


History of Computer Science at the Vrije Universiteit

Expanded version of a talk I gave on 2 May 2025 at Henri' Bal's retirement event
For a more detailed version of this poster, see www.cs.vu.nl/~ast/history

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1880-1968

- The VU was founded in 1880 by Abraham Kuyper
- A faculty of mathematics and physics was created in 1930
- The Wiskundig Seminarium was formally created in 1939
- The VU moved to Buitenveldert 1966-1970 in phases
- In 1969, the VU Senate proposed an interfaculty informatica
- It was to be a service organization helping the other faculties
- It never happened and informatica started in the math department



1969

- The math department decided to hire a professor for "informatica"
- They had Reind van de Riet in mind as the candidate
- He worked at the Mathematisch Centrum (MC), now CWI
- He got his Ph.D. there in 1968 under Adriaan van Wijngaarden
- His thesis was: "ALGOL 60 as a Formula Manipulation Language"
- He did his research on the Electrologica X1
- It used words of 27 bits as the main memory
- It was replaced ca. 1968 by the X8, which was an 8x faster X1
- They also saw the need for an assistant to the professor
- I became the assistant (long story, see full slide show)

1969 (continued)

- The Electrologica X1/X8 filled a large room
- It used paper tape for I/O




1971

- The math department had about 20 academic staff in math
- The computer group consisted of three academic staff:



Reind van de Riet
Professor
(Ph.D. math)



Andy Tanenbaum
Assistant professor
(Ph.D. astrophysics)



Jim van Keulen
Lecturer
(M.Sc. Math)

1971 (continued)













- SARA (Stichting Academisch Rekencentrum Amsterdam) was created to have ONE computer for everyone at VU, UvA, & MC
- They decided to buy a CDC mainframe, I think a Cyber 73
- In any event, it was a slightly slower & cheaper version of the CDC 6600, the fastest computer in the world for many years



A 6600 or Cyber 73 with its disks, tape drives, card readers, and printers filled a very large room. The base 6600 version cost the equivalent of €50 million in 2025 euros.

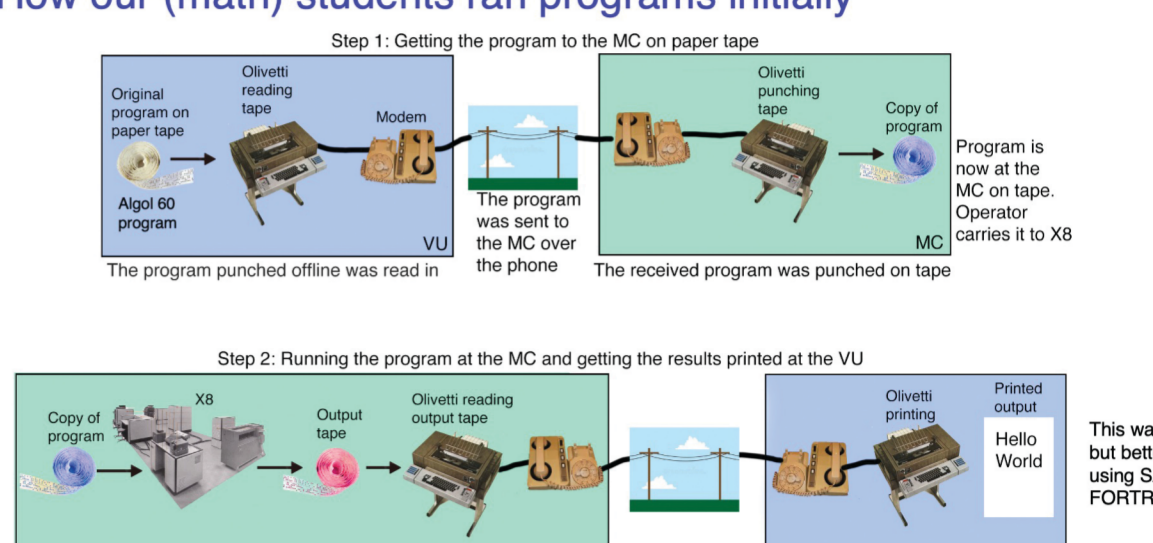
1972

- Informatica was initially on the 4th floor of the main building

1972 (continued)


- How our (math) students ran programs initially




Step 1: Getting the program to the MC on paper tape
Step 2: Running the program at the MC and getting the results printed at the VU

1973

- With difficulty, we bought a PDP-11/45
- It had 16 KB of core memory
- It had one 2.5-MB (RK05) disk
- The PDP-11 used paper tape for I/O
- It cost fl. 250K ≈ €490,000 (2025) (All prices are inflation corrected)
- Initially, we ran some awful DEC OS
- In 1975, we switched to UNIX V6
- We were the 2nd UNIX site in NL (the MC was 1st by a few months)
- We switched to UNIX V7 in 1979



1973 (continued)


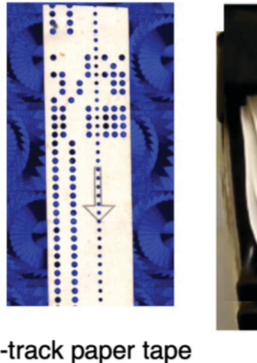
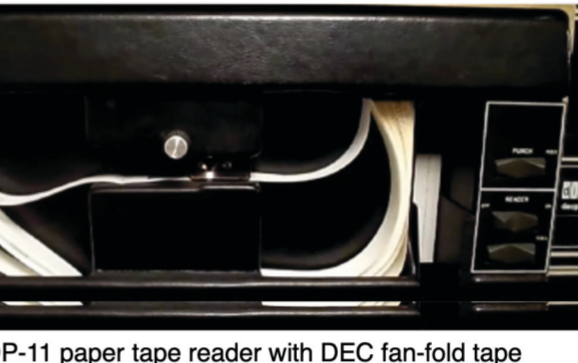


Our PDP-11/45 was kept in an ordinary office on the 4th floor of the main building. It did not require a special room with a raised floor and special cooling like SARA's Cyber 73. It was a MINI computer.

The GT40 was an independent PDP-11/10 computer with a graphical display. It was not connected to the PDP-11/45. We played simulated moon landings on it.

1973 (continued)

- Everyone wrote programs on Olivetti terminals offline
- The terminals punched a row of holes on tape for each character
- Each row of holes was one 7-bit ASCII character plus a parity bit


1973 (continued)

- Initially we ran some awful single-user DEC operating system
- There was a sign-up sheet so you could sign up for 1 hour of time
- Here is how it worked

 - You wrote your program in Macro-11 assembly language on paper
 - Then you went to an Olivetti (offline) and typed it in, getting a paper tape
 - When it was your turn, you typed a command on the DECwriter to assemble it
 - This resulted in the binary program being punched on paper tape
 - If there were no syntax errors, you typed a command to read and run the binary
 - The PDP-11/45 punched the program's output on paper tape
 - You took the paper tape to an Olivetti and it printed the contents of the tape (offline)
 - Until we got UNIX (and timesharing), the PDP-11/45 was only for staff

1973 (continued)

- In 1973, Jaco de Bakker became a Prof. in theoretical informatica
- He had a Ph.D. in mathematics under Adriaan van Wijngaarden
- He came to the VU one day a week and taught two classes
- Then he went back to the MC where he actually worked
- Other than teaching his classes, he was not involved with us
- Now (on paper) we had 1.2 full professors
- Initially, Jaco had one Ph.D. student (AIO): Willem Paul de Roever
- Reind also had one Ph.D. student, Frank Teer
- As an assistant professor I was not allowed any





1974

- The math Dept. had four "vkgroepen"
 - Math A (geometry and topology)
 - Math B (analysis, applied math, numerical math)
 - Statistics and probability
 - Informatica
- Each faculty member belonged to one of them
 - Informatica was Van de Riet, De Bakker, Tanenbaum, & Van Keulen
- Each vkgroep largely ran its own education and research


1975

- We moved from 4A in the main building to the W & N building
- We bought a 1-KB fast cache memory to speed up the PDP-11/45
 - A man came all the way from England to install it!!!

1976

- We joined the UUCP network to get email
- The MC called our PDP-11/45 daily over the telephone system
- They gave us incoming email
- We gave them outgoing email
- We weren't on the ARPAnet or the Internet




1976 (continued)

- We installed and ran UNIX V6 on the PDP-11/45
- We bought a multiplexer and connected ≈ 16 Olivettis to the PDP-11
- We bought a second RK05 disk; now we had 5 MB (!) online
- This system could support ≈ 16 students in a lab all at once
- We stopped using the X8 at the MC
- This step greatly enhanced the students' lab experience
- Staff spent hundreds of hours playing "Adventure" game on UNIX
 - A cave had 66 rooms and 2-word commands like: go north, get lamp, drop rod, throw ax
 - It was a massive time sink for months

See: <https://people.math.harvard.edu/~ctm/pink/culture/adventure.html>

1977


- We bought a **HUGE** 40-MB Ampex disk for the PDP-11/45
- This increased our storage capacity for student files 8x
- A little later we bought a second 40-MB Ampex disk
- Later an Ampex guy showed us how to upgrade them to 80 MB by just removing a jumper (little plug!)



The disk packs were removable. The cabinet under the drive on the right was used to store spare disk packs. The disk packs were the size of a large multilayer birthday cake.

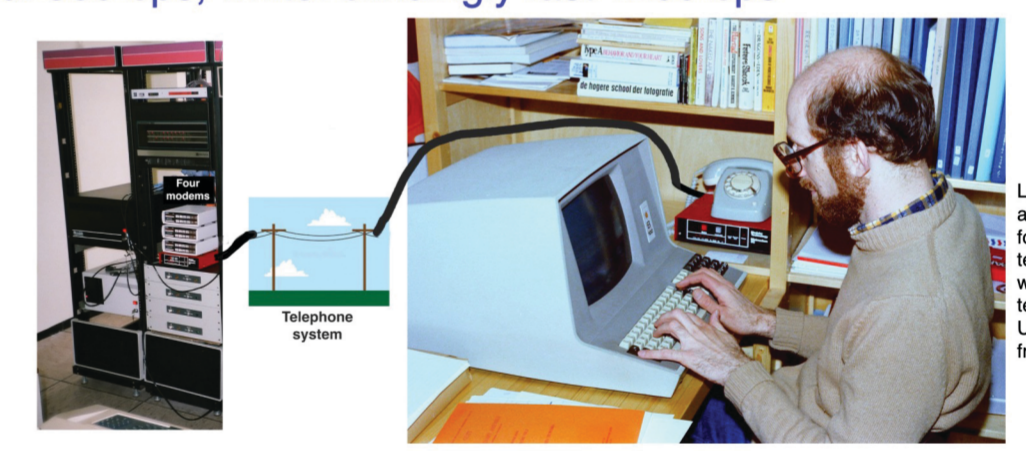
1977 (continued)

- We bought a PDP-11/60 for microprogramming research
- The tools DEC promised for it were never developed
- But we now had one PDP-11 for students; one for research



1977 (continued)


- We bought some modems
- Might not have been legal
- Red: 300 bps, white: blindingly fast 1200 bps




Later I upgraded to a 1200-bps modem for my 2400 ASCII terminal. My setup was cutting-edge technology. I could use the PDP-11 from home!

1979

- We wanted to make "informatica" an official study
- The most famous computer scientist in NL was Edsger Dijkstra
- The minister of education asked him (repeatedly)
- Every time he said: informatica is an area of math, like algebra
- Eventually, Reind and others convinced the minister
- We hired our first programmer, Ruud Wiggers




Edsger Dijkstra (Hij TUE)



Ruud Wiggers

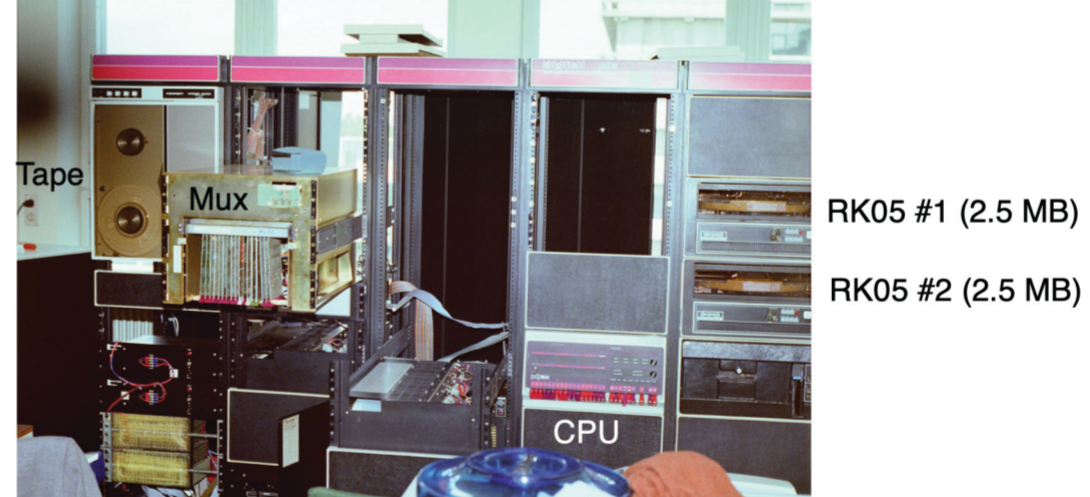
1979 (continued)

- We bought eight 8086 headless workstations and invented cloud computing running our Amoeba research operating system
- We also bought a 9-track magnetic tape drive for the PDP-11/45



1979 (continued)


- We often had to take the PDP-11/45 apart



Labels: Tape, Mux, CPU, RK05 #1 (2.5 MB), RK05 #2 (2.5 MB)



1980

- 1980 was the 100th anniversary of the VU and 50th of the faculty
- We held a hacking contest for high school kids; Prize: a computer
- Reind organized an exhibition "Computer en beroep"
- During it, Reind and former world chess champion Max Euwe demonstrated the new NOS Teletekst
- The event was meant to recruit students




1980 (continued)

- I was appointed a "persoonlijk hoogleraar" by the minister of education
- This wasn't a structural position
- If I were run over by a tram, we would lose the position
- I was very careful with trams
- Now we had 2.2 full professors
- Math had about 12





1980 (continued)


- We bought a PDP-11/44 (like an 11/45) for ≈ €100K
- Now we had THREE (!) PDP-11s:
 - PDP-11/45 supported ca. 16 students for lab work
 - PDP-11/44 for staff programming and projects
 - PDP-11/60 was for special research projects
- We bought 18 (24x80 ASCII) terminals ≈ €3800 each
- We hired our second programmer, Ed Keizer



Ampex D80




Ed Keizer




PDP-11/44

1980 (continued)

- Around 1980 we bought a Diablo daisy wheel printer
- Ed Keizer wrote S/W to first print a page with the Roman letters
- Then it would stop and beep once for the *italics* wheel
- Then it would print the italics and beep twice for the math wheel



A daisy wheel printer



A removable daisy wheel; there were wheels for Roman letters, italics, math, other symbols, etc.

1980 (continued)

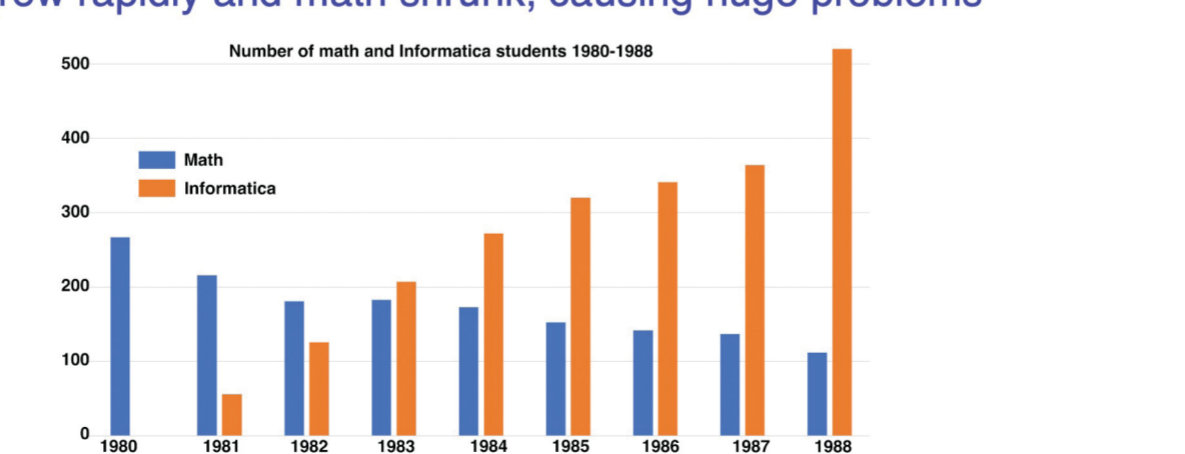
- We released our first piece of open-source software
 - It was a Pascal compiler for UNIX on the PDP-11
 - It was largely written by Johan Stevenson
 - It was used in Australia, Belgium, Brazil, Canada, Denmark, Finland, France, Germany, Israel, Japan, Sweden, Switzerland, the U.S. and later other countries
- In subsequent years, we produced ACK, Amoeba, MINIX, Globe and much other open-source software

1981

- The "vkgroep informatica" now had four areas:
 - Computer organization and system programming (led by me)
 - Databases (led by Reind)
 - Theoretical computer science (led by Jaco de Bakker)
 - Applied computer science (vacancy, later filled by Laurent Siklossy)

1981 (continued)

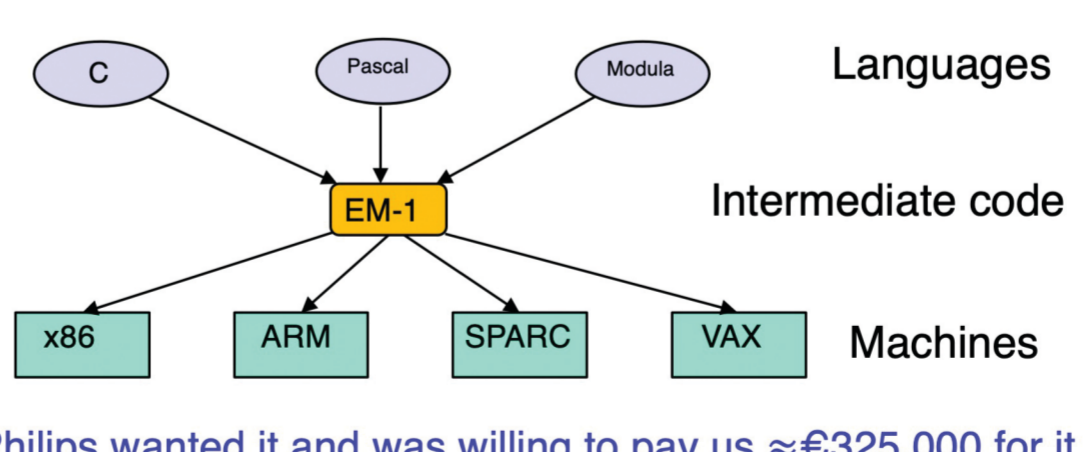
- Computer science became an official study in Sept. 1981
- 57 Students signed up
- It grew rapidly and math shrunk, causing huge problems



Number of math and informatica students 1980-1988

1982

- My research project was the Amsterdam Compiler Kit (ACK)



The diagram shows Languages (C, Pascal, Modula) feeding into Intermediate code (EM-), which then feeds into Machines (x86, ARM, SPARC, VAX).

- Philips wanted it and was willing to pay us ≈ €325,000 for it
- We took the money


1983

- We bought a VAX-11/750 for the equivalent of €260,000
- It was a 32-bit version of the PDP-11
- It could run programs bigger than 64 KB
- We ran Berkeley UNIX (BSD 4.1) on it
- Eventually, we upgraded the PDP-11s to BSD as well




1984

- We bought a second VAX-11/750 for our future AI professor
- This upgraded our computing power: 3 PDP-11s + 2 VAXes
- We outfitted a large room to hold many future VAXes
- Reind liked all the pretty Macintosh fonts, so we got him one
- The AI professor, Laurent Siklossy, wanted a Mac, not a VAX



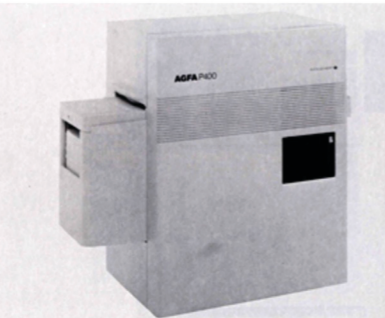
The VAXes had 1.2 GB total




A portable 4000-GB disk costs €120 now

1985

- We bought an Agfa LED printer (near laser printer quality)
- It cost the equivalent of ≈ €90,000 (from the Philips money)
- Ed Keizer wrote a driver for *troff*, a predecessor of TeX
- After some years, we got rid of it and bought an Oce laser printer




Agfa P400 LED printer




Oce true laser printer (everyone had an assigned bin)

1986


- We created an official computer lab with Jim van Keulen as the head because the computing load kept increasing and the technology kept improving. As the number of students increased rapidly, the programming labs for them needed to grow as fast. Jim managed that, selecting, buying, and installing terminals, computers, servers, networking, etc. He kept everything running. By 1988, we began migrating to Sun workstations



Diskless Sun 3 in its pizza box.



Diskful Sun 4



Jim

1987-2025

- For the rest of the story and more detail on 1971-1986 see

www.cs.vu.nl/~ast/history