

G53IDS - Final Report

Embedded Domain Specific Language for
Describing Recipes in Haskell

James Burton - 4251529 - psyjb6

March 28, 2018

Contents

1	Abstract and Acknowledgements	4
2	Introduction and Motivation	6
2.1	Overview	6
2.2	Cooking with Computers	6
2.3	DSLs and Haskell	6
2.4	Deep and Shallow Embedding	6
3	Development Process	6
3.1	Project Management	6
4	Combinators	6
4.1	Initial Definitions	6
4.2	Sequencing Problem	6
4.3	Conditionals	6
4.4	Transactions	6
4.5	Moving to a Tree of Actions	6
4.6	Final Definitions	6
4.7	Custom Combinators	6
5	Deriving Equality	6
5.1	Topological Sorting	6
5.2	Quickspec	6
6	Modelling a Kitchen	6
6.1	Stations	6
6.2	Scheduling	6
6.2.1	Linear Programming	6
6.2.2	Implementing Scheduler	6
7	Recipe Properties	6
7.1	Folding Over Recipes	6
7.2	Time and Cost	6
7.3	Flavours	6
7.4	Generating New Recipes	6
8	Evaluation and Testing	6
8.1	Test Recipes	6
8.2	QuickCheck	6

9	Summary and Reflections	6
9.1	Project Management	6
9.2	Contributions	6
9.3	Reflections	6
10	Related Work	6
10.1	Pretty Printing	6
10.2	Financial Contracts	6
10.3	Ivory and Ion	6

1 Abstract and Acknowledgements

2 Introduction and Motivation

2.1 Overview

2.2 Cooking with Computers

2.3 DSLs and Haskell

2.4 Deep and Shallow Embedding

3 Development Process

3.1 Project Management

4 Combinators

4.1 Initial Definitions

4.2 Sequencing Problem

4.3 Conditionals

4.4 Transactions

4.5 Moving to a Tree of Actions

4.6 Final Definitions

4.7 Custom Combinators

5 Deriving Equality

5.1 Topological Sorting

5.2 Quickspec

6 Modelling a Kitchen

6.1 Stations

6.2 Scheduling

6.2.1 Linear Programming

6.2.2 Implementing Scheduler

7 Recipe Properties

7.1 Folding Over Recipes

7.2 Time and Cost

7.3 Flavours

7.4 Generating New Recipes

8 Evaluation and Testing

References

- [1] The Guardian. 2015. *Future of food: how we cook*. <https://www.theguardian.com/technology/2015/sep/13/future-of-food-how-we-cook>
- [2] Paul Hudak. Domain Specific Languages. Department of Computer Science, Yale University, December 15, 1997.
- [3] Michael Snoynman. O'Reilly Webcast: Designing Domain Specific Languages with Haskell. January 4, 2013. https://www.youtube.com/watch?v=8k_SU1t50M8
- [4] Simon Peyton Jones, Microsoft Research, Cambridge. Jean-Marc Eber, LexiFi Technologies, Paris. Julian Seward, University of Glasgow. Composing contracts: an adventure in financial engineering. August 17, 2000.
- [5] John Hughes. The Design of a Pretty-printing Library. Chalmers Teniska Hogskola, Goteborg, Sweden. 1995.
- [6] Simon Peyton Jones, Microsoft Research, Cambridge. Jean-Marc Eber, LexiFi Technologies, Paris. Julian Seward, University of Glasgow. Composing contracts: an adventure in financial engineering (PowerPoint Slides). August 17, 2000. <https://www.microsoft.com/en-us/research/publication/composing-contracts-an-adventure-in-financial-engineering/>
- [7] Simon Peyton Jones. Into the Core - Squeezing Haskell into Nine Constructors. September 14, 2016. https://www.youtube.com/watch?v=uR_VzYxvbxg
- [8] Graham Hutton. Fold and Unfold for Program Semantics. Department of Computer Science, University of Nottingham. September 1998.