Amendments to the Dissertation "Analysis and Coordination of Mixed-criticality Cyber-physical Systems"

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1 Introduction

This document provides written guidance of how and where I have implemented the required amendments. This is done in Section 2. Further, in Section 3 I provide a complete list of implemented changes where also issues are covered that were briefly touched during the Viva but not mentioned in the list of amendments.

2 Required and Suggested Amendments

In this section I refer to the official list of amendments that were provided to me in written form.

2.1 Clear Statement of the Thesis

I changed the name of Section 1.1 from "Research Questions" to "Thesis and Research Questions" and added the thesis: *It is possible to bridge the gap between stream processing and Labelled Transition Systems (LTSs) for complex components.*
Further I introduced a new paragraph in the introduction hinting at the thesis (last paragraph on page 2).
Finally, I extended the section "Contributions" with the image I showed during the viva and a description of the image.

2.2 Abstract

In the abstract I now put the focus on bridging the gap between LTS and stream processing to highlight the novelty of the work. Further, I highlight that the work spans from theory of a coordination model to the instantiation of the model as a coordination language.

2.3 Claims to Novelty

First, I extended the list in Section 1.2 of the dissertation to cover all major contributions and novelties of my work. Second, when talking about PNSCs and SIAs I put more focus on SIAs, which is the novelty of the model and on the extensions described in Chapter 4. Third, I explicitly point out the novelty of a concept when it is first introduced (e.g. semi-state message semantics).

2.4 Typographical Slips

I fixed spelling mistakes, consistency problems (hyphen, no hyphen), punctuation issues, subscripts of equations, and captions of figures.

2.5 Lengthy Formal Definitions

In order to make the formulas in Chapter 6 of the dissertation more accessible I added a brief informal description to each line. Further I added a short description of the main features of Figures 6.8, 6.9, 6.10, and 6.14.

2.6 Brief Description of Other Case Studies

In Chapter 7 of the dissertation, I added a list of all simple examples that are available on GitHub and added a brief description for each of them. I also provided a short documentation on how to compile and run the examples.

3 Changelog

This sections provides an extensive changelog, listing the changes made to the dissertation after the examination of the 11th of January 2018.

- All Chapters
  - Fix typos, presentation, and figure captions throughout the dissertation
  - Improve the readability by addressing smaller issues that surfaced during the examination
- Abstract
  - Change the focus to better address contributions and innovations
- Chapter 1
  - Put the focus on SIAs rather than PNSCs
- Section 1.1
  - Change the title to “Thesis and Research Questions”

  - Add a clear statement of the thesis

- Section 1.2
  - Add the figure from examination slides and a description of the figure
  - Extend the list of contributions and made claim for new concepts

- Subsection 1.2.1
  - Chang the title to "Publications"

- Section 2.2
  - Hint at differences between Interface Automata and Synchronous Interface Automata

- Section 2.3
  - Move the deadlock and lonely blocker definitions from Chapter 5 to Section 2.3
  - Add a crossroad example of a lonely blocker

- Chapter 3
  - Change the title to "PNSC with SIA - An Analysable Event-based Component Model"
  - Change the section structure and order to first group formal definitions and then provide examples

- Section 3.1
  - Fix the formula subscripts in Definition 3.1
  - Change non-conflicting port condition to hold for n processes
  - Change "abstract process" to "composed process"
  - Add an example of a composed process

- Section 3.2
  - Make the relation between a SIA and a PNSC process more explicit in definition 3.3
  - Make clear that multiple state transitions can use the same action
  - Mention that hidden actions do not require determinism

- Subsection 3.2.3
  - Make the relation between SIAs and PNSC processes more verbose

- Section 4.1

  - Improve wording to make the difference between different coupling mechanisms clear

- Subsection 4.1.2
  - Improve wording to make clear that decoupling inside a process is undesirable
  - Fix the states of Figure 4.3 (need to be pairs)
  - Fix the caption of Figure 4.3 (was the same as Fig 4.1)
  - Add a forward reference to message types (loss and duplication of messages is tolerable in some cases)
  - Remove the name "smart" FIFO
- Subsection 4.2.2
  - Improve the definition of the PBRT protocol
- Subsection 4.4.1
  - Highlight the process of higher criticality in Figure 4.13
- Section 4.6
  - Discuss the possible number of criticality levels
- Chapter 5
  - Improve the section structure throughout this chapter:
    * Discuss permanent blocking analysis on 2 processes then extend to n processes
    * Discuss deadlock analysis on 2 processes then extend to n processes
    * Describe specific aspects of the algorithms
  - Include more explicit talk about exponential growth of state space
- Chapter 6
  - Add informal descriptions of the lengthy formulas
- Subsubsection 6.2.2.1
  - Fix the FIFO length definition
- Subsection 6.3.1
  - Explain the choice of the names "left" and "right" for port collections
- Chapter 7
  - Add a list of examples that are provided on GitHub
  - Make function names consistent with code on GitHub
  - Change "model checker" to "permanent blocking analysis"