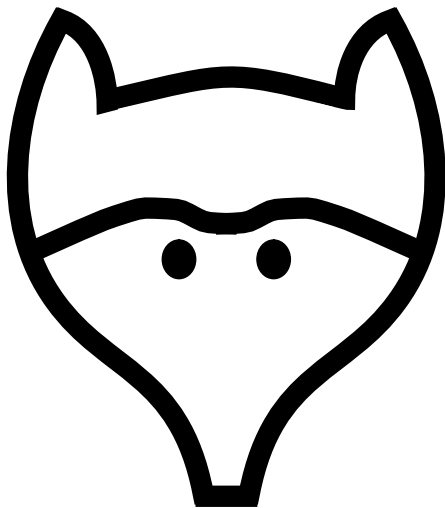# FOCS '99

The 40th Annual
IEEE Computer Society
**Symposium on Foundations
of Computer Science**

October 17 – 19, 1999
New York, New York

Sponsored by the IEEE Computer Society
Technical Committee on Mathematical
Foundations of Computing
In cooperation with ACM SIGACT

Registration Instructions for FOCS '99

The registration fees for FOCS '99 are listed on the registration form. To qualify for the early registration fee, your registration application must be postmarked by **Wednesday, September 15**. Refund requests will be honored until September 22. The registration fee includes the Saturday night reception, the Sunday night business meeting, coffee breaks, lunches Sunday through Tuesday, and a copy of the proceedings.

Please completely fill out the left half of the registration form. You can pay by check or money order (in U.S. $, drawn on a U.S. bank) payable to "IEEE – FOCS '99," and send it together with the form to

Piotr Berman
Attn: FOCS '99 Registration
220 Pond Lab.
Dept. of Computer Science and Eng.
Penn State
University Park, PA   16802

Alternatively, you can pay by Visa or Mastercard; in that case, fill in the credit card information on the form, and either mail it, or

Fax to (814) 865-3176, Att. Piotr Berman.

If you decided to register at the conference site, it would be still very helpful if you notify the organizers by e-mail to berman@cse.psu.edu. You can also e-mail any questions that you may have or requests for help.

Machtey Award: The Machtey Award is presented for the most outstanding paper (or papers) written by a student or collaboration of students, as judged by the Program Committee. The award includes a grant to help defray expenses incurred in attending the Symposium. Please consider making a donation to the Machtey Award Fund so that this award tradition can be sustained. Add the amount of your donation to the total that you pay by check, money order or credit card.

Registration Form for FOCS '99

Name⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Affiliation⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Street Address⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

City⎯⎯⎯⎯⎯⎯⎯⎯State⎯⎯⎯⎯⎯⎯⎯

ZIP or Country & Postal code⎯⎯⎯⎯⎯⎯

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Phone⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Dietary restrictions: Kosher⎯⎯Vegetarian⎯⎯None⎯⎯

Please circle one category below and fill in your membership

number if appropriate: #⎯⎯⎯⎯⎯⎯⎯⎯⎯

Category	Fee	After 9/22
ACM or SIGACT member	315	380
IEEE or EATCS member	315	380
Author or PC member	315	380
Student	110	130
Other	380	465

Machtey Fund Contributions ⎯⎯⎯⎯⎯⎯

Total registration ⎯⎯⎯⎯⎯⎯⎯⎯⎯

If you pay by Mastercard or Visa, please complete the information below. You should provide the name that appears on the card, the billing address of this card and the signature of the card holder.

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City, ZIP, etc.⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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I agree to pay the above total amount according to card issuer agreement.

HOTEL PENNSYLVANIA
Reservation Request for
a participant of IEEE Computer Society FOCS'99

To reserve a room you can

- call 212-736-5000 or 1-800-223-8585;

- fill a form available at hhtp://hotelpenn.com;

- fill this form and fax it to 212-502-8712.

Be sure to request the rates for **IEEE Computer Society FOCS'99**: $149 per night for Single, $159 for Double, $184 for Triple, and $209 for Quad, plus 13.25% tax, plus $2 per night occupancy tax.

Name:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Institution:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Address:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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State/Province:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

ZIP/Postal Code:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Phone:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Fax:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Number of rooms you need:⎯⎯⎯⎯⎯⎯

Arrival (month/day/year):⎯⎯⎯⎯⎯⎯⎯

Departure (month/day/year):⎯⎯⎯⎯⎯⎯

Number of adults:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Type of room: single | double | triple | quad

Would you prefer: Smoking | Non-Smoking

Credit Card Name: AmEx | Mastercard | Visa

Name on Card:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Credit Number:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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I request the special rate for IEEE Computer Society FOCS'99: $149 per night for Single, $159 for Double, $184 for Triple and $209 for Quad, plus 13.25% tax, plus $2 per night occupancy tax.

Program

Reception: 7:00 pm – 10:00 pm

SUNDAY, OCT 17, 1999

Session 1: 8:50 am – 10:15 am
Chair: David Shmoys

8:50 *Primal-Dual Approximation Algorithms for Metric Facility Location and k-Median Problems*
Kamal Jain, Vijay Vazirani, *Georgia Tech.*

9:10 *Approximation Algorithms for Classification Problems with Pairwise Relationships: Metric Labeling and Markov Random Fields*
Jon Kleinberg, Eva Tardos, *Cornell University.*

9:35 *Approximating Fractional Multicommodity Flow Independent of the Number of Commodities*
Lisa Fleischer, *Columbia University.*

9:55 *Approximation Schemes for Minimizing Average Weighted Completion Time with Release Dates*
Foto Afrati, *Heroon Polytechniou*; Evripidis Bampis, *Université D'Evry*; Chandra Chekuri, *Bell Labs*; David Karger, *M.I.T.*; Claire Kenyon, *Université Paris-Sud*; Sanjeev Khanna, *Bell Labs*; Ioannis Milis, *Athens Univ. of Economics*; Maurice Queyranne, *Univ. of British Columbia*; Martin Skutella, *Université catholique du Louvain*; Cliff Stein, *Dartmouth College*; Maxim Sviridenko, *Sobolev Institute of Mathematics.*

Break 10:15 - 10:45

Session 2: 10:45 am – 12:30 pm
Chair: Paul Beame

10:45 *A $\frac{5}{2}n^2$-Lower Bound for the Rank of $n \times n$-Matrix Multiplication over Arbitrary Fields*
Markus Bläser, *Universität Bonn.*

11:05 *Improved Bounds for Sampling Colorings*
Eric Vigoda, *U.C. Berkeley.*

11:30 *A Non-linear Time Lower Bound for Boolean Branching Programs*
Miklós Ajtai, *I.B.M. Almaden.*

11:50 *Derandomizing Arthur-Merlin Games using Hitting Sets*
Peter Bro Miltersen, N.V. Vinodchandran, *University of Aarhus.*

12:10 *Fully Dynamic Algorithms for Maintaining All-Pairs Shortest Paths and Transitive Closure in Digraphs*
Valerie King, *University of Victoria.*

Lunch 12:30 - 2:00

2:00 pm – 3:00 pm KNUTH PRIZE LECTURE
László Lovasz

Session 3: 3:10 pm – 3:50 pm
Chair: Joseph Mitchell

3:10 *Dynamic Planar Convex Hull Operations in Near-logarithmic Amortized Time*
Timothy Chan, *University of Miami.*

3:30 *Taking a walk in a planar arrangement*
Sariel Har-Peled, *Tel-Aviv University.*

Break 3:50 - 4:20

Session 4: 4:20 pm – 5:45 pm
Chair: Michael Mitzenmacher

4:20 *PSPACE has Constant-Round Quantum Interactive Proof Systems*
John Watrous, *Université de Montréal.*

4:40 *Verifiable Random Functions*
Silvio Micali, *M.I.T.*; Michael Rabin, *Harvard University*; Salil Vadhan, *M.I.T.*

5:05 *How Asymmetry Helps Load Balancing*
Berthold Vöcking, *I.C.S.I. Berkeley.*

5:25 *Noncryptographic Selection Protocols*
Uriel Feige, *Weizmann Institute.*

Business Meeting 9:00 pm

MONDAY, OCT 18, 1999

Session 5A: 9:00 am – 10:10 am
Chair: Andrei Broder

9:00 *A PTAS for Clustering in Metric Spaces*
Piotr Indyk, *Stanford University.*

9:25 *Efficient Regular Data Structures and Algorithms for Location and Proximity Problems*
Arnon Amir, *I.B.M. Almaden*; Alon Efrat, Piotr Indyk, *Stanford University*; Hanan Samet, *University of Maryland.*

9:50 *Approximate Nearest Neighbor Algorithms for Hausdorff Metrics via Embeddings*
Martin Farach-Colton, *Rutgers University*; Piotr Indyk, *Stanford University.*

Session 5B: 9:00 am – 10:10 am
Chair: Eric Allender

9:00 *Near-Optimal conversion of Hardness into Pseudo-Randomness*
Russell Impagliazzo, *U.C. San Diego*; Ronen Shaltiel, Avi Wigderson, *Hebrew University.*

9:25 *Error Reduction for Extractors*
Ran Raz, Omer Reingold, *Weizmann Institute*; Salil Vadhan, *M.I.T.*

9:50 *Primality and Identity Testing via Chinese Remaindering*
Manindra Agrawal, Somenath Biswas, *I.I.T. Kanpur*.

Break 10:10 - 10:40

Session 6A: 10:40 am – 12:15 pm
Chair: Dana Randall

10:40 *On Counting Independent Sets In Sparse Graphs*
Martin Dyer, *University of Leeds*; Alan Frieze, *Carnegie Mellon University*; Mark Jerrum, *University of Edinburgh*.

11:05 *Torpid Mixing of Some Monte Carlo Markov Chain Algorithms in Statistical Physics*
Christian Borgs, Jennifer Chayes, *Microsoft Research*; Alan Frieze, *Carnegie Mellon University*; Jeong Han Kim, *Microsoft Research*; Prasad Tetali, *Georgia Tech*; Eric Vigoda, *U.C. Berkeley*; Van Ha Vu, *I.A.S. Princeton*.

11:30 *Random Walks on Truncated Cubes and Sampling 0-1 Knapsack Solutions*
Ben Morris, Alistair Sinclair, *U.C. Berkeley*.

11:55 *Markovian Coupling versus Conductance for the Jerrum-Sinclair Chain*
V.S. Anil Kumar, Ramesh Hariharan, *I.I.Sc. Bangalore*.

Session 6B: 10:40 am – 12:15 pm
Chair: James Aspnes

10:40 *A Near-tight Lower Bound on the Time Complexity of Distributed MST Construction*
David Peleg, *Weizmann Insitute* Vitaly Rubinovich, *Bar Ilan University*.

11:05 *Long-Lived and Adaptive Collect with Applications*
Yehuda Afek, Gideon Stupp, *Tel-Aviv University*; Dan Touitou, *IDC Herzliya*.

11:30 *A Theoretical Framework for Memory-Adaptive Algorithms*
Rakesh Barve, Jeffrey Vitter, *Duke University*.

11:55 *Cache-Oblivious Algorithms*
Matteo Frigo, Charles Leiserson, Harald Prokop, Sridhar Ramachandran, *M.I.T.*

Lunch 12:15 - 2:00

Session 7A: 2:00 pm – 3:35 pm
Chair: Satish Rao

2:00 *The Directed Steiner Network Problem is Tractable for a Constant Number of Terminals*
Jon Feldman, Matthias Ruhl, *M.I.T.*

2:25 *Inverse Parametric Optimization*
David Eppstein, *U.C. Irvine*.

2:50 *Finding Double Euler Trails of Planar Graphs in Linear Time*
Zhi-Zhong Chen, *Tokyo Denki University*; Xin He, Chun-Hsi Huang, *S.U.N.Y. Buffalo*.

3:15 *Edge-Disjoint Routing in Plane Switch Graphs in Linear Time*
Karsten Weihe, *Universität Konstanz*.

Session 7B: 2:00 pm – 3:35 pm
Chair: Peter Shor

2:00 *On Quantum and Classical Space-Bounded Processes with Algebraic Transition Amplitudes*
John Watrous, *Université de Montréal*.

2:25 *A Better Lower Bound for Quantum Algorithms Searching an Ordered List*
Andris Ambainis, *U.C. Berkeley*.

2:50 *Bounds for Small-Error and Zero-Error Quantum Algorithms*
Harry Buhrman, *C.W.I. Amsterdam*; Richard Cleve, *University of Calgary*; Ronald de Wolf, *C.W.I. and University of Amsterdam*; Christof Zalka, *Los Alamos National Labs*.

3:15 *Optimal Lower Bounds for Quantum Automata and Random Access Codes*
Ashwin Nayak, *U.C. Berkeley*.

Break 3:35 - 4:05

Session 8A: 4:05 pm – 5:15 pm
Chair: Joseph Mitchell

4:05 *Improved Combinatorial Algorithms for the Facility Location and k-Median Problems*
Moses Charikar, Sudipto Guha, *Stanford University*.

4:30 *Lovasz's Lemma for the K-Level of Concave Surfaces and its Applications*
Naoki Katoh, *Kyoto University*; Takeshi Tokuyama, *I.B.M. Tokyo*.

4:55 *Cuts, Trees and l_1-Embeddings of Graphs*
Anupam Gupta, *U.C. Berkeley*; Ilan Newman, Yuri Rabinovich, *University of Haifa*; Alistair Sinclair, *U.C. Berkeley*.

Session 8B: 4:05 pm – 5:15 pm
Chair: Paul Beame

4:05 *A Probabilistic Algorithm for k-SAT and Constraint Satisfaction Problems*
Uwe Schöning, *Universität Ulm*.

4:30 *Random CNF's are Hard for the Polynomial Calculus*
Eli Ben-Sasson, *Hebrew University*; Russell Impagliazzo, *U.C. San Diego*.

4:55 *A Study of Proof Search Algorithms for Resolution and Polynomial Calculus*
Maria Bonet, Nicola Galesi, *Universitat Politecnica de Catalunya*.

Session 9A: 9:00 am – 10:10 am
Chair: Yair Bartal

9:00 *Scheduling to Minimize Average Stretch*
Johannes Gehrke, *University of Wisconsin*; S. Muthukrishnan, *AT&T Labs*; Rajmohan Rajaraman, *Northeastern University*; Anthony Shaheen, *Loyola Marymount University*.

9:25 *Weak Adversaries for the k-Server Problem*
Elias Koutsoupias, *U.C.L.A.*.

9:50 *Finely-competitive Paging*
Avrim Blum, Carl Burch, Adam Kalai, *Carnegie Mellon University*.

Session 9B: 9:00 am – 10:10 am
Chair: Luca Trevisan

9:00 *On the Complexity of SAT*
Richard Lipton, Anastasios Viglas, *Princeton University*.

9:25 *Hardness of Approximating Σ_2^p Minimization Problems*
Christopher Umans, *U.C. Berkeley*.

9:50 *Hardness of Approximating the Minimum Distance of a Linear Code*
Ilya Dumer, *U.C. Riverside*; Daniele Micciancio, Madhu Sudan, *M.I.T.*.

Break 10:10 - 10:40

Session 10A: 10:40 am – 12:15 pm
Chair: Ming Li

10:40 *On Universal and Fault-Tolerant Quantum Computing: A Novel Basis and a New Constructive Proof of Universality for Shor's Basis*
P. Oscar Boykin, Tal Mor, Mathew Pulver, Vwani Roychowdhury, Farrokh Vatan, *U.C.L.A.*.

11:05 *Satisfiability of Word Equations with Constants is in PSPACE*
Wojciech Plandowski, *Warsaw University*.

11:30 *An Approximate L^1-Difference Algorithm for Massive Data Streams*
Joan Feigenbaum, *AT&T Labs*; Sampath Kannan, *University of Pennsylvania*; Martin Strauss, *AT&T Labs*; Mahesh Viswanathan, *University of Pennsylvania*.

11:55 *Algorithmic Aspects of Protein Structure Similarity*
Deborah Goldman, *U.C. Berkeley*; Sorin Istrail, *Sandia National Labs*; Christos Papadimitriou, *U.C. Berkeley*.

Session 10B: 10:40 am – 12:15 pm
Chair: Luca Trevisan

10:40 *Magic Functions*
Cynthia Dwork, *I.B.M. Almaden*; Moni Naor, Omer Reingold, *Weizmann Institute*; Larry Stockmeyer, *I.B.M. Almaden*.

11:05 *Limits on the Efficiency of One-Way Permutation-Based Hash Functions*
Jeong Han Kim, Daniel Simon, *Microsoft Research*; Prasad Tetali, *Georgia Tech*.

11:30 *Non-Malleable Non-Interactive Zero Knowledge and Achieving Chosen-Ciphertext Security*
Amit Sahai, *M.I.T.*.

11:55 *Non-Interactive Cryptocomputing for NC^1*
Tomas Sander, *I.C.S.I. Berkeley*; Adam Young, *Columbia University*; Moti Yung, *Certco New York*.

Lunch 12:15 - 2:00

Session 11A: 2:00 pm – 4:00 pm
Chair: Susanne Albers

2:00 *Fairness in Routing and Load Balancing*
Jon Kleinberg, *Cornell University*; Yuval Rabani, *Technion*; Eva Tardos, *Cornell University*.

2:25 *Stochastic Load Balancing and Related Problems*
Ashish Goel, Piotr Indyk, *Stanford University*.

2:50 *Reducing Network Congestion and Blocking Probability Through Balanced Allocation*
Malwina Luczak, *M.I.T.*; Eli Upfal, *Brown University*.

3:15 *Finding Maximal Repetitions in a Word in Linear Time*
Roman Kolpakov, *Moscow University*; Gregory Kucherov, *LORIA/INRIA Lorraine*.

3:40 *All Pairs Shortest Paths in Undirected Graphs with Integer Weights*
Avi Shoshan, Uri Zwick, *Tel-Aviv University*.

Session 11B: 2:00 pm – 4:00 pm
Chair: Nader Bshouty

2:00 *An Algorithmic Theory of Learning: Robust Concepts and Random Projection*
Rosa Arriaga, *Harvard University*; Santosh Vempala, *M.I.T.*.

2:25 *Boosting and Hardness Amplification*
Adam Klivans, *M.I.T.*; Rocco Servedio, *Harvard University*.

2:50 *Learning Mixtures of Gaussians*
Sanjoy Dasgupta, *U.C. Berkeley*.

3:15 *Regular Languages Are Testable With a Constant Number of Queries*
Noga Alon, *Tel-Aviv University*; Michael Krivelevich, *DIMACS and AT&T Labs*; Ilan Newman, *University of Haifa*; Mario Szegedy, *I.A.S. Princeton*.

3:40 *Efficient Testing of Large Graphs*
Noga Alon, Eldar Fischer, *Tel-Aviv University*; Michael Krivelevich, *DIMACS and AT&T Labs*; Mario Szegedy, *I.A.S. Princeton*.

Program Ends: 4:00 pm

General Information

For detailed and up-to-date information, see the conference web site:

http://www.cs.washington.edu/focs99

We will post updates of the general information, requests for hotel roommates (send them to berman@cse.psu.edu), etc. at this site.

Registration: The registration desk will be open from 6 pm - 10 pm on Saturday, and during the day on Sunday and Monday. Additional copies of the proceedings will be sold during the conference at the registration desk.

Conference Events: A reception will be held at the Pennsylvania Hotel from 7PM until 10PM on Saturday, October 16. Drinks and hors d'oeuvres will be served. There will be a business meeting on Sunday, October 17. Lunches will be served in the conference hotel Sunday through Tuesday.

Location and Accommodations

All conference events will take place at the Hotel Pennsylvania in New York, located at 400 Seventh Avenue, between 32nd and 33 street. The hotel was built 80 years ago, and its name refers to Pennsylvania Station Terminal, the main train station of New York, which is located across the street. In the 1930's it was a center for big bands – Glen Miller's song *Pennsylvania 6-5000* made its telephone number famous.

The prices quoted in the Reservation form are for a limited block of rooms at the Hotel Pennsylvania and are guaranteed until **September 15.** You are advised to make reservations as soon as possible, because the size of the reserved block of rooms had to be based on the demand in the previous years, when obtaining an alternative accommodation was much easier.

Important advice: obtaining a cheaper hotel in New York is theoretically possible, especially if you reserve well in advance. However, it is not easy to obtain one that is *much* cheaper without a substantial commute. After the September 15 deadline, you may have a choice between paying more than $200 per night, or paying only about a $100, and commuting a significant distance by train each way. Recently, the tourist traffic in New York has increased considerably, and finding a room is much more difficult than it was 2-3 years ago.

Getting There

The Hotel Pennsylvania is in the central part of Manhattan, on Seventh Avenue, it occupies the entire block between 32nd and 33 Street, and half of the block between Seventh and Sixth Avenue. This location is served very well by public transportation; nearby there are subway entrances to lines A, C, E, 1, 2, 3, 4, B, D, F, N, Q and R, and to PATH (trains to Newark and Hoboken in New Jersey).

Across the street is the main train station of New York City, Penn Station Terminal under Madison Square Garden building. This terminal serves AMTRAK and suburban trains from New Jersey and Long Island. The main bus terminal of New York is called the Port Authority, and is located 12 minute walk away on Eight Avenue and 42nd Street. Commuters from the northern suburbs arrive at Grand Central Station, which is a short taxi ride or a 20 minute walk away at Park Avenue and 42nd Street.

Airports: New York is served by three airports, JFK and La Guardia in Queens (the eastern part of New York City) and Newark in New Jersey (on the other side of the Hudson River). Both Newark and JFK have significant numbers of international flights available. A rental car is probably a disadvantage within the city as taxis and the subway are very convenient.

From JFK, there are three transportation options. For a fixed rate of $30 plus $3.50 toll plus tip one can take a taxi (drivers tend to be irate if the tip is under $5). The taxi trip takes between 35 minutes and 3 hours depending on traffic. For $1.50, one can get a free bus to the Howard Beach subway station, and there continue by the A line (there is no other line on this stop). The whole trip takes about 1 hour 20 minutes. For $12, one can take Gray Line bus to the Port Authority.

From LaGuardia, the options are similar. The taxi costs roughly $16 plus $3.50 toll plus tip, Carey Coach Express bus goes to Penn Station for $10. Both are between 25 and 30 minutes off-peak and up to 1 1/2 hours or more at rush hour. One can also take Q33 bus to Jackson Heights (have 6 quarters ready, go to the last stop) and take subway line E from there.

From Newark airport, the Olympia Trails bus goes directly to Penn Station Terminal for $7. During rush hour, one may alternatively take the NJ Transit 303 bus (or a taxi) to *Newark's* Penn Station (not to be confused with NY Penn Station), and from there continue by PATH train (for $1). In PATH, one has to change trains at Journal Square (walk across the platform from the World Trade Center train to the 33rd St. train). Reversing this latter route may be your fastest route out of town of all the airports from the conference hotel during rush hour.

Car travel: For people traveling by car, we may offer a word of caution. Both driving and parking in Manhattan is *relatively* easy provided you stick to certain simple rules. Don't drive during business hours. After the conference, it may be better to enjoy a city afternoon and leave after 8 pm to avoid gridlock. Don't park on the street: the car can be broken into and the ticket for incorrect parking can be so high that you could wish that the car was broken into instead. Parking garages are plentiful and convenient (expect about $20-25 per 24 hours). The nearest parking garage is at 371 Seventh Ave., near 31st street. There are also other garages on 31st and 34th streets.

Climate: The average high temperature in October is $65°$ F ($18°$ C), but there is a wide degree of variation. Visitors should also be prepared for rain.

Things to Do

During the 1880s and '90s, the area around the hotel was known as the Tenderloin District and was filled with dance halls and bordellos. During the 1930s, big band jazz orchestras were entertaining in Hotel Pennsylvania. Today, this area is known as the Fashion District, as it is full of stores with apparel, fabric stores, dress designers, etc. The largest department store in the world, *Macy's*, is one block away. Two blocks away, one can find *Empire State Building*, the second tallest in the city, with its famous observation deck.

The nearest area with a concentration of good restaurants is Greenwich Village, 20 blocks to the south (one street block $\approx$ 1 minute walking). Adjacent is multi-ethnic East Village, artistic SoHo, China Town and Little Italy. Just strolling, shopping and eating is a great experience. Notes: (1) Only tourists eat in Little Italy. (2) To the south of these neighborhoods is the gloomy Financial District.

Beginning 10 blocks north from the hotel is the Theatre District, with adjacent Carnegie Hall and Lincoln Center. One can spend a typical New York afternoon by going to a concert, theatre, musical, opera or ballet, and later visiting a restaurant on the Upper West Side.

New York has some of the best museums in the world, and a large number of art galleries. To choose an exhibition or a cultural event one can buy one of the two magazines, the *New Yorker* or *New York*. Of the tourist guides, one of the best is published in the *Eyewitness Travel Guides* series.