Biography of an influential Software Engineer- 'Betty Holberton'
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Betty Holberton is considered to be one of the first computer programmers in history. She was a key part of the six-woman team that programmed one of the world's first electronic computers, the ENIAC. Holberton worked on this computer during WWII and her contributions helped pave the way for the vast technology industry we are all immersed in and take for granted. She was very diligent and thrived in a male dominated environment making a significant impact on the software engineering world. Holberton made advances in key aspects of software development such as identification of errors in code and also contributing to the creation of the first electronic computers. I believe we would not have made this many advancements in software engineering if it wasn't for Holberton and her team members.

Holberton was born in Philadelphia in March of 1917. She was an extremely ambitious and intelligent woman who stood up for what she believed in. This is demonstrated by the decisions she made during her academic and working life. After being told by her professor to drop out of college and take up the role of a house wife, she persisted and graduated with a degree in Journalism from the University of Pennsylvania. This allowed her to pursue her ambition of travelling the world. Not long after, Holberton became aware of the Army recruiting women to help calculate ballistic trajectories during WWII. Having a keen interest in maths, this greatly appealed to her. Holberton and her female co-workers were referred to as 'computers', tasked with manually calculating complicated ballistic trajectories. The Army were quick to notice Holberton's skills, choosing her and five others from a pool of several hundred candidates to work on a top secret project. Their role was to program the first ever electronic digital computer, the ENIAC, leading to advancements in technology that would change the course of history forever.

The ENIAC was used primarily to calculate these trajectories but it also was used in the computation of large numerical problems. Holberton was able to assist in optimizing the ENIAC calculations, allowing it to complete tasks in a fraction of the time it would have taken the 'human computers'. For example, a 30 second ENIAC calculation would have taken a human 20 hours. This was a significant advancement from the Army's prospective. One hour of ENIAC computation was equivalent to 2400 human hours!

Operations such as loops, subroutines and branches were able to be executed by the ENIAC thanks to Holberton's programming. Due to the fact that programming languages did not exist at this time, the group studied the ENIAC blueprints and were able to gain much knowledge in how to employ the computers switches and cables which in turn allowed for the successful running of numerical calculations and operations. If Holberton came across any issues in the process of calculations, she would crawl inside the machines to find poor tubes and joints and fix these errors.

Working on the ENIAC was evidently problematic at times and Holberton wanted a way to obtain information about how the program was functioning to ascertain if it was correct. To address this issue, Holberton conceived the idea of breakpoints, a user controlled way of halting program execution to gain the required information. Breakpoints and associating mechanisms are ubiquitous in all programming languages and are extensively used in the debugging process of software engineering projects.

Holberton continued to work on the ENIAC until the war was over and subsequently moved onto establishing UNIVAC. UNIVAC was one of the world's first line of mainframe computers. Holberton designed the control panels used on the UNIVAC computers and was also responsible for positioning the numerical keypad beside the keyboard which is the design of most computers today. She was also involved in the development of the BINAC computer, specifically producing the C-10 instruction set used in the computer's software. The BINAC was the first stored-program computer produced in the USA. It is said that the C-10 instruction set that Holberton developed is what all modern programming languages is based on.

Holberton continued to use her high level of intelligence to create the first SORT/MERGE program. This program was designed to arrange records in a file into a particular order, join files already sorted into one sorted file and copy specific records. Holberton established the idea behind the binary sort function by using a deck of cards. She then wrote the code to read and write data during the process of sorting using tape drives. The IEEE (Institute of Electrical and Electronics Engineers) claim that her SORT/MERGE program "inspired the first ideas about compilation" (IEEE Computer Society, 1997).

Another significant advancement that Holberton made in software engineering was her input to COBOL. COBOL is an English-like compiled programming language that is used widely in business and finance companies. Designed by Grace Hopper in 1959, Holberton assisted Hopper in the early stages of the development of this language. COBOL's general data structure impacted many programming languages used today such as PASCAL and PL/I. Although declining in popularity, COBOL is known for being a very readable language which made it a popular choice in companies as business analysts would be able to read the code and understand it easily.

Betty Holberton's health started to deteriorate and she sadly passed away from heart disease and stroke complications in 2001. Her husband and two children were by her side as she passed.

It is evident that Holberton pioneered the way for all computer programmers today and her level of tenacity and hard work is truly inspiring for all. Her fantastic work has impacted the computer science world greatly and has won her multiple prestigious awards such as the Augusta Ada Lovelace award which is the highest award that can be awarded by the Association of Women in Computing. From being subjected to sexism by her professor when she was told to stay at home and raise children or when her superiors in the Army considered programming to be a 'clerical task', it is clear that Holberton came a very long way in her career.

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