CS 350 2024-25 Sem I Lecture 8

Satyadev Nandakumar

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Outline

Outine

What is a class

- A class is a collection of types which support common methods
- A type is called an instance of a class
- A class have many instances
- A type may be an instance of 0 or 1, more than one classes,
- A class may extend another class by adding more methods

Use of classes

- modular design of types
- avoid writing common methods (Don't repeat yourself)

Eq class

- All types which support equality (==) method
- The method is not defined in the class
- Instance types must implement (==)
- But `Eq` class implements (/=) : so instances need not redefine
- instances type support both (==) and (/=)
- Examples: `Bool`, `Num` etc.

Ord class

Definition of Ord class

```
class Eq a => Ord a where
  compare :: a -> a -> Ordering
  (<) :: a -> a -> Bool
  (<=) :: a -> a -> Bool
  (>) :: a -> a -> Bool
  (>=) :: a -> a -> Bool
  max :: a -> a -> a
  min :: a -> a -> a
  {-# MINIMAL compare | (<=) #-}
        -- Defined in ‘GHC.Classes’
```

Making an instance of an `Ord` type

- We need to implement `(>=)`
- If our type is an instance of `Eq`, then we don't need to implement anything else
- All other methods are available, since they can be implemented using `(<=)` and `(/=)`.

`Show` class

- A type which needs to print its value on the output console.
- Functions are NOT instances of `Show`, so we cannot print function definitions.
- If we our type to be an instance of `Show`, we need to implement `show`.

Making binary tree an instance of Show

A simple implementation of show

```
instance Show a => Show (BinaryTree a) where
    show Nil = ""
    show (Node n Nil Nil) = (show n)
    show (Node n l r) = (show n) ++ "(" ++ (show l) ++ ")(" ++
```

Deriving a class

- A class B may extend another class A
- B has all the methods that A has
- B is a subclass of A
- can a type be an instance of B but not of A?

Fractional as a subclass of Num

Fractional

- see `:info Fractional`
- see `:browse GHC.Float` - which methods are listed?