Carl Tropper
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Personal

American born
Married, 3 children

Education

McGill University, Montreal, Canada - B.Sc. (Mathematics) 1968
Polytechnic Institute of New York - Ph.D. (Mathematics) 1973.

Academic, Research and Industrial Experience

Profile

My major research interest is in distributed systems and my recent focus has been on distributed VLSI simulation. I have worked in the area since its inception having served as the technical chair of PADS, the major conference in the area and have been guest editor of several special journal issues on distributed simulation. I am also strongly interested in computer networks. I worked on performance issues of computer networks at BBN and MITRE, focusing on routing and flow control algorithms for wide area networks and access control for local area networks (I wrote a book on LAN performance-see book section). BBN is well-known for having developed the ARPANET while MITRE did pioneering work on local area networks. I have recently been the technical chair of *ACM MSWIM, Conference on the Modelling and Simulation of Mobile Networks.*

McGill University, School of Computer Science, Montreal, Canada 1984-present

My current major research interest centers about the distributed discrete-event simulation of VLSI circuitry. As is well-known, simulation plays a central role in circuit design. I am at present collaborating with Nortel Telecommunications on a project for the distributed simulation of large digital circuits (described in Verilog).

I have worked in the area of distributed simulation since its inception and have developed algorithms belonging to both of the major classes of synchronization algorithms for distributed simulation, the conservative and optimistic classes of algorithm. I have also developed load-balancing algorithms for both of these classes.

My other major interest is in computer networks. I have recently developed channel access algorithms and assessed their performance by distributed simulation.

California Institute of Technology, Pasadena, California
Sabbatical year 1991-92

My sabbatical was spent at the Jet Propulsion Laboratories of the California Institute of Technology, working on a project whose goal it was to verify the sequence of commands sent to a spacecraft. I developed a synchronization mechanism to execute the verification model on a distributed memory machine. They can easily be modified to take advantage of a shared memory environment. The algorithms are based on a conservative synchronization strategy, and were implemented on an Intel i860 parallel computer.

Bolt, Beranek and Newman, 1982-84, Cambridge, Mass, Senior Scientist

As part of a network design and performance group, I worked on a number of projects whose principle orientation was to develop new routing algorithms and flow control strategies for the ARPANET. The ARPANET was the research predecessor of the INTERNET and was both designed and implemented by BBN. After doing this pioneering research, BBN for some time built networks for both government and private sector clients based on this technology.

I also participated in the Packet Radio project. Again, my orientation on this project was towards the development of routing and flow control algorithms.

MITRE Corporation, Bedford, Mass.,1978-82, Member, Technical Staff

As a member of the local area networking group at MITRE, I participated in design studies for the Air Force and other DOD clients. The local area networking group at MITRE was one the first developers of Ethernet technology, pioneering a broadband approach.

While at MITRE, I wrote a book on the performance of local area networks. It contained a description of the (current) LAN access protocols, and compared their performance via both queuing and simulation models.

Boeing Computer Services, McLean, Virginia, 1976-78 Senior Analyst

I participated in the development of a combined arms simulation model for the Air Force.

Rutgers University, 1973-76, Department of Mathematics

I taught undergraduate mathematics courses. During my tenure at Rutgers, I also worked for *Data Systems Analysts*, a company which developed real-time software for airplane flight controllers.

Journal Publications

1. "The Dependence List in Time Warp", with Jing lei Zhang, under review at the *Transactions of the Society for Computer Simulation*

2. "XTW: A Parallel and Distributed VLSI Simulator", with Qing Xu, under review at *IEEE Transactions on Parallel and Distributed Systems.*

3. "Towards Distributed Verilog Simulation", with Lijun Li and Hai Huang, *International Journal of Simulation:Systems, Science and Technology (IJS3T)*, vol 4, nos 3-4, September 2003, pp. 44-55.

4. "Parallel and Discrete Event Simulation-Applications", *Journal of Parallel and Distributed Computing, special issue on parallel and distributed discrete-event simulation*, March2002, p.327-335.

5. "Parallel and Distributed Simulation", *Parallel and Distributed Computing Practices-special issue on distributed simulation*, July 2002

6. "Scalable Clustered Time Warp and Logic Simulation", with H. Avril, the *VLSI Design,Special Issue on Current Advances in Parallel Logic Simulation*, Gordon-Breach, vol9,no3,pp291-313, 1999.

7. "On Rolling back and Checkpointing in Time Warp", with H. Avril, *IEEE Transactions of Parallel and Distributed Systems*, vol. 12, no. 11, November 2001, pp. 1105-1122.

8. "Flow Control and Dynamic Load Balancing in Time Warp", with M. Choe, *Transactions of the Society for Computer Simulation*, vol.18, no. 1, March 2001, pp. 9-24.

9. "Local versus Global Lookahead in Conservative Parallel Simulation", with A. Boukerche, *Parallel Computing*,North-Holland, Elsevier, vol.27,no.8, pp.1033-1055

10. "On the Parallel Simulation of Fixed Channel Allocation Algorithms", with P. Alleyne,*Wireless Networks*,vol.5,pp.209-218,Baltzer Science Science Publishers, the Netherlands

11. "A Distributed Graph Algorithm for the Detection of Local Cycles and Knots", with A. Boukerche, *IEEE Transactions on Parallel and Distributed Systems*, August, 1998, pp. 748-758

12. "Parallel Simulation on the Hypercube Multiprocessor", with A. Boukerche, *Distributed Computing*, Springer Verlag, vol.8, no.4, pp.181-191, 1995

13. "On Load Balancing and Process Migration in Time Warp", with D. Glazer, *IEEE Transactions on Parallel and Distributed Computing*, March 1993,pp 318-328

14. "Optimal Packet Size in packet-Switching Networks", with C. Evequoz, *Computer Networks and ISDN Systems*, vol. 25, 1992, pp.387-404

15. "Approximate Analysis of Bulk Closed Queuing Networks", with C. Evequoz, *INFOR*,Canadian Operational Research Society, Feb.1992

16. "The Distributed Simulation of Clustered Processes", with B. Groselj, *Distributed Computing* Springer-Verlag, 1991, pp. 111-121

17. "A New Metric for Dynamic Routing", with D. Glazer,*IEEE Transactions on Communications*, vol. 38, issue 3,March 1990. pp.360-367.

18. "On Buffer Allocation in Transport Protocols", with A. Zissopoulos, *Computer Networks and ISDN Systems*, vol. 16, no.5, May 1989, pp. 383-393

19. "On Reassembly Delay in Packet-Switching Networks", C.Evequoz,*Computer Networks and ISDN Systems*,vol.15, no.1 1988, pp.1-25

20. "On Priorities and Performance in Packet-Switching Networks", *Computer Networks and ISDN Systems*, vol 12, no.2, 1987, pp.89-99

21. "Pseudosimulation: An Algorithm for Distributed Simulation with Limited Memory", with B. Groselj,*International Journal of Parallel Programming*, vol15, no5, October 1987, pp.42-82

Papers in refereed conference proceedings

1. "XTW: A Parallel and Distributed Logic Simulator", with Qing Xu, submitted for publication at GLVLSI conference, Boston, Mass. 2004.

2. "Event Reconstruction vs Dynamic Checkpointing", accepted for publication at PADS04.

3. "Accelerate Simulation on Myrinet Cluster", with Lijun Li, accepted for publication at the ASTC, Arlington, Va. 2004

4. "Flow Control in Optimistic Simulation", with L. Solomen, 17th European Simulation Multiconference, HP5, Nottingham, England, June, 2003

5. "DVS-An Object Oriented Framework for Distributed Simulation", with Lijun Li, PADS2003, June 10-13,2003, San Diego, California, pp. 173-180

6. "Distributed Simulation of Channel Allocation Algorithms" with O. Cismasu, MASCOTS02, October 12-16, 2002, Ft. Worth, Texas,pp.329-338.

7. "The Dependence List in Time Warp", with J. Zhou, PADS2001, pp. 35-46, Lake Arrowhead, California,*nominated for the best paper award*

8. "Flow Control and Dynamic Load Balancing in Time Warp", with M. Choe, Proc. 33rd Annual Simulation Symposium (SS 2000), 16-20 April, 2000, pp. 219-226.

9. "On Learning Algorithms and Balancing Loads in Time Warp", with M. Choe, PADS99, May2-5, Atlanta, Georgia,pp.101-108.

10. "The Parallel Simulation of Distributed Channel Allocation Algorithms", with Peter Alleyne, Wireless Communications Workshop, MASCOTS98, Montreal, Canada, June 19-27,1998

11. "On Metrics for the Dynamic Load Balancing of Optimistic Simulations", with K.el Khatib, HICSS-32, Proceedings of the 32nd Annual Hawaii International Conference on System Sciences,Hawaii,Track 8, January, 1999

12. "An Efficient GVT Algorithm using Snapshots", with M. Choe, CSMA98, Orlando, Florida, November, 1998

13. "Parallel Simulation of Billiard Balls using Shared Variables", with P MacKenzie,PADS'96(Proc. 10th Workshop on Parallel and Distributed Simulation), Philadelphia, Penn., May 22-24, 1996, pp. 190-195.

14. "The Dynamic Load Balancing of Clustered Time Warp for Logic Simulation",with H. Avril, PADS'96, Philadelphia, Penn., May 22-24, 1996, pp.20-27.

15. "SGTNE: Semi-Global Time of the Next Event Algorithm", with A. Boukerche, PADS'95,Lake Placid, New York State, June, 1995, pp.68-77

16. "Clustered Time Warp and Logic Simulation", with H Avril, PADS'95, Lake Placid, New York State, June, 1995, pp.112-119

17. ”A Distributed Algorithm for the Detection of Local Knots and Cycles”, with A. Boukerche, Proc. Ninth International Parallel Processing Symposium,25-28 April 1995, Santa Barbara, California, pp.118-127.

18. ”Hierarchical Schedulings of the Time of Next Event Heuristic on Distributed Memory Machines”, with A. Boukerche, Proc. 28th Annual Simulation Symposium, Phoenix, Arizona, 9-13 April 1995, pp. 155-165.

19. ”An Efficient Distributed Cycle/Knot Detection Algorithm”, Proc 1993 Canadian Conference on Electrical and Computer Engineering”, 14-17 September 1993, pp. 619-622, vol.2

20. ”A Static Partitioning and Mapping Algorithm for Conservative Parallel Simulations”, with A. Boukerche, PADS94, Edinburgh, Scotland, pp.164-173

21. ”Parallel Simulation of Communicating Finite State Machines”, with A. Boukerche, PADS93, San Diego, California, May 1993, vol. 23, no.1, pp. 143-151

22. ”On the Performance of Time Warp”, with N. Krivossidis, International Conference on Parallel Processing, Chicago, Illinois, August, 1992

23. ”On Distributed and Pseudosimulation”,with C. Cote, PADS92, SCS Simulation Series, vol.24, no.3, pp. 97-107

24. ”A Performance Analysis of Distributed Simulation with Clustered Processes”, with A. Boukerche, 1991 IEEE Workshop on Parallel and Distributed Computing, SCS vol.23, no.1, pp.112-125

25. ”End-to-End Delay of Multiple Packet Messages in Window Flow Controlled Packet-Switched Networks”, with C. Evequoz, IEEE INFOCOM, 3-7 June, 1990, pp. 47-54, vol.1.

26. ”Local Deadlock Detection for Distributed Simulation”, with L. Liu, 1990 PADS, SCS vol. 22, no. 1, pp. 64-70

27. ”A Deadlock Resolution Scheme for Distributed Simulation”, with B. Groselj, 1989 PADS, Tampa, Florida, SCS vol. 21, no. 2, pp.108-113

28. ”The Time-of-Next-Event Algorithm”, with B. Groselj, PADS88, San Diego, SCS vol. 19,no.3, pp. 25-30

29. “On Re-Assembly Delay in Packet-Switching Networks”, with C. Evequoz, INFOCOM’87

30. “A Congestion Based Dynamic Routing Algorithm”, with D. W. Glazer ICC’87

31. ”On Congestion Based Dynamic Routing ”, with D. Glazer, Telecom ’87, Geneva, Switzerland, vol. III.3, pp.377-381

32. ”On Priorities in a Packet-Switching Network”, 19th Annual Hawaiian Conference on System Science, Honolulu, Hawaii, 1986.

33. “Distributed Simulation Using a Look-Ahead Algorithm,” with B. Groselj, ACM Workshop on Distributed Computing, Amsterdam, Holland, 1986

34. "Priorities and Performance in Packet-Switching Networks", IEEE INFOCOM '86, Miami, Fla.

35. "Re-Transmission Protocols for Ethernet", ICC83, Boston, Mass. IEEE.

Book

Local Computer Network Technologies, Academic Press, 1981

The book provided a comprehensive overview of access techniques for local area networks which were in existence as of the time of its publication. In addition to this description, it also discussed their performance. as determined by both analytical(queuing) and simulation models.

Technical Reports

1. "Window - A Queuing Model of the ARPANET", BBN Internal Report, July 1984.

2. "On Multipath Routing", BBN Internal Report.

3. "Packet size in the ARPANET", BBN Internal Report.

4. "Computerized Models for the Design and Analysis of Computer-Communications Networks", ESD-TR-79-128, MITRE Corp., Bedford, Mass., May, 1979.

5. "Models of Local Networks", ESD-TR-80-111, MITRE Corp., April 1980.

6. "Software Timing Studies for the Hughes Class 1 JTIDS Terminals", Working Papers 23253, MITRE Corp., March 1981.

7. "Applications of Distributed Database Technology to Tactical C3". Working Paper 23323 (joint with D. Lambert and W. Tracton, MITRE Corp. March 1983

Professional Activities

1. *NSF proposal reviewer* 2002-03

2. *Program Chair*, 11th Workshop on Parallel and Distributed Simulation (PADS97), held in Lockenhaus, Austria, June 1997

3. *Chair*, 9th Workshop on Parallel and Distributed Simulation (PADS95), Lake Placid, New York State, June, 1995

4. *Program Co-Chair*, ACM MSWIM, Conference on the Modelling and Simulation of Mobile Networks, Boston, August, 2000.

5. *Program Committee* for PADS (*Parallel and Distributed Simulation Workshop*), 1992-present

6. *Program Committee* for MASCOTS97 (*Sixth International Symposium on Modeling, Analysis, and Telecommunications*)

7. *Editorial board*, Parallel and Distributed Computing Practices, *Nova Science Publishers*, New York

8. *Guest Editor*, Journal of Parallel and Distributed Computing (Academic Press), Special Issue on Distributed and Parallel Simulation, March 2002.

9. *Guest Editor*, Parallel and Distributed Computing Practices, *Nova Science Publishers), Special Issue on Distributed and Parallel Simulation, July 2002*

Research Grants

1. *National Science and Engineering Research Council(NSERC),1984-present* The Canadian counterpart of the NSF. I have had continuous good support from NSERC in the form of both research and equipment grants.

2. *Quebec Research Grants(FCAR)* Quebec's research grant organization, I have participated in several team grants.

3. *Nortel Corporation(1999-02)* Grant for parallel simulation of VLSI. Funded Myrinet based network of computers in my research lab and students.

4. *NSERC Collaborative Research and Development Grant(1999-present)* for VLSI simulation, Further support for VLSI simulation with Nortel.

Courses

Parallel Simulation Graduate level seminar.
Computer Networks Graduate/upper-level undergraduate.
Distributed Algorithms Graduate/upper-level undergraduate.
Operating Systems Undergraduate.

Graduate Students

Doctoral Students. Six Ph.D. students have completed their degree. One will start this spring.
One *post-doctoral* fellow spent a year at McGill.
Master's Students. Fifteen M.Sc. students have completed their degree. Three M.Sc.students are under my supervision at present.

References

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   Atlanta, Georgia, 30332
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   Nanyang Ave.,Singapore,63978
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