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Bibliography

- [1] A. Alexandrov, M. Ionescu, K. Schauer, and C. Scheiman. LogGP: Incorporating Long Messages into the LogP Model - One Step Closer Towards a Realistic Model for Parallel Computation. In *Proceedings of the Symposium on Parallel Algorithms and Architectures (SPAA)*, pages 95–105, Santa Barbara, California, USA, July 1995.
- [2] R. Allen and S. Johnson. Compiling C for Vectorization, Parallelization, and Inline Expansion. In *Proceedings of the SIGPLAN '88 Conference of Programming Languages Design and Implementation*, pages 241–249, Atlanta, Georgia, USA, June 1988.
- [3] C. Andras Moritz and M.I. Frank. LoGPC: Modeling Network Contention in Message-Passing Programs. *IEEE Transactions on Parallel and Distributed Systems*, 12(4):404–415, April 2001.
- [4] I. Andreadis, A. Gasteratos, and P. Tsalides. An ASIC for Fast Grey-Scale Dilation. *Microprocessors and Microsystems*, 20(2):89–95, 1996.
- [5] Applied Parallel Research. FORGE Explorer User's Guide. Technical report, Version 2.0, 1995.
- [6] H.E. Bal. Interprocess Communication and Synchronization based on Message Passing. Technical report, Department of Mathematics and Computer Science, Vrije Universiteit, Amsterdam, The Netherlands, 1995.
- [7] H.E. Bal et al. The Distributed ASCI Supercomputer Project. *Operating Systems Review*, 34(4):76–96, October 2000.
- [8] H.E. Bal, M.F. Kaashoek, and A.S. Tanenbaum. Orca: A Language for Parallel Programming of Distributed Systems. *IEEE Transactions on Software Engineering*, 18(3):190–205, March 1992.
- [9] R. van Balen, D. Koelma, T. ten Kate, B. Mosterd, and A.W.M. Smeulders. ScilImage: A Multi-layered Environment for Use and Development of Image Processing Software. In *Experimental Environments for Computer Vision and Image Processing*, pages 107–126, 1994.
- [10] U. Banerjee, R. Eigenmann, A. Nicolau, and D.A. Padua. Automatic Program Parallelization. *Proceedings of the IEEE*, 81(2):211–243, February 1993.
- [11] A. Bar-Noy and S. Kipnis. Designing Broadcasting Algorithms in the Postal Model for Message-Passing Systems. *Mathematical Systems Theory*, 27(5):431–452, 1994.
- [12] G. Barnes et al. The ILLIAC IV Computer. *IEEE Transactions on Computers*, C-17(8):746–757, August 1968.
- [13] J. Barnes. *Programming in Ada 95, first edition*. Addison Wesley, 1995.
- [14] G. Baumgartner et al. A Performance Optimization Framework for Compilation of Tensor Contraction Expressions into Parallel Programs. In *Proceedings of the 16th International Parallel & Distributed Processing Symposium - Workshop on High-Level Parallel Programming Models and Supportive Environments*, Fort Lauderdale, Florida, USA, April 2002.

- [15] B.N. Bershad, M.J. Zekauskas, and W. A. Sawdon. The Midway Distributed Shared Memory System. In *Proceedings of the 38th IEEE International Computer Conference*, pages 528–537, San Francisco, California, USA, February 1993.
- [16] R.A.F. Bhoedjang, T. Rühl, and H.E. Bal. LFC: A Communication Substrate for Myrinet. In *Proceedings of the Fourth Annual Conference of the Advanced School for Computing and Imaging*, pages 31–37, Lommel, Belgium, June 1998.
- [17] W. Blume et al. Automatic Detection of Parallelism: A Grand Challenge for High-Performance Computing. *IEEE Parallel and Distributed Technology*, 2(3):37–47, 1994.
- [18] A. Bouridane et al. A High Level FPGA-based Abstract Machine for Image Processing. *Journal of Systems Architecture*, 45(10):809–824, April 1999.
- [19] S. Boussakta. A Novel Method for Parallel Image Processing Applications. *Journal of Systems Architecture*, 45:825–839, 1999.
- [20] J. Brown and D. Crookes. A High Level Language for Parallel Image Processing. *Image and Vision Computing*, 12(2):67–79, March 1994.
- [21] J. Bruck, L. de Coster, N. Dewulf, C.-T. Ho, and R. Lauwereins. On the Design and Implementation of Broadcast and Global Combine Operations Using the Postal Model. *IEEE Transactions on Parallel and Distributed Systems*, 7(3):256–265, March 1996.
- [22] D.K.G. Campbell. A Survey of Models of Parallel Computation. Technical Report YCS-97-278, Department of Computer Science, University of York, March 1997.
- [23] B.L. Chamberlain et al. A Comparative Study of the NAS MG Benchmark across Parallel Languages and Architectures. In *Proceedings of the 2000 ACM/IEEE Supercomputing Conference on High Performance Networking and Computing*, Dallas, Texas, USA, November 2000.
- [24] S.C. Chan, H.O. Ngai, and K.L. Ho. A Programmable Image Processing System using FPGAs. *International Journal of Electronics*, 75(4):725–730, 1993.
- [25] R. Chandra, L. Dagum, D. Kohr, and D. Maydan. *Parallel Programming in OpenMP*. Morgan Kaufmann, October 2000.
- [26] K.M. Chandy and C. Kesselman. Compositional C++: Compositional Parallel Programming. Technical Report TR-92-13, California Institute of Technology, 1992.
- [27] S. Chatterjee et al. Generating Local Addresses and Communication Sets for Data Parallel Programs. *Journal of Parallel and Distributed Computing*, 26(1):72–84, 1995.
- [28] D. Chavarría-Miranda et al. Data-Parallel Compiler Support for Multipartitioning. In *Proceedings of the 7th International Euro-Par Conference (Euro-Par 2001), LNCS 2150*, pages 241–253, Manchester, UK, August 2001.
- [29] M. Chu-Carroll and L.L. Pollock. Design and Implementation of a General Purpose Parallel Programming System. In *Proceedings of HPCN Europe 1996*, pages 499–507, Brussels, Belgium, April 1996.
- [30] Clusters@TOP500. URL: <http://clusters.top500.org/>.

- [31] J.M. Constantin, M.W. Berry, and B.T. Vander Zanden. Parallelization of the Hoshen-Kopelman Algorithm Using a Finite State Machine. *International Journal of Super-computer Applications and High Performance Computing*, 11(1):31–45, 1997.
- [32] M. Crochemore and W. Rytter. Note on Two-Dimensional Pattern Matching by Optimal Parallel Algorithms. In *Proceedings of the Second International Conference on Parallel Image Analysis, ICPIA '92*, pages 100–112, Ube, Japan, December 1992.
- [33] D. Crookes. Architectures for High Performance Image Processing: The Future. *Journal of Systems Architecture*, 45:739–748, 1999.
- [34] D. Crookes et al. Achieving Portability and Efficiency through Automatic Optimisation: an Investigation in Parallel Image Processing. In *Euro-Par 1998*, pages 102–112, Southampton, UK, September 1998.
- [35] D. Crookes, A.P. McHale, and N. Beney. A DAP-based Implementation of a Portable Parallel Image Processing Machine. In *Parallel Processing: CONPAR 92-VAPP V*, pages 803–804, Lyon, France, September 1992.
- [36] D. Crookes and P.J. Morrow. Design Considerations for a Portable Parallel Abstract Machine for Low Level Image Processing. In *BCS Workshop on Abstract Machine Models for Highly Parallel Computers*, pages 107–110, Leeds, UK, March 1991.
- [37] D. Crookes, P.J. Morrow, and P.J. McParland. IAL: A Parallel Image Processing Programming Language. *IEE Proceedings, Part I*, 137(3):176–182, June 1990.
- [38] D. Culler et al. LogP: Towards a Realistic Model of Parallel Computation. In *Proceedings of the Fourth ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, pages 1–12, San Diego, California, USA, May 1993.
- [39] H.J. Curnow and B.A. Wichmann. A Synthetic Benchmark. *The Computer Journal*, 19(1):43–49, February 1976.
- [40] A. Darte, D. Chavarría-Miranda, R. Fowler, and J. Mellor-Crummey. Generalized Multipartitioning for Multi-dimensional Arrays. In *Proceedings of the 16th International Parallel & Distributed Processing Symposium*, Fort Lauderdale, Florida, USA, April 2002.
- [41] D. Dent, G. Mozdzynski, D. Salmond, and B. Carruthers. Implementation and Performance of OpenMP in ECMWF's IFS Code. In *Proceedings of the Fifth European SGI/Cray MPP Workshop*, Bologna, Italy, September 1999.
- [42] K. Diefendorff, P.K. Dubey, R. Hochsprung, and H. Scales. Altivec Extension to PowerPC Accelerates Media Processing. *IEEE Micro*, 20(2):85–95, March/April 2000.
- [43] P. Dinda et al. The CMU Task Parallel Program Suite. Technical Report CMU-CS-94-131, School of Computer Science, Carnegie Mellon University, Pittsburgh, Pennsylvania, 1994.
- [44] J. Dongarra, J.L. Martin, and J. Worlton. Computer Benchmarking: Paths and Pitfalls. *IEEE Spectrum*, 24(7):38–43, July 1987.
- [45] M.C. d'Ornellas. *Algorithmic Patterns for Morphological Image Processing*. PhD thesis, Faculty of Science, University of Amsterdam, The Netherlands, March 2001.

- [46] B.A. Draper, J.R. Beveridge, A.P.W. Böhm, C. Ross, and M. Chawathe. Implementing Image Applications on FPGAs. In *Proceedings of the 16th International Conference on Pattern Recognition*, pages 1381–1384, Quebec City, Canada, August 2002.
- [47] J.T.J. van Eijndhoven, F.W. Sijstermans, K.A. Vissers, E.J.D. Pol, M.J.A. Tromp, P. Struik, R.H.J. Bloks, P. van der Wolf, A.D. Pimentel, and H.P.E. Vranken. Tri-Media CPU64 Architecture. In *Proceedings of the IEEE International Conference on Computer Design (ICCD'99)*, pages 586–592, Austin, Texas, USA, October 1999.
- [48] J. Eyre and J. Bier. The Evolution of DSP Processors: From Early Architecture to the Latest Developments. *IEEE Signal Processing Magazine*, 17(2):44–55, March 2000.
- [49] M.J. Flynn. Very High Speed Computing Systems. *Proceedings of the IEEE*, 56(12):1901–1909, 1966.
- [50] I.T. Foster. *Designing and Building Parallel Programs : Concepts and Tools for Parallel Software Engineering*. Addison-Wesley, 1995.
- [51] M. Frigo and S.G. Johnson. FFTW: An Adaptive Software Architecture for the FFT. In *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*, pages 1381–1384, Seattle, Washington, USA, May 1998.
- [52] E. Gabber, A. Averbuch, and A. Yehudai. Portable, Parallelizing Pascal Compiler. *IEEE Software*, 10(2):71–81, March 1993.
- [53] A. Geist et al. *PVM: Parallel Virtual Machine - A Users' Guide and Tutorial for Networked Parallel Computing*. Scientific and Engineering Computation Series. The MIT Press, 1994.
- [54] G.A. Geist, J.A. Kohl, and P.M. Papadopoulos. PVM and MPI: a Comparison of Features. *Calculateurs Paralleles*, 8(2). 1996.
- [55] J.M. Geusebroek, A.W.M. Smeulders, and H. Geerts. A Minimum Cost Approach for Segmenting Networks of Lines. *Int. Journal of Computer Vision*, 43(2):99–111, July 2001.
- [56] J.M. Geusebroek, A.W.M. Smeulders, and J. van de Weijer. Fast Anisotropic Gauss Filtering. In *Proceedings of the 7th European Conference on Computer Vision, Lecture Notes in Computer Science 2350*, pages 99–112, 2002.
- [57] R.J. Goozée and P.A. Jacobs. Distributed and Shared Memory Parallelism with a Smoothed Particle Hydrodynamics Code. In *Proceedings of the 10th Biennial Computational Techniques and Applications Conference*, Brisbane, Australia, July 2001.
- [58] S. Gregory. *Parallel Logic Programming in PARLOG: The Language and Its Implementation*. Addison Wesley, 1987.
- [59] C. Grellck. Array Padding in the Functional Language SAC. In *Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications*, pages 2553–2560, Las Vegas, Nevada, USA, June 2000.
- [60] A.S. Grimshaw. Easy-to-Use Object-Oriented Parallel Processing with Mentat. *IEEE Computer*, 26(5):39–51, May 1993.

- [61] W. Gropp, E. Lusk, N. Doss, and A. Skjellum. A High-Performance, Portable Implementation of the MPI Message Passing Interface Standard. *Parallel Computing*, 22(6):789–828, September 1996.
- [62] S.E. Hambrusch. Models for Parallel Computation. In *Proceedings of the 1996 Workshop on Challenges for Parallel Processing*, pages 92–95, August 1996.
- [63] S.E. Hambrusch and A. Khokhar. C³: A Parallel Model for Coarse-Grained Machines. *Journal of Parallel and Distruted Computing*, 32(2):139–154, 1996.
- [64] L.G.C. Hamey, J.A. Webb, and I.C. Wu. An Architecture Independent Programming Language for Low Level Vision. *Computer Vision, Graphics and Image Processing*, 48(2):246–264, 1989.
- [65] D.W. Hammerstrom and D.P. Lulich. Image Processing Using One-Dimensional Processor Arrays. *Proceedings of IEEE*, 84(7):1005–1018, 1996.
- [66] S. Hauck. The Roles of FPGAs in Reconfigurable Systems. *Proceedings of the IEEE*, 86(4):615–639, April 1998.
- [67] R. Hempel. The Status of the MPI Message-Passing Standard and Its Relation to PVM. In *Parallel Virtual Machine - EuroPVM'96, Third European PVM Conference*, pages 14–21, Munich, Germany, 1996.
- [68] T. Hey. Performance Engineering and the Grid. Invited Talk. Presented at *the 7th International Euro-Par Conference (Euro-Par 2001)*, Manchester, UK, August 2001.
- [69] R. Hockney and M. Berry. Public International Benchmarks for Parallel Computers. Technical report, PARKBENCH Committee: Report-1, February 1994. Available at <http://www.netlib.org/parkbench/>.
- [70] J.E. Hopcroft, R. Motwani, and J.D. Ullman. *Introduction to Automata Theory, Languages, and Computation (2nd Edition)*. Addison Wesley, 2000.
- [71] D. Howe. FOLDOC - Free On-Line Dictionary Of Computing, March 2001. Available at foldoc.doc.ic.ac.uk.
- [72] R. Jain. *The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation, and Modeling*. John Wiley & Sons, Inc., 1991.
- [73] L.H. Jamieson, E.J. Delp, S.E. Hambrusch, A.A. Khokhar, G.W. Cook, F. Hameed, J.N. Patel, and K. Shen. Parallel Scalable Libraries and Algorithms for Computer Vision. In *Proceedings of the 12th International Conference on Pattern Recognition*, volume III, pages 223–228, 1994.
- [74] L.H. Jamieson, E.J. Delp, and A.A. Khokhar. A Library-Based Program Development Environment for Parallel Image Processing. In *Proceedings of the Scalable Parallel Libraries Conference*, pages 187–194, Mississippi State, Mississippi, USA, October 1993.
- [75] L.H. Jamieson, E.J. Delp, C.-C. Wang, J. Li, and F.J. Weil. A Software Environment for Parallel Computer Vision. *IEEE Computer*, 25(2):73–75, February 1992.

- [76] K.L. Johnson, M.F. Kaashoek, and D.A. Wallach. CRL: High-Performance All-Software Distributed Shared Memory. In *Proceedings of the Fifteenth ACM Symposium on Operating Systems Principles*, pages 213–226, Copper Mountain, Colorado, USA, December 1995.
- [77] G. Jones and M. Goldsmith. *Programming in Occam 2*. International Series in Computer Science. Prentice Hall, 1988.
- [78] P.P. Jonker. Why Linear Arrays are Better Image Processors. In *Proceedings of the 12th International Conference on Pattern Recognition*, pages 334–338, Jerusalem, Israel, October 1994.
- [79] Z. Juhasz. An Analytical Method for Predicting the Performance of Parallel Image Processing Operations. *The Journal of Supercomputing*, 12(1/2):157–174, 1998.
- [80] Z. Juhasz and D. Crookes. A PVM Implementation of a Portable Parallel Image Processing Library. In *Parallel Virtual Machine - EuroPVM'96, Third European PVM Conference*, pages 188–196, Munich, Germany, 1996.
- [81] Z. Juhasz, D. Crookes, and A. Chaudry. A Portable, Parallel Image Processing System in Java. In *Proceedings of DAPSYS, Workshop on Parallel and Distributed Systems*, pages 151–154, Budapest, Hungary, September 1998.
- [82] T. Kanade. Development of a Video-Rate Stereo Machine. In *Proceedings of the 1994 DARPA Image Understanding Workshop*, pages 549–558, November 1994.
- [83] D. Koelma. *A Software Environment for Image Interpretation*. PhD thesis, Faculty of Mathematics, Computer Science, Physics and Astronomy, University of Amsterdam, The Netherlands, March 1996.
- [84] D. Koelma et al. Horus C++ Reference, Version 1.1. Technical report, Intelligent Sensory Information Systems, Faculty of Science, University of Amsterdam, The Netherlands, January 2002.
- [85] D. Koelma et al. Horus User Guide, Version 1.1. Technical report, Intelligent Sensory Information Systems, Faculty of Science, University of Amsterdam, The Netherlands, January 2002.
- [86] D. Koelma, P.P. Jonker, and H.J. Sips. A Software Architecture for Application Driven High Performance Image Processing. In *Parallel and Distributed Methods for Image Processing, Proceedings of SPIE*, volume 3166, pages 340–351, 1997.
- [87] D. Koelma and H.J. Sips. A Software Architecture for Parallel Image Processing. In *Proceedings of the Third Annual Conference of the Advanced School for Computing and Imaging*, pages 34–40, Heijen, The Netherlands, June 1997.
- [88] E.R. Komen. *Low-Level Image Processing Architectures*. PhD thesis, Delft University of Technology, The Netherlands, 1990.
- [89] S. Kyo, T. Koga, and S. Okazaki. IMAP-CE: A 51.2 Gops Video Rate Image Processor with 128 VLIW Processing Elements. In *Proceedings of the 2001 International Conference on Image Processing*, Thessaloniki, Greece, October 2001.

- [90] J. Landrum, J. Hardwick, and Q.F. Stout. Predicting Algorithm Performance. *Computing Science and Statistics*, 30:309–314, 1998.
- [91] P. Lapsley, J. Bier, A. Shoham, and E.A. Lee. *DSP Processor Fundamentals: Architectures and Features*. IEEE Press Series on Signal Processing, 1996.
- [92] M. Lauria. LogP Characterization of FM on the VU's DAS Machine. Technical report, Dipartimento di Informatica e Sistemistica, Universita di Napoli Federico II, 1997.
- [93] C. Lee and M. Hamdi. Parallel Image Processing Applications on a Network of Workstations. *Parallel Computing*, 21(1):137–160, January 1995.
- [94] C. Lee, Y.-F. Wang, and T. Yang. Static Global Scheduling for Optimal Computer Vision and Image Processing Operations on Distributed-Memory Multiprocessors. In *Computer Analysis of Images and Patterns, 6th International Conference, CAIP '95*, pages 920–925, 1995.
- [95] C. Lee, Y.-F. Wang, and T. Yang. Global Optimization for Mapping Parallel Image Processing Tasks on Distributed Memory Machines. *Journal of Parallel and Distributed Computing*, 45(1):29–45, 1997.
- [96] P. Linz. *An Introduction to Formal Languages and Automata*. D.C. Heath and Company, 1990.
- [97] D.B. Loveman. High Performance Fortran. *IEEE Parallel & Distributed Technology*, pages 25–42, February 1993.
- [98] L. Luck and C. Chakrabaty. A Digit-Serial Architecture For Gray-Scale Morphological Filtering. *IEEE Transactions on Image Processing*, 4(3):387–391, 1995.
- [99] M. Püschel and B. Singer and M. Veloso and J. Moura. Fast Automatic Generation of DSP Algorithms. In *Proceedings of the International Conference on Computational Science, LNCS 2073*, pages 97–106, 2001.
- [100] B.M. Maggs, L.R. Matheson, and R.E. Tarjan. Models of Parallel Computation: A Survey and Synthesis. In *Proceedings of the 28th Hawaii International Conference on System Sciences (HICSS)*, volume 2, pages 61–70, January 1995.
- [101] P. Maurer. Logic Simulation Using Networks of State Machines. In *Proceedings of Design, Automation and Test in Europe Conference 2000 (DATE 2000)*, pages 674–678, Paris, France, March 2000.
- [102] O.A. McBryan. An Overview of Message Passing Environments. *Parallel Computing*, 20(4):417–444, April 1994.
- [103] W.F. McColl. Scalability, portability and predictability: The BSP approach to parallel programming. *Future Generation Computer Systems*, 12:265–272, 1996.
- [104] Message Passing Interface Forum. MPI: A Message-Passing Interface Standard (version 1.1). Technical report, University of Tennessee, Knoxville, Tennessee, June 1995. Available at <http://www.mpi-forum.org>.

- [105] Message Passing Interface Forum. MPI-2: Extensions to the Message-Passing Interface. Technical report, University of Tennessee, Knoxville, Tennessee, July 1997. Available at <http://www.mpi-forum.org>.
- [106] D. Milicev and Z. Jovanovic. A Finite State Machine Based Formal Model of Software Pipelined Loops with Conditions. *International Journal of Computer Research*, 10(1):11-20, 2001.
- [107] M. van der Molen and P. Jonker. A Comparison of Linear Processor Arrays for Image Processing. Technical report, Pattern Recognition Group, Faculty of Applied Sciences, Delft University of Technology, Delft, The Netherlands, 1998.
- [108] M.S. Moore et al. A Model-Integrated Program Synthesis Environment for Parallel/Real-Time Image Processing. In *Parallel and Distributed Methods for Image Processing, Proceedings of SPIE*, volume 3166, pages 31-45, 1997.
- [109] P.J. Morrow et al. Efficient Implementation of a Portable Parallel Programming Model for Image Processing. *Concurrency: Practice and Experience*, 11:671-685, 1999.
- [110] T. Nakahara and T. Kanade. Experiments in Multi-Baseline Stereo. Technical report, Carnegie Mellon University, Computer Science Department, University, Pittsburgh, Pennsylvania, August 1992.
- [111] C. Nicolescu and P. Jonker. EASY-PIPE - An Easy to Use Parallel Image Processing Environment Based on Algorithmic Skeletons. In *Proceedings of the 15th International Parallel & Distributed Processing Symposium - Workshop on Parallel and Distributed Computing in Image Processing, Video Processing, and Multimedia*. San Francisco, California, USA, April 2001.
- [112] C. Nicolescu and P. Jonker. A Data and Task Parallel Image Processing Environment. *Parallel Computing*, 28(7-8):945-965, August 2002.
- [113] D.S. Nikolopoulos et al. Is Data Distribution Necessary in OpenMP? In *Proceedings of the 2000 ACM/IEEE Supercomputing Conference on High Performance Networking and Computing (SC 2000)*, Dallas, Texas, USA, November 2000.
- [114] N. Nupairoj and L.M. Ni. Performance Evaluation of Some MPI Implementations on Workstation Clusters. In *Proceedings of the 1994 Scalable Parallel Libraries Conference (SPLC94)*, pages 98-105, Mississippi State, Mississippi, USA, October 1994.
- [115] N. Nupairoj and L.M. Ni. Performance Metrics and Measurement Techniques of Collective Communication Services. In *First International Workshop on Communication and Architectural Support for Network-Based Parallel Computing*, pages 212-226, San Antonio, Texas, USA, February 1997.
- [116] S. Oberman, G. Favor, and F. Weber. AMD 3DNow! Technology: Architecture and Implementations. *IEEE Micro*, 19(2):37-48, March/April 1999.
- [117] M. Okutomi and T. Kanade. A Multiple-Baseline Stereo. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 15(4):353-363, April 1993.
- [118] J.G.E. Olk and P.P. Jonker. A Programming and Simulation Model of a SIMD-MIMD Architecture for Image Processing. In *Workshop on Computer Architecture for Machine Perception*, pages 98-105, September 1995.

- [119] OpenMP Architecture Review Board. OpenMP C and C++ Application Program Interface. Technical report, <http://www.openmp.org>, October 1998.
- [120] C.M. Pancake and D. Bergmark. Do Parallel Languages Respond to the Needs of Scientific Programmers? *IEEE Computer*, 23(12):13–23, December 1990.
- [121] A. Peleg, S. Wilkie, and U. Weiser. Intel MMX for Multimedia PCs. *Communications of the ACM*, 40(1):24–38, January 1997.
- [122] B.L. Peuto and L.J. Shustek. An Instruction Timing Model of CPU Performance. In *Proceedings of the Fourth Annual Symposium On Computer Architecture*, pages 165–178, March 1977.
- [123] A. Pimentel. *A Computer Architecture Workbench*. PhD thesis, University of Amsterdam, The Netherlands, December 1998.
- [124] M. Prieto, I.M. Llorente, and F. Tirado. A Review of Regular Domain Partitioning. *SIAM News*, 33(1), January 2000.
- [125] M. Prieto, I.M. Llorente, and F. Tirado. Data Locality Exploitation in the Decomposition of Regular Domain Problems. *IEEE Transactions on Parallel and Distributed Systems*, 11(11):1141–1149, November 2000.
- [126] S. Ramaswamy, S. Sapatnekar, and P. Banerjee. A Framework for Exploiting Task and Data Parallelism on Distributed Memory Multicomputers. *IEEE Transactions on Parallel and Distributed Systems*, 8(11):1098–1115, November 1997.
- [127] N. Ranganathan. *VLSI and Parallel Computing for Pattern Recognition and Artificial Intelligence*. World Scientific Series in Machine Perception and Artificial Intelligence - Vol. 18, 1995.
- [128] C. van Reeuwijk. Spar 1.0 Language Specification - Version Beta 1. Technical report, Delft University of Technology, Delft, The Netherlands, May 1999.
- [129] C. van Reeuwijk, A.J.C. van Gemund, and H.J. Sips. Spar: A Programming Language for Semi-Automatic Compilation of Parallel Programs. *Concurrency: Practice and Experience*, 9(11):1193–1205, November 1997.
- [130] A.K. Riemens et al. TriMedia CPU64 Application Domain Benchmark Suite. In *Proceedings of the International Conference on Computer Design*, Austin, Texas, USA, October 1999.
- [131] G.X. Ritter and J.N. Wilson. *Handbook of Computer Vision Algorithms in Image Algebra*. CRC Press, Inc, 1996.
- [132] R.H. Saavedra and A.J. Smith. Analysis of Benchmark Characteristics and Benchmark Performance Prediction. Technical Report USC-CS-92-524, Computer Science Department, University of Southern California, 1992.
- [133] R.H. Saavedra-Barrera, A.J. Smith, and E. Miya. Machine Characterization Based on an Abstract High-Level Language Machine. *IEEE Transactions on Computers*, 38(12):1659–1679, December 1989.

- [134] A. Saoudi and M. Nivat. Optimal Parallel Algorithms for Multidimensional Template Matching and Pattern Matching. In *Proceedings of the Second International Conference on Parallel Image Analysis, ICPIA '92*, pages 240–246, Ube, Japan, December 1992.
- [135] C.H. Sauer and K. Mani Chandi. *Computer Systems Performance Modeling*. Prentice-Hall Series in Advances in Computing Science and Technology. Prentice-Hall, 1981.
- [136] K. Schutte and G.M.P. van Kempen. Optimal Cache Usage for Separable Image Processing Algorithms on General Purpose Workstations. *Signal Processing*, 59(1):113–122, May 1997.
- [137] F.J. Seinstra, H.E. Bal, and H.J.W. Spoelder. Parallel Simulation of Ion Recombination in Nonpolar Liquids. In *Proceedings of High-Performance Computing and Networking (HPCN'97)*, pages 213–222, Vienna, Austria, April 1997.
- [138] F.J. Seinstra, H.E. Bal, and H.J.W. Spoelder. Parallel Simulation of Ion Recombination in Nonpolar Liquids. *Future Generation Computer Systems*, 13(4-5):261–268. March 1998.
- [139] F.J. Seinstra and D. Koelma. Modeling Performance of Low Level Image Processing Routines on MIMD Computers. In *Proceedings of the Fifth Annual Conference of the Advanced School for Computing and Imaging*, pages 307–314. Heijen, The Netherlands, June 1999.
- [140] F.J. Seinstra and D. Koelma. Transparent Parallel Image Processing by way of a Familiar Sequential API. In *Proceedings of the 15th International Conference on Pattern Recognition*, pages 824–827, Barcelona, Spain. September 2000.
- [141] F.J. Seinstra and D. Koelma. The Lazy Programmer's Approach to Building a Parallel Image Processing Library. In *Proceedings of the 15th International Parallel & Distributed Processing Symposium - Workshop on Parallel and Distributed Computing in Image Processing, Video Processing, and Multimedia*, San Francisco, California, USA, April 2001.
- [142] F.J. Seinstra and D. Koelma. Incorporating Memory Layout in the Modeling of Message Passing Programs. In *Proceedings of the 10th Euromicro Workshop on Parallel, Distributed and Network-Based Processing (PDP 2002)*, pages 293–300, Las Palmas de Gran Canaria, Canary Islands, Spain, January 2002.
- [143] F.J. Seinstra and D. Koelma. P-3PC: A Point-to-Point Communication Model for Automatic and Optimal Decomposition of Regular Domain Problems. *IEEE Transactions on Parallel and Distributed Systems*, 13(7):758–768, July 2002.
- [144] F.J. Seinstra and D. Koelma. Incorporating Memory Layout in the Modeling of Message Passing Programs. *Journal of Systems Architecture (in press)*, 2003.
- [145] F.J. Seinstra and D. Koelma. Lazy Parallelization: A Finite State Machine Based Optimization Approach for Data Parallel Image Processing Applications. In *Proceedings of the 17th International Parallel & Distributed Processing Symposium - Workshop on Parallel and Distributed Computing in Image Processing, Video Processing, and Multimedia*, Nice, France. April 2003.

- [146] F.J. Seinstra and D. Koelma. User Transparency: A Fully Sequential Programming Model for Efficient Data Parallel Image Processing. *Concurrency and Computation: Practice and Experience (in press)*, 2003.
- [147] F.J. Seinstra, D. Koelma, and J.M. Geusebroek. A Software Architecture for User Transparent Parallel Image Processing on MIMD Computers. In *Proceedings of the 7th International Euro-Par Conference (Euro-Par 2001)*, Lecture Notes in Computer Science 2150, pages 653–662, Manchester, UK, August 2001.
- [148] F.J. Seinstra, D. Koelma, and J.M. Geusebroek. Bridging the Gap between Computing and Imaging: Towards 'Effortless' Parallel Image Processing. In *Proceedings of the Seventh Annual Conference of the Advanced School for Computing and Imaging*, pages 443–450, Heijen, The Netherlands, May 2001.
- [149] F.J. Seinstra, D. Koelma, and J.M. Geusebroek. A Software Architecture for User Transparent Parallel Image Processing. *Parallel Computing*, 28(7–8):967–993, August 2002.
- [150] F.J. Seinstra, D. Koelma, J.M. Geusebroek, F.C. Verster, and A.W.M. Smeulders. Efficient Applications in User Transparent Parallel Image Processing. In *Proceedings of the 16th International Parallel & Distributed Processing Symposium - Workshop on Parallel and Distributed Computing in Image Processing, Video Processing, and Multimedia*, Fort Lauderdale, Florida, USA, April 2002.
- [151] H.J. Siegel et al. Mapping Computer Vision-Related Tasks onto Reconfigurable Parallel-Processing Systems. *IEEE Computer*, 25(2):54–63, February 1992.
- [152] B. Singer and M. Veloso. Learning to Generate Fast Signal Processing Implementations. In *Proceedings of the Eighteenth International Conference on Machine Learning*, pages 529–536, 2001.
- [153] J.M. Squyres et al. Cluster-Based Parallel Image Processing. Technical report, Laboratory for Scientific Computing, Department of Computer Science and Engineering, University of Notre Dame, Notre Dame, Indiana, USA (TR 96-9), 1996.
- [154] J.M. Squyres, A. Lumsdaine, and R.L. Stevenson. A Toolkit for Parallel Image Processing. In *Parallel and Distributed Methods for Image Processing II, Proceedings of SPIE*, San Diego, California, USA, July 1998.
- [155] J.A. Steele. *An Abstract Machine Approach to Environments for Image Interpretation on Transputers*. PhD thesis, Faculty of Science, Department of Computer Science, The Queen's University of Belfast, N. Ireland, May 1994.
- [156] A.J. van der Steen. Is it Really Possible to Benchmark a Supercomputer? A graded approach to performance measurement. In A.J. van der Steen, editor, *Evaluating Supercomputers: strategies for exploiting, evaluating and benchmarking computers with advanced architectures*, chapter 14, pages 190–212. Chapman and Hall, 1990.
- [157] T. Sterling et al. BEOWULF: A Parallel Workstation for Scientific Computation. In *Proceedings of the 24th International Conference on Parallel Processing*, pages I:11–14, Oconomowoc, Wisconsin, USA, August 1995.
- [158] B. Stroustrup. *The C++ Programming Language, 3rd Edition*. Addison-Wesley, 1997.

- [159] R. Taniguchi et al. Software Platform for Parallel Image Processing and Computer Vision. In *Parallel and Distributed Methods for Image Processing, Proceedings of SPIE*, volume 3166, pages 2–10, 1997.
- [160] J.J. Temminck. *Haarlemmer Halletjes - Grepen uit de Geschiedenis van Haarlem en Omgeving*. Excelsior Haarlem B.V., 2000.
- [161] S.H. Unger. A Computer Oriented towards Spatial Problems. *Proceedings of the Institute of Radio Engineers*, 46:1744–1750, 1958.
- [162] L.G. Valiant. A Bridging Model for Parallel Computation. *Communications of the ACM*, 33(8):103–111, August 1990.
- [163] A.J. van der Steen and R. van der Pas. A Performance Analysis of the SGI Origin 2000. In *Proceedings of the Third International Meeting on Vector and Parallel Processing*, pages 534–547, Porto, Portugal, June 1998.
- [164] R.S. Wallace, J.A. Webb, and I.C. Wu. Machine-Independent Image Processing: Performancy of Apply On Diverse Architectures. *Computer Vision, Graphics and Image Processing*, 48(2):265–276, 1989.
- [165] J.A. Webb. Steps Toward Architecture-Independent Image Processing. *IEEE Computer*, 25(2):21–31, February 1992.
- [166] J.A. Webb. Implementation and Performance of Fast Parallel Multi-Baseline Stereo Vision. In *Proceedings of the 1993 DARPA Image Understanding Workshop*, pages 1005–1010, April 1993.
- [167] R.P. Weicker. Dhrystone: A Synthetic Systems Programming Benchmark. *Communications of the ACM*, 27(10):1013–1030, October 1984.
- [168] F. Weil, L.H. Jamieson, and E.J. Delp. Dynamic Intelligent Scheduling and Control of Reconfigurable Parallel Architectures for Computer Vision/Image Processing. *Journal of Parallel and Distributed Computing*, 13:273–285, 1991.
- [169] R.C. Whaley and J.J. Dongarra. Automated Empirical Optimization of Software and the ATLAS Project. *Parallel Computing*, 27(1–2):3–25, 2001.
- [170] G.V. Wilson. *Practical Parallel Programming*. Scientific and Engineering Computation Series. The MIT Press, 1995.
- [171] G.V. Wilson and P. Lu. *Parallel Programming Using C++*. Scientific and Engineering Computation Series. The MIT Press, 1996.
- [172] Z. Xu, X. Zhang, and L. Sun. Semi-Empirical Multiprocessor Performance Predictions. *Journal of Parallel and Distributed Computing*, 39(1):14–28, 1996.
- [173] X. Zhang, Y. Yan, and K. He. Latency Metric: An Experimental Method for Measuring and Evaluating Parallel Program and Architecture Scalability. *Journal of Parallel and Distributed Computing*, 22(3):392–410, 1994.