Biography of Edsgar W. Dijkstra

Student Number: 19335552

Edsgar Wibe Dijkstra was a very influential person in the field of computer science in the later half of the 20th century. He was a computer scientist, a programmer and a software engineer and pioneered many aspects of these fields creating many algorithms and solutions to problems that we still use today. He also had a degree in theoretical physics from Leiden University and was the first person from outside the United States and The United kingdom to be awarded the Turing Award. Dijkstra was born in May of 1930 in Rotterdam in the Netherlands to a chemist father and a mathematician mother. He had originally wanted to study law hoping to represent the Netherlands in the United Nations but was after graduating from school he was convinced to do otherwise by his scientist parents who suggested he study mathematics and physics which led him to get his degree in theoretical physics. Dijkstra was a simple life who led a humble life with his wife in their small home in Nuenen. He did not have a TV or telephone at home. He was a fan of classical music and attended many classical concerts. He died in August of 2002 at age 72 after a long battle with cancer.

Dijkstra was a university professor most of his life, teaching mathematics in the Eindhoven University of Technology for 12 years and was a research fellow at Burroughs Corporation from 1973 to 1984. This reflects the fact that valued computer science from the academic point of view and took great interest in teaching it as a branch of mathematics as outlined by his paper called “On the Cruelty of Really Teaching Computer Science” which was published in 1988. Computer science was yet to be seen as a science by the academic world and public officials and was seen as more of an art or “craft”. During the software crisis of the 1960s, Dijkstra was one of the very few academics who pushed for a new approach to programming and software design. His background in mathematics and physics helped him push for computer science to be accepted as a scientific discipline later coining the term “structured programming”, the use of flow control and subroutines to improve the ease of maintenance, runtime and development time among other things, which came to be the default programming and software development methodology in the next decade.

Dijkstra also made many advancements and contributions in the field of algorithms. He created various algorithms and solutions to solve a variety of problems in the software programming world from sorting and graph algorithms to concurrency and deadlock prevention. In 1965, he introduced the mutual exclusion problem in a small paper and discussed a solution to it, along with the notion of a critical section. In the same year he formulated the dining philosophers problem as a student exam exercise, which is now commonly used as a teaching example for mutual exclusion. Three years later he published the paper "Solution of a Problem in Concurrent Programming Control" in which he solves the mutual exclusion problem, earning him credit for kickstarting the field of concurrent programming and distributed systems and it remains to this day as the most influential paper in this field. One of his most famous contributions is in the field of graph theory namely ‘Dijkstra's Algorithm’ in 1956 which he designed in about 20 minutes to provide an example of a computer’s capability to someone who may not fully understand the field of computing. The algorithm was formally published 3 years later and remains very widely spread and one of the go to algorithms when addressing a shortest path problem.

Dijkstra made many other substantiation contributions in other fields of computer science including working on the compiler for ALGOL 60 and closely involved in developing and integrating it as he was known to be a big fan of the language. In the 1960s he worked with his colleagues in Eindhoven to develop the THE operating system which was designed in a way that clearly identified abstraction layers. The foundations of operating system design and how to organise its layers today can be largely attributed to the paper Dijkstra published in 1968. The approach the team took in designing this OS is considered one of the earliest examples of computer architecture.