

REFERENCES

- 1 J.Adámek, H.Herrlich and G.Strecker, *Abstract and Concrete Categories*, John Wiley & Sons 1990.
- 2 R.Allen and D.Garlan, "A Formal Basis for Architectural Connectors", *ACM TOSEM* 6(3), 1997, 213-249.
- 3 F.Arbab, "What Do You Mean, Coordination?", in *Bulletin of the Dutch Association for Theoretical Computer Science (NVTI)*, March 1998, (available at www.cwi.nl/pub/manifold/NVTIpaper.ps.Z).
- 4 M.Arbib and E.Manes, *Arrows, Structures and Functors: The Categorical Imperative*, Academic Press 1975.
- 5 M.Arrais and J.Fiadeiro, "Unifying Theories in Different Institutions", in M.Haverlaen, O.Owe and O-J.Dahl (eds), *Recent Trends in Data Type Specification*, LNCS 1130, Springer-Verlag 1996, 81-101.
- 6 A.Asperti and G.Longo, *Categories, Types and Structures: An Introduction to Category Theory for the Working Computer Scientist*, MIT Press 1991.
- 7 E.Astesiano, M.Broy and G.Reggio. "Algebraic Specification of Concurrent Systems", in [8].
- 8 E.Astesiano, B.Krieg-Bruckner and H.-J.Kreowski (eds) *IFIP WG 1.3 Book on Algebraic Foundations of System Specification*, Springer Verlag, 1999.
- 9 R.J.Back, "Refinement calculus II: Parallel and reactive programs", in J.deBakker, W.deRoever and G.Rozenberg (eds), *Stepwise Refinement of Distributed Systems*, LNCS 430, Springer-Verlag 1990, 67-93.
- 10 R.J.Back and K.Sere, "Superposition Refinement of Reactive Systems", *Formal Aspects of Computing*, 8(3):324-346, 1996.
- 11 J.P.Banâtre and D.Le Métayer, "Programming by Multiset Transformation", *Communications ACM* 16(1), 1993, 55-77.
- 12 M.Barr and C.Wells, *Category Theory for Computing Science*, Prentice-Hall International Series in Computer Science 1990.
- 13 H.Barringer, "The Use of Temporal Logic in the Compositional Specification of Concurrent Systems", in A.Galton (ed) *Temporal Logics and their Applications*, Academic Press 1987.

- 14 L.Bass, P.Clements and R.Kasman, *Software Architecture in Practice*, Addison-Wesley 1998.
- 15 M.Bednarczyk, *Categories of Asynchronous Transition Systems*, PhD Thesis, University of Sussex, 1988.
- 16 G.Berry and G.Boudol, "The Chemical Abstract Machine", *Theoretical Computer Science* 96, 1992, 217-248.
- 17 R.Burstall and J.Goguen, "Putting Theories together to make Specifications", in R.Reddy (ed) *Proc. Fifth International Joint Conference on Artificial Intelligence*, 1977, 1045-1058.
- 18 R.Burstall and J.Goguen, "The Semantics of CLEAR, a Specification Language", in *Proc. Advanced Course on Abstract Software Specification*, LNCS 86, Springer-Verlag 1980, 292-332.
- 19 K.Chandy and J.Misra, *Parallel Program Design - A Foundation*, Addison-Wesley 1988.
- 20 J.F.Costa, A.Sernadas and C.Sernadas, "Data Encapsulation and Modularity: Three Views of Inheritance", in A.Borzyszkowski and S.Sokolowski (eds), *Mathematical Foundations of Computer Science '93*, LNCS 711, Springer-Verlag 1993, 382-391.
- 21 J.F.Costa, A.Sernadas, C.Sernadas and H.-D.Ehrich, "Object Interaction", in *Mathematical Foundations of Computer Science*, LNCS 629, Springer-Verlag 1992, 200-208.
- 22 R.Crole, *Categories for Types*, Cambridge Mathematical Textbooks, Cambridge University Press 1993.
- 23 E.Dijkstra, *A Discipline of Programming*, Prentice-Hall International 1976.
- 24 H.-D.Ehrich, J.Goguen and A.Sernadas, "A Categorical Theory of Objects as Observed Processes", in J.deBakker, W.deRoeve and G.Rozenberg (eds) *Foundations of Object-Oriented Languages*, LNCS 489, Springer Verlag 1991, 203-228.
- 25 H.-D.Ehrich, A.Sernadas and C.Sernadas, "Objects, Object Types and Object Identity", in H.Ehrig *et al* (eds) *Categorical Methods in Computer Science with Aspects from Topology*, LNCS 393, Springer-Verlag 1989, 142-156.
- 26 H.Ehrig, M.Große-Rhode and U.Wolter, "Applications of category theory to the area of algebraic specification in computer science", *Applied Categorical Structures* 6, 1998, 1-35.
- 27 H.Ehrig, K.-D.Kiermeier, H.-J.Kreowski and W.Kuhnel, *Universal Theory of Automata: A Categorical Approach*, B.G.Teubner, Stuttgart 1974.
- 28 H.Ehrig and B.Mahr, *Fundamentals of Algebraic Specification 1: Equations and Initial Semantics*, volume 6 of EATCS Monographs on Theoretical Computer Science, Springer-Verlag 1985.

- 29 H.Ehrig and B.Mahr, *Fundamentals of Algebraic Specification 2: Module Specifications and Constraints*, volume 21 of EATCS Monographs on Theoretical Computer Science, Springer-Verlag 1990.
- 30 E.Emerson and E.Clarke, "Using Branching Time Logic to Synthesize Synchronisation Skeletons", *Science of Computer Programming* 2, 1982, 241-266.
- 31 J.Fiadeiro, "On the Emergence of Properties in Component-Based Systems", in M.Wirsing and M.Nivat (eds) *Proc. International Conference on Algebraic Methodology and Software Technology (AMAST'96)*, LNCS 1101, Springer-Verlag 1996, 421-443.
- 32 J.Fiadeiro and J.F.Costa, "Mirror, Mirror in My Hand: a duality between specifications and models of process behaviour", *Mathematical Structures in Computer Science* 6, 1996, 353-373.
- 33 J.Fiadeiro and J.F.Costa, "Institutions for Behaviour Specification", in E.Astesiano, G.Reggio and A.Tarlecki (eds) *Recent Trends in Data Type Specification*, LNCS 906, Springer-Verlag 1995, 273-289.
- 34 J.Fiadeiro and A.Lopes, "Semantics of Architectural Connectors", in M.Bidoit and M.Dauchet (eds) *Proc. TAPSOFT'97*, LNCS 1214, Springer-Verlag 1997, 505-519.
- 35 J.Fiadeiro and A.Lopes, "Algebraic Semantics of Coordination, or what is in a signature?", in A.Haeberer (ed) *Proc. International Conference on Algebraic Methodology and Software Technology (AMAST'98)*, Springer-Verlag 1999.
- 36 J.Fiadeiro, A.Lopes and T.Maibaum, "Synthesising Interconnections", in R.Bird and L.Meertens (eds) *Algorithmic Languages and Calculi*, Chapman Hall 1997, 240-264.
- 37 J.Fiadeiro, A.Lopes and M.Wermelinger, "A Mathematical Semantics for Architectural Connectors", in R.Backhouse and J.Gibbons (eds) *Generic Programming*, LNCS 2793, Springer-Verlag 2003, 90-234.
- 38 J.Fiadeiro and T.Maibaum, "Describing, Structuring, and Implementing Objects", in J.deBakker, W.deRoeveer and G.Rozenberg (eds) *Foundations of Object-Oriented Languages*, LNCS 489, Springer-Verlag 1991, 274-310.
- 39 J.Fiadeiro and T.Maibaum, "Temporal Theories as Modularisation Units for Concurrent System Specification", *Formal Aspects of Computing* 4(3), 1992, 239-272.
- 40 J.Fiadeiro and T.Maibaum, "Verifying for Reuse: Foundations of Object-Oriented System Verification", in C.Hankin, I.Makie and R.Nagarajan (eds) *Theory and Formal Methods 1994*, World Scientific Publishing Company 1995, 235-257.
- 41 J.Fiadeiro and T.Maibaum, "Interconnecting Formalisms: supporting modularity, reuse and incrementality", in G.E.Kaiser (ed) *Proc. 3rd Symposium on Foundations of Software Engineering*, ACM Press 1995, 72-80.
- 42 J.Fiadeiro and T.Maibaum, "A Mathematical Toolbox for the Software Architect", in *Proc. 8th International Workshop on Software Specification and Design*, IEEE Computer Society Press 1996, 46-55.

- 43 J.Fiadeiro and T.Maibaum, "Design Structures for Object-Based Systems", in S.Goldsack and S.Kent (eds) *Formal Methods and Object Technology*, Springer-Verlag 1996, 183-204.
- 44 J.Fiadeiro and T.Maibaum, "Categorical Semantics of Parallel Program Design", *Science of Computer Programming* 28(2-3), 1997, 111-138.
- 45 J.Fiadeiro and A.Sernadas, "Structuring Theories on Consequence", in D.Sannella and A.Tarlecki (eds) *Recent Trends in Data Type Specification*, LNCS 332, Springer-Verlag 1988, 44-72.
- 46 P.Finger, "Componend-Based Frameworks for E-Commerce", *Communications of the ACM* 43(10), 2000, 61-66.
- 47 N.Francez and I.Forman, *Interacting Processes*, Addison-Wesley 1996.
- 48 P.Freyd and A.Scedrov, *Categories, Allegories*, North-Holland Mathematical Library, vol 39, North-Holland 1990.
- 49 D.Garlan and D.Perry, "Software Architecture: Practice, Potential, and Pitfalls", in *Proc. 16th ICSE*, 1994, 363-364.
- 50 D.Gelernter and N.Carriero, "Coordination Languages and their Significance", *Communications ACM* 35(2), 1992, 97-107.
- 51 J.Goguen, "Mathematical Representation of Hierarchically Organised Systems", in E.Attinger (ed) *Global Systems Dynamics*, Krüger 1971, 112-128.
- 52 J.Goguen, "Categorical Foundations for General Systems Theory", in F.Pichler and R.Trapp (eds) *Advances in Cybernetics and Systems Research*, Transcripta Books 1973, 121-130.
- 53 J.Goguen, "Objects", *International Journal of General Systems* 1(4), 1975, 237-243.
- 54 J.Goguen, "Reusing and Interconnecting Software Components", *IEEE Computer* 19(2), 1986, 16-28.
- 55 J.Goguen, "Principles of Parametrised Programming", in Biggerstaff and Perlis (eds) *Software Reusability*, Addison-Wesley 1989, 159-225.
- 56 J.Goguen, "A Categorical Manifesto", *Mathematical Structures in Computer Science* 1(1), 1991, 49-67.
- 57 J.Goguen, "Sheaf Semantics of Concurrent Interacting Objects", *Mathematical Structures in Computer Science* 1(2), 1991, 159-191.
- 58 J.Goguen, "Parametrised Programming and Software Architecture", in *Symposium on Software Reusability*, IEEE 1996.
- 59 J.Goguen and R.Burstall, "Some fundamental algebraic tools for the semantics of computation, part 1: Comma categories, colimits, signatures and theories", *Theoretical Computer Science* 31(2), 1984, 175-209.

- 60 J.Goguen and R.Burstall, "Some fundamental algebraic tools for the semantics of computation, part 2: Signed and abstract theories", *Theoretical Computer Science* 31(3), 1984, 263-295.
- 61 J.Goguen and R.Burstall, "Institutions: Abstract Model Theory for Specification and Programming", *Journal of the ACM* 39(1), 1992, 95-146.
- 62 J.Goguen and R.Burstall, "A Study in the Foundations of Programming Methodology: Specifications, Institutions, Charters and Parchments", in D.Pitt et al (eds) *Category Theory and Computer Programming*, LNCS 240, Springer-Verlag 1986, 313-333.
- 63 J.Goguen and S.Ginali, "A Categorical Approach to General Systems Theory", in G.Klir (ed) *Applied General Systems Research*, Plenum 1978, 257-270.
- 64 J.Goguen, J.Thatcher and E.Wagner, "An initial algebra approach to the specification, correctness and implementation of abstract data types", in R.Yeh (ed) *Current Trends in Programming Methodology IV*, Prentice Hall 1978, 80-149.
- 65 J.Goguen, J.Thatcher E.Wagner and J.Wright, *A junction between computer science and category theory, I: Basic concepts and examples*, Technical report, IBM Watson Research Center, Yorktown Heights NY, 1973. Report RC 4526 (part 1) and 5908 (part 2).
- 66 R.Goldblatt, *Logics of Time and Computation*, CSLI 1987.
- 67 R.Goldblatt, *Topoi: The Categorical Analysis of Logic*, North-Holland 1989.
- 68 C.A.R.Hoare, *Communicating Sequential Processes*, Prentice-Hall International 1985.
- 69 B.Jacobs, \square *Categorical Logic and Type Theory*, Studies in Logic and the Foundations of Mathematics, Vol 141, Elsevier 2001.
- 70 S.Johnson, *Emergence: The connected lives of ants, brains, cities and software*, The Penguin Press 2001.
- 71 S.Katz, "A Superimposition Control Construct for Distributed Systems", *ACM TOPLAS* 15(2), 1993, 337-35.
- 72 W.Kent, "Participants and Performers: A Basis for Classifying Object Models", in *Proc. OOPSLA 1993 Workshop on Specification of Behavioral Semantics in Object-Oriented Information Modeling*, 1993.
- 73 J.Lambek and P.Scott, *Introduction to Higher-Order Categorical Logic*, Cambridge University Press 1986.
- 74 F.W.Lawvere and S.H.Schanuel, *Conceptual Mathematics – A first introduction to categories*, Cambridge University Press 1997.
- 75 J.Loeckx, H-D.Ehrich and M.Wolf, *Specification of Abstract Data Types*, Wiley 1996.
- 76 A.Lopes and J.L.Fiadeiro, "Using Explicit State to Describe Architectures", in E. Astesiano (ed), *FASE'99*, LNCS 1577, Springer-Verlag 1999, 144–160.

- 77 A.Lopes and J.L.Fiadeiro, "Superposition: Composition vs Refinement of Non-deterministic Action-based Systems", in *Formal Aspects of Computing*, in print (a preliminary version appeared in *Electronic Notes on Theoretical Computer Science* 70 (3), 2002).
- 78 A.Lopes, M.Wermelinger and J.L.Fiadeiro, "Higher-Order Architectural Connectors", in *ACM Transactions on Software Engineering Methodology*, January 2004
- 79 S.MacLane, *Categories for the Working Mathematician*, Springer-Verlag 1971.
- 80 J.Magee, J.Kramer and M.Sloman, "Constructing Distributed Systems in Conic", *IEEE TOSE* 15 (6), 1989.
- 81 T.Maibaum and M.Sadler, "Axiomatising Specification Theory", *Proc. 3rd Abstract Data Type Workshop*, Fachbereich Informatik 25, Springer Verlag 1984.
- 82 T.Maibaum and W.Turski, "On What Exactly Goes On When Software Is Developed Step by Step" *Proc. 7th Int. Conference on Software Engineering*, IEEE 1984, 528-533.
- 83 T.Maibaum, P.Veloso and M.Sadler, "A Theory of Abstract Data Types for Program Development: Bridging the Gap?" in *Formal Methods and Software Development*, LNCS 186, Springer-Verlag 1985.
- 84 T.Maibaum, P.Veloso and M.Sadler, "A Logical Approach to Specification", submitted for publication, Technical Report, Department of Computing, Imperial College 1990.
- 85 Z.Manna and P.Wolper, "Synthesis of Communicating Processes from Temporal Logic Specifications", in *ACM Transactions on Programming Languages and Systems* 6(1), 1984, 68-93.
- 86 N.Mehta, N.Medvidovic and S.Phadke, "Towards a taxonomy of software connectors", in *Proc. of the 22nd Intl. Conf. on Software Engineering*, ACM Press 2000, 178-187.
- 87 J.Meseguer, "General Logics", in H.-D.Ebbinghaus et al (eds) *Logic Colloquium 87*, North-Holland 1989.
- 88 B.Meyer, *Object-Oriented Software Construction*, Addison-Wesley 1992.
- 89 M.Moriconi and X.Qian, "Correctness and Composition of Software Architectures", *Proc. Second Symposium on the Foundations of Software Engineering*, ACM Press 1994, 164-174.
- 90 D.Perry and A.Wolf, "Foundations for the Study of Software Architectures", *ACM SIGSOFT Software Engineering Notes* 17(4):40-52, 1992.
- 91 B.Pierce, *Basic Category Theory for Computer Scientists*, MIT Press 1991.
- 92 D.Pitt, S.Abramsky, A.Poigné and D.Rydeheard (eds), *Category Theory and Computer Programming*, LNCS 240, Springer-Verlag 1985.
- 93 H.Reichel, *Initial Computability, Algebraic Specifications, and Partial Algebras*, Oxford University Press 1987.

- 94 G.-C.Roman, P.J.McCann and J.Y.Plun, "Mobile UNITY: Reasoning and Specification in Mobile Computing", *ACM TOSEM*, 6(3), 1997, 250-282.
- 95 R.Rosen, *Life Itself*, Columbia University Press 2000.
- 96 D.Sannella and A.Tarlecki, "Building Specifications in an Arbitrary Institution", *Information and Control* 76, 1988, 165-210.
- 97 D.Sannella, S.Sokolowski and A.Tarlecki, "Toward Formal Development of Programs from Algebraic Specifications: Parameterisation Revisited", *Acta Informatica* 29, 1992, 689-736.
- 98 V.Sassone, M.Nielsen and G.Winskel, "Models for Concurrency: Towards a Classification", *Theoretical Computer Science* 170, 1996, 277-296
- 99 M.Shaw, "Procedure Calls are the Assembly Language of Software Interconnection: Connectors Deserve First-Class Status", in D.A. Lamb (ed) *Studies of Software Design*, LNCS 1078, Springer-Verlag 1996.
- 100 M.Shaw and D.Garlan, *Software Architecture: Perspectives on an Emerging Discipline*, Prentice Hall, 1996
- 101 D.Smith, "Constructing Specification Morphisms", *Journal of Symbolic Computation* 15 (5-6), 571-606, 1993.
- 102 Y.Srinivas and R.Jüllig, "Specware™: Formal Support for Composing Software", in B.Möller (ed) *Mathematics of Program Construction*, LNCS 947, 399-422, Springer-Verlag, 1995.
- 103 A.Tarlecki, R.Burstall and J.Goguen, "Some fundamental algebraic tools for the semantics of computation, part 3: Indexed categories", *Theoretical Computer Science* 91, 1991, 239-264
- 104 P.Veloso and T.Pequeno, "Interpretations between Many-sorted Theories", in *Proc. 2nd Brazilian Colloquium on Logic*, 1978
- 105 P.Veloso, T.Maibaum and M.Sadler, "Program Development and Theory Manipulation", *Proc. Third International Workshop on Software Specification and Design*, London, IEEE Computer Society Press 1985, 228-232.
- 106 P.Veloso and T.Maibaum, "On the Modularisation Theorem for Logical Specifications", *Information Processing Letters* 53, 1995, 287-293.
- 107 R.Walters, *Categories and Computer Science*, Cambridge Computer Science Texts 1991.
- 108 W.Wechler, *Universal Algebra for Computer Scientists*, EATCS Monographs on Theoretical Computer Science 25, Springer-Verlag 1992.
- 109 G.Winskel, "Synchronization Trees", *Theoretical Computer Science* 34, 1984.
- 110 G.Winskel, "Categories of Models for Concurrency", in S.D.Brookes et al (eds), *Proceedings of the Seminar on Concurrency*, Springer-Verlag, 1985, 246-267.
- 111 G.Winskel, "Petri Nets, Algebras, Morphisms and Compositionality", in *Information and Computation* 72, 1987, 197-238.

- 112 G.Winskel and M.Nielsen, "Models for Concurrency", in S.Abramsky, D.Gabbay and T.Maibaum (eds) *Handbook of Logic in Computer Science* 4, Oxford University Press 1995.
- 113 P.Wolper, "On the Relation of Programs and Computations to Models of Temporal Logic", in B.Banieqbal, H.Barringer and A.Pnueli (eds) *Temporal Logic in Specification*, LNCS 398, Springer-Verlag 1989, 75-123.
- 114 P.Zave, "Feature Interactions and Formal Specifications in Telecommunications", *IEEE Computer* XXVI(8), 1993, 20-30.