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SCALAR

OVERVIEW

- Objective / Motivations
- What is ScalaR
- Design / Implementation
    - Typing
    - RVectors
    - DataFrames
- Challenges
- Opportunities for Expansion

OBJECTIVE AND MOTIVATION

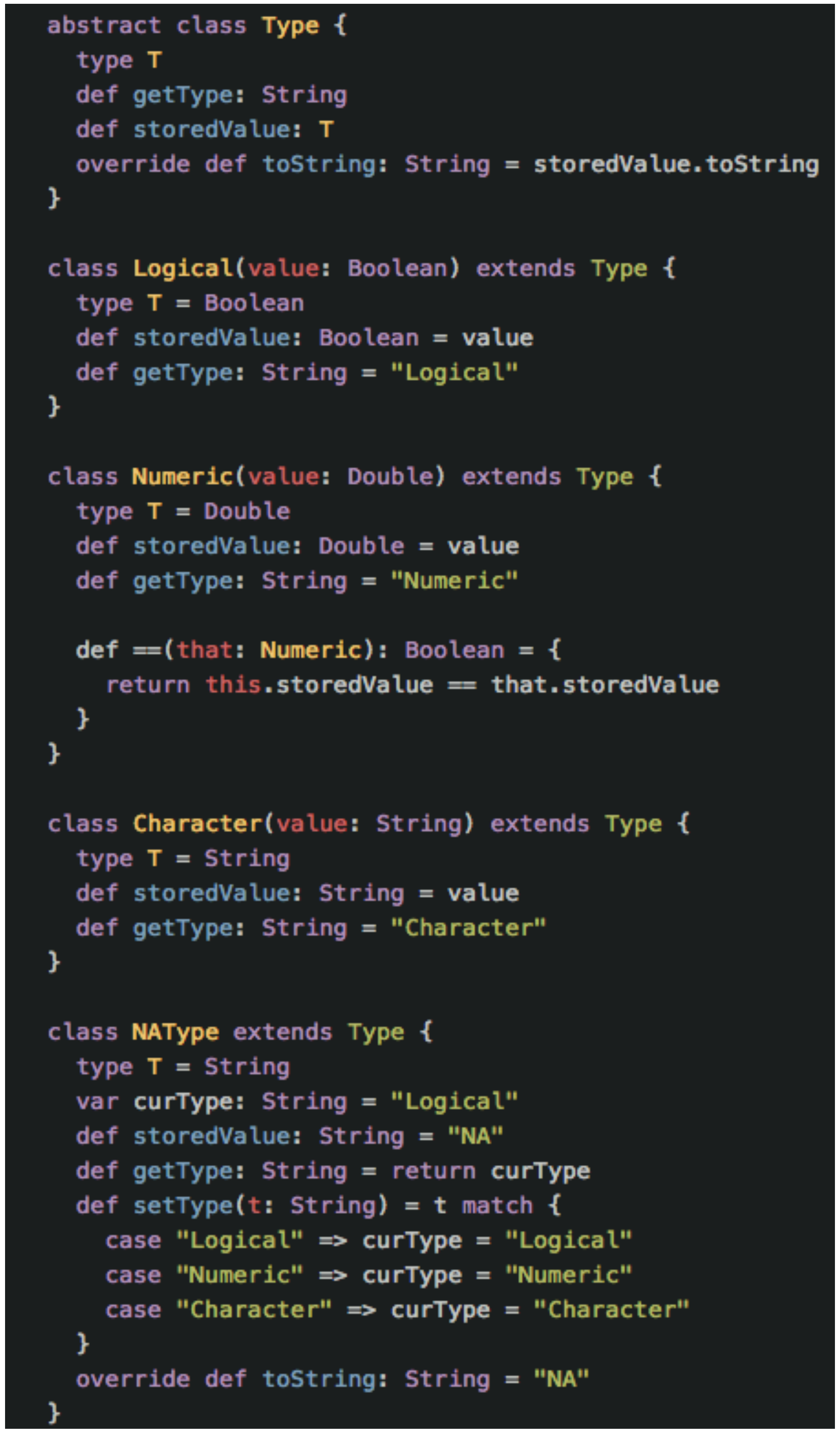
- Create a convenient language for statistical analysis in Scala
- Lack a native structure for working with large datasets
- Offer an easy way for users to visualize their data

WHAT IS SCALAR

- A subset of the R programming language that uses a similar syntax
  - All variable assignment is done with the “<--” operator
  - c(…) can be used to create new vectors
- Uses DataFrame and vector objects as wrappers for all variables
  - Allows reading in of datasets from external files
  - Easy to query and perform operations on
- Gives the user a way to visualize their data in various ways
  - Scatter Plots
  - Histograms

TYPING

- Present four types for representing data
- Numeric
  - Represents Numbers
  - For simplicity, everything is a Double
- Logical
  - Booleans
- Character
  - “Hello World”
- NA
  - Absence of type
- Important concept for statistics



```
abstract class Type {
  type T
  def getType: String
  def storedValue: T
  override def toString: String = storedValue.toString
}

class Logical(value: Boolean) extends Type {
  type T = Boolean
  def storedValue: Boolean = value
  def getType: String = "Logical"
}

class Numeric(value: Double) extends Type {
  type T = Double
  def storedValue: Double = value
  def getType: String = "Numeric"

  def ==(that: Numeric): Boolean = {
    return this.storedValue == that.storedValue
  }
}

class Character(value: String) extends Type {
  type T = String
  def storedValue: String = value
  def getType: String = "Character"
}

class NAType extends Type {
  type T = String
  var curType: String = "Logical"
  def storedValue: String = "NA"
  def getType: String = return curType
  def setType(t: String) = t match {
    case "Logical" => curType = "Logical"
    case "Numeric" => curType = "Numeric"
    case "Character" => curType = "Character"
  }
  override def toString: String = "NA"
}
```

VECTORS

- A vector is a one dimensional collection of values all of which are the same type
- Type coercion among elements within a single vector
- Logical -> Numeric -> Character
- Missing data within a vector will take on the type NA

DATAFRAMES

- Column based storage of vectors with a specified schema it follows
  - `[column1, column2, column3] , [String, Numeric, Numeric]`
- Supports operations to be performed on the data
  - Add
  - Minus
  - Dot and cross product
  - Sum
  - Mean
  - Standard Deviation
- Simple queries may be performed on the Dataframe
  - `“Column1 > 10”`
- Allows for a few types of graphical representation (WISP)

FURTHER GOALS

- Add user-defined functions
- Implement ability to execute more complex queries
- Support for more arithmetic operations on the vectors

THANK YOU!

scalar