**Software Engineer Biography**

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I found it very difficult to find a software engineer that impacted my life. Of course, you could say all the social media, software engineers have impacted my life. I wanted to look for an engineer however that changed software engineering for the rest of humanity. I wanted to find someone who inspired people. I began to look at my childhood and the biggest changes between then and now. It made me think of how I wanted to be an astronomer when I was younger, how the improvements in space technology has been rapidly improving. The more I looked into space technology and software engineering in this line of work, I realised there was only one person I could write this Biography on.

Margaret Hamilton was first introduced to me in the very first lecture of this module. She was explained to me to be the very first software engineer. This Biography will take you through her early life, professional life, how life was as a software engineer in her day and finally her impact on todays society.

Margaret was born on the 17th of August 1936, in a town called Paoli in Indiana. Paoli right now is a town with under 4,000 people in it, so you can imagine the size of it in 1936. She would later move to Michigan. This is where she would spend the majority of her childhood. She spent an academic year at the university of Michigan but would then transfer to Earlham College in Indiana as her mother attended here. She would finish here with a bachelor’s degree in Mathematics.

Soon after her and her newly wedded husband would move to Boston, where her husband would chase after a law degree in Harvard. This opened the opportunity for Margaret to take a temporary position working for Professor Edward N. Lorenzo, in the meteorologist department of MIT. Here, she earned her stripes by creating a computer software that could predict the weather. This was a pretty big deal at the time as software engineering nor computer science were really a thing back then.

This accomplishment would lead her to getting a place at her next line of work. From 1961-1963 Margaret would work on the SAGE project in MIT. SAGE stood for Semi-Automatic Ground Environment. This project was a program designed to locate unidentified enemy aircrafts in the sky. It was at this point in her career she really began to question things around software. She looked at software reliability. How to make software more reliable. She mentioned before how the SAGE program would sound like a ‘seashore’. The workers on the project would know something had gone wrong. You can see, from early on in her career, Margaret would question the boundaries and look outside the box. Like she used sound as a form of software reliability in the SAGE project.

In the mid-1960s, a team was being assembled to send man to the moon. Among this team a group of programmers were to be hired and work on this project. Although Margaret had other plans to get a degree in abstract maths, she decided this was too good of an opportunity to pass up on and went for it. Margaret was quoted saying ‘Wow, I’ve got to go there.’ Due to her successful work at SAGE, Margaret was the first person appointed to the programming team of apollo and was head of the team. This team would later go onto be known as the software engineering team; however, software engineering was not a thing at this point in time of course.

This team was in charge of programming software for all of the Apollo missions and getting man on the moon. They were most recognised for their work on the two 70-pound computers for apollo 11. Apollo 11 was the name of the space craft which landed on the moon in 1969. These computers were stored on the space crafts and would fly with the astronauts. This is why, Margaret made a big deal of understanding everything about these computers. She wanted to be able to prevent unknown problems before they’ve even happened. This would ensure that the space craft would fly man to the moon and return them safely. A very outrageous conquest to take on by anyone. The computers would take over 400,000 lines of code.

Quite a lot you may think but these were not just any lines of code. To write codes, programmers used paper punch cards to tell the computers what to do. If you think that is tough, none of the computers had any screen interfaces. In return they would receive printout sheets which would consist of equation and program calculations. These printout sheets were known as ‘listings’. These listing helped Margaret and her team predict outcomes and make judgements long before events occurred.

Once the programmers and team were happy with the code, they would ship it off to a Raytheon factory. Here the code would be woven into copper wires and magnetic cores to represent ones and zeros. These would form into a big, long wire, where the copper wire would go around the magnetic core to form a zero and through the core when it represented a one.

As you can see there was a lot to Margaret’s job. There is no doubt in my mind that she was the only one for the job also. She truly knew these machines inside and out. However, one slip up along the way and she would go down in history for all the wrong reasons. That nearly happened. About 3 minutes before ‘Eagle’ landed on the moon, Margaret was faced with a decision. A few alarms were triggered, among these were, so-called “never supposed to happen displays”. This had obviously caused discomfort in every camp of this project. It meant no different to Margaret. She understood her creation, she had prepared for this, and knew exactly what had gone wrong. The men inside apollo 11 had left a switch on which was called the rendezvous radar switch on. Margaret was able to tell Buzz Aldrin, on-board to wait five seconds before hitting the priority display button as she knew there would be a delay in programs.

The rest is history, man may have walked on the moon, but this would not have happened without the outstanding contribution from a woman. During a time of the movement for women’s rights in the USA, Margaret Hamilton was a stereo-type changer, an idol and a movement in herself. She empowered millions of women across the US that they too could make a change to the history of the world. In a line of work which was dominated by male workers, Margaret outworked and outshone all in front of her. It was in the 70s that women’s rights broke ground. Margaret Hamilton helped that in every sense.

Not only did she break ground for women, but Margaret coined the term Software Engineer throughout her career. Engineers nor computer scientist never really accepted the term until she proved herself. Margaret really had to build a whole software for a man-made space craft to land on the moon, just so software engineer could get recognised. It is incredible to think of all the great software engineers we have today and how relevant it is in society, yet back then it was almost frowned upon.

Margaret means a lot to many different people. She can be viewed as an icon to women. She can be viewed as a founder to software engineers. To me Margaret is all those things and more. To me, she is the mother of space exploration, without her there would not be as near as rapid advancements in space explorations. To me, she was a question answerer, to be a 12-year-old kid and be able to learn about space and the infinity of it all. I know, for sure, that all that would no be possible if it was for Margaret Hamilton.

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