Homework 3: Scala Overview

Due: October 27, 2005

1 Scala Overview

Read the paper "An Overview of the Scala Programming Language", by Odersky, *et al.* [OAC$^+$04]. You may also find it helpful to read *Scala By Example* [Ode05], and to use *The Scala Language Specification* [OAC$^+$05] as a reference. You can get all of these from `http://scala.epfl.ch/docu/`.

1. (5 points) What is the interpretation of `==` in Scala and how does it differ from Java (or C#)?

2. (10 points) Scala defines several desugarings that turn into method calls. For example, `f(e)` turns into `f.apply(e)` if the type of `f` is not a function type. This makes the method name `apply` *special*, in that it is used in this desugaring. Furthermore, Scala programmers need to know about `applly` in order to define a class with objects that can be used with this syntactic sugar.

   What other method names in Scala are special in this sense? List them and briefly describe how each is used in a sugar.

3. (5 points) What is the main difference between a declaration and a definition in Scala?

4. (10 points) What is the differences between `val` and `def` definitions in Scala? Give examples that illustrate the differences.

5. (10 points) How is a trait different from a Java (or C#) interface ? Explain.

6. (10 points) Compare Scala's pattern matching facility to that in Haskell. What are the similarities and differences?

7. (10 points) Consider section 11 of the paper "An Overview of the Scala Programming Language", by Odersky, *et al.* [OAC$^+$04]. This section tells how to desugar Scala and ultimately how to translate it into Java. (Note, however, that the use of `def` for formal parameters seems to have been replaced by the use of `=>`.)

   Given that this desugaring and translation is possible, what main advantages does Scala give to the programmer who writes code in Scala instead of Java?

8. (40 points; extra credit) Compare and contrast the goals of Scala and Cω. That is, what are the differences between the kinds of problems they are attacking, and what are the similarities? You can find information about Cω from its web site (`http://www.research.microsoft.com/Comega/`), which is linked from the course resources page.

References

[OAC$^+$04] Martin Odersky, Philippe Altherr, Vincent Cremet, Burak Emir, Sebastian Maneth, Stéphane Micheloud, Nikolay Mihaylov, Michel Schinz, Erik Stenman, and Matthias Zenger. An overview of the Scala programming language. Technical Report IC/2004/64, École Polytechnique Fédérale de Lausanne, 1015 Lausanne, Switzerland, 2004. Revised June 3, 2005.

[OAC+05] Martin Odersky, Philippe Altherr, Vincent Cremet, Burak Emir, Stéphane Micheloud, Nikolay Mihaylov, Michel Schinz, Erik Stenman, and Matthias Zenger. The Scala language specification version 1.0. `http://scala.epfl.ch/docu/files/ScalaReference.pdf`, October 2005.

[Ode05]   Martin Odersky.   Scala by example.   `http://scala.epfl.ch/docu/files/ScalaByExample.pdf`, October 2005.