Relational Programming in miniKanren

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For my H211 students: Indiana University, Fall 2010 & 2011.

Learning with always trumps learning from.

—Woodie Flowers

Contents

Preface

Audience

This book is written for intermediate-to-advanced programmers, computer science students, and researchers. For this book, *intermediate* means that you are comfortable writing simple recursive procedures in a functional programming language, such as Scheme, Racket, Clojure, Lisp, ML, or Haskell. I also assume you have a reading knowledge of Scheme. No knowledge of relational programming, logic programming, or programming language theory is required.

If you want to learn about relational programming, but are new to programming, Dan Friedman, Oleg Kiselyov, and I have written a book just for you, called *The Reasoned Schemer*[1]. In that book we assume you are familiar with the material in *The Little Schemer*[2], which is a very gentle introduction to recursion and functional programming.

If you are an experienced programmer, but weak on recursion, you, too, might benefit from *The Little Schemer*. If you are comfortable with recursion, but not functional programming, good introductions include *Scheme and the Art of Programming*[3] and the classic *Structure and Interpretation of Computer Programs*[4].

If you are an experienced functional programmer, but do not know Scheme, the beginning of *Structure and Interpretation of Computer Programs* should get you up to speed, while *The Scheme Programming Language, 4th Edition*[5] describes the language in detail.

[1] D. P. Friedman, W. E. Byrd, and O. Kiselyov. *The Reasoned Schemer*. MIT Press, Cambridge, MA, 2005

[2] D. P. Friedman and M. Felleisen. *The Little Schemer (4th ed.)*. MIT Press, Cambridge, MA, 1996

[3] G. Springer and D. P. Friedman. *Scheme and the Art of Programming*. MIT Press, Cambridge, MA, 1989

[4] H. Abelson and G. J. Sussman. *Structure and Interpretation of Computer Programs*. MIT Press, Cambridge, MA, 2nd edition, 1996
(full text at `http://mitpress.mit.edu/sicp/full-text/book/book.html`)

[5] R. K. Dybvig. *The Scheme Programming Language, 4th Edition*. The MIT Press, 4th edition, 2009
(full text at `http://www.scheme.com/tspl4/`)

Goals

Margin Notes

This book is typeset using the "Tufte-Style Book" LaTeX style, based on Edward Tufte's magnificent *The Visual Display of Quantitative Information*[6]. A distinguishing feature of Tufte's writing is his heavy use of margin notes. Like Tufte I love margin notes, which is why I chose this LaTeX style. Margin notes also help solve the problem of addressing readers with widely varying knowledge of computer science and

Tufte-Style Book is freely available from `http://www.LaTeXTemplates.com`.

[6] E. R. Tufte. *The visual display of quantitative information*. Graphics Press, Cheshire, CT, 1986
True marginalia afficianados should grab a continuation, then immediately read David Foster Wallace's "Host", in:
D. F. Wallace. *Consider the Lobster and Other Essays*. Little, Brown and Co., 2005

programming. To make the book accessible to a wide audience, in the main text I assume the reader is the hypothetical *intermediate-level* programmer or student described in the *Audience* section above. In the margin notes, however, anything goes. Many margin notes will be aimed at all readers, but some will assume specialized knowledge of theoretical computer science, programming languages, or programming idioms. If you find a margin note assumes knowledge you do not have, please ignore the note and read on!

More David Foster Wallace marginilia pr0n: http://www.hrc.utexas.edu/press/releases/2010/dfw/books/

William E. Byrd
Salt Lake City, Utah
June 2013

Introduction

gl hf!

(Traditional greeting in the Koprulu Sector)

Conclusion

G.G.

—Sean “Day[9]” Plott

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D. F. Wallace. *Consider the Lobster and Other Essays*. Little, Brown and Co., 2005.