

lava-arrows

Fixing what VHDL has done wrongly

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VHDL

- No integrated validation (Requires test bench)
- Very low level

Arrows

- Formalization through category theory
- Automated validation from the formal declaration (for free!)

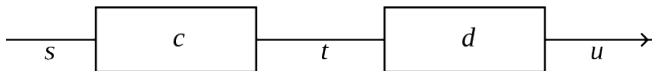


Abbildung : A very simple circuit: c and d are components

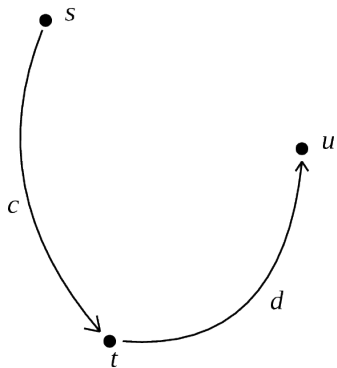


Abbildung : A very simple category: c and d are morphisms

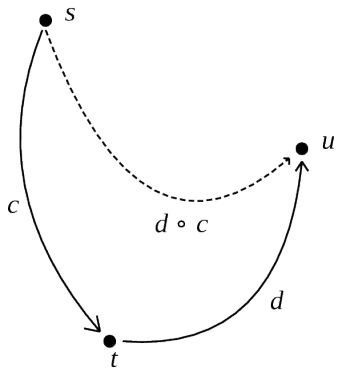


Abbildung : Composition: c and d chained together give rise to a new morphism

```
class Arrow a where
  pure   :: (s -> t) -> a s t
  (>>>) :: a s t -> a t u -> a s u
  first :: a s t -> a (s, u) (t, u)
```

Let's take Andy's base64 codec:

`http://git.o2s.ch/?p=lava-arrows.git;a=blob;f=src/Base64.lhs;hb=HEAD`

Automated validation (Line 29)

```
> quickCheckWith stdArgs { maxSuccess = 1000 } $ \(a, b, c) ->
>   let input = (byte2BitVec a, byte2BitVec b, byte2BitVec c) in
>   input == test Virtex6 (base64Encode >>> base64Decode) input
```


Project repository:

<http://git.o2s.ch/?p=lava-arrows.git;a=summary>

GIT clone:

`git clone http://git.o2s.ch/git/lava-arrows.git`

- A state machine generating Monad
- Direct synthesis at some point

Thank you for your attention