Grace Hopper

This essay will be a short biography on Grace Hopper. I chose to do an essay on Grace Hopper as I wanted to focus on a woman. When I originally googled for famous software engineers there were not many examples of women to be found. As I am a woman in STEM myself I found this unfair. The ratio of women to men in STEM is such that there are a lot more men than woman and I can see this in my classes. The ratio has improved in recent years but there is still room to improve. This is why I think its important to support women. Grace Hopper is very widely recognised as a software engineer and a mathematician who has contributed to the field.

Early Life

Grace was born in New York in 1906. She was the eldest of three. Her parents encouraged her curiosities and they supported her. From a young age Grace was interested in mathematics and technology. She used to take apart alarm clocks in her house and attempt to put them back together and she did this so many times that her mother had to confiscate them. She left her one clock to take apart and put back together. Grace believed that “It’s not really unusual for a woman to have an interest in mathematics”. I agree with this statement as even when I was in school most of my female friends had an interest in mathematics. She did however think that women are discouraged from a young age. I think this is evident in the transition from secondary school to college. There is a major difference in the number of women and men in mathematics and computer science. Grace, however, was not discouraged by her parents or teachers. Her sister was also quite good at maths although she was more interested in economics. Grace’s father believed that his daughters should have the same opportunities as his son and so he thought education and training would be important. He wasn’t sure he would be able to leave them any money and so giving them a good education was important to him. Grace was very lucky in her time that her parents were supportive. Her interest in problem solving was always something that drove her. She enjoyed challenges and they were something that drove her (Gilbert, 1981).

Education

Grace attended two private schools in New York, the Graham School from 1911 – 1913 and then the Schoonmaker School from 1913-23. She then graduated from a boarding school in Plainfield, New Jersey called Hartridge School. This was an all-girls school. During these years she was interested in maths and more specifically geometry. After this she attended Vassar College in Poughkeepsie, New York. She graduated from here in 1928, she had attended beginners courses in all the sciences that they offered as well as some other courses such as business and economics. She left with a degree in mathematics and physics. After getting a fellowship from a Vassar College in 1928-1929 she attended Yale University and then on a Sterling Scholarship from 1929-1930 she received her MA in 1930. On another Sterling scholarship from 1930-1931 she studied in Yale again. She then became an assistant in mathematics at Vassar and after receiving her PhD from Yale in 1934 she was promoted to an instructor at her job in Vassar. It was then that she became interested in number symbolism. She was also promoted to assistant professor in 1939 (Green & LaDuke, 2009).

The Military

There was a history of service in the military in Grace's family and she felt a patriotic duty to help her country win the war. Hopper had wanted to be in the Navy from her school days and she was a member of the WAVES (Women Available for Volunteer Emergency Service). She became a lieutenant in June of 1944. A Navy commander at Harvard University called Howard Aiken required a mathematician to help program the Mark I. She was assigned to this computation project. Grace decided she wanted to join the Navy Reserve during World War II and she had to persuade Vassar to give her leave. The Navy were not so convinced that she should join the WAVES and they advised her to stay at her job at Vassar. Hopper was determined however and she got special permission to leave her job and she also had to obtain a waiver because she was underweight for her height. Her first assignment was at Midshipman's School in Connecticut and she graduated from there in 1944 at the top of her class. It was after this that she was commissioned as a lieutenant and she

was assigned to the computation project at Harvard University (Mitchell, 1994). Grace retired from the navy as commander in 1966 but was recalled the next year as she was needed to help standardise the navy's computer languages. She was promoted to commodore in 1983 and she was the oldest officer on active duty in 1986 when she retired at the age of 79.

Contributions

Grace was a pioneer in computer technology. While she was working in Harvard she worked on Mark I which was the first large-scale automatic calculator and it was also a precursor of all electronic computers. Grace wrote the first computer manual which described how to operate Mark I and it was one of the first extensive manuals on how to program a computer. The term "bug" in software engineering comes from Grace as she found a moth had made its way into the circuits of Mark I causing a problem. This term is now used to refer to any unexplained computer failures. One of Grace's more notable contributions is that she designed one of the first compilers. This compiler translated instructions from a programmer into computer code. She also was the first to use the word "compiler". This lead to the development of the first English language data-processing compiler known as "Flow-Matic" in 1957. Some of its features inspired the development of COBOL (Common Business Oriented Language). Grace continued developing compilers for COBOL and she was an advocate for the language. Use of the language was more widespread after the 1960s (Britannica, 2021). Grace thought that her teaching of young people was more important than even creating the world's first compiler. She encouraged other women to continue studying. She was also known for using interesting and non-traditional ways of teaching students. She liked to keep them engaged in any material she was teaching. Correcting other students work also helped her in her own instructions. When Hopper began teaching, students became so interested in her teaching methods that many more people were attending these classes which would previously have been nearly empty. Hopper taught people from all disciplines and reached a wide variety of people with her teaching. In her engineering maths teaching she made problems intriguing for her students. For example, ballistics problems were made more interesting by turning usual bullet examples into rockets.

She later solved firing tables for these devices on the first digital computer in America (Meyr, 2017).

Conclusions

Grace Hopper was a very interesting software engineer and it is clear that she made many contributions to the field. She also had a lot of patriotic passion and being in the military was something that changed her life because the military had a lot of funding for computing projects. I think Grace is an interesting and innovative software engineer because creating compilers for programming languages was something that revolutionised the industry. I also really admire the fact that she encouraged other women in pursuing an education. Because she is someone who was supported by her family it was great that she encouraged others to do the same and continue in their studies.

References

Britannica, T. E. (2021, April 11). *Grace Hopper. Encyclopedia*. Retrieved from Britannica: https://www.britannica.com/biography/Grace-Hopper

Gilbert, L. (1981). Particular Passions: Grace Murray Hopper. In L. Gilbert, & G. Moore, *Particular Passions: Talks with Women Who Have Shaped our Times.*

Green, J., & LaDuke, J. (2009). Pioneering Women in American Mathematics: The Pre-1940 PhD's. Providence, Rhode Island: American Mathematical Socity.

Meyr, J. (2017). Grace Hopper and the Marvelous Machine: Lessons for Modern Technical Communicators from the Mark I ASCC Manual . *Technical and Professional Writing Commons* .

Mitchell, C. L. (1994). The Contributions of Grace Murray Hopper to Computer Science and Computer Education. Denton, Texas.