Debugging for math lover

LambdaDays2022

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Plan

- How to model debugging?
- How to find error?
- Time to fix
- Search space
- Cognitive limits

Types of errors

- Does not compile

Errors higher on this page are faster to fix

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Types of errors (2)

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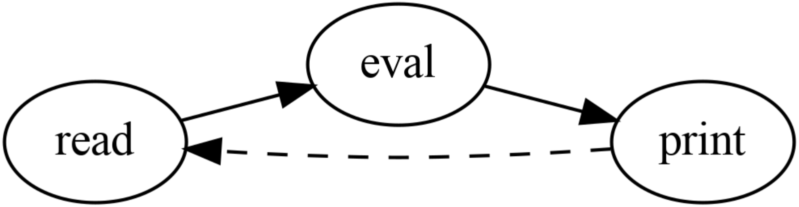
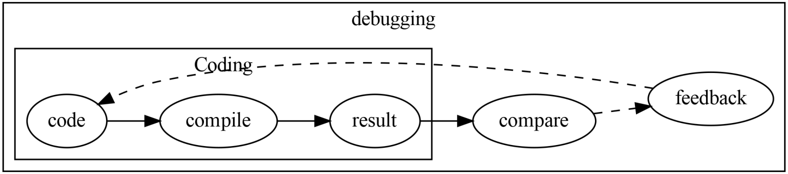
- Type error
- Gives wrong result
- Performance is too slow
- Wrong concept was used to model reality
- User experience is frustrating
- Specification does not match user expectations

Error is a difference between what we want, and what we got.

Read-eval-print loop



Discrepancy model



Feedback cycle

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- With small probability we devolve to searching neighbourhood

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- $\rightarrow$ decrease *latency*!

Fixing function

What is easier to debug:

```
capitalize     (w:ws) =
        toUpper w:
    map toLower   ws
```

OR:

```
capitalize = zipWith f [1..]
  where
    f 1 a = toUpper a
    f _ a = toLower a
```

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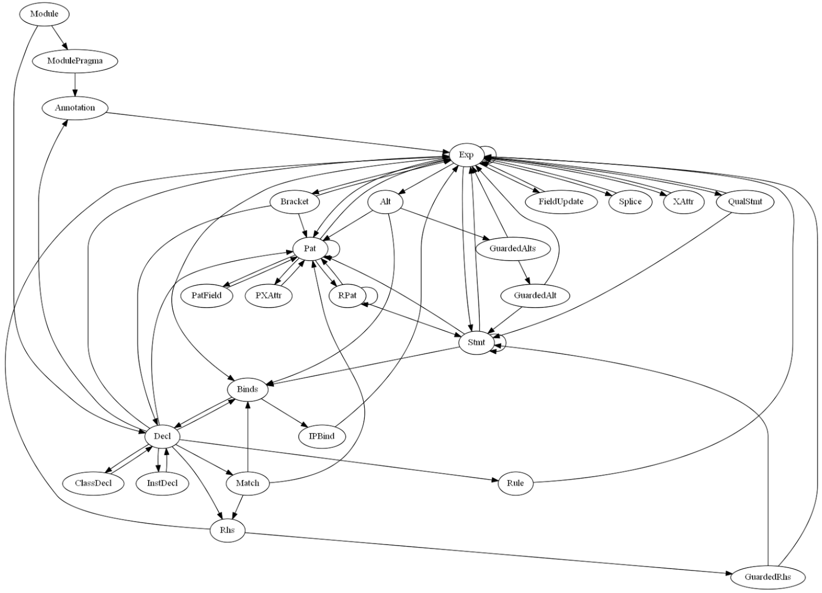

Neil Mitchell *Haskell type graphs with Uniplate and Haskell-src-exts*

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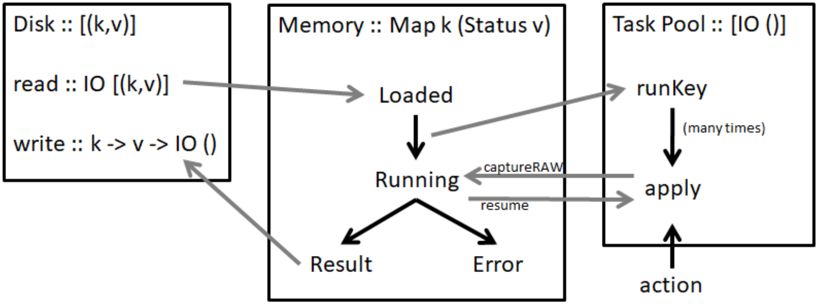
- May depend on the number of different users
- ...depends of a number of interactions with other functions.

Fixing library



Neil Mitchell - Shake from 10,000ft

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- high-level abstraction $\rightarrow$ common interface $\rightarrow$ decreased complexity

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- use `Homplexity` to find hot spots in your Haskell code!