Software Engineer Biography

Edsger W. Dijkstra was born in Rotterdam, Netherlands on the 11th of May, 1930 to a chemist father and a mathematician mother. Despite originally considering pursuing law as a career choice, at his parents' suggestion, he chose to study mathematics, physics and theoretical physics at the University of Leiden. However, it was by chance that he stumbled upon his future career. With continual exposure to computing, his focus underwent some changes. It was through his supervisor that he met the director of the Computation Department at the Mathematics Amsterdam, Adriaan van Wijingaarden. He was the one who offered Dijkstra a job, who became the Netherland's first *programmer* in 1952.

The reason I chose to write my biography based off Dijkstra is largely due to his contribution to the field of computer science that occurred in 1956. This is the year where he formulated and solved the shortest path problem, where one has to find the shortest possible path between two given nodes in a graph. This was done for a demonstration at the official inauguration of the ARMAC computer, a new machine at the time. According to Dijkstra himself, this algorithm took about "twenty minutes" to design without pencil and paper. To this day, this algorithm is still used and goes by the name of the Dijkstra Method. This method used heuristics to reduce the run time of the search for the shortest path.

This was, in my opinion, a major advancement for the field of software engineering as this contribution still continues to impact graph algorithms to this day. One example of this that can be seen to this day is the A* algorithm (first described by Peter Hart, Nils Nilsson and Bertram Raphael of Stanford Research Institute in 1968). This is a search algorithm that reduces run time by reducing the search space. This was inspired by the Dijkstra method and is used in many areas. As someone who has worked on personal passion

projects in game development, I have made use of the A* algorithm many times for giving AI in the project pathfinding capabilities, to be able to move around objects that may be present and track another object. Without Dijkstra's contribution, enemy AI in games would definitely be less advanced than they are at the moment.

However, this was not his only contributions to the field. In 1961, Dijkstra described a method for parsing mathematical expressions specified in infix notation called the shunting-yard algorithm. It can produce output in Reverse Polish Notation(RPN) or an Abstract Syntax Tree(AST). This method is still used in operator precedence parsers. He also proposed the semaphore mechanism for mutual exclusion. This could have been the first concurrent algorithm, which introduced new algorithmic research. Dijkstra also managed to identify the deadlock problem and introduced a function (banker's algorithm) to help solve this problem. He developed smoothsort in1981, which is a comparison-based sorting algorithm. This algorithm is a variant of heapsort, in that it is in-place, places input into a priority queue and has an upper bound of $O(n \log(n))$. However, it is not a stable sort, and if input is already somewhat ordered, running time can come closer to $O(n)$. Dijkstra was also on the team that implemented the first compiler for the programming language ALGOL 60. Fortran was another software development, which was considered a "successful coding technique", but was too expensive to use, and was forgotten. In 1965, he wrote his acclaimed "Notes on Structured Programming", where he declared programming to be a discipline rather than a craft.

Dijkstra built an expansive resume, working at universities such as Mathematisch Centrum, Amsterdam, Eindhoven University of Technology, and the University of Texas at Austin. However, after 15 years of working at the University of Texas, he retired and returned to the Netherlands, where he learned he had a few months left to live. He passed away on the 6th of August 2002 after a long fight

against cancer. I am sure, nevertheless, that Dijkstra's contributions to the programming field will never go unnoticed and will remain relevant for years to come.

Sources:

[Edsger W. Dijkstra - Study in China 2022 - Wiki English (duhoctrungquoc.vn)](#)

[The humble programmer (acm.org)](#)