1 Preface

One of the main research objectives of computer science is the development of formal methods for the design and implementation of programming languages. This research area has witnessed a proliferation of concepts, models and methods. However, the problem of the relative expressive power of the various programming concepts has rarely been addressed systematically.

A systematic study and a formal comparison is even more needed in the case of formalisms for programming or specifying parallel and distributed systems. This study is indispensable for classifying the different programming languages and for providing a formal basis for design principles and implementation techniques of concurrent and/or distributed programming languages.

The main aim of the seminar, organized within the program of the HCM-network EXPRESS, was a better understanding of the interconnections and relations between programming concepts, constructs, models and logics for concurrent specification and implementation languages. The final objective of the project is the definition of a general framework for the comparison of the formal methods for specification and verification developed within the various programming paradigms, in particular with a focus on process algebras. The seminar gave the possibility to compare results of the project with related approaches.

The different talks and the lively discussion offered the occasion for comparing specification and verification methods, developed various programming paradigms, and threw light on:

• the primitives for communication (synchronous vs asynchronous) and nondeterministic choice (internal vs external);
• the different stress on causal and temporal dependencies offered by the various semantic models (process algebras, Petri nets, modal logics, rewrite systems),
• the relative merits of the different approaches to concurrent systems semantics (algebraic, axiomatic, operational, denotational).

The program of the seminar was intense and stimulating; it comprised 30 talks, the abstracts of which are recorded in this report in alphabetical order.

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Ursula Goltz
Frits Vaandrager

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2 Workshop Programme

Monday 16

Morning Session - Chair: Ursula Goltz

9.00 Luca Aceto: A Menagerie of Non-finitely based Semantic over BPA*
9.40 Joachim Parrow: Trios in Concert
10.30 COFFEE BREAK
10.50 Maciej Koutny: Two Semantics for the Box Algebra
11.30 Walter Vogler: Efficiency of Asynchronous Systems and Expressivity of Read Arcs in Petri Nets
12.15 LUNCH BREAK

Afternoon Session - Chair: Frits Vaandrager

14.00 David Janin: On the Expressive Completeness of the Modal Mu-Calculus wrt. Monadic Second Order Logic
14.40 Alexander Rabinovich: On Translations of Temporal Logic of Actions into Monadic Second Order Logic
15.20 COFFEE and CAKE BREAK
16.10 Rom Langerak: Causal Ambiguity and Partial Orders
16.50 Julia Padberg: Rule-Based Refinement of Petri Nets

Tuesday 17

Morning Session - Chair: Rocco De Nicola

9.00 Ilaria Castellani: On Bisimulations for the Asynchronous ß-calculus
9.40 Uwe Nestmann: Choice Encodings
10.30 COFFEE BREAK
10.50 Michele Boreale: On the Expressiveness of Internal Mobility in Name Passing Calculi
11.30 Catuscia Palamidessi: Comparing the Expressive Power of the Synchronous and the Asynchronous ß-calculus
12.15 LUNCH BREAK

Afternoon Session - Chair: Walter Vogler

14.00 Michael Siegel: A Proof System for Stabilizing Systems
14.40 Arend Rensink: Action Refinement as an Implementation Relation
15.20 COFFEE and CAKE BREAK
16.10 Mads Dam: Modelling security and authentication protocols as higher order processes
Wednesday 18

Morning Session - Chair: Rob van Glabbeek

9.00 Mogens Nielsen: Behavioural Equivalence for Infinite Systems - Partially Decidable!
9.40 Anna Labella: Models of Nondeterministic Regular Expressions
10.30 COFFEE BREAK
10.50 Eike Best: CCP, NETS and COMPOSETS
11.30 Eric Badouel: Splitting of Actions, Higher-Dimensional Automata, and Net Synthesis
12.15 LUNCH BREAK

EXCURSION

Thursday 19

Morning Session - Chair: Ed Brinksma

9.00 Jan Willem Klop: Rewriting in Concurrency
9.40 Rocco De Nicola: Testing Processes via Basic Observables
10.30 COFFEE BREAK
10.50 Frits Vaandrager: Minimizable Timed Automata
11.30 Ursula Goltz: Causal Testing and Action Dependencies
12.15 LUNCH BREAK

Afternoon Session - Chair: Jan Willem Klop

14.00 Rob van Glabbeek: On the Expressiveness of ACP
14.40 Gianna Reggio: Labelled Transition Logic and Rewriting Logic
15.20 COFFEE and CAKE BREAK
16.10 Alban Ponse: Grid Protocols based on Synchronous Communication
16.50 EXPRESS Meeting
Friday 20

Morning Session - Chair: Mogens Nielsen

9.00 Ed Brinksma: The Use of Contexts in Formal Design
9.40 Michaela Huhn: Action Refinement and Property Inheritance in Systems of Sequential Agents
10.10 COFFEE BREAK
10.30 Wojciech Penczek: Partial Order Temporal Logics
11.10 Peter Niebert: Branching Time Properties and Partial Order Reductions
12.15 LUNCH

END