Women in Computing

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Outline

Some Top Women Computer Scientists I

- **Lady Ada Lovelace** : World's first programmer
- **Kay McNulty, Betty Snyder, Marlyn Wescoff, Ruth Lichterman, Betty Jennings, and Fran Bilas** - original programmers of the ENIAC
- **Grace Hopper** (1906-1992), first programmer for the Mark I Calculator, Ada Lovelace award winner
- **Anita Borg**, the founding director of the Institute for Women and Technology (IWT), Ada Lovelace award winner
- **Frances E. Allen**, first woman recipient of the ACM'S Turing Award in 2006
- **Barbara Liskov**, Turing award winner in 2008
- **Shafi Goldwasser**, theoretical computer scientist, two time recipient of the Gödel Prize and Turing Award winner of 2012

Some Top Women Computer Scientists II

- **Radia Perlman**, Inventor of spanning tree protocol, recipient of Anita Borg Women of Vision award
- **Rosa Peter**, Founder of Recursive Function theory
- **Eva Tardos**, Winner of Fulkerson prize for outstanding papers in discrete mathematics and Gödel Prize in 2012
- **Jennifer Rexford**, Grace Hopper Award winner for outstanding young computer professional of the year for 2004

Lady Ada Lovelace

- When Charles Babbage developed his analytical engine, Lady Ada was the only one who took it seriously. She translated the article of Babbage into English and added her own notes which included the detailed specification on how to generate Bernoulli numbers.
- She predicted that this machine would be used to compose complex music, to produce graphics, and would be used for both practical and scientific use.

Jean Jennings, Betty Snyder, Kathleen McNulty, Marlyn Wescoff, Frances Bilas and Ruth Lichterman[1]

- ENIAC (also called the beast) was a thirty-ton box that contained 17,000 vacuum tubes, 70,000 resistors and 6000 switches
- As the first programmers, they had no programming manuals or courses, only the logical diagrams to help them figure out how to make the ENIAC work
- They had to physically program the ballistics trajectory prediction program by using the 3000 switches and dozens of cables and digit trays to physically route the data and program pulses through the machine

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[1]http://www.witi.com/center/witimuseum/halloffame/1997/eniac.php

Grace Hopper

- Worked with Howard Aiken on the Mark I calculator and later continued to work with Mark I and II calculators.
- She later joined the Eckert-Mauchly Computer Corporation and the team developing the UNIVAC (Universal Automatic Computer)
- She wrote the first compiler called the A compiler. Later versions were released as FLOW-MATIC, MATH-MATIC and ARITH-MATIC compilers.
- COBOL is an extension of her FLOW-MATIC with IBM's COMTRAN. She wrote the first COBOL compiler.
- Was instrumental in pushing the idea of languages close to human language than assembly or machine language for programming.

Anita Borg

- Ph.D. in computer science from New York University, 1981.
- Spent 12 years in DEC's Western Research Laboratory and as consultant engineer in the Network Systems Laboratory in Palo Alto, California.
- Primary responsibility was for the MECCA Communications and Information Systems project.
- Developed and patented a method for generating complete address traces used for analyzing and designing high-speed memory systems.
- Started **Systers**, an e-mail list and information-sharing community providing mentors, support and encouragement to women in computing, after attending a conference in 1987.

Frances Allen

- First Woman Recipient of the Turing Award for 2006.
- Joined IBM in 1957 to pay off her debts which she incurred for her masters studies. Stayed for 45 yrs in IBM!
- Formed the Parallel TRANslation (PTRAN) group in 1980s to study issues involved in compiling for parallel machines.
- Her work forms the basis for **the theory of program optimization** and is widely used in today's commercial compilers.
- Appointed IBM Fellow in 1989 and she was president of the IBM Academy of Technology

Barbara Liskov

- Ford Professor of Engineering in MIT's Electrical Engineering and Computer Science department.
- In 2004, Barbara Liskov won the John von Neumann Medal for **fundamental contributions to programming languages, programming methodology, and distributed systems**.
- **Liskov received the 2008 Turing Award from the ACM for her work in the design of programming languages and software methodology that led to the development of object-oriented programming**
- Liskov has led many significant projects, including the Venus operating system, a small, low-cost and interactive timesharing system; the design and implementation of CLU; Argus, the first high-level language to support implementation of distributed programs and to demonstrate the technique of promise pipelining; and Thor, an object-oriented database system. With Jeannette Wing, she developed a particular definition of subtyping, commonly known as the Liskov substitution principle. She leads the Programming Methodology Group at MIT, with a current research focus in Byzantine fault tolerance and distributed computing.

Shafi Goldwasser

- RSA professor in electrical engineering and computer science at MIT - Ph.D. from Berkeley
- Research areas include complexity theory, cryptography and computational number theory
- Co-inventor of **zero-knowledge proofs**, which probabilistically and interactively demonstrate the validity of an assertion without conveying any additional knowledge
- She showed that some problems in NP remain hard even when only an approximate solution is needed
- **Won the Gödel Prize in theoretical computer science: first in 1993 for The knowledge complexity of interactive proof systems, and again in 2001 for Interactive Proofs and the Hardness of Approximating Cliques**
- **Won the Turing Award in 2012 along with Silvio Micali for their work in the field of cryptography.**

Radia Perlman

- Sometimes referred to as the **Mother of the Internet** for her work on the spanning tree protocol which is fundamental to the operation of network bridges.
- Radia's 1988 Ph.D. thesis at MIT titled **Routing with Byzantine Robustness**, guaranteed that communication was possible provided at least one non-faulty path existed between a source and a destination, even if all other routers were flooding the network with garbage, lying about routing information, corrupting packets from one source, etc.
- Author of two widely used textbooks **Interconnections: Bridges, Routers, Switches, and Internetworking Protocols** and co-author along with Charlie Kaufman of **Network Security: Private Communication in a Public World**.

Rósa Peter

- Her first research topic was number theory, but she became discouraged on finding that her results had already been proved by Dickson.
- Kalmár suggested Rósa examine Gödel's work, and in a series of papers she became a founder of recursive function theory.
- Rósa wrote **Recursive Functions in 1951**, which was the first book on the topic and became a standard reference.
- From the mid 1950's she applied recursive function theory to computers.

Eva Tardos

- Jacob Gould Schurman Professor, Dept. of Computer Science, Cornell University
- Her research interest focuses on the design and analysis of efficient methods for combinatorial-optimization problems on graphs or networks.
- Focuses also on on-line algorithms.
- Her recent work focuses on algorithmic game theory, an emerging new area of designing systems and algorithms for selfish users.
- **Awarded Fulkerson prize in 1988 and Gödel prize in 2012**.

Jennifer Rexford

- Jennifer joined the Computer Science Department at Princeton University in February 2005 after eight and a half years at AT&T Research.

- Her research focuses on Internet routing, network measurement, and network management, with the larger goal of making data networks easier to design, understand, and manage.

- Jennifer is co-author of the book **Web Protocols and Practice: HTTP1.1, Networking Protocols, Caching, and Traffic Measurement (Addison-Wesley, May 2001)** and co-editor of **She's an Engineer? Princeton Alumnae Reflect**.

- She received her BSE degree in electrical engineering from Princeton University in 1991 **CGPA: 4.0/4.0**, and her MSE and PhD degrees in computer science and electrical engineering from the University of Michigan in 1993 and 1996, respectively **CGPA: 8.4/8**.

- **She was the winner of ACM's Grace Murray Hopper Award for outstanding young computer professional of the year for 2004**.

Recognition/Awards for Women in Computing

- Awards
  - Augusta Ada Lovelace Award
  - Anita Borg award for Women of Vision
  - Women in Technology International (WITI) Hall of Fame
  - Grace Hopper Award
- Professional Societies
  - IEEE Women in Engineering (WIE) Chapters
  - Association for Women in Computing
  - Anita Borg Institute for Women and Technology
  - Ada Initiative

Events for Women in Computing

- Grace Hopper Celebration of Women in Computing Conference
- Grace Hopper Celebration of Women in Computing India
- Global Marathon For, By and About Women in Engineering

References

Women in Computing http://en.wikipedia.org/wiki/Women_in_computing# Organizations_for_women_in_computing

Association for Women in Computing: http://www.awc-hq.org/

Anita Borg Institute for Women and Technology: http://anitaborg.org/index.php

The Ada Project: http://women.cs.cmu.edu/ada/

Pioneering Women of Computing: http://www.cs.yale.edu/homes/tap/past-women-cs.html

Famous Women in Computer Science
http://anitaborg.org/news/profiles-of-technical-women/famous-women-in-computer-science/

WITI: Women in Technology International

WITI Hallf of Fame: http://www.witi.com/center/witimuseum/halloffame/

Jennifer Rexford Home Page: http://www.cs.princeton.edu/ jrex/

http://en.wikipedia.org/wiki/Barbara_Liskov