Report on an Influential Software Engineer, Grace Hopper

The person I have chosen to write my report about is Grace Hopper, “Amazing Grace” or “the Queen of Software” as many considered her as a result of her contributions to the field of computing. Grace Hopper is an inspirational woman whose list of achievements is endless. When I searched for “brilliant” or “famous” software engineers on Google, I was disheartened that every person to come up was a male. It wasn’t until I scrolled to number thirty-four, I finally came across a female which I feel is a true pity, especially as I learnt more about the fascinating work of someone like Grace Hopper. Grace is a software engineer I feel deserves much more recognition for her contributions to computer science and their impacts, especially writing the first ever compiler, among other achievements.

Hopper was born in 1906, New York. Her full name is Grace Brewster Murray Hopper. She was a very curious child. This curiosity lasted her whole life. At only seven years old she decided she wanted to know how alarm clocks work, so she dismantled seven alarm clocks until her mother realized what she was doing (limiting her to only one clock!)

She studied at Yale University where she earned her PhD in maths. This was a very rare accomplishment for anyone at the time, even more so for a woman. Only 1279 maths PhD’s were awarded across an entire 72 years, from 1862 – 1934, the year Hopper received hers. She was also a professor at Vassar College.

Hopper married another professor from New York, Vincent Foster Hopper. They were married 15 years but divorced in 1945, however she still kept his name.

She was one of the first programmers of the Harvard Mark I computer and invented one of the first ever program linkers (originally called a compiler). She believed that a programming language based on English was possible. Her determination led her to invent a way to translate instructions given in English, to a computer to understand, creating the world’s first compiler. This was a pinnacle moment and key achievement in the field of computer science and software development.

Not only did Hopper invent the first compiler, but also helped develop one of the first ever high-level programming languages, COBOL. She popularised the idea of machine-independent language which led to the development of COBOL., which is still used today. This was developed in 1959 as part of a US Department of Defence effort to create a portable programming language for data processing. It is not as popular today, mainly used to maintain existing applications that were written in COBOL. However, it was an important advancement in programming languages and remains widely used in legacy applications deployed on mainframe computers, such as large-scale batch and transaction processing jobs.

Hopper developed this when she was a United States Navy rear admiral. She had tried to join the Navy during World War II but was rejected as she was 34 years old, but this did not stop her. She instead joined the Navy Reserves. This is where she earnt one of her nicknames, “Amazing Grace”, thanks to her high naval rank and countless accomplishments in maths and computer science. The Cray XE6 “Hopper” supercomputer was even named after her, at the National Energy Research Scientific Computing Centre., as was the Navy guided-missile destroyer, the “USS Hopper”. During her time in the Navy she co-authorised three papers based on her work on the Harvard Mark I.

In 1966 Hopper retired from her Navy service, but only a year later the Navy recalled her to active duty. Eventually in 1986 she was able to retire and act as a consultant for the Digital Equipment Corporation, sharing her computer experiences and knowledge. Initially she was offered the job position but insisted she applied and went through the formal interview process; this is a true show of her character, I think. She also insisted she would be available on alternating Thursdays, receiving a high salary, and have access to an unlimited expense account if she were to be exhibited at their museum of computing as a pioneer. Hopper was a woman who knew what she was worth and was not afraid to ask for it, something many of us today could learn from in our careers.

Grace was a pioneer of computing. She even coined the term “bug”, which all software engineers still use today for malfunctions in code. One day Hopper and her team could not figure out a computer error, until she opened the machine and found a moth inside! She removed the moth and taped it into her logbook and said, “first actual bug found”, thus also coining the term “debugging”. I never knew that was where those terms came from and find it amazing how influential this woman was, so much so that her logbook comment is attributed to the name of what every computer programmer now calls a bug.

It was great to see Hopper’s attitude towards helping others pursue their own paths in the STEM fields. She was apparently a big believer in mentoring others, once saying “The most important thing I've accomplished, other than building the compiler, is training young people. They come to me, you know, and say, 'Do you think we can do this?' I say, ‘Try it.’ And I back 'em up.” This attitude to try things, make mistakes and explore different solutions mirrors some popular software engineering styles of today like agile development. It reminded me of a famous Facebook quote the modern software engineer might be more familiar with, “Move fast and break things.” I can imagine Grace would have made a good modern-day manager, as she also said, “I keep track of them as they get older and I stir 'em up at intervals so they don't forget to take chances.” This is a popular attitude in successful technology firms today, empowering and encouraging employees grow and continue to challenge themselves.

Hopper lectured widely about the early days of computing and her career, sharing her knowledge, where she usually received standing ovations. She also wore her full Navy uniform to these lectures even though she no longer served as an officer (which is not allowed under US regulation), but she did it anyway.

Hopper died January 1st, 1992 age 85. She remains one of the most influential people in maths and computer science. During her lifetime, she was awarded 40 honorary degrees from universities across the world. A college at Yale, her own university, was named in her honour. She received the National Medal of Technology in 1991, a year before she died. Her work is inspiring and the legacy she left encourages others to continue to explore and pioneer these areas. As recently as 2016 her work was still being recognised, when she was awarded the Presidential Medal of Freedom by Barack Obama. I thoroughly enjoyed learning about Grace Hopper.

References:

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