HASKELL'S TYPECLASSES

Curt Clifton
Rose-Hulman Institute of Technology

SVN update then look in *HaskellTypeClasses* folder and open *typeClasses.hs*

HASKELL *TYPECLASSES*

- Like interfaces in Java
  - Provide polymorphism by specifying that a type supports certain operations
  - But more powerful…

EXAMPLE

instance type name, think "self" but for types

```
class MyEq a where
    isEqual :: a -> a -> Bool
```

declares a typeclass, but think "interface"

Any type that claims to be an instance of MyEq (think "implements the MyEq interface") must provide a function that takes two things of it's type and returns a Bool.

INSTANCE DECLARATIONS

- Syntax:
  instance *TypeClassName DataType* ***where***
  <Required and optional function declarations>

- Example: `instance MyEq String where`

```
isEqual "" "" = True
isEqual "" _  = False
isEqual _  "" = False
isEqual (c:cs) (c':cs') =
  (c == c') && isEqual cs cs'
```

think "String implements MyEq"

MORE POWER!

```
class MyEq2 a where
  isEqual2 :: a -> a -> Bool


  isNotEqual2 :: a -> a -> Bool
```

MORE POWER!

```
class MyEq2 a where
  isEqual2 :: a -> a -> Bool
  isEqual2 x y =
    not (isNotEqual2 x y)

  isNotEqual2 :: a -> a -> Bool
  isNotEqual2 x y =
    not (isEqual2 x y)
```

Q2


Number 1477: Read Manual Before Operation
Hey Hanners, what's up?
What? Oh, I'm in the coffee shop now. Hi, Dora.
Are you okay?
Oh, I'm fine, I'm fine! I hit that sweet spot at around 40 hours of bein' awake where you feel GREAT! Can I have a cup of coffee?
I'll pour you some decaf. The last thing you need right now is a stimulant.
Here you go.
portishead

http://www.questionablecontent.net/view.php?comic=1477 used by permission

SOME BUILT-IN TYPECLASSES

- Show: converts values to Strings
  - show :: (Show a) => a -> String
- Read: the opposite of Show, provides simple parsing
  - read :: (Read a) => String -> a
  - readsPrec :: (Read a) => Int -> String -> [(a, String)]
- Eq, Ord, Num, Double, Float, Int, Integer, Rational, …

I NEED MORE POWER!

```
data Color = Red | Yellow | Blue
  deriving
    (Read, Show, Eq, Ord, Enum)
```

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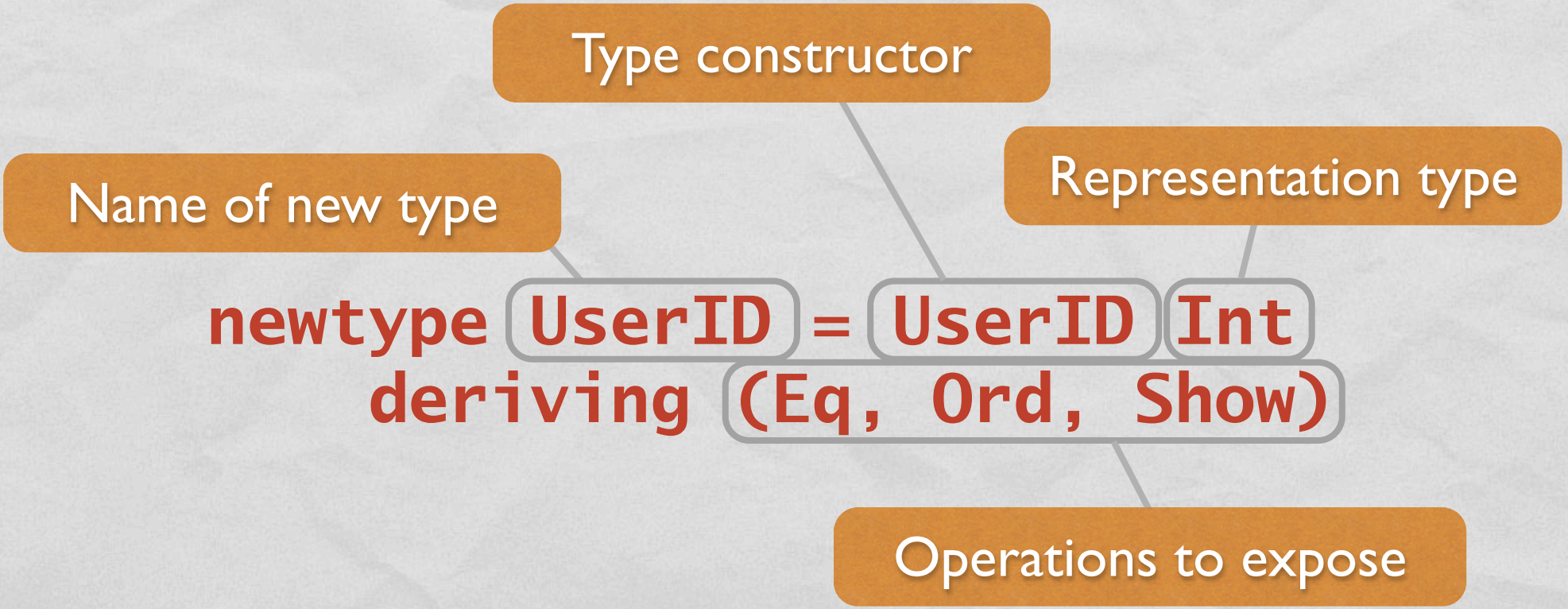
ONE MORE WAY TO NAME TYPES



THREE WAYS TO NAME TYPES

- *data BinTree a = ExtNode | IntNode a (BinTree a) (BinTree a)*
  - A brand new, structured, algebraic datatype
- *type String = [Char]*
  - Just synonyms, *String* and *[Char]* interchangeable
- *newtype UserID = UserID Int deriving (Eq, Show, Ord)*
  - Distinct type, represented as underlying type, but only supports some operations, not interchangeable