



The story behind

The First SIGOPS Dennis M. Ritchie Doctoral Dissertation Award

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The idea for creating the Dennis M. Ritchie Doctoral Dissertation Award came to me on October 25th at the banquet of the 23rd ACM Symposium on Operating Systems Principles held in Portugal. Ritchie had died two weeks before. Steve Jobs had died a week before that. Both were pioneers of the computer revolution, and both succumbed to cancer within days of one another. But while Jobs' death was all over the news, the death of Ritchie did not get the coverage it deserved. Even at the banquet, where many speeches were held, Ritchie's death received little attention, and I felt badly that none of us had gone through the trouble of preparing a eulogy.

Then, during the board meeting held directly after the banquet, SIGOPS chair Jeanna Matthews mentioned something that would give me an opportunity to relieve my feelings of guilt: there was money in the budget with which to do something interesting, such as creating an award. SIGOPS had been lacking an annual doctoral dissertation award like those offered by other ACM communities such as the SIGCOMM Doctoral Dissertation Award, the SIGPLAN John C. Reynolds Doctoral Dissertation Award, and the SIGMOD Jim Gray Doctoral Dissertation Award. Even Eurosys, the European chapter of SIGOPS, had the EuroSys Roger Needham Ph.D. Award.

After the meeting I stepped up to Jeanna and told her about my idea. She liked it, and I thought I had done my part. However, I was to find out that one should not ask what SIGOPS can do for you, but what you can do for SIGOPS. Fran Spinola, Program Coordinator at ACM, told us that proposals for 'named' awards are much more involved than unnamed service awards, both in the substance of the materials required, and in the committee process, and can take much longer. The SIG Governing Board (all SIG Chairs) first reviews the proposal, and then the Executive Committee of the SIG Governing Boards makes a recommendation to the ACM Awards Committee. Finally, ACM Council votes to approve the award. Each of these levels can send the proposal back for changes, and because some of these committees meet only rarely, a single mistake can cause approval to be delayed by a year or more.

Jeanna and I were apparently slightly discouraged by this, as neither of us took further action. But in mid-February 2013, Mike Freedman suggested to Jeanna that SIGOPS create a best thesis award, and Jeanna asked me to take the lead. I agreed, thinking that we would still have enough time to put a proposal together, get the award approved by ACM, solicit nominations for the award, put a committee together, and select a winner before SOSOP to be held in October. We did in fact make that goal, but it wasn't without bumps in the road. This report chronicles various obstacles that we encountered along the way.

ACM has clear and sensible rules for a named award proposal. First, I needed to write about Dennis M. Ritchie (dmr). Ritchie, for a short time, was my boss: When I was at AT&T Bell Labs, Murray Hill in 1990, he became manager of BL1127 where we were working on Plan

9. Ritchie was a very private person, however, and I barely got to know him. I turned to the Web for information. Born in September 1941, he joined Bell Labs in 1967 and initially worked on Multics. In 1970 he started helping Ken Thompson with the second version of Unix. The idea was to do it in assembly and Fortran (the first version had been written entirely in assembly).

In order to make Unix code more portable, Ritchie developed the C programming language. Ritchie was the first to acknowledge shortcomings in the language. He described it as having “the power of assembly language and the convenience of assembly language.” Nonetheless, C was and continues to be ideal for systems programming, and many popular languages including C++, Java, C#, Javascript, and Objective C, are strongly based on C. His book *The C Programming Language* (aka “the K&R book”), co-authored with Brian Kernighan, is a must-read for any systems programmer.

While much of the elegance of the Unix interfaces is due to Thompson, Ritchie’s contributions to the success of Unix cannot be underestimated. They include the portability of Unix (thanks to the C language), countless device drivers, and many of the “man” pages that were first published in 1971. The seminal paper “The UNIX Time Sharing System” (Ritchie and Thompson, Communications of the ACM, Volume 17, Issue 7, July 1974) won the ACM Programming Systems and Languages Paper Award in 1975. In 1983, Ritchie and Thompson received the Turing Award for their development of generic operating systems theory.

Ritchie and Thompson went on to receive many more awards for this work, of which I will just mention a few here. In 1988, they were elected into the U.S. National Academy of Engineering. In 1990, Ritchie and Thompson received the IEEE Richard W. Hamming Medal. In 1997, both Ritchie and Thompson were made Fellows of the Computer History Museum. On April 21, 1999, Thompson and Ritchie received the National Medal of Technology from President Bill Clinton for co-inventing the UNIX operating system and the C programming language which, according to the citation for the medal, “led to enormous advances in computer hardware, software, and networking systems and stimulated growth of an entire industry, thereby enhancing American leadership in the Information Age.”

With all this ammunition, I knew it wouldn’t be hard to convince the various ACM committees to honor Ritchie with a named award. The trickiest part seemed securing funding for the prize. The rules require that enough money be secured to fund the prize for many years to come. In consultation with the SIGOPS board (George Candea, Dilma da Silva, and Jeanna) we decided on a \$2000 prize. While the original AT&T Bell Labs no longer exists, I contacted Rick Schlichting at AT&T Labs Research and Katie Guo at Bell Labs Alcatel Lucent, and both reacted extremely enthusiastically. Unfortunately, they could only commit to providing funding on an annual basis. ACM ended up agreeing to a plan in which AT&T Labs Research and Bell Labs Alcatel Lucent will try to each contribute \$2000 annually. \$3000 of these monies will go into an endowment fund. SIGOPS itself is responsible for whatever remains, as well as for a plaque.

Another ACM requirement for a named award is to obtain supporting letters. Everybody I asked enthusiastically supported the proposal and wrote a supporting letter. They are Ramón Cáceres (AT&T Labs Research), Jeff Dean (Google), Mike Freedman (Princeton University), Katie Guo (Bell Labs Alcatel Lucent), Frans Kaashoek (MIT),

Jeanna Matthews (Clarkson University), Eric Schmidt (Google), Emin Gün Sirer (Cornell University), and Andy Tanenbaum (Vrije Universiteit).

With a draft proposal, supporting letters, and funding in hand, I needed to fulfill one more requirement, which was to get permission from the Ritchie family. Brian Kernighan kindly put me in touch with Bill, Lynn, and John Ritchie, Dennis's siblings. The draft proposal that they received included the language "... in 1968, he received a PhD from Harvard under the supervision of Patrick C. Fischer, his doctoral dissertation being *Program Structure and Computational Complexity*." I had plagiarized this from Ritchie's Wikipedia page. Dennis Ritchie himself had written "I received Bachelor's and advanced degrees from Harvard University. [...] The subject of my 1968 doctoral thesis was subrecursive hierarchies of functions."

I was therefore rather surprised to receive the following response on March 13th from Bill Ritchie:

Brian Kernighan passed your proposal/request for a dmr award on to us as Dennis' siblings. It is a wonderful idea, we fully support it and we would love to stay in the loop.

There is one small matter we want to call your attention to, as a factual correction. It is our understanding that Dennis never actually was awarded a PhD. In her talk at Bell Labs [Alcatel Lucent] DMR Day, Lynn described the details of all this, it is possible that Harvard will now grant a posthumous doctorate if we pay some minor fee, but we think that in fact they did not grant it in 1968 or any other time. If you have info we don't have, we're all ears. Everything else in your proposal is thorough and accurate; we'd like to make sure that this info fits the true record also.

After a month of hard work and putting many other people to work on a proposal for naming a doctoral dissertation award after Dennis Ritchie, I found out that Ritchie apparently did not have a Ph.D. I was feeling slightly panicked because I wasn't sure how ACM was going to react to this. Lynn Ritchie kindly made the following suggestion:

What about [...] we substitute: 'Ritchie graduated from Harvard University with degrees in Physics and Applied Mathematics. Under the supervision of Patrick C. Fischer, his doctoral dissertation was 'Program Structure and Computational Complexity.'

After some discussion with Jeanna Matthews and checking that there was no requirement that the honoree has a Ph.D., I followed Lynn's suggestion and submitted the proposal. By the way, I highly recommend the YouTube video of Lynn's presentation in which she discusses the lack of Ph.D. (as well as many other entertaining presentations from "DMR Day").

The proposal then started on its journey through the various layers of approval within ACM. The final approval was not to come until the middle of June after ACM Council met. In the mean time I thought I would settle this "minor fee" for a posthumous Harvard doctorate and get Dennis Ritchie his Ph.D.

Initially it was not even clear that there was a thesis, and Patrick Fisher, Ritchie's advisor had passed away, coincidentally also in 2011. Lynn Ritchie contacted Prof. Fisher's wife Charlotte Froese Fisher, professor of computer science at Vanderbilt University. Charlotte managed to find a copy of the thesis, which had the names of the committee members penciled on it. One of those committee members, Dr. Sheila Greibach (UCLA), vaguely remembers a defense but has no documentation of it. I later learned that my Cornell colleague, Bob Constable, was very familiar with Ritchie's dissertation and had discussions with Ritchie about it at the time. Bob considered the work to be very strong and highly worthy of a PhD.

With the help of Greg Morrisett and Margo Seltzer at Harvard, I contacted various officials. It turned out that people at Bell Labs Alcatel Lucent had beaten me to the attempt, but Dean Mike Smith had turned down the request. There is no record of Ritchie having defended his thesis on file. From former Dean Harry Lewis I found out that the rule at Harvard is that posthumous degrees are granted only to people who have fulfilled all degree requirements before death and that distinction of the candidate is irrelevant. So was paying the minor fee. At this point, I threw in the towel, knowing that Dennis Ritchie actually would have enjoyed the irony of it all.

On June 19th 2013, ACM Council approved the establishment of the ACM Dennis M. Ritchie Doctoral Dissertation Award. With only four months to go to SOSR, I quickly posted a call for nominations with a deadline of August 1st with the help of SIGOPS Information Director Muli Ben-Yehuda. The call started as follows:

ACM SIGOPS is pleased to announce the SIGOPS Dennis M. Ritchie Doctoral Dissertation Award to recognize research in software systems and to encourage the creativity that Dennis Ritchie embodied, providing a reminder of Ritchie's legacy and what a difference one person can make in the field of software systems research.

Because time was going to be tight, I put together a selection committee before the August 1st deadline, with Steve Gribble, YY Zhou, and myself acting as chair.

On August 1st I had received 5 nominations, which I understand is a fairly normal number for an award like this. Unfortunately I had to face another obstacle: all three of us on the committee were conflicted with one or another of the nominations, and the rules that I created myself required me to fire the entire committee, including myself, and put together a new one. Thankfully, I was quickly able to get Steven Hand, Andrew Myers, and Frans Kaashoek, with Frans acting as chair.

The committee reached a decision on September 26th. They found that two of the five theses stood out above the others and wanted to award a winner and an honorable mention. The SIGOPS board and I all thought this was an excellent idea and so we ended up with two winners. In the end, it was my great pleasure to call the two winners on the phone and to present the awards at the 2013 SOSR conference.

The Honorable Mention went to Roxana Geambasu, now assistant professor at Columbia University, for her University of Washington thesis titled "Regaining Control over Cloud and Mobile Data". The following quote comes from one of the supporting letters:

"[This] thesis was the first to broadly consider the privacy risks in cloud and mobile computing. The art of her research is in showing how to transform a seemingly impossible problem into a practically solvable one, using techniques from both systems and cryptography."

The first SIGOPS Dennis M. Ritchie Doctoral Dissertation award went to Mona Attariyan, now at Google, for her University of Michigan thesis titled "Improving Software Configuration Troubleshooting with Causality Analysis." From a supporting letter:

"I like the dissertation's focus on important problems and pragmatic use cases, rather than simply demonstrating the effectiveness of new "systems" techniques on artificial problems or benchmarks. These tools can be used in reasonably small amounts of time by non-experts, and the dissertation attacks configuration problems from several different angles using tools with a spread of performance vs. precision tradeoffs."

Although Dennis Ritchie still does not have a Ph.D., I am extremely pleased with the outcome, as I am certain he would have been as well. I will end this report with thanking all the many people mentioned above, as well as Rob Pike (Google), Irene Frawley (ACM), Ann Lane (ACM), the dedicated people who serve on the ACM committees who read and discussed the proposal, Lesley Greene (my wife), and the folks at AT&T Labs Research and Bell Labs Alcatel Lucent.