

CONTENTS

Preface	v
1. Böhm's Theorem	1
<i>Stefano Guerrini, Adolfo Piperno and Mariangiola Dezani-Ciancaglini</i>	
1. Introduction	1
2. Böhm's Theorem for Trees	4
3. Böhm's Theorem for λ -Calculus	8
4. Follow-Up to Böhm's Theorem	10
4.1. Böhm's work on Böhm's theorem	10
4.2. Generalizations of Böhm's theorem	10
4.3. Theories and models of λ -calculus	11
4.4. Böhm trees and Böhm-out-technique	11
4.5. Observational equivalence	12
2. Membrane Computing: History and Brief Introduction	17
<i>Gheorghe Păun</i>	
1. Personal Views on the History of Membrane Computing	18
1.1. The pre-history	18
1.2. The first years	21
1.3. The recent years	24
1.4. The next years	27
2. Elements of Membrane Computing	28
2.1. The three main classes of P systems	28
2.2. Cell-like P systems: An informal presentation . .	29
2.3. Basic ingredients of P systems	31

2.4.	A large number of variants	34
2.5.	Computational completeness	36
2.6.	Computational efficiency	37
2.7.	Applications	39
3.	Critique of Computational Reason in the Natural Sciences	43
	<i>Giuseppe Longo</i>	
1.	From the Alphabet to the Machine	43
2.	The Elementary and the Complex	46
3.	Imitations and Models	48
3.1.	Models, processes, and unpredictability	53
4.	Calculus, Physics, and Living Phenomena	58
5.	But... Natural Processes Compute?	61
6.	Mnemonic Interlude	65
7.	Conclusion: A Question of Principles	67
4.	Deterministic Computation with Random G-Networks	71
	<i>Erol Gelenbe, Zhi-Hong Mao and Yanda Li</i>	
1.	Introduction	71
2.	The GNN and Its Extensions	73
2.1.	Stationary or steady-state solution	75
2.2.	The bipolar GNN or BGNN	76
3.	Approximation of Functions of One Variable by the GNN with a Bounded Number of Layers	77
3.1.	Technical premises	78
3.2.	BGNN approximation of continuous functions of one variable	81
3.3.	CGNN approximation of continuous functions of one variable	84
4.	Approximation of Continuous Functions of s Variables	87
5.	Conclusions	91
5.	Assertions: A Personal Perspective	97
	<i>Tony Hoare</i>	
1.	Experience in Industry, 1960–1968	97
2.	Research in Belfast, 1968–1977	102

3.	Move to Oxford, 1977–1999	106
4.	Back in Industry, 1999	111
6.	The Call To ARMs	117
	<i>Steve Furber</i>	
1.	Acorn Computer Ltd	117
2.	The BBC Micro	119
3.	Why Design a Microprocessor?	120
4.	The ARM Design Process	122
5.	The Formation of ARM Ltd	125
6.	A 20-year Perspective	126
7.	Carl Adam Petri and “Petri Nets”	129
	<i>Wilfried Brauer and Wolfgang Reisig</i>	
1.	Introduction	129
2.	The Dissertation	130
3.	Carl Adam Petri, The Man	133
4.	The Years Until 1980	135
5.	The Years Since 1980	136
6.	Honors	137
7.	What Will the Future Bring?	138
8.	From Stochastic Modeling to Operational Analysis: The Journey Begins	141
	<i>Jeffrey P. Buzen</i>	
1.	Stochastic Processes and the Central Server Model	141
2.	Early Concerns About Stochastic Modeling	143
3.	Impact of Empirical Success	144
4.	Lectures at Serre Chevalier and Bologna	145
5.	Emergence of Operational Analysis	146
9.	From Rocket Control to Virtual Design	151
	<i>Olivier Pironneau</i>	
1.	Computational Fluid Dynamics	151
2.	Open Problems	154
3.	Computational Fluid Dynamics and Computer Science	156