

Contents

<i>Foreword by Tony Hoare</i>	page ix
<i>Foreword by Robin Milner</i>	x
<i>Foreword by Jan Bergstra</i>	xi
<i>Preface</i>	xiii
1 Process algebra	1
1.1 Definition	1
1.2 Calculation	3
1.3 History	4
2 Preliminaries	11
2.1 Introduction	11
2.2 Equational theories	11
2.3 Algebras	21
2.4 Term rewriting systems	30
2.5 Bibliographical remarks	34
3 Transition systems	35
3.1 Transition-system spaces	35
3.2 Structural operational semantics	47
3.3 Bibliographical remarks	64
4 Basic process theory	67
4.1 Introduction	67
4.2 The process theory MPT	68
4.3 The term model	72
4.4 The empty process	81
4.5 Projection	92
4.6 Prefix iteration	102
4.7 Bibliographical remarks	107
5 Recursion	109
5.1 Introduction	109

5.2	Recursive specifications	110
5.3	Solutions of recursive specifications	113
5.4	The term model	119
5.5	Recursion principles	124
5.6	Describing a stack	146
5.7	Expressiveness and definability	148
5.8	Regular processes	154
5.9	Recursion and $\text{BSP}^*(A)$	157
5.10	The projective limit model	159
5.11	Bibliographical remarks	168
6	Sequential processes	171
6.1	Sequential composition	171
6.2	The process theory TSP	171
6.3	The term model	174
6.4	Projection in $\text{TSP}(A)$	177
6.5	Iteration	178
6.6	Recursion	182
6.7	Renaming, encapsulation, and skip operators	189
6.8	Bibliographical remarks	194
7	Parallel and communicating processes	195
7.1	Interleaving	195
7.2	An operational view	196
7.3	Standard communication	199
7.4	The process theory BCP	201
7.5	The term model	216
7.6	Recursion, buffers, and bags	218
7.7	The process theory TCP and further extensions	227
7.8	Specifying the Alternating-Bit Protocol	235
7.9	Bibliographical remarks	242
8	Abstraction	245
8.1	Introduction	245
8.2	Transition systems with silent steps	246
8.3	BSP with silent steps	256
8.4	The term model	258
8.5	Some extensions of $\text{BSP}_\tau(A)$	267
8.6	TCP with silent steps	276
8.7	Iteration and divergence	280
8.8	Recursion and fair abstraction	284
8.9	Verification of the ABP and queues revisited	295
8.10	Bibliographical remarks	298

9 Timing	301
9.1 Introduction	301
9.2 Timed transition systems	304
9.3 Discrete time, relative time	307
9.4 The term model	309
9.5 Time iteration and delayable actions	312
9.6 The relation between $\text{BSP}(A)$ and $\text{BSP}^{\text{drt}^*}(A)$	317
9.7 The process theory $\text{TCP}^{\text{drt}^*}(A, \gamma)$	319
9.8 Fischer's protocol	327
9.9 Bibliographical remarks	333
10 Data and states	335
10.1 Introduction	335
10.2 Guarded commands	336
10.3 The inaccessible process	345
10.4 Propositional signals	348
10.5 State operators	362
10.6 Choice quantification	366
10.7 Bibliographical remarks	374
11 Features	375
11.1 Priorities	375
11.2 Probabilities	381
11.3 Mobility	387
11.4 Parallel composition revisited	389
11.5 Bibliographical remarks	391
12 Semantics	393
12.1 Bisimilarity and trace semantics	393
12.2 Failures and readiness semantics	397
12.3 The linear time – branching time lattice	401
12.4 Partial-order semantics	407
12.5 Bibliographical remarks	410
<i>Bibliography</i>	411
<i>Index of Symbols and Notations</i>	421
<i>Index of Authors</i>	435
<i>Index of Subjects</i>	439