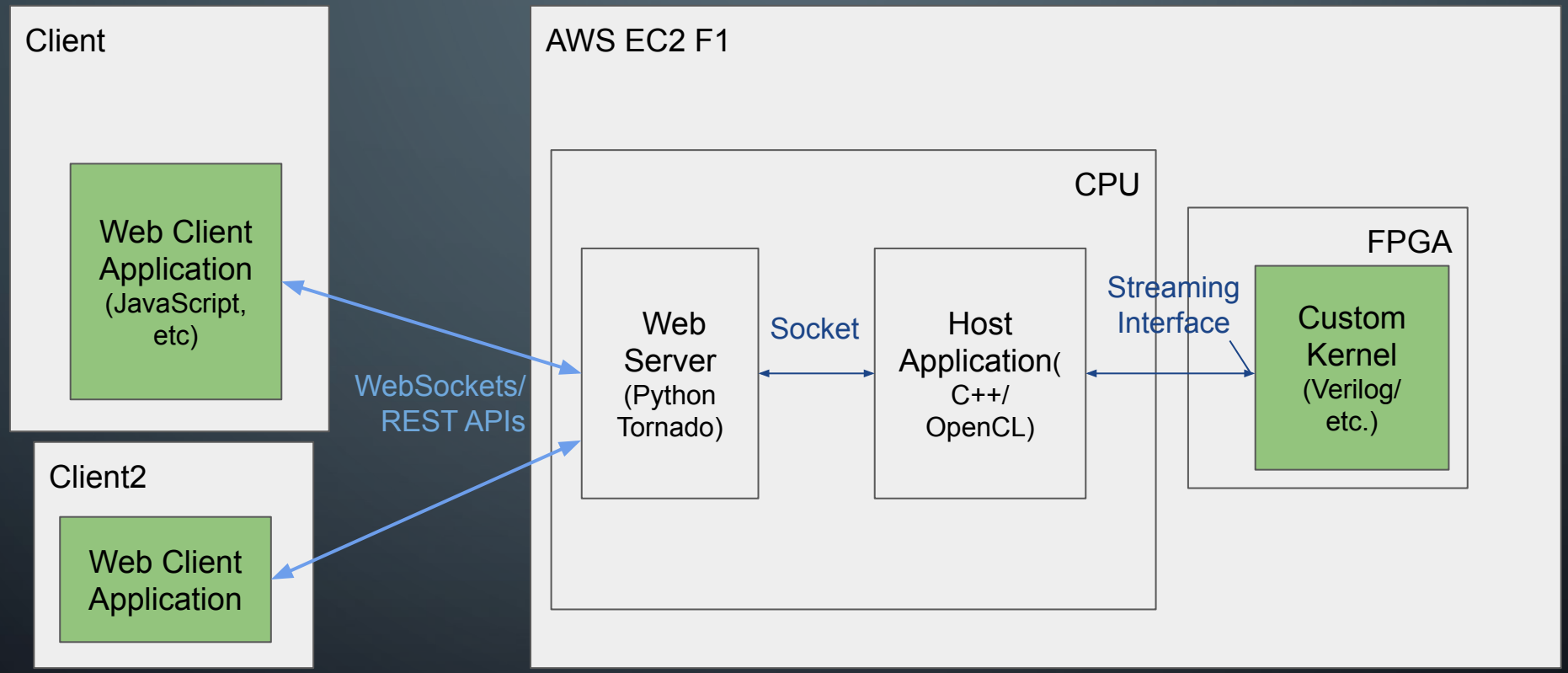
- Hardware platforms exist (e.g. AWS F1)
- Software ecosystem is immature:
  - built for local development
  - built for professionals
  - dropped into the cloud
- Little focus on:
  - developing in cloud
  - small-scale development
  - integrating FPGAs w/ cloud applications

1st CLaaS

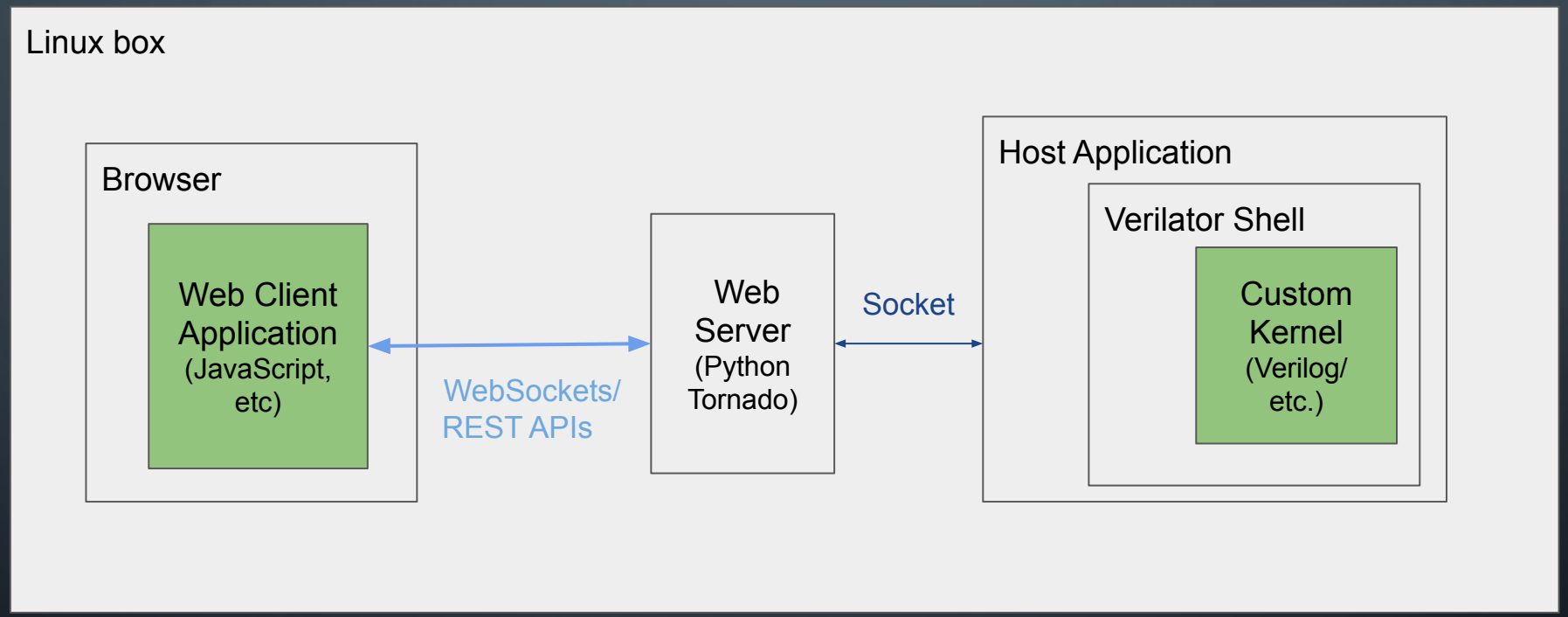
- CLaaS: Custom Logic as a Service
- Focused on ease of development
- Communication layer from web app to H/W kernel



Hardware-Accelerated Web Application

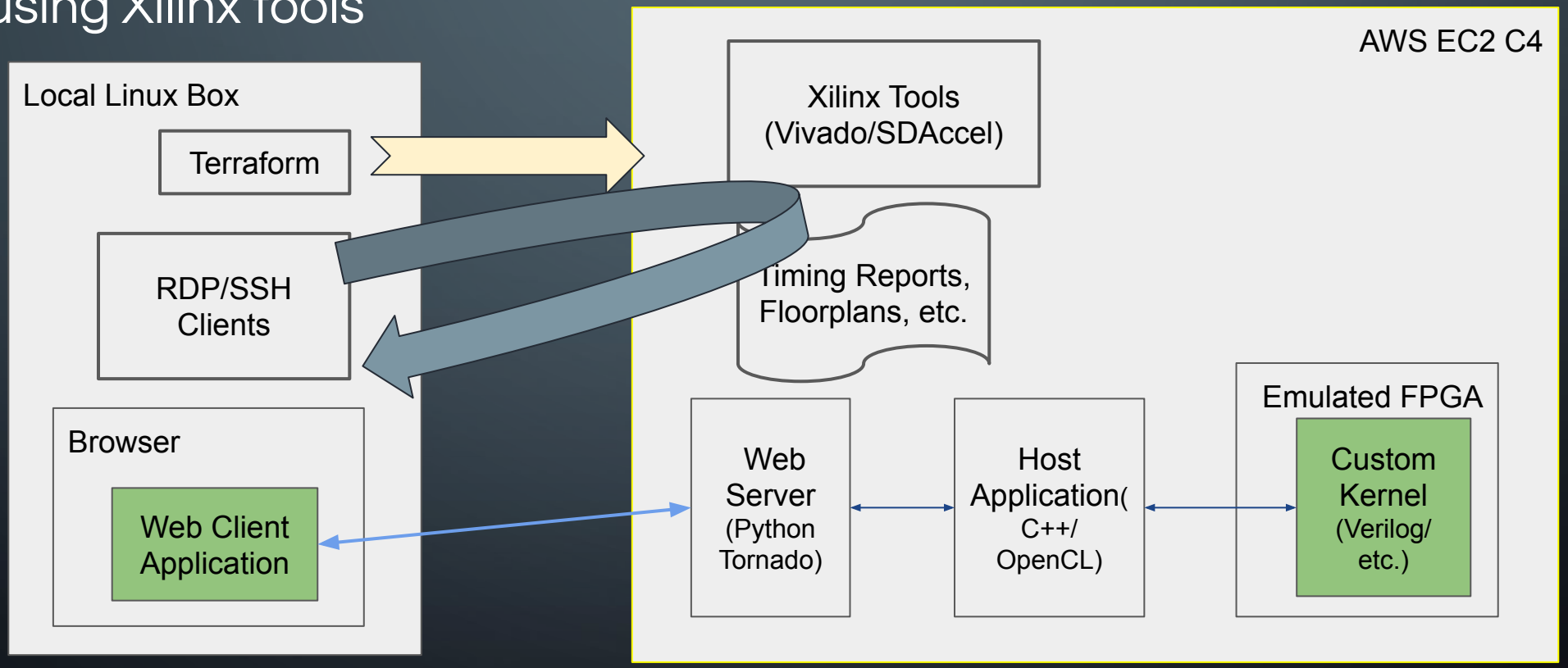


Local Development



Implementation Instance

- For optimizing implementation using Xilinx tools

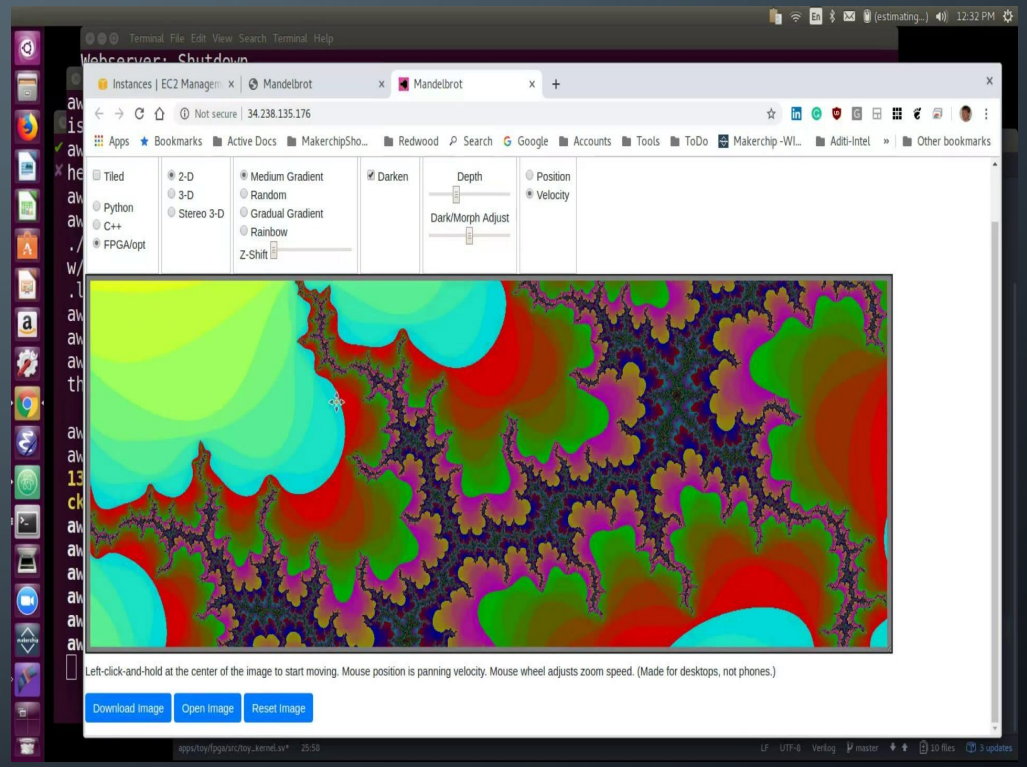


1st CLaaS Usage Examples

3-Part Screen-Capture Video

1. Install 1st-CLaaS locally and run Mandelbrot Demo w/ Verilator
2. Install 1st-CLaaS on F1 and run Mandelbrot Demo w/ FPGA
3. Create simple custom kernel and talk w/ Verilated kernel

Time: 11 min. (edited to 5:30 min.)



Conclusion

1st CLaaS enables open-source FPGA development that is:

- integrated with software development
- low cost
- nearly as easy as open-source software development

No more barriers!

Open-source silicon will hit hard!