04 Lab Advanced FP in Scala

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Lab 04: Outline

Outline

- Exercises on advanced mechanisms of functional programming in Scala
 - Experiments with advanced ADTs modeling
 - Experiments with type classes and monads
 - ► (Optional) try to extend the MVC example

Getting started

- Fork/clone repository https://github.com/unibo-pps/pps-lab04
- Then, follow the instructions in the following slides

Exercise 1: ADTs

- Look at the package tasks.adts in the u04lab.code package
- Task 1: complete the Ex1ComplexADT module so that it passes the tests (ComplexADTTest).
 - Thinking at the ADT, what is the best way to represent a complex number?
- Task 2: implement the Ex2SchoolModel module along with the SchoolModelTest test
 - ► Follow the suggestions in the comments of the SchoolModel module
- Task 3: implement the Ex3StackADT along with the StackADTTest test
 - Follow the suggestions in the comments of the StackADT module

Exercise 2: Type classes

- Look at the package tasks.typeclasses in the u04lab.code package
- Task 4: follow the instructions in the comments of the Ex4Summables module
 - this is a one-kinded type class, composed of methods zero and sum
- Task 5: follow the instructions in the comments of the Ex5Traversable module
 - this is an higher-kinded type class, so it takes a type constructor as a parameter

Exercise 3: Monads

- Look at the package tasks.monads in the u04lab.code package
- Task 6: implement the Try monad as described in the comments of the Ex6TryMonad module
 - Try is similar to the Optional monad, but it can carry an exception
 - Understand the implementation of the Try monad
 - Complete the tasks and verify that the main works

Optional exercises

- Consider the MVC example shown in the lecture
- Task 7: extend the counter with a GUI by adding a necessary text field and a "set" button, so that pressing the "set" button sets the counter to the value in the text field (if valid).
- Task 8: using a GUI with a label, a button, and a text field, and by implementing the model with state, try to realize the MVC (Model-View-Controller) for "drawmynumber".