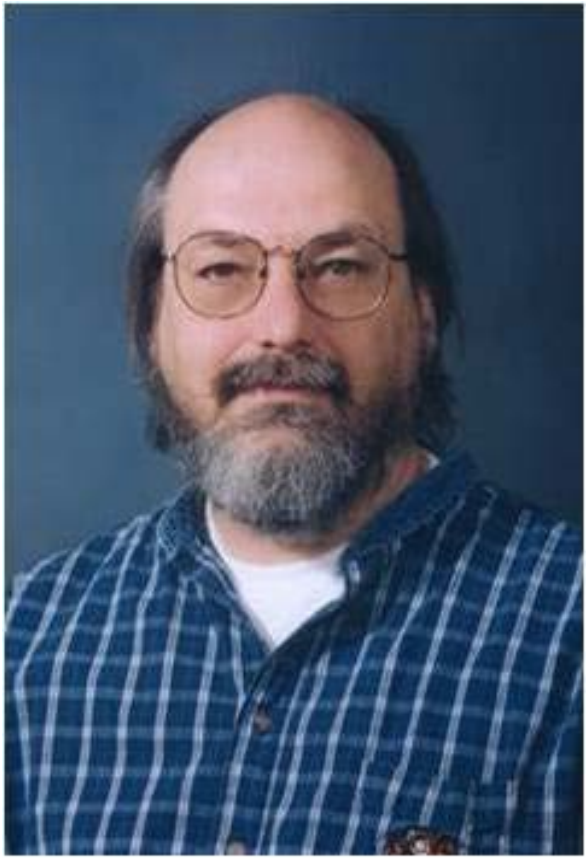
ACM Turing Awardees 1983

Dennis Ritchie and

Ken Thompson

Dennis Ritchie

Ken Thompson



Citation

DENNIS M. RITCHIE with **KEN THOMPSON**

(United States – 1983)

for

their development of

generic operating systems theory and specifically for the implementation of

the UNIX operating system

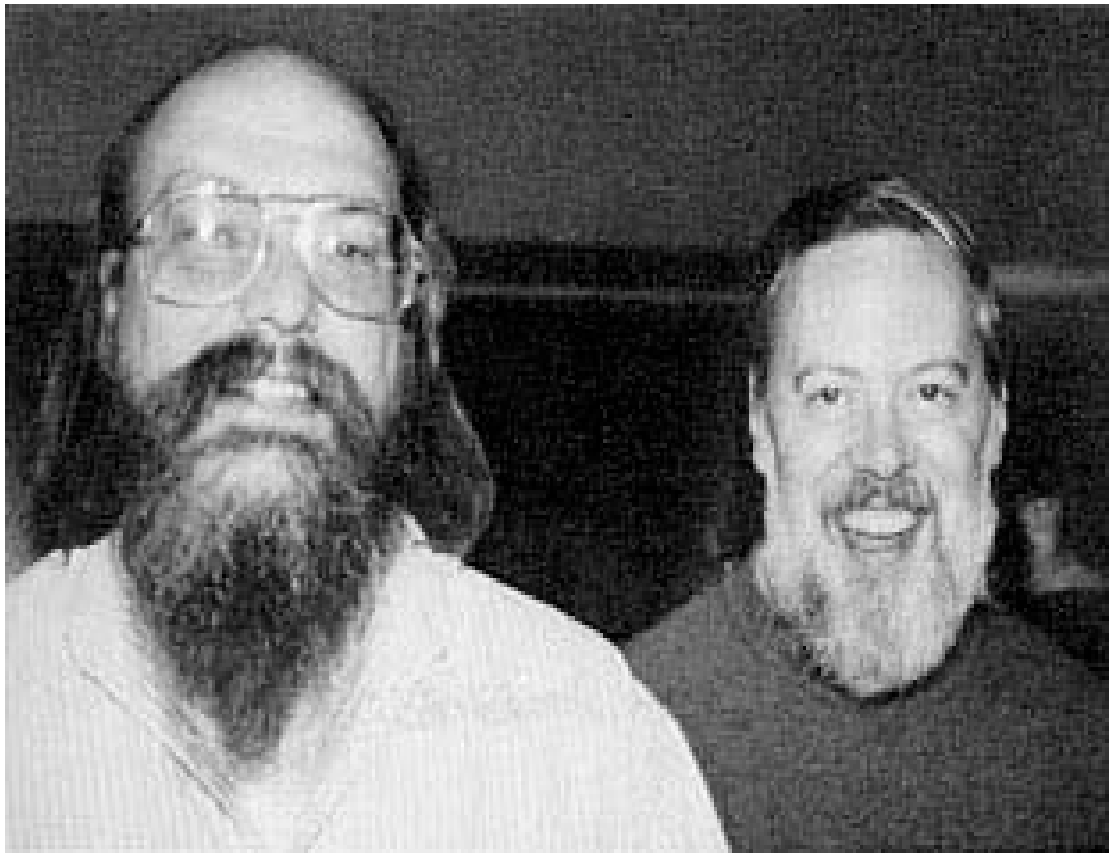
Turing Award selection committee

"The success of the UNIX system stems from its tasteful selection of a few key ideas and their elegant implementation.

The model of the UNIX system has led a generation of software designers to new ways of thinking about programming.

The genius of the UNIX system is its framework, which enables programmers to stand on the work of others."

"Pretty much everything on the web uses



those two things: C and UNIX," – Pike

Dennis MacAlistair Ritchie

Dennis MacAlistair Ritchie

- Born: 9 September 1941,
  Bronxville, New York, United States
- Son of Alistair Ritchie
  Switching systems engineer at Bell Laboratories.
- Education: Summit High School, New Jersey
  Bachelors degree in Physics and Applied Mathematics 1963,
  PhD in Mathematics in 1968,
  Harvard University

R – PhD thesis

Ritchie defended his PhD thesis on

"Program Structure and Computational Complexity" at Harvard

under the supervision of Patrick C. Fischer.

Career

- Started to work at the Bell Laboratories – Computing Sciences Research Center (referred to as Department 1127) in 1967.

- Retired as the head of Systems Software Research Department at Lucent Technologies, in 2007.

Contributions

- Father of the C programming language.
- Built the UNIX operating system (conceived by Thompson) using C.

‘C’ for Contributions

- Published his research paper on the C language - 1973
- Wrote a book with Kernighan, 5 years later.
- A key contribution to the portability of the UNIX system was the development of the C Programming Language.
- Early versions of the operating system were written in assembly language, but during the summer of 1973, it was rewritten in C.

Contributions - Unix

- "The UNIX Time-Sharing System" - Seminal paper with Thompson
- Originally presented at the Fourth ACM symposium on Operating Systems Principles in 1973 and a revised version in the July 1974 issue of Communications of the ACM.
- ACM award for best paper in programming languages and systems in 1974.

Contributions - Unix

- Bell Labs started giving away the UNIX source code – this gave rise to the modern open source movement.
- UNIX ported to different machines and platforms.

Award lecture

- “Reflections on Software Research”

  focused on the nature of the environment at Bell Labs that made development of UNIX possible.

Ritchie About UNIX

"It began in 1969 when ***Ken Thompson*** discovered a little-used PDP-7 computer and set out to fashion a computing environment that he liked."

" His work soon attracted me; I joined in the enterprise, though most of the ideas, and most of the work for that matter, ***were his***".

R about UNIX

- “Beyond technical considerations, there were sociological forces that contributed to its success”.
- “First, it appeared at a time when alternatives to large, centrally administered computation centers were becoming possible; the 1970s were the decade of the minicomputer”.

R about UNIX

- “Second, UNIX was first available on the PDP-11, one of the most successful of the new minicomputers”.
- “UNIX enjoyed an unusually long gestation period. During much of this time (say 1969-1979), the system was effectively under control of its designers and being used by them”.
- “Some outside contributions were substantial, for example those from the University of California at Berkeley”.

R about UNIX

- “It can be said that UNIX was written in the 70s to distill the best systems ideas of the 60s, and became the commonplace of the 80s”.

R on CS Research

- “Computer science research is different from these more traditional disciplines. Philosophically it differs from the physical sciences because it seeks not to discover, explain, or exploit the natural world, but instead to study the properties of machines of human creation”.

R on CS Research

- “More than anything else, the greatest danger to good computer science research today (1983) may be *excessive relevance”.*
- “The attention is flattering, but it can work to the detriment of good research”.
- “The best professors, instead of teaching bright students, join start-up companies, and often discover that their brightest students have preceded them”.

R on CS Research

Another UNIX ?!

- “If we can keep alive enough openness to new ideas, enough freedom of communication, enough patience to allow the novel to prosper, it will remain possible for a future Ken Thompson to find a little-used CRAY/I computer and fashion a system as creative, and as influential, as UNIX”.

Ritchie's Quotes

- *"Unix is basically a simple operating system, but you have to be a genius to understand the simplicity."*

About other technologies

- *“The kind of programming that C provides will probably remain similar absolutely or slowly decline in usage, but relatively, javascript or its variants, or xml, will continue to become more central”.*

About Linux

- *“I think the Linux phenomenon is quite delightful, because it draws so strongly on the basis that UNIX provided.*
- *Linux seems to be among the healthiest of the direct UNIX derivatives, though there are also the various BSD systems as well as the more official offerings from the workstation and mainframe manufacturers.”*

Personal

- *"Obviously, the person who had most influence on my career was Ken Thompson."*
- *"I've done a reasonable amount of traveling, which I enjoyed, but not for too long at a time. I'm a home-body and get fatigued by it fairly soon, but enjoy thinking back on experiences when I've returned and then often wish I'd arranged a longer stay in the somewhat exotic place."*

R with M. Douglas McIlroy

Head, Research Dept., Bell Labs.

"Dennis discussed at length the puzzle of how to fully exploit byte addressed machines.
He finally came up with a beautiful way to reconcile address arithmetic with indexing – *one of those inventions that is so right that once you see it you think you always knew it*".

McIlroy on R

- Another important, but largely overlooked, contribution of Dennis's was the page template for the Unix manual.
- Devised for the very first Unix manual, that template and the concise writing style that went with it, has stood the test of time.

Jeong Kim (the then President of Alcatel-Lucent Bell Labs)

- “Dennis was well loved by his colleagues at Alcatel-Lucent Bell labs.
- He was truly an inspiration to all of us, not just for his many accomplishments, but because of who he was as a friend, an inventor, and a humble and gracious man”.

Paul E. Ceruzzi, Computer historian

"Dennis Ritchie was under the radar. His name was not a household name at all, but… if you had a microscope and could look in a computer, you'd see his work everywhere inside."

Colleagues

- Kernighan. "We're all standing on Dennis' shoulders.“
- “Dennis still hasn’t gotten his due”.
- Kernighan and Rob Pike : “Ritchie was an unusually private person”.
- Pike : “I worked across the hall from him for more than 20 years, and yet I feel like I don’t know him all that well."

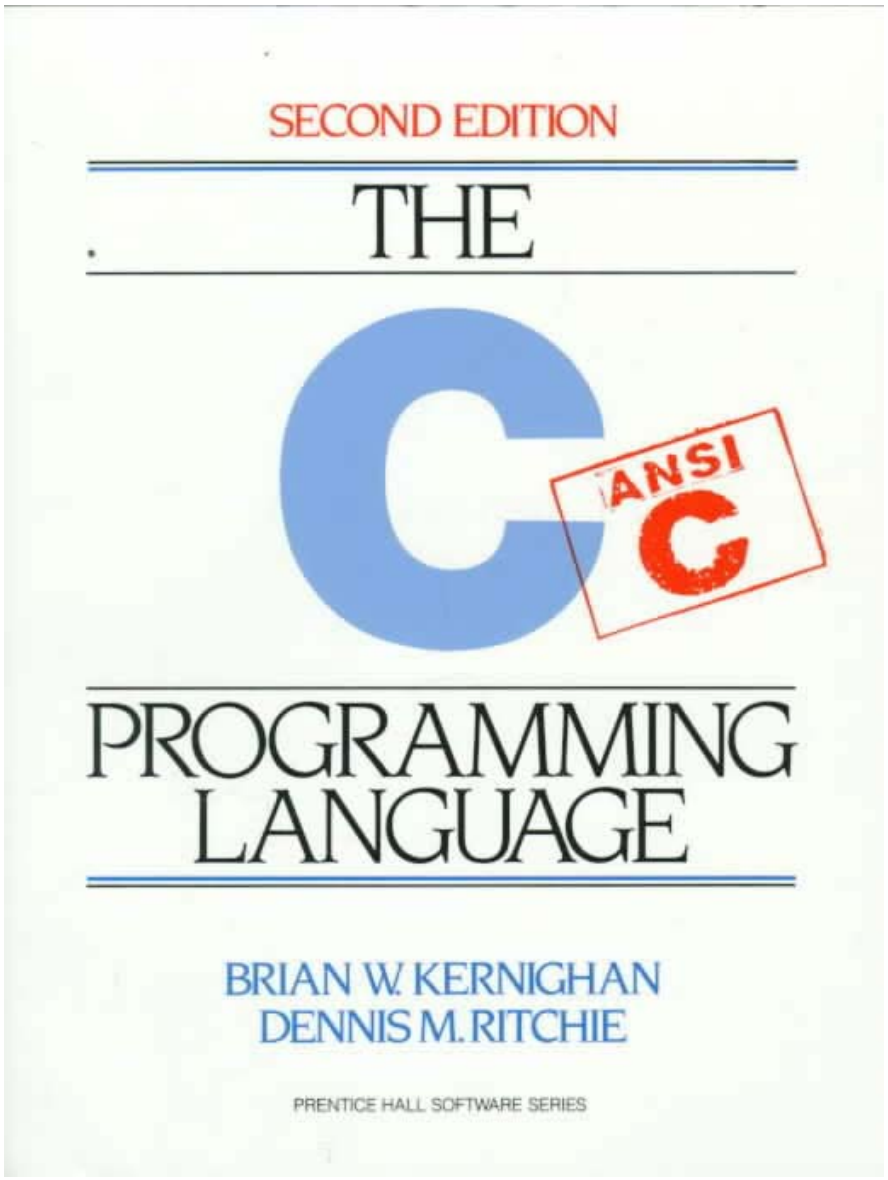
Awards

- The ACM award for the outstanding paper in systems and languages in 1974.
- The IEEE Emmanuel Piore Award in 1982.
- Bell Laboratories Fellow in 1983.
- The ACM Turing Award in 1983.
- The ACM Software Systems Award in 1983.
- Nominated to the United States National Academy of Engineering in 1988.
- IEEE Hamming Medal in 1990.
- IEEE Computer Pioneer Award (1994);
- Fellow of the Computer History Museum in 1997.
- ACM SIGOPS Hall of Fame Award (2005).

Awards

- The United States National Medal of Technology from President Bill Clinton for co-inventing UNIX operating system and the C programming language in April of 1999.
- Achievement Award from Industrial Research Institute for his valuable contribution to science and technology in 2005.
- Japan Prize for Information and Communications for UNIX operating system development in 2011.
- All of awards that Dennis Ritchie received were in conjunction with Ken Thompson.

The Book


SECOND EDITION
THE
C
ANSI
C
PROGRAMMING
LANGUAGE
BRIAN W. KERNIGHAN
DENNIS M. RITCHIE
PRENTICE HALL SOFTWARE SERIES

About K and R

- Pike :"That reference manual is a model of clarity and readability - justifiably a classic. I read it while sick in bed, and it made me forget that I was sick."

Last Years

- Lived alone at his home in Berkeley Heights, New Jersey
- Spent several years in frail health following treatment for prostate cancer and heart disease.
- Found dead on October 12, 2011.
- The cause and exact time of his death are unknown.
- Died a week after the death of Steve Jobs but was not given as much media coverage as Jobs.

In his memory

- The Fedora 16 Linux Distribution, which was released about a month after he died was dedicated to his memory.
- FreeBSD 9.0, released January 12, 2012 was also dedicated in his memory.

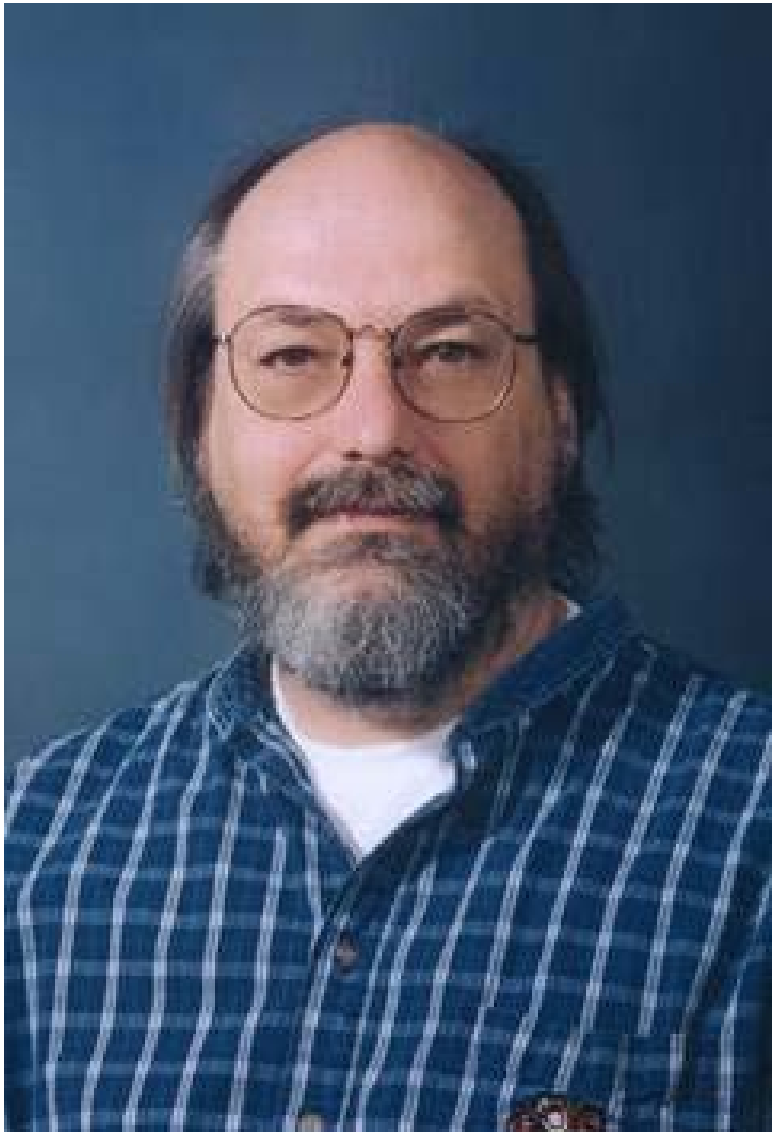
He lives on

- There is no doubt that Dennis Ritchie's contributions on the computing industry has significantly altered the core of the history of computing industry.
- His ideas still live on, at the center of modern operating systems design, in almost all new programming languages, and in every bit of open systems.

A tribute to R

- ‘Write in C’

Kenneth Lane Thompson



Kenneth Lane Thompson

- Born:

  February 4, 1943

  Louisiana, New Orleans, United States

- Education:

  Bachelors Degree 1965

  Masters in 1966 in Electrical Engg. and Comp. Sci. University of California, Berkeley,

Career

- Worked at the Bell Laboratories – Computing Sciences Research Center, Murray Hill, NJ 1966 - 2000
- UC Berkeley, 1975 (on Sabbatical).
- Entrisphere, Inc as a fellow until 2006.
- Google as a Distinguished Engineer till date.

Contributions

- B programming language, the direct predecessor to the C programming language
- Work on regular expressions -Thompson's construction
- Text editors QED for CTSS and ed
- Definition of the UTF-8 encoding
- Work on computer chess - creation of endgame table bases and the chess machine Belle

Contributions

- Development of Lucent's PathStar Access Server, which provides packet voice and data services over the Internet
- One of the creators /developers of Plan 9 and Inferno operating systems.
- ‘Go’ programming language.

Award Lecture

- “Reflections on Trusting Trust”

  To what extent should one trust a statement that a program is free of Trojan horses? Perhaps it is more important to trust the people who wrote the software.

Award Lecture

- In this lecture, Thompson shows how bugs can be introduced in programs using code snippets in C!
- “After trying to convince you that I cannot be trusted, I wish to moralize”.

Award Lecture

- “You can't trust code that you did not totally create yourself”.
- “No amount of source-level verification or scrutiny will protect you from using untrusted code”.
- “A well-installed microcode bug will be almost impossible to detect”.

On Hacking

- “Unauthorized access to computer systems is a serious crime”.
- “It is only the inadequacy of the criminal code that saves the hackers from very serious prosecution”.

Thompson About Turing award

- “I am receiving this honor for timing and serendipity as much as technical merit”.

T on Unix

"I did the first of two or three versions of UNIX all alone. And Dennis became an evangelist. Then there was a rewrite in a higher-level language that would come to be called C".

"He worked mostly on the language and on the I/O system, and I worked on all the rest of the operating system. That was for the PDP-11, which was serendipitous, because that was the computer that took over the academic community".

About UNIX

- “I think the major good idea in Unix was its clean and simple interface: open, close, read, and write”.

- When asked what he would do differently if he were redesigning the UNIX system. His reply: "I'd spell creat with an e."

About C

“ The C language grew up with one of the rewritings of the system and, as such, it became perfect for writing systems".

Ethics

- “The act of breaking into a computer system has to have **the** same social stigma as breaking into a neighbor's house”.
- “It should not matter that the neighbor's door is unlocked”.

About the Press

- “The acts performed by these kids are vandalism at best and probably trespass and theft at worst”.
- “They make heroes of vandals by calling them whiz kids”.
- “The press must learn that misguided use of a computer is no more amazing than drunk driving of an automobile”.

Quotes

- “One of my most productive days was throwing away 1000 lines of my code”.
- “I am a programmer”.
- “ I am a very bottom-up thinker”.
- “When in doubt, use brute force”.

Other Technologies

- “I view Linux as something that's not Microsoft-a backlash against Microsoft, no more and no less(1999)”.
- “I can't really tell whether the quality has gotten better or not [since 1999]. But certainly the reliability has gotten better”.[2009]
- “FORTRAN was the language of choice for the same reason that three-legged races are popular”.
- “SCCS, the source motel! Programs check in and never check out!”

Society

- “We know we cannot change the past and we cannot make up for the wrongs of slavery. But we can learn from our past and begin a stronger dialogue about slavery and the experience of African Americans in our country”.

About Ritchie

- “Our collaboration has been a thing of beauty”.
- “We collaborated every day. There was a lunch that we went to. And we'd talk over lunch. Then, at night, we each worked from our separate homes but we were in constant communication. In those days, we had mail and writ (pronounced 'write'), and writ would pop up on your screen and say there was a message from so-and-so”.

About R…

- “And we discussed things from home with writ. We worked very well together and didn't collaborate a lot except to decide who was going to do what. Then we'd run and very independently do separate things. Rarely did we ever work on the same thing”.

About R…

- “In the ten years that we have worked together, I can recall only one case of mis-coordination of work. On that occasion, I discovered that we both had written the same 20-line assembly language program. I compared the sources and was astounded to find that they matched character-for-character. The result of our work together has been far greater than the work that we each contributed”.

About R…

When asked whether there was any concept of looking at each other's code or doing code reviews, his reply, “We were all pretty good coders”.

Doug McIlroy on T

- “Ken and Dennis have unerring design sense. They write code that works, code that can be read, code that can evolve”.
- “This is the Unix philosophy: Write programs that do one thing and do it well. Write programs to work together.”

T’s many interests

- Research interests:

  Voice recognition, Language, Searching, Security, Games

- Other interests:

  Cars, Airplanes, Sumo wrestling

  Chess !!

To young researchers- Thompson

- “Research and development are two different things. Development has clear goals, but research is goal-less because it is the act of discovering something new. My advice to researchers is to continue enjoying the research at hand....UNIX resulted from research into new things we were merely interested in. We were very lucky it turned out to be very fruitful.”

Awards

- Nominated to the United States National Academy of Engineering in 1980.
- Tsutomu Kanai Award (1999)

(major contributions to the state-of-the-art distributed computing systems and their applications).

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- M. Douglas McIlroy, “Remarks for Japan Prize award ceremony for Dennis Ritchie”, May 19, 2011, Murray Hill, NJ.

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Thank you

Uma Maheswari &
Ranjani Parthasarathi