McGill University
School of Computer Science
ACAPS Laboratory

Advanced Compilers, Architectures
and Parallel Systems

# List of External Publications by Members of ACAPS

*Compiled by*
*Kevin B. Theobald*

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ACAPS • School of Computer Science • 3480 University St. • Montréal • Canada • H3A 2A7
FTP: ftp-acaps.cs.mcgill.ca • WWW: http://www-acaps.cs.mcgill.ca/

# 1 Journal Papers

The following is a list of journal papers (refereed or unrefereed) written solely or in part by members of ACAPS while in ACAPS. This includes works by former members of ACAPS if the paper reports research done while in ACAPS.


[1] E. Arjomandi, W. O'Farrell, I. Kalas, G. Koblents, F. Ch. Eigler, and G. R. Gao, "ABC++: Concurrency by Inheritance in C++," *IBM Systems Journal*, 34(1):120–137, 1995.

[2] G. R. Gao, "An Efficient Hybrid Dataflow Architecture Model," *Journal of Parallel and Distributed Computing*, 19(4):293–307, December 1993.

[3] G. R. Gao, H. H. J. Hum, and Y.-B. Wong, "Toward Efficient Fine-Grain Software Pipelining and the Limited Balancing Technique," *International Journal of Mini and Microcomputers*, 13(2):57–68, 1991.

[4] Guang R. Gao, "Algorithmic Aspects of Balancing Techniques for Pipelined Data Flow Code Generation," *Journal of Parallel and Distributed Computing*, 6:39–61, 1989.

[5] Guang R. Gao, "Exploiting fine-grain parallelism on dataflow architectures," *Parallel Computing*, 13(3):309–320, March 1990.

[6] Laurie J. Hendren and Guang R. Gao, "Designing Programming Languages for the Analyzability of Pointer Data Structures," *Computer Languages*, 19(2):119–134, April 1993.

[7] Laurie J. Hendren, Guang R. Gao, Erik R. Altman, and Chandrika Mukerji, "A register allocation framework based on hierarchical cyclic interval graphs," *The Journal of Programming Languages*, 1(3):155–185, 1993.

[8] Herbert H. J. Hum and Guang R. Gao, "Summary of the Second Workshop on Frontiers in Functional Programming and Dataflow Architecture," *Computer Architecture News*, 16(5):12–19, December 1988.

[9] Herbert H. J. Hum and Guang R. Gao, "A High-Speed Memory Organization for Hybrid Dataflow/von Neumann Computing," *Future Generation Computer Systems*, 8(4):287–301, September 1992.

[10] Herbert H. J. Hum, Olivier Maquelin, Kevin B. Theobald, Xinmin Tian, Guang R. Gao, and Laurie J. Hendren, "A Study of the EARTH-MANNA Multithreaded System," *International Journal of Parallel Programming*, 24(4):319–347, August 1996.

[11] Joseph Hummel, Laurie J. Hendren, and Alexandru Nicolau, "Abstract Description of Pointer Data Structures: An Approach for Improving the Analysis and Optimization of Imperative Programs," *ACM Letters on Programming Languages and Systems*, 1(3):243–260, September 1992.

[12] Radha Jagadeesan, Keshav Pingali, and Prakash Panangaden, "A Fully Abstract Semantics for a First-Order Functional Language with Logic Variables," *ACM Transactions on Programming Languages and Systems*, 13(4):577–625, October 1991.

[13] David MacAllester, Prakash Panangaden, and Vasant Shanbhogue, "Nonexpressibility of Signaling and Fairness," *Journal of Computer and System Sciences*, 47(2):287–321, October 1993.

[14] Ettore Merlo, Pierre-Yves Gagne; Jean-Francois Girard, Kosta Kontogiannis, Laurie Hendren, Prakash Panangaden, and Renato De Mori, "Reengineering User Interfaces," *IEEE Software*, 12(1):64–73, January 1995.

[15] Qi Ning and Guang R. Gao, "Optimal Loop Storage Allocation for Argument-Fetching Dataflow Machines," *International Journal of Parallel Programming*, 21(6):421–448, December 1992.

[16] Prakash Panangaden and Vasant Shanbhogue, "The Expressive Power of Indeterminate Dataflow Primitives," *Information and Computation*, 98(1):99–131, May 1992.

[17] Prakash Panangaden and K. E. Taylor, "Concurrent Common Knowledge," *Distributed Computing*, 6:73–93, June 1992.

[18] Anne Rogers, Martin C. Carlisle, John H. Reppy, and Laurie J. Hendren, "Supporting Dynamic Data Structures on Distributed-Memory Machines," *ACM Transactions on Programming Languages and Systems*, 17(2):233–263, March 1995.

[19] Kevin B. Theobald, "Panel Sessions of The 1991 Workshop on Multithreaded Computers," *Computer Architecture News*, 22(1):2–33, March 1994. Workshop held at *Supercomputing '91,*Albuquerque, New Mexico, November 1991.

[20] Kevin B. Theobald, "The W-Network: A Low-Cost Fault-Tolerant Multistage Interconnection Network for Fine-Grain Multiprocessing," *Concurrency — Practice and Experience*, 1996. To appear.

# 2 Books

The following is a list of books and book chapters written or edited, solely or in part, by members of ACAPS while in ACAPS.

[1] Jack B. Dennis and Guang R. Gao, "Multithreaded Architectures: Principles, Projects, and Issues," in *Multithreaded Computer Architecture: A Summary of the State of the Art* (Robert A. Iannucci, Guang R. Gao, Robert H. Halstead, Jr., and Burton Smith, eds.), ch. 1, pp. 1–72, Norwell, Massachusetts: Kluwer Academic Publishers, 1994. Book contains papers presented at the Workshop on Multithreaded Computers, held in conjunction with Supercomputing '91 in Albuquerque, New Mexico, November 1991.

[2] G. R. Gao, *A Code Mapping Scheme for Dataflow Software Pipelining.* Boston, Massachusetts: Kluwer Academic Publishers, December 1990.

[3] G. R. Gao, "A Flexible Architecture Model for Hybrid Data-Flow and Control-Flow Evaluation," in *Advanced Topics in Data-Flow Computing* (Jean-Luc Gaudiot and Lubomir Bic, eds.), ch. 12, pp. 327–346, Englewood Cliffs, New Jersey: Prentice-Hall, 1991. Book contains papers presented at the First Workshop on Data-Flow Computing, held in conjunction with the 16th Annual International Symposium on Computer Architecture in Eilat, Israel, May 1989.

[4] Guang R. Gao, Lubomir Bic, and Jean-Luc Gaudiot, eds., *Advanced Topics in Dataflow Computing and Multithreading.* IEEE Computer Society Press, 1995. Book contains papers presented at the Second International Workshop on Dataflow Computers, Hamilton Island, Australia, May 24–26, 1992, held in conjunction with the 19th Annual International Symposium on Computer Architecture.

[5] Herbert H. J. Hum and Guang R. Gao, "Concurrent Execution of Heterogeneous Threads in the Super-Actor Machine," in *Multithreaded Computer Architecture: A Summary of the State of the Art* (Robert A. Iannucci, Guang R. Gao, Robert H. Halstead, Jr., and Burton Smith, eds.), ch. 13, pp. 317–350, Norwell, Massachusetts: Kluwer Academic Publishers, 1994. Presented at the Workshop on Multithreaded Computers, held at *Supercomputing '91,* Albuquerque, New Mexico, November 1991.

[6] Robert A. Iannucci, Guang R. Gao, Robert H. Halstead, Jr., and Burton Smith, eds., *Multithreaded Computer Architecture: A Summary of the State of the Art.* Norwell, Massachusetts: Kluwer Academic Publishers, 1994. Book contains papers presented at the Workshop on Multithreaded Computers, held in conjunction with Supercomputing '91 in Albuquerque, New Mexico, November 1991.

[7] L. M. Mullin, M. J. Jenkins, G. Hains, R. Bernecky, and G. R. Gao, eds., *Arrays: Functional Languages and Parallel Systems.* Boston, Massachusetts: Kluwer Academic Publishers, 1991.

[8] Kevin B. Theobald, Guang R. Gao, and Laurie J. Hendren, "The Effects of Resource Limitations on Program Parallelism," in *Advanced Topics in Dataflow Computing and Multithreading* (Guang R. Gao, Lubomir Bic, and Jean-Luc Gaudiot, eds.), pp. 367–392, IEEE Computer Society Press, 1995. Book contains papers presented at the Second International Workshop on Dataflow Computers, Hamilton Island, Australia, May 24–26, 1992, held in conjunction with the 19th Annual International Symposium on Computer Architecture.

## 3 Conference Papers

The following is a list of conference papers written solely or in part by members of ACAPS while in ACAPS. This includes works by former members of ACAPS if the paper reports research done while in ACAPS.

### 1987

[1] Guang R. Gao, "Pipelining of Array Computation—A Data Flow Approach for Exploiting Fine-Grain Parallelism," in *Proceedings of CIPS Edmonton '87*, Edmonton, Alberta, pp. 406–415, Canadian Information Processing Society, November 16–19, 1987.

[2] Guang R. Gao, "Balancing Techniques for Pipelined Data Flow Code Generation," in *Proceedings of CIPS Edmonton '87*, Edmonton, Alberta, pp. 416–424, Canadian Information Processing Society, November 16–19, 1987.

### 1988

[3] Jack B. Dennis and Guang R. Gao, "An Efficient Pipelined Dataflow Processor Architecture," in *Proceedings of Supercomputing '88*, Orlando, Florida, pp. 368–373, November 1988.

[4] Guang R. Gao, "A Pipelined Code Mapping Strategy for Data Flow Supercomputers," in *Proceedings of the Third International Conference on Supercomputing*, vol. III, Boston, Massachusetts, pp. 209–214, May 1988.

[5] G. R. Gao and S. J. Thomas, "An Optimal Parallel Jacobi-Like Solution Method for the Singular Value Decomposition," in *Proceedings of the 1988 International Conference on Parallel Processing*, vol. III, St. Charles, Illinois, pp. 47–53, August 1988.

[6] G. R. Gao and R. Tio, "Instruction Set Architecture for an Argument-Fetching Dataflow Architecture," in *Proceedings of the Canadian Conference on Very Large-Scale Integration (CCVLSI-88)*, Halifax, October 1988.

[7] Guang R. Gao, René Tio, and Herbert H. J. Hum, "Design of an Efficient Dataflow Architecture Without Data Flow," in *Proceedings of the International Conference on Fifth Generation Computer Systems*, vol. 3, Tokyo, Japan, pp. 861–868, November–December 1988.

[8] M. Whelan, Guang R. Gao, and T. K. Yum, "Optimal Decomposition of Matrix Multiplication on Multiprocessor Architectures," in *Proceedings of the 1988 International Conference on Parallel Processing*, vol. III, St. Charles, Illinois, pp. 181–185, August 1988.

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[9] Guang R. Gao and Z. Paraskevas, "Efficient Software Pipelining in an Argument Fetching Dataflow Architecture," in *Proceedings of the Canadian Conference on Electrical and Computer Engineering*, Montréal, Québec, pp. 869–876, Canadian Society for Electrical and Computer Engineering, September 17–20, 1989.

[10] G. R. Gao and S. J. Thomas, "A Parallel Kobegliantz Algorithm for General Purpose Multiprocessors," in *Proceedings of the Fourth Conference on Hypercube Concurrent Computers and Applications*, March 1989.

[11] Guang R. Gao and René Tio, "Instruction Set Architecture of an Efficient Pipelined Dataflow Architecture," in *Proceedings of the Twenty-Second Annual Hawaii International Conference on System Sciences*, vol. I, Kailua-Kona, Hawaii, pp. 385–392, January 1989.

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[13] Guang R. Gao, Herbert H. J. Hum, and Yue-Bong Wong, "Towards Efficient Fine-Grain Software Pipelining," in *Conference Proceedings, 1990 International Conference on Supercomputing*, Amsterdam, The Netherlands, pp. 369–379, June 1990.

[14] Guang R. Gao, Herbert H. J. Hum, and Yue-Bong Wong, "An Efficient Scheme for Fine-Grain Software Pipelining," in *Proceedings of CONPAR '90–VAPP IV — the Joint International Conference on Vector and Parallel Processing* (H. Burkhart, ed.), no. 457 in Lecture Notes in Computer Science, Zurich, Switzerland, pp. 709–720, Springer-Verlag, September 1990.

[15] Guang R. Gao, Herbert H. J. Hum, and Yue-Bong Wong, "Limited Balancing—An Efficient Method for Dataflow Software Pipelining," in *Proceedings of the ISMM International Conference on Parallel and Distributed Computing and Systems*, New York, New York, International Society for Mini and Microcomputers, October 10–12, 1990.

[16] G. R. Gao and Z. Paraskevas, "Dataflow Software Pipelining: A Case Study (Abstract)," in *Proceedings of the 1989 International Phoenix Conference on Computers and Communications*, Phoenix, Arizona, IEEE Computer Society Press, March 1990.

[17] Guang R. Gao and Zaharias Paraskevas, "Compiling for Dataflow Software Pipelining," in *Languages and Compilers for Parallel Computing* (David Gelernter, Alexandru Nicolau, and David Padua, eds.), ch. 15, pp. 275–306, Pitman Publishing and the MIT Press, 1990. Selected papers from the Second Workshop on Languages and Compilers for Parallel Computing, Urbana, Illinois, August 1989.

[18] G. R. Gao, R. Yates, J. B. Dennis, and L. Mullin, "A Strict Monolithic Array Constructor," in *Proceedings of the IEEE Symposium on Parallel and Distributed Processing*, pp. 596–603, IEEE Computer Society, December 1990.

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[19] Guang R. Gao, Herbert H. J. Hum, and Jean-Marc Monti, "Towards an Efficient Hybrid Dataflow Architecture Model," in *Proceedings of PARLE '91 – Parallel Architectures and Languages Europe*, vol. I of *Lecture Notes in Computer Science 505–506*, Eindhoven, The Netherlands, pp. 355–371, Springer-Verlag, June 1991.

[20] Guang R. Gao, Yue-Bong Wong, and Qi Ning, "A Timed Petri-Net Model for Fine-Grain Loop Scheduling," in *Proceedings of the ACM SIGPLAN '91 Conference on Programming Language Design and Implementation*, Toronto, Ontario, pp. 204–218, June 1991.

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[23] Herbert H. J. Hum and Guang R. Gao, "A Novel High-Speed Memory Organization for Fine-Grain Multi-Thread Computing," in *Proceedings of PARLE '91 – Parallel Architectures and Languages Europe*, vol. I of *Lecture Notes in Computer Science 505–506*, Eindhoven, The Netherlands, pp. 34–51, Springer-Verlag, June 1991.

[24] Herbert H. J. Hum and Guang R. Gao, "Efficient Support of Concurrent Threads in a Hybrid Dataflow/von Neumann Architecture," in *Proceedings of the Third IEEE Symposium on Parallel and Distributed Processing*, Dallas, Texas, pp. 190–193, ACM SIGARCH and IEEE Computer Society, December 2–5, 1991.

[25] Vijay A. Saraswat, Martin Rinard, and Prakash Panangaden, "Semantic Foundations of Concurrent Constraint Programming," in *Conference Record of the Eighteenth Annual ACM Symposium on Principles of Programming Languages*, Orlando, Florida, pp. 333–352, January 1991. Preliminary report.

[26] Vivek Sarkar and Guang R. Gao, "Optimization of Array Accesses by Collective Loop Transformations," in *Conference Proceedings, 1991 International Conference on Supercomputing*, Cologne, Germany, pp. 194–205, June 1991.

[27] Kevin B. Theobald and Guang R. Gao, "An Efficient Parallel Algorithm for All Pairs Examination," in *Proceedings of Supercomputing '91*, Albuquerque, New Mexico, pp. 742–753, November 1991.

## 1992

[28] Weiren Ding and Laurie J. Hendren, "SELSYN-C: A Self-Synchronizing Parallel Programming Language," in *Proceedings of the 4th International Conference on Computing and Information, ICCI'92*, Toronto, Ontario, pp. 143–146, IEEE Computer Society Press, May 1992.

[29] G. R. Gao, R. Govindarajan, and P. Panangaden, "Well-Behaved Dataflow Programs for DSP Computation," in *Proceedings of ICASSP-92, the 1992 International Conference on Acoustics, Speech, and Signal Processing*, vol. I, San Francisco, California, pp. 561–564, March 1992.

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[31] L. Hendren, C. Donawa, M. Emami, G. Gao, Justiani, and B. Sridharan, "Designing the McCAT Compiler Based on a Family of Structured Intermediate Representations," in *Proceedings of the 5th International Workshop on Languages and Compilers for Parallel Computing*, no. 757 in Lecture Notes in Computer Science, New Haven, Connecticut, pp. 406–420, Springer-Verlag, August 1992. Published in 1993.

[32] Laurie J. Hendren and Guang R. Gao, "Designing Programming Languages for Analyzability: A Fresh Look at Pointer Data Structures," in *Proceedings of the 1992 International Conference on Computer Languages*, Oakland, California, pp. 242–251, April 1992.

[33] Laurie J. Hendren, Guang R. Gao, Erik R. Altman, and Chandrika Mukerji, "A Register Allocation Framework Based on Hierarchical Cyclic Interval Graphs," in *Proceedings of the 4th International Conference on Compiler Construction*, no. 641 in Lecture Notes in Computer Science, Paderborn, Germany, pp. 176–191, Springer-Verlag, October 1992.

[34] Laurie J. Hendren, Joseph Hummel, and Alexandru Nicolau, "Abstractions for Recursive Pointer Data Structures: Improving the Analysis and Transformation of Imperative Programs," in *Proceedings of the ACM SIGPLAN '92 Conference on Programming Language Design and Implementation*, San Francisco, California, pp. 249–260, June 1992.

[35] Joseph Hummel, Laurie J. Hendren, and Alexandru Nicolau, "Applying an Abstract Data Structure Description Approach to Parallelizing Scientific Pointer Programs," in *Proceedings of the 1992 International Conference on Parallel Processing*, vol. II, St. Charles, Illinois, pp. 100–104, August 1992.

[36] Philip Lenir, R. Govindarajan, and S. S. Nemawarkar, "Exploiting Instruction-Level Parallelism: The Multithreaded Approach," in *Proceedings of the 25th Annual International Symposium on Microarchitecture*, Portland, Oregon, pp. 189–192, December 1992.

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[38] S. S. Nemawarkar, R. Govindarajan, G. R. Gao, and V. K. Agarwal, "Performance Evaluation of Latency Tolerant Architectures," in *Proceedings of the 4th International Conference on Computing and Information, ICCI'92*, Toronto, Ontario, pp. 183–186, IEEE Computer Society Press, May 1992.

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[41] A. Rogers, J. Reppy, and L. Hendren, "Supporting SPMD Execution for Dynamic Data Structures," in *Proceedings of the 5th International Workshop on Languages and Compilers for Parallel Computing*, no. 757 in Lecture Notes in Computer Science, New Haven, Connecticut, pp. 192–207, Springer-Verlag, August 1992. Published in 1993.

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[43] Erik R. Altman, Vinod K. Agarwal, and Guang R. Gao, "A Novel Methodology using Genetic Algorithms for the Design of Caches and Cache Replacement Policy," in *Proceedings of the 5th International Conference on Genetic Algorithms* (Stephanie Forrest, ed.), pp. 392–399, Morgan Kaufmann Publishers, Inc., July 1993. University of Illinois at Urbana-Champaign.

[44] R. F. Blute, Prakash Panangaden, and R. A. G. Seely, "Holomorphic Models of Exponential Types in Linear Logic," in *Proceedings of the 9th International Conference on Mathematical Foundations of Programming Semantics*, no. 802 in Lecture Notes in Computer Science, New Orleans, Louisiana, pp. 474–512, Springer-Verlag, April 1993. Published in 1994.

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[46] Marija Čubrić and Prakash Panangaden, "Minimal Memory Schedules for Dataflow Networks," in *Proceedings of the 4th International Conference on Concurrency Theory* (Eike Best, ed.), no. 715 in Lecture Notes in Computer Science, Hildesheim, Germany, pp. 368–383, Springer-Verlag, August 23–26, 1993.

[47] Guang R. Gao, Qi Ning, and Vincent Van Dongen, "Extending Software Pipelining Techniques for Scheduling Nested Loops," in *Proceedings of the 6th International Workshop on Languages and Compilers for Parallel Computing*, no. 768 in Lecture Notes in Computer Science, Portland, Oregon, pp. 340–357, Springer-Verlag, August 1993. Published in 1994.

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[49] R. Govindarajan and Guang R. Gao, "A Novel Framework for Multi-Rate Scheduling in DSP Applications," in *Proceedings of the 1993 International Conference on Application Specific Array Processors*, Venice, Italy, pp. 77–88, IEEE Computer Society, October 1993.

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[52] Qi Ning and Guang R. Gao, "A Novel Framework of Register Allocation for Software Pipelining," in *Conference Record of the Twentieth Annual ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages*, Charleston, South Carolina, pp. 29–42, January 1993.

[53] Kevin B. Theobald, Guang R. Gao, and Laurie J. Hendren, "Speculative Execution and Branch Prediction on Parallel Machines," in *Conference Proceedings, 1993 International Conference on Supercomputing*, Tokyo, Japan, pp. 77–86, July 1993.

[54] Robert Kim Yates and Guang Rong Gao, "A Kahn Principle for Networks of Nonmonotonic Real-time Processes," in *Proceedings of PARLE '93 – Parallel Architectures and Languages Europe*, no. 694 in Lecture Notes in Computer Science, Munich, Germany, pp. 209–227, Springer-Verlag, June 1993.

## 1994

[55] Weiren Ding and Vincent Van Dongen, "TagC: a Language with Computation Distribution Directives for Expressing Parallelism," in *Proceedings of Supercomputing Symposium'94, Canada's Eighth Annual High Performance Computing Conference*, Toronto, Ontario, pp. 145–152, University of Toronto, June 1994.

[56] Maryam Emami, Rakesh Ghiya, and Laurie J. Hendren, "Context-Sensitive Interprocedural Points-to Analysis in the Presence of Function Pointers," in *Proceedings of the ACM SIGPLAN '94 Conference on Programming Language Design and Implementation*, Orlando, Florida, pp. 242–256, June 1994.

[57] Ana M. Erosa and Laurie J. Hendren, "Taming Control Flow: A Structured Approach to Eliminating Goto Statements," in *Proceedings of the 1994 International Conference on Computer Languages*, Toulouse, France, pp. 229–240, May 1994.

[58] R. Govindarajan, Erik R. Altman, and Guang R. Gao, "Minimizing Register Requirements under Resource-Constrained Rate-Optimal Software Pipelining," in *Proceedings of the 27th Annual International Symposium on Microarchitecture*, San Jose, California, pp. 85–94, November–December 1994.

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[63] Joseph Hummel, Laurie J. Hendren, and Alexandru Nicolau, "A General Data Dependence Test for Dynamic, Pointer-Based Data Structures," in *Proceedings of the ACM SIGPLAN '94 Conference on Programming Language Design and Implementation*, Orlando, Florida, pp. 218–229, June 1994.

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[66] Justiani and Laurie J. Hendren, "Supporting Array Dependence Testing for an Optimizing/Parallelizing C Compiler," in *Proceedings of the 5th International Conference on Compiler Construction*, no. 786 in Lecture Notes in Computer Science, Edinburgh, Scotland, pp. 309–323, Springer-Verlag, April 1994.

[67] Ivan Kalas, Eshrat Arjomandi, Guang R. Gao, and Bill O'Farrell, "FTL: A Multithreaded Environment for Parallel Computation," in *Proceedings of CASCON'94 – Integrated Solutions*, Toronto, Ontario, pp. 292–303, IBM Centre for Advanced Studies, October–November 1994.

[68] G. Liao, E. R. Altman, V. K. Agarwal, and G. R. Gao, "A Comparative Study of DSP Multiprocessor List Scheduling Heuristics," in *Proceedings of the 27th Annual Hawaii International Conference on System Sciences*, Kihei, Hawaii, 1994.

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