

FPGA vs. ASIC

FPGA World:

- Short release cycles
- Features are mixed and matched
- Very small team

ASIC-strength verification in the FPGA world requires addressing these head on.

We have had great success doing so with the below tools and techniques.

Automation with Python

Challenge:

- Don't do things manually that can be scripted
- Scripts aren't your primary job
- Scripts need to be easy to read and maintain

Saved time with Python

- Very readable: like pseudo-code
- No \$%&*(#@) line-noise
- "Batteries Included." There are lots of helpful Python libraries

See How Pretty:

```
# get the length of a list,
# and a string
a_list = ['a', 'b', 'c']
list_length = len(a_list)

a_string = 'foobarbaz'
string_length = len(a_string)
```

Distributed Version Control (DVC)

Challenge:

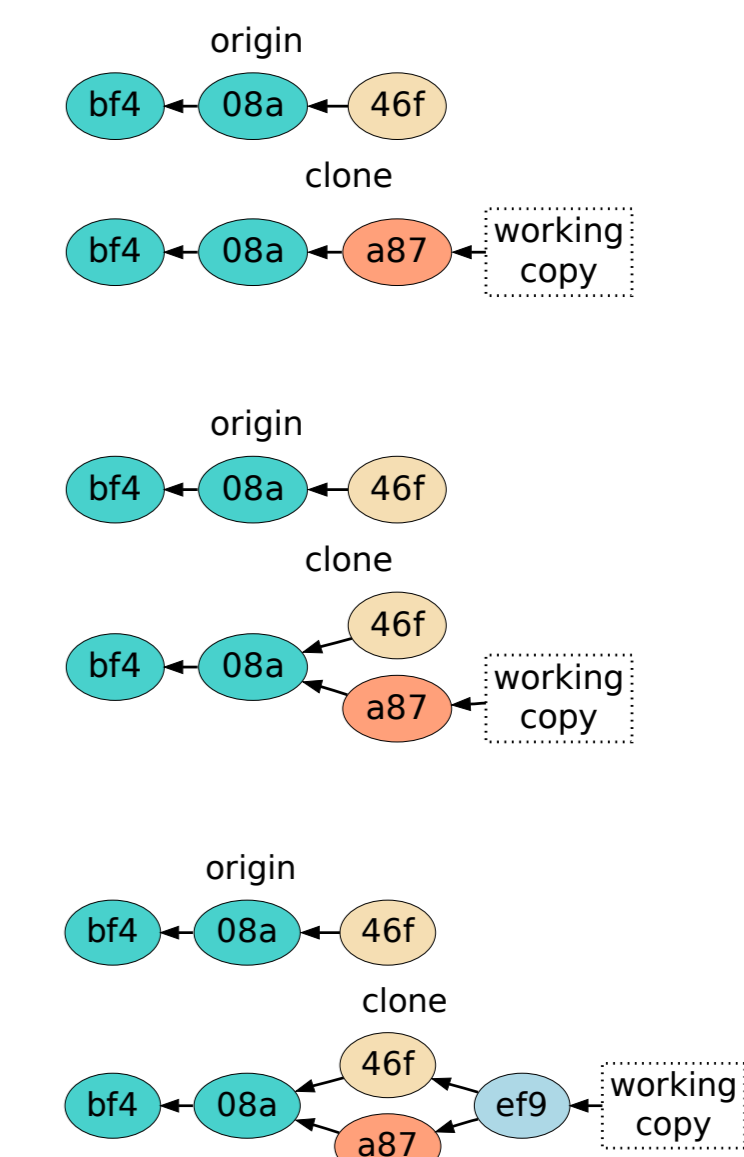
Many concurrent lines of development:

- Multiple big features
- Support for old bitstream releases
- Stabilizing and testing multiple releases

CVS, SVN don't handle branches and merges well

DVC Met the Challenge:

- Branching and merging are handled beautifully
- Commits are local: edit, re-arrange, or combine them before sharing
- Free, Open Source, and high quality DVC tools: [Mercurial](#), [Git](#)



A Configuration-Driven Build System

Challenge:

With a single codebase:

- Create bitstreams for multiple FPGA's
- Create multiple bitstreams with different feature sets

Collected compile-time options and file lists into *Builds*

```
// build: functional
'define FUNCTIONAL_BUILD 1
'define CLOCK_FREQUENCY_MHz 100
'define BUS_WIDTH 32
'define BUFFER_DEPTH 16
// hardware ecc
```

```
// file list for build: functional
top.v
fifo.v
bus.v
ecc/ecc.v
```

```
// build: small
'define SMALL_BUILD 1
'define CLOCK_FREQUENCY_MHz 700
'define BUS_WIDTH 16
'define BUFFER_DEPTH 4
'define SOFT_ECC 1
```

```
// file list for build: small
top.v
fifo.v
bus.v
software_ecc/ecc.v
```

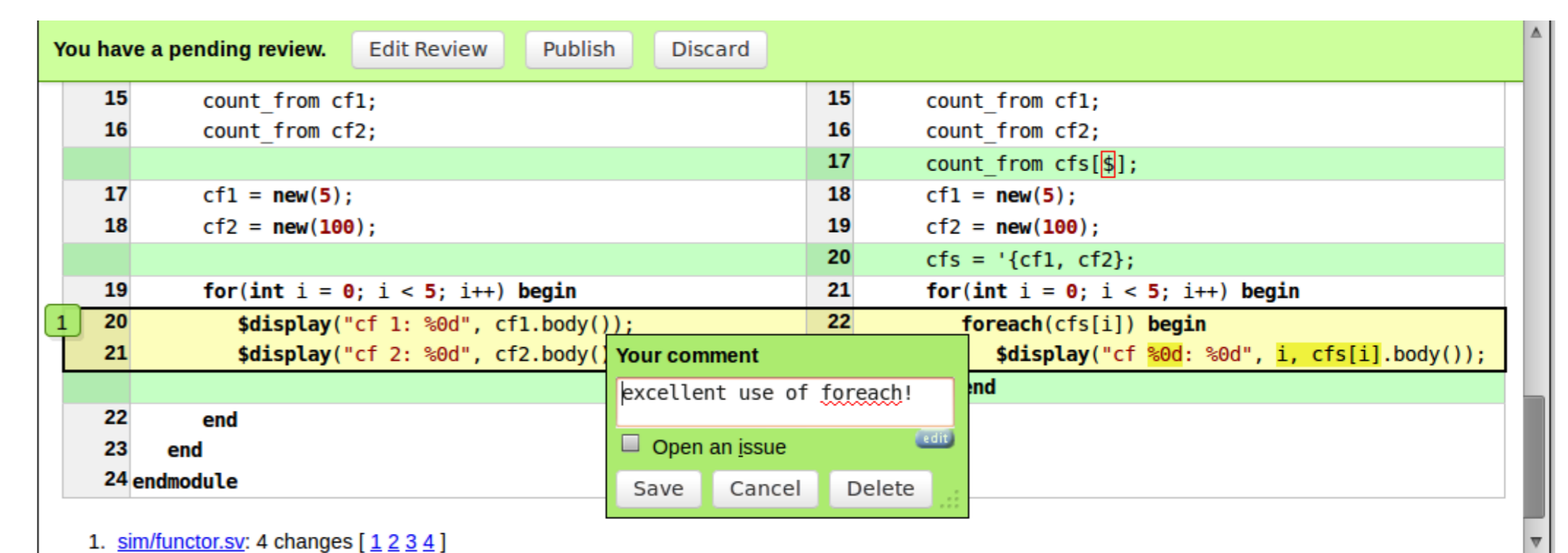
Web-Based Code Reviews

Challenge:

In-person Code Reviews are:

- Inconvenient
- Hard to concentrate on the code
- No written record of the review

Review Board to the rescue



Future Work: Registers

Challenge:

Registers are tedious to maintain manually

Commercial register tools automate the process
One definitive source turns into code and documentation.

