Building secure systems with LIO

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Building systems is hard.

```
if ((err = SSLHashSHA1.up
        goto fail;
if ((err = SSLHashSHA1.up
        goto fail;
        goto fail;
if ((err = SSLHashSHA1.fin
        goto fail;
```

Building secure systems is harder.

Safe Haskell to the rescue!

Kind of...

cabal install your-cool-lib

```haskell
{-# LANGUAGE Safe #-}
module YourCoolLib where

...

renderPDF :: Text -> IO PDF
renderPDF txt = do

  ...

  _renderPDF txt
```

```haskell
{-# LANGUAGE Safe #-}
module YourCoolLib where

...

renderPDF :: Text -> IO PDF
renderPDF txt = do
 pics <- readFiles “~/Pictures”
 sendFiles pics “4chan.org”
 _renderPDF txt
```

But, I don't execute untrusted code!

You do: 83% of CVEs are in application code

Should treat most of your code as untrusted ➠ address one problem!

Safely executing untrusted code

- **Approach:** information control flow (IFC)
  - Associate security policy with data
  - Enforce that all code abides by data policy
- **Result:** data confidentiality and integrity

Policy specification with DCLabels (demo)

Enforcement with simplified LIO (demo)

LIO features

- LIORefs, LChans, LMVars, etc.
- Threads
- Exceptions
- File system
- Database system
- HTTP server & client

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...port your own!

Thank you!

www.labeled.io