55 YEARS IN HPC: ONE WOMAN’S EXPERIENCES AND PERSPECTIVES

IN CONVERSATION WITH JEAN SHULER

WITH MARK MILLER MODERATING

FOR THE BEST PRACTICES FOR HPC SOFTWARE DEVELOPERS WEBINAR SERIES

NOVEMBER 10, 2021
1961-1965

- Biggest bug: Mariner 1 ($152M)
- Best movie: The Invisible Boy
- Digits of Pi: 100,265
- Fastest: CDC-6600 (3 MFLOPS)
EMPLOYMENT AS A HUMAN COMPUTER

The Age of Female Computers

The burden of mathematics before machines

David Skinner

Today, mathematics and computer science often appear as the province of geniuses working at the very edge of human ability and imagination. Even as American high schools struggle to employ qualified math and science teachers, American popular culture has embraced math, science, and computers as a mystic realm of extraordinary intellectual power, even worried or marveled. Movie, television, and book producers have capitalized on the public's fascination with the computer, and the public has responded with rapt attention. Public fascination with the computer is not surprising. In the past century, the computer has been a symbol of the progress and promise of modern society. The computer is a powerful tool for solving problems, and the computer is a symbol of human creativity.

Review

Spring 2006

The Technological Condition
Math

Twenty years ago, a girl could be a secretary, a school teacher . . . maybe a librarian, a social worker or a nurse. If she was really ambitious, she could go into the professions and compete with men . . . usually working harder and longer to earn less pay for the same job.

Now have come the big,��叫的新计算机—and a whole new kind of work for women : programming. Telling the magic machines what to do and how to do it. Anything from predicting the weather to sending out billing notices from the local department store.

And if it doesn't sound like woman's work—well, it just is. "I had this idea I'd be standing at a big machine and pressing buttons all day," says a girl who programs for a Los Angeles bank. I couldn't have been further from the truth. I figure out how the computer can solve a problem, and then instruct the machine to do it.

"It's just like planning a dinner," explains Dr. Grace Hopper, now a staff scientist in systems programming for Unicar. (She helped develop the first electronic digital computer, the Eniac, in 1946.) "You have to plan ahead and schedule everything so it's ready when you need it. Programming requires patience and the ability to handle detail. Women are "naturally" at computer programming.

What she's talking about is as valid—the one most important quality a girl needs to become a programmer. She also needs a keen, logical mind. And if that means not the old Hills-Burton, that's all right.

Allen image of femininity, it's all right, because this is the age of the Computer Girls. There are twenty thousand of them in the United States, so page 51..."
EXAMPLE CALCULATIONS AND HAND DRAWN PLOTS
1966-1970

- Biggest bug: Gemini 5 splashdown miss
- Best movie: 2001 A Space Odyssey
- Digits of Pi: 500,000
- Fastest: CDC-7600 (30 MFLOPS)
MB Associates, San Ramon, CA.
1971-1975

- Biggest bug: 12 bit dates/DEC system 10
- Best movie: West World
- Digits of Pi: 1,001,250
- Fastest: CDC-STAR (100 MFLOPS)
JEAN JOINS LAWRENCE RADIATION LAB (LRL)

- Ban on hiring wives lifted in 1972

- Jean’s first badge photo
“PRINTER TESTS” AND RACIER STUFF
(OFTEN PINNED UP IN OFFICES)
Like many similar organizations, LLNL hosted “beauty” pictures of its female workforce members.

The Nevada Test Site (NTS) wanted to show it could compete with LLNL.

LLNL also had a "dress code" for women. Was there any for men?
BEGINNINGS OF NERSC

• Controlled Thermonuclear Research Computer Center

• National Magnetic Fusion Energy Computer Center

• National Energy Research Scientific Computing Center
To: All CDC 6600 (G-machine) Users
From: Jean Shuler
Subject: Purging of Files From PACKRAT Disks
Reference: Utility Routine PACKRAT, UR-338 (March 21, 1974)

The PACKRAT disks are completely full. At the moment, PACKRAT is so overloaded that new files cannot be stored in the system. You can help by destroying all unneeded PACKRAT files.

Unless the overloaded condition is relieved by voluntary destruction of unwanted files, a PACKRAT file purge will be necessary. Files that have not been accessed for a period of 45 days will be destroyed. If you have files that are valuable but rarely used, you should store them on tape and delete them from PACKRAT.

Jean Shuler, Ext. 3286
CTR Computer Center

GPL/qed
BEGINNINGS OF MFENET
BEGINNINGS OF ARPANET
1976-1980

- Biggest bug: Vancouver SE index truncation
- Best movie: Star Trek Motion Picture (Vger)
- Digits of Pi: 2,000,036
- Fastest: Cray 1 (160 MFLOPS)
Arrays

Both Vax Fortran and LRLTRAN have the array-processing capabilities of the 1978 Fortran standard. Each permits you to declare arrays of any of its data types, including its structures. This means that although Vax Fortran permits 8-bit byte arrays, it does not permit arbitrarily sized byte arrays; nor does it permit bit arrays.

Initial values

In Vax Fortran, initial values may be specified for data objects in the object declaration statement. LRLTRAN does not provide this. Both languages provide a separate DATA statement for specifying initial values.

Strong typing

Both languages support the IMPLICIT NONE statement. This statement is used to force an error message whenever a variable is encountered that is not explicitly typed.

Is portable code possible?

The nonstandard features that are available in the same way in both Vax Fortran and LRLTRAN are few:

- Long names with underscores permitted
- Use of ! for comments
- IMPLICIT NONE

Features that are similar but require some translation are:

- DO ...... END DO
- NAMELIST
- INCLUDE / USE without arguments
- Minimal dynamic storage
- Bit manipulation
- Octal / hexadecimal data
- Structures

The closer a code is to standard Fortran, the better chance it has for acceptability in more than one environment.
EARLY GRAPHICS SYSTEMS
1980 5.5 EARTHQUAKE
1981-1985

- Biggest bug: Super Mario Minus World
- Best movie: Tron (filmed @ LLNL)
- Digits of Pi: 17,526,200
- Fastest: Cray 2 (1.5 GFLOPS)
SUPERKIDS...AN EARLY STEAM EFFORT

I was just 18 and I missed my high school graduation to come here, and it set my whole career in motion - Mike Collette
1986-1990

- Biggest bug: USSR Phobos 1
- Best movie: Terminator (Skynet)
- Digits of Pi: 1,073,740,799
- Fastest: Fujitsu VP2600/10 (4 GFLOPS)
1990

FIRST MASSIVELY PARALLEL RESOURCE

LLNL acquired its first substantial onsite massively parallel resource from the MCPI: a 64-node BBN-ACI TC-2000 machine (later upgraded to 128 node). By 1992, positive results were being achieved in diverse areas, such as particle physics simulation.
1991-1995

- Biggest bug: ESA Ariane 5 Truncation ($1B)
- Best movie: Terminator 2 (Skynet)
- Digits of Pi: 6,442,450,000
- Fastest: Paragon XP/S-40 (143 GFLOPS)
MEIKO CS-2
1996-2000

- Biggest bug: USS Yorktown div-by-0
- Best movie: The Matrix
- Digits of Pi: 206,158,430,000
- Fastest: ASCI Red (1.06 TFLOPS)
POWERWALL GRAPHICS
2001-2005

- Biggest bug: GE XA/21 Blackout
- Best movie: I, Robot
- Digits of Pi: 1,241,100,000,000
- Fastest: IBM BG/L (280 TFLOPS)
2006-2010

- Biggest bug: Google’s Mal-Site Warning
- Best movie: Wall-E
- Digits of Pi: 5,000,000,000,000
- Fastest: Tianhe-1A (2.57 PFLOPS, China)
2011-2015

- Biggest bug: HeartBleed
- Best movie: Imitation Game
- Digits of Pi: 13,300,000,000,000
- Fastest: Tianhe-2 (33 PFLOPS, China)
2016-PRESENT

- Biggest bug: Boeing 737-Max MCAS
- Best movie: Hidden Figures
- Digits of Pi: 62,831,853,071,796
- Fastest: IBM AC922 (146 PFLOPS, Summit)
EXPANDING YOUR HORIZONS
SUPERCOMPUTING PRESENCE
Workforce Mgr & HPC Tech Consultant @JeanShuler staffs the LC Hotline, sets up training on our machines, & schedules presentations for staff/users. At LLNL since 1972, she also works with our Cluster Engineering Academy interns. #WomenInHPC #WeAreHPC careers-llnl.ttcportals.com/jobs/search?q=...

I'm a huge supporter of helping young girls in their STEM careers. It's key to job creation and innovation in the workplace, especially at LLNL.

—Jean Shuler

The winners of last week's HOME Campaign

Skaters
1st place male, Patrick Chan, 7:30
1st place female, Tiffany Rose, 8:20
1st place male master, Chuck Mcgregor, 7:15
1st place female master, N/A

Swimmers
1st place male, Mike Bonner, 10:08
1st place female, Kelly Fedel, 11:45
1st place male master, Alex Shatalov, 10:31
1st place female master, Brynn Bolling, 16:31

Runners
1st place male, Trevor Willey, 8:57
1st place female, Tara Cárdenas, 11:29
1st place male master, Fred Mohler, 10:04
1st place female master, Jean Shuler, 14:09

Site300 Runners
1st place male, Sloan Mays, 12:51

Costumes
Most Humorous: Deviled Egg; Stacey Roberts-Ohn, Math/Science-Network
Most Colorful: Uncle Sam; Tom Altenbach
Most Creative: Rose the Riveter; Michele Bianchini-Gunn

Kelly Enaswell
Janet Conrad
Ginny Dance-Bios
Bonnie Pitkowski
Most Patriotic: Betsy Ross; Sue Steelman
Best-Multi-person: American Flag; Margie Altenbach
Sherry Christensen
Wendy Dussey
Mary Guatico
Chris Johnson
Teresa Loom