Engineering Adaptive Software Systems

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Preface

The first Shonan Meeting on Engineering Adaptive Systems (EASy) [1], which was held in 2012, generated heated discussions on the problems and challenges about self-managing systems. Participants from multiple disciplinaries reached the consent that EASy has by no means an easy solution in software engineering alone, not to mention many other challenges in general system engineering.

The organisers of the following Shonan meetings [2, 3] decided to focus on the problems and solutions that can help engineer adaptive software, hence a change of the focus to Engineering Adaptive Software Systems (EASSy). The technical reports above have gathered from abstracts of all individual participants; however, there has not yet been a full report on the crux of interesting viewpoints, which could collaboratively pave the way to solve some aspects of the long-standing research problems.

This book is a collection of materialised reflections by some of our active participants present in much greater details, which we hope can fuel a tank of thoughts for engineering the next-generation adaptive software systems.

The chapters included in the book have a good coverage of the area, ranging from design and engineering principles (Chap. 1) to control-theoretic solutions (Chap. 2) and bidirectional transformations (Chap. 3), which can be seen as promising ways to implement the functional requirements of self-adaptive systems. Important quality requirements are also dealt with by these approaches: parallel adaptation for performance (Chap. 4), self-adaptive authorization infrastructure for security (Chap. 5), and self-adaptive risk assessment for self-protection (Chap. 6). Finally, Chap. 7 provides a concrete self-adaptive robotics operating system as a testbed for self-adaptive systems.

Although by no means a complete coverage of all possible research topics, these chapters can be seen as concrete research agenda's proposed by experts in these areas.

In a nutshell, we hope the book will initiate promising progresses in this interdisciplinary research field.

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Contents

1 Design and Engineering of Adaptive Software Systems 1
Soichiro Hidaka, Zhenjiang Hu, Marin Litoiu, Lin Liu, Patrick Martin, Xin Peng, Guiling Wang, and Yijun Yu

2 Self-Adaptation of Software Using Automatically Generated Control-Theoretical Solutions 35
Stepan Shevtsov, Danny Weyns, and Martina Maggio

3 Challenges in Engineering Self-Adaptive Authorisation Infrastructures 57
Lionel Montrieux, Rogério de Lemos, and Chris Bailey

4 Bidirectional Transformations for Self-Adaptive Systems 95
Lionel Montrieux, Naoyasu Ubayashi, Tianqi Zhao, Zhi Jin, and Zhenjiang Hu

5 Parallel Adaptation of Multiple Service Composition Instances 115
Rafael Roque Aschoff, Andrea Zisman, and Pedro Alexandre

6 Assessing Security and Privacy Behavioural Risks for Self-Protection Systems 135
Yijun Yu, Yoshioka Nobukazu, and Tetsuo Tamai

7 Experimenting with Adaptation in Smart Cyber-Physical Systems: A Model Problem and Testbed 149
Vladimir Matena, Tomas Bures, Ilias Gerostathopoulos, and Petr Hnetynka