Classless Java

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Abstract

This paper presents an OO style without classes, which we call interface-based object-oriented programming (IB). IB is a natural extension of closely related ideas such as traits. *Abstract state operations* provide a new way to deal with state, which allows for flexibility not available in class-based languages. In IB state can be type-refined in subtypes. The combination of a purely IB style and type-refinement enables powerful idioms using multiple inheritance and state. To introduce IB to programmers we created Classless Java: an embedding of IB directly into Java. Classless Java uses annotation processing for code generation and relies on new features of Java 8 for interfaces. The code generation techniques used in Classless Java have interesting properties, including guarantees that the generated code is type-safe and good integration with IDEs. Usefulness of IB and Classless Java is shown with examples and case studies.

Categories and Subject Descriptors   D.3.2 [*Programming Languages*]: Language Classifications—Object-Oriented Programming;   F.3.3 [*Logics and Meanings of Programs*]: Studies of Program Constructs

General Terms   Languages

Keywords   Interface-based programming, multiple inheritance, code generation

1. Introduction

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