A Biography of Fernando Corbató, recipient of the 1990 Turing Award

Fernando José Corbató, nicknamed 'Corby' by his colleagues and friends, was born on the 1st of July 1926 in Oakland, California on the west coast of the USA. His parents were both studying postgraduates at the University of California, Berkeley at the time of his birth.
Early in Corbató's childhood his family moved south to Los Angeles, where his father took up his post as a professor of Spanish literature at University of California, Los Angeles. When World War II broke out in 1941 Corbató, who was in high school at the time, graduated early and enlisted in the US Navy at age 17, becoming an electronics technician. After the war he applied and entered the California Institute of Technology and received a Bachelor of Science in Physics in 1950.

Corbató then went to MIT for his post-graduate studies. While a graduate assistant at MIT, he was encouraged by Prof. Philip M. Morse to become an expert in the use of the Whirlwind computer for physics computations. The Whirlwind computer, while revolutionary for it's time, was notoriously cumbersome as only one person could use it at a time and you had to sign up to use it in advance. Upon the completion of his Ph.D. in physics in 1956 he became a member of Prof. Morse's research staff in the newly formed MIT Computation Center. He served as Deputy Director of the Computation Center from 1958 to 1965. As computer use increased rapidly at MIT in the late 1950s, Corbató became increasingly familiar with their constraints.

The Computation Center where Corbató worked had an IBM 704 which was run in batch-mode, where professional engineers ran previously-submitted computational tasks by other members of staff. Between the IBM 704 and the Whirlwind computer both approaches required the programmer to wait for hours or days for their programs to be ran, and they could also possibly have to wait longer if the job required to be re-run due to an error in the code.

There was a need for a more efficient method of processing computational tasks and so 'time-sharing' was proposed at the end of the 1950s. The general idea behind 'time-sharing' was that several users would be connected to the same computer at the same time and the computer would have the ability to switch rapidly between their programs, running one for a short time, then another. Each user would interact with their program using a terminal.

In order for this 'time-sharing' idea of computing to work, the computer would have to be able to interrupt a running job, save it in it's current condition, bring up a different job, and start it up where it had been previously stopped. Certain computers had such abilities at the time, but scientific machines like the MIT Computation Center's IBM 709 did not. Also, the overseeing program that switched between users had to be protected from being overwritten by a user program operating outside its bounds.

Corbató, alongside Bob Daley and Marjorie Merwin-Daggett proposed a small project on their IBM 709 that would demonstrate their 'time-sharing' idea of computing. They built the initial version of the Compatible Time-Sharing System (CTSS) and gave a demonstration of it in MIT in November of 1961. It saved suspended programs onto four magnetic tape drives, providing simultaneous access for four time-sharing users who used modified terminals where users protected their individual work using passwords, the first ever implementation of passwords in a programming sense. CTSS was formally described in a paper presented by Corbató, Merwin-Daggett and Daley at the 1962 Spring Joint Computer Conference in San Francisco, California. Many people today view CTSS as the first steps in what would eventually lead to both the UNIX and LINUX operating systems.

In the Autumn of 1962, Joseph Licklider and MIT Prof. Robert Fano began Project MAC, an interdepartmental laboratory at MIT focused on time-sharing and funded by the Advanced Research Projects Agency of the US Department of Defense. Corbató was chosen to lead Project MAC's Computer System Research group. He managed a group of about 30 people, coordinated with similar sized teams from Bell Laboratories and General Electric, which established design directions and priorities for Multics, a second generation version of CTSS implemented using IBM's PL/1 programming language. Many view his important contributions as creating a development culture that emphasized open communication and collaboration, thorough review, and iterative improvement. He led the development of Multics for well over a decade, starting in 1963 and not leaving this position until the late 1970s.

Corbató was appointed Professor of Electrical Engineering at MIT in 1965. He also later served as Associate department head for Computer Science and Engineering at MIT for the years 1974-1978 and 1983-1993. He retired from all academia in 1996.

Dennis Ritchie, co-designer of the UNIX O.S said the following when asked of the impact Corbató's CTSS had on his UNIX O.S: "In most ways UNIX is a very conservative system. Only a handful of its ideas are genuinely new. In fact, a good case can be made that it is, in essence, a modern implementation of MIT's CTSS. This claim is intended as a compliment to both UNIX and CTSS. Today, more than fifteen years after CTSS was born, few of the interactive systems we know of are superior to it in ease of use; many are inferior in basic design."

Corbató who is still alive today at the age of 91 is also known for 'Corbató's Law' which states: "The number of lines of code a programmer can write in a fixed period of time is the same, independent of the language used."

Though Corbato will most likely be remembered for his invention of the 'password' his contributions to the origins of the LINUX and UNIX operating systems should not be overlooked as they would most likely not exist today if it were not for his invention of the CTSS.

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