Functional Programming with Scala: Class 5

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Notes on Assignments

- Use immutable data structures as much as possible

- Compile should produce no warnings

- Submit a .tar.gz file of the src directory (no more and no less)

- Note that turning in an assignment late earns more points than not turning it in at all. Doing the assignments is a key part of your learning Scala

Help on Assignments

- A few people have not turned in all the coding assignments

- Coding assignments are an essential part of this class

- Study groups can help. Take the initiative!

- If you are having trouble, feel free to send me email to set up a time were we can meet so I can help you complete all the assignments

Philip Wadler Youtube

- Strongly recommend you watch this

- Category Theory for the Working Hacker by Philip Wadler

- https://www.youtube.com/watch?v=V10hzjgoklA

- Functional programming was "discovered" not "invented"

Review

- Water

  - Present solution(s)

  - Code review and discussion

Lecture

Scala versus Java OO

- Companion objects (versus statics)

- Default public (versus private)

- Multiple inheritance via traits (versus interfaces)

  - class C(i:Int) extends P(2*i) with T1 with T2

- Constructor and fields via class header

- No need for getters/setters (versus separate methods)

- abstract, final, override

ADTs and Case Classes

- ADTs, sealed

- case class and case objects (CaseClass.sc)

  - apply, unapply

  - equals, hashCode, toString, copy

  - Product

Scala Testing

- JUnit (Java)

- ScalaTest and Specs2 (Scala)

  - Very big and complex

  - Not functional

  - Aimed more at PMs than developers

  - Hard to customize and extend

Two Better Scala Testing Frameworks

- ScalaCheck

  - property based testing

  - test data generation

  - failure simplification

- LambdaTest

  - small clean

  - functional/immutable

  - easy to program and extend

  - includes ScalaCheck

LambdaTest and Scala Check

- <u>LambdaTest</u>

    - Review documentation and demos

- <u>ScalaCheck</u>

    - Review documentation

Testing Examples

- LTestCQueue

- LTestFQueue

- SCTestFQueue

- LTestTree1

- SCTestTree1

Assignment 5

Assign 5: Recipes

- Goals

  - Build a Scala OO application

  - Use your own design

  - Use LambdaTest

Recipe 1 : Scrambled Eggs

- Step 1. Whisk 3 eggs, 1 pinch salt, 1 pinch pepper

- Step 2. Cook the result of step 1 using 1 tablespoon of butter

- Step 3. Let the result of step 2 rest for 1 minute

Recipe 2: Quiche

- Step 1. Cook 3 slices of bacon

- Step 2. Shred 2 slides of swiss cheese

- Step 3. Combine the result of steps 1 and 2 with 3 eggs and 10 tablespoons of cream

- Step 4. Bake the result of step 3

- Step 5. Let the result of step 4 cool

Recipe 3: BLT

- Step1. Slice 1 tomato

- Step 2. Cook 3 slices of bacon

- Step 3. Combine the results of step 1 and 2 on 2 slices of bread with 2 leaves of lettuce

Assignment

- Add more classes as needed to RecipeClasses

  - You are free to use mutable state

- Extend RecipeExample with more class instances

  - Include 3 recipes from above

  - Feel free to add other recipes and ingredients

  - Create other objects as needed

- In RecipeTest implement answers to questions

  - Feel free to change to "real" tests

  - Feel free to add more LambdaTest tests

Assignment Output

- do a test:run of RecipeTests

- start of output should look something like

```
 Test: What is the cost of the ingredients in a blt?
  Ok: [$1.61] blt costs (TestRecipes1.scala Line 19)
Test: What ingredients do I need to make a quiche?
  Ok: [3 egg eggs
  3 strip bacon
  3 slice swiss cheese
  10 T cream] quiche ingredients (TestRecipes1.scala Line 23)
Test: What ingredients do I have in my house?
  Ok: [] in my house (TestRecipes1.scala Line 27)
Test: Buying everything I need to make scrambled eggs and a quiche
  Ok: [$10.00] cost of groceries (TestRecipes1.scala Line 34)
Test: What ingredients do I have in my house?
  Ok: [20 T cream
  20 slice swiss cheese
  12 egg eggs
  12 T butter
  30 strip bacon
  100 pinch salt
  100 pinch pepper] in my house (TestRecipes1.scala Line 38)
Preparing a quiche
Test: What ingredients do I have in my house?
  Ok: [10 T cream
  17 slice swiss cheese
  12 T butter
  100 pinch salt
  9 egg eggs
  100 pinch pepper
  27 strip bacon] in my house (TestRecipes1.scala Line 48)
```

End