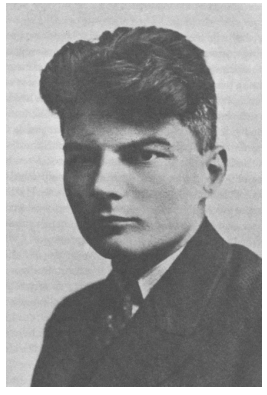
History of Computer Science at the Vrije Universiteit

Expanded version of a talk I gave on 2 May 2025 at Henri' Bal's retirement event

Andrew S. Tanenbaum
Vrije Universiteit, Amsterdam

1880-1968

- The VU was founded in 1880 by Abraham Kuyper
- A faculty of mathematics and physics was created in 1930
- The first math Prof., Jurjen Koksma (26), was appointed in 1930
- Shortly thereafter, Marius van Haaften became a second math Prof.
- The Wiskundig Seminarium was formally created in 1939
- The VU moved to Buitenveldert 1966-1970 in phases



Jurjen Koksma



Marius van Haaften

1969

- The VU Senate created a committee to advise about “informatica”
- It came up with a plan in which informatica would be an interfaculty
- It would be more of a service facility than a real department
- Fortunately, it never got off the ground

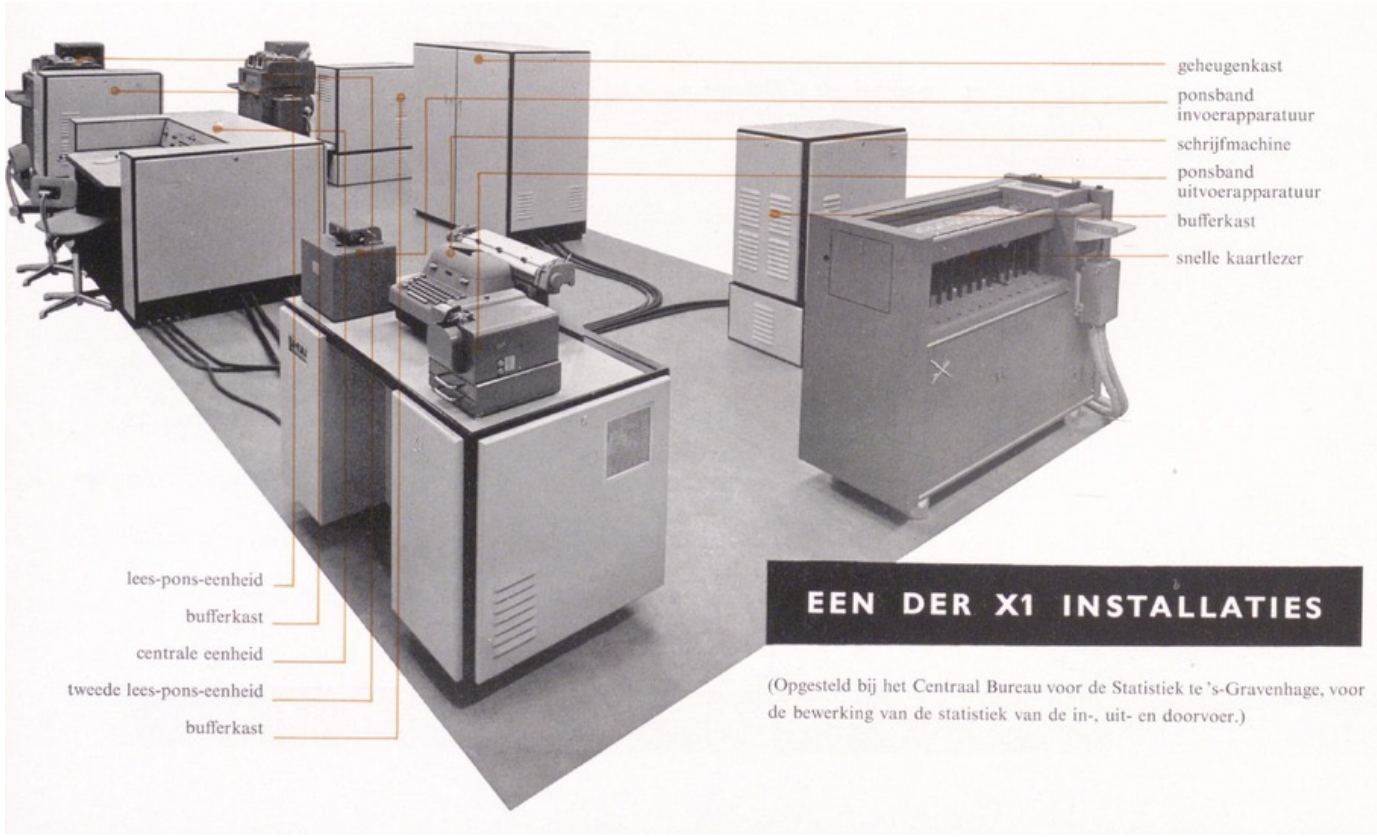


1969 (continued)

- The plan called for a part-time professor in informatica (CS)
- The Math Dept. 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
- The committee also saw the need for an assistant to the professor
- I became the assistant

1969 (continued)

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



1971

- I was hired as an ass't professor of math at the VU in Sept. 1971
- By freak accident
- There were two jobs:
  - Assistant professor in the math department in the area of computers
  - FORTRAN programmer for the computer center (SARA)
- There were two applicants
  - Me, looking for a job as a FORTRAN programmer, although I'm a physicist
  - Kim Gostelow, looking for a teaching job; he had a Ph.D. in CS from UCLA
- Reind put me at the VU and Kim at SARA !!!
- Reind also forgot the earth is round, called me at 05:00 in California

1971 (continued)

- Math department had about 20 academic staff in math
- 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)

- The department was the “Wiskundig Seminarium”
- Or “Mathematics seminary,” not even a real academic unit
- It was part of the Dept. of Mathematics, Physics, and Astronomy



Reind’s true love was playing the church organ (especially with his friend Donald Knuth)

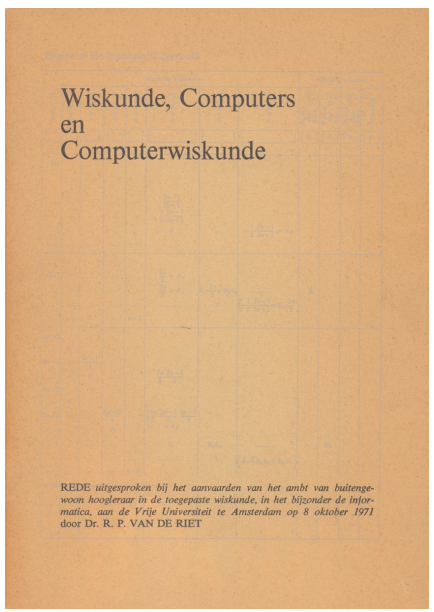
1971 (continued)

- Entrance to the Wiskundig Seminarium, De Boelelaan 1081



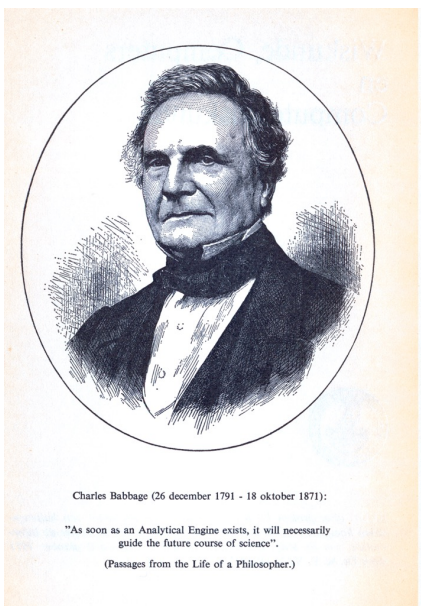
1971 (continued)

- On 8 Oct. 1971 Reind gave his inaugural lecture
- It was a history of computers from Charles Babbage up to Zuse, Aiken, Mauchley, Wilkes, & Turing with a note the IBM 360/75



Wiskunde, Computers
en
Computerwiskunde

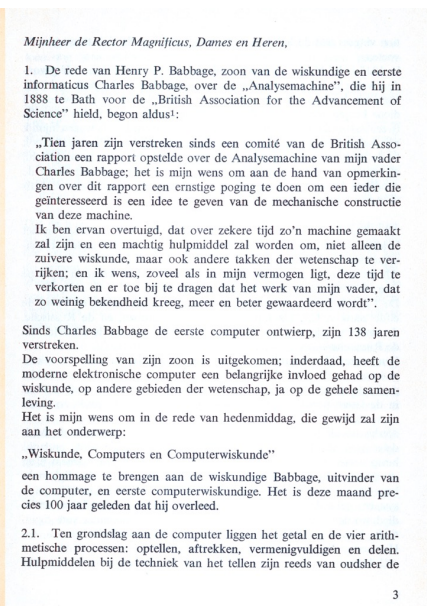
REDE *uitgesproken bij het aanvaarden van het ambt van buitengewoon hoogleraar in de toegepaste wiskunde, in het bijzonder de informatica, aan de Vrije Universiteit te Amsterdam op 8 oktober 1971*
door Dr. R. P. VAN DE RIET



Charles Babbage (26 december 1791 - 18 oktober 1871):

"As soon as an Analytical Engine exists, it will necessarily guide the future course of science".

(Passages from the Life of a Philosopher.)



Mijnheer de Rector Magnificus, Dames en Heren,

1. De rede van Henry P. Babbage, zoon van de wiskundige en eerste informaticus Charles Babbage, over de „Analysemachine", die hij in 1888 te Bath voor de „British Association for the Advancement of Science" hield, begon aldus[1]:

„Tien jaren zijn verstreken sinds een comité van de British Association een rapport opstelde over de Analysemachine van mijn vader Charles Babbage; het is mijn wens om aan de hand van opmerkingen over dit rapport een ernstige poging te doen om een ieder die geïnteresseerd is een idee te geven van de mechanische constructie van deze machine.
Ik ben ervan overtuigd, dat over zekere tijd zo'n machine gemaakt zal zijn en een machtig hulpmiddel zal worden om, niet alleen de zuivere wiskunde, maar ook andere takken der wetenschap te verrijken; en ik wens, zoveel als in mijn vermogen ligt, deze tijd te verkorten en er toe bij te dragen dat het werk van mijn vader, dat zo weinig bekendheid kreeg, meer en beter gewaardeerd wordt".

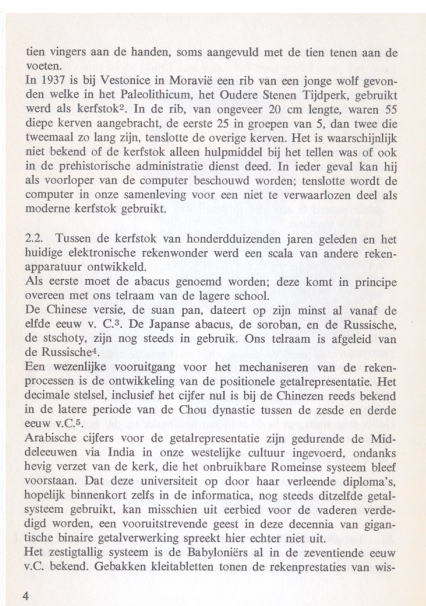
Sinds Charles Babbage de eerste computer ontwierp, zijn 138 jaren verstreken.
De voorspelling van zijn zoon is uitgekomen; inderdaad, heeft de moderne elektronische computer een belangrijke invloed gehad op de wiskunde, op andere gebieden der wetenschap, ja op de gehele samenleving.
Het is mijn wens om in de rede van hedenmiddag, die gewijd zal zijn aan het onderwerp:

„Wiskunde, Computers en Computerwiskunde"

een hommage te brengen aan de wiskundige Babbage, uitvinder van de computer, en eerste computerwiskundige. Het is deze maand precies 100 jaar geleden dat hij overleed.

2.1. Ten grondslag aan de computer liggen het getal en de vier arithmetische processen: optellen, aftrekken, vermenigvuldigen en delen. Hulpmiddelen bij de techniek van het tellen zijn reeds van oudsher de

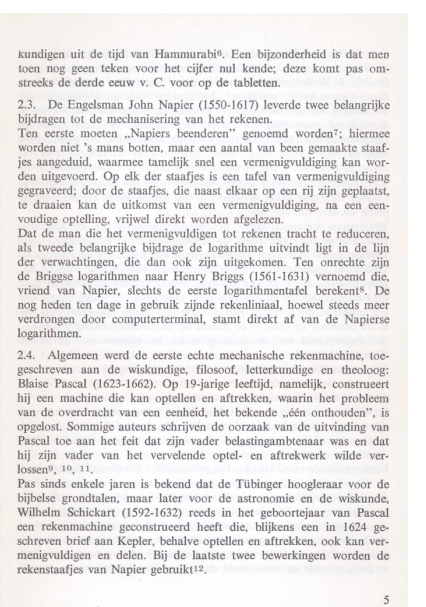
3



tien vingers aan de handen, soms aangevuld met de tien tenen aan de voeten.
In 1937 is bij Vestonice in Moravië een rib van een jonge wolf gevonden welke in het Paleolithicum, het Oudere Stenen Tijdperk, gebruikt werd als kerfstok[2]. In de rib, van ongeveer 20 cm lengte, waren 55 diepe kerven aangebracht, de eerste 25 in groepen van 5, dan twee die tweemaal zo lang zijn, tenslotte de overige kerven. Het is waarschijnlijk niet bekend of de kerfstok alleen hulpmiddel bij het tellen was of ook in de prehistorische administratie dienst deed. In ieder geval kan hij als voorloper van de computer beschouwd worden; tenslotte wordt de computer in onze samenleving voor een niet te verwaarlozen deel als moderne kerfstok gebruikt.

2.2. Tussen de kerfstok van honderdduizenden jaren geleden en het huidige elektronische rekenwonder werd een scala van andere rekenapparatuur ontwikkeld.
Als eerste moet de abacus genoemd worden; deze komt in principe overeen met ons telraam van de lagere school.
De Chinese versie, de suan pan, dateert op zijn minst al vanaf de elfde eeuw v. C.[3]. De Japanse abacus, de soroban, en de Russische, de stschoty, zijn nog steeds in gebruik. Ons telraam is afgeleid van de Russische[4].
Een wezenlijke vooruitgang voor het mechaniseren van de rekenprocessen is de ontwikkeling van de positionele getalrepresentatie. Het decimale stelsel, inclusief het cijfer nul is bij de Chinezen reeds bekend in de latere periode van de Chou dynastie tussen de zesde en derde eeuw v.C.[5].
Arabische cijfers voor de getalrepresentatie zijn gedurende de Middeleeuwen via India in onze westelijke cultuur ingevoerd, ondanks hevig verzet van de kerk, die het onbruikbare Romeinse systeem bleef voorstaan. Dat deze universiteit op door haar verleende diploma's, hopelijk binnenkort zelfs in de informatica, nog steeds ditzelfde getalsysteem gebruikt, kan misschien uit eerbied voor de vaderen verdedigd worden, een vooruitstrevende geest in deze decennia van gigantische binaire getalverwerking spreekt hier echter niet uit.
Het zestigtallig systeem is de Babyloniërs al in de zeventiende eeuw v.C. bekend. Gebakken kleitabletten tonen de rekenprestaties van wis-

4



kundigen uit de tijd van Hammurabi[6]. Een bijzonderheid is dat men toen nog geen teken voor het cijfer nul kende; deze komt pas omstreeks de derde eeuw v. C. voor op de tabletten.

2.3. De Engelsman John Napier (1550-1617) leverde twee belangrijke bijdragen tot de mechanisering van het rekenen.
Ten eerste moeten „Napiers beenderen" genoemd worden[7]; hiermee worden niet 's mans botten, maar een aantal van been gemaakte staafjes aangeduid, waarmee tamelijk snel een vermenigvuldiging kan worden uitgevoerd. Op elk der staafjes is een tafel van vermenigvuldiging gegraveerd; door de staafjes, die naast elkaar op een rij zijn geplaatst, te draaien kan de uitkomst van een vermenigvuldiging, na een eenvoudige optelling, vrijwel direkt worden afgelezen.
Dat de man die het vermenigvuldigen tot rekenen tracht te reduceren, als tweede belangrijke bijdrage de logarithme uitvindt ligt in de lijn der verwachtingen, die dan ook zijn uitgekomen. Ten onrechte zijn de Briggse logarithmen naar Henry Briggs (1561-1631) vernoemd die, vriend van Napier, slechts de eerste logarithmentafel berekent[8]. De nog heden ten dage in gebruik zijnde rekenliniaal, hoewel steeds meer verdrongen door computerterminal, stamt direkt af van de Napierse logarithmen.

2.4. Algemeen werd de eerste echte mechanische rekenmachine, toegeschreven aan de wiskundige, filosoof, letterkundige en theoloog: Blaise Pascal (1623-1662). Op 19-jarige leeftijd, namelijk, construeert hij een machine die kan optellen en aftrekken, waarin het probleem van de overdracht van een eenheid, het bekende „één onthouden", is opgelost. Sommige auteurs schrijven de oorzaak van de uitvinding van Pascal toe aan het feit dat zijn vader belastingambtenaar was en dat hij zijn vader van het vervelende optel- en aftrekwerk wilde verlossen[9, 10, 11].
Pas sinds enkele jaren is bekend dat de Tübinger hoogleraar voor de bijbelse grondtalen, maar later voor de astronomie en de wiskunde, Wilhelm Schickart (1592-1632) reeds in het geboortejaar van Pascal een rekenmachine geconstrueerd heeft die, blijkens een in 1624 geschreven brief aan Kepler, behalve optellen en aftrekken, ook kan vermenigvuldigen en delen. Bij de laatste twee bewerkingen worden de rekenstaafjes van Napier gebruikt[12].

5

It was 20 pages plus acknowledgements and six pages of footnotes

1971 (continued)

- From before 1971 to 1981 the traditional degree structure existed
  - Students took courses for a “kandidaats” diploma (2-3 years), got title “kand.”
  - With a kand. diploma, a student could then study for a teaching certificate
  - Or a student could go for a “doctoraal” diploma (3 years) and get title “drs.”
  - Many doctoraal students took longer than 6 years in total
  - A doctoraal diploma (drs.) was ***NOT*** a Ph.D., but more like a masters
- From 1982-2002 the two-phase structure was introduced nationally
  - The first phase was undergraduate education
  - The second was graduate school, but that never happened
- In 2002, the entire E.U. standardized on a 3-year bachelors degree potentially followed by a 1-2 year masters, for interested students

1971 (continued)

- Department chairmen/deans
- Math & Computer Science
  - 1964-1973 Pieter Mullender
  - 1973-1974 Gerke Nieuwland
  - 1975-1978 Maarten Maurice
  - 1978-1981 Kobus Oosterhoff
  - 1981-1983 Gerke Nieuwland
  - 1983-1986 Maarten Maurice
  - 1987-1989 Maarten Maurice*
  - 1989-1991 Kobus Oosterhoff*
  - 1992-1995 Hans van Vliet*
  - 1995-1996 Kobus Oosterhoff*
  - 1997-1998 Rien Kaashoek**
  - 1998-2000 Reind van de Riet**
  - 2000-2002 Jan van Mill**

- Department chairmen
- Computer Science
  - 2002-2004 Jan Willem Klop
  - 2004-2007 Guszti Eiben
  - 2007-2010 Hans Akkermans
  - 2010-2014 Maarten van Steen
  - 2014-2016 Guus Schreiber
  - 2016-2018 Dick Bulterman
  - 2018-2024 Jaap Heringa
  - 2024- Stefan Schlobach

Note: The chairmanship usually changed in Sept., so some years had two chairmen, one thru August, one afterwards

* From 1987 to 1996 the head of W & I was called a dean because W & I was a separate faculty

** From 1997 to 2002 W & I was called a “division” of the big science faculty rather than a “subfaculty” (“department”) After 2002, the divisions were called “departments” again

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

CPU



Console

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.

1971 (continued)

- SARA was intended for physics, chemistry, and other sciences
- They needed heavy-duty computing, hence the CDC Cyber 73
- Other Depts. eventually got interested in using computers
  - Economics hired Prof. Jan van Oorschot for business computing
  - The medical faculty hired Prof. Jan van Bemmel for medical computing
  - Gerrit van de Veer in Social Sciences was also an early adopter
  - A bit later, Assoc. Prof. A. Dees in the French Dept. studied the historical development of the French language by digitizing and analyzing real estate deeds because each one had a known date and place. *Maison* was spelled in many ways in different times and different places.
- We had some contact with them

1972

- The Dept. of Math, Physics, and Astronomy was split up
- A Subfaculteit Wiskunde (Dept. of Mathematics) was born
- The only CS staff were still Reind, Jim, and & me
- Reind got his first Ph.D. student, Frank Teer
- Frank’s research was on symbolic algebra

1972 (continued)

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



Main bldg



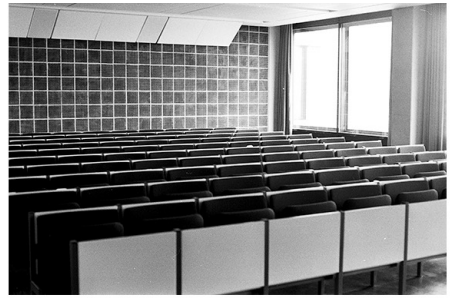
Terminals



Olivetti paper-tape terminal could punch and read paper tape



My office on the 4th floor



A classroom



4th Floor coffee point



Campus from 15th floor



Addition of top two floors to W & N building



Buitenveldert from 15th floor

Ca. 1972 (continued)

- A blind student wanted to take our programming course
- We wanted to help him succeed
- We modified one of the Olivettis to make bumps instead of holes
- I think we modified the hole punches to not go all the way through
- We wrote software to produce output in Braille for him
- It worked and the student could read the Braille on paper tape

1972 (continued)

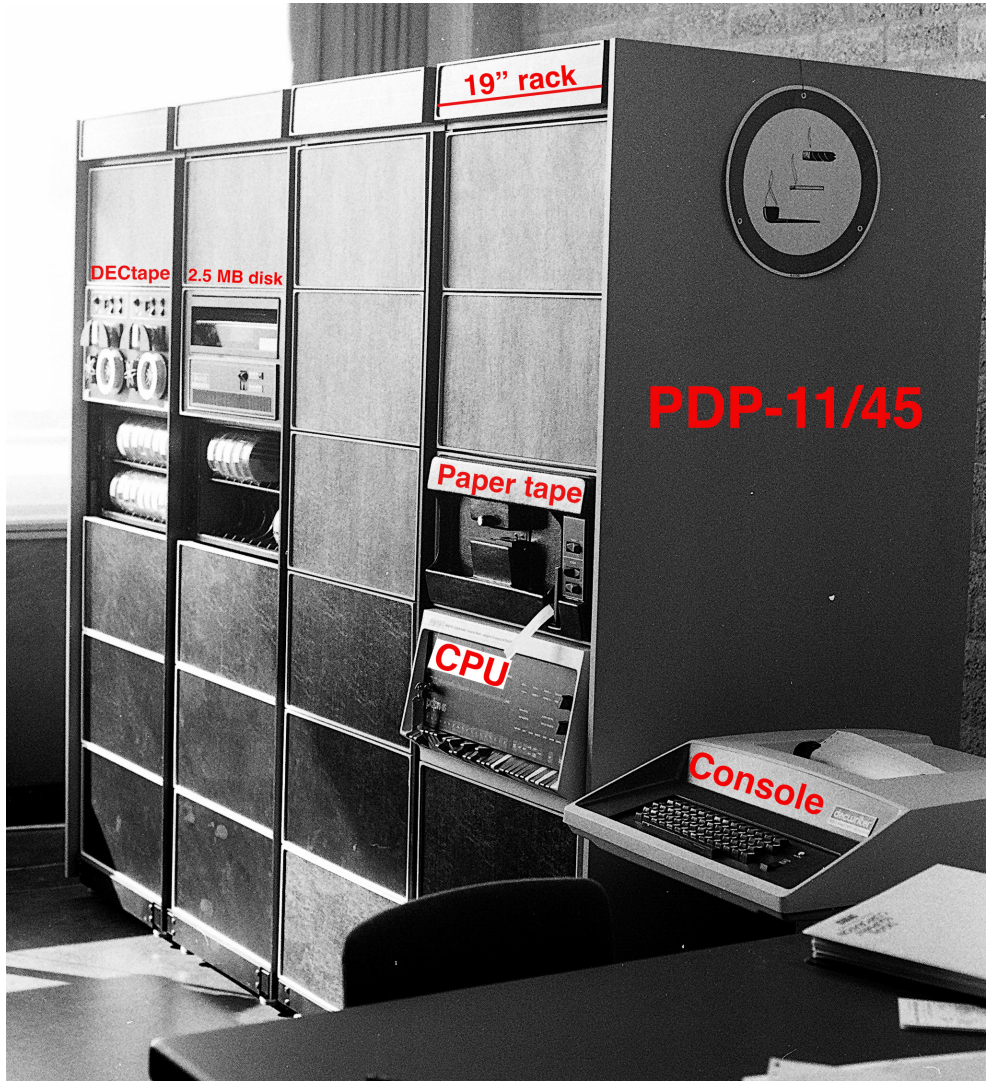
- We began giving a programming course for math students
- The students punched their programs offline on paper tape
- One of the Olivetti's was connected to a 300 bps modem
- Student programs were read in and run on the X8 at the MC
- Results came back and were printed on the Olivetti
- This was a horrible and slow arrangement
- But we hated SARA, the Cyber 73, and FORTRAN
- DEC had just announced the PDP-11/45 minicomputer
- I desperately wanted it and pleaded with Reind to get me one
- Reind schmoozed with everyone and shook the money loose

1972 (continued)

- The money was only step 1
- All equipment purchases over fl. 5000 (€12,000 now) had to be approved by the Rijks Kantoor Machine Centrale
- This involved a fair bit of paperwork and a good story
- The VU had an bureaucrat, Piet Kuiper, in charge of all computing
- He knew next to nothing about computers
- He believed there was no need for any computer besides SARA's
- Again, Reind's schmoozing skills eventually won his permission
- We could finally place the order
- It was delivered sometime in 1973

1973

- We got the 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)

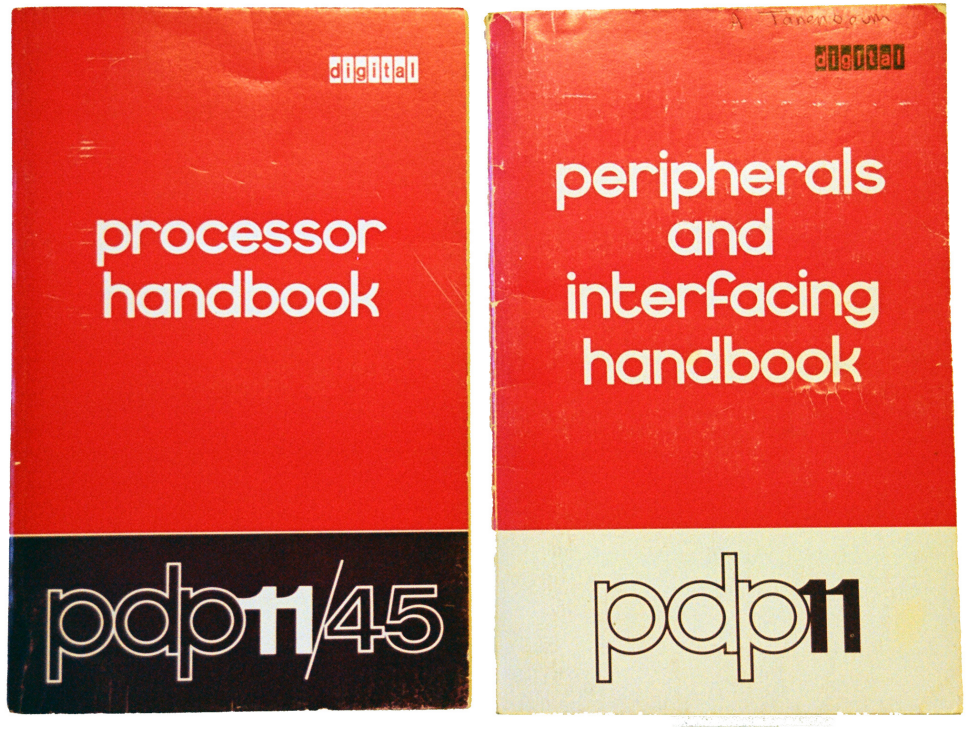


Our PDP-11/45 was kept in an ordinary office on the 4th floor of the main building.
It did not require a special room with a raised floor and special cooling.
It was a MINIcomputer.

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.

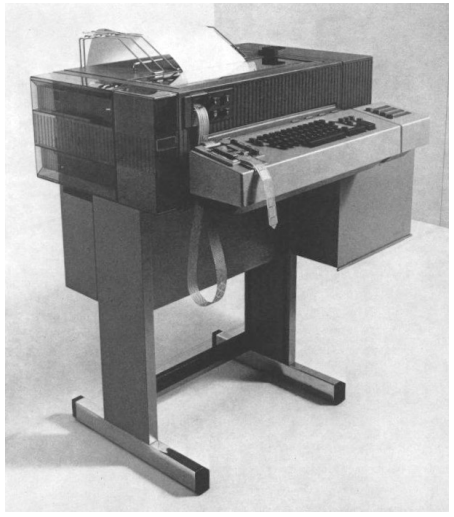
1973 (continued)

- The PDP-11/45 had about 60 instructions
- The x86-64 has 981 unique mnemonics and 3,684 variants
- Here is the complete set of PDP-11/45 manuals

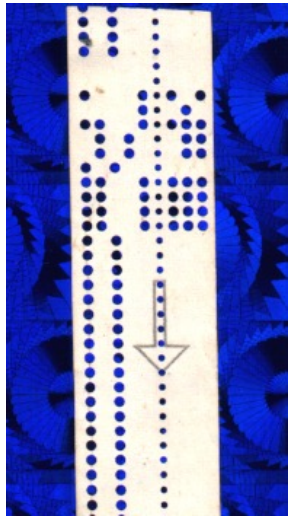


1973 (continued)

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



Olivetti terminal



8-track paper tape



PDP-11 paper tape reader with DEC fan-fold tape

1973 (continue)

- Initially we ran some 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
  - If there were no syntax errors, you typed a command to run it
  - The PDP-11/45 punched the output on paper tape
  - You took the paper tape to an Olivetti and it printed the contents of the tape (offline)
  - You could also print on the DECwriter, but that tied up the computer while printing
  - Until we got UNIX (and timesharing), the PDP-11/45 was only for staff

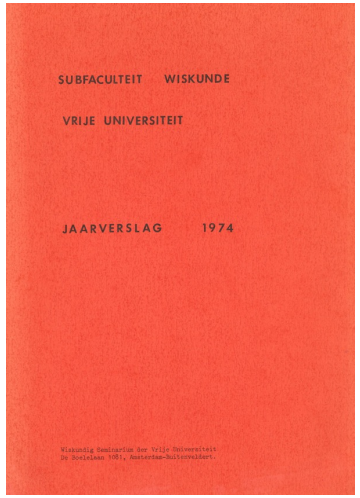
1973 (continued)

- 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
- (Technically 1.3 since we paid him 0.1 for prep time)
- Initially, Jaco had one Ph.D. student (AiO):
  Willem Paul de Roever

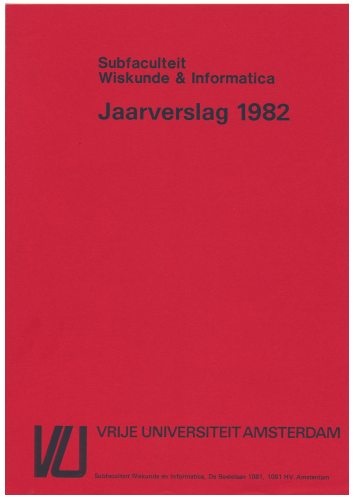


1974

- Each year the Dept. produced an annual report (“jaarverslag”)
- The library had them only from 1974-1995 and 2001
- Some of the information in this history comes from them







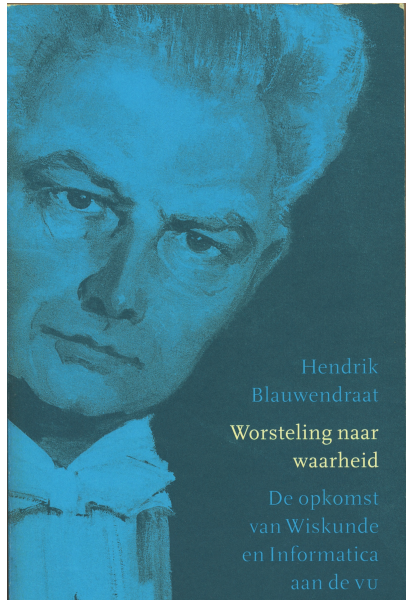




The style, format, and content changed over time. After 1995, the information in this history is spotty.

1974 (continued)

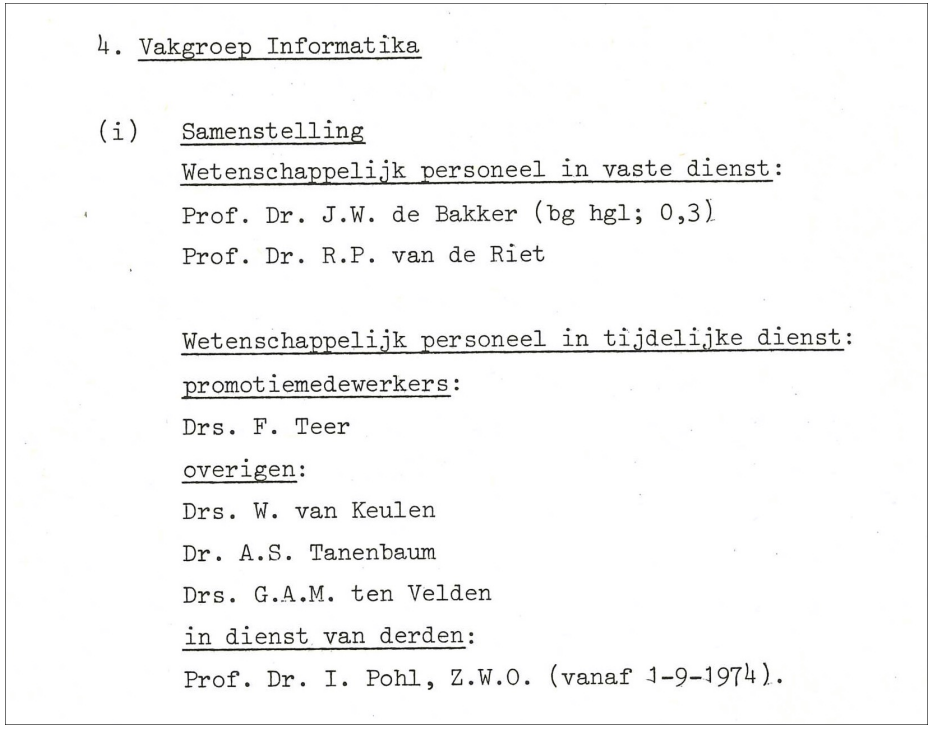
- Other information came from Hendrik Blauwendraat's book: *Worsteling naar Waarheid*, which covers 1930-2003



- Much of the rest is from my memory with help from many people
- Almost all the photos are mine

1974 (continued)

- From the annual report



4. Vakgroep Informatika

(i) Samenstelling

Wetenschappelijk personeel in vaste dienst:

Prof. Dr. J.W. de Bakker (bg hgl; 0,3)

Prof. Dr. R.P. van de Riet

Wetenschappelijk personeel in tijdelijke dienst:

promotiemedewerkers:

Drs. F. Teer

overigen:

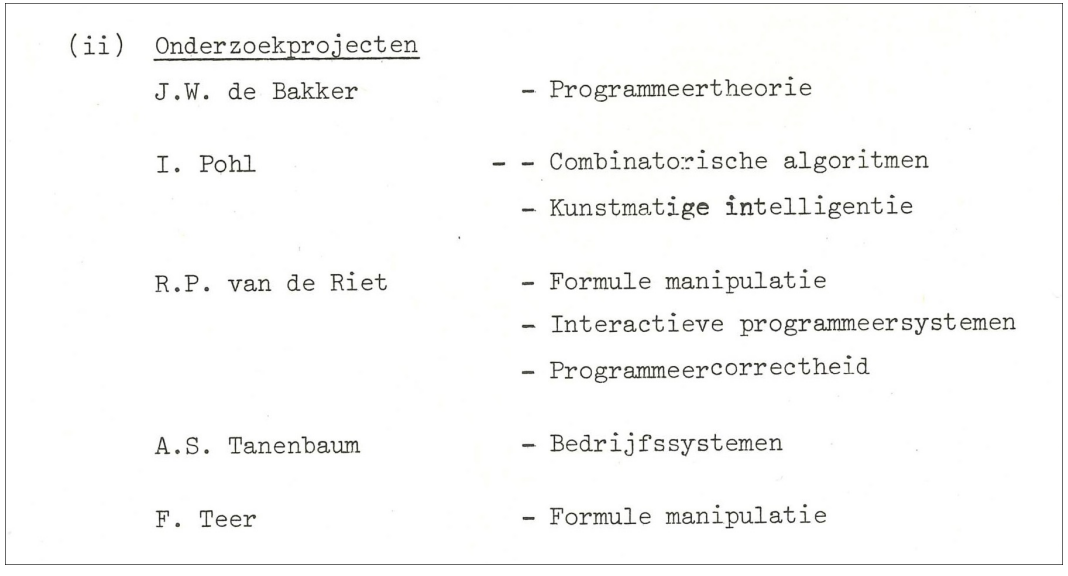
Drs. W. van Keulen

Dr. A.S. Tanenbaum

Drs. G.A.M. ten Velden

in dienst van derden:

Prof. Dr. I. Pohl, Z.W.O. (vanaf 1-9-1974).



(ii) Onderzoekprojecten

J.W. de Bakker	- Programmeertheorie
I. Pohl	- Combinatorische algoritmen
	- Kunstmatige intelligentie
R.P. van de Riet	- Formule manipulatie
	- Interactieve programmeersystemen
	- Programmeercorrectheid
A.S. Tanenbaum	- Bedrijfssystemen
F. Teer	- Formule manipulatie

Ger ten Velden was temporary staff. He didn't have a Ph.D.
He didn't work out so well and was gone when his contract expired.

The number of (math) students was: 71 first year students, 108 pre-kandidaats diploma, 62 doctoraal (241 total).
Computer science would not exist as a separate study until 1981.

1974 (continued)

- On 29 March 1974, Jaco de Bakker gave his inaugural lecture

Dr. J. W. de Bakker

Niet met zoveel woorden

Over de taal der informatica

REDE *uitgesproken bij de aanvaarding van het ambt van buitengewoon hoogleraar in de Informatica aan de Faculteit der Wiskunde en Natuurwetenschappen van de Vrije Universiteit te Amsterdam op 29 maart 1974.*



Mijnheer de Rector Magnificus, Dames en Heren,

Bij de aanvaarding van het ambt van buitengewoon hoogleraar in de Informatica wil ik vanmiddag een aantal onderwerpen aan de orde stellen die een indruk geven van het werkterrein van de theoretische informatica. Ik heb deze gegroepeerd rond het thema „de taal der informatica".
Allereerst zal ik aandacht schenken aan enkele punten betreffende de talen waarmee de computer wordt bestuurd, de zogeheten programmeertalen, en de belangrijkste hierin voorkomende concepten noemen; daarna zal ik programmeertalen bespreken in hun relatie tot formele en natuurlijke talen, vervolgens iets zeggen over de betrouwbaarheid van programma's, en tenslotte enkele fundamentele vragen aan de orde stellen over macht en onmacht van de computer, zoals die bijvoorbeeld gesteld worden naar aanleiding van het onderzoek op het gebied van de kunstmatige intelligentie.

1. De taal van de computer

De computer is machteloos zonder programma. Pas nadat de mens het op te lossen probleem heeft gespecificeerd, en een oplossingsmethode heeft ontwikkeld in de vorm van een zogenaamde algorithme – dat is, een geheel van acties die, liefst in eindige tijd, tot het beoogde doel leiden – en deze heeft vastgelegd in de vorm van een programma – dat is, een voor de computer begrijpelijke rij opdrachten – pas dan kan deze aan het werk gaan. Dat ook dan succes nog niet verzekerd is, zullen wij in een volgend gedeelte van ons betoog bespreken.
Van wat voor aard zijn dergelijke door de computer – of eventueel een andere verwerker, soms de mens zelf – uitvoerbare instructies, en van wat voor soort problemen laten zich hiermee oplossingsmethoden formuleren? Wat meer fundamenteel gesteld is dit de vraag naar de aard van de taal der informatica, en naar de grenzen van wat hiermee kan worden uitgedrukt.
Om over deze vraag meer te kunnen zeggen moet ik eerst een aantal inleidende gegevens over programmeren en programmeertalen bespreken. Er bestaat in

de programmeertalen een rijke verscheidenheid. Enkele historische en vergelijkende opmerkingen volgen straks. In de meeste talen zijn echter bepaalde concepten steeds weer terug te vinden, waarvan ik U zodadelijk de belangrijkste zal noemen.
Voor ik hiertoe overga nog een punt van meer algemene aard. We kunnen de collectie van alle talen verdelen in twee groepen, namelijk de zogenaamde *natuurlijke* talen, Nederlands, Engels, en de andere door de mens voor onderlinge communicatie gebruikte talen, en de *formele* talen – kunsttalen vooral in de wiskunde en logica geintroduceerd, maar thans ook als belangrijke groep die der programmeertalen omvattend. Met een, overigens aanvechtbare, uitbreiding van het begrip taal zouden we hier desgewenst ook de taal van sommige dieren zoals bijen of dolfijnen aan kunnen toevoegen[1]). Bij al deze talen treffen we een dualiteit aan tussen syntactische en semantische aspecten, dat is tussen het geheel van beschouwingen die de *vorm* van een taaluiting betreffen, en die welke zich richten op de *betekenis* van deze uiting. Bij analyse van de betekenis van een programma zullen we ons steeds bewust moeten zijn van een hieruit voortvloeiende dualiteit, die tussen het programma als linguistisch object – een welgevormde rij, voor de computer leesbaar veronderstelde, symbolen enerzijds, en de door het programma voorgeschreven acties die de computer moet verrichten op in het algemeen eveneens door het programma beschreven objecten, anderzijds. Een streng geformuleerde behandeling van de semantiek zal dan ook gesteld dienen te zijn in termen van deze correspondentie.
Heel duidelijk komt dit tot uiting in de definitie van de onder leiding van Van Wijngaarden ontworpen programmeertaal ALGOL 68[2]), waar wij deze gedachte, zoals ook diverse later te bespreken begrippen, voor het eerst systematisch uitgewerkt zien. De ook wel aangehangen opvatting dat de computer als symboolmanipulerend systeem bij uitstek zich in dezelfde wereld bevindt als de programmatekst, deze tekst als invoer opvat, en successievelijk transformeert tot een eindtoestand is bereikt, is naar mijn mening weinig geschikt voor een vruchtbare studie der semantiek. Zij het vanuit zeker dogmatisch standpunt verdedigbaar, is zij in het bijzonder weinig verhelderend, omdat

To the right are the thank yous at the end

Nederlandse informatica-onderwijs qua omvang heeft op vergelijkbare landen, is hier zeker mede schuldig aan.
Aan het einde van mijn rede gekomen wil ik de wens uitspreken dat voortgaand onderwijs en onderzoek moge leiden tot het beter spreken en verstaan van de taal der informatica, als middel tot het doel: het verantwoord benutten van de macht van de computer.

Mevrouw, Mijne Heren Leden van het Bestuur van de Vereniging voor Wetenschappelijk Onderwijs op Gereformeerde Grondslag,

Voor het in mij gestelde vertrouwen, blijkend uit mijn benoeming tot buitengewoon hoogleraar in de informatica, ben ik U zeer erkentelijk.

Mijne Heren Leden van het College van Bestuur,

U hebt zich de informatica welgezind betoond, zowel door in de gegeven omstandigheden tot mijn benoeming te adviseren, als door Uw daadwerkelijke steun bij de opzet tot interfacultaire samenwerking. Hiervoor betuig ik U mijn bijzondere dank.

Hooggeachte van de Riet,

Onze eerste kennismaking dateert uit 1956, toen wij als jaargenoten de wiskundestudie aanvingen. Later waren wij collegae als medewerkers bij het Mathematisch Centrum, toen als souschefs van de Rekenafdeling aldaar, en thans als docenten informatica. De twee laatste stadia hiervan zijn in belangrijke mate gevolg geweest van Uw niet-aflatende inspanningen. Ik wil U daarom vandaag dankzeggen voor alles wat U hebt gedaan voor de opbouw van de afdeling informatica van onze Universiteit, en in het bijzonder voor mijn benoeming.

Dames en Heren Medewerkers van de Subfaculteit Wiskunde,

Als alumnus van het Wiskundig Seminarium is het mij een groot genoegen thans weer in Uw kring te zijn teruggekeerd, zij het zowel partieel wat de tijd, als perifeer wat de plaats betreft. Hooggeleerde Grosheide en Mullender, U waart mijn hooggeschatte leermeesters in vroeger jaren. Waarde Maurice, de vele persoonlijke contacten die ik met U mocht hebben, speciaal in de tijd dat wij tezamen aan het Wiskundig Seminarium verbonden waren, hebben veel voor mij betekend. Waarde Nieuwland, U hebt een hoofdrol gespeeld bij de voorbereidingen voor het tot stand komen van de afdeling informatica, waarvoor ik U hartelijk dank. Waarde Baayen, Uw actieve belangstelling voor de theoretische informatica stel ik zeer op prijs.

Hooggeachte van Wijngaarden,

Toen ik tien jaar geleden medewerker werd van de Rekenafdeling van het Mathematisch Centrum, was de informatica voor mij een nog geheel onbekend terrein. U hebt als promotor mijn eerste schreden bij het verkennen hiervan begeleid, mij geïntroduceerd in de internationale wereld der informatici, en mij de gelegenheid gegeven mij in de zo stimulerende sfeer van het Mathematisch Centrum verder te ontwikkelen.

Mijne Heren Leden van de Raad van Beheer van het Mathematisch Centrum,

De collegiale wijze waarop U mij nog niet zo lang geleden in Uw midden opnam heeft mij veel genoegen gedaan.

Waarde Collegae van de Afdeling Informatica van het Mathematisch Centrum,

Ik ben mij er zeer van bewust mijn taak bij het coördineren van Uw werk slechts te kunnen verrichten dankzij Uw toewijding aan ons vak.

1974 (continued)

- Ira Pohl was a visiting Prof. 1974-75 from U. Calif. Santa Cruz
- His research was on AI and combinatorial algorithms
- He taught a course on AI for interested students



1974 (continued)

- In Sept. 1974 the Dept. changed the math study for all students
- The study took 8 semesters (down from 10)
- The first three semesters were the same for all students
- Most of the courses in the first three semesters were math
- Then students had to choose one of
  - Pure mathematics
  - Applied mathematics
  - Informatica
- They also had to pick a minor from a different faculty

1974 (continued)

- The informatica students were required to take these courses:
  - Data structures
  - Computer organization
  - Operating systems
  - Compilers
  - Programming languages
  - Theory of programming
  - Formal languages
  - Statistics and probability
  - Numerical mathematics I and II
  - Differential equations
- Students also had to do a final-year project (afstudeerproject)

Note: This was the long-range goal. Not every course would be taught every year

1974 (continued)

- Courses we actually taught in the kandidaats program 1974
  - Introduction to computer science (Reind van de Riet, 53* students)
- Courses we actually taught in the doctoraal program 1974
  - Fundamentals of programming (Jaco de Bakker, 12* students)
  - Semantics of programming languages (Jaco de Bakker, 18* students)
  - Data structures (Reind van de Riet, 8* students)
  - Programming languages (Andy Tanenbaum, 14* students)
  - Artificial intelligence (visiting Prof. Ira Pohl, 13* students)

* Only students from our department are counted in this history but there were also students from physics, etc.

We also taught courses for other departments and faculties, but they are not listed in this history
In the early days, it took a while to get a stable educational program
And remember, computer science wasn't an actual major until 1981

1974 (continued)

- The Subfaculteit Wiskunde had four “vakgroepen”
  - 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 vakgroep largely ran its own education and research

1975

- We moved from 4A in the main building to the new 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!!!



Main building



W & N (Math & Physics) building (photo ≈ 2000)

1975 (continued)

- From the annual report

Vakgroep Informatica

Samenstelling:

Wetenschappelijk personeel in vaste dienst:

Prof.dr. W.J. de Bakker (buitengewoon hoogleraar 0,3 werktijd)

Prof.dr. R.P. van de Riet

Dr. A.S. Tanenbaum

Wetenschappelijk personeel in tijdelijke dienst

promotiemedewerker:

Drs. F. Teer

Overigen:

Drs. W. van Keulen

Drs. G.A.M. ten Velden

In dienst van derden:

Prof.dr. I. Pohl, Z.W.O. (tot 01.07.75)

Onderzoekprojekten

J.W. de Bakker	- Programmeertheorie
I. Pohl	- Combinatorische algorithmen
	- Kunstmatige intelligentie
R.P. van de Riet	- Formule manipulaties
	- BASIS
	- PASCAL-P
A.S. Tanenbaum	- Hoog-niveau machines
	- P.D.P. 11/45 timesharing systeem
F. Teer	- Polynoommanipulatie in verschillende programmeertalen
	- Complexiteit van algorithmen voor polynoommanipulatie

1975 (continued)

- Computer sciences courses in the kandidaats program
  - Introduction to computer science I (Jim van Keulen, 85* students)
  - Introduction to computer science II (Reind van de Riet, 39* students)
- Computer science courses in the doctoraal program
  - Algol 68 (Jaco de Bakker, 7* students)
  - Formal languages (Jaco de Bakker, 9* students)
  - Computer organization (Andy Tanenbaum, 14* students)
  - System programming (AndyTanenbaum, 6* students)

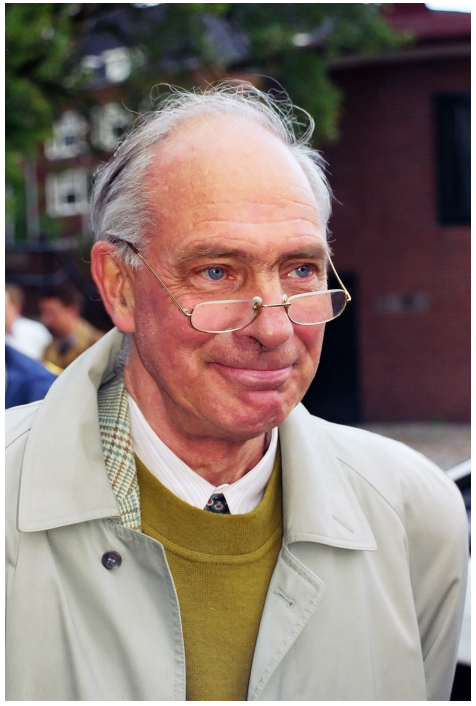
1975 (continued)

- Research projects
  - De Bakker: Programming theory
  - Van de Riet: formula manipulation, BASIS programming lang., Pascal-P
  - Tanenbaum: High-level machines, TSS-11 operating system
- Research output
  - De Bakker: 5 papers*, 12 talks‡
  - Van de Riet: 1 paper*, 5 talks ‡
  - Tanenbaum: 3 talks ‡
  - Pohl: 1 paper* 3 talks ‡

* Papers in journals and conferences, not internal reports or MC reports; also in later years
‡ Symposia at universities or talks at conferences; also in later years

1975 (continued)

- In Jan. 1975, the Dept. hired Kobus Oosterhoff as a full Professor
- He was professor of statistics but was friendly to computer science
- He was Dept. chairman 1978-1981, 1989-1991 and 1995-1996



1975 (continued)

- Willem Paul de Roever got his Ph.D. degree
- The title of his thesis was
  - "Recursive Program Schemes: Semantics and Proof Theory"
- His thesis adviser was Jaco de Bakker
- He was the first Ph.D. in computer science at the VU



From 1990 onward until he retired he was a full professor at the Christian-Albrechts University in Kiel, Germany

1976

- From the annual report

IV. Vakgroep Informatica

Per 31 december 1976 maakten de volgende stafleden deel uit van de vakgroep:

dr. J.W. de Bakker	(bghl)
drs. W. van Keulen	(wa)
ir. A. Nijholt	(pmw)
dr. R.P. van de Riet	(hgl)
drs. J.W. Stevenson	(mw belr)
dr. A.S. Tanenbaum	(hmw)
drs. F. Teer	(pmw)
drs. R.A.C. Thomas	(mw belr)
drs. G. ten Velden	(mw)

Gezien de opbouw van de vakgroep is het niet zinvol een nadere verdeling in onderzoekseenheden te maken.

The CvB did not give all the money it got from the government to the faculties. It kept some for itself for “beleidsruimte” (belr). Academic staff members were invited to make proposals to do things from this pot of money. I made a proposal, won, and hired Johan Stevenson. Reind made one, also won, and hired Rob Thomas.

1976 (continued)

- Jerre Noe was a visiting Prof. 1976-77 from U. of Washington
- In the fall he taught systems performance and evaluation
- In the spring he taught simulation
- His research was on performance modeling and simulation
- He wrote 1 paper and gave 8 talks while here



1976 (continued)

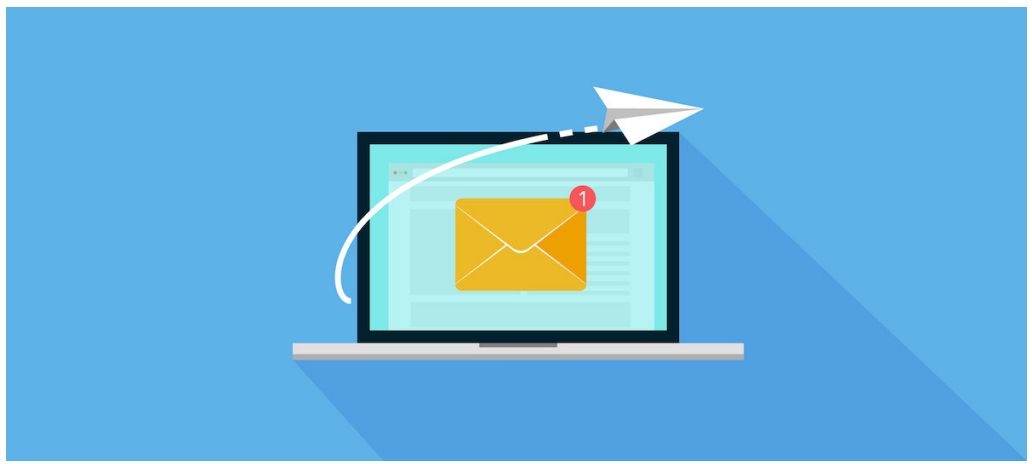
- Computer Sciences courses in the kandidaats program
  - Introduction to computer science I (Jim Van Keulen, 61 students)
  - Introduction to computer science II (Reind van de Riet, 38 students)
  - Data structures (Reind van de Riet, 20 students)
  - Computer organization (Andy Tanenbaum, 16 students)
- Computer Sciences courses in the doctoraal program
  - Programming theory (Jaco de Bakker, 6 students)
  - Formal languages (Jaco de Bakker, 12 students)
  - System performance and evaluation (Jerre Noe, 11 students)
- Final projects (afstudeerprojecten) supervised:
  - Van de Riet: 5 (including Peter Apers, later professor at Twente University)
  - Tanenbaum: 3 (including Pieter Hartel, later professor at Twente University)

1976 (continued)

- Research projects
  - De Bakker: programming theory
  - Van de Riet: formula manipulation, BASIS programming lang., databases
  - Tanenbaum: operating systems, distributed systems
- Research output
  - De Bakker: 4 papers, 4 talks
  - Van de Riet: 1 book, 3 papers, 1 talk
  - Tanenbaum: 1 book, 6 papers, 2 talks
  - Noe: 4 talks
  - Ph.D Students: 1 paper, 4 talks

1976 (continued)

- 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/links/culture/adventure.html

1976 (continued)

- My first book, *Structured Computer Organization*, was published
- I wrote five books in 22 editions, translated into 23 languages



Structured Computer Organization



Computer Networks



Operating Systems--
Design & Implementation
(book about MINIX)



Modern Operating Systems



Distributed (Operating) Systems

There are 163 combinations of title-edition-language that I know of and probably many I don't know of. They are used at universities all over the world.

1977

- From the annual report

Vakgroep Informatica

drs. P.M.G. Apers	(pmw.)
dr. J.W. de Bakker	(bg.hgl.)
drs. W. van Keulen	(wa.)
ir. A. Nijholt	(pmw.)
dr. R.P. van de Riet	(hgl.)
drs. J.W. Stevenson	(mw.belr.)
dr. A.S. Tanenbaum	(hmw.)
drs. F. Teer	(pmw.)
drs. R.A.C. Thomas	(mw.belr.)

De vakgroep heeft drie onderzoekseenheden, nl.

Theoretische informatica: J.W. de Bakker, A. Nijholt

Programmering en toepassingen: P.G.M. Apers, R.P. van de Riet, F. Teer, R.A.C. Thomas

Systeemprogrammering: J.W. Stevenson, A.S. Tanenbaum

1977 (continued)

- Computer Sciences courses in the kandidaats program
  - Introduction to computer science I (Jim Van Keulen, 77 students)
  - Introduction to computer science II (Reind van de Riet, 31 students)
  - Data structures (Reind van de Riet, 16 students)
  - Computer organization (Andy Tanenbaum, 13 students)
- Computer Sciences courses in the doctoraal program
  - Programming theory (Jaco de Bakker, 13 students)
  - Formal languages (Jaco de Bakker, 10 students)
  - Simulation (Jerre Noe, 8 students)
  - Compiler construction (Reind van de Riet, 19 students)
  - Databases (Reind van de Riet, 14 students)
- Final projects (afstudeerprojecten) supervised:
  - Van de Riet: 3, Tanenbaum: 1

1977 (continued)

- Research projects
  - De Bakker: formal languages and programming theory
  - Van de Riet: distributed databases, DB algorithms, formula manip., BASIS
  - Tanenbaum: distributed systems
  - Visiting professor Jerre Noe (U. of Washington): performance, simulation
- Research output
  - De Bakker: 4 papers, 6 talks
  - Van Keulen: 1 talk
  - Van de Riet: 2 papers, 13 talks
  - Tanenbaum: 1 paper, 5 talks
  - Noe: 7 talks
  - Ph.D Students: 4 papers, 5 talks

1977 (continued)

- 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)

- Reind wanted teletypes with paper
- I wanted CRT terminals with glass screens
- I convinced him that CRTs would save paper
- We bought five Beehive terminals
- I bought a Beehive and an acoustic coupler
- I was the first remote user of our PDP-11/45
- We also bought more Olivetti's with paper tape



An Olivetti terminal could punch paper tape and also print from it

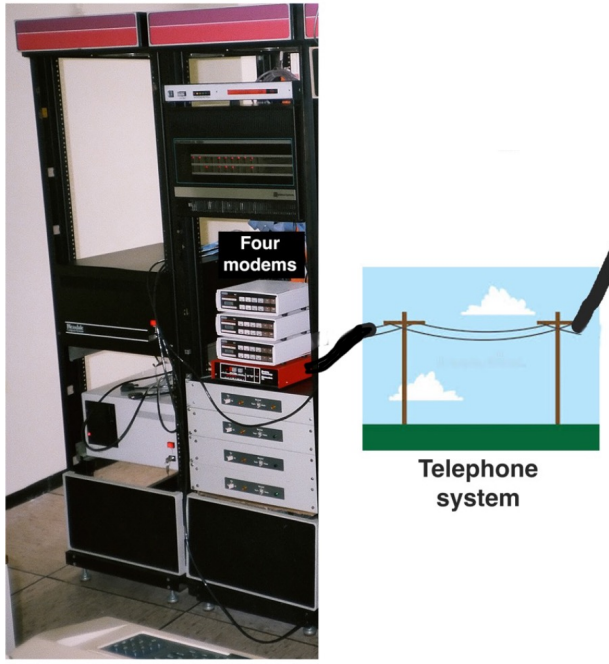


Beehive

Acoustic couplers like the yellow one above were legal because they were not electrically connected to the phone system. They just converted characters from the terminal into strange noises and transmitted the noises. It ran at 150 bps and was unreliable.

1977 (continued)

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





Later I upgraded to a 300-bps modem for my Beehive Terminal. My setup was cutting edge technology. I could Use the PDP-11 from home!

1977 (continued)

- A digital artist, Harold Cohen, had a show at the Stedelijk Museum
- He had a computer-controlled device with a pen, called a turtle
- It moved around the floor drawing art on a big sheet of paper
- People were amazed to see the turtle draw pictures
- His computer, a PDP-11, broke down in the middle of the show
- He called DEC (the PDP-11 manufacturer) and they told him to call us
- My students Sape and Hans went over there and solved the problem
- Cohen was very grateful and gave us some framed turtle art as thanks
- We hung it on the walls of our machine room

See: https://dam.org/museum/essays_ui/essays/harold-cohen-unique/

1978

- For the first time, the 1977 annual report lists “subfaculteitsraad”
- This may existed earlier but was not listed in the annual reports
- In theory, it had the final say on everything: people, budgets, etc.
- In practice, it did nothing and the 4-man board ran the department
- The composition in 1978 was
  - 5 math academic staff
  - 1 computer science academic staff
  - 1 administrative staff
  - 4 students

1978 (continued)

- From the annual report

Vakgroep Informatica

drs. P.M.G. Apers	(pmw.)
dr. J.W. de Bakker	(bg.hgl.)
drs. W. van Keulen	(wa.)
drs. S.J. Mullender	(pmw.)
ir. A. Nijholt	(pmw.)
dr. R.P. van de Riet	(hgl.)
drs. J.W. Stevenson	(mw.belr.)
dr. A.S. Tanenbaum	(bg.l.)
drs. R.A.C. Thomas	(mw.belr.)
dr. G. Yuval	(hmw.)

Gideon Yuval was nontenured faculty. His research was on cryptography. After his 1-year contract expired, he left by mutual consent. He went to Intel and then to Microsoft Research.

De vakgroep heeft drie onderzoekeenheden, nl.

Theoretische informatica: J.W. de Bakker, A. Nijholt

Programmering en Toepassingen: P.M.G. Apers, W. van Keulen, R.P. van de Riet, R.A.C. Thomas

Systeemprogrammering: S.J. Mullender, J.W. Stevenson, A.S. Tanenbaum, G. Yuval

1978 (continued)

- Tony Wasserman was a visiting Prof. from U. Calif. San Francisco
- He came back in the summers of 1979 and 1981
- He worked with Reind and Martin Kersten on databases
- Tony was co-promotor on Martin's thesis
- Together they coauthored six published articles on databases



1978 (continued)

- Computer Sciences courses in the kandidaats program
  - Introduction to computer science I (Jim Van Keulen, 77 students)
  - Introduction to computer science II (Reind van de Riet, 31 students)
  - Data structures (Reind van de Riet, 16 students)
  - Computer organization (Andy Tanenbaum, 13 students)
- Computer Sciences courses in the doctoraal program
  - Programming theory (Jaco de Bakker, 13 students)
  - Formal languages (Jaco de Bakker, 10 students)
  - Simulation (Jerre Noe, 8 students)
  - Compiler construction (Reind van de Riet, 19 students)
  - Databases (Reind van de Riet, 14 students)
- Final projects (afstudeerprojecten) supervised:
  - Van de Riet: 3, Tanenbaum: 1

1978 (continued)

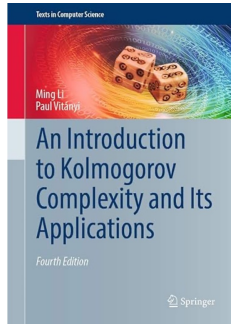
- New courses were gradually introduced
  - 1978: Operating systems (Tanenbaum)
  - 1979: Distributed systems (Tanenbaum)
  - 1979: Programming languages (Tanenbaum)
  - 1983: Computer networks (Tanenbaum)
  - 1984: UNIX (Grune); this was to show students they didn't know everything
  - 1984: Introduction to AI (Siklossy)
  - 1984: Expert systems (Siklossy)
  - 1984: Computers in society (Teun Koetsier, math)
  - 1985: Databases II (Van de Riet)
- As the staff grew larger, we could add new courses

1978 (continued)

- Research projects
  - De Bakker: formal languages and programming theory
  - Van de Riet: distributed databases, DB algorithms, formula manip., BASIS
  - Tanenbaum: distributed systems
- Research output
  - De Bakker: 1 paper, 4 talks
  - Van de Riet: 2 papers, 8 talks
  - Tanenbaum: 3 paper, 6 talks
  - Ph.D Students: 2 papers, 8 talks

1978 (continued)

- Paul Vitanyi got his Ph.D.
- He was Jaco de Bakker's second Ph.D student to graduate
- Paul's thesis was entited:
  - "Lindenmayer Systems: Structures, Languages, and Growth Functions"
- He worked at CWI and was later a full professor at the UvA
- He was a member of the Academia Europaea
- He was a knight in the Order of the Netherlands Lion
- He won the IFIP Silver Core Award
- His book won a TAA McGuffey Award





1978 (continued)

- Frank Teer got his Ph.D.
- He was Reind van de Riet's first Ph.D student to graduate
- (Willem Paul de Roever was the first CS Ph.D. P. Vitanyi was 2nd)
- Frank's thesis was entited:
  - "Formula Manipulation and Pascal"

1978 (continued)

- The College van Bestuur was very frugal with money
- It didn't spend it easily all year
- But if it didn't spend it by Dec. 31, the money was lost forever
- On Dec. 23 it would announce: We have money, bring projects
- The first time they caught us off guard
- The next year I had a shopping list for different amounts
- By then we had 64 KB RAM and in 1978 we bought another 64 KB
- Correcting for inflation, the 64 KB cost ≈ €65,000 (€1 per *byte*)
- We hired our first systems programmer, Ruud Wiggers

1979

- From the annual report

Vakgroep Informatica

drs. P.M.G. Apers	(pmw.)
dr. J.W. de Bakker	(bg.hgl.)
N.V. Findler	(gasthgl., vanaf 1 augustus)
drs. M. Kersten	(ZWO-mw., vanaf 1 september)
drs. W. van Keulen	(wa.)
drs. S.J. Mullender	(pmw.)
ir. A. Nijholt	(pmw.)
dr. R.P. van de Riet	(hgl.)
G. Sicherman	(gastmw. op IBM-beurs, vanaf 1 november)
drs. J.W. Stevenson	(mw.belr.)
dr. A.S. Tanenbaum	(bg.l.)
drs. R.A.C. Thomas	(mw.belr.)
R. Wiggers	(tas)
dr. G. Yuval	(hmw., tot 1 september)

De vakgroep omvat drie onderzoekseenheden:

Theoretische Informatica: J.W. de Bakker, A. Nijholt

Programmering en Toepassingen: P.M.G. Apers, N.V. Findler (gast), M.Kersten, R.P. van de Riet, G. Sicherman (gast), R.A.C. Thomas

Systeemprogrammering: S.J. Mullender, J.W. Stevenson, A.S. Tanenbaum, G. Yuval

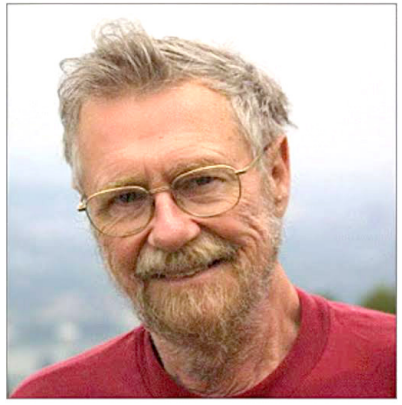
1979 (continued)

- Nicholas V. Findler was a visiting professor for 1 year
- He was a Hungarian
- He worked in artificial intelligence
- While here, he published 4 papers in journals and 2 in conferences
- After leaving us, he taught at Arizona State University



1979 (continued)

- 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



Edsger Dijkstra (Hgl TUE)

1979 (continued)

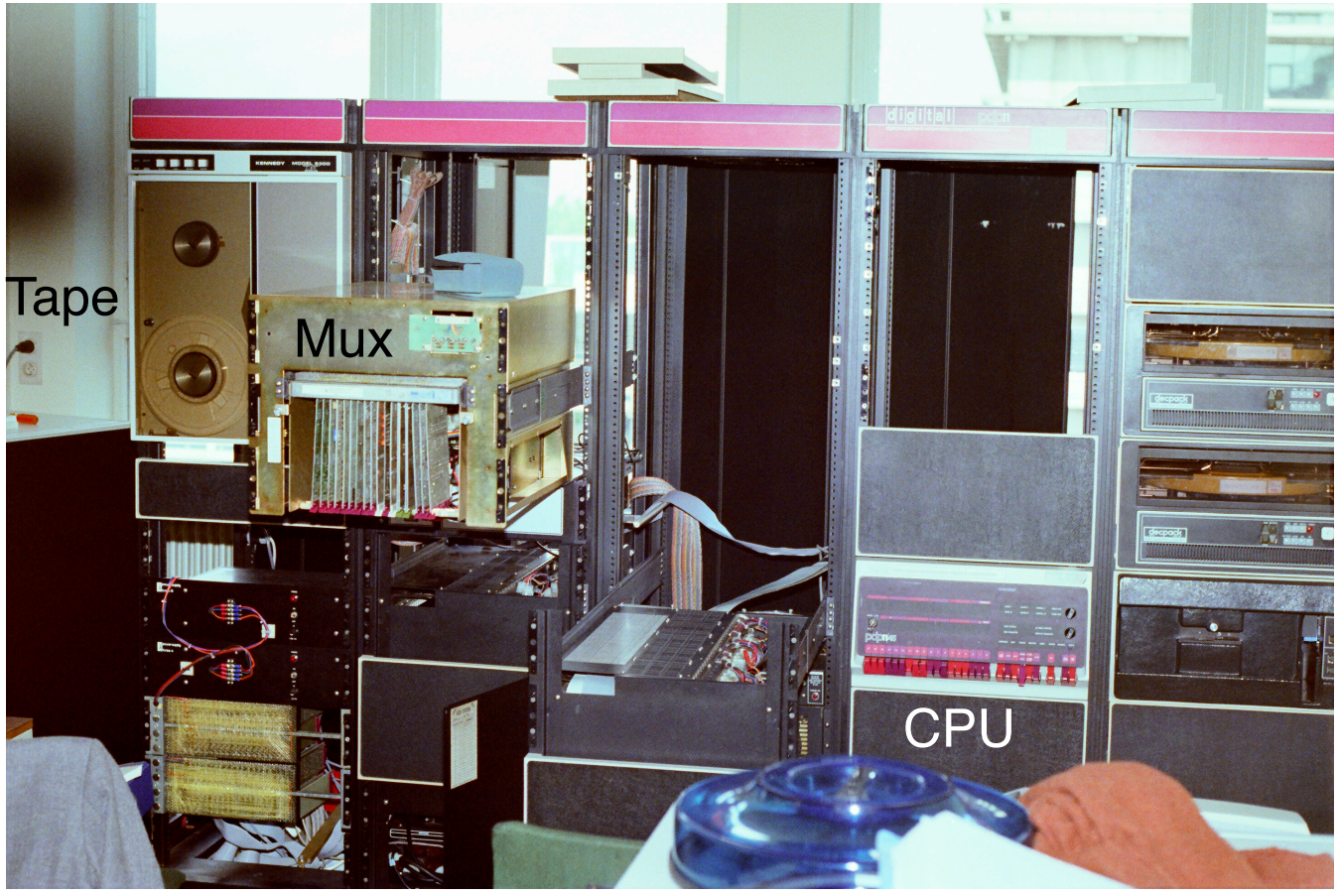
- We bought eight 8086 headless workstations and invented cloud computing running our Amoeba research operating system
- We also bought a 9-track magnetic tape drive for the PDP-11/45





1979 (continued)

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

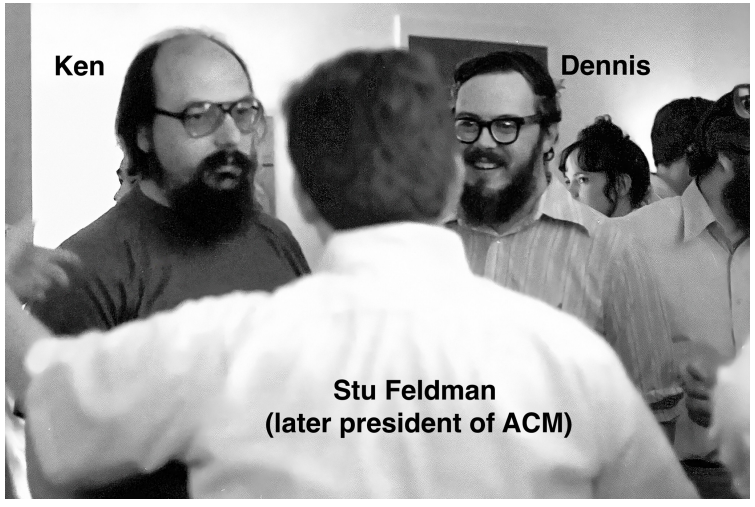


RK05 #1 (2.5 MB)

RK05 #2 (2.5 MB)

1979 (continued)

- I spent the summer as a visitor at Bell Labs (also 1980 & 1981)
- I worked in the UNIX group with Ken Thompson and Dennis Ritchie
- I threw a party at the house I rented; here is a photo from it



- Dennis, Steve Johnson, and Peter Weinberger later visited the VU
- Peter was “referent” for Sape Mullender’s thesis

1980

- From the annual report

Vakgroep Informatica.

drs. P.M.G. Apers	(pmw)
dr. J.W. de Bakker	(bg hgl)
dr. N.V. Findler	(gast hgl, tot 1 augustus)
drs. W. de Jonge	(Z.W.O.-mw)
drs. E. de Keizer	(tas vanaf 1 mei)
drs. M.L. Kersten	(Z.W.O.-mw)
drs. W. van Keulen	(wa)
drs. S.J. Mullender	(pmw)
drs. J.-J.Ch. Meyer	(pmw, vanaf 1 augustus)
ir. A. Nijholt	(pmw, tot 16 oktober).
dr. R.P. van de Riet	(hgl)
G.Sicherman	(gast pmw, tot 1 oktober)
drs. J.M. van Staveren	(mw. belr., sinds 16 oktober)
drs. J.W. Stevenson	(mw. belr.)
dr. A.S. Tanenbaum	(hgl)
drs. R.A.C. Thomas	(mw.belr., tot 1 septembe
R. Wiggers	(tas)

De vakgroep omvat drie onderzoekseenheden:

Theoretische Informatica: J.W. de Bakker, J.-J.Ch. Meyer, A. Nijholt.

Programmering en Toepassingen: P.M.G. Apers, N.V. Findler (gast), W. de Jonge, M.L. Kersten, R.P. van de Riet, G. Sicherman (gast), R.A.C. Thomas.

Systeemprogrammering: E. Keizer, S.J. Mullender, J.W. Stevenson, J.M. van Staveren, A.S. Tanenbaum

1980 (continued)

- 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



Reind Max Euwe

1980 (continued)

- The VU and University of Amsterdam agreed to cooperate
- Some areas would be done at the VU and some at the UvA
- If either one had a professor in some area, the other wouldn't
- Each one would have someone on the other's search committees
- This was to enforce the agreement
- It worked well for several decades

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





c.c.De Jager
Hoogenkamp

→ Bestuur Wiskunde

MINISTERIE VAN ONDERWIJS EN WETENSCHAPPEN

cntv. d.d. 11.03.80	nr. R373
kopie naar A.S. Tanenbaum	par.
beantw. d.d.	nr.
afgeh.	par.

Het College van Bestuur van de
Vrije Universiteit
Postbus 7161
1007 MC AMSTERDAM

Uw brief van
12 december 1979,
kenmerk HPZ/916

Kenmerk
HW/IW/P-360.200

'S-GRAVENHAGE
5 MAART 1980

Onderwerp
persoonlijk ordinariaat
dr. A.S. Tanenbaum

Doorkiesnummer
(070) 74 23 73

In antwoord op Uw bovenvermelde brief deel ik U mede, dat ik kan instemmen met een persoonlijk ordinariaat op het vakgebied van de informatica, in het bijzonder de computerorganisatie en systeemprogrammering, ten behoeve van dr. A.S. Tanenbaum.

Met verwijzing naar de circulaire van 28 december 1978, kemerk HW/IW/A-338592, maak ik U erop attent dat de instelling van dit persoonlijk ordinariaat geen invloed zal hebben op de berekening van de gemiddelde personeelslast.

Tenslotte deel ik U nog mede dat het hier gaat om een gewone leerstoel, waaraan een honorering is verbonden, volgens de hoogleraarssalarisschaal A, als aangegeven in de Richtlijnen 1980, inzake de salariëring van hoogleraren.

De minister van onderwijs en wetenschappen,

(dr. A. Pais)

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



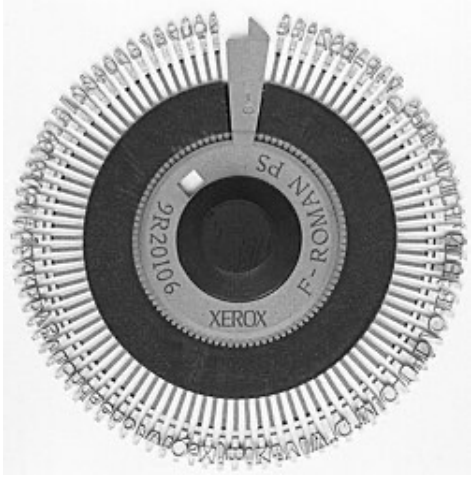
1980 (continued)

- 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

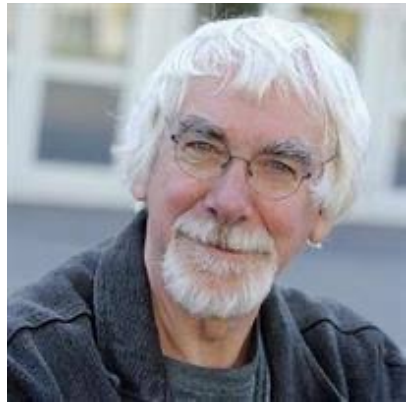
The printer used a carbon ribbon, so The quality of print was extremely good. It was fed by a box of fan-fold paper.



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

1980 (continued)

- Anton Nijholt got his Ph.D.
- He was Jaco de Bakker's third Ph.D. student to graduate
- Anton's thesis was entitled:
  - "Context-free Grammars: Covers, Normal Forms, and Parsing"
  - It was based on 15 previously published papers, 1976-1980
- He was later a full professor in Twente and had 50 Ph.D. students



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

- From the annual report

5.4. VAKGROEP INFORMATICA

5.4.1.1. Stafleden van de vakgroep:

drs. P.M.G. Apers	(pmw)
dr. J.W. de Bakker	(bg hgl)
drs. W. de Jonge	(Z.W.O.-mw)
drs. E.G. Keizer	(tas)
drs. M.L. Kersten	(Z.W.O.-mw)
drs. W. van Keulen	(wa)
drs. S.J. Mullender	(pmw)
drs. J.-J.Ch. Meyer	(pmw)
dr. R.P. van de Riet	(hgl)
drs. J.M. van Staveren	(mw. belr.)
drs. J.W. Stevenson	(pmw) (tot 1 maart 1981)
dr. A.S. Tanenbaum	(hgl)
R. Wiggers	(tas)

5.4.2. Onderzoekseenheden

Tot de vakgroep behoren de volgende onderzoekseenheden:

5.4.2.1. Theoretische Informatica

Stafleden: J.W. de Bakker, J.-J.Ch. Meyer

5.4.2.2. Programmering en Toepassingen

Stafleden: P.M.G. Apers, W. de Jonge, M.L. Kersten, W. van Keulen, R.P. van de Riet

5.4.2.3. Systeemprogrammering

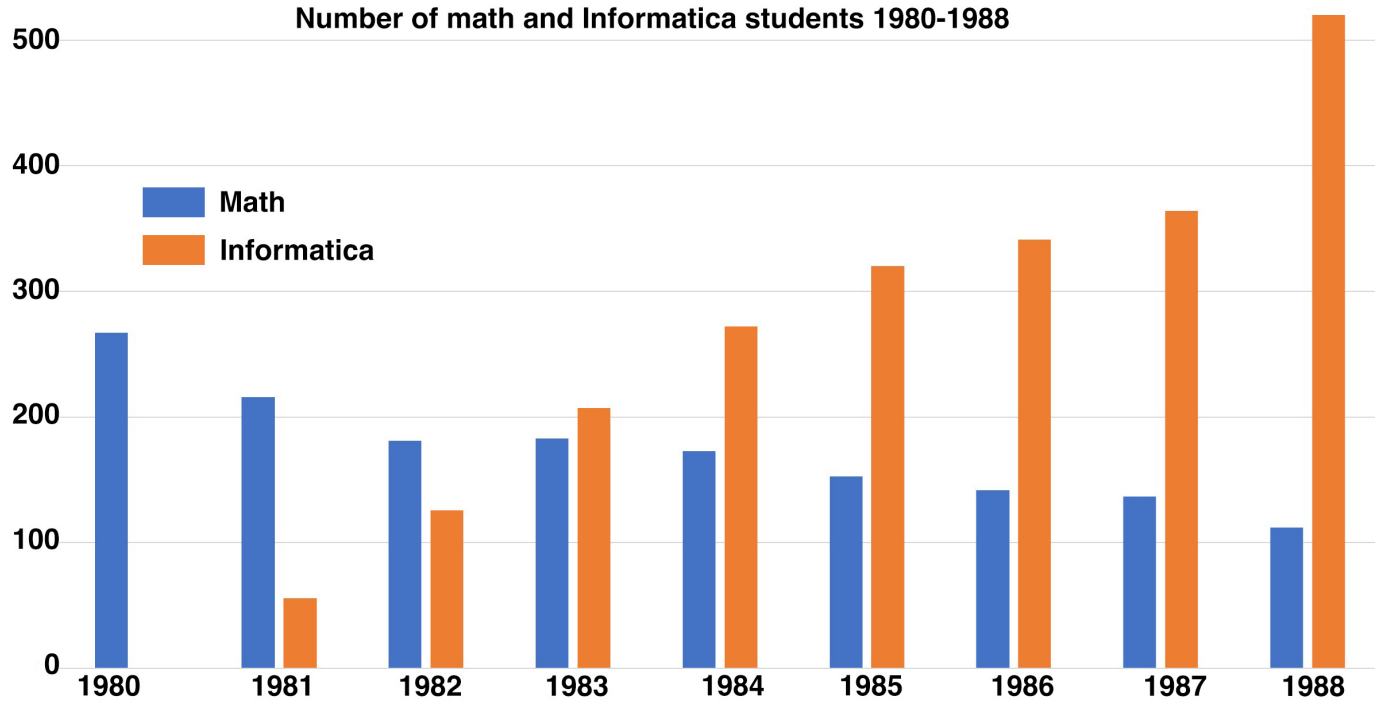
Stafleden: E.G. Keizer, S.J. Mullender, J.M. van Staveren, J.W. Stevenson, A.S. Tanenbaum

1981 (continued)

- The “vakgroep 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



1981 (continued)

- Courses taught
  - Kandidaats
    - Introduction to CS (Van de Riet)
    - Data structures (Van de Riet)
    - Computer organization (Tanenbaum)
    - Introduction to programming (Van Keulen)
  - Doctoraal
    - Databases (Van de Riet)
    - Distributed systems (Tanenbaum)
    - Programming languages (Tanenbaum)
    - Formal languages (De Bakker)
    - Programming Theory (De Bakker)

1981 (continued)

- Prof. Pieter Mullender retired
  - He had been in the Dept. for 32 years and was long chairman
  - He helped guide the creation of informatica as a study
  - By now, his son, Sape, was my first Ph.D. student
  - Privately, he asked me: “Is a Ph.D. in informatica even possible?”
  - I said: “I hope so, we’ll see”
  - When I gave a speech after Sape’s thesis defense, I turned to him and said: “Prof. Mullender, yes it is possible”

1981 (continued)

- While at Bell Labs, I learned *troff* and the C/A/T/ typesetter
- I offered my 1st book to the publisher on paper tape
- They didn't want tape and sent the printout to Japan for typesetting
- That took 18 months and cost (2025 equivalent of) €130 per page
- I did the 2nd (networks) book in *troff* and put it on 9-track mag tape
- I told the publisher that a company in Maryland could typeset *troff*
- They sent the vice president for book manufacturing down to look
- The company said it could typeset it at 2400 dpi in 1 week for €16 pp
- The vice president fell off his chair when he heard this
- This was the first book ever produced by computer typesetting

1982

- The department changed its name to the
  - Subfaculteit Wiskunde en Informatica
  - (Department of Mathematics and Computer Science)
- At least we now officially existed
- Soon we would have 5x as many students as math
- And 1/5 x as many staff to teach them
- Dick Grune joined the department as ass't Prof.



Dick (not Richard)

Note: CS (computer Science) will be used as the translation of "Informatica" but it is also used for the Computer Systems section. It should be clear from the context which is meant.

1982 (continued)

- From the annual report

4.4. VAKGROEP INFORMATICA

4.4.1. Personeelssamenstelling

4.4.1.1. Stafleden van de vakgroep:

dr. P.M.G. Apers	(wmw)
dr. J.W. de Bakker	(bg hgl)
ir. H.E. Bal	(STW)
dr. D. Grune	(wmw)
drs. C.J.H. Jacobs	(wa)
drs. W.N.H. Jansweyer	(wa) (deeltijds, 01.09 - 31.12)
drs. W. de Jonge	(ZWO)
drs. E.G. Keizer	(tas)
drs. M.L. Kersten	(ZWO)
drs. W. van Keulen	(wa)
drs. S.J. Mullender	(pmw)
drs. J.-J.Ch. Meyer	(pmw)
dr. R.P. van de Riet	(hgl)
drs. J.M. van Staveren	(BRO)
dr. A.S. Tanenbaum	(hgl)
drs. J.R.B. Tebra	(pmw)
dr. B.J. Wielinga	(wa) (deeltijds, 01.09 - 31.12)
R. Wiggers	(tas)

4.4.1.2. Andere personen die aan de vakgroep waren verbonden:

dr. D. Chaum	(University of California at Santa Barbara, van 1 november tot 31 december)
dr. C. Resnikoff	(University of California at San Francisco, van 1 juli tot 31 september)

4.4.2. Onderzoekseenheden

Tot de vakgroep behoren de volgende onderzoekseenheden:

4.4.2.1. Theoretische Informatica

Stafleden: J.W. de Bakker, J.-J.Ch. Meyer

4.4.2.2. Informatiesystemen

Stafleden: P.M.G. Apers, W. de Jonge, M.L. Kersten, R.P. van de Riet, J.R.B. Tebra

4.4.2.3. Computersystemen

Stafleden: H.E. Bal, D. Grune, C.J.H. Jacobs, S.J. Mullender, J.M. van Staveren, A.S. Tanenbaum

David Chaum was a guest whose research was on digital cash, that is anonymous, untraceable digital money. It was a forerunner of crypto coins like bitcoin.

1982 (continued)

- 1982 was a tumultous year that saw five major changes:
  - Education: The two phase structure
  - Research: Conditional financing
  - Internal budgeting
  - Personnel
  - PR

1982 (continued)

- The old kandidaats/doctoraal educational system was abolished
- In the place came the new two-phase system
- Phase 1 had two parts:
  - 1 Year “propedeuse” that had to be completed in 2 years
  - Students failing to complete the propedeuse in 2 years were expelled
  - This was new; students previously often took 5-10 years to graduate
  - The doctoraal part was limited to a 3-year program for a total of 4 years
  - Previously, many programs were planned for 5-6 years
  - This required revamping some of the educational programs
- The second phase (graduate school) was never implemented

1982 (continued)

- Research was now subjected to conditional financing
- This gave the government much more control over research
- Universities got a teaching budget based on number of students
- But research funding now depended on the research topics (so the minister could favor some and disfavor others)
- There was also external evaluation of all university research
- Highly rated research in favored areas got money
- Poorly rated research in disfavored areas were shut down
- Previously, universities controlled their own research
- This led to a huge amount of new bureaucracy and reporting

1982 (continued)

- Now that CS was an actual major, it had impact on the budget
- The College van Bestuur wanted to devote more funding to CS
- But the total funding for the university was unchanged
- In fact, it was under pressure due to the conditional financing
- The money had to come from other studies and departments
- Needless to say, no department wanted to give up money

1982 (continued)

- Several math staff were near retirement or found other jobs
- Some of these were in key areas
- Plans had to be made about what to do with these positions
- This was extremely contentious
- Vakgroep A was renamed Meetkunde
- Vakgroep B was renamed Analyse
- Vakgroepen Stochastiek and Informatica remained unchanged

1982 (continued)

- The Dept. increased its activities recruiting students
- In the past, Jim went to high schools talking about CS at the VU
- Now we also held an open house with a presentation and demos
- This was a direct result of the financing structure:
  - The university got a fixed amount of money per degree granted
  - That model filtered down to the faculties and departments
  - More students didn't mean much more work (lecturing to 200 vs. 100 is the same)
  - But twice the students meant twice the educational budget

1982 (continued)

- The number of students who wanted to study informatica exploded
- The total capacity across the Netherlands was (barely) sufficient
- But the distribution was way off: Too many wanted the VU or UvA
- A national committee was formed to assign students to universities
- Each applicant had to explain why he* wanted to go to his choice
- The committee read the explanations and made assignments
- I was on the committee
- I accepted: “I like the study program at university X”
- I accepted: “My uncle lives in Amsterdam and I can live with him”
- I did not accept: “My girlfriend studies English at university X”

* The number of girls probably was less than 10%

1982 (continued)

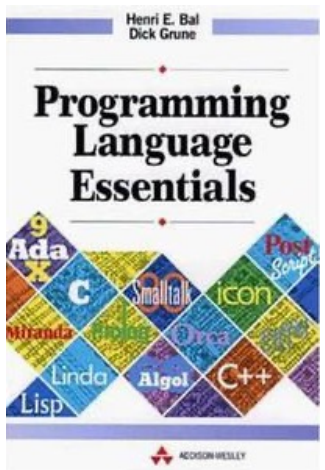
- Peter Apers got his Ph.D.
- He was Reind van de Riet's second Ph.D. student to graduate
- Peter's thesis was entitled:
  - "Query Processing and Data Allocation in Distributed Database Systems"
  - It was based on 6 previously published papers, 1978-1982
- He was later a full professor in Twente and (co)-authored 240 papers



1982 (continued)

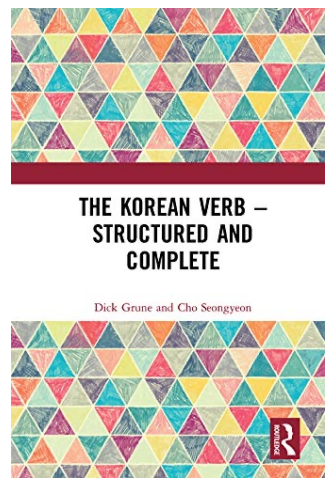
- Dick Grune got his Ph.D.
- He was Adriaan van Wijngaarden's student
- Dick's thesis was entitled: "On the Design of ALEPH"
- He was later an Assoc. Prof. in our Dept. and (co)wrote 4 books





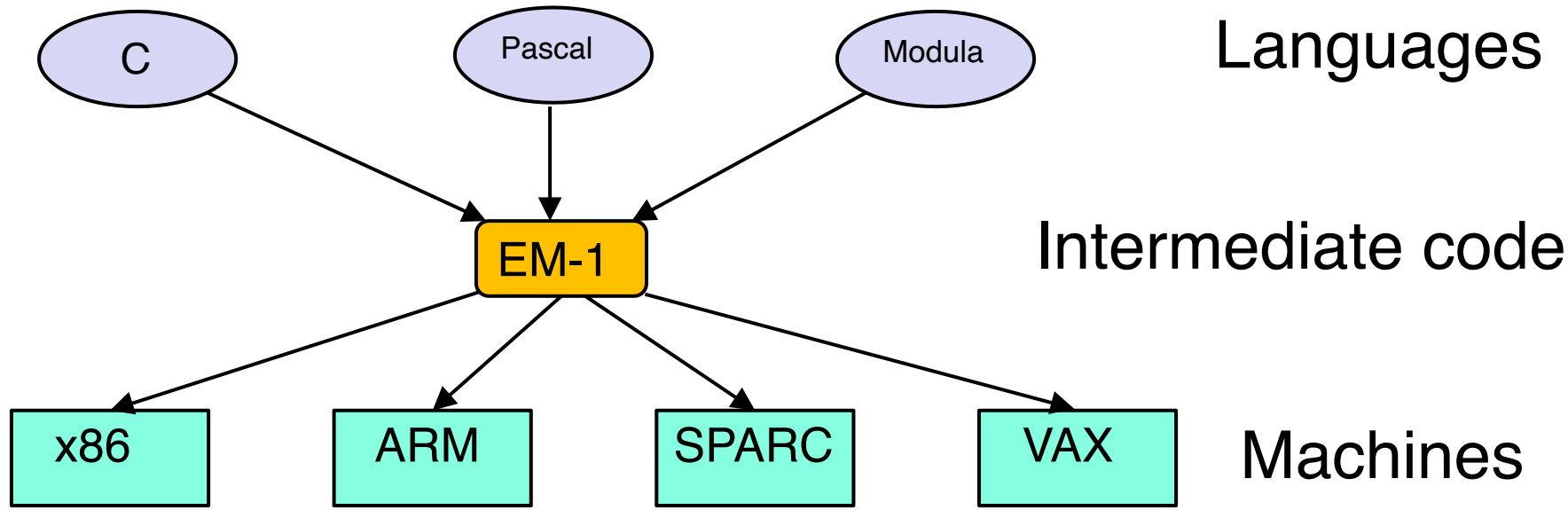






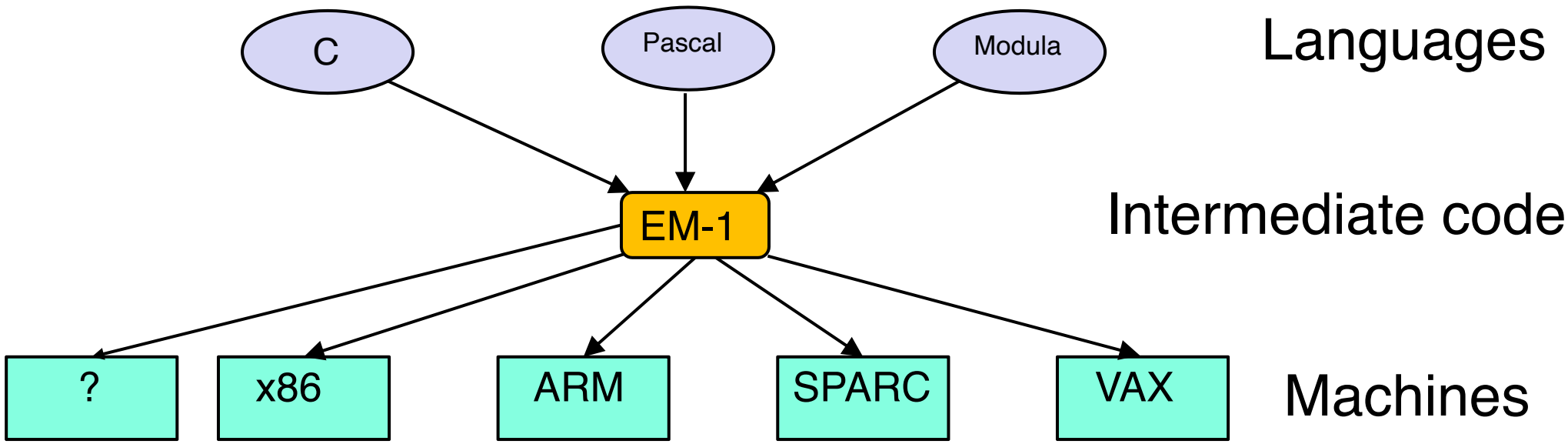
1982 (continued)

- In February, Henri got his masters from the TU Delft
- In March, I hired him as a programmer
- He worked on an S.T.W. project: Amsterdam Compiler Kit (ACK)



1982 (continued)

- Adding a new machine was easy
- Just write a translator from EM-1 to the new target machine
- Then you have all the compilers; likewise for a new language



1982 (continued)

- One of the ACK developers, Johan Stevenson, later went to Philips
- His team of 6 was to write one compiler for their minicomputer
- The day he got there, Johan ported ACK to their computer
- In one day, he had half a dozen compilers working
- Johan's manager fell off his chair
- Ten minutes later he called me with a request to license ACK
- He offered ≈ €325,000 and a free Philips minicomputer
- We never used the minicomputer much but we liked the €325K
- We did have to spend $28,000 to buy a commercial UNIX license

1982 (continued)

- Henri met Sinterklaas at the VU



Sinterklaas is Prof. Pieter Mullender

1983

- From the annual report

- So in 1983, we now had 6 academic staff
- Jaco de Bakker (BG Hgl)
- Jim van Keulen (lecturer)
- Reind van de Riet (Hgl)
  - Peter Apers (Ass't Prof.) in Reind's group
- Andy Tanenbaum (Hgl)
  - Dick Grune (Assoc. Prof.) in my group

- Rapid growth began then
- By 1987, academic staff doubled

5.4. VAKGROEP INFORMATICA

dr. P.M.G. Apers	(mw)
dr. J.W. de Bakker	(bg hgl)
drs. H.E. Bal	(S.T.W.-mw)
dr. D. Grune	(whm)
drs. C.J.H. Jacobs	(pmw)
drs. W. de Jonge	(Z.W.O.-mw)
drs. E.G. Keizer	(tas)
drs. M.L. Kersten	(tot 01.09. Z.W.O.-mw)
drs. W. van Keulen	(wa)
drs. L.J.M. van Moergestel	(tas)
drs. S.J. Mullender	(pmw)
drs. J.-J.Ch. Meyer	(pmw)
dr. R.P. van de Riet	(hgl)
dr. P. Scheuermann	(gasthgl. tot 15.07)
drs. J.M. van Staveren	(mw. beleidsruimte)
dr. A.S. Tanenbaum	(hgl)
drs. J.R.B. Tebra	(pmw)
R. Wiggers	(tas)

5.4.1.2. Andere personen die aan de vakgroep waren verbonden:

prof.dr. D. Chaum (University of California Santa Barbara, van 1 juni tot 15 augustus)

5.4.2. Onderzoekseenheden

Tot de vakgroep behoren de volgende onderzoekseenheden:

5.4.2.1. Theoretische Informatica

Stafleden: J.W. de Bakker, J.-J.Ch. Meyer

5.4.2.2. Informatiesystemen

Stafleden: P.M.G. Apers, W. de Jonge, M.L. Kersten, R.P. van de Riet, J.R.B. Tebra

5.4.2.3. Computersystemen

Stafleden: H.E. Bal, D. Grune, C.J.H. Jacobs, E.G. Keizer, S.J. Mullender, J.M. van Staveren, A.S. Tanenbaum

1983 (continued)

- Peter Scheuermann was a visiting professor for 6 months
- His research was on data management
- He worked with Reind and they became good friends for years
- He later taught at Northwestern University



1983 (continued)

- 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



1983 (continued)

- In 1982, the minister of education devised a new hurdle for us
- It was called “Voorwaardelijke financiering” (conditional financing)
- He probably got the idea from the soon-to-be former Soviet Union
- It meant we had to make a 5-year plan for our research
- We made our first plan in 1983
- It just listed what we were already doing
- In 1989 we received a grade of excellent
- In later years on all evaluations we were excellent

1983 (continued)

- The number of CS students surpassed the number in math
- There were 203 CS students and 188 math students
- By 1989, the ratio of CS : math students was almost 5 : 1
- Many students from other departments did a minor in CS
- CS had 2 full-time full professors; math had 9
- CS had 5.2 FTE staff; math had 24.2 FTE staff
- The CS people were swamped with teaching
- One idea was to have mathematicians teach CS courses
- Almost none of the math people were interested or capable
- Evert Wattel helped out with one lab, but that was about it

1984

- From the annual report

5.4. VAKGROEP INFORMATICA

dr. P.M.G. Apers	(wmw)
dr. J.W. de Bakker	(bg hgl)
drs. H.E. Bal	(S.T.W.-mw)
dr. J. Chudáček	(wmw)
drs. J.A. Durieux	(pmw)
dr. D. Grune	(wmw)
drs. C.J.H. Jacobs	(pmw)
drs. W. de Jonge	(Z.W.O.-mw)
drs. E.G. Keizer	(tas)
drs. M.L. Kersten	(Z.W.O.-mw)
drs. W. van Keulen	(wa)
drs. L. van Moergestel	(tas)
drs. J.-J.Ch. Meyer	(pmw)
dr. R.P. van de Riet	(hgl)
L. Siklóssy	(hgl)
A. Steegstra	(tas)
drs. J.M. van Staveren	(mw. belr.)
dr. A.S. Tanenbaum	(hgl)
drs. J.R.B. Tebra	(pmw)
drs. H. Weigand	(twmw)
R. Wiggers	(tas)

5.4.2. Onderzoekseenheden

Tot de vakgroep behoren de volgende onderzoekseenheden:

5.4.2.1. Theoretische Informatica

Stafleden: J.W. de Bakker, J.-J.Ch. Meyer

5.4.2.2. Informatiesystemen

Stafleden: P.M.G. Apers, W. de Jonge, M.L. Kersten, R.P. van de Riet, J.R.B. Tebra, H. Weigand, W. van Keulen.

5.4.2.3. Computersystemen

Stafleden: H.E. Bal, D. Grune, C.J.H. Jacobs, E.G. Keizer, L. van Moergestel, J.M. van Staveren, A.S. Tanenbaum

5.4.2.4. Kunstmatige Intelligentie

Stafleden: J. Chudáček, J.A. Durieux, L. Siklóssy

1984 (continued)

- 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
- I didn't trust Ethernet so we connected all the kit with a token ring
- Reind liked all the pretty Macintosh fonts, so we got him one



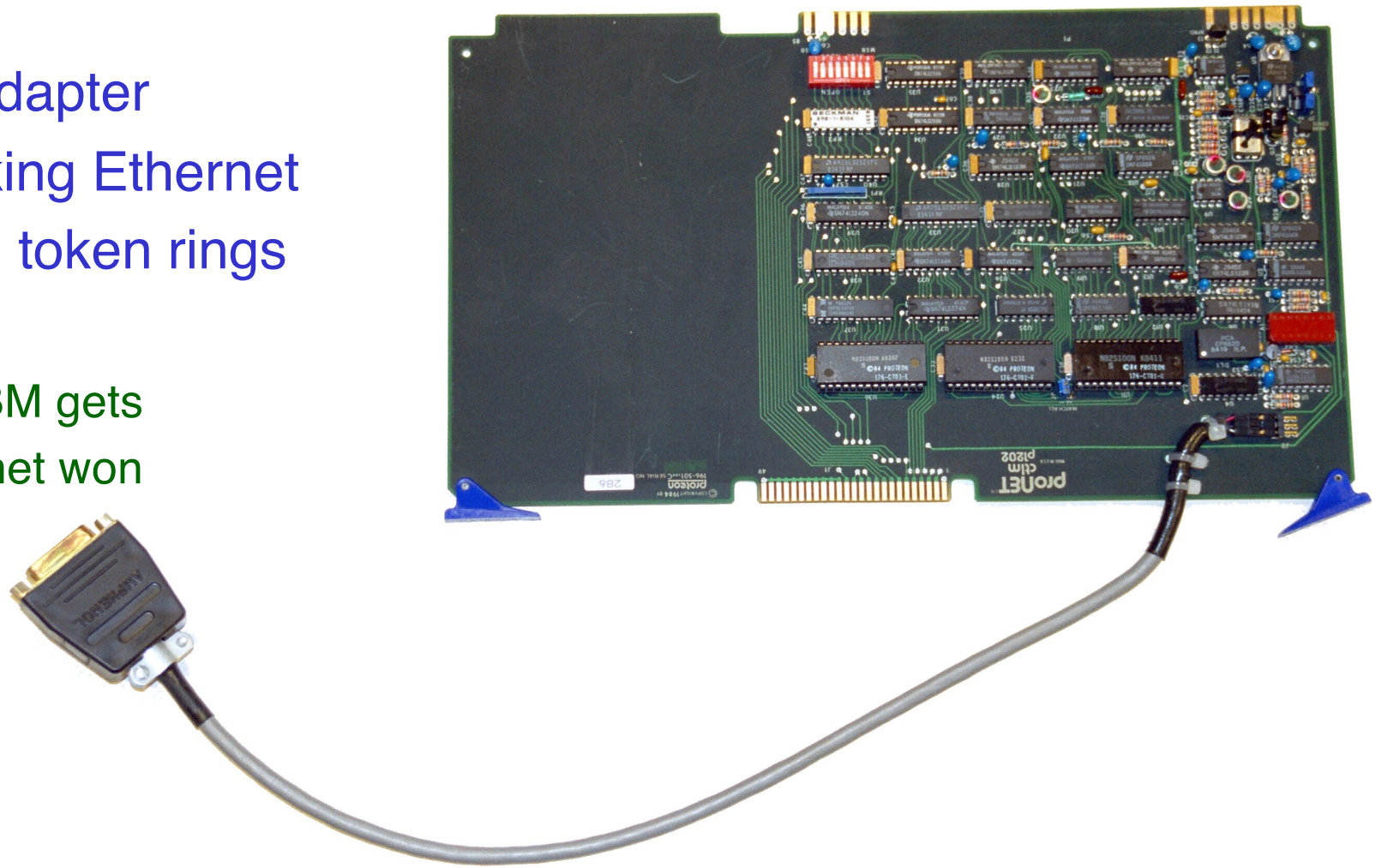
The VAXes had 1.2 GB total



A portable 4000-GB disk costs €120 now

1984 (continued)

- Pronet token ring adapter
- I wasn't alone disliking Ethernet
- IBM also supported token rings
- I thought:
  - What IBM wants, IBM gets
  - I was wrong; Ethernet won



1984 (continued)

- Laurent Siklossy was appointed a professor of AI
- He had no interested in “his” VAX and wanted a Macintosh
- Siklossy got married a month after arriving in Amsterdam



The church wedding



The attendees at the wedding

- A month later, Siklossy’s wife left him and went back to Chicago

1985

- From the annual report

5.4. Vakgroep Informatica

5.4.1.1. Stafleden van de vakgroep:

drs. E. Baalbergen	(pmw; vanaf 01.09)
dr. J.W. de Bakker	(bg hgl)
drs. H. Bal	(Z.W.O.)
drs. A.M. Botman	(Z.W.O.)
dr. J. Chudáček	(mw)
drs. F. Dignum	(pmw; vanaf 01.09)
drs. J.A. Durieux	(pmw)
dr. D. Grune	(mw)
ir. M. Huntjens	(mw; vanaf 01.09)
drs. C. Jacobs	(pmw)
dr. W. de Jonge	(mw)
drs. E.G. Keizer	(tas)
dr. M.L. Kersten	(mw)
drs. W. van Keulen	(wa)
drs. L. van Moergestel	(tas)
dr. J.-J.Ch. Meyer	(pmw)
drs R. van Renesse	(Z.W.O)
drs. H. van Riemsdijk	(pmw; vanaf 01.07)
dr. R.P. van de Riet	(hgl)
G. Sharp	(tas; vanaf 01.08)
prof.dr. L. Siklóssy	(hgl)
A. Steegstra	(tas)
drs. J.M. van Staveren	(tas; vanaf 01.12)
dr. A.S. Tanenbaum	(hgl)
drs. J.R.B. Tebra	(pmw)
drs E.P de Vink	(pmw; vanaf 01.09)
drs. H. Weigand	(Z.W.O.)
R. Wiggers	(tas)

5.4.2. Onderzoekseenheden

Tot de vakgroep behoren de volgende onderzoekseenheden:

5.4.2.1. Theoretische Informatica

Stafleden: J.W. de Bakker, J.-J.Ch. Meyer, E.P. de Vink

5.4.2.2. Informatiesystemen

Stafleden: F. Dignum, W. de Jonge, M.L. Kersten, R.P. van de Riet, J.R.B. Tebra, H. Weigand

5.4.2.3. Computersystemen

Stafleden: H.E. Bal, D. Grune, C. Jacobs, A.S. Tanenbaum

5.4.2.4. Kunstmatige Intelligentie

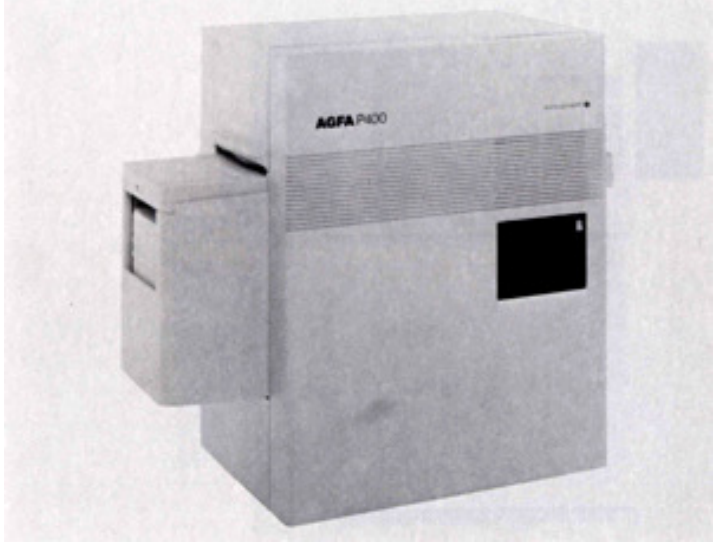
Stafleden: F. Botman, J. Chudáček, J.A. Durieux, H.H. van Riemsdijk, L. Siklóssy

1985 (continued)

- The S.T.W. project Henri was working on (ACK) finished
- I was impressed with Henri; I hired him as an AiO (Ph.D. student)
- He was well worked in on compilers and languages
- He looked for a research topic in that area

1985 (continued)

- 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* for it
- 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)

1985 (continued)

- By now, *TeX* was available as well as *troff*
- The math staff discovered that the Agfa printer could print equations
- They loved it
- Before long, the mathematicians were the biggest printer users

$$f(x;\mu,\sigma^2) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}(\frac{x-\mu}{\sigma})^2}$$

1985 (continued)

- The first student to get a Ph.D. with me was Sape Mullender
- His thesis title was: “Principles of Distributed Operating System Design”
- He was later a full professor in Twente



Me and Sape after his defense



Sape’s father, Prof. Pieter Mullender,
long-time chairman of the math Dept.

1985 (continued)

- Martin Kersten got his Ph.D. supervised by Reind
- Martin's thesis was entitled:
  - "A Model for a Secure Programming Environment"
- After graduating, he worked at CWI on databases
- He started several data analysis/storage companies
- Martin was later a full professor at the UvA
- He was also CEO of MonetDB (for massive DBs)
- He was a Fellow of the ACM
- He passed away 6 July 2022 at the age of 68



Obituary: https://www.cwi.nl/en/news/in-memoriam-martin-kersten/

1985 (continued)

- Wiebren de Jonge got his Ph.D.
- He and Martin both graduated in June 1985, #3 and #4 for Reind
- Wiebren's thesis was entitled:
  - "Security and Privacy in Information Systems: Some Technical Aspects"
- Wiebren was an Ass't/Assoc. professor in our Dept. 1987-2014
- His main interest was privacy in road pricing systems
- He was a consultant for several companies in this area



1985 (continued)

- John-Jules Meyer got his Ph.D.
- He was Jaco de Bakker's fourth Ph.D. student
- His thesis was entitled:
  - "Programming Calculi Based on Fixed-Point Transformations"



John-Jules at a
Dept. party in 1993

After 1985, Ph.Ds became so common most recipients don't rate full slides

1985 (continued)

- Corry van Rossum was hired in 1964 as a secretary
- She later studied law part time and became “beheerder” (manager)
  - De facto she ran the Dept. for years because the (older) math professors were focused on teaching and research and were not so interested in management work. Eventually, younger math professors took over management.



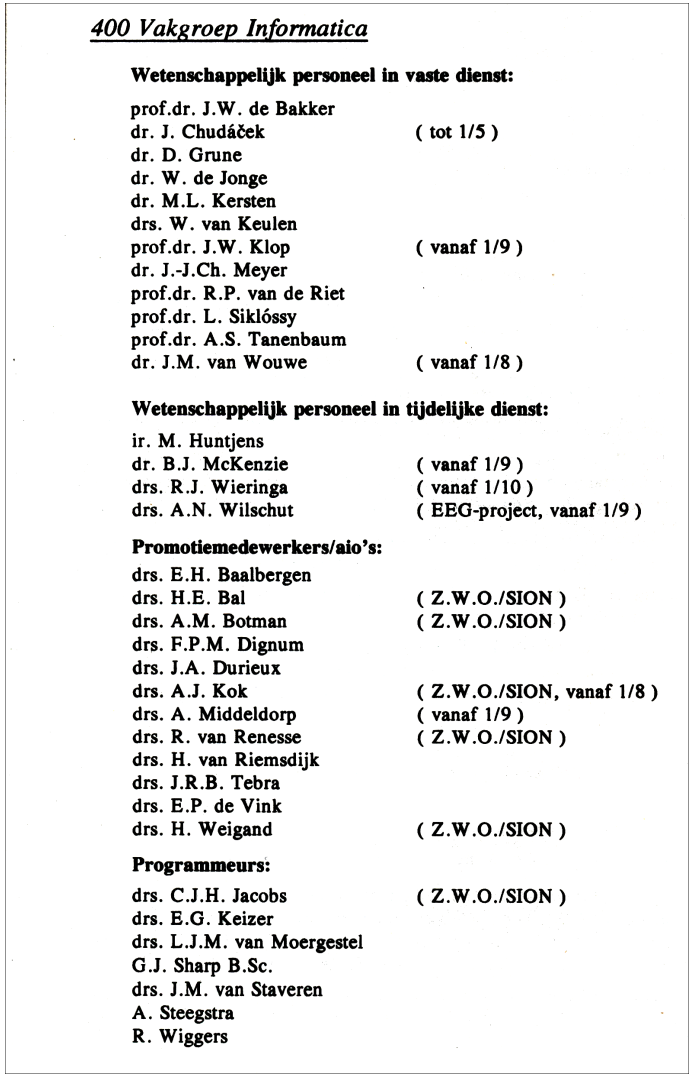
Corry van Rossum Maarten Maurice (Hgl math)

1986

- From the annual report

The format changed in 1986.
There was no longer a compact research summary.
The research units were:

- Theoretische informatica (Profs. De Bakker, Klop et al.)
- Informatiesystemen (Prof. Van de Riet et al.)
- Computersystemen (Prof. Tanenbaum et al.)
- Kunstmatige intelligentie (Prof. Siklossy et al.)



400 Vakgroep Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.W. de Bakker	
dr. J. Chudáček	(tot 1/5)
dr. D. Grune	
dr. W. de Jonge	
dr. M.L. Kersten	
drs. W. van Keulen	
prof.dr. J.W. Klop	(vanaf 1/9)
dr. J.-J.Ch. Meyer	
prof.dr. R.P. van de Riet	
prof.dr. L. Siklóssy	
prof.dr. A.S. Tanenbaum	
dr. J.M. van Wouwe	(vanaf 1/8)

Wetenschappelijk personeel in tijdelijke dienst:

ir. M. Huntjens	
dr. B.J. McKenzie	(vanaf 1/9)
drs. R.J. Wieringa	(vanaf 1/10)
drs. A.N. Wilschut	(EEG-project, vanaf 1/9)

Promotiemedewerkers/aio's:

drs. E.H. Baalbergen	
drs. H.E. Bal	(Z.W.O./SION)
drs. A.M. Botman	(Z.W.O./SION)
drs. F.P.M. Dignum	
drs. J.A. Durieux	
drs. A.J. Kok	(Z.W.O./SION, vanaf 1/8)
drs. A. Middeldorp	(vanaf 1/9)
drs. R. van Renesse	(Z.W.O./SION)
drs. H. van Riemsdijk	
drs. J.R.B. Tebra	
drs. E.P. de Vink	
drs. H. Weigand	(Z.W.O./SION)

Programmeurs:

drs. C.J.H. Jacobs	(Z.W.O./SION)
drs. E.G. Keizer	
drs. L.J.M. van Moergestel	
G.J. Sharp B.Sc.	
drs. J.M. van Staveren	
A. Steegstra	
R. Wiggers	

1986 (continued)

- Chris Steketee from the U. of South Australia was a visiting Prof.
- He worked on Amoeba
- Chris took Amoeba back to U. of S.A. and did research on process migration there
- Henri remembers this:
  - "Chris wanted to do a weekend trip to Germany and I recommended something nearby (Aachen). When he came back, he explained they indeed went there, and then drove on to Munich, Austria, Milan and back, all in a (long) weekend! I guess Australians are used to driving long distances."



1986 (continued)

- Bruce McKenzie was a visiting Prof. 1986-87 from U. Canterbury NZ
- He taught the course on compilers

1986 (continue)

- Jan Willem Klop was appointed professor of applied logic (0.3 FTE)
- His research was on the algebra of communicating processes



1986 (continued)

- Dissertations
  - A. de Bruin: “Experiments with Continuation Semantics” (De Bakker)

1986 (continued)

- 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.



1986 (continued)

- The programmers were put in the computer lab
- Jim was formally their boss, but not in practice
- Jim was also chair of the equipment committee
- Having an official lab was also intended to show physics and chemistry that computer science was a real “science,” with a lab, and thus needed (expensive) equipment and personnel, just as they did. This helped us argue for a bigger piece of the budget

1987

- The 57-year-old Faculty of Mathematics and Sciences was abolished
- Every subfaculty became a top-level faculty under the CvB
- The Dept. was promoted to the Faculty of Math & Computer Science
- Officially, we were as important as physics, medicine, and law
- But math and CS were still in one unit, now a full faculty, together

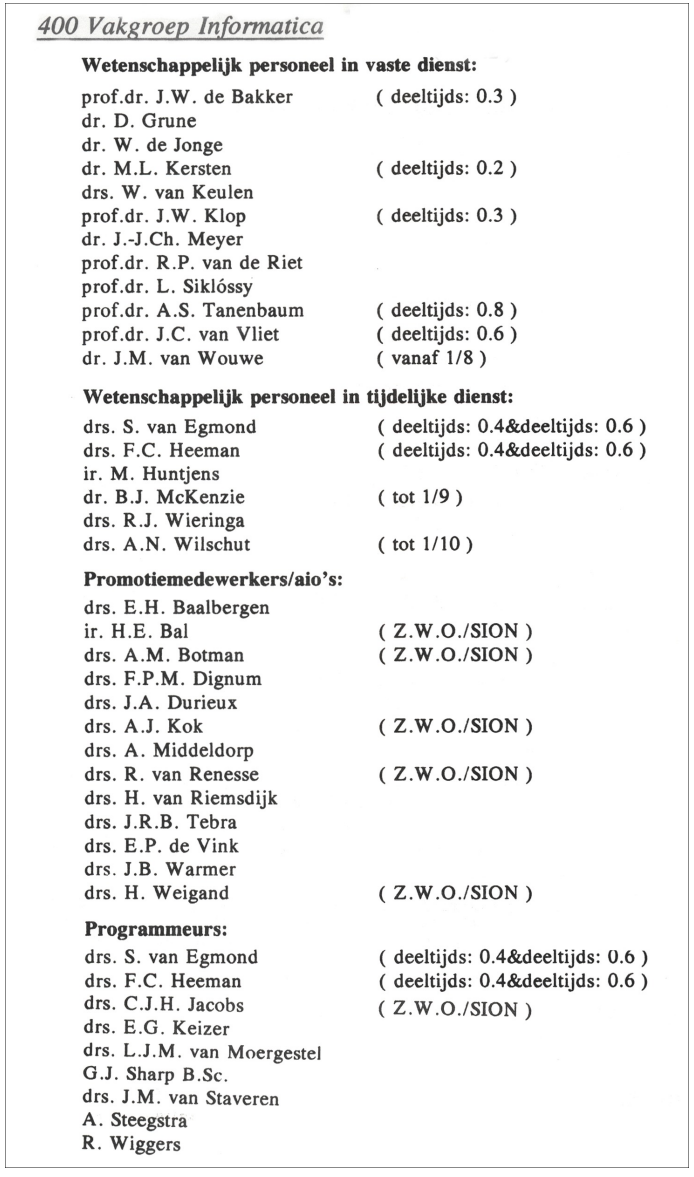
1987 (continued)

- Now that we were a faculty, subfaculteitsraad ➔ faculteitsraad
- The composition was
  - 3 math academic staff
  - 3 computer science academic staff
  - 1 administrative staff
  - 5 students

1987 (continued)

- From the annual report

The research units were:
- Theoretische informatica (Profs. De Bakker, Klop et al.)
- Informatiesystemen (Prof. Van de Riet et al.)
- Computersystemen (Prof. Tanenbaum et al.)
- Kunstmatige intelligentie (Prof. Siklossy et al.)
- Software Engineering (Prof. Van Vliet et al.)



400 Vakgroep Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.W. de Bakker	(deeltijds: 0.3)
dr. D. Grune	
dr. W. de Jonge	
dr. M.L. Kersten	(deeltijds: 0.2)
drs. W. van Keulen	
prof.dr. J.W. Klop	(deeltijds: 0.3)
dr. J.-J.Ch. Meyer	
prof.dr. R.P. van de Riet	
prof.dr. L. Siklóssy	
prof.dr. A.S. Tanenbaum	(deeltijds: 0.8)
prof.dr. J.C. van Vliet	(deeltijds: 0.6)
dr. J.M. van Wouwe	(vanaf 1/8)

Wetenschappelijk personeel in tijdelijke dienst:

drs. S. van Egmond	(deeltijds: 0.4&deeltijds: 0.6)
drs. F.C. Heeman	(deeltijds: 0.4&deeltijds: 0.6)
ir. M. Huntjens	
dr. B.J. McKenzie	(tot 1/9)
drs. R.J. Wieringa	
drs. A.N. Wilschut	(tot 1/10)

Promotiemedewerkers/aio's:

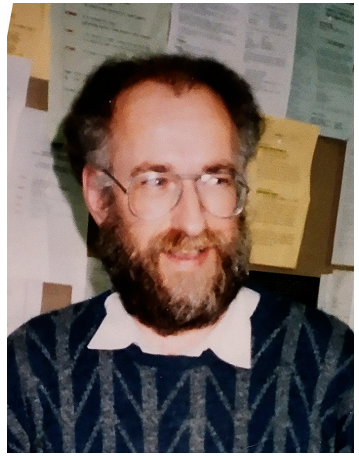
drs. E.H. Baalbergen	
ir. H.E. Bal	(Z.W.O./SION)
drs. A.M. Botman	(Z.W.O./SION)
drs. F.P.M. Dignum	
drs. J.A. Durieux	
drs. A.J. Kok	(Z.W.O./SION)
drs. A. Middeldorp	
drs. R. van Renesse	(Z.W.O./SION)
drs. H. van Riemsdijk	
drs. J.R.B. Tebra	
drs. E.P. de Vink	
drs. J.B. Warmer	
drs. H. Weigand	(Z.W.O./SION)

Programmeurs:

drs. S. van Egmond	(deeltijds: 0.4&deeltijds: 0.6)
drs. F.C. Heeman	(deeltijds: 0.4&deeltijds: 0.6)
drs. C.J.H. Jacobs	(Z.W.O./SION)
drs. E.G. Keizer	
drs. L.J.M. van Moergestel	
G.J. Sharp B.Sc.	
drs. J.M. van Staveren	
A. Steegstra	
R. Wiggers	

1987 (continued)

- Hans van Vliet was appointed a full professor of Software Eng. His research covered
  - Software architecture
  - Knowledge management in software development
  - Empirical software engineering
- He later headed Information Systems & Software Engineering



1987 (continued)

- We bought a new multicomputer for research
- This was V2.0, after the 8 x 8086s (V1.0)
- It had 16 Motorola 68020s
- It ran our research operating system, Amoeba
- It was used for research on distributed systems

16 68020s



1987 (continued)

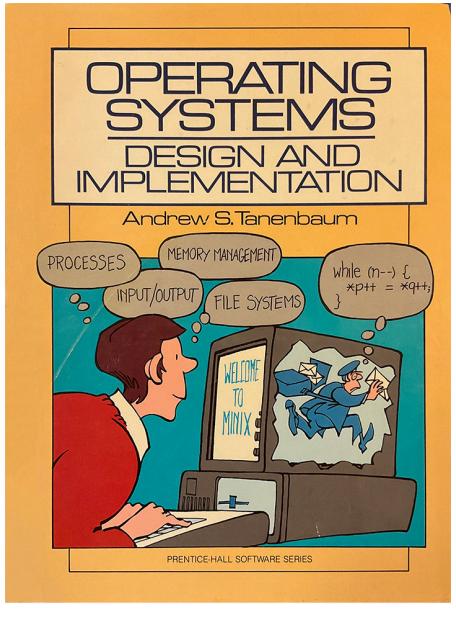
- We hired director Jan Kelder to make a PR film
- He got actors from the film academy, because they were cheap
- The star in the film was an unknown film student named Isa Hoes
- She played the role of a high school student who chooses the VU
- When she later became famous, we couldn’t use the film anymore



Isa Hoes

1987 (continued)

- I released MINIX with source code and a book describing it
- It created a huge storm with 40,000 people on the news group
- Ultimately Linus Torvalds used it to create Linux
- Intel incorporated it into every x86 chip set in the world







1987 (continued)

- CS research output in 1987 was 3 books, 51 papers, 103 talks
- The computer systems group joined a European project
  - Our Amoeba system ran on computers in four countries (DE, NO, NL, UK)
  - They were connected by a wide-area network provided by the PTTs
  - This was one of the first tests of an actual running distributed system
- Computer lab was now
  - 3 PDP-11s, 4 VAXes, 20 PCs, 20 Sun Workstations, Sun File server
  - 100 terminals serving 600 users
  - Computer lab staff was Jim van Keulen and two programmers

1988

- From the annual report

The research units were now:

- Theoretische informatica (Profs. De Bakker, Klop, Meyer
- Informatiesystemen (Prof. Van de Riet et al.)
- Computersystemen (Prof. Tanenbaum et al.)
- Kunstmatige intelligentie (Prof. Siklossy et al.)
- Software Engineering (Prof. Van Vliet et al.)

400 Vakgroep Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.W. de Bakker	(deeltijds: 0.3)
dr. D. Grune	(deeltijds: 0.5)
dr. W. de Jonge	
dr. M.L. Kersten	(deeltijds: 0.2)
drs. W. van Keulen	
prof.dr. J.W. Klop	(deeltijds: 0.3)
prof.dr. J.-J.Ch. Meyer	
prof.dr. R.P. van de Riet	
prof.dr. L. Siklóssy	
prof.dr. A.S. Tanenbaum	(deeltijds: 0.8)
dr. R.C. de Vrijer	(v/a 1/5, deeltijds: 0.5)
prof.dr. J.C. van Vliet	
dr. J.M. van Wouwe	

Wetenschappelijk personeel in tijdelijke dienst:

drs. S. van Egmond	
drs. F.C. Heeman	
ir. M. Huntjens	
drs. C.J.H. Jacobs	(Z.W.O./SION)
drs. N. Sikkel	(vanaf 1/4)
drs. G.C. van der Veer	(deeltijds: 0.4)
drs. R.J. Wieringa	

Promotiemedewerkers/aio's/oio's:

drs. E.H. Baalbergen	
ir. H.E. Bal	(Z.W.O./SION)
drs. A.M. Botman	(Z.W.O./SION)
drs. F.P.M. Dignum	
drs. J.A. Durieux	
drs. W. v.d. Hoek	(vanaf 1/5)
drs. A.J. Kok	(Z.W.O./SION)
drs. A. Middeldorp	
drs. R. van Renesse	(Z.W.O./SION)
drs. H. van Riemsdijk	
drs. J.R.B. Tebra	(tot 1/9)
drs. E.P. de Vink	
drs. J.B. Warmer	
drs. H. Weigand	(Z.W.O./SION)
drs. M.F. Kaashoek	(vanaf 1/12)

Programmeurs:

drs. S. van Egmond	(deeltijds: 0.6)
drs. F.C. Heeman	(deeltijds: 0.6)
drs. E.G. Keizer	(deeltijds: 0.8)
drs. L.J.M. van Moergestel	
T.M. Sandoski	
G.J. Sharp B.Sc.	
drs. J.M. van Staveren	
A. Steegstra	(deeltijds: 0.8, v/a 1/9: 0.3)
R. Wiggers	
V. Gamito-Dignum	(deeltijds: 0.5 v/a 1/11)

1988 (continued)

- Only 15 new students signed up for math (vs. 115 for CS)
- The tenured staff ratio was way out of whack
  - Vakgroep Meetkunde: 7.2 FTE
  - Vakgroep Analyse: 7.4 FTE
  - Vakgroep Stochastiek: 5.0 FTE
  - Vakgroep Informatica: 10.6 FTE
- So math had 19.6 FTE and CS had 10.6 FTE, for a ratio of $\approx$ 2:1
- The the first year student ratio was $\approx$ 1:8
- This was untenable and the pressure began to build
- Still, we published 3 books, 15 journal papers, 33 conference papers
- We also gave 93 talks domestically and abroad

1988 (continued)

- John-Jules Meyer was appointed a full professor in theory
- This was only 3 years after his Ph.D.
- He had 23 published papers prior to his appointment
- His early work was on deontic reasoning, stream semantics and logic



1988 (continued)

- We started to decentralize the department's computing
- We retired the three PDP-11s and bought 24 diskless Sun-3s
- They were networked to file servers using NFS



Diskless Sun-3 in its pizza box.

T

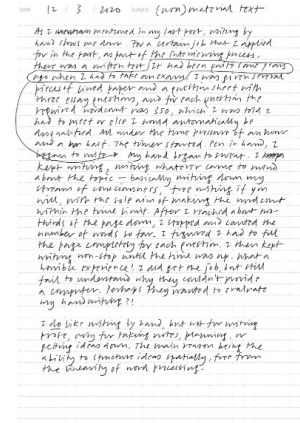


A later model Sun 3.

All the Suns had bitmap displays

1988 (continued)

- In 1988, professors didn't use books for courses
- They wrote lecture notes in long hand
- This is Betty, our secretary





This is a typewriter



Betty typed the notes

They were run off on mimeograph machine



1988 (continued)

- We went to court to fire Siklossy in Sept.
- He was impossible for many reasons
- The court agreed and he was fired (but got a lump sum payment)
- But who would teach the AI courses and supervise the AI AiOs?
  - We lucked out. I had arranged to hire Susan Flynn to be my postdoc. She brought her boyfriend along. The boyfriend, Bob Hummel, was a famous AI professor! We offered him a job as a visiting AI professor and he accepted it. He taught AI courses and supervised the AI AiOs.
- In 1989 we searched for a new professor and found one

1989

- Maarten Maurice was dean of the faculty from 1 Jan. to 31 Aug.
- Kobus Oosterhoff was dean of the faculty from 1 Sep. to 31 Dec,
- The three math “vakgroepen” merged into one “vakgroep wiskunde”
- So now the Faculty “W & I” had only two internal subunits: W & I
  - Gerke Nieuwland was chairman of the “vakgroep wiskunde”
  - Hans van Vliet was chairman of the “vakgroep informatica”

1989 (continued)

- We formed five official sections within computer science now
  - Theory (led by Profs. De Bakker, Klop, & Meyer)
  - Information management led by Prof. Van de Riet)
  - Computer Systems (led by Prof. Tanenbaum
  - Artificial intelligence (led by Prof. Treur)
  - Software Engineering (led by Prof. Van Vliet)
- Each section largely organized its own teaching and research

1989 (continued)

- The annual report was reformatted to show the sections

400 Sectie Theoretische Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.W. de Bakker	(deeltijds: 0.3)
prof.dr. J.W. Klop	(deeltijds: 0.3)
prof.dr. J.-J.Ch. Meyer	(deeltijds: 0.8)
dr. R.C. de Vrijer	(deeltijds: 0.5)

Promotiemedewerkers/aio's/oio's:

drs. W. v.d. Hoek	
drs. A. Middeldorp	
drs. E.P. de Vink	
drs. F.C. van Breugel	(vanaf 1/10)
drs. V. van Oostrom	(vanaf 1/10)
drs. G. Vreeswijk	(NWO/SION, vanaf 16/3)

500 Sectie Informatiesystemen

Wetenschappelijk personeel in vaste dienst:

dr. W. de Jonge	(deeltijds: 0.8)
dr. M.L. Kersten	(deeltijds: 0.2)
prof.dr. R.P. van de Riet	

Wetenschappelijk personeel in tijdelijke dienst:

drs. R.J. Wieringa

Promotiemedewerkers/aio's/oio's:

drs. J.R.B. Tebra	(tot 1/9/88)
drs. F.P.M. Dignum	(tot 15/12)
drs. H. Weigand	(NWO/SION, tot 1/6)

Programmeurs:

drs. A. Schijf	(vanaf 1/10)

600 Sectie Computersystemen

Wetenschappelijk personeel in vaste dienst:

dr. D. Grune	(deeltijds: 0.5)
prof.dr. A.S. Tanenbaum	(deeltijds: 0.8)
dr. J.M. van Wouwe	

Wetenschappelijk personeel in tijdelijke dienst:

dr.ir. H.E. Bal	(vanaf 1/6)
dr. R. van Renesse	(vanaf 1/5)

Promotiemedewerkers/aio's/oio's:

drs. E.H. Baalbergen	
ir. H.E. Bal	(NWO/SION, tot 1/6)
drs. R. van Renesse	(NWO/SION, tot 1/5)
drs. M.F. Kaashoek	

Tweede Geldstroom personeel:

ir. A.B.J.M. Geels	(NWO, vanaf 16/3 (programmeur))
dr. S.F. Hummel-Flynn	(NWO/NFI)

Derde Geldstroom personeel:

M.N. Condict	(vanaf 1/9)
C.B. Officer	(vanaf 1/9)
drs. J. van Eck	(vanaf 15/3)

700 Sectie Kunstmatige Intelligentie

Wetenschappelijk personeel in tijdelijke dienst:

prof. R.A. Hummel

Promotiemedewerkers/aio's/oio's:

drs. A.M. Botman	(NWO/SION, tot 15/6)
drs. J.A. Durieux	(tot 1/8)
drs. A.J. Kok	(NWO/SION, tot 15/6)
drs. H. van Riemsdijk	

800 Sectie Software Engineering

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.C. van Vliet

Wetenschappelijk personeel in tijdelijke dienst:

ir. M.P.H. Huntjens	
drs. G.C. van der Veer	(deeltijds: 0.4)

Promotiemedewerkers/aio's/oio's:

drs. J.B. Warmer

Derde Geldstroom personeel:

drs. N. Sikkel

De dienst Computerlab bestond in 1989 uit de volgende

drs. S. van Egmond (0,6),
drs. K. Bot (0,6 tot juni)
drs. F.C. Heeman (0,6),
drs. C. Jacobs,
drs. E.G. Keizer (0,8),
drs. W. van Keulen (0.6)
drs. L.J.M. van Moergestel,
T. Sandoski
G.J. Sharp, BSc.
A. Steegstra (0,3)
drs. J.M. van Staveren,
L. Uljee (0,6 tot augustus)
T. Vermeer (vanaf september)
R. Wiggers,
V. Gamito-Dignum (0.5, tot 31 december)

1989 (continued)

- The equipment was expanded with
  - 16 Sun workstations (initially for staff, eventually for students, too)
  - 44 X-terminals (for students)
  - 20 Ampex ASCII terminals (for students)
- In 1990, we added
  - 12 Sun workstations
  - 6 X-terminals (for students)
- In 1991, we added
  - 22 Sun SparcStations
- In 1992, we added
  - 46 Sun SparcStations, 20 X-terminals, 20 486 PCs

1989 (continued)

- Dissertations
  - J.J.M.M. Rutten: “A Parallel Object-Oriented Language” (De Bakker)
  - P.H.M. America: joint dissertation with Rutten
  - J.N. Kok: “Semantic Models for Parallel Computation” (De Bakker)
  - F.P.M. Dignum: “A Language for Modeling Knowl. Bases (Van de Riet)
  - J.R.B. Tebra: “Optimistic And-Parallelism in Prolog” (Van de Riet)
  - H. Weigand: “Linguistically Motivated Principles in Knowl. Bases (Vd Riet)
  - H.E. Bal & R. van Renesse (see below) (Tanenbaum)

1989 (continued)

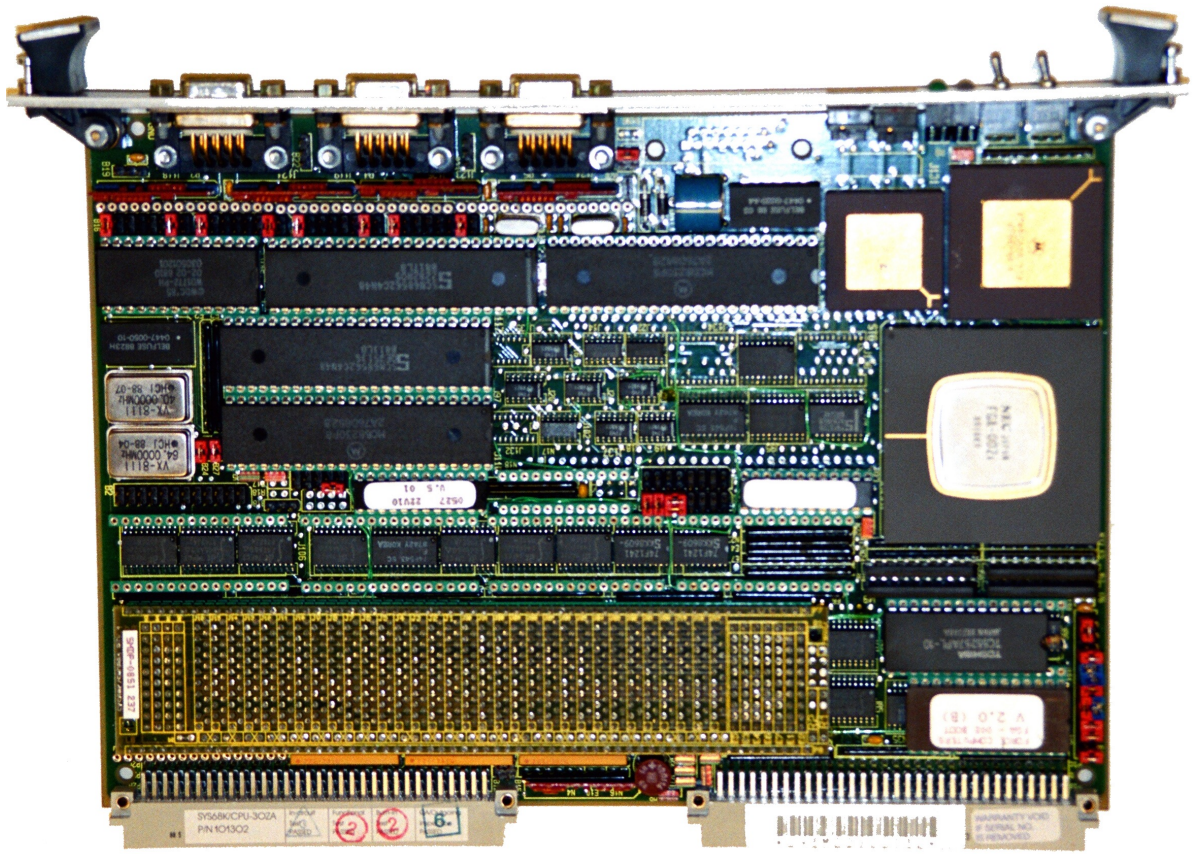
- We bought a third research multicomputer
- It had 32 68030 processors
- It ran Amoeba as the operating system
- Applications were in Henri Bal's Orca language for distributed computing
- It was about parallel programming with distributed shared objects
- This was a whole new way to look at distributed computing

32 68030s



1989 (continued)

- Two views of a 68030 single board computer

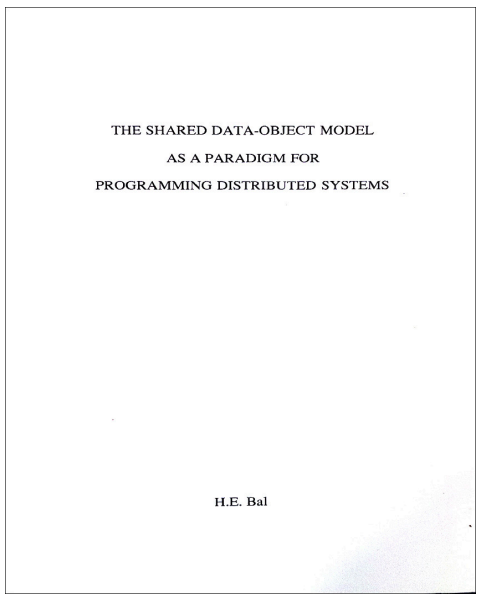




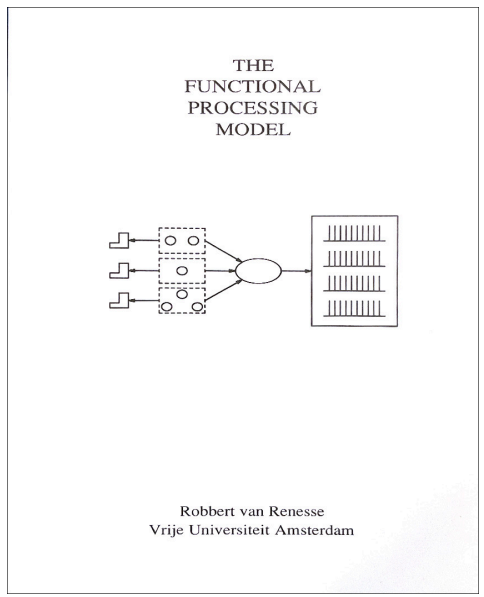
1989 (continued)

- Henri successfully defended his thesis on 17 Oct. at 13:30
- Now, as a doctor, he could be on Ph.D. defense committees
- On 17 Oct. at 15:30, he used his new right for the first time as a member of Robbert van Renesse's committee

Henri was later a full professor in our department For 27 years



Henri's thesis



Robbert's thesis

Robbert was later a full professor at Cornell University

1989 (continued)

- I gave Henri a STERN WARNING:
  - ***DO NOT BECOME A PROFESSOR BEFORE YOU ARE 40.***
  - ***YOU ARE TOO GOOD A RESEARCHER TO WASTE ON BECOMING A BUREAUCRAT***

- He promised me he wouldn't



1989 (continued)

- We got connected to the Internet
- At first we got 256 IP addresses (192.31.231.0/24)
- Later we got 65,536 of them (2^{16})
- There were 4 billion of them and nobody could imagine 4 billion computers in the world; so they gave them out like candy

1989 (continued)

- Jaco de Bakker was elected to the KNAW (Royal Academy) in 1989
- I was elected to the KNAW in 1994
- Jan Willem Klop was elected to the KNAW in 2003
- Frank van Harmelen was elected to the KNAW in 2017



Trippenhuis in Amsterdam
Seat of the KNAW



Jaco



Me



Jan Willem



Frank

1989 (continued)

- Party to celebrate 50 years of “Wiskundig Seminarium” at the VU


Piet Mullender (Hgl math)


Maarten Maurice (Hgl math)


Corry van Rossum (manager)


Marja Verburg (secretary)


Greg Sharp (progr.), Reind, Marja


Reind + Corry


Hans van Vliet & Jaco de Bakker


Ilse Thomson (secretary)


Staff and students


Staff and students


Loes (secretary), Jim van Keulen(CL), & Betty Kuiper (secretary)


Erik Baalbergen (AiO CS) & Wiebren de Jonge (UD IMSE)

1990

- From the annual report

400 Sectie Theoretische Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.W. de Bakker	(deeltijds: 0.3)
prof.dr. J.W. Klop	(deeltijds: 0.3)
prof.dr. J.-J.Ch. Meyer	(deeltijds: 0.8)
dr. R.C. de Vrijer	(deeltijds: 0.5)

Wetenschappelijk personeel in tijdelijke dienst:

dr. E.P. de Vink

Promotiemedewerkers/aio's/oio's:

drs. W. v.d. Hoek	
drs. A. Middeldorp	(tot 1/9)
drs. F.C. van Breugel	
drs. V. van Oostrom	
drs. G. Vreeswijk	(NWO/SION)

500 Sectie Informatiesystemen

Wetenschappelijk personeel in vaste dienst:

dr. W. de Jonge	
dr. M.L. Kersten	(deeltijds: 0.2)
prof.dr. R.P. van de Riet	
dr. R.J. Wieringa	

Promotiemedewerkers/aio's/oio's:

drs. P.A. Spruit (v/a 1/5)

Programmeurs:

drs. A. Schijf

600 Sectie Computersystemen

Wetenschappelijk personeel in vaste dienst:

dr. H.E. Bal	
dr. D. Grune	(deeltijds: 0.5)
prof.dr. A.S. Tanenbaum	(deeltijds: 0.8)
dr. J.M. van Wouwe	

Promotiemedewerkers/aio's/oio's:

drs. E.H. Baalbergen
drs. M.F. Kaashoek

Tweede Geldstroom personeel:

ir. A.B.J.M. Geels	(NWO (programmeur))
dr. R. van Renesse	(KNAW-fellow, v/a 1/7)
F. Douglis	(v/a 1/9)

Derde Geldstroom personeel:

M.N. Condict	(tot 1/9)
C.B. Officer	(tot 1/9)
drs. J. van Eck	

700 Sectie Kunstmatige Intelligentie

Wetenschappelijk personeel in vaste dienst:

dr. W. Kowalczyk
prof.dr. J. Treur

Wetenschappelijk personeel in tijdelijke dienst:

drs. J. Adriaanse	(tot 1/12)
drs. P.H.G. van Langen	
drs. J.H.M. Pannekeet	
drs. P.A. Geelen	
dr. Zs. Ruttkay	(ZWO, v/a 1/10)
drs. A.W.S. Wentholt	(v/a 1/9)

Promotiemedewerkers/aio's/oio's:

drs. Y.H. Tan	
drs. H.H. van Riemsdijk	
drs. I.A. van Langevelde	(v/a 1/11)
drs. A.W. Philipsen	(v/a 1/10)
drs. H.A. Brumsen	(tot 1/5)

800 Sectie Software Engineering

Wetenschappelijk personeel in vaste dienst:

drs. A. Eliëns	
ir. M.P.H. Huntjens	
dr. G.C. van der Veer	(deeltijds: 0.4)
prof.dr. J.C. van Vliet	

Promotiemedewerkers/aio's/oio's:

drs. J.B. Warmer	(tot 15/10)
drs. G. de Haan	(NWO v/a 1/9)

Samenstelling en aktiviteiten dienst Computerlab

Leiding

drs. W. van Keulen (0,8), hoofd ComputerLab

Systeembeheer en -onderhoud

R. Wiggers, systeembeheerder
L. Bahler (0.5, vanaf 1 september), programmeur
drs. K.J. Bot (vanaf 1 september), systeemprogrammeur
drs. E.G. Keizer (0,4), wetenschappelijk programmeur
H. Smit (vanaf 1 mei), systeemprogrammeur
drs. J.M van Staveren (0,2), wetenschappelijk programmeur
A. Steegstra (0,3), assistent-beheerder
T. Vermeer assistent-beheerder

Ondersteuning projekten

drs. C. Jacobs, wetenschappelijk programmeur
drs. E.G. Keizer (0,4), wetenschappelijk programmeur
drs. L.J.M. van Moergestel (tot 1 april), wetenschappelijk programmeur
G.J. Sharp BSc, wetenschappelijk programmeur
drs. J.M van Staveren (0,8), wetenschappelijk programmeur

L. Bahler (0.5, vanaf 1 september), programmeur
drs. A. Blom (vanaf 1 oktober), wetenschappelijk programmeur
drs. H. van Eck (tot 31 december), wetenschappelijk programmeur
drs. L. van de Mey (vanaf 1 mei), wetenschappelijk programmeur
drs. A. Schijf (tot 31 december), wetenschappelijk programmeur
drs. C. Verstoep (vanaf 1 mei), wetenschappelijk programmmeur
drs. C. Visser (vanaf 1 november), wetenschappelijk programmeur

1990 (continued)

- Fred Douglis was a visiting Prof. 1990-91 from U. Calif. Berkeley
- He and I worked together on distributed systems
- We wrote a journal paper together
- He gave 10 talks at various universities



1990 (continued)

- We started BWI: Bedrijfswiskunde en informatica (Business math and computer science)
- It was run jointly by math, computer science, and economics
- It soon proved to be a very popular major
  - In the first year there were 36 students
  - In the second year there were 80 students
- Two adjunct professors from industry were appointed:
  - Dr. H.M.P. Kersten (who worked for a bank)
  - Dr. D.B.B. Rijsenbrij (who worked for a software house)

1990 (continued)

- Dissertations
  - R.J. Glabbeek: “Comparative Concurrency Semantics” (Klop)
  - A. Middeldorp: “Modular Properties of Term Rewriting Systems (Klop)
  - E.P. de Vink: “Designing Stream-Based Semantics for Uniform Concurrency and Logic Programming” (De Bakker)
  - R.J. Wieringa: “Algebraic Foundations for Dynamic Conceptual Models” (Van de Riet)
  - G.C. van de Veer: “Human-Computer Interaction: Learning, Individual Differerences, and Design Recommendations” (Fokkema, psychology)

1990 (continued)

- Jan Treur was appointed a full professor of AI replacing Siklossy
- His research focused on intelligent agents
- The Dept. started a official AI major, not just a few courses
- The AI research didn't require any special equipment



1990 (continued)

- Jaco de Bakker was elected to the Academia Europaea in 1990
- Jan Willem Klop was elected to the Academia Europaea (2011)
- Henri Bal was elected to the Academia Europaea in 2013
- Frank van Harmelen was elected to the Acad. Europaea in 2017

ACADEMIA EUROPAEA
The Academy of Europe

Jaco de Bakker



Sadly, this member passed away.

Membership Number:	778
Membership type:	ORDINARY
Section:	INFORMATICS
Elected:	1990
Main Country of Residence:	THE NETHERLANDS

Jaco de Bakker passed away December 13, 2012.

Positions Held

- Since 2002 CWI Fellow
- Since 1964 Professor at Centrum Wiskunde & Informatica (CWI)

Fields of Scholarship

- Theoretical informatics

ACADEMIA EUROPAEA
The Academy of Europe

Jan W. Klop



Membership Number:	3062
Membership type:	ORDINARY
Section:	INFORMATICS
Elected:	2011
Main Country of Residence:	THE NETHERLANDS
Homepage(s):	http://www.cs.vu.nl/~jwk

Present and Previous Positions

- 2010 Emeritus Professor of Applied Logic, VU University Amsterdam, the Netherlands
- 1986 - 2010: Professor of Applied Logic, VU University Amsterdam, the Netherlands
- 2002 - 2004 Head of department of computer science of VU University Amsterdam
- 1999 - 2004 Head of the section theoretical computer science of VU University Amsterdam
- 1980 - 2007 Researcher, respectively senior researcher at Mathematisch Centrum, Amsterdam, later renamed to Centrum Wiskunde & Informatica, Amsterdam
- 1998 - 2007 Guest researcher Radboud University Nijmegen, department Foundations
- 1993 - 1996 project leader project group AP4, Algebraic and Syntactic Methods, CWI Amsterdam
- 1996 - 1998 project leader project group SEN 2.2, Data manipulation and term rewriting, CWI Amsterdam

Fields of Scholarship

- Term rewriting systems
- Algebraic specifications
- Process algebra
- Communicating systems
- Infinitary rewriting
- Infinite words

ACADEMIA EUROPAEA *The Academy of Europe*

Henri Bal



Foto: Ernst van Deursen

Membership Number:	3504
Membership type:	ORDINARY
Section:	INFORMATICS
Elected:	2013
Main Country of Residence:	THE NETHERLANDS
Homepage(s):	http://http://www.cs.vu.nl/~bal

Present and Previous Positions

- 2005-now, Full Professor, VU University Amsterdam, Department of Computer Science
- 1998, Full Professor, VU University Amsterdam, Department of Computer Science (0.8) and Department of Physics and Astronomy (0.2)
- 1994, Associate Professor, VU University Amsterdam, Computer Science
- 1990, 04, Assistant Professor, VU University Amsterdam, Computer Science
- 1989, 10, Visiting researcher, Massachusetts Institute of Technology + University of Arizona + Imperial College, London (on one combined grant)
- 1982, Research assistant, VU University Amsterdam, Computer Science

Fields of Scholarship

- Parallel and distributed systems
- Programming environments for clusters, grids, clouds, heterogeneous and mobile systems
- High-performance distributed applications in areas like search algorithms , multimedia, eScience, semantic web and model checking

ACADEMIA EUROPAEA
The Academy of Europe

Frank van Harmelen



Membership Number:	3789
Membership type:	ORDINARY
Section:	INFORMATICS
Elected:	2014
Main Country of Residence:	THE NETHERLANDS
Homepage(s):	http://www.cs.vu.nl/~frankh

Present and Previous Positions

- 2011-current: scientific director of The Network Institute, VU University, Amsterdam
- 2001-current: full professor, VU University, Amsterdam (tenured)
- 1999-2001: associate professor (UHD), VU University, Amsterdam (tenured)
- 1995-1999: assistant professor (UD), VU University, Amsterdam (tenured)
- 1990-1995: post-doc researcher with prof. Bob Wielinga, University of Amsterdam (fixed-term)
- 1989: completion of PhD under prof. Alan Bundy at University of Edinburgh, Dept. of Artificial Intelligence

Fields of Scholarship

- Artificial Intelligence, in particular the symbolic representation of knowledge and its use for inference
- Very large scale Knowledge Representation, in particular inference over very large knowledge bases
- Semantic Web, in particular handling distributed, large, heterogeneous, dynamic and possibly inconsistent information
- Medical knowledge representation, in particular the formalisation of medical guidelines and medical trials

1990 (continued)

- Instead of doing one postdoc, Henri did three of them:



MIT



University of Arizona



Imperial College

1991

- From the annual report (I)

400 Sectie Theoretische Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.W. de Bakker	(deeltijds: 0.3)
prof.dr. J.W. Klop	(deeltijds: 0.3)
prof.dr. J.-J.Ch. Meyer	(deeltijds: 0.8)
dr. R.C. de Vrijer	(deeltijds: 0.5)
dr. E.P. de Vink	(v/a 1/9)

Promotiemedewerkers/aio's/oio's:

drs. W. v.d. Hoek	
drs. F.C. van Breugel	
drs. V. van Oostrom	
drs. G. Vreeswijk	(NWO/SION)

500 Sectie Informatiesystemen

Wetenschappelijk personeel in vaste dienst:

dr. W. de Jonge	
dr. M.L. Kersten	(deeltijds: 0.2)
prof.dr. R.P. van de Riet	
dr. R.J. Wieringa	

Wetenschappelijk personeel in tijdelijke dienst:

drs. P.P. Buitelaar

Promotiemedewerkers/aio's/oio's:

drs. A. Schijf
drs. P.A. Spruit

600 Sectie Computersystemen

Wetenschappelijk personeel in vaste dienst:

dr. H.E. Bal	
dr. D. Grune	(deeltijds: 0.5)
prof.dr. A.S. Tanenbaum	(deeltijds: 0.8)
dr. J.M. van Wouwe	

Promotiemedewerkers/aio's/oio's:

drs. E.H. Baalbergen	(tot 1/12)
drs. M.F. Kaashoek	

Tweede Geldstroom personeel:

ir. A.B.J.M. Geels	(NWO (programmeur))
dr. R. van Renesse	(KNAW-fellow)
F. Douglis	(NWO visiting professor)

Derde Geldstroom personeel:

drs. J. van Eck

1991 (continued)

- From the annual report (II)

700 Sectie Kunstmatige Intelligentie

Wetenschappelijk personeel in vaste dienst:

dr. F.M.T. Brazier	(v/a 1/6)
prof.dr. J. Treur	

Wetenschappelijk personeel in tijdelijke dienst:

dr. W. Kowalczyk

Promotiemedewerkers/aio's/oio's:

drs. I.S. Gavrila	(v/a 1/12)
drs. I.A. van Langevelde	
drs. A.W. Philipsen	
drs. H.H. van Riemsdijk	(tot 1/9)

Tweede Geldstroom personeel:

drs. P.A. Geelen	(NWO-NFI/SPIN-SKBS)
drs. P.H.G. van Langen	(ESPRIT-ROCOCO/SPIN-SKBS)
drs. J.H.M. Pannekeet	(NWO-NFI/SPIN-SKBS, tot 1/5)
drs. Y.H. Tan	(NWO-SION/SPIN-SKBS)

Derde Geldstroom personeel:

drs. S Bakker	(v/a 1/12)
A.E. de Gorter	(0,3, SPIN-SKBS, tot 1/7)
drs. F.J. Jüngen	(v/a 1/12)
drs. G.J. Moses	(v/a 15/11)
dr. Zs. Ruttkay	(NWO-NFI/SPIN-SKBS)
drs. L.J.P. Schoenmaker	(SPIN-SKBS, v/a 4/12)
drs. M. Sloof	
drs. A.W.S. Wentholt	(SPIN-SKBS)

800 Sectie Software Engineering

Wetenschappelijk personeel in vaste dienst:

dr. A. Eliëns
ir. M.P.H. Huntjens
dr. G.C. van der Veer
prof.dr. J.C. van Vliet

Promotiemedewerkers/aio's/oio's:

drs. G. de Haan (NWO)

Leiding

drs. W. van Keulen (0,8), hoofd ComputerLab

Systeembeheer en -onderhoud

R. Wiggers, systeembeheerder
L. Bahler (0.5, tot 1 september), programmeur
R. van de Pol (0.5, vanaf 15 oktober), programmeur
drs. K.J. Bot (vanaf 1 september), systeemprogrammeur
drs. E.G. Keizer (0,4), wetenschappelijk programmeur
H. Smit (vanaf 1 mei), systeemprogrammeur
drs. J.M van Staveren (0,2), wetenschappelijk programmeur
A. Steegstra (0,3 tot 1 september, 0,5 vanaf 1 september)
T. Vermeer assistent-beheerder

Ondersteuning projekten

drs. C. Jacobs, wetenschappelijk programmeur
drs. E.G. Keizer (0,4), wetenschappelijk programmeur
G.J. Sharp BSc, wetenschappelijk programmeur
drs. J.M van Staveren (0,8), wetenschappelijk programmeur
L. Bahler (0.5, tot 1 september), programmeur
drs. A. Blom, wetenschappelijk programmeur
drs. L. van de Mey, wetenschappelijk programmeur
drs. C. Verstoep, wetenschappelijk programmmeur
drs. C. Visser, wetenschappelijk programmeur

1991 (continued)

- Courses for year 1
  - Computer organization
  - Data structures
  - Introduction to programming
  - Introduction to bedrijfsinformatica
  - Introduction to computer science
  - Representation and search

- Courses for years 2-4
  - Applied logic
  - Compilers
  - Computer networks
  - Databases
  - Database techniques
  - Distributed systems
  - Expert systems
  - Formal languages
  - Human-computer interaction
  - Introduction to computer science
  - Introduction to Logic
  - Introduction to UNIX
  - Knowledge systems
  - Knowledgebases
  - Object-oriented programming
  - Operating systems
  - Programmming languages
  - Prolog
  - Semantics of programming languages
  - Software engineering
  - Term rewriting

1991 (continued)

- Dissertations
  - F.S. de Boer: “Reasoning about Dynamically Evolving Process Structures” (De Bakker)
  - F.M.T. Brazier: “Design and Evaluation of a User Interface for Information Retrieval” (Fokkema, psychology)
  - A. Eliens: “DLP: A Language for Distributed Logic Programming for Artificial Intelligence” (Klint, CWI)

1991 (continued)

- We signed a contact with a local company, ACE, to sell Amoeba
- I went to Japan to give talks to encourage sales
- ACE didn't sell any (because they didn't allow potential customers to test it in advance; they also priced it too high)
- Eventually, we made it open source
- While in Japan, a local professor rented a ballroom to have 100+ Japanese engineers meet me at the height of the MINIX hype
- Many were unable to give their name, company, and title in English
- All of them had had at least 6 years of English in school and college

1992

- From the annual report (I)

400 Sectie Theoretische Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr J.W. de Bakker	(deeltijds: 0.3)
prof.dr J.W. Klop	(deeltijds: 0.3)
prof.dr J.-J.Ch. Meyer	(deeltijds: 0.8)
dr E.P. de Vink	
dr R.C. de Vrijer	(deeltijds: 0.5)

Wetenschappelijk personeel in tijdelijke dienst:

dr W. v.d. Hoek	(v/a 1/7)

Promotiemedewerkers/aio's/oio's:

drs F.C. van Breugel	
drs W. v.d. Hoek	(tot 1/7)
drs B. van Linder	(v/a 1/7)
drs V. van Oostrom	
drs G. Vreeswijk	(NWO/SION)

500 Sectie Informatiesystemen

Wetenschappelijk personeel in vaste dienst:

dr W. de Jonge	
dr M.L. Kersten	(deeltijds: 0.2)
prof.dr R.P. van de Riet	
dr R.J. Wieringa	

Wetenschappelijk personeel in tijdelijke dienst:

drs P.P. Buitelaar	(tot 1/7)

Promotiemedewerkers/aio's/oio's:

drs P.A. Spruit

Tweede Geldstroom personeel:

drs J.F.M. Burg	(v/a 1/9)
drs R.B. Feenstra	(v/a 1/5)
drs A.J. van der Vos	(v/a 1/9)

600 Sectie Computersystemen

Wetenschappelijk personeel in vaste dienst:

dr H.E. Bal	
dr D. Grune	(deeltijds: 0.5)
prof.dr A.S. Tanenbaum	(deeltijds: 0.8)
dr J.M. van Wouwe	

Wetenschappelijk personeel in tijdelijke dienst:

dr M.F. Kaashoek	(v/a 1/12)
M. Wood	

Promotiemedewerkers/aio's/oio's:

drs M.F. Kaashoek	(tot 1/12)

Tweede Geldstroom personeel:

dr R. van Renesse	(KNAW-fellow tot 1/7)

A00 Groep Bedrijfswiskunde en -informatica

Wetenschappelijk personeel in tijdelijke dienst:

prof.dr H.M.P. Kersten	(v/a 1/2)

1992 (continued)

- From the annual report (II)

700 Sectie Kunstmatige Intelligentie

Wetenschappelijk personeel in vaste dienst:

dr F.M.T. Brazier
dr W. Kowalczyk
prof.dr J. Treur

Wetenschappelijk personeel in tijdelijke dienst:

dr A.E. Eiben	(v/a 1/2)
drs L. Schoenmaker	

Promotiemedewerkers/aio's/oio's:

drs F.J. Jüngen	(v/a 1/6)
drs I.A. van Langevelde	
drs A.W. Philipsen	

Tweede Geldstroom personeel:

drs I.S. Gavrila	(NWO-NFI)
drs P.A. Geelen	(NWO-NFI/SPIN-SKBS; tot 1/9)

Derde Geldstroom personeel:

drs S. Bakker	(tot 1/6)
drs F.J. Jüngen	(DISKUS; tot 1/6)
drs P.H.G. van Langen	(ESPRIT-ROCOCO/SPIN-SKBS)
drs G.J. Moses	(tot 1/6)
dr Zs. Ruttkay	(NWO-NFI/SPIN-SKBS)
drs M. Sloof	(ATO-Agrotechnologie)
dr Y.H. Tan	(SPIN-SKBS/Esprit DRUMS II)
drs A.W.S. Wentholt	(SPIN-SKBS; tot 1/9)

800 Sectie Software Engineering

Wetenschappelijk personeel in vaste dienst:

dr A. Eliëns	
ir M.P.H. Huntjens	
dr G.C. van der Veer	(deeltijds: 0.5)
prof.dr J.C. van Vliet	

Promotiemedewerkers/aio's/oio's:

drs G. de Haan	(NWO)

Leiding

drs. W. van Keulen (0,8), hoofd ComputerLab

Systeembeheer en -onderhoud

drs. K.J. Bot, systeemprogrammeur
J. Hogema, assistent systeembeheer (vanaf 15 januari)
drs. E.G. Keizer (0,4), wetenschappelijk programmeur
R. van de Pol (0.5), programmeur
H. Smit, systeemprogrammeur (tot 1 december)
drs. J.M van Staveren (0,4), wetenschappelijk programmeur
A. Steegstra (0,5), assistent-beheerder
L. Uljee, assistent systeembeheer, (0,5, vanaf 15 augustus)
T. Vermeer assistent systeembeheer (tot 1 augustus)
R. Wiggers, systeembeheerder

Ondersteuning projekten

drs. A. Blom, wetenschappelijk programmeur
drs. C. Jacobs, wetenschappelijk programmeur
drs. E.G. Keizer (0,4), wetenschappelijk programmeur
drs. L. van de Mey, wetenschappelijk programmeur
G.J. Sharp BSc, wetenschappelijk programmeur
drs. J.M van Staveren (0,6), wetenschappelijk programmeur
drs. C. Verstoep, wetenschappelijk programmmeur
drs. C. Visser, wetenschappelijk programmeur

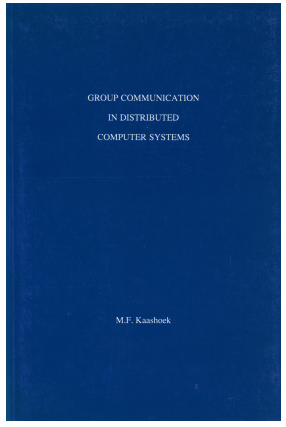
1992 (continued)

- Dissertations
  - W. van der Hoek: “Modalities for Reasoning about Knowledge and Quantities” (Meyer)
  - E.H. Baalbergen: “The Declarative Operating Systems Model” (Tanenbaum)
  - M.F. Kaashoek: “Group Communication in Distributed Computer Systems” (Tanenbaum)
  - Y.-H. Tan: “Non-Monotonic Reasoning” (Van Benthem, UvA)
  - P.J. Veerkamp: “On the Development of an Artifact and Design Description Language” (Treur)
  - R.F. Walker: “An Expert System Architecture in the Legal Field” (Treur)

1992 (continued)

- Frans Kaashoek got his Ph.D. under my supervision
- His thesis was entitled
  - "Group Communication in Distributed Computer Systems"
  - It was based on 23 papers he authored or coauthored
- He later became a very famous full professor at M.I.T.
- My first four Ph.D. students all became full professors





1993

- From the annual report (I)

400 Sectie Theoretische Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.W. de Bakker	(deeltijds: 0.3)
prof.dr. J.W. Klop	(deeltijds: 0.3)
dr. E.P. de Vink	
dr. R.C. de Vrijer	

Wetenschappelijk personeel in tijdelijke dienst:

dr. P.A. Mellies	(tot 1/10)
dr. V. van Oostrom	(v/a 15/6)
dr. Y. Venema	(postdoc tot 1/5)
dr. C.F.M. Vermeulen	(tot 1/9)

Promotiemedewerkers/aio's/oio's:

drs. S.C.C. Blom	
drs. M. Bognar	(v/a 7/8)
drs. M.M. Bonsangue	

KNAW aanstellingen:

dr. Y. Venema	(v/a 1/5)

500 Sectie Informatiesystemen

Wetenschappelijk personeel in vaste dienst:

dr. W. de Jonge
prof.dr. R.P. van de Riet
dr. R.J. Wieringa

Promotiemedewerkers/aio's/oio's:

drs. J. Broersen	(v/a 1/11)
drs. J.F.M. Burg	(NWO)
drs. R.B. Feenstra	(NWO)
drs. M.A. Oey	
drs. J. Scheerder	
drs. A.J. van der Vos	

A00 Groep Bedrijfswiskunde en -informatica

Wetenschappelijk personeel in tijdelijke dienst:

drs. I.D. Everts	(v/a 1/7 deeltijds: 0.3)
prof.dr. H.M.P. Kersten	(deeltijds: 0.2)
prof.dr. D.B.B. Rijsenbrij	(deeltijds: 0.2)
ir. C.M. Veenstra-Strijland	(v/a 15/6 deeltijds: 0.4)

600 Sectie Computersystemen

Wetenschappelijk personeel in vaste dienst:

dr. H.E. Bal	
dr. D. Grune	(deeltijds: 0.5)
drs. W. van Keulen	(0.2)
prof.dr. A.S. Tanenbaum	(deeltijds: 0.8)
dr. J.M. van Wouwe	

Wetenschappelijk personeel in tijdelijke dienst:

dr.ir. M.R. van Steen

Promotiemedewerkers/aio's/oio's:

drs. R.A.F. Bhoedjang	
drs. L.P. van Doorn	
drs. Ph. Homburg	(NWO)
drs. J.W. Romein	
drs. T. Rühl	(NWO)

Tweede Geldstroom personeel:

S. Ben Hassen
drs. R.F.H. Hofman
dr. K.G. Langendoen

Derde Geldstroom personeel:

dr. F.J. Hauck	(postdoc v/a 1/9)

1993 (continued)

- From the annual report (II)

700 Sectie Kunstmatige Intelligentie

Wetenschappelijk personeel in vaste dienst:

dr. F.M.T. Brazier
dr. W. Kowalczyk
prof.dr. J. Treur

Wetenschappelijk personeel in tijdelijke dienst:

dr. L.V. Allis	(tot 1/5)
dr. C.M. Jonker	(v/a 1/10)
drs. P.H.G. van Langen	(v/a 1/2)
dr. Zs. Ruttkay	(0.0)
dr. L.C. Verbrugge	(v/a 1/6)
dr.ir. M. Willems	(tot 15/12)

Promotiemedewerkers/aio's/oio's:

drs. P. van Eck	(v/a 1/5)
drs. J. Engelfriet	
drs. I.S. Gavrila	(NWO NFI)
drs. F.J. Jüngen	
drs. N.J.E. Wijngaards	(NWO)

Derde Geldstroom personeel:

drs. P.H.G. van Langen	(tot 1/2)
drs. M. Sloof	(ATO-Agro)
dr. Y.H. Tan	(tot 1/10)

800 Sectie Software Engineering

Wetenschappelijk personeel in vaste dienst:

dr. A. Eliëns	
ir. M.P.H. Huntjens	
dr. G.C. van der Veer	(deeltijds: 0.5)
prof.dr. J.C. van Vliet	

Wetenschappelijk personeel in tijdelijke dienst:

drs. D. Bolier	(erkend gew.bezwaarde mil.
drs. H. Luden	(deeltijds: 0.5)

Promotiemedewerkers/aio's/oio's:

drs. J.R. van Ossenbruggen

Derde Geldstroom personeel:

drs. F. Niessink	(v/a 1/9)

Leiding

drs W. van Keulen (0,8),	hoofd ComputerLab

Systeembeheer en -onderhoud

drs K.J. Bot	systeemprogrammeur
J. Hogema, (0,8)	assistent systeembeheer
drs E.G. Keizer (0,5)	toegepast informaticus
R. van de Pol (0.8)	programmeur
drs J.M van Staveren (0,5)	wetenschappelijk programmeur
drs A. Steegstra	assistent-beheerder
L. Uljee, (0,6)	assistent systeembeheer
R. Wiggers	systeembeheerder

Ondersteuning projekten

drs F. Dehne	wetenschappelijk programmeur
drs C. Jacobs	wetenschappelijk programmeur
drs E.G. Keizer (0,5)	toegepast informaticus
drs L. van de Mey	wetenschappelijk programmeur
G.J. Sharp BSc	wetenschappelijk programmeur
drs J.M van Staveren (0,5)	wetenschappelijk programmeur
drs C. Verstoep	wetenschappelijk programmeur
drs C. Visser	wetenschappelijk programmeur

Er werd vanuit het ComputerLab ondersteuning gegeven bij de volgende projekten:

projekt	projectleider
Amoeba	Tanenbaum (2,5)
ADAM	Van de Riet (0,3)
CM	Wieringa (0,6)
DESIRE e.a. AI-projekten	Treur (1,0)
DejaVU	Eliëns (1,0)
Orca	Bal (1,0)
LD	W. de Jonge (0,2)

1993 (continued)

- The 1993 faculteitsraad consisted of
  - 4 math academic staff
  - 4 computer science academic staff
  - 2 administrative staff (one programmer, one bookkeeper)
  - 5 students (4 of whom were CS, 1 math)
- Before each meeting, I met with the 4 CS students to strategize
- I was a member and began to push motions through to overrule the board; this had never happened before
- I wanted concrete measures to fix the staff imbalance

1993 (continued)

- Nearly all the students were CS but most of the staff were math
- A committee was set up with Rien Kaashoek (math) and me (CS)
- I wrote software to model the workload
- For example, a 3-unit course with 100 students = 300 work-units
- The model added these up for all courses we taught
- Then we knew the total math workload and total CS workload
- We decided that no one would be fired but all new vacancies would go to computer science until the staff matched the workload
- The board and faculteitsraad accepted this proposal

1993 (continued)

- A new minister scrapped the *voorwaardelijk financering* system
- Multi-university graduate schools were now the order of the day
- The VU, UvA, TU Delft, and Leiden formed the *Advanced School for Computing and Imaging*
- I was the first scientific director (1993-2005)



1993 (continued)

- After traveling the world, Henri came home to the VU
- He got an NWO Pionier grant equivalent to ≈ €1.5 million now
- It ran from 1993 to 1998
- It was about writing parallel applications on a collection of processors using a new version of Orca running on top of a portable run-time system.
- Programmability, portability, and performance were the goals

1993 (continued)

- Dissertations
  - E. Horita: “Fully Abstract Models for Concurrent Langs.” (De Bakker)
  - H. Prakken: “Tools for Modeling Legal Argument” (Soeteman, law)
  - G.A.W. Vreeswijk: “Studies in Defeasible Argumentation” (Meyer)

1993 (continued)

- Message from Henri on 22 Sept. 1993:

  "Ik ben de Pionier begroting voor 1994-1997 aan het opstellen.
  Ik heb een groot probleem: ik krijg het geld niet op!"
- English: Henri had too much money
- So we got our fourth research multicomputer
- It had 80 micro-SPARCS
- We called it the Zoo
- The scheduler was called the "Zookeeper"
- In fact, we were doing cloud computing long before it became popular

80 micro-SPARCS



1993 (continued)

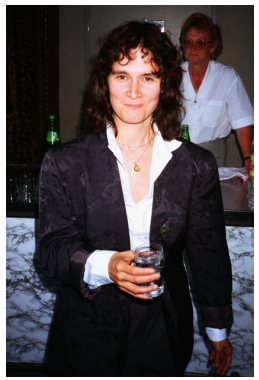
- There wasn't much information on the Internet yet
- If we didn't have a journal subscription, staff couldn't read papers
- The Dept. library spent the current equivalent of
  - €137,000 on journal subscriptions (largely math)
  - €9,400 on "seriewerken" (probably annual conference proceedings)
  - €4,700 on books
- Math and CS fought over the library budget
- Each year the library Comm. asked staff which books to buy
- All of the journals and books were available on the 6th floor
- You could just go up there and borrow them

1993 (continued)

- Goodbye party for Marja Verburg (secretary) who left for Twente


Marja Verburg & Roel Wieringa (UD IMSE)


Jim van Keulen (computer lab)


Frances Brazier (Hgl AI)


Vojtek Kowalczyk (UD AI)


Corry van Rossum (beheerder)


Jan van Wouwe (UD CS)


Hans van Vliet & John-Jules Meyer


Marieke Frohn & Henri Bal (UD CS)


Reind van de Riet (Hgl IMSE) & Hans van Vliet (Hgl IMSE)


Anton Eliens (UD IMSE) & Wiebren de Jonge (UD IMSE)


Corry van Rossum & Hans van Vliet


Ilse Thomson & Marieke Frohn (secretaries)

1993 (continued)

- John-Jules Meyer moved to the University of Utrecht
- He later (co)authored one book and 500 papers
- He supervised 56 Ph.D.s
- He served on 400 program committees





1994

- From the annual report (I)

400 Sectie Theoretische Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr J.W. de Bakker	(deeltijds: 0.3)
prof.dr J.W. Klop	(deeltijds: 0.3)
dr E.P. de Vink	
dr R.C. de Vrijer	

Wetenschappelijk personeel in tijdelijke dienst:

dr F.S. de Boer	(tot 1/9)
dr Y.Venema	(v/a 1/3 deeltijds: 0.5 tot 1/9
dr C.F.M. Vermeulen	(v/a 1/9 deeltijds: 0.5)

Promotiemedewerkers/aio's/oio's:

drs S.C.C. Blom	(v/a 1/4)
drs M.M. Bonsangue	
ir F.C. van Breugel	(tot 1/10)

500 Sectie Informatiesystemen

Wetenschappelijk personeel in vaste dienst:

dr W. de Jonge	
dr M.L. Kersten	(tot 1/7)
prof.dr R.P. van de Riet	
dr R.J. Wieringa	

Promotiemedewerkers/aio's/oio's:

drs J.F.M. Burg	(NWO)
drs R.B. Feenstra	(NWO)
drs M.A. Oey	(v/a 1/11)
drs J. Scheerder	(v/a 1/12; NWO)
drs P.A. Spruit	(tot 1/5)
drs A.J. van der Vos	

600 Sectie Computersystemen

Wetenschappelijk personeel in vaste dienst:

dr H.E. Bal	
dr D. Grune	(deeltijds: 0.5)
drs W. van Keulen	(0.2)
prof.dr A.S. Tanenbaum	(deeltijds: 0.8)
dr J.M. van Wouwe	

Wetenschappelijk personeel in tijdelijke dienst:

dr ir M.R. van Steen	(v/a 1/9)
G.V. Wilson	(tot 15/9)

Promotiemedewerkers/aio's/oio's:

drs R.A.F. Bhoedjang	(v/a 1/7)
drs Ph. Homburg	(NWO)
drs J.W. Romein	(v/a 1/9)
drs T. Rühl	(NWO)

Tweede Geldstroom personeel:

S. Ben Hassen	(v/a 1/9)
drs R.F.H. Hofman	
dr K.G. Langendoen	

A00 Groep Bedrijfswiskunde en -informatica

Wetenschappelijk personeel in tijdelijke dienst:

drs I.D. Everts	(deeltijds: 0.3)
prof.dr H.M.P. Kersten	(deeltijds: 0.2)
prof.dr D.B.B. Rijsenbrij	(deeltijds: 0.2)
dr H.J. van der Sluis	
ir C.M. Veenstra-Strijland	(deeltijds: 0.4)

1994 (continued)

- From the annual report (II)

700 Sectie Kunstmatige Intelligentie

Wetenschappelijk personeel in vaste dienst:

dr F.M.T. Brazier
dr W. Kowalczyk
prof.dr J. Treur

Wetenschappelijk personeel in tijdelijke dienst:

dr L.V. Allis	
dr A.E. Eiben	(tot 1/10)
dr ir M. Willems	

Promotiemedewerkers/aio's/oio's:

drs J. Engelfriet	(v/a 1/9)
drs I.S. Gavrila	(NWO-NFI)
drs F.J. Jüngen	
drs I.A. van Langevelde	(tot 1/11)
drs A.W. Philipsen	(tot 1/10)
drs N.J.E. Wijngaards	(NWO)

Derde Geldstroom personeel:

drs J. Engelfriet	(tot 1/9)
dr W. van der Hoek	(Esprit DRUMS II;deeltijds: 0.05)
drs P.H.G. van Langen	(SPIN-SKBS)
drs B. van Linder	(Esprit DRUMS II;deeltijds: 0.05)
prof.dr J.-J.Ch. Meyer	(Esprit DRUMS II;deeltijds: 0.05)
drs M. Sloof	(ATO-Agrotechnologie)
dr Y.H. Tan	(Esprit DRUMS II;deeltijds: 0.2)

800 Sectie Software Engineering

Wetenschappelijk personeel in vaste dienst:

dr A. Eliëns	
ir M.P.H. Huntjens	
dr G.C. van der Veer	(deeltijds: 0.5)
prof.dr J.C. van Vliet	

Wetenschappelijk personeel in tijdelijke dienst:

drs D. Bolier	(v/a 1/9, erkend gew.bez

Promotiemedewerkers/aio's/oio's:

drs M.A.B. van Doorn	(v/a 1/9)
drs G. de Haan	(tot 1/9; NWO)
drs J.R. van Ossenbruggen	(v/a 1/9)

Samenstelling en aktiviteiten dienst Computerlab

Leiding

drs W. van Keulen (0,8), hoofd ComputerLab

Systeembeheer en -onderhoud

drs K.J. Bot	systeemprogrammeur
J. Hogema,	assistent systeembeheer
drs E.G. Keizer (0,5)	toegepast informaticus
R. van de Pol (0.8)	programmeur
drs J.M van Staveren (0,5)	wetenschappelijk programmeur
drs A. Steegstra	assistent-beheerder
L. Uljee, (0,6)	assistent systeembeheer
R. Wiggers	systeembeheerder

Ondersteuning projekten

drs C. Jacobs	wetenschappelijk programmeur
drs F. Dehne (vanaf 1 februari)	wetenschappelijk programmeur
drs E.G. Keizer (0,5)	toegepast informaticus
drs L. van de Mey	wetenschappelijk programmeur
G.J. Sharp BSc	wetenschappelijk programmeur
drs J.M van Staveren (0,5)	wetenschappelijk programmeur
drs C. Verstoep	wetenschappelijk programmeur
drs C. Visser	wetenschappelijk programmeur

Er werd in 1994 vanuit het ComputerLab ondersteuning gegeven bij

Amoeba	Tanenbaum (2,8)
ADAM	Van de Riet (0,3)
CM	Wieringa (0,6)
DESIRE e.a. AI-projekten	Treur (1,0)
DejaVU	Eliëns (1,0)
Orca	Bal (1,0)
LD	W. de Jonge (0,2)

1994 (continued)

- Dissertations
  - F.C. van Breugel: “Topological Models in Comparative Models” (De Bakker)
  - V. van Oostrom: “Confluence for Higher-Order Rewriting” (Klop)
  - P.A. Spruit: “Logics of Database Updates” (Meyer)

1994 (continued)

- Computers run by the computer lab

werkpleksystemen	aantallen		
soort	stud.	staf	totaal
IBM PC kloon	27	10	37
MacIntosh (SE,PLus)	2	6	8
MacIntosh II (cx,ci, si)	-	14	14
Macintosh Centris	-	12	12
Apple PowerMac	-	2	2
Sun-4/6[05] (SS1)	47	12	59
Sun-4//75 (SS2)	-	1	1
Sun-4/30 (LX)	-	12	12
Sun-4/15 (Classic)	13	19	32
Sun-4 (SS5)		16	16
Sun-3/80 X-Station	5	-	5
Sun-4/20 (SLC)	35	16	51
X-terminals	80	29	109
Totaal	209	149	358

Overzicht werkplekapparatuur, december 1994

serversystemen	aantallen		
soort	stud.	staf	totaal
Sun-4/630 ComputeServer	2	1	3
SparcServer10 ComputeServer	3	2	5
Sun-4/380S FileServer	1	2	3
Sun-4/60S miniserver	1	1	2
Sun-4/75S miniserver	-	1	1
SparcServer10 FileServer	3	2	5

Overzicht servers december 1994

Speciale onderzoekapparatuur (Computersysteemgroep)

- Armada poolprocessorkasten, 32x single board computer (Force CPU-30)
- Bullet fileserver, (3x Sun-3/60)
- Zoo poolprocessorsysteem, 83x single board computer (micro Sparc, 32 MB)
- Starfish systemen, 6x [34]86-systeem
  Diverse kleine systemen (4x Sun-3/60, 2x SS1)

De apparatuur is gekoppeld d.m.v Ethernet netwerken en een FDDI-netwerk. Alle server systemen zijn d.m.v. FDDI gekoppeld. Het facultaire netwerk werd gedeeltelijk gerenoveerd door aanleg van UTP-bekabeling en aanschaf van Lannet hubs.

1995

- From the annual report (I)

400 Sectie Theoretische Informatica

Wetenschappelijk personeel in vaste dienst:

prof.dr. J.W. de Bakker	(deeltijds: 0.3)
prof.dr. J.W. Klop	(deeltijds: 0.3)
dr. E.P. de Vink	
dr. R.C. de Vrijer	

Wetenschappelijk personeel in tijdelijke dienst:

dr. P.A. Mellies	(tot 1/10)
dr. V. van Oostrom	(v/a 15/6)
dr. Y. Venema	(postdoc tot 1/5)
dr. C.F.M. Vermeulen	(tot 1/9)

Promotiemedewerkers/aio's/oio's:

drs. S.C.C. Blom	
drs. M. Bognar	(v/a 7/8)
drs. M.M. Bonsangue	

KNAW aanstellingen:

dr. Y. Venema	(v/a 1/5)

500 Sectie Informatiesystemen

Wetenschappelijk personeel in vaste dienst:

dr. W. de Jonge
prof.dr. R.P. van de Riet
dr. R.J. Wieringa

Promotiemedewerkers/aio's/oio's:

drs. J. Broersen	(v/a 1/11)
drs. J.F.M. Burg	(NWO)
drs. R.B. Feenstra	(NWO)
drs. M.A. Oey	
drs. J. Scheerder	
drs. A.J. van der Vos	

A00 Groep Bedrijfswiskunde en -informatica

Wetenschappelijk personeel in tijdelijke dienst:

drs. I.D. Everts	(deeltijds: 0.3)
prof.dr. H.M.P. Kersten	(deeltijds: 0.2)
prof.dr. D.B.B. Rijsenbrij	(deeltijds: 0.2)
dr. H.J. van der Sluis	
ir. C.M. Veenstra-Strijland	(deeltijds: 0.4)

600 Sectie Computersystemen

Wetenschappelijk personeel in vaste dienst:

dr. H.E. Bal	
dr. D. Grune	(deeltijds: 0.5)
drs. W. van Keulen	(0.2)
prof.dr. A.S. Tanenbaum	(deeltijds: 0.8)
dr. J.M. van Wouwe	

Wetenschappelijk personeel in tijdelijke dienst:

dr.ir. M.R. van Steen

Promotiemedewerkers/aio's/oio's:

drs. R.A.F. Bhoedjang	
drs. L.P. van Doorn	
drs. Ph. Homburg	(NWO)
drs. J.W. Romein	
drs. T. Rühl	(NWO)

Tweede Geldstroom personeel:

S. Ben Hassen
drs. R.F.H. Hofman
dr. K.G. Langendoen

Derde Geldstroom personeel:

dr. F.J. Hauck	(postdoc v/a 1/9)

1995 (continued)

- From the annual report (II)

700 Sectie Kunstmatige Intelligentie

Wetenschappelijk personeel in vaste dienst:

dr. F.M.T. Brazier
dr. W. Kowalczyk
prof.dr. J. Treur

Wetenschappelijk personeel in tijdelijke dienst:

dr. L.V. Allis	(tot 1/5)
dr. C.M. Jonker	(v/a 1/10)
drs. P.H.G. van Langen	(v/a 1/2)
dr. Zs. Ruttkay	(0.0)
dr. L.C. Verbrugge	(v/a 1/6)
dr.ir. M. Willems	(tot 15/12)

Promotiemedewerkers/aio's/oio's:

drs. P. van Eck	(v/a 1/5)
drs. J. Engelfriet	
drs. I.S. Gavrila	(NWO NFI)
drs. F.J. Jüngen	
drs. N.J.E. Wijngaards	(NWO)

Derde Geldstroom personeel:

drs. P.H.G. van Langen	(tot 1/2)
drs. M. Sloof	(ATO-Agro)
dr. Y.H. Tan	(tot 1/10)

800 Sectie Software Engineering

Wetenschappelijk personeel in vaste dienst:

dr. A. Eliëns	
ir. M.P.H. Huntjens	
dr. G.C. van der Veer	(deeltijds: 0.5)
prof.dr. J.C. van Vliet	

Wetenschappelijk personeel in tijdelijke dienst:

drs. D. Bolier	(erkend gew.bezwaarde
drs. H. Luden	(deeltijds: 0.5)

Promotiemedewerkers/aio's/oio's:

drs. J.R. van Ossenbruggen

Derde Geldstroom personeel:

drs. F. Niessink	(v/a 1/9)

Leiding

drs W. van Keulen (0,8),	hoofd ComputerLab

Systeembeheer en -onderhoud

drs K.J. Bot	systeemprogrammeur
J. Hogema, (0,8)	assistent systeembeheer
drs E.G. Keizer (0,5)	toegepast informaticus
R. van de Pol (0.8)	programmeur
drs J.M van Staveren (0,5)	wetenschappelijk programmeur
drs A. Steegstra	assistent-beheerder
L. Uljee, (0,6)	assistent systeembeheer
R. Wiggers	systeembeheerder

Ondersteuning projekten

drs F. Dehne	wetenschappelijk programmeur
drs C. Jacobs	wetenschappelijk programmeur
drs E.G. Keizer (0,5)	toegepast informaticus
drs L. van de Mey	wetenschappelijk programmeur
G.J. Sharp BSc	wetenschappelijk programmeur
drs J.M van Staveren (0,5)	wetenschappelijk programmeur
drs C. Verstoep	wetenschappelijk programmeur
drs C. Visser	wetenschappelijk programmeur

Er werd in 1995 vanuit het ComputerLab ondersteuning gegeven bij de v

projekt	projectleider
Amoeba	Tanenbaum (2,5)
ADAM	Van de Riet (0,3)
CM	Wieringa (0,6)
DESIRE e.a. AI-projekten	Treur (1,0)
DejaVU	Eliëns (1,0)
Orca	Bal (1,0)
LD	W. de Jonge (0,2)

1995 (continued)

- We decommissioned 24 old Sun workstations and bought 60 Sun S4s
- Staff had 30 X-terminals, 82 Suns, 10 PCs, 27 Macs (total = 149)
- Students had 95 X-terminals, 84 Suns, 38 PCs, 2 Macs (total = 219)
- Total machine park was 368 desktop computers/X-terminals
- We also had a dozen Sun servers for all the X-terminals
- In addition we had two custom-built research multiprocessors
  - 32 Motorola 68030s (Force CPU-30) (the Armada Amoeba pool processors)
  - 80 MicroSPARCs (the Zoo, mostly for Henri's research)
- The computer lab, under Jim's leadership, managed all this kit

1995 (continued)

- Corry van Rossum retired
  - Her title was “beheerder” but she actually helped run the Dept. for years



1995 (continued)

- Department picnic in the Amsterdamse Bos in September



Frances Brazier
(Hgl AI)



Reind van de Riet
(Hgl IMSE)



Maarten van Steen
(Hgl CS)



Jan Treur
(Hgl AI)



Hans van Vliet
(Hgl IMSE)

1996

- The cs.vu.nl Website went live on 28 Jan. 1996 with this

Nederlands

Welcome to the WWW server of the Faculty of Mathematics and Computer Science of the Vrije Universiteit in Amsterdam in the Netherlands

Starting points:

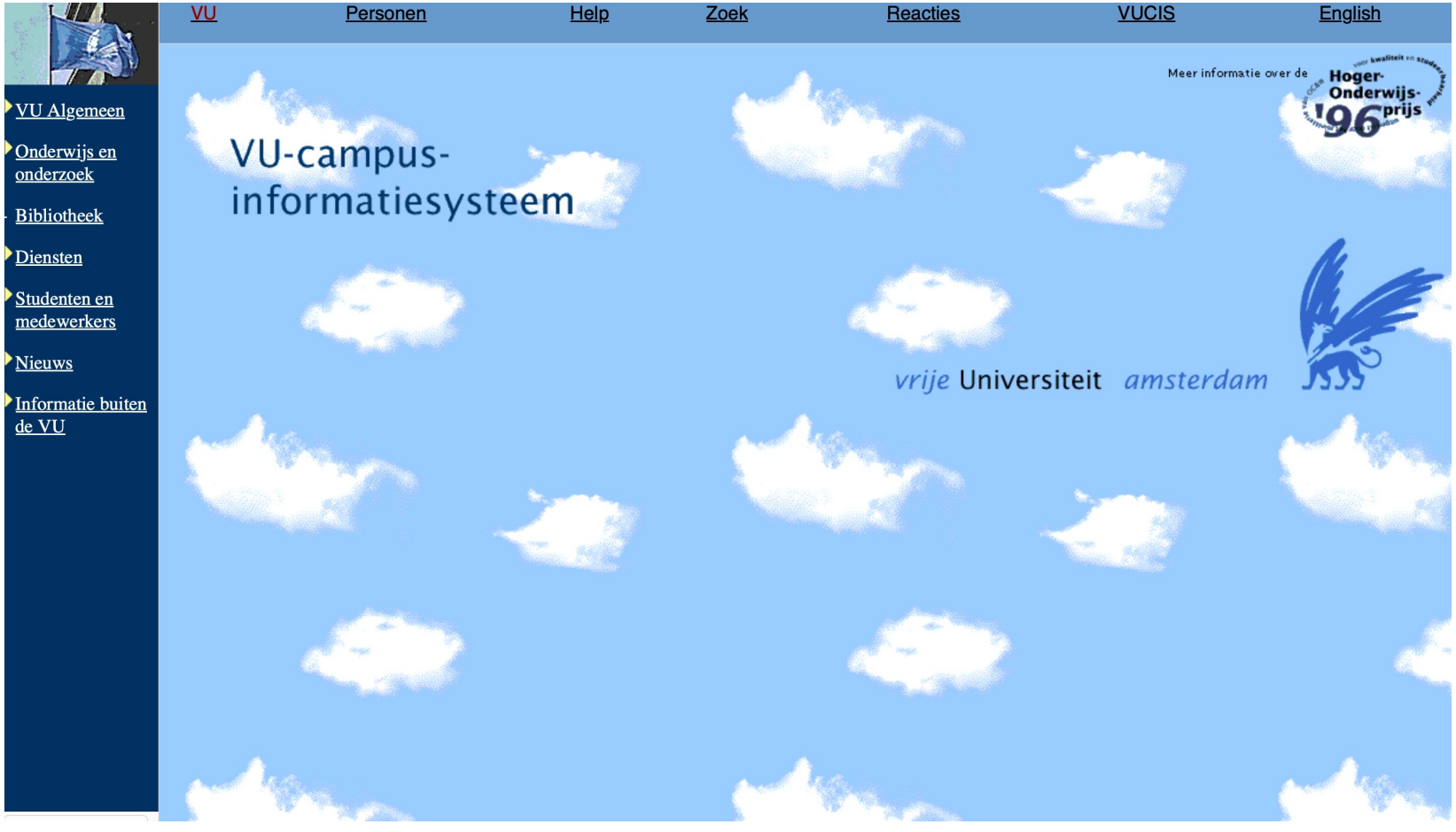
- The general info page has an overview of the faculty, information about the secretariats and on how to get to the faculty.
- People working and studying at the faculty
- Our research departments: Computer Science and Mathematics
- Information for new students
- The Educational Secretariat
- STORM is the faculty's student interests group
- Public Maintainers Page, maintained by a group of WWW-crazed students that call themselves Public Maintainers. It offers a great variety of information.
- Miscellaneous:
  - ASCI
  - Stieltjes institute
  - Stichting Vierkant
  - Internet exploring
  - The Vrije Universiteit Campus Information System and Universities in NL
  - Our ftp server
  - About our WWW server
  - Local users should select http://www.cs.vu.nl/home.html as their home page.

[Address] [People] [Mathematics] [Computer Science] [VU] [Internet]

28 Jan 1996, webmaster@cs.vu.nl

1996 (continued)

- The VU Website went live in April with this



1995 (continued)

- Toshiba, paid us ≈ €30,000 to host one of its employees
- He was supposed to work on research with us
- However, he didn't actually speak English, so we couldn't work w/him
- I asked my Ph.D. student Leendert van Doorn to babysit him, but that didn't work because they couldn't communicate
- Leendert was later fellow at Microsoft and then senior VP at Qualcomm



1996 (continued)

- SIKS (School for Information and Knowledge Systems) created
- Reind was the cofounder and former chairman
- Its research focus was on:
  - Agent technology
  - Computational intelligence
  - Computational linguistics
  - Data management and retrieval
  - Enterprise information systems
  - Human-computer interaction
  - Knowledge representation and reasoning
  - Process mining and business process management
  - Web-based information systems
- It grew to 500 researchers and 250 Ph.D. students

1996 (continued)

- IPA (Institute for Programming Research and Algorithmics) created
- IPA's research focus was:
  - Scalable Reliable Software Engineering
  - Software Sustainability
  - Domain-specific Approaches for Diverse Software and Data
  - Software Engineering for AI
- Wan Fokkink was later on the board of directors

1996 (continued)

- I was elected Fellow of the ACM
- Frans Kaashoek (my Ph.D. student) was elected 2004
- Robbert van Renesse (my Ph.D student) was elected 2009
- Martin Kersten (Reind's Ph.D. student) was elected 2016



Frans me Robbert



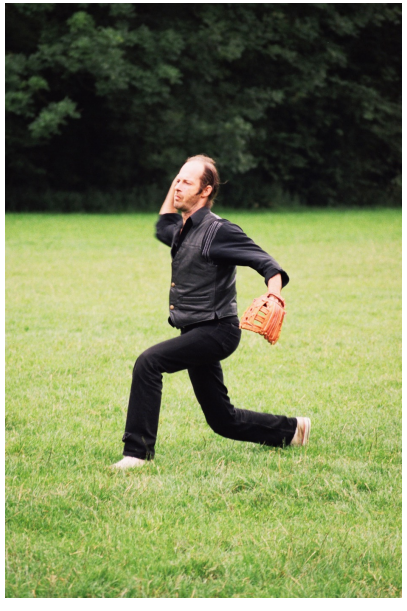
Martin

1996 (continued)

- Department picnic in the Amsterdamse Bos in September



Roel Wieringa
(UD IMSE)



Anton Eliens
(UD IMSE)



Dick Grune
(UD CS)



Kees Verstoep
(programmer CS)



Me at the dinner
(Hgl CS)

1997

- The VU was reorganized--again
- A Faculty of Sciences was created—reversing the 1987 changes
- The 15 faculties were reduced to about 8
- Instead of dealing with 15 faculties, the CvB had to deal with only 8
- This meant they had only half as many annual meetings
- The subunits of a faculty were now called “divisions”
- There was Division of Math & CS that lasted until 2002
- This reconstituted the faculty (more or less) as it was from 1930-1986

1997 (continued)



Main building



Main building



Campus entrance



W & N building



W & N building



W & N building from the street

1997 (continued)

- A new system of evaluating universities was introduced
- Our study was rated the #1 CS study in the Netherlands

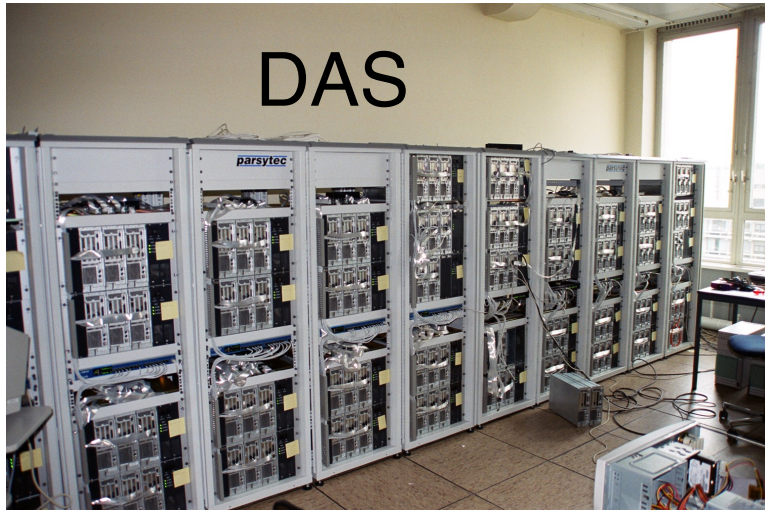


- The evaluation committee wrote (translated):

"Two of the programs (computer systems and theoretical computer science) are excellent--both in quality and output--and the others range from adequate to good. The research agenda of computer science is well balanced and its overall impact is very good."

1997 (continued)

- ASCI applied for and got an NWO grant for a distributed cloud
- It was called DAS (Distributed ASCI Supercomputer)
- We (eventually) had 128 single-board computers; the others had 24
- They were VU, UVA, Leiden, and TUD with fast connections
- Henri was deeply involved in this project and used it in Pioneer





DAS logo

("Das" means both "badger" and "tie" In Dutch)

1997-2019

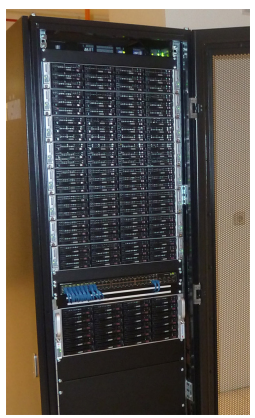
- Henri was the driving force at getting funding and building:
  - DAS-1 (1997), DAS-2 (2002), DAS-3 (2006), DAS-4 (2010), DAS-5 (2015), and DAS-6 (2019)
- These were used for hundreds of research projects done by Dutch universities and partners in the EU



DAS-2



DAS-3



DAS-4



DAS-5



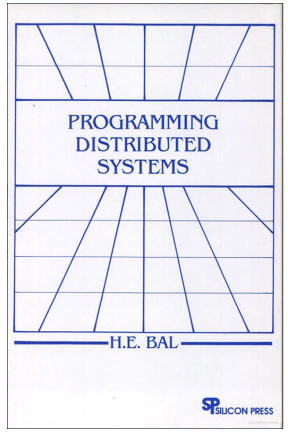
DAS-6

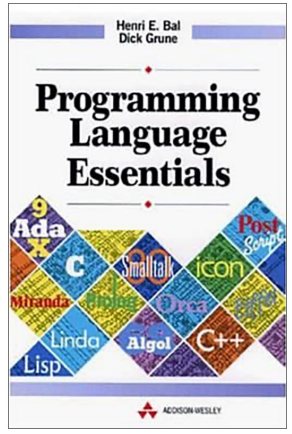
1998

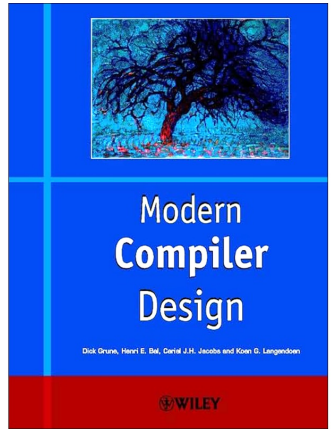
- Henri ignored my advice and became a full professor
- 15 days before his 40th birthday
- His research was on systems for parallel programming
- He (co)-authored four books



Henri Bal (Hgl CS)







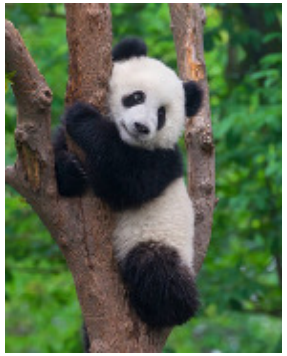


1998 (continued)

- Henri began getting grants and doing projects
- Many were named for black and white animals


Orca


Manta


Panda


Albatross


Magpie


Ibis


Swan

1999

- Again in 1999 we were tops (from *Ad Valvas* 20 Oct. 1999)

VU-informatici beste van Nederland

Internationale visitatiecommissie beoordeelt onderzoek wiskunde & informatica

Het onderzoek van wiskundigen en informatici aan de VU wordt hoog aangeslagen door een internationale visitatiecommissie. De informatici komen landelijk als beste uit de bus, terwijl de wiskundigen op de derde plaats staan, achter de Universiteit Utrecht en de Universiteit van Amsterdam.

De groep Computersystemen van informaticus prof.dr. A.S. Tanenbaum is absolute wereldtop, terwijl de informatici geen zwakke onderzoeksgroepen kennen. De groep Waarschijnlijkheidsrekening van de VU is verreweg de beste van Nederland. De visitatiecommissie, bestaand uit een zevental toponderzoekers onder wie veel Duitsers, kwam tot deze conclusies door het onderzoek te beoordelen op kwaliteit, productiviteit, relevantie en levensvatbaarheid.

Nederlandse wiskundigen draaien in de internationale top vijf mee. Met name in algebra, analyse en discrete wiskunde blinkt Nederland uit. De groepen die zich met waarschijnlijkheidsrekening bezighouden, hebben echter moeite de internationale ontwikkelingen bij te houden. De samenwerking in onderzoekscholen wordt toegejuicht.

Over informatica is de commissie minder te spreken. Doordat het vakgebied in Nederland traditioneel bij wiskunde ingedeeld wordt, is de theorie dik in orde. De praktische en technische aspecten van de informatica zijn echter zwaar ondervertegenwoordigd. En als er al iets aan gebeurt, concentreren onderzoekers zich toch vaak op de theoretische kant. Toegepast onderzoek op gebieden als *software engineering*, *computer graphics* en netwerken krijgt kwalificaties als "is onvoldoende aandacht voor", "is bijna geheel afwezig" en "vereist snelle actie".

Tegelijkertijd moest de voorzitter van de commissie, prof.dr. P.C. Baayen, bij de presentatie van het rapport afgelopen maandag 29 september toegeven dat de samenstelling van de commissie (louter theoretici) lage cijfers voor toegepast onderzoek in de hand had gewerkt. Dat 'voortrekken van de theorie' leidde tot enig gemor uit de technische hoek.

Als het aan de commissie ligt, worden wiskunde en informatica sterker gescheiden, zodat de laatste zich beter kan ontwikkelen. Dat moet leiden tot meer bruikbare software - daarvan is de commissie nu niet onder de indruk. Ook is er zorg over de leeftijdsopbouw van de wiskundegemeenschap (te oud), het bibliotheekbudget bij informatica en het geringe aantal promoties bij beide.

De commissie spreekt bovendien haar zorg uit over de teruglopende studentenaantallen en de daarmee samenhangende afname van het aantal onderzoekers. Dit probleem speelt bij wiskunde iets sterker dan bij informatica. Verschillende groepen zijn inmiddels zo klein geworden dat hun voortbestaan bedreigd wordt. Van de onvoldoendes die de commissie uitreikte, wordt een deel veroorzaakt door gebrek aan mankracht.

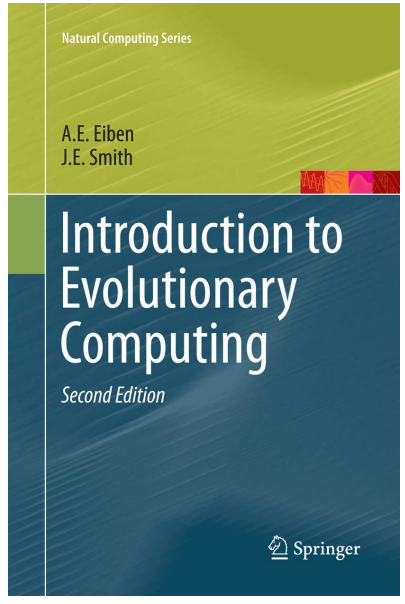
De bevindingen van de visitatie vertonen voor de beide disciplines opvallende overeenkomsten. Utrecht en de beide Amsterdamse universiteiten verdelen onderling de podiumplaatsen. Leiden en Eindhoven vormen de middengroep. Groningen, Delft, Nijmegen en Twente bungelen in die volgorde achteraan. De commissie keek ook naar de kleine groepen in Wageningen en Maastricht, die alle een voldoende kregen.

Wellicht nog opvallender is het verschil met de oordelen die de nationale visitatiecommissie vorig jaar velde over het onderwijs in beide gebieden. Daar ging Twente namelijk met de meeste eer strijken, terwijl de Universiteit van Amsterdam naar de bodem van de ranglijst verwezen werd. Alleen Utrecht hoort bij zowel onderwijs als onderzoek aan de top. Veelzeggend in dit verband is dat de onderzoeksgroep computer graphics in Eindhoven van de nieuwe commissie op de kop krijgt omdat ze zich te veel concentreert op het overdragen van kennis aan studenten (in plaats van die kennis te publiceren). *(CJ, HOP)*

1999 (continued)

- Guszti Eiben was appointed a full professor of AI
- He was also a professor at the University of York
- His research was on evolutionary computing
- He co-authored a book on evolutionary computing





1999 (continued)

- Hans Akkermans was appointed a full professor of Business Inf. Sys.
- He headed the Business Information Systems section
- His research focused on business process modeling & ontologies



2000

- cs.vu.nl in March 2000; the English one was just a link to this one



2000 (continued)

- Frances Brazier was appointed a full professor of AI
- She was the first female CS professor in the Netherlands
- Her research was about intelligent agents
- In 2009, she moved to the TU Delft



2000 (continued)

- Chris Verhoef was appointed a full professor of Software Eng.
- His research was on algebra of communicating processes, reverse engineering, and structured operational semantics
- He wrote a column in *AutomatiseringsGids*
- He wrote articles or been cited in the media over 200x



2000 (continued)

- Computer science sections within the department and professors:
  - Business information systems: Akkermans
  - Computer systems: Bal & Tanenbaum
  - Information Syst. & Software Engineering: Van de Riet, Van Vliet, & Verhoef
  - Artificial intelligence: Brazier, Eiben, & Treur
  - Theory: Fokkink, Klop, & Rutten

2000 (continued)

- In 2000, five of the top 20 computer scientists in NL were VU related:
  - Me, Henri Bal, and three of my other Ph.D. students (Frans, Robbert, Sape)



Automatisering Gids 25 Feb. 2000 WETENSCHAP Vrijdag 25 februari 2000 nr 8

Nieuwe citatie-index voorkomt dubbel werk

Het informatica-onderzoek heeft er een nieuw hulpmiddel bij: de citatie-index van het Nec Research Institute. Informatici kunnen hier volgens prof. dr. Frits Vaandrager hun voordeel mee doen. De Nec-index is actueler en volledi ger dan de traditionele science citation index. Men komt er snel achter waar onderzoekers mee bezig zijn. De nieuwe index laat ook zien hoe goed het Nederlandse onderzoek is ten opzichte van de rest van de wereld.

FRITS VAANDRAGER

Sinds kort is er voor informatica-onderzoekers een zeer relevante citatie-index die wordt bijgehouden door het Nec Research Institute en gratis toegankelijk is via http://citeseer.nj.nec.com/cs. Het innovatieve in de aanpak van het Nec Research Institute is dat een programma volledig automatisch het Internet afstruint op zoek naar artikelen op het terrein van informatica (in word, postscript, pdf-formaat) en daar dus alle referenties uitleest. De index is momenteel gebaseerd op meer dan 250.000 documenten en bevat meer dan 3 miljoen citaties.

Citatie-indices vormen een buitengewoon puttig hulpmiddel bij het doen van onderzoek. Ze wijzen onderzoekers op belangrijke correcties op eerdere publicaties en op nieuwe resultaten die voortbouwen op eerder werk. Op deze manier helpen ze om zinloze duplicatie van onderzoek te voorkomen.

Binnen de informatica heb je veel meer aan de index van het Nec Research Institute dan aan bijvoorbeeld de traditionele 'Science Citation Index', ondanks de veel grotere betrouwbaarheid van de laatste en de intransparantie van het Nec-selectiecriterium. Dit komt vanwege, ten eerste, de grotere actualiteitswaarde van de Nec-index. Binnen de informatica zit er (helaas) toch vaak een periode van een paar jaar tussen het moment waarop een artikel wordt geschreven (en op het web gezet) en het moment waarop dit artikel in een tijdschrift verschijnt.

Ten tweede dringen niet veel relevante artikelen door tot de SC-index. In tegenstelling tot andere vakgebieden zoals fysica en geneeskunde, bestaat er niet echt een vaste lijst van vooraanstaande tijdschriften waarin de belangrijke resultaten gepubliceerd worden. Informatici publiceren veelal in conferentieproceedings, omdat dit sneller is. Wanneer zich een nieuw belangrijk onderwerp aandient dan zullen er vrij snel nieuwe conferenties plaatsvinden. De beste onderzoekers zullen hun resultaten daar presenteren. Een verhoudingsgewijs zeer groot gedeelte van de informaticapublicaties is online beschikbaar en wordt opgenomen in de Nec-index.

Ten derde verwijst de SC-index alleen naar artikelen en gegeven artikel citeren. De Nec-index geeft met één druk op de knop ook de contexts de referenties geografen waarin de citaties voorkomen, citeerd. Daarnaast verwijst men ook veel naar zijn fundamentele inzichten op het terrein van zelf-stabilisatie, graafalgoritmen en guarded commands.

Sommige resultaten van Dijkstra zijn zozeer deel gaan uitmaken van de basiskennis van iedere informaticus (denk bijvoorbeeld aan zijn werk op het gebied van mutual exclusion en semaforen) dat men het vaak niet meer nodig acht om naar de oorspronkelijke artikelen te verwijzen. Misschien zou Tanenbaum, die een aantal van Dijkstra's resultaten uitvoerig bespreekt in zijn boeken, een paar

Wanneer we kijken naar het aantal vertegenwoordigers in de top-50 bij de diverse informatica-onderzoekinstellingen in Nederland, dan staan het Centrum voor Wiskunde en Informatica (CWI) en de Universiteiten van Amsterdam (UvA), Nijmegen en Utrecht aan kop. Opvallend is dat zowel de Technische Universiteit Delft als de Universiteit van Groningen niet vertegenwoordigd zijn. Verder doen de algemene universiteiten het wat beter dan de TU's.

Bij elkaar staan er in de top-5000 van de Nec-citatielijst ruim vijftig onderzoekers die werkzaam zijn in of afkomstig zijn uit Nederland. Eigenlijk niet eens zo zeer beperkt tijdsbestek al het Nederlandse informatica-onderzoek moet beoordelen, ziet zichzelf in wezen geplaatst voor een onmogelijke taak. Hoe bepaal je de kwaliteit van een onderzoeker wanneer je nauwelijks inzicht hebt in zijn specialisme en geen tijd hebt om je daar ook maar enigszins in te verdiepen? Noodgedwongen zal zo'n commissie zich verschullen achter grootschalige kwantitatieve analyses. Gebruik van citatie-analyse hierbij is gevaarlijk.

Fouten

Wat kan er misgaan? Om te beginnen is duidelijk dat er in de Nec-citatielijst nog heel veel fouten zitten. Zo eindigt een zekere J. Smith maar liefst op plaats twintig in de lijst. Het gaat hierbij echter niet om een enkele persoon maar om een groep, om onderzoekers die op één hoop zijn geveegd. Verder gelooft natuurlijk niemand in het bestaan van de onderzoekers C Systems (1686) en C Programming (5816).

Dan zijn er nog diverse andere meerfouten. Zo staat de Nijmeegse onderzoeker Rinus Plasmeijer op positie 42 in de top-50 met 223 citaties. Wanneer men het systeem echter vraagt naar de citaties waarbij Plasmeijer auteur is, dan levert dit 345 citaties op. Dit blijken inderdaad allemaal verwijzingen te zijn naar artikelen van Rinus Plasmeijer. Op grond hiervan hoort hij dus eigenlijk op plaats dertig thuis. Mogelijk heeft deze fout te maken met het feit dat Plasmeijer in plaats van de initiaal 'M' van Marinus tegenwoordig de 'R' van Rinus gebruikt in zijn publicaties.

In technische rapporten van de vakgroep programmatuur van de Universiteit van Amsterdam staat aan het einde altijd een lijst met recente rapporten van de vakgroep. Het Nec-systeem denkt ten onrechte steeds dat het hier om referenties gaat. Deze fout levert bijvoorbeeld Jan Bergstra een flink aantal citaties op. Wanneer dit verdisconteerd zou worden, zou hij zeker een plaats zakken in de top-50.

Bovengenoemde en andere fouten maken dat we de aantallen citaties die het Nec-systeem levert met een flinke korrel zout moeten nemen. Nog los van de problemen die samenhangen met persoonsidentificatie, lijkt een foutenmarge van 20 procent redelijk.

Top-50 Nederlandse informatici

Plaats NL	Plaats Wereld	Onderzoeker	Aantal citaties	Affiliatie
1	91	Andy Tanenbaum	1669	(VU)
2	112	Edsger Dijkstra	1580	(U Texas, emeritus)
3	240	Jan Willem Klop	1155	(KUN/CWI/VU)
4	246	Krzysztof Apt	1135	(CWI/UVA)
5	294	Frans Kaashoek	1046	(MIT)
6	303	Henk Barendregt	1035	(KUN)
7	382	Jan Bergstra	921	(UVA/UU, filosofie)
8	422	Robbert van Renesse	882	(Cornell)
9	535	Lex Schrijver	773	(CWI/UVA, wiskunde)
10	537	Jan Karel Lenstra	769	(TUE, wiskunde)
11	585	Grzegorz Rozenberg	740	(RUL)
12	660	Mark Overmars	691	(UU)
13	672	Henri Bal	685	(VU)
14	791	Gerard Holzmann	615	(Lucent)
15	796	Emile Aarts	612	(TUE/Philips)
16	985	Jos Baeten	541	(TUE)
17	1108	Thomas Bäck	503	(RUL)
18	1200	Sape Mullender	476	(UT/Lucent)
19	1247	Owe Axelsson	466	(KUN, wiskunde)
20	1350	Frits Vaandrager	442	(KUN)
21	1383	Ed Brinksma	434	(UT)
22	1432	Rob van Glabbeek	423	(Stanford)
23	1568	Arjen Lenstra	399	(CityBank, NY)
24	1569	Jan van Leeuwen	398	(UU)

2000 (continued)



Main building



Entrance to the W&N building



Fourth floor hallway (W&N building)



Machine room



Machine room

2000 (continued)



Staff mailboxes in the coffee room



My office

2000 (continued)

- Reind retired in Aug. 2000
  - He was editor of *Europe Data and Knowledge Engineering Journal*
  - He was on the board of *Information Systems Journal*
  - He was a knight in the Order of the Netherlands Lion



2000 (continued)

- Reind's Ph.D. students:
  - Frank Teer (1978)
  - Peter Apers (1982)
  - Martin Kersten (1985)
  - Wiebren de Jonge (1985)
  - Hans Tebra (1989)
  - Frank Dignum (1989)
  - Hans Weigand (1989)
  - Roel Wieringa (1990)
  - Frances Brazier (1991)
  - P. Spruit (1994)
  - Hans Burg (1996)
  - Philip Elsas (1996)
  - Radu Serban (2002)
  - Jan Broersen (2003)
  - Martin Caminda (2004)

In this list and all subsequent ones, only Ph.D.s where the professor was the first advisor count. Students where the professor was the "copromotor" are not listed.

2000 (continued)

- Here are photos from Reind's retirement dinner


Reind van de Riet (Hgl IMSE)


Jaco de Bakker (Hgl TI)


Henri Bal (Hgl CS)


Frances Brazier (Hgl AI)


Jim van Keulen (Comp. lab)


Maarten van Steen (UHD CS)


Jan Treur (Hgl AI)


Chris Verhoef (Hgl IMSE)

2001

- Annual reports for the Faculty apparently stopped in 1995
- I found this for 2001; nothing else seems to exist after 1995

Faculteit der Exacte Wetenschappen

Datum	Ons kenmerk	Bijlage(n)
23.07.2002	U02/143/CF/AC	
Uw brief van	Uw kenmerk	
Telefoon	Fax	E-mail
020 - 4447500	020 - 4447509	

Postadres: FEW, De Boelelaan 1083 a, 1081 HV Amsterdam

vrije Universiteit amsterdam

Dear Mr/ Mrs,

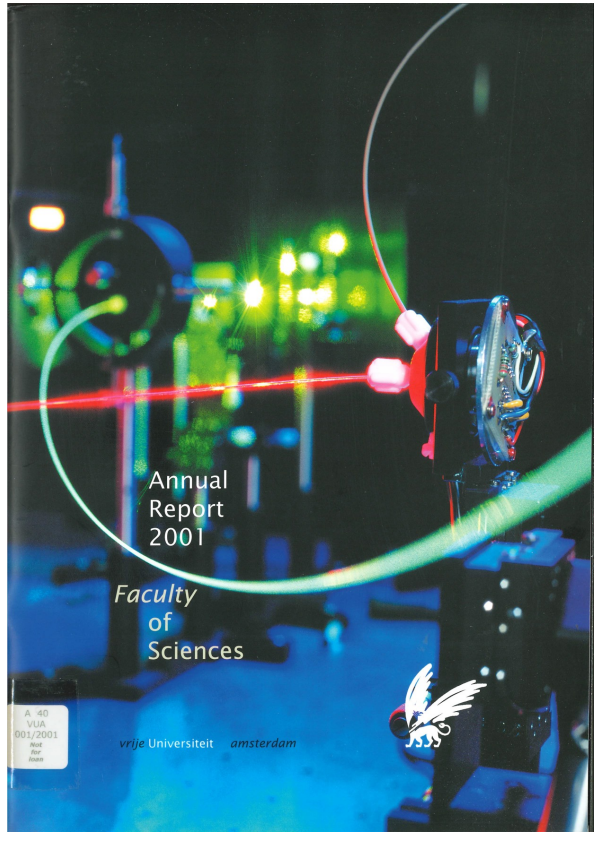
It is my pleasure to present you the Annual Report 2001 of the Faculty of Sciences of the Vrije Universiteit Amsterdam.

The annual report is different from what you might expect from an annual report of a faculty of science. You will not find lists of publications, lectures or posters presented and the like. Besides general information about the Faculty, we decided to include a short presentation of each research department, with the most important results, some selected (key) papers, unique events and highlights etc. in our Annual Report. We give you an overview of what we do, both in research and education, and the recent developments therein. We paid extra attention to four main interdisciplinary projects and research facilities: Cluster Computing, the Centre for Research of Complex Systems, the Laser Centre and the Radionuclide Centre.

I hope you like this way of reporting, and that your interest is raised to follow future developments of our institute or to pay us a visit. Do not hesitate to contact us!
More detailed information can be found on our homepage: www.few.vu.nl. In case you would like to receive further information, you may approach the different departments directly or send your mail to our Office of Public Relations and Information (vpr@few.vu.nl). This office can also provide extra copies of the report.

Best wishes,

Prof. dr. H. Timmerman,
dean



2001 (continued)

Preface



Annual reports of university departments often are a mere listing of all activities that took place during the year concerned. Also, such reports are not read by many or intensively. The Faculty of Sciences therefore decided to use another format to inform about the progress, the events, and the results of the faculty.

In the present, new type of annual report you will especially find highlights of the year 2001. Each department presents its activities, focussing on special results or events. Lists of published papers or lectures presented will not be found; the readers are referred to the faculty's homepages on the Internet.

The board of the faculty will use the new way of reporting to inform interested parties in the activities of all departments. It is hoped as well that this information will rise the interest of others, will lead to new contacts and especially to cooperation.

In a way the report is an experiment. The board of the faculty therefore welcomes comments on this publication. Is the information useful? Should some type of information be added in future reports? Indeed, your comments are awaited!

Professor Henk Timmerman,
Dean Faculty of Sciences, Vrije Universiteit, Amsterdam

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2001 (continued)

The Faculty of Sciences



The Faculty of Sciences,
a strong bond of disciplines

The Faculty of Sciences hosts the disciplines Physics and Astronomy, Chemistry (including Pharmacochemistry), Mathematics and Computer Science. Synergy at the interface of these disciplines results in excellent research and educational opportunities. The scientific staff comprises approximately 50 full professors and over 250 lecturers and researchers. The Faculty of Sciences offers them excellent research facilities, such as the Laser Centre, the Radionuclide Centre, highly specialised laboratories and unique computing facilities. In this environment, over 1100 students are stimulated to develop their skills in a variety of subdisciplines, some of which are unique in the Netherlands and Western Europe. Both in research and education, the Faculty of Sciences maintains active national and international contacts. The Faculty aspires a strong connection with society; in several fields a close collaboration with industry is being developed.

The Vrije Universiteit,
a special university

The Vrije Universiteit is special: its foundation is the result of one man's initiative. Over a century ago, in 1878, under the leadership of the theologian and statesman Dr Abraham Kuyper, orthodox Protestant Dutchmen established an association whose goal was the foundation of a free (Vrije) Christian University - 'free' here meaning independent of church or state, bound only by Gods' word. The establishment of this association and the subsequent foundation of the Vrije Universiteit on 20 October 1880 provided the answer to the discrimination then experienced in many areas of society, including higher education. This background led to a distinctive organisational culture in which personal, professional and administrative relations are governed by care, attentiveness to students' needs and by a sense of compassionate responsibility towards the world.

The VU Campus,
an unit of variety

At the VU Campus, interdisciplinary cooperation is accommodated in an optimal way. At the same campus, faculties that cover a broad field of disciplines are embedded, among which virtual all basic disciplines. Beside the Faculty of Sciences, the campus houses the Faculties of Earth and Life Sciences, Medicine, Dentistry, Human Movement Sciences, Economics, Business Administration and Econometrics, Social Studies, Theology, Law, Psychology and Pedagogical Sciences and Arts. Both in research and education, cooperation with other VU Faculties is stimulated. The presence of all other disciplines nearby opens a lot of possibilities both in research and educational directions.



Location,
good accessibility

The VU Campus is situated in the southern part of Amsterdam, at a point where motorways and public transport facilities converge. It can be easily reached both by car and public transport: it is situated next to the A10 (the belt highway around Amsterdam) and can be reached in a 7 minutes' walk from the railway station Amsterdam WTC. The express tram takes 20 minutes to bring you from the VU Campus to the very centre of Amsterdam. The international airport of Schiphol is only 10 kilometers away.

Address information

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Visitors Address:
Faculty board, Entrance 1083, Secretariat Room P-338,
Educational Office, Entrance 1083, Room S-311



2001 (continued)

Organisation
The scientific staff of the Faculty of Sciences is placed into three divisions: the Division of Physics and Astronomy, the Division of Chemistry and the Division of Mathematics and Computer Science. Six or seven departments are included in each division. Each department comprises one to three chairs. The separate divisions are governed by a board. The chairpersons of these boards are members of the faculty board. The faculty board is completed with three advisory members (the managing director, a student and a representative of the supporting personnel), and is presided by a selected dean. The supporting staff is placed under supervision of the managing director and comprises Service Departments (Electronics, Mechanics and Computer Support) and the Faculty Office (Secretariat of the Board, Educational Office, Financial Administration, Human Resources Office, Policy Support Office and the Support Office for Safety and Building).

Faculty Office
- Secretariat of the Board
- Educational Office
- Financial Administration
- Human Resources Office
- Policy Support Office
- Support Office for Safety and Building

Service Departments
- Electronics
- Mechanics
- Computer Support

Faculty of Sciences

Faculty Board 2001 Members:
Prof.dr. Henk Timmerman (dean)
Prof.dr. Dick Raué (Chemistry)
Prof.dr. Jan van Mill (Mathematics and Computer Science)
Prof.dr. Wim Hogervorst (Physics and Astronomy)
Advisors:
Wim Feien (student),
Wim Borrius (supporting personnel)
Drs. Gerard Veerbeek (managing director)

Department of History, Philosophy and Social Aspects of Science

Division of Physics and Astronomy
Board 2001 Members:
Prof.dr. Wim Hogervorst (chairman)
Dr. Dick de Groot
Dr. Piet Blankert
Dr. Henk Blok
Advisors:
Mijndert van Dijk (student)
Ing. Jan Rector (supporting personnel)
Drs. Gerard Veerbeek (managing director)

Division of Chemistry
Board 2001 Members:
Prof.Dr. Dick Raué (chairman)
Dr. Henk van der Goot
Dr. Luuk Visscher
Dr. Pim Mager
Advisors:
Saskia van Hemert (student)
Raoul Mooyman (supporting personnel)
Drs. Gerard Veerbeek (managing director)

Division of Mathematics and Computer Sciences
Board 2001 Members:
Prof.dr. Jan van Mill (chairman)
Prof.dr. Henri Bal
Dr. Gerrit van der Veer
Dr. Nico Dekker
Dr. Jan van Wouwe
Advisors:
Sandra van Dijk (student)
Dr. Jim van Keulen (supporting personnel)
Drs.Gerard Veerbeek (managing director)

Departments within the Division of Physics and Astronomy
- Atomic and Laser Physics
- Biophysics and Physics of Complex Systems
- Condensed Matter Physics
- Physics Applied Computer Science
- Student Laboratory and Physics Education
- Subatomic Physics
- Theoretical Physics

Departments within the Division of Chemistry
- Analytical Chemistry & Applied Spectroscopy
- Biochemistry and Molecular Biology
- Organic and Inorganic Chemistry
- Pharmacochemistry
- Physical Chemistry
- Theoretical Chemistry

Departments within the Division of Mathematics and Computer Science
- Algebra, Geometry and Topology
- Mathematical Analyses
- Stochastics
- Artificial Intelligence
- Computer Systems
- Information Management and Software Engineering
- Theoretical Computer Science



History

In 1930 a Faculty of Mathematics and Sciences was founded at the Vrije Universiteit with the appointment of three full professors J. Coops (Chemistry), G.J. Sizoo (Physics) and J.F. Koksma (Mathematics) and one extraordinary professor M.van Haaften (Actuarial Mathematics). Coops was the first Dean. In 1933 the faculty got it's own facilities in a new building in De Lairessestraat in Amsterdam and things really got on the way. Despite a steady increase in the number of students the faculty remained small scale due to limited financial resources: in those years private universities received little state support and depended largely on gifts; yet the faculty quickly gained a good reputation.

In 1950 Biology was added to the faculty, followed by Geology in 1960. In 1955 the faculty counted nine full professors: Koksma, Grosheide and Mullender in Mathematics, Sizoo and Jonker in Physics, Coops and van Dalen in Chemistry and Algera and Lever in Biology. They were accompagnied by several extraordinary professors and a few lecturers. However, the total size remained still very small. This changed in the years between 1965 and 1975 with an almost explosive growth of the amount of both students and staff; the faculty matured to a thriving institution with extensive teaching and research programmes. These developments were accommodated by the move from De Lairessestraat to new facilities in southern Amsterdam in 1965: the present VU campus.

During the same years another important event took place: in 1971 the charter of the VU was broadened from a purely calvinistic to a general christian basis. It reflected the changes in society and put the VU on a more equal footing with other universities. At the same time student revolts resulted in a change towards a more democratic education law for Dutch universities changing the old ways irrevocably. Subsequently, the old faculty slowly crumbled and was split into five smaller faculties. In 1982 a new discipline was born, Computer Sciences, which quickly gained a strong position.

Under the pressure of dwindling numbers of students in the sciences during the last part of the twentieth century, a remedy was sought in the clustering of faculties into larger units. Thus in 1998 a new Faculty of Sciences was created by merging the faculties of Mathematics and Computer Science, Physics and Astronomy, and Chemistry. So it seems that the original faculty has returned, however at an incomparably higher level of sophistication!

More information and news about FEW can be found on the world-wide-web: www.few.vu.nl

2001 (continue)

Theoretical Computer Science

Head of the department: prof. dr. J.W. Klop
Contact information: tel (+31) 20 444 7718 fax (+31) 20 444 7653 e-mail elly@cs.vu.nl

The traditional main areas of our department have been semantics of programming languages, and applied logic. These fields continue to be our paramount motivation. In recent times our research goals are increasingly oriented towards applications. In general we work on formal methods, regarding both development and application. The three prevailing themes are: (i) term rewriting and lambda calculi, (ii) process algebra, and (iii) coalgebraic methods.

▪Term rewriting and lambda calculi. We have developed the theory of infinitary rewriting and of higher-order rewriting. Infinitary rewriting is concerned with computation processes that are infinite - and even longer, transfinite. This is primarily of foundational value.
As an important subfield of term rewriting we have developed a theory of term graph rewriting, important for implementations of term rewriting. The lambda calculus was discovered in the thirties of last century, formalizing for the first time the notion of 'computable'. Later, it was used as the kernel of functional programming languages. Lambda calculus is a perennial gem, and continues to be of value; in recent years its typed versions have been developed to be the heart of proof checking systems of great reliability and economy, such as Coq and PVS. Our department has often contributed to the theory of pure lambda calculus and is more recently working on systems of typed lambda calculus and its applications.

▪ Process algebra, or ACP, Algebra of Communicating Processes,is a theory of communicating processes. It is intensively applied in the verification of small but crucial protocols and other systems, using mu-CRL, a specification/verification language based on ACP.

▪ A relatively young subject in the field of formal methods is coalgebra. This is concerned with formalizations of and computing with infinite objects such as streams and processes. Also here the spectrum ranges from deep theory, based on category theory, to potential promising applications, arising by the ubiquitous presence of infinite objects in programming practice.

The three subjects are strongly related. In process algebra as well as in coalgebra, there is the classical notion of bisimulation between processes, as the main notion to compare processes. Also term rewriting plays a role in bothprocess algebra and coalgebra.

Keywords

Formal methods, process algebra, model checking, term rewriting, lambda calculus, type theory, proof checking, formal verification, coalgebra.

Ph.D. defenses

Blom, S.C.C., Term graph rewriting - syntax and semantics. Promotores: Prof. dr. J.W. Klop, Dr. Z.M. Ariola. Vrije Universiteit, Amsterdam, 2001, 190 p.

Key publications

M. Bognar and R. de Vrijer. A calculus of lambda calculus contexts. Journal of Automated Reasoning, 27(1): 29-59, 2001.

F. van Raamsdonk. On termination of higher-order rewriting. In: Proc. of RTA 2001, Rewriting Techniques and Applications, p. 261-275, Springer-Verlag, 2001.

L. Aceto, W.J. Fokkink, and C. Verhoef. Structural operational semantics. In: Handbook of Process Algebra, p.197-292. (Eds. J.A. Bergstra, A. Ponse and S.A. Smolka), Elsevier 2001.

Main external research partners

- CWI (Centre for Mathematics and Computer Science), Amsterdam
- KUN (Katholieke Universiteit Nijmegen)

Participation in research schools

- Dutch Graduate School in Logic
- Institute for Programming Research and Algorithmics

Staff

Professors:
Prof.dr. Jan Willem (J.W.) Klop
Prof. dr. Wan (W.J.) Fokkink
Prof. dr. Jan (J.J.M.M.) Rutten
Professor emeritus: Prof. dr. Jaco (J.W.) de Bakker
Assistant professors:
Dr. Femke (F.) van Raamsdonk
Dr. Roel (R.C.) de Vrijer
Postdocs:
Dr. Bas (S.P.) Luttik
Ph.D. students:
Drs. Clemens (C.) Grabmayer
Drs. Paulien (P.) de Wind
Drs. Jeroen (J.) Ketema
Drs. Mirna (M.) Bognar
Secretary: Elly (E.) Lammers

Highlight

The Thue-Morse sequence (TM) is an infinite stream of 0's and 1's arising by starting with 1 and appending in each generation step the 'negative' of the sequence already obtained so far: 1, 10, 1001, 10010110, 1001011001101001, ...
It was found in 1906 by Axel Thue, a founding father of the theory of formal languages, as an example of a cube-free sequence (one not containing a substring of the form www) It combines aspects that illustrate some major areas of study in our department: infinitary term rewriting, process algebra, and coinductive techniques. The TM sequence results as the infinite normal form of a term rewriting system. It serves to differentiate the expressiveness of process algebra axiom systems - namely, TM viewed as an infinite process requires communication primitives for its definition in ACP, the Algebra of Communicating Processes. TM is an infinite state process, and has the fractal-like property of self-similarity: each finite substring occurs infinitely often in the sequence. The self-similarity is manifest in a two-dimensional rendering of TM yielding a tiling of the plane of which an initial part is displayed in the figure.

2001 (continued)

Information Management & Software Engineering

Head of department: Prof. dr. J.C. van Vliet
Contact information: tel (+31) 20 444 7718 fax (+31) 20 444 7728 e-mail elly@cs.vu.nl

General description of the research:
- A central theme of our research is modeling, of processes and products.
- The research covers the complete life cycle, from requirements engineering up to and including the deployment of systems.
- The research is experimental, i.e. firmly based on real problems in real domains.

Within the Software Engineering subprogram, the emphasis of the research is on architecture and human-computer interaction. Within the Information Systems subprogram, the emphasis is on Software Asset Management. Within the Business Informatics subprogram, emphasis is on e-commerce and on ontologies for business modeling.

- Architecture:

The long-term goal of our research is to develop a methodology in which architecture development is no longer a black art, the success of which is solely determined by the skills of an experienced software architect, but rather a natural first step in software development, with clearly defined techniques and results. We capture both process and product related architectural knowledge and its relevant context (including time/evolution) in a rich feature-solution graph, which connects quality requirements with solution fragments. Analyzing and generating a software architecture is then accomplished by iteratively traversing this graph. Since the feature-solution graph captures knowledge from different stakeholders, each with their own concerns, this type of analysis includes trade-off analysis and conflict resolution.

- Human-computer interaction:

Our philosophy of design is represented in our vision of the design process. We focus on what we label "the user's virtual machine" (UVM) which indicates all aspects of a system to be designed from the point of view of the user. Our research approach can be summarized into one word: DUTCH (Designing for Users and Tasks from Concepts to Handles).

- Software Asset Management:

Software assets are just like other more tangible assets very valuable business-critical objects without which an enterprise cannot survive. Bonds, real estate, money, and brand names: they all need proper asset management, but not many enterprises realize that the same holds for their software assets. Software asset management is a multi-disciplinary field comprising of at least the following five important aspects: strategic, legal, economical, managerial, and technical aspects. These five aspects are supported by the technical aspect. For instance, the construction value of a software asset can be estimated from the source code - such figures are necessary for accountancy and merges. The risk of retiring an old system can be calculated from the sources. Strategic aspects such as the feasibility of a merge, reorganization, or a change of company profile can be supported by an analysis of the current state of the existing software assets.

Keywords

Software Engineering, Software Asset Management, Architecture, Human-Computer Interaction, Business Informatics, Multimedia, Information Systems.

Ph.D. defenses

Jacco van Ossenbruggen: Processing Structured Hypermedia - A Matter of Style. Promoter: prof.dr. J.C. van Vliet, Copromotor: dr. A. Eliëns.

Martijn van Welie: Task-based User Interface Design. Promoter: prof.dr. J.C. van Vliet, Copromotores: dr. G.C. van der Veer, dr. A. Eliëns.

Bastiaan Schönhage: DIVA: Architectural Perspectives on Information Visualization. Promoter: prof.dr. J.C. van Vliet, Copromotor: dr. A. Eliëns.

Tom M. van Engers: Knowledge management: The Role of Mental Models in Business Systems Design. Promoter: prof.dr. J.M. Akkermans, Copromotor: dr. G.C. van der Veer.

Key publications

J. Gordijn and J. M. Akkermans, Designing and Evaluating e-Business Models. IEEE Intelligent Systems - Intelligent e-Business", 16(4): 11-17, 2001.

Lämmel, R. and Verhoef, C., Semi-automatic Grammar Recovery. Software Practice & Experience, 31(15): 1395-1438, 2001.

Nico Lassing, Daan Rijsenbrij, and Hans van Vliet, Viewpoints on modifiability. International Journal of Software Engineering and Knowledge Engineering, 11(4): 453-478, 2001.

Roel Vertegaal, Robert Slagter, Gerrit van der Veer, and Anton Nijholt, Eye gaze patterns in conversations: there is more the conversational agents than meets the eyes. ACM SIGCHI Letters, 3(1): 301-308, 2001.

Industrial Associates

- Cap Gemini

Participation in Research Networks

- IOP Man-Machine Interaction (Min. Economic Affairs)
- Nuffic project "Mozambique"
- Vuture.net (EC)
- OntoWeb (EC)
- OBELIX (EC))
- OntoKnowledge (EC)
- IBROW (EC)

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Dr. Clair (C.) Dormann
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Drs. Ing. Jaap (J.) Gordijn
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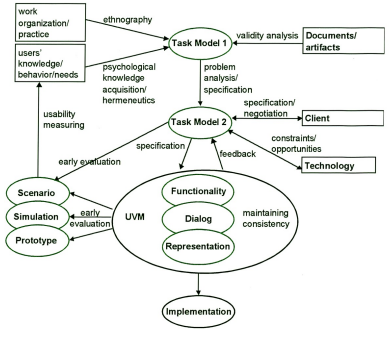
Dr. Johan (J.F.) Hoorn
Dr. Philip (P.C.) Homburg
Dr. Hideaki (H.) Kanai
Assistent researchers: Maxim (M.) Korotkiy
Vladimir (V.) Zykov
Vera (V.) Kartseva
Ph.D. Students:
Drs. Borys (B.) Omelayenko
Drs. Michel (M.C.A.) Klein
Drs.Cristina (C.) Chisalita
Drs. Ronny (R.M.) Siebes
Drs. Martijn (M.) van Welie
Drs. Jacco (J.) van Ossenbrugge
Drs. Bas (B.) Schönhage
Secretary: Elly (E.) Lammers

Highlight

We developed DUTCH (Designing for Users and Tasks from Concepts to Handles), an eclectic approach to designing usable systems. An important element of DUTCH is task analysis. We developed GTA (GroupWare Task Analysis) and an associated tool Euterpe. The GTA framework covers modeling the current as well as the envisaged situation. This modeling includes modeling the organization, the work situation, and the history of both. Both GTA and Euterpe are covered in the Ph.D. thesis of Martijn van Welie (2001). The figure shows the structure of the design approach according to DUTCH.



Boxes indicate sources of information, the arrows indicate design techniques. The red circles indicate the analysis phases, were task model points to a model of the current work situation, and task model points to envisioning of the future work situation.

The blue circles represent the details of design of the user interface or "User Virtual Machine" (UVM), which represents all design specifications as far as these are relevant for the users and their tasks. Different aspects of the UVM refer to the functionality, the dialogue, and the representation of the user interface.

The green circles indicate representations that are used early in design for evaluation of the proposed development by confronting them to prospective users and clients of design.

2001 (continued)

Computer Systems

Head of Department: prof. dr. Andrew S. Tanenbaum
Contact information: tel (+31) 20 444 7780 fax (+31) 20 444 7653 e-mail ast@cs.vu.nl

The Department of Computer Systems is doing research on large-scale parallel and distributed systems. Below we will briefly mention each of these topics in turn.

▪ Distributed Systems
With the increasing popularity of the Internet, millions of people are being connected electronically to each other and to vast amounts of information. The infrastructure upon which these applications are based is already being pushed to the limit. The purpose of this research is to build a software infrastructure that allows new, large-scale applications to be constructed in a straightforward, reliable, and secure way.
The heart of our research is the Globe system, which is based on the idea of a distributed shared object.
Each object has its own policy in terms of replication, security, and other properties, to allow for maximum flexibility. This technology could be used, for example, to allow a website to automatically replicate itself all over the world when there was a sudden demand for it (think: the Florida election, CNN's website on 11 Sept 2001, etc.) and automatically shrink when the demand ceased.
Another example where this technology is useful is security. Newspaper stories about security breaches all over the world occur on a regular basis. There needs to be a powerful, yet flexible way, to protect objects on the Internet, something that is currently lacking. These are the kinds of problems we are tackling.

▪ Parallel Computing
Many applications need so much computing power that they cannot execute fast enough on a single machine. Such applications traditionally were run on a specialized supercomputer with many processors. Two related developments, cluster and grid computing, offer cheaper alternatives. A cluster consists of many inexpensive PCs. A grid integrates computers at different locations into a single, world-wide distributed system.
We do research on programming systems and applications for clusters and grids. We have developed efficient communication protocols for cluster networks like Myrinet, giving clusters roughly the same communication speed as supercomputers.
On top of this, we have implemented a Java-based programming environment (Manta) that provides very fast and flexible communication schemes.
Unlike centralized supercomputers, clusters are often used for interactive applications, so they frequently are idle. A grid combines idle resources into a large-scale distributed system. Our Albatross project studies which applications are suitable for grids. We have obtained surprisingly good results even for fine-grained applications like search algorithms. We have developed a system (Satin) that executes divide-and-conquer style Java programs by distributing the subtasks over a grid. Our research thus eases cluster and grid programming, while delivering high performance even on geographically distributed systems.

Keywords

Distributed systems, Middleware, Parallel computing, Grid computing.

Ph.D. defenses

L. van Doorn: The Design and Application of an Extensible Operating System, 218 pp, Promotor: A.S. Tanenbaum.

P.C. Homburg: The Architecture of a Worldwide Distributed System 380 pp, Promotor: A.S. Tanenbaum.

J.W. Romein: Multigame- An Environment for Distributed Game Tree Search, 176 pp, Promotor: H.E. Bal.

Key publications

Baggio, A., Steen, M. van, Ballintijn, G., and Tanenbaum, A.S.: Efficient Tracking of Mobile Objects in Globe," Computer Journal, vol. 44, 2001.

Pierre, G., Kuz, I., Steen, M. van and Tanenbaum, A.S.: Differentiated Strategies for Replicating Web Documents," Computer Communications, vol. 24, pp. 232-240, Feb. 2001.

Kielmann, T., Hatcher, P., Bouge, L., and Bal, H.E.: Enabling Java for High-Performance Computing, Communications of the ACM, Vol. 44, No. 10, pp. 110-117, Oct. 2001.

Maassen, J., Nieuwpoort, R. van, Veldema, R., Bal, H.E., Kielmann, T., Jacobs, C., and Hofman, R.: "Efficient Java RMI for Parallel Programming", ACM. Trans. on Programming Languages and Systems, Nov. 2001.

Participation in research schools

▪ Advanced School for Computing and Imaging

Staff

Professors:
Prof. dr. Henri E. Bal
Prof. dr. Maarten R. van Steen
Prof. dr. Andrew S. Tanenbaum
Assistant Professors:
Dr. Dick Grune
Drs. Jim van Keulen
Dr. Thilo Kielmaan
Dr. Jan van Wouwe
Postdocs:
Dr. Aline Baggio
Dr. Guillaume Pierre
Dr. Luc Renambot
Dr. John Romein

Ph.D. Students:
Drs. Arno Bakker
Drs. Gerco Ballintijn
Drs. Ihor Kuz
Drs. Jason Maassen
Drs. Guido van 't Noordende
Drs. Rob van Nieuwpoort
Bogdan Popescu, M.Sc.
Drs. Ronald Veldema
Spyros Voulgaris, M.Sc.
Drs. Jan-Mark Wams
Secretary: Mw. Ilse Thomson

Highlight

The DAS-2 (Distributed ASCI Supercomputer) system is a collection of 400 large Pentium III located at five sites in The Netherland and devoted exclusively to research in parallel and distributed computing. A cluster of 144 of these CPUs is located at the VU and pictured here. It is connected by a high-speed network to smaller clusters at other Dutch universities.



2001 (continued)

Artificial Intelligence

Head of department: prof. dr J. Treur
Contact information: tel (+31) 20 444 7700 fax (+31) 20 444 7653 http://www.cs.vu.nl/ai
frances@cs.vu.nl prof. dr F.M.T. Brazier, group leader Intelligent Interactive Distributed Systems (IIDS)
gusz@cs.vu.nl prof. dr A.E. Eiben, group leader Computational Intelligence (CI)
frankh@cs.vu.nl prof. dr F. van Harmelen, group leader Knowledge Representation and Reasoning (KRR)
jonker@cs.vu.nl dr C.M. Jonker, group leader Agent Systems (AS)

The Agent Systems Research group addresses agent-oriented analysis and simulation of dynamics of software agents, biological and cognitive processes and of multi-agent organisations. In biological context the dynamics of intracellular processes is modelled in relation to bacterial behaviour. In cognitive context the dynamics of beliefs, desires and intentions, and of trust is modelled. Furthermore, organisational dynamics within a.o. a Call Center and bank organisation is modelled. Moreover, applications of software agents in Electronic Commerce and the Semantic Web are addressed: negotiating agents and information agents.

The Computational Intelligence group studies CI techniques and their applications with an emphasis on evolutionary computing and data mining. Evolutionary computing research focusses on of self-calibrating evolutionary mechnisms, constraint satisfaction, machine learning applications, evolutionary economy, and distributed evolutionary computing. The group is a main partner in a 5th framework IST research project in the latter area. Data mining activities are mainly directed at financial and bioinformatics applications.

The Intelligent Interactive Distributed Systems group focuses on support for large scale, intelligent, interactive, distributed systems in its AgentScape research programme. Support is needed at at least three levels: middleware, services and applications. AgentScape includes (1) an agent operating system (AOS) designed to support scalability, migration, management, heterogenity, and security of/within large scale agent systems, (2) services such as an agent factory and agent directory services, and (3) analysis of requirements for large scale (mobile) agent systems through experience with applicable distributed applications.

The Knowledge Representation and Reasoning group investigates modelling and representation of different forms of knowledge and reasoning. We study theoretical properties of knowledge representation and reasoning formalisms, but are also involved in developing practical knowledge-based systems. Recently, we have been very active in developments around the Semantic Web. Key areas of research are:
- Approximate reasoning: methods with an attractive anytime behaviour which give results even under time-pressure.
- The Semantic Web: applying Knowledge Representation methods to the Web in order to enable more intelligent machine support while searching, querying and navigating.
- Medical protocols: using formal Knowledge Representation methods to represent medical guidelines, leading to increased precision and quality of these guidelines.

Keywords

agent systems, dynamics, cognitive, organisation evolutionary computing, data mining, computational intelligence agent technology, scalability, middleware, distributed systems, mobile agents knowledge representation, approximate reasoning, semantic web, medical protocols.

Ph.D. defenses

Eck, P.A.T. van, A Compositional Semantic Structure for Multi-Agent Systems Dynamics. Supervisors: F.M.T. Brazier, J. Treur. Vrije Universiteit Amsterdam, Department of Artificial Intelligence, 2001.

Key publications

F.M.T. Brazier and N.J.E. Wijngaards, Automated Servicing of Agents. In: AISB Journal. dec 2001, Volume 1, number 1, pp. 5-20.
Special Issue on Agent Technology.

J. Broekstra, M. Klein, S. Decker, D. Fensel, F. van Harmelen, I. Horrocks
Enabling knowledge representation on the Web by Extending RDF Schema (WWW'01) Proceedings of the Tenth World Wide Web conference WWWW'10, May 2001, Hong Kong.

A.E. Eiben, Evolutionary Algorithms and Constraint Satisfaction: Definitions, Survey, Methodology, and research Directions, in L. Kallel and B. Naudts and A. Rogers (eds.), Theoretical Aspects of Evolutionary Computating, Springer, Natural Computing Series, pp. 13-58, 2001.

Jonker, C.M., Treur, J., An Agent Architecture for Multi-Attribute Negotiation. In: B. Nebel (ed.), Proc. of the 17th International Joint Conference on AI, IJCAI'01. Morgan Kaufman, 2001, pp. 1195 - 1201.

Participation in research networks / main external research

- SIKS: research school for graduate students
- AgentLink: European Network of Excellence for Agent-Based Computing
- EvoNet, the European Network of Excellence in Evolutionary Computing (European IST)
- DREAM, Distributed Resource Evolutionary Algorithm Machine (European IST)

- On-To-Knowledge: Content-driven knowledge management through evolving ontologies.http://www.ontoknowledge.org. Partners: University of Karlsruhe, Aldministrator Nederland BV, British Telecom Research Labs, Swiss Life, Enersearch
- Protocure: Improving medical protocols by formal methods http://www.protocure.org. Partners: Vienna University of Technology, University of Augsburg, Dutch Institute for Healthcare Improvement (CBO), University of Aberdeen
- SWAP: Semantic Web and Peer-to-Peer. Partners: University of Karlsruhe, META4 (Spain), Empolis (UK), IBIT (Spain), Dresdner Bank
- Wonderweb: Infrastructure for the Semantic Web http://wonderweb.semanticweb.org. Partners: University of Manchester, LADSEB-CNR, Padova, University of Karlsruhe
- IBROW: Intelligent Brokering Service for Knowledge-Component Reuse on the World Wide Web http://www.swi.psy.uva.nl/projects/ibrow/home.html Partners: University of Amsterdam, Open University (UK), University of Karlsruhe CSIC (Spain), iSOCO (Spain), Stanford University
- OntoWeb: Ontology-based information exchange for management and Electronic Commerce http://www.ontoweb.org. 92 partners from European industry and academia.

Industrial associates

- Aldministrator Nederland BV, Amersfoort
- Landbouwkundig-Economisch Instituut (LEI), Den Haag
- Stichting NLnet

Staff

Scientific programmer: Drs. Lourens van der Mey
Secretary: Maryke Titawano
- Agent Systems: Professor:

Associate professors:
Dr. Joris Hulstijn
Dr. Catholijn M. Jonker
Dr. Matthias Klusch
Dr. Martijn Schut
Dr. Vera Stebletsova
Dr. Allard Tamminga
Dr. Bas Terwijn
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Dr. Zhisheng Huang
Dr. Leon W.N. van der Torre
Ph.D. Students:
Drs. Fred Wan
Drs. Wouter C.A. Wijngaards
- Computational Intelligence

Professor: Prof.dr. (A.E.)
Associate professors:
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Dr. M. Keijzer
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Drs. Frederico Divina
Drs. C. Jong
- Intelligent Interactive Distributed Systems

Professor: Prof.dr. F.M.T. Brazier
Associate professors:
Dr. Niek J.E. Wijngaards
Dr. Benno J. Overeinder
Ph.D. Students:
Drs. David G. Mobach
Drs. Guido van 't Noordende
Technical staff:
Onno Kubbe, Etienne Posthumus
- Knowledge Representation and Reasoning

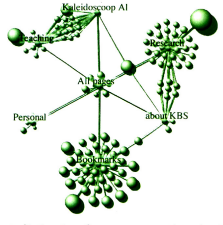
Associate professor: Dr. Frank van Harmelen
Postdoc: Dr. Mar Marcos Lopez
Ph.D. Students:
Drs. Perry Groot
Drs. Jeen Broekstra, Drs. Amal El Khattabi
Technical staff: Drs. Marta Sabou

Highlight

Work of AI Research group at VU are basis for World Wide Web standard

The growth of the Web has resulted in a very large body of on-line information. The Semantic Web is an effort to make the meaning of this information accessible not only to humans, but also to machines. This will help whith searching, navigating, visualising and maintaining such information. (The figure illustrates a map for navigating web-sites that has been constructed using Semantic Web technology). A crucial piece of technology for the success of the Semantic Web are Knowledge Representation languages (also known as "ontology languages") that can be used to describe particular application domains in a sufficiently formal and precise way that the information becomes machine processable.

The World Wide Web Consortium (W3C), the body which regulates standards as they are used on the Web (such as HTML, XML, etc), is currently standardising such an ontology language for the Web. (http://www.w3.org/2001/sw/)



It is a great distinction for our group that the W3C has selected the languages OIL (http://www.ontoknowledge.org/oil) and DAML+OIL (http://www.daml.org/language) as the basis for such this standardisation effort. This makes it very likely that the eventual W3C standard language for Web Ontologies will be very close to the work that we have been producing over the past 2 years. For more details, see: "Enabling knowledge representation on the Web by Extending RDF Schema," J. Broekstra, M. Klein, S. Decker, D. Fensel, F. van Harmelen, I. Horrocks, World Wide Web Conference 2001.

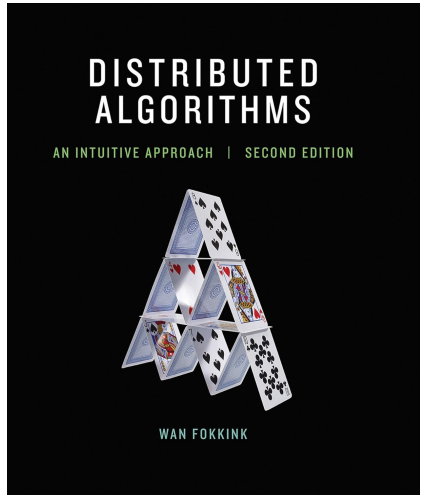
2001 (continued)

- Dissertations
  - S.C.C. Blom: “Term Graph Rewriting Syntax and Semantics” (Klop)
  - J. van Ossenbruggen: “Processing Structured Hypermedia” (Van Vliet)
  - L. van Doorn: “Design and Application of an Extensible OS” (Tanenbaum)
  - P.C. Homburg: “The Architecture of a Worldwide Distrib. Sys. (Tanenbaum)
  - J.W. Romein: “Multigame: An Environment for Distributed Game Tree Search (Bal)
  - P.A.T. van Eck: “A Compositional Structure for Multi-Agent Systems Dynamics (Brazier)

2001 (continued)

- Wan Fokkink was appointed a full professor of Theoretical Comp. Sci.
- In 2004 he became head of the section Theoretical Computer Science
- His research was on control systems, modal logic, distributed algorithms/systems, process algebra, network protocols, and more
- He wrote a book on distributed algorithms





2001 (continued)

- Artificial Intelligence (Profs. Brazier, Eiben, Treur)
  - Intelligent agents
  - Computational intelligence
  - Intelligent interactive distributed systems
  - Knowledge representation
- Business Information Systems (Prof. Akkermans)
  - Business modeling and ontologies
- Computer systems (Profs. Bal, Tanenbaum)
  - Distributed systems
  - Parallel systems
- Information Mgmt & Software Engineering (Profs. Van de Riet, Verhoef, Van Vliet)
  - Process modeling
  - Life cycle of software
- Theoretical computer science (Profs. De Bakker, Klop)
  - Term rewriting systems and lambda calculus
  - Process algebra

2001 (continued)



Main building from street



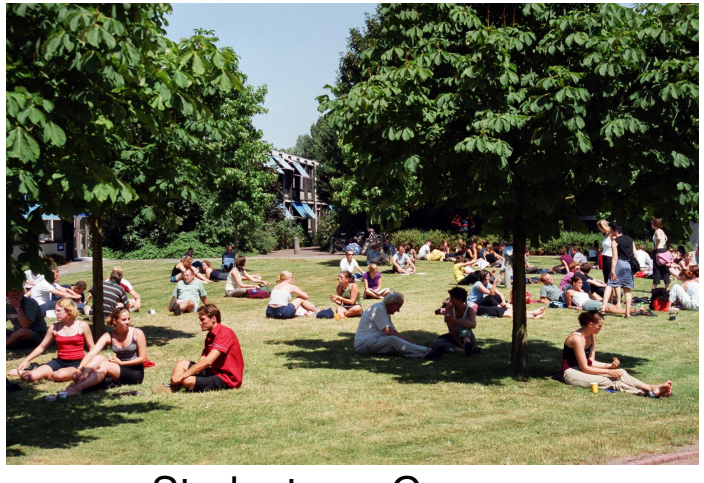
Campus from the street



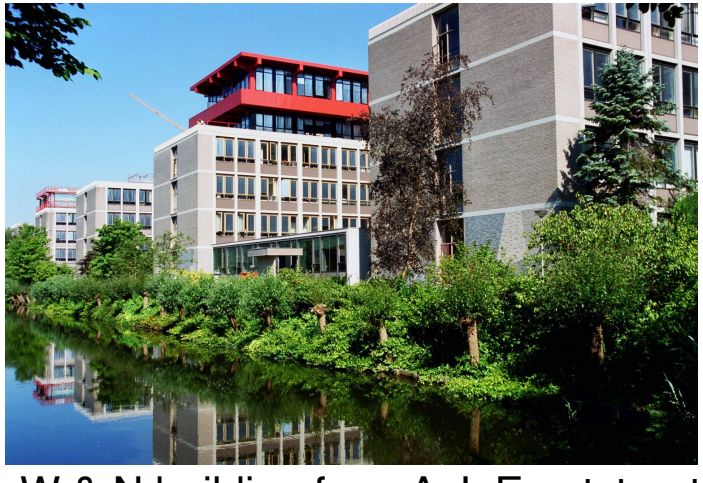
W & N building



Students on campus



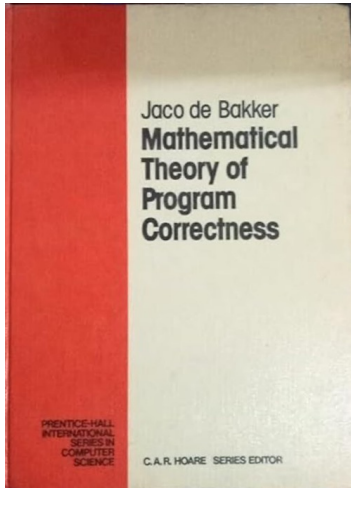
Students on Campus

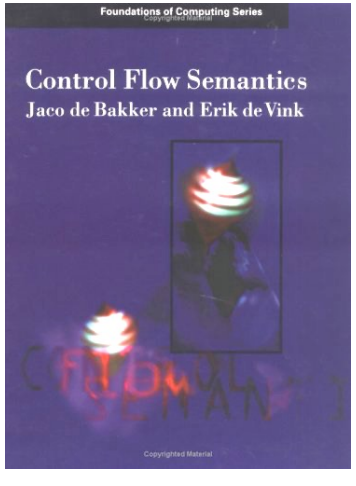


W & N building from A.J. Ernststraat

2001 (continued)

- Jaco retired in Nov. 2001
  - He was a member of the Royal Dutch Academy of Sciences
  - He was a member of the Academia Europaea
  - He was a knight in the Order of the Netherlands Lion
  - He co-founded the European Assoc. for Theoretical Computer Sci.
  - He (co)authored two books





2001 (continued)

- Here are some photos from Jaco's retirement dinner


Jan van Mill & Jaco de Bakker


Jaco de Bakker + Jan Willem Klop


Jan Willem Klop


Jan Willem, Erik de Vink, Roel de Vrijer


Reind van de Riet


Jan Rutten


Wan Fokkink


Femke van Raamsdonk & Andrew Tanenbaum

2001 (continued)

- Jaco's Ph.D students
  - Willem Paul de Roever (1975)
  - Paul Vitanyi (1978)
  - Anton Nijholt (1980)
  - John-Jules Meyer (1985)
  - Arie de Bruin (1986)
  - Pierre America (1989)
  - Joost Kok (1989)
  - Jan Rutten (1989)
  - Erik de Vink (1990)
  - Frank de Boer (1991)
  - Anton Eliens (1975)
  - Eichi Horita (1993)
  - Franck van Breugel (1994)
  - Marcello Bonsangue (1996)
  - Daniele Turi (1996)
  - Jerry den Hartog (2002)

2002

- The English cs.vu.nl March 2002

Division of Mathematics and Computer Science

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Fax: +31 20 444-7653
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Language/taal

VU campus (Click for slide show)



Amsterdam (Click for slide show)





Information for prospective students (D)
Help with high school projects (D)
Information for high school teachers (D)

General

News
Organization
Getting here
Faculty jobs available
Newsletter (D)
Photos
Videos
Amsterdam
Public maintainer
Site search

Education

Current students
Masters program
Exchange students
Guide for VU faculty (D)
Course home pages
Schedule & exams
Study guide (D)

Research

Research groups
Research schools
Published papers
Ph.D.s since 1985
Upcoming colloquia
Computing facilities
Library
FTP site
Information for the press

People

Faculty and research staff
Secretarial staff
Ph.D. students
Undergraduates
Alumni
Telephone numbers
Photos by research dept.
STORM (D)
Education and other offices

I mentioned to the dean of the faculty, that The cs.vu.nl Website sucked. He asked me if I could make a better one. I said I could. He asked me to do so.. This is my v1.0

2002 (continued)

- Later in the year, math and CS were finally split
- We were now our own department within the Faculty of Science
- The “divisions” were back to being departments (“afdelingen”)
- Jan Willem Klop kindly agreed to be chairman of CS, a job nobody wanted but was now needed

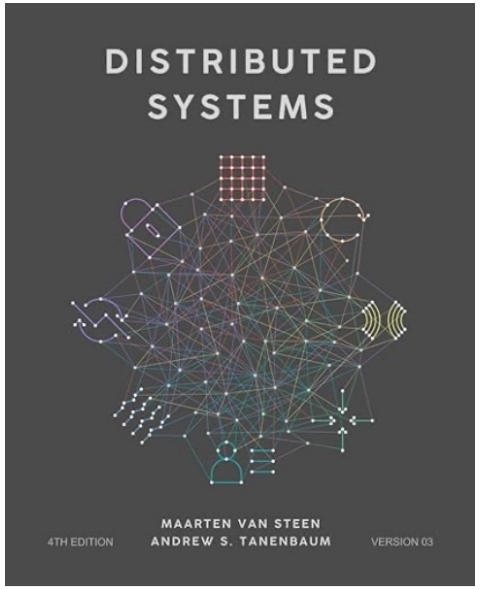
2002 (continued)

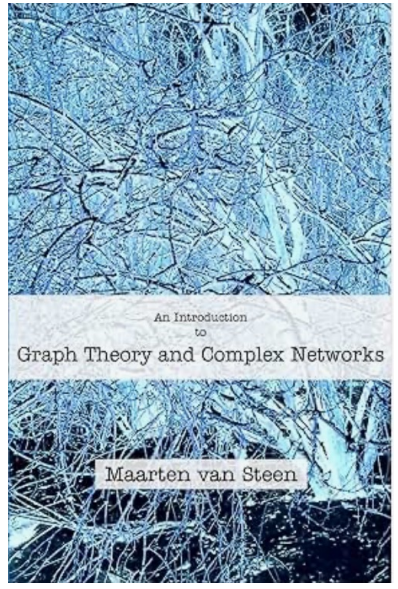
- We switched from the two-phase system to bachelor/masters
- The idea was to make all universities in the E.U. compatible
- Students could do a bachelors and masters in different countries
  - The propedeuse year was eliminated
  - There was now a 3-year bachelor's degree
  - This required a restructuring of the educational programs
  - We offered multiple 1- and 2-year masters degrees

2002 (continued)

- Maarten van Steen was appointed a full professor
- He did research on distributed systems
- He (co)-authored well over 200 papers and two books
- Later he became department chairman 2010-2015







2002 (continued)

- Frank van Harmelen was appointed a full professor
- He joined the artificial intelligence section
- His research was in knowledge representation and reasoning



2002 (continued)

- Jaap Heringa was appointed a full professor of Bioinformatics
- He did research on bioinformatics and headed that section
- Later he became department chairman



2002 (continued)

- We hired Shirley Chedi as business manager in August
- Her contract was signed by Jan van Mill so the split was in Sept.
- We needed someone to manage all of our many grants/contracts



2002 (continued)

- Department outing and dinner in Driehuizen in June



Roel de Vrijer & Hans v. Vliet



Dinner time



Henri, Kees, Ceriel, Philip



Dessert time



Jan-Willem Klop (Hgl TI)



Thilo Kielmann (UD CS)



Catholijn Jonker (UD AI)



Roel De Vrijer (UD TI)



Guillaume Pierre (UD CS)



Henri Bal (Hgl CS)



Jim Van Keulen (Comp. lab)



Natalia Silvis Cividjian (UD IMSE)

2003

- Guus Schreiber was appointed a full professor of Business Inf. Sys.
- In 2016, he became dean of the Faculty of Sciences
- His research was about knowledge engineering, Web science, and e-humanities



2003 (continued)



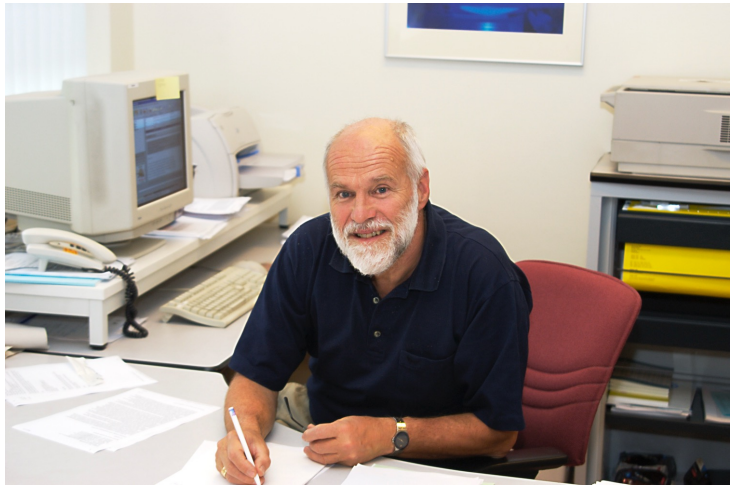
Research IC wall



Q105 Lecture hall



Science building library



Wim Hogervorst, dean of the faculty

2003 (continued)



Spyros Voulgaris (UD CS)



Melanie Rieback (AiO CS)



Swami Sivasubramanian (AiO IMSE)



Student lab

2003 (continued)

- Coffee mugs in the STORM (student association) room



2003 (continued)

- Q105 for a lecture I gave to faculty and students



2003 (continued)

- Together with his student, John Romein, Henri solved the 3500-year-old African game of awari (kalah)

John & Henri playing awari



2003 (continued)

- V2.0 of my Website went live in Sep. 2003 (NL site is same in Dutch)



The VU house style changed, so I thought I should update the Website to match the new House style. While I was at it, I also updated the content and put in more links to make navigation easier. I was the de facto Webmaster.

2003 (continued)

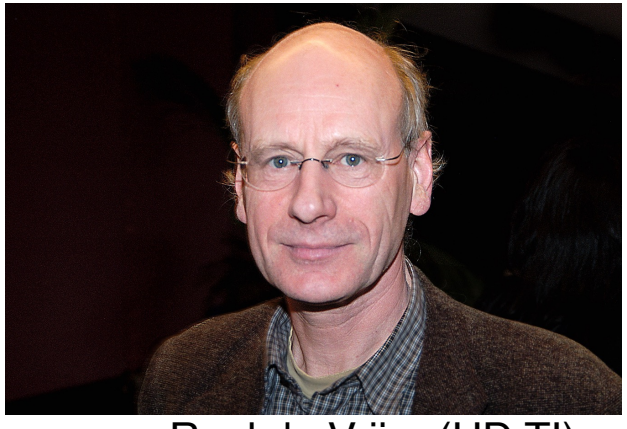
- Christmas lunch in December



Wan Fokkink (Hgl TI)



Femke van Raamsdonk (UD TI)



Roel de Vrijer (UD TI)



Guszti Eiben (Hgl AI)



Vojtek Kowalczyk (UD AI)



Jaap Gordijn, Hans Akkermans

2004

- In May, a man named Ken Brown called and asked if he could interview me
  - He said he was writing a history of UNIX; I was once at Bell Labs, so sure, I knew all the creators personally
  - He flew over from the U.S specifically to see me and said: “Surely Linus could not have written Linux alone?”
  - I said I wrote MINIX alone, and Linux 0.01 was the same size, so yes he could
  - He insisted Linus must have stolen it from me; I strongly refuted this
  - He kept asking me if I would sue people using Linux because it was “stolen”? I said it was NOT stolen
  - I asked who was behind this interview and book project? Was it Microsoft trying to create chaos?
  - He refused to answer and became very defensive
  - I asked if he knew about Peter Salus’ book on the history of UNIX. Nope. He never even searched Amazon
  - It was now so fishy, I ended the interview; Brown wandered the halls interviewing random students about this
  - I now knew something was very very wrong so I wrote and posted this: www.cs.vu.nl/~ast/brown
  - The tech news site slashdot.com picked this up and linked to my page. It got over 150,000 hits that day
  - I gave permission to mirror my page elsewhere; dozens of copies were made; there were probably 1M hits
  - There was a huge discussion all over the Internet about this. Search for: “Ken Brown” Tanenbaum
  - Based on this, I responded; see the “Follow up” and other links on top of the page linked to above
  - This made the story even bigger; the storm went on for days

2004 (continued)

- Richard M. Stallman is very famous for writing a lot of free software
- This includes the GNU software, C compiler, emacs, and much more
- In Oct. 2004 he gave a talk at the RAI on the danger of S/W patents
- I invited him to the VU; he refused saying: “I wouldn’t learn anything”
- Then I invited him to dinner with my student Jan-Mark Wams
- We argued bitterly about free software licenses for 2 hours
- RMS insisted on GPL; I said “BSD license is also OK”; He ***hated*** that


Me


RMS


Jan-Mark

GPL requires everyone to publicize any changes they make to the free software. BSD allows (but does not mandate) this. Stallman wrote the GPL license and is absolutely fanatic about everyone using it for all free software.

2004 (continued)

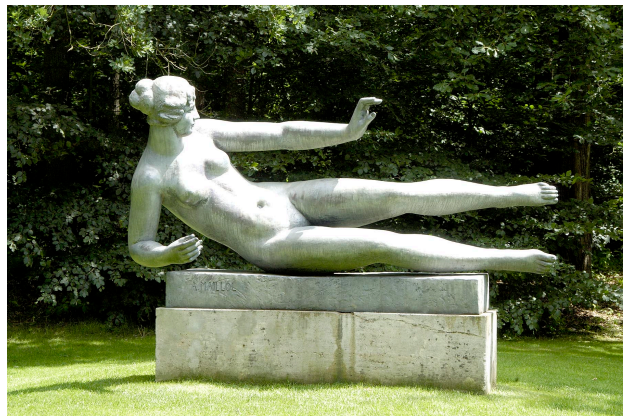
- Outing to Kroller-Muller Museum and biking in June



Bikes to use



Dick Grune (UD CS)



Lying woman statue



Ilse Thomson & Andrew Tanenbaum



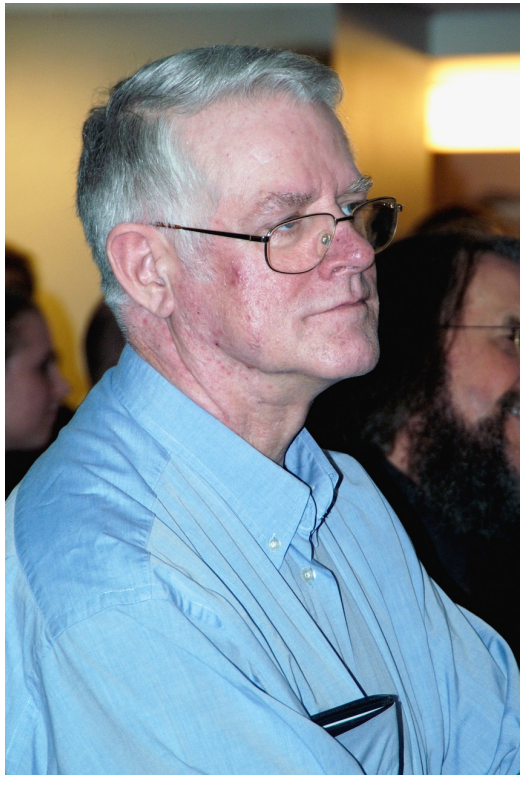
Andrew Tanenbaum & Melanie Rieback



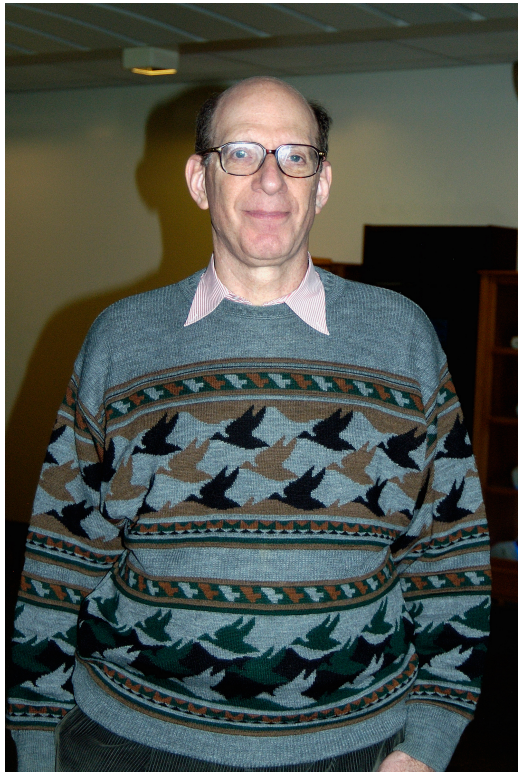
Brigitte Blasweiler & Henri Bal (Hgl)

2004 (continued)

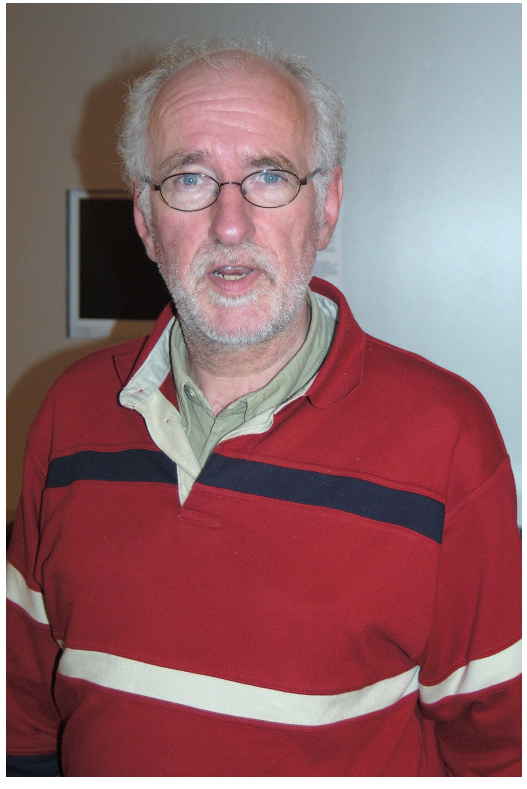
- Retirement party for Riekus Kok (mathematician) in October



Jan Willem Klop (Hgl TI)



Me (Hgl CS)



Hans van Vliet (Hgl IMSE)



Gerrit van de Veer (UHD IMSE)

2004 (continued)

- Henri became adjunct director of €20 million VI-e project
- VI-e is about virtual science, making models of the world in physics, biology, medicine, and other fields
- It is a third way to do science, after experiment and theory
- Henri's specialty was high-performance, distributed computing
- E-science needs to process vast amounts of data using multiple computers connected by high-speed networks



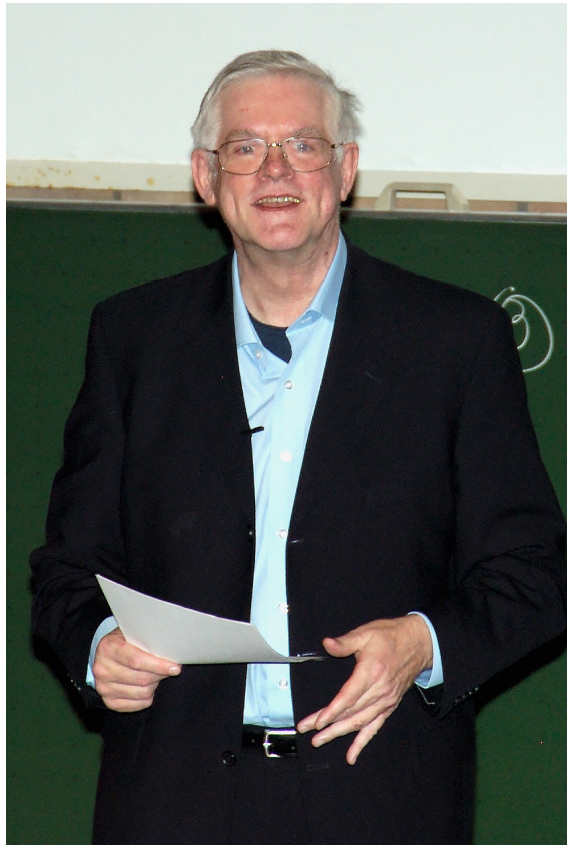
2005

- Henri and I began a masters course on writing grant proposals
- We did it together for 10 years
- We gave them our grant proposals to review
- Then they had to write a grant proposal for 1 AiO
- All the students had to write reviews of all the proposals
- Then we met like a program committee to discuss the proposals
- They liked the course but said it was a lot of work



2005 (continued)

- Symposium and dinner for Jan Willem Klop's 60th birthday (Dec.)



Jan Willem Klop (Hgl TI)



Henri Bal (Hgl CS)



Femke van Raamsdonk (UD TI)



Jos Baeten (Hgl TUE) &
John-Jules Meyer (Hgl UU)

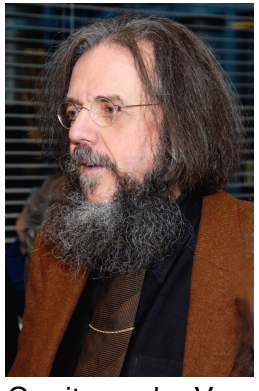


Jaco de Bakker (Hgl TI)

2005 (continued)

- Jim van Keulen and Ruud Wiggers retired in November


Jim van Keulen (CL)


Gerrit van der Veer (UHD IMSE)

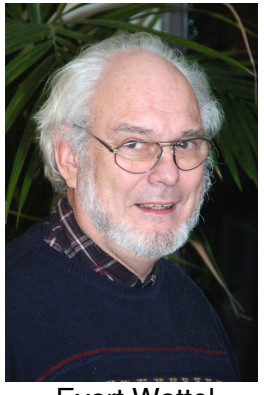

Ed Keizer (programmer)


Hans van Staveren (programmer CS)


Marjolijn Witte (Education Dir.)


Jan van Wouwe (UD CS)


Mathisca de Gunst (Hgl math)


Evert Wattel (UHD Math)


Henri Bal (Hgl CS)


Katja van ‘t Noord (financial controller)


Jan van Mill (Hgl math) & Rien Kaashoek (Hgl math)


Rutger Hofman & Melanie Rieback & Dimitris Stafylarakis & Bruno Crispo

2006

- 25th Anniversary party for Ceriel Jacobs in March


Ceriel Jacobs (programmer CS)


Reind van de Riet (Hgl IMSE)


Henri Bal (Hgl CS)


Dick Grune (UHD CS)

2006 (continued)

- Eventually we switched from Suns to PCs
- We had dozens of old Sun workstations
- VU began centralizing IT



The elephants' burial ground

2006 (continued)

- A paper written by my Ph.D. student, Melanie Rieback, "Is Your Cat Infected with a Computer Virus?," made the front page of the *New York Times (below left)* on 15 March 2006. It was the biggest tech news story in the world, for example in:



Study Says Chips in ID Tags Are Vulnerable to Viruses

By JOHN MARKOFF

A group of European computer researchers have demonstrated that it is possible to insert a software virus into radio frequency identification tags, part of a microchip-based tracking technology in growing use in commercial and security applications.

In a paper to be presented today at an academic computing conference in Pisa, Italy, the researchers plan to demonstrate how it is possible to infect a tiny portion of memory in the chip, which can hold as little as 128 characters of information.

Until now, most computer security experts have discounted the possibility of using such tags, known as RFID chips, to spread a computer virus because of the tiny amount of memory on the chips.

The tracking systems are intended to improve the accuracy and lower the cost of tracking goods in supply chains, warehouses and stores. Radio tags store far more data about a product than bar codes and can be read more quickly. They have even been injected into pets and livestock for identification.

The chips have already prompted debate over privacy and surveillance, given their tracking ability. Now the researchers have added a series of worrisome prospects, including the ability of terrorists and smugglers to evade airport luggage scanning systems that will use RFID tags in the future.

In the researchers' paper, "Is Your Cat Infected With a Computer Virus?," the group, affiliated with the computer science department at Vrije Universiteit in Amsterdam, also describes how the vulnerability could be used to undermine a variety of tracking systems.

The researchers said they realized that there are risks associated with publishing security vulnerabilities in computerized systems. To head off some of the possible attacks they described, they have also published a set of steps to help protect RFID chips from such attacks.

The group, led by Andrew S. Tanenbaum, an American computer scientist, will make the presentation at the annual Pervasive Computing and Communications Conference sponsored by the Institute of Electrical and Electronic Engineers. Mr. Tanenbaum is the author of the Minix operating system, an experimental project that became the heart of the Linux open-source operating system.

The researchers asserted that the RFID demonstration had not used the commercial software that collects and organizes information from RFID readers. Rather, it used software that they designed to replicate those systems.

"We have not found specific flaws" in the commercial RFID software, Mr. Tanenbaum said, but "experience shows that software written by large companies has errors in it."

The researchers have posted their paper and related materials on security issues related to RFID systems at www.rfidvirus.org.

The researchers acknowledged that inside information would be required in many cases to plant a hostile program. But they asserted that the commercial software developed for RFID applications had the same potential vulnerabilities that have been exploited by viruses and other malicious software, or malware, in the rest of the computer industry.

One such standard industry problem is a software coding error referred to as a buffer overflow. Such errors occur when programmers set aside memory to receive data temporarily, but fail to require a check on the size of the value that is moved to the allocated space. A larger-than-expected value can cause the program to break and trick the computer operating system into executing a malicious program. "You should check all of your input all of the time, but experience shows this isn't the case," Mr. Tanenbaum said.

Independent computer security specialists also said RFID systems were potential problem areas.

"It shouldn't surprise you that a system that is designed to be manufactured as cheaply as possible is designed with no security constraints whatsoever," said Peter Neumann, a computer scientist at SRI International, a research firm in Menlo Park, Calif.

Mr. Neumann is the co-author of an article to be published in the May issue of the Communications of the Association for Computing Machinery on the risks of RFID systems. He said existing RFID systems were a computer security disaster waiting to happen.

He cited inadequate identification for users, the potential for counterfeiting or disabling tags, and the problem of weak encryption in a passport-tracking system being developed in the United States. But he said he had not previously considered the possibility of viruses and other malicious software programs.

An industry executive acknowledged that the companies that make computerized tracking systems faced potential security problems.

"We are very actively looking at the different way the technology is used," said the executive, Daniel P. Mullen, president of the Association for Automatic Identification and Mobility, an industry trade group. "It's an ongoing dialogue about protecting information on the tag and in the database."

The association has a working group of experts assessing both security and privacy challenges, he said.

There are many types of RFID tag, and some of the sophisticated versions include security features like encryption of the identifying number carried by the chip.

But the Dutch research group warned that in a variety of situations it is possible for attackers to alter the information in an RFID tag to subvert its purpose.

"RFID malware is a Pandora's box that has been gathering dust in the corners of our 'smart' warehouses and homes," they write in their paper.

In one example they offered, a virus from an infected tag on luggage passing through an airport could be picked up when it is scanned by the luggage-handling control systems and then spread to tags attached to other pieces of luggage.

Such an attack, they suggest, might spread luggage contamination to other airports. It might also be used by a smuggler to cause a piece of luggage to avoid security systems.

They also described situations of counterfeit RFID tags possibly being be used to subvert pricing and other aspects of commercial sales systems, or a virus could be inserted into RFID tags used to identify pets.

Don Bernstein/The Raytheon Company

Radio frequency identity tags are growing in popularity because they are easily scanned.

Newspapers
Automatiserings Gids
Computer Weekly
Computerworld
De Morgen
De Telegraaf
De Volkskrant
Herald News Daily
Information Week
International Herald Tribune
New York Times
NRC Handelsblad
Reuters
Seattle Post Intelligencer
Spits
Sydney Morning Herald
Trouw
United Press International
Washington Post

TV station Websites
Australian Broadcasting Corp
BBC
CNN
Fox News
MSNBC

Magazines
Business Week
Computer Business Review
Dagens IT
New Scientist
HCC Magazine
PC Magazine
PC World
Red Herring
RFID Journal
Supplychain Review
SC Magazine UK

2007

- English cs.v.u.nl in Jan. 2007



This was the first Professionally designed Version of cs.vu.nl

2007 (continued)

- We set up a joint masters with the Technical Univ. of Bucharest
- It was a 2-year program; students did 1 year there and 1 year here
- We told the professor there to send only the very best students
- He did, and the quality of them was outstanding
- Many went on to get Ph.D.s at the VU and at other universities

2007 (continued)

- Jan Willem retired in Dec. 2007
  - He was elected to the KNAW (2003)
  - He was also elected to the Academia Europaea (2011)
  - He has an honorary doctorate from the U. of East Anglia (2002)
  - He was made an honorary member of IFIP WG 1.6 on term rewriting (2011)



2007 (continued)

- Jan Willem's Ph.D. students
  - Aart Middeldorp (1990)
  - Robert van Glabbeek (1990)
  - Vincent van Oostrom (1994)
  - Femke van Raamsdonk (1996)
  - Stefan Blom (2001)
  - Mirna Bognar (2002)
  - Clemens Grabmayer (2005)
  - Jeroen Ketema (2006)
  - Jorg Endrullis (2010)
  - Ariya Ishihara (2010)
  - Cynthia Kop (2012)

2007 (continued)

- Retirement party for Jan Willem Klop



Jan Willem Klop (Hgl TI)



Hans Akkermans (Hgl BI)



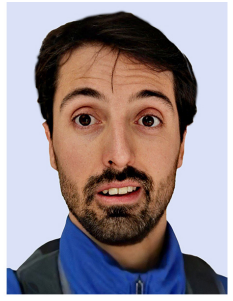
Jan Rutten (Hgl TI)



Jan Treur (Hgl AI)

≈ 2007-2012 (Mostly people Henri Knew)


Aart van Halteren


Alessio Sclocco


Alexandru Uta


Ana-Maria Oprescu


Andy Tanenbaum


Anjo Bikker


Anne-Marie Kermarre


Arno Bakker


Asia Slowinska


Aske Plaat


Ben Gras


Ben Werkhoven


Brigitte Brasweiler


Bruno Crispo


Caroline Waij

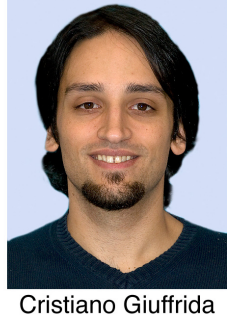

Cedric Nugteren


Ceriel Jacobs


Chris Verhoef


Claudio Martella


Corry van Rossum


Cristiano Giuffrida

≈ 2007-2012 (Mostly people Henri Knew)

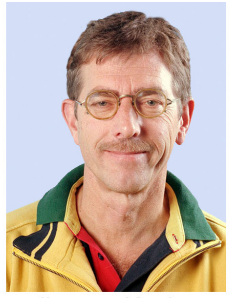


≈ 2007-2012 (Mostly people Henri Knew)


Jan Willem Klop


Jan-Mark Wams


Jason Maassen

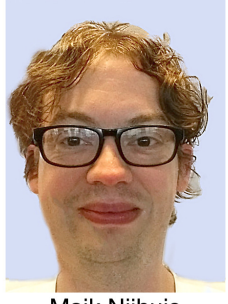

Jim van Keulen


John Romein


Kees Verstoep


Maarten van Steen


Marieke Frohn

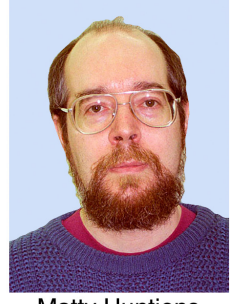

Maik Nijhuis


Marja Verburg


Marjolein Witte

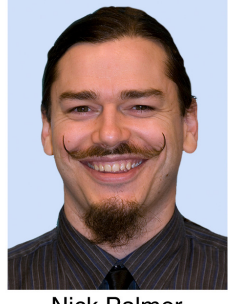

Mathijs den Burger


Mathisca de Gunst


Matty Huntjens


Melanie Rieback


Natalia Silvis


Nick Palmer


Niels Drost


Patricia Lago


Pieter Hijma


Raoul Bhoedjang

≈ 2007-2012 (Mostly people Henri Knew)



2008

- 9-13 Dec. 2008 Reind was at Stanford University, in California
- He met with his good friends Donald Knuth and Gio Wiederhold
- In the afternoon of 18 Dec. 2008, Reind visited me at the VU
- He didn't feel well, so he went home
- He passed away at home later that evening
- He was 69
- He was a knight in the Order of the Netherlands Lion
- Reind was the godfather of informatica at the VU
- Obituary: https://djoerdhiemstra.com/2008/reind-van-de-riet-passed-away/

2009

- I got a €2.5 million European Research Council Advanced Grant
- Later Herbert Bos also got one; here is a symposium to honor me



Sign



Henri Bal



Frans Kaashoek

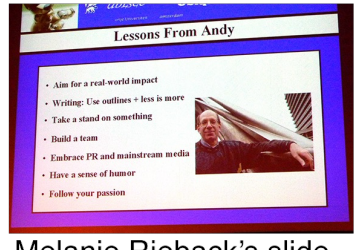


Robbert van Renesse



Sape Mullender


Melanie Rieback + Frances



Melanie Rieback's slide


Coffee break


Maarten van Steen


Herbert Bos



Me and Frances Brazier


Me and my Ph.D. students

2009 (continued)

- Frances Brazier's departure from the VU for Delft in September



Frances Brazier (Hgl AI)


Frances & me (Hgl CS)


Wan Fokkink (Hgl TI) & Roel de Vrijer (UD TI)


Frank van Harmelen (Hgl AI)


Jaap Heringa (Hgl BioInf)


Cristiano Giuffrida (AiO CS)


Elly Lammers (Sec'y)


Ilse Thomson (Sec'y

2009 (continued)

- Frances' Ph.D. students
  - Pascal van Eck (2001)
  - Pieter van Langen (2002)
  - Elizabeth Ogston (2005)
  - David Mobach (2007)
  - Sander van Splunter (2010)

These are Frances' students at the VU. She later had more at Delft.

2009 (continued)

- The VU granted Sir Tim Berners-Lee an honorary doctorate
- Guus Schreiber was the “promotor”



2010

Bedrijfsinformatica


Hans Akkermans (HGL)


Dick Bulterman (HGL)


Guus Schreiber (HGL)


Jan Top (HGL)




Jaap Gordijn (UHD)


Lora Arroyo (UD)


Anton Eliens (UD)


Laura Hollink (UD)


Jacco van Ossenbruggen (UD)


Chris van Aart (PD)


Mark van Assem (PD)


Willem van Hage (PD)


Veronique Malaise (PD)


Borys Omelayenko (PD)


Ronny Siebes (PD)


Natasha Stash (PD)


Jan Wielemaker (PD)


Davide Ceolin


Anna Chmielowiec


Zsofia Derzsi


Luit Gazendam


Risto Gligorov


Chide Groenouwe


Sybren de Kinderen


Koen Kok


Vincent Pijpers


Anna Tordai


Yiwen Wang


Razo Zapata

2010 (continued)

Bioinformatica


Jaap Heringa (HGL)


Bas Teusink (HGL)


Hans van Beek (UD)


Anton Feenstra (UD)


Bernd Brandt (PD)


Anand Gavai (PD)


Neslihan Tas (PD)


Thomas
Binsl

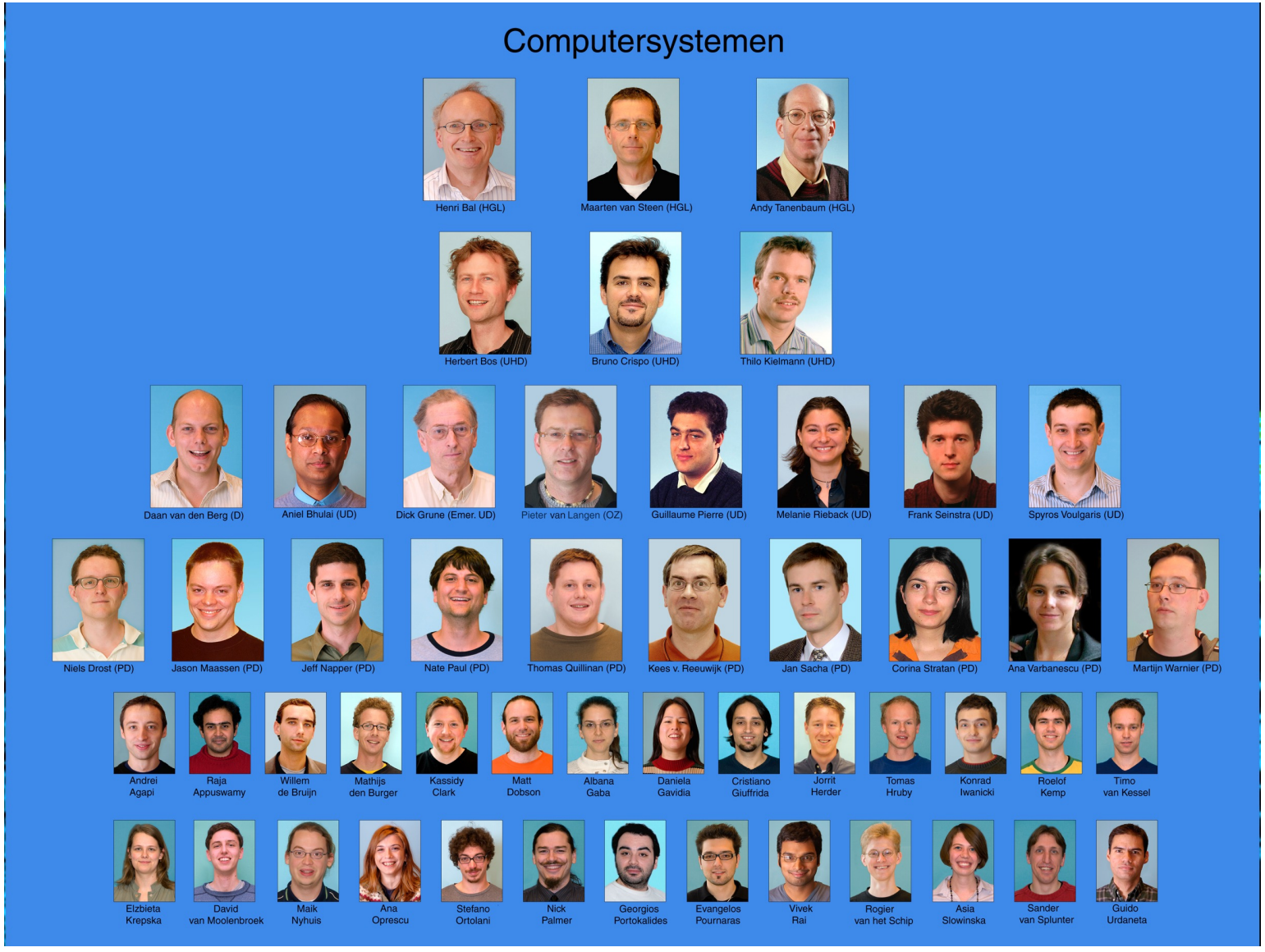

Nicola
Bonzanni


Hannes
Hettling


Bart
van Houte


Walter
Pirovano

2010 (continued)



2010 (continued)

Information Management en Software Engineering


Chris Verhoef (HGL)


Hans van Vliet (HGL)


Rene Krikhaar (UHD)


Patricia Lago (UHD)


Matty Huntjens (D)


Steven Klusener (UD)


Rahul Premraj (UD)


Natalia Silvis-Cividjian (D)


Remco de Boer


Viktor Clerc


Laurenz Eveleens


Rik Farenhorst


Qing Gu


Peter Kampstra


Erald Kulk


Lukasz Kwiatkowski

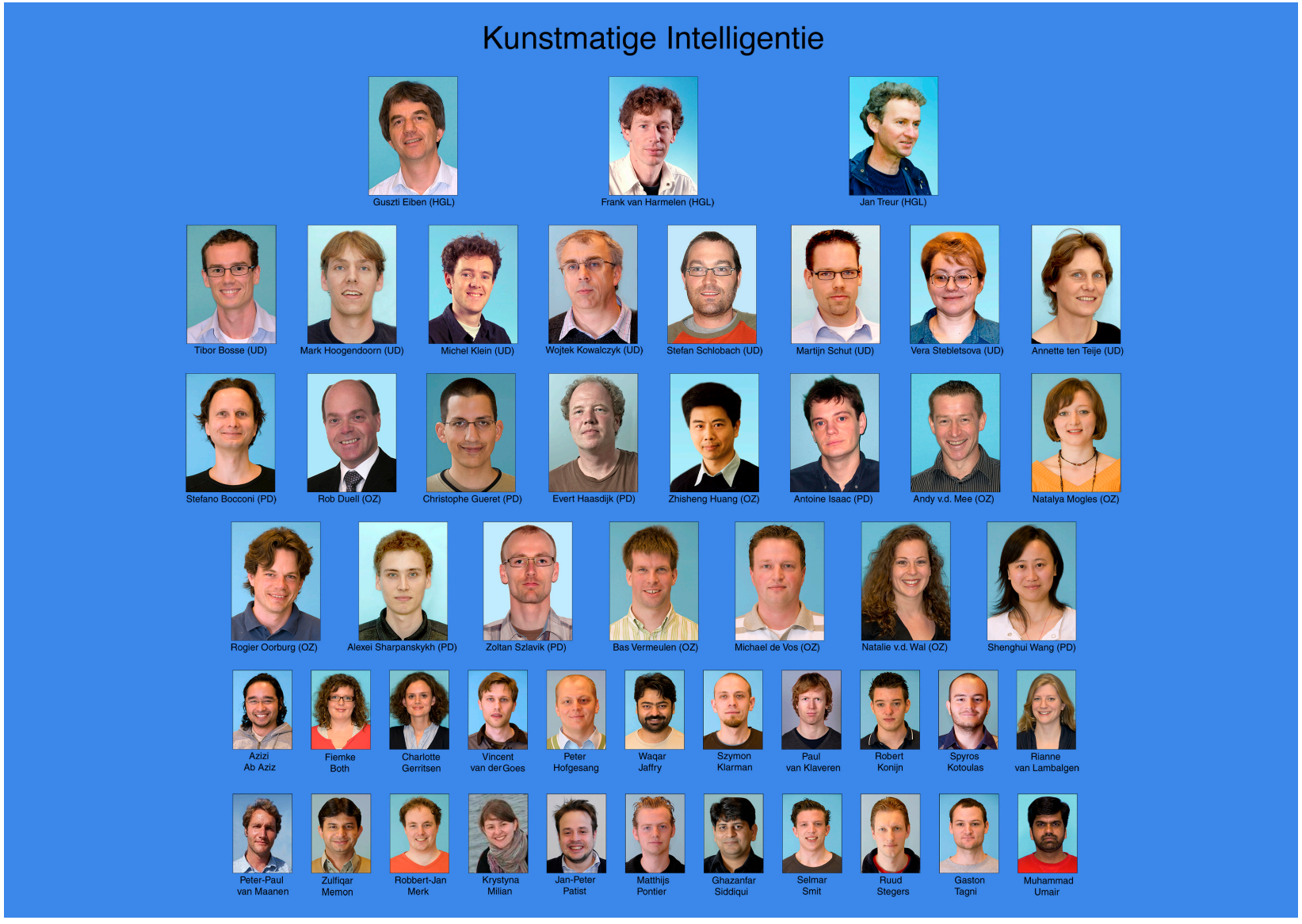

Maryam Razavian


Pieter van der Spek


Adam Vanya


Vincent de Vries

2010 (continued)



2010 (continued)

Theoretische Informatica


Wan Fokkink (HGL)


Jan Willem Klop (Emer. HGL)


Jan Rutten (HGL)


Roel de Vrijer (UHD)


Femke van Raamsdonk (UD)


Rena
Bakhshi


Joerg
Endrullis


Ariya
Isihara


Cynthia
Kop

2010 (continued)

Programmeurs


Arno Bakker


Ben Gras


Rutger Hofman


Philip Homburg


Ceriel Jacobs


Lourens van der Meij


Lasantha Don Peterge


Arun Thomas


Kees Verstoep


Cees Visser

Ondersteunend Personeel


Michiel Boere
Communicatiemedewerker


Shirley Chedi
Afdelingsmanager

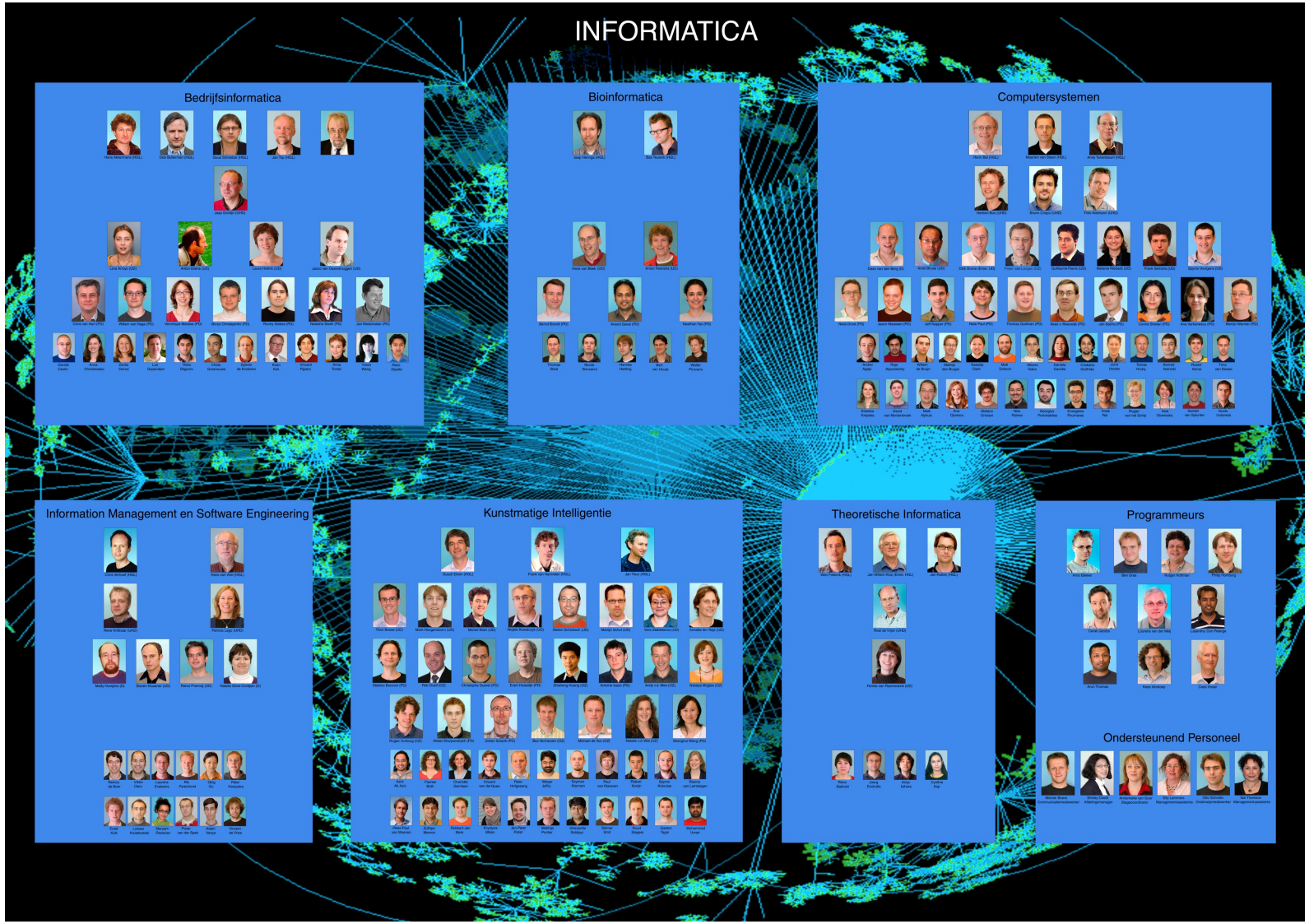

Annemieke van Goor
Stagecoordinator


Elly Lammers
Managementassistente


Otto Schrofer
Onderwijsmedewerker


Ilse Thomson
Managementassistente

2010 (continued)



The wall poster showing the entire department (including Ph.D. students)

2010 (continued)

- In 2010, external experts reviewed research at Dutch universities
- The review covered the period 2002-2008
- For each item, the score was 1 (unsatisfactory) to 5 (excellent)
- Here are the scores for our sections

Section	Research Program	Quality	Productivity	Relevance	Vitality
Artificial Intel.	4.5	4.0	4.5	4.0	4.5
Bioinformatica	3.5	3.5	4.0	3.5	4.0
Business Inf.	4.0	3.5	4.5	4.5	4.5
Comp. Systems	5.0	5.0	5.0	5.0	5.0
IMSE	4.0	4.0	4.0	4.0	3.5
Theoretical Inf.	4.0	4.5	4.0	4.0	3.5

2010 (continued)

- The coffee room in the old W&N building



1. Freek van Schagen (UD math)
2. Sandjai Bhulai (Hgl math)
3. Shirley Chedi (business mgr)
4. Jan Willem Klop (Hgl TI)
5. Hans Akkermans (Hgl BI)

2010 (continued)

- Shirley Chedi's farewell party in March (part I)


Shirley Chedi (Bus. Mgr.)


Hans Akkermans (Hgl BI)


Guus Schreiber (Hgl BI)


Lora Arroyo (UD BI)

2010 (continued)

- Shirley Chedi's farewell party in March (part II)


Patricia Lago (UHD IMSE)


Guillaume Pierre (UD CS)


Saskia Edixhoven (HR)


Caroline Waij (Sec'y)

2010 (continued)

- Christmas Party in December



Natalia Silvis-Cividjian (UD IMSE)



Erik van der Kouwe (AiO)



Asia Slowinska (AiO CS)



Arun Thomas (Programmer CS)

2011

- Symposium to celebrate 30 years of informatica (part I)



Introduction slide


Audience


Dick Grune & Jim van Keulen


Patricia Lago (UHD IMSE)


Frank van Harmelen (Hgl AI)


Hans van Vliet (Hgl IMSE)

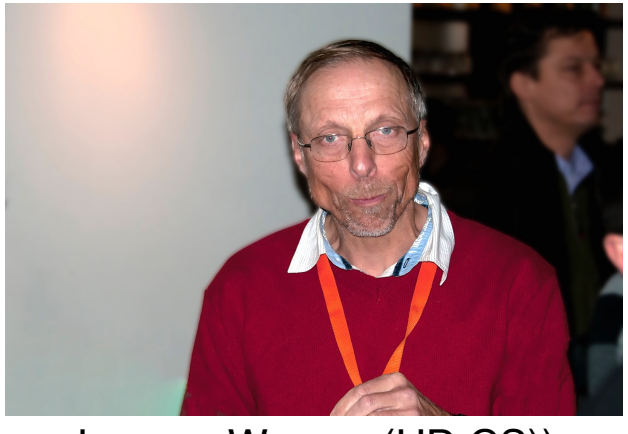
2011 (continued)

- Symposium to celebrate 30 years of informatica (part II)


Gerrit van der Veer (UHD IMSE


Guszti Eiben (Hgl AI)


Natalia Silvis-Cividjian (UD IMSE)


Jan van Wouwe (UD CS))


Spyros Voulgaris (UD CS)


Wiebren de Jonge (UHD IMSE)

2011 (Continued)

- Henri became the third scientific director of ASCI (2011-2021)
- During this time ASCI
  - began an annual computer systems workshop
  - started the Netherlands Conference on Computer Vision
  - successfully applied for funding and built the DAS-5 and DAS-6 systems
  - introduced several new courses to the Ph.D. teaching program
  - Set up the NWO-TTW Perspectief project “Efficient Deep Learning”

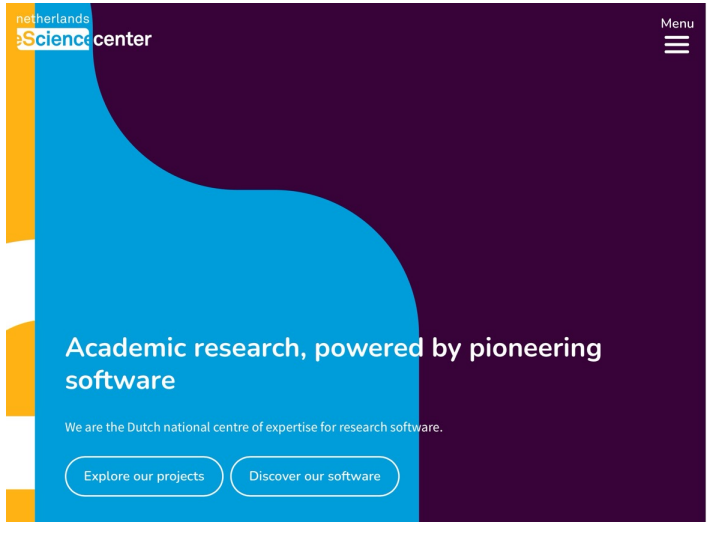
(2011-2017)



From Google Earth

2012

- Henri helped found the NL eScience Center
- eScience is “enhanced science” using computer technology
- Mission: Empower researchers through innovative software
- Many of his Ph.D. students staffed it
- It has grown to >100 researchers, fellows, and interns now



2012 (continued)

- Herbert Bos was appointed a full professor in Computer Systems
- His research was about computer security
- Six of his Ph.D. students have won the ACM Roger Needham Award for the best systems thesis in Europe
- In 2024, he received an ERC Advanced Grant



2012 (continued)

- Jaco de Bakker passed away on 13 Dec. 2012 at 73
- Obituaries
  - https://eatcs.org/index.php/component/content/article/1-news/1492-obituary-for-jaco-de-bakker-1939-2012
  - https://www.cwi.nl/en/news/2012/copy2_of_default-page/
  - https://resources.illc.uva.nl/LogicList/newsitem.php?id=5663



2012 (continued)

- Aerial photo showing where our building (NU building) would be



Ca. 2013

- We had a faculty meeting about switching all courses to English
- Maarten asked if there was anyone who couldn't lecture in English
- No one dared to raise his or her hand
- So, the idea was unanimously accepted by all the professors
- We started in September
- The number of enrolled students doubled, with many from abroad



2013 (continued)

- Computer systems barbeque in the tuinzaal (and outside it)



2014

- Me in my office just prior to retiring





2014 (continued)

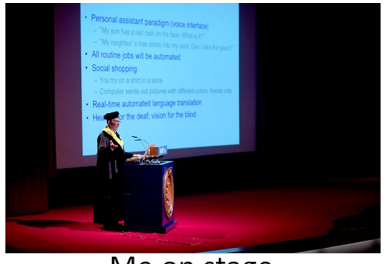
- I retired in Oct. 2014
  - I was a member Netherlands Royal Academy (KNAW) (1994)
  - Fellow of the ACM (1996) and Fellow of the IEEE (1998)
  - I received the ACM System Software Award for MINIX (2024)
  - Recipient of the ACM Karlstrom and IEEE Mulligan Awards
  - I won TAA Texty and McGuffey Awards for Outstanding Textbooks
  - I received two honorary doctorates
  - Lifetime achievement awards:
    - Eurosys Lifetime Achievement Award
    - USENIX Flame Award
    - IEEE Tech. Comm. on Distributed Processing Award
  - I gave 40 keynotes at conferences and 125 colloquia



2014 (continued)

- 1000 people came to my retirement event in the aula

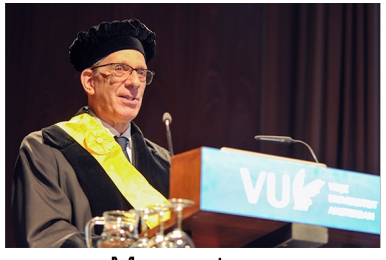

Entering the aula



Me on stage



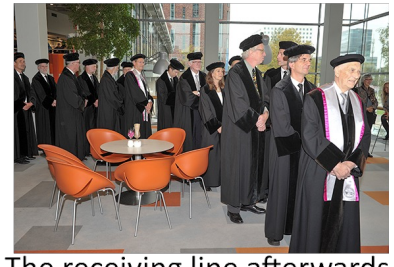
Me on stage



Me on stage

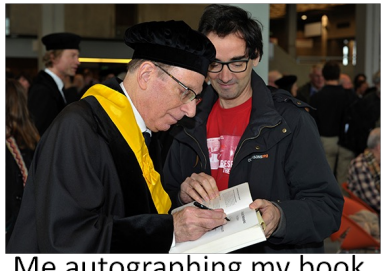

Part of the audience


After my lecture


The receiving line afterwards


Mathisca, Gerke, Frances, me


Willem van der Poel & me


Me autographing my book


The MINIX team


Frans Kaashoek, me, Robbert v. Renesse

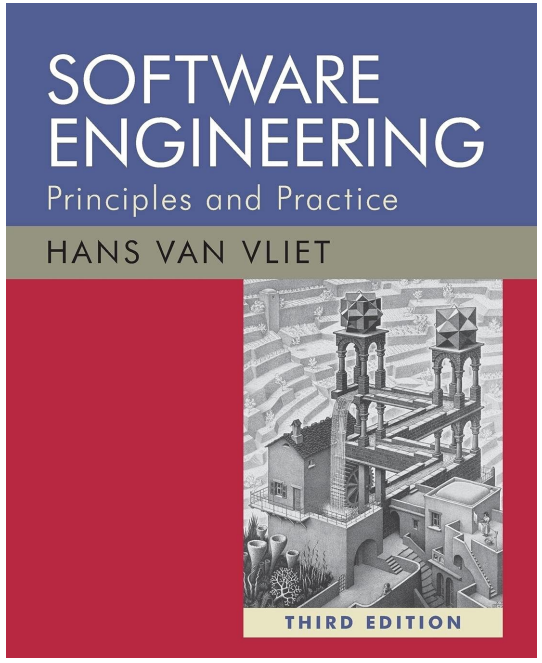
- Henri became head of the Computer Systems Section

2014 (continued)

- My Ph.D. students
  - Sape Mullender (1985)
  - Henri Bal (1989)
  - Robbert van Renesse (1989)
  - Erik Baalbergen (1992)
  - Frans Kaashoek (1992)
  - Leendert van Doorn (2001)
  - Philip Homburg (2001)
  - Arno Bakker (2002)
  - Gerco Ballintijn (2003)
  - Michel Oey (2005)
  - Bogdan Popescu (2007)
  - Melanie Rieback (2008)
  - Jorrit Herder (2010)
  - Srijith Nair (2010)
  - Stefano Ortolani (2013)
  - Cristiano Giuffrida (2014)
  - Raja Appuswamy (2014)
  - Guido van 't Noordende (2015)
  - Tomas Hruby (2016)
  - Erik van der Kouwe (2016)
  - David van Moolenbroek (2016)
  - Dirk Vogt (2019)

2014 (continued)

- Hans van Vliet retired in 2014
- He was editor-in-chief of the *Journal of Systems and Software*
- He wrote a book on software engineering

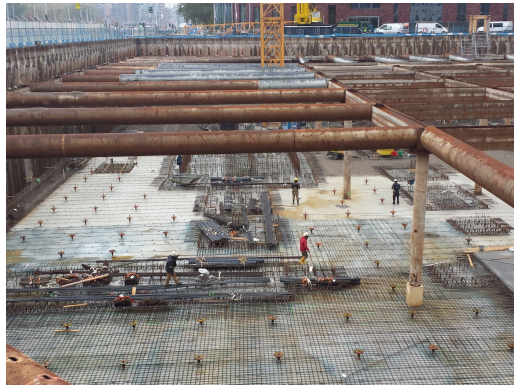


2014 (continued)

- Hans' Ph.D. students:
  - Geert de Haan (2000)
  - Frank Niessink (2000)
  - Bastiaan Schonhage (2001)
  - Jacco van Ossenberuggen (2001)
  - Martijn van Welie (2001)
  - Nico Lassing (2002)
  - Bert Bongers (2006)
  - Cristina Chisalita (2006)
  - Johan Hoorn (2006)
  - Joost Schalken (2007)
  - Henk Koning (2008)
  - Remco de Boer (2009)
  - Rik Farenhorst (2009)
  - Viktor Clerc (2011)
  - Qing Gu (2011)
  - Bastiaan van der Raadt (2011)
  - Eltjo Poort (2012)
  - Adam Vanya (2012)
  - Maryam Razavian (2013)
  - Christina Manteli (2014)
  - Damian Tamburri (2014)
  - Klaas de Graaf (2015)
  - John Klein (2017)
  - Martin van de Berg (2019)

2014 (continued)

- Construction on our new building was started in 2014
- It was delivered in 2018 casco: only the outer shell and supports








2015

- Patricia Lago was appointed full professor of Software Engineering
- She established the Software and Sustainability section
- In 2022, she received an honorary doctorate from the Norwegian University of Science and Technology



2017

- The Faculties of Science and Life Sciences were merged
- The merged faculty was called the “betafaculteit”
- In effect biology was demoted into a Dept. within the Fac. of Science
- The merged faculty had six departments
  - biology, chemistry, computer science, earth science, math, physics
- We were sort of back to where we were 30 years ago
- In 2025, the betafaculteit had over 10,000 students
- It was far and away the biggest faculty at the VU
- But at least we were a full-blown department, equal to the others

2017 (continued)

- Photo of NU building Jan. 2017



2017 (continued)

- Alexandru Iosup was appointed a full professor of Computer Sys.
- His research was about massive computer systems
- He was a member of the Young Academy



2017

- Jan Treur retired 12 Dec. 2017
  - He got the Brain Inspired Cognitive Architecture Award (2022)
  - He got the Research.com Computer Science in the Netherlands Leader Award in 2024 & 2025



2017 continued

- Jan's Ph.D. students (page 1)
  - Paul Veerkamp (1992)
  - Rob Walker (1992)
  - Peter Lucas (1996)
  - Joeri Engelfriet (1999)
  - Mark Sloof (1999)
  - Niek Wijngaards (1999)
  - Wouter Wijngaards (2002)
  - Tibor Bosse (2005)
  - Alexi Sharpanskykh (2008)
  - Annerieke Heuvelink (2009)
  - Charlotte Gerritsen (2010)
  - Zulfiqar Memon (2010)
  - Ghazanfar Siddiqui (2010)
  - Peter-Paul van Maanen (2010)
  - Azizi Aziz (2011)

2017 continued

- Jan's Ph.D. students (page 2)
  - Syed Waqar Jaffry (2011)
  - Matthijs Pontier (2011)
  - Fiemke Both (2012)
  - Muhammad Umair (2012)
  - Natalie van der Wal (2012)
  - Rianne van Lambalgen (2012)
  - Robbert-Jan Merk (2013)
  - Nataliya Mogles (2014)
  - Arlette van Wissen (2014
  - Jeroen de Man (2016)
  - Rob Duell (2016)
  - Dilhan Thilakarathne (2016)
  - Altaf Abro (2017)
  - Adnan Manzoor (2017)
  - Julia Mollee (2018)
  - Seyed Amin Tabatabaei (2018)
  - Lenin Medeiros (2020)
  - Fakhra Jabeen (2022)
  - Nimat Ullah (2022)

2017 (continued)



Computer Systems Section

2018

- Hans Akkermans gave his valedictory lecture 11 Nov. 2018
  - He is the founding director of the Network Institute
  - He won European Innovation Awards in 1992 and 1998
  - In 2011, he won the $250K Innovation News Contest Prize
  - He is also active in Regreening Africa



2018 (continued)

- Hans' Ph.D. students
  - Jan Top (UT, 1992)
  - Anita Pos (UT, 1997)
  - Tom van Engers (2001)
  - Jaap Gordijn (2002)
  - Ziv Baide (2006)
  - Peter Mika (2007)
  - Syben de Kinderen (2010)
  - Syben de Kinderen (2010)
  - Alexander Pijpers (2010)
  - Koen Kok (2013)
  - Ivan Salvador Razo Zapata (2014)
  - Julie Birkholz (2015)
  - Nana Baah Gyan (2016)

2019

- Frank van Harmelen received a €20 million NWO Gravitation grant
- The project will run for 10 years
- It is about collaboration between humans and computers
- Application areas include health care, education, and science
- One goal is to write a paper with a computer as a major coauthor



2019 (continued)

- Old coffee room during the move to the new building





2020

- Campus with NU building



2020 (continued)

- NU building



2020 (continued)

- NU building in the foreground



2020 (continued)

- Koen Hindriks was appointed a full professor of AI
- His research is on social robots, multiagent systems, and human-robot interactions



2020 (continued)

- Mark Hoogendoorn was appointed a full professor of AI
- His research is about machine learning, especially for health
- In particular, he looks at efficiency, safety, using domain knowledge



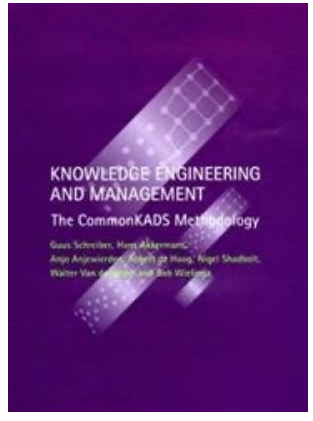
2020 (continued)

- Fabio Massacci was appointed a full professor of Computer Sys.
- His research is about security and software engineering
- He is interested in risk analysis, vulnerabilities, malware, and AI



2022

- Guus Schreiber gave his valedictory lecture on 24 Nov. 2022
  - His valedictory lecture was entitled: “On embracing errors”
  - He advanced knowledge engineering and the semantic Web
  - He played an important role in W3C, chairing the RDF group
  - He served as dean of the Faculty of Science 2016-2022
  - He wrote a book:
    - *Knowledge Engineering and Management*





2022 (continued)

- Guus' Ph.D. students
  - Michiel Klein (2004)
  - Borys Omelayenko (2005)
  - Laura Hollink (2006)
  - Willem van Hage (2009)
  - Mark van Assem (2010)
  - Anna Tordai (2012)
  - Davide Ceolin (2014)
  - Luit Gazendam (2015)
  - Marten Teitsma (2015)
  - Martine de Vos (2017)
  - Risto Gligorov (2018)
  - Chris Dijkshoorn (2019)
- Honorary promotor for
  - Sir Tim Berners-Lee (2009)

2022 (continued)

- The Forumzaal in the main building

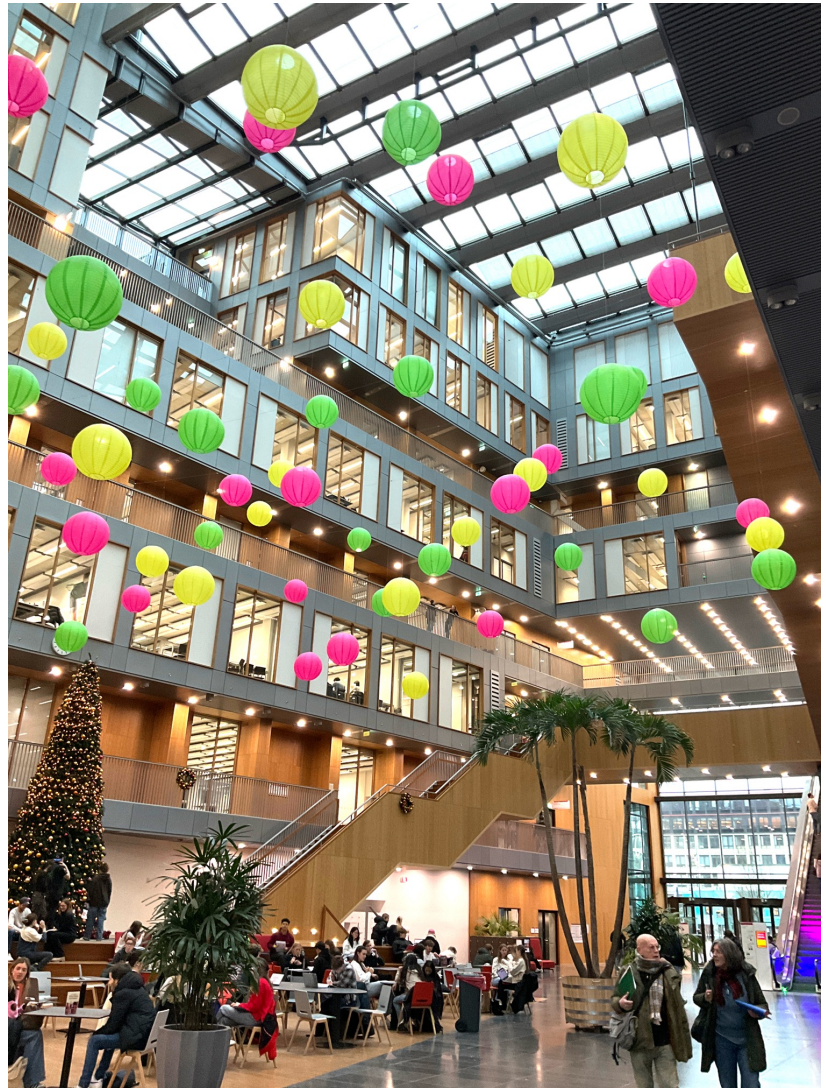


2022-2024

- Inside the new building



2022



2024

2025

- Jaap Heringa gave his valedictory lecture 10 Jan 2025
  - He was scientific director of the Netherlands Bioinformatics Ctr.
  - He was scientific director of the BioSB Research School
  - He was head of the Dutch node of the ELIXIR biodata network



2025 (continued)

- Jaap's Ph.D. students
  - Walter Pirovano (2010)
  - Nicola Bonzanni (2012)
  - Mohammed El-Kebir (2015)
  - Qingzhen Hou (2017)
  - Annika Jacobsen (2019)
  - Maurits Dijkstra (2021)
  - Ting Liu (2024)

2025

- Henri Bal retired 2 May 2025
  - He gave nine keynote talks at conferences
  - He was editor of five journals
  - He has been on over 50 conference program committees
  - He has won many best-paper awards at conferences
  - Google says Henri's 230 papers have been cited 14,643 times
  - His h-index = 63 (#21 of all Dutch CS researchers; top 5%)
- Henri's famous sayings:
  - Before deleting a file, always make a backup first
  - It's not easy to make ten computers do the work of one

2025 (continued)

- Henri's Ph.D. students

#	Year	Student
		Raoul Bhoedjang
		Tim Rühl
		John Romein
		Jason Maassen
		Rob van Nieuwpoort
		Ronald Veldema
		Werner Vogels
		Gosia Wrzesinska
		Kate Mullen
		Tom van der Schaaf
		Desmond Germans
		Mathijs den Burger
		Willem de Bruijn
		Georgios Portokalidis
		Maik Nijhuis
		Niels Drost
		Ela Krepska
		Nick Palmer
		Jacopo Urbani
		Ana-Maria Oprescu
		Roelof Kemp
		Ben van Werkhoven
		Pieter Hijma
		Kaveh Razavi
		Daniela Remenska
		Alexandru Uta
		Alessio Sclocco
		Vladimir Bozdog
		Chris Broekema
		Roshan Bharath Das
		Bram Veenboer
		Hamid Bazoubandi
		Bojan Simoski
		Vinod Nigade
		Leonardos Pantiskas

2025 (continued)

- Henri's retirement event



Henri Bal Herbert Bos



Ceriel Jacobs | Koen Langendoen | Henri Bal | Saniya Ben Hassen | Me | Tim Ruhl

2025 (continued)

- The new building



2025 (continued)

- Cristiano Giuffrida was appointed a full professor
- His primary research interest is hardware security
- He won
  - Roger Needham Award for best Ph.D. thesis in systems in Europe (2015)
  - Dennis Ritchie Award for best Ph.D. thesis in systems worldwide (2015)
  - Jochen Liedtke Young Researcher Award (2022)

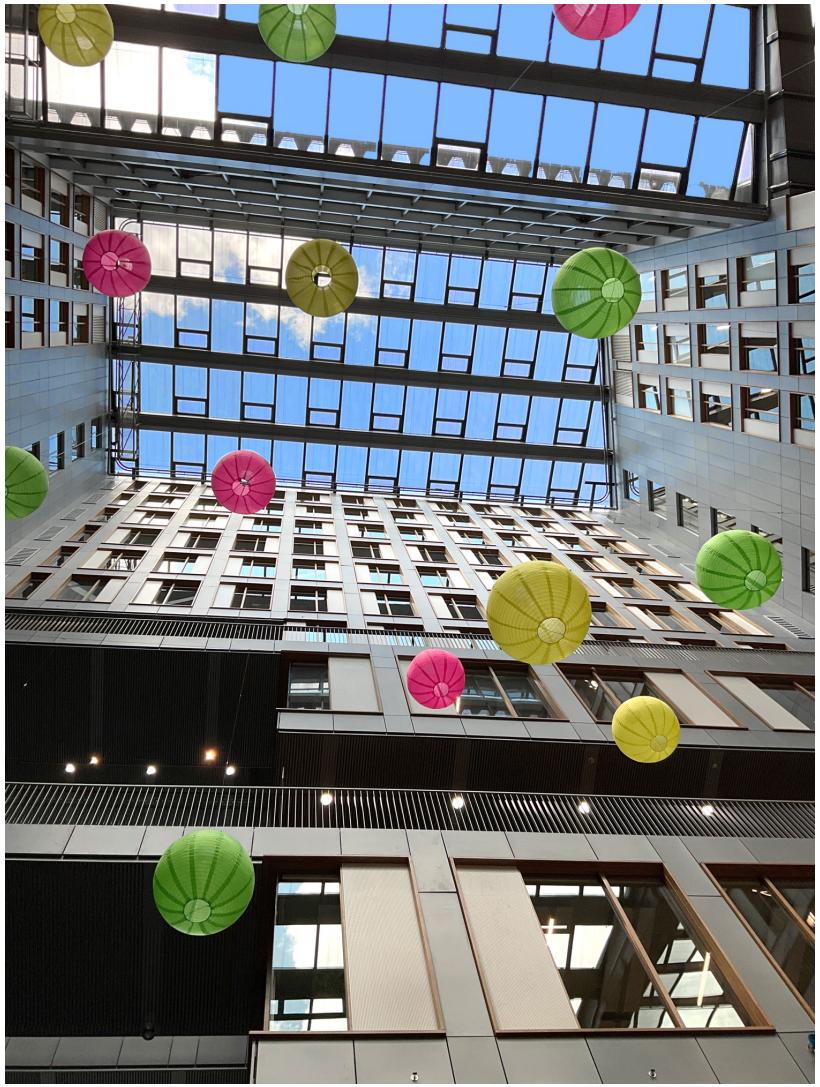


2025 (continued)

- Stefan Schlobach was appointed a full professor
- His primary research is on knowledge bases as complex systems
- He was in second place in the Billion Triple Challenge (2009)



2025 (continued)











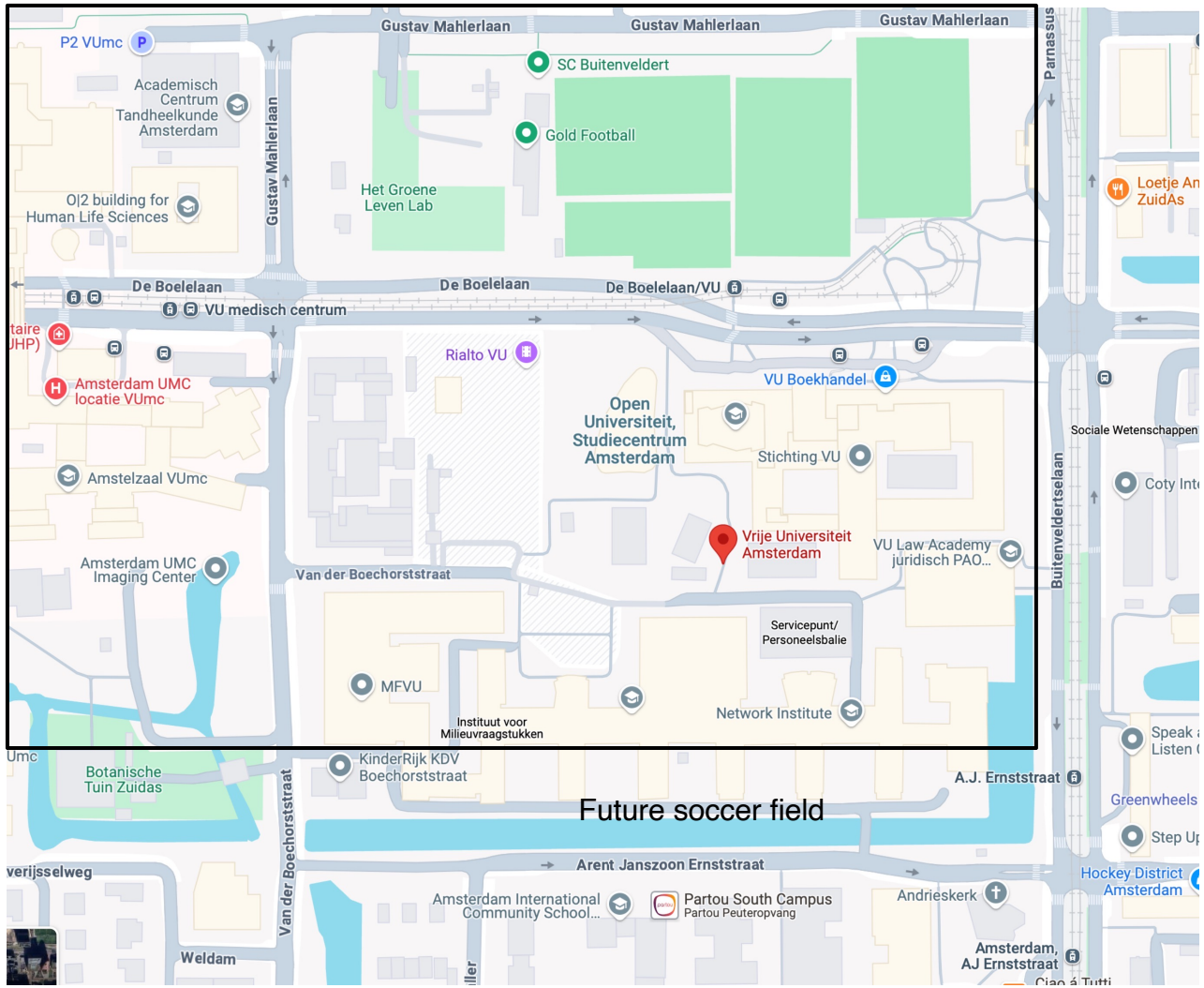
2025 (continued)

- Demolition of the W & N building began on 19 June 2025
- There was a fire in the main building just after construction
- To prevent fires, the W & N building was filled with asbestos
- After ca. 50 years it was decided to tear it down
- It will be replaced by a kids' soccer field as part of a trade with the city of Amsterdam (the VU got land north of De Boelelaan)
- Unfortunately, a major street will now divide the campus in half



2025 (continued)

Future campus



See: https://vu.nl/en/about-vu/more-about/phased-campus-renewal

Acknowledgements

- I would like to thank the following people for their help
  - Marielle van der Aa
  - Henri Bal
  - Hendrik Blauwendraat (via his book)
  - Dick Grune
  - Frans Kaashoek
  - Jim van Keulen
  - Jan Willem Klop
  - Mojca Lovrencak
  - Jan van Mill
  - Hans van Staveren
  - Maarten van Steen
  - Kees Verstoep
  - Tony Wasserman


That's all Folks!