**Software Engineering - Report**

**Edsger Wybe Dijkstra – 1930-2002**

Edsger Djikstra was a Dutch computer scientist and is widely regarded as a pioneer in the field of computer programming. He was born in May of 1930 in Rotterdam and passed away 72 years later. During the course of these 72 years he made many significant contributions to a number of different areas within the discipline of computer science. Dijkstra’s ideas around structured programming helped to develop and shape software engineering into the professional discipline it is today.  
 Dijkstra was brought up in an environment that thoroughly nurtured his intellect. His father was a chemist and was president of the Dutch Chemical Society while his mother was a mathematician. In 1942, when Dijkstra was 12 years old he entered the Gymnasium Erasminium, a high school for extremely bright students, and he was educated in a number of different subjects including: Greek, Latin, French, German, English, biology, mathematics, and chemistry. Edsger initially had considered a career in law but upon his parent’s recommendation he went on to study mathematics and physics, and then on to theoretical physics, at the University of Leiden.  
 In the early 1950’s electronic computers were not common household items like they are today, there was no such thing as the study of computer science, there was no sound body of knowledge that could support it as an intellectually respectable discipline. However, this was about to change. In 1952 Edsger Dijkstra was offered a job by his college supervisor, Adriaan van Wijngaarden, who at the time was the director of the Computation Department at the Mathematical Center in Amsterdam. Edsger accepted his proposition and officially became the Netherland’s first ‘programmer’. In ‘The Humble Programmer’, a short text written by Dijkstra in 1972 he says “in 1957, I married and Dutch marriage rites require you to state your profession and I stated that I was a programmer. But the municipal authorities of the town of Amsterdam did not accept it on the grounds that there was no such profession. And, believe it or not, but under the heading ‘profession’ my marriage act shows the ridiculous entry ‘theoretical physicist’!”.  
 Edsger Dijkstra helped to shape the discipline of computer science from both an engineering and an academic perspective. His work on concurrent and graph algorithms is regarded as some of the most influential work in the field to date. His most famous ‘Dijkstra’s algorithm’ finds the shortest path between nodes in a graph. Dijkstra illustrated his problems with diagrams and real-life situations, for example the ‘Dining Philosophers Problem’ which is used to illustrate synchronisation issues and techniques for resolving them and is often used in concurrent algorithm design, and the ‘Banker’s Algorithm’, a resource allocation and deadlock avoidance algorithm which was developed in the design process for the THE Multiprogramming System. He used examples and illustrations such as this to show that the discipline is based around practical problem solving. The quote “Computer science is no more about computers than astronomy is about telescopes” is famously attributed to Dijkstra.  
 The THE Multiprogramming System was a computer operating system that was designed by a team led by Edsger Dijkstra and was published in 1968. It was never named, THE is simply an acronym for ‘Technische Hogeschool Eindhoven’ (or ‘Eindhoven University of Technology’, for those of you whose Dutch isn’t up to scratch). The THE system was written in assembly language for the Dutch Electrologica X8 computer and was primarily a batch system that supported multitasking. It introduced the first forms of software-based paged virtual memory which freed programmers from having to use actual physical locations on the drum memory.   
 While Dijkstra is commended more for his pioneering work on concurrent programming and distributed computing, he did help lay the foundations for the birth and progress of software engineering as a professional discipline. The field of software metrics, which is used to quantifiably measure the quality and performance of software in order to provide schedules, budget plans, cost estimates etc., is often considered a direct influence of the structured programming movement on software engineering in the 1970’s in which Edsger Dijkstra played a big role.  
 Dijkstra received the Turing Award in 1972 for his contribution to the field of computer science. For the development of the ALGOL, a high-level programming language which has become a model of clarity and mathematical rigor and also for being one of the principal proponents of the science and art of programming languages in general, greatly contributing to our understanding of their structure, representation, and implementation. He was commended for his fifteen years of publications extending from theoretical articles on graph theory to basic manuals, expository texts, and philosophical contemplations in the field of programming languages.  
 Dijkstra was renowned for his ‘correctness’ approach to programming. He believed that programs should be composed correctly and not just debugged into correctness. He stated that “if you want more effective programmers, you will discover that they should not waste their time debugging, they should not introduce the bugs to start with”. He was admired by many throughout his career and inspired others to follow his footsteps, paving the way for modern day computer scientists. Alexander Stepanov, primary designer and implementer of the C++ Standard Template Library, in an interview with Graziano Lo Russo of *Edizioni Infomedia srl*, is quoted saying that “I also discovered books of two great computer scientists from whose work I learned the scientific foundation of my trade: Donald Knuth and Edsger Dijkstra. Knuth taught me the answers. Dijkstra taught me the questions. Time and time again I come back to their works for new insights.”  
 Dijkstra moved to Austin, Texas in 1980 and was soon appointed to Schlumberger Centennial Chair in Computer Sciences at the University of Texas at Austin from 1984 until his retirement in 1999. He was one of the most influential computer scientists of the founding generation. Shortly before his death in 2002, he received the ACM PODC Influential-Paper Award in distributed computing for his work on self-stabilization of program computation. This annual award was renamed the Dijkstra Prize (or, ‘The Edsger W. Dijkstra Prize in Distributed Computing’) the following year, in his honour.

**-Philip Reilly**

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