An Intro to Dependent Types with Idris

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Problems with regular type systems

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```
head []
-- *** Exception: Prelude.head: empty list

printf "blah %s %s" "hello"
-- *** Exception: printf: argument list ended
-- prematurely
```

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- Most functional languages have two languages that can't interact: the Type language, and the programming language
  - Types exist only as an enforcement layer
- Since these languages can't interact, all the types and conditions for them must be known by the programmer ahead of time, and can't be deduced from the context of the code.

The solution to these problems (and many others) are dependent types

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Common languages for it are:

- Agda
- Coq
- F*

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- Even getting the length requires O(n) operations.
  - You could store the length as a property, but that requires anyone who updates length to make sure it's updated
    - Generally ok for well-audited things, risky for anything else.

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Let's code it!

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- Mixing types (like in printf) generally eschews compiler type-safety
- Compiler can't check to see if you have the correct number of arguments

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More coding!

A note about compiler hacks

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This is totes OK, but that only works for that particular case.

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  - (I'm still learning how to use them)

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  - Scala actually has basic support for dependent types.
- One could write an F# backend for Idris and use it here
- Having increased program safety is always a good thing
- Because dependent types are super cool, and worth a ton of further research.

Questions

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