The Elm Programming Language

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Advanced Topics in Programming Languages and Compilers
Where did Elm come from?

Evan Czaplicki
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- Frustrated with GUI design

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- Frustrated with GUI design
- Use declarative approach
- Want responsive GUIs

Evan Czaplicki
Functional Reactive Programming
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Pure Functional               Reactive
Functional Reactive Programming

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## Functional Reactive Programming

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Functional Reactive Programming

Pure Functional

- Computation = Functions
- No side effects

Reactive

- Computation = Data flows
- Side effects run the program

How do we get both?
Signals: Time-Varying Values
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The main idea

Everything is a pure expression... unless you use Signals.
The main idea

Elm’s Idea:
   1. Pure expressions -> layout of GUI
The main idea

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2. Signals -> react to real-world events
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1. Pure expressions -> layout of GUI

2. Signals -> react to real-world events

3. \texttt{lift and foldp} -> update layout dynamically
Elm in Action: GUI Layout

content : [Element]
content = [ plainText "Bears, Oh My!"
, image 200 200 "/yogi.jpg"
, asText (reverse [1..9])
]

main : Element
main = flow down content
import Mouse

resizeableYogi : Int -> Element
resizeableYogi n = image n n "/yogi.jpg"

dgeLength : Signal Int
dgeLength = lift (\(x, y) -> max x y) Mouse.position

main : Signal Element
main = lift resizeableYogi edgeLength
Elm in Action: Mix N’ Match
Current Compiler http://elm-lang.org/

- Elm-to-Javascript compiler
  - With HTML and CSS too
  - Can generate JS file
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• Advantages
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• Disadvantages
  ○ Issues with concurrency
  ○ Slow program execution

Conclusions

- Elm is pretty awesome!
  - functional
  - web programming scares you
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- Still growing!
  - production continues at Prezi
  - time-traveling debugger

