Symposium on Theory of Computing
Twenty-First Annual
May 15-17, 1989
Seattle, Washington

Local Arrangements Chair: *Richard Ladner*
Program Committee Chair: *Christos Papadimitriou*
Program Committee:

Fan Chung	*Nancy Lynch*
Cynthia Dwork	*Christos Papadimitriou*
Faith Fich	*Vijaya Ramachandran*
Shafi Goldwasser	*Éva Tardos*
Debbie Joseph	*Avi Wigderson*
Maria Klawe	*Frances Yao*

STOC '89
Advance Registration Form

Please send this form or a facsimile, along with a check or money order, to:

Richard Ladner
Department of Computer Science, FR-35
University of Washington
Seattle, WA 98195
(Attn: STOC Registration)

Registration Fee	By 4/25/89	After 4/25/89
ACM or SIGACT Member	$190	$240
Neither ACM nor SIGACT Member	$200	$250
Author or Program Committee Member	$180	$230
Full-time Student	$50	$100

Registration fee includes 3 lunches, 1 outing, coffee breaks, and the proceedings. Student registration fee includes lunches, coffee breaks and proceedings, but not the outing. Additional outing tickets are $40 each. Circle the appropriate amount above.

Name_____

Affiliation_____

Address_____

Address_____

City_____State_____Zip_____

Country_____Phone_____

E-mail_____

Dietary restriction: □ Kosher   □ Vegetarian

STOC '89
May 15-17, 1989
Hotel Reservation Form

Reservations should be made by April 23, 1989. To make reservations by phone, 206-621-9000 Ext. 5555. When calling mention the dates of the conference and the code STOC '89.

To make reservations by mail, return this form with check, money order, or major credit card information, for the first night's deposit to:

Seattle Sheraton Hotel and Towers
1400 Sixth Avenue
Seattle, WA 98101

□ Single $95   □ Double $95   □ Triple $110   □ Quadruple $110

Name_____

Address_____

Address_____

City_____State_____Zip_____

Day time phone_____

Arrival Date and Time_____

Departure Date and Time_____

Sharing room with_____

Credit Card (if used)_____

Name on Credit Card_____

Credit Card No._____

Expiration Date of Card_____

Signature_____

Reservations received after the contracted block of rooms is full or after the cut-off date of April 23, 1989 are subject to space and rate availability.

Arrivals after 4:00 pm must guarantee first nights accommodations with check, money order, or major credit card.

Fire codes require that triples or quadruples must use existing bedding.

Conference Information

Hotel Information. The Seattle Sheraton Hotel and Towers is a first-class hotel located in downtown Seattle at 1400 Sixth Avenue, between Pike and Union Streets. To make a reservation call 206-621-9000 Ext. 5555 or send in the Hotel Reservation Form to the hotel. When calling mention the dates of the conference and the code STOC '89. Room rates are $95 for a single or double, $110 for a triple or quadruple. Fire codes require that triples or quadruples must use existing bedding. The symposium rate will be honored up to three days prior to and three days after the symposium. A block of rooms is being held for the symposium until the cut-off date of April 23, 1989. Reservations received after the block of rooms is full or after the cut-off date of April 23, 1989 are subject to space and rate availability. Check-in time is 3:00 pm and Check-out time is 1:00 pm.

Transportation. If you are flying you will arrive at Seattle-Tacoma International Airport (SEA-TAC) which is about 15 miles south of downtown Seattle. The Airport Express (Gray Line) runs about every 30 minutes from outside the baggage claim area to the Sheraton and costs $5.50 one-way or $10 round-trip. A taxi to the Sheraton costs about $22. To reach the hotel by car going north on I-5, exit on the left at the Seneca Street (exit 165), turn immediately right onto 6th and continue three blocks to the hotel on the right. Going south on I-5, exit on the right at Union Street (exit 165B), the hotel is immediately on your right between 6th and 7th. Going west on I-90, exit onto I-5 north (exit 2C), then exit I-5 at Madison. Turn left on Madison, then right onto 6th and continue 5 blocks to the hotel.

Airline Information. *American Airlines* has been designated the official carrier of STOC '89 offering special fares to North American conferees. From within the contiguous 48 States, *American* will allow 5% off any promotional air fare for which you qualify, 45% off regular day coach air fare with a 14 day advance purchase, or 40% off regular day coach air fare with a 7 day advance purchase. From within Canada, *American* will allow 35% off regular day coach fare with a 7 day advance purchase. These fares are valid for travel dates between 5/7/89 and 5/24/89. To take advantage of these fares you or your travel agent should call 1-800-433-1790 and ask for Star File #S-0759WE.

Outing. On Tuesday evening our group will take a short bus ride to the waterfront where we will board a boat to cross Puget Sound to Kiana Lodge. At Kiana we can enjoy their lovely gardens and be treated to a Northwest salmon feast. Busses depart the hotel at 5:20 and return about 9:30. The boat trip is about 50 minutes each way and may be chilly. The outing is included in the registration fee, except for those paying the student registration fee. Additional outing tickets may be purchased for $40.

Registration. There will be registration outside of the Cirrus Room on Sunday, May 14, from 8:00 to 10:00 pm. From Monday to Wednesday there will be a registration and information desk set up outside the Grand Ballroom from 8:30 am to 5:00 pm .

Information about Seattle. Seattle is a beautiful city of 500,000 people located on the shores of Lake Washington and Puget Sound. The Cascade Mountains to the east and Olympic Mountains to the west can both be viewed from the city. Mount Rainier (14,411 ft. or 4,434 m. tall) looms in the distance some 90 miles away. In mid May the temperature range is typically between 50F

(10C) and 70F (21C). Cloudy days with occasional rain can be expected with probability about 1/2.

Things To Do. There is much to do in the city during breaks at the conference. Washington State has many attractions if you plan to come before or stay after the conference. To obtain a statewide travel planning guide call 1-800-544-1800. A restaurant guide will be given out at the conference.

- Downtown, within walking distance or within the free bus zone. Yes, the city busses are free in the downtown area before 9 pm.

    - Pike Place Market (6 blocks west on Pike Street). This is an open air public market with many indoor and outdoor shops.

    - Waterfront (a short walk down stairs from Pike Place Market). On the waterfront you can visit the Seattle Aquarium, Omnidome with fantastic Mt. Saint Helens movie footage, Washington State ferries, and harbor boat tours.

    - Pioneer Square (10 blocks south of Pike Place Market on free bus lines). This is an historic area of Seattle with the Underground Tour, many galleries and shops, Elliot Bay Bookstore and Cafe, Smith Tower, and Kingdome Stadium.

    - International District (14 blocks south of the hotel and just east of the Kingdome). This is a small area populated with many oriental restaurants.

    - Convention Center and Freeway Park (just east of the hotel).

    - Downtown Shopping (just west of the hotel). Many nice stores including Eddie Bauer, Nordstroms, I. Magnin, and the small shops in the new Westlake Center are nearby.

- Within Seattle and can be easily reached by city bus. Busses fares are 55 cents during non-peak hours and 75 cent during peak hours. On busses going out of Downtown you pay on getting off the bus and on busses going toward Downtown you pay on getting on the bus. You must have exact change.

    - Capitol Hill. An off beat area about just east of Downtown. The main attraction is Broadway which has many shops and eating places. Special attractions there are the art cinemas the Harvard Exit and the Egyptian. Volunteer park has a very nice art museum and plant conservatory. A retail store of the mail order house REI is on Capitol Hill.

    - University District. This area surrounds the beautiful University of Washington campus. Nearby is the University Arboredum with a splendid Japanese Garden.

    - Seattle Center. This is an enclosed campus which houses the Space Needle, an amusement park, Pacific Science Center, Bagley Wright Theatre, Opera House, Intiman Theatre, and ACT Theatre. Seattle Center is reachable from Downtown by an elevated monorail.

    - Ballard Locks, Shilshole Marina, Golden Gardens Park, and Discovery Park. (four attractions very near each other in the northwest part of the city). The Ballard Locks connect the salt water Puget Sound to fresh water Lake Washington. This is a great place to go boat watching on weekends. Shilshole Marina is a moorage for about 1,500 sail boats. Golden Gardens is a beach on Puget Sound and Discovery Park is a huge undeveloped park where a pair of Bald Eagles have a nest.

– Woodland Park Zoo and Green Lake (adjacent attractions). The Zoo has great African savannah and Gorilla exhibits. Green Lake is a jogger's paradise, a 2.6 mile (4.3 k) run around a park surrounded lake. Those two Bald Eagles which are nesting in Discovery Park seem to spend their afternoons at Green Lake.

- Outside Seattle requiring an automobile to get there.

    – Museum of Flight near Boeing Field (15 minutes South).
    – Boeing Tour of 747 Plant in Everett (30 minutes North).
    – Ste. Michelle Winery (30 minutes Northeast).
    – Mt. Rainier (3 hours south). There is Paradise Lodge and a visitors' center near the 6000 foot (1850 meter) level on the south face of Rainier. The trails will be snow-covered at this time. You should be able to see Rainier from I-5 as you leave from the south end of Seattle otherwise you may not see anything at 6000 feet either.
    – Mt. Saint Helens (3.5 hrs south). The last parts of this route are on well maintained one lane forest service roads with turnouts. On a clear day there are also good views of Mt. Rainier, Mt. Adams, and Mt. Hood as well as Mt. St. Helens. Check that this road is open since that may depend on the snow pack. Hiking trails are probably snow-covered.
    – North Cascades (1.5-2 hrs northeast). The North Cascades loop highway travels through some beautiful jagged mountains. Most of the trails will be snow/ice covered. The full loop is a very long drive but interesting places crop up fairly quickly.
    – Steven's Pass-Cascades (1-1.5 hr northeast). Highway 2 through the mountains travels through a somewhat less rugged area than the North Cascades. Most areas below the pass should have good snow-free hiking areas.
    – Snoqualmie Pass-Cascades (1 hr east). Lowest of the passes through the Cascades, following I-90. Several hikes along the way, also along the way is Snoqualmie Falls, a pleasant park setting with waterfall very popular with Sunday picnickers in the summer.
    – Olympic Penninsula (2-3 hrs west). Reachable either by ferry and across Hood Canal Bridge to the north or through Olympia to the south. Several very different areas to explore. The Hurricane Ridge visitor center in the Olympic mountains is reachable an hour south from Port Angeles. The Pacific coast (another 2 hrs) has some of the most rugged shorelines in the continental U.S. The west side of the Olympics also creates middle latitude rain forests in several places. Many trails on the east side of the Olympics should be hikable in May.
    – San Juan Islands (2.5 hours north by car then ferry). Beautiful cluster of islands with small resorts and towns. Many bed-and-breakfasts can be found for overnight stays.
    – Victoria B.C. (2.5-4.5 hrs by boat). There is no need to take a car to enjoy Victoria. From Seattle take either the Princess Marguerite (slow boat) or Victoria Clipper (fast boat).
    – Vancouver B.C. (3 hrs North).

Further Information. For further information contact Richard Ladner, Department of Computer Science, University of Washington, Seattle, WA 98195, 206-543-9347.

STOC '89 Program

All events except the outing are held at the Seattle Sheraton. All technical sessions and lunches will be held in the Grand Ballroom on the second floor. Other events will be in rooms indicated in the program. During the day there will be rooms on the second floor available for small meetings.

Sunday Evening, May 14, 1989

RECEPTION: 8:00 - 11:00, in the Cirrus Room on the 35th floor.
  Video Tape of AAAS Academic Funding Panel can be viewed nearby.

Monday, May 15, 1989

SESSION 1: 8:30 - 10:10, chaired by Shafi Goldwasser, M.I.T.

8:30 "Multiparty protocols and logspace-hard pseudorandom sequences," Laszlo Babai, Univ. of Chicago and Eotvos University, Hungary, Noam Nisan, UC Berkeley, and Mario Szegedy, Univ. of Chicago.

8:50 "Pseudo-random Number Generation from ANY One-way Function," Russell Impagliazzo, UC Berkeley, Leonid Levin, Boston University, and Michael Luby, Univ. of Toronto.

9:10 "A Hard-Core Predicate for All One-Way Functions," Oded Goldreich, Technion, Israel, and Leonid A. Levin, Boston University.

9:30 "Universal One-Way Hash Functions and their Cryptographic Applications," Moni Naor, UC Berkeley, and Moti Yung, IBM Yorktown.

9:50 "Limits on the Provable Consequences of One-way Permutations," Russell Impagliazzo, UC Berkeley, and Steven Rudich, Univ. of Toronto.

BREAK: 10:10 - 10:40

SESSION 2: 10:40 - 12:00, chaired by Cynthia Dwork, IBM Almaden Research Center

10:40 "A Zero-One Law for Boolean Privacy," Benny Chor and Eyal Kushilevitz, Technion, Israel.

11:00 "Verifiable Secret Sharing and Multiparty Protocols with Honest Majority," Tal Rabin and Michael Ben-Or, the Hebrew University, Israel.

11:20 "Designing Programs that Check Their Work," Manuel Blum and Sampath Kannan, UC Berkeley.

11:40 "Provably Fast Integer Factoring with Quasi-uniform Small Quadratic Residues," Brigette Vallee, Univ. de Caen, France.

LUNCH: 12:00 - 1:20

SESSION 3: 1:20 - 3:20, chaired by Debby Joseph, Univ. of Wisconsin at Madison

1:20 "Functional Interpretations of Feasibly Constructive Arithmetic," Stephen Cook and Alasdair Urquhart, Univ. of Toronto.

1:40 "Expressiveness of Restricted Recursive Queries," Foto Afrati, National Technical University of Athens, Greece, and Stavros S. Cosmadakis, IBM T. J. Watson Research Center.

2:00 "On ω-Automata and Temporal Logic," Shmuel Safra, Weizmann Institute, Israel, and Moshe Y. Vardi, IBM Almaden Research Center.

2:20   "Quantifier Elimination in the Theory of Algebraically-Closed Fields," Doug Ierardi, Cornell University.

2:40   "Probabilistic Computation and Linear Time," Lance Fortnow and Michael Sipser, M.I.T.

3:00   "The Isomorphism Conjecture Fails Relative to a Random Oracle," Stuart A. Kurtz, Univ. of Chicago, Stephen R. Mahaney, AT&T Bell Laboratories, and James S. Royer, Univ. of Chicago.

BREAK: 3:20 - 3:40

SESSION 4: 3:40 - 5:40, chaired by Avi Wigderson, Hebrew University, Israel

3:40   "On the Method of Approximations," A. A. Razborov, Steklov Mathematical Institute, USSR.

4:00   "On the Extended Direct Sum Conjecture," Nader H. Bshouty, Technion, Israel.

4:20   "Circuits and Local Computation" Andrew Chi-Chih Yao, Princeton University.

4:40   "A General Sequential Time-Space Tradeoff for Finding Unique Elements," Paul Beame, Univ. of Washington.

5:00   "Towards a Theory of Average Case Complexity," Shai Ben-David, Benny Chor, and Oded Goldreich, Technion, Israel, and Michael Luby, Univ. of Toronto.

5:20   "Tradeoffs Between Communication and Space," Tak Lam, Univ. of Washington, Prasoon Tiwari and Martin Tompa, IBM T. J. Watson Research Center

SIGACT BUSINESS MEETING: 8:30 - 11:00 in Metropolitan Ballroom on the third floor

Tuesday, May 16, 1989

SESSION 5: 8:30 - 10:10, chaired by Maria Klawe, University of British Columbia

8:30   "Work-Preserving Simulations of Fixed-Connection Networks," Richard Koch and Tom Leighton, M.I.T., Bruce Maggs, Univ. of Massachusetts, Amherst, Satish Rao, M.I.T., and Arnold Rosenberg Univ. of Massachusetts, Amherst.

8:50   "An $O(\log N)$ Deterministic Packet Routing Scheme," Eli Upfal, IBM Almaden Research Center.

9:10   "Fast Computation Using Faulty Hypercubes," Johan Hastad, Royal Institute of Technology, Sweden, and Tom Leighton and Mark Newman, M.I.T.

9:30   "Optimal Size Integer Division Circuits," John H. Reif and Stephen R. Tate, Duke University.

9:50   "On the Complexity of Radio Communication," Noga Alon, Tel Aviv University, Israel, Amotz Bar-Noy, Stanford University, Nathan Linial, IBM Almaden Research Center, and David Peleg, Weizmann Institute, Israel, and Stanford University.

BREAK: 10:10 - 10:40

SESSION 6: 10:40 - 12:20, chaired by Vijaya Ramachandran, Univ. of Texas at Austin

10:40   "Local Reorientation, Global Order, and Planar Topology," Ming-Yang Kao and Gregory E. Shannon, Indiana University, Bloomimgton.

11:00   "Parallel Depth-First Search in General Directed Graphs," Alok Aggarwal, T. J. Watson Center, Richard J. Anderson, Univ. of Washington, and Ming-Yang Kao, Indiana University, Bloomington.

11:20 "Highly Parallelizable Problems," Omer Berkman and Dany Breslauer, Tel Aviv University, Israel, Zvi Galil, Tel Aviv University, Israel, and Columbia University, Baruch Schieber, IBM T. J. Watson Research Center, and Uzi Vishkin, Tel Aviv University, Israel, and Univ. of Maryland.

11:40 "Optimal Separations Between Concurrent-write Parallel Machines," Ravi B. Boppana, Rutgers University.

12:00 "CREW PRAMS and Decision Trees," Noam Nisan, UC Berkeley.

LUNCH: 12:20 - 2:00

SESSION 7: 2:00 - 3:20, chaired by Faith Fich, Univ. of Toronto

2:00 "Implicit $O(1)$ Probe Search," Amos Fiat and Moni Naor, UC Berkeley.

2:20 "The Cell Probe Complexity of Dynamic Data Structures," Michael Fredman, Bellcore and UCSD, and Michael Saks, UCSD, Bellcore, and Rutgers University.

2:40 "On Aspects of Universality and Performance for Closed Hashing," Jeanette P. Schmidt, Rutgers University, and Alan Siegel, NYU.

3:00 "Verifying Partial Orders," Claire Kenyon-Mathieu and Valerie King, Princeton University.

BREAK: 3:20 - 3:40

SESSION 8: 3:40 - 5:00, chaired by Frances Yao, Xerox Palo Alto Research Center

3:40 "A Random Polynomial Time Algorithm for Approximating the Volume of Convex Bodies," Martin Dyer, Univ. of Leeds, United Kingdom, and Alan Frieze and Ravi Kannan, CMU.

4:00 "Lines in Space –Combinatorics, Algorithms and Applications" Bernard Chazelle, Princeton University, Herbert Edelsbrunner, Univ. of Illinois at Urbana-Champaign, Leonidas Guibas, DEC Systems Research Center and Stanford University, and Micha Sharir, NYU and Tel Aviv University, Israel.

4:20 "Polling: A New Randomized Sampling Technique for Computational Geometry" John H. Reif and Sandeep Sen, Duke University.

4:40 "Coordinate Representation of Order Types Requires Exponential Storage," Jacob E. Goodman, City College, CUNY, Richard Pollack, NYU, and Bernd Sturmfels, Johannes-Kepler Univ., Austria.

OUTING TO KIANA LODGE: 5:20 - 9:30

INFORMAL MEETING ON ACADEMIC FUNDING: 9:30 - 11:00, in Meeting Room 426 on fourth floor, chaired by Barbara Simons, IBM Almaden Research Center

Wednesday, May 17, 1989

SESSION 9: 8:30 -9:50, chaired by Christos Papadimitriou, UCSD

8:30 "Inference of Finite Automata Using Homing Sequences," Ronald L. Rivest and Robert E. Schapire, M.I.T.

8:50 "The Minimum Consistent DFA Problem Cannot Be Approximated within any Polynomial," Leonard Pitt, Univ. of Illinois at Urbana, Champaign, and Manfred K. Warmuth, UC Santa Cruz.