Grace Hopper

A Biography by Mikhail Dyuldin

Grace was born December 9, 1906 in New York. Her Father - Walter Fletcher Murray and Mother - Mary Campbell Horne Murray, were crazy about baby Grace, the eldest among three children. Walter Murray worked as an insurance agent, things were going well, and over time he even got his own office, which brought, though not large, but stable income. At least the family did not live in poverty, and in the summer the children were taken to a summer cottage, which their parents rented in New Hampshire on the lake ... Life went on as usual - the children were growing up, Grace, as the eldest, was in charge of the kids and had already mastered reading , which allowed her to amuse younger children with reading fairy tales, and she brought emotion to other relatives, quite tenderly playing ten popular tunes on the piano. However, in addition to these quite ordinary hobbies, characteristic of a girl from a decent family, the baby had one more entertainment inherent in boys rather than girls. Grace was attracted to technology. And not just from the point of view of all kinds of "brilliant things," but from the desire to know "how it all works." The seven alarm clocks of the Murray family turned into seven piles of gears, wheels and other absolutely wonderful details, falling victim to the curiosity of little Grace.

But, as you know, all good things must come to an end, and thus, Grace's childhood is over.. School weekdays began. According to that time, she studied at a private school for girls, where the main subjects were ethics, pleasant manners, housekeeping and playing music - things necessary for a well-educated lady.
Be that as it may, Grace dreamed of entering a college of mathematics, which was greatly facilitated by the girl's ability to study the exact sciences that she inherited from her mother. However, American society at the beginning of the century was just beginning to partake of the fruits of feminism, and the traditional destiny of a woman was considered to be traditional values in the form of family, children, husband ... Serious study of mathematics, in the eyes of public opinion, was an inappropriate occupation for the female sex. And so, Grace Murray had few chances to make his dream come true. However, life is a complicated thing, sometimes bringing unexpected plot twists that no novelist would have thought of. No matter how bitter it sounds, but it was the misfortune that occurred in the family that allowed Grace to realise her dream. It so happened that a father suffering from thrombophlebitis had both legs amputated ... Alas, Walter Murray was no longer able to support his family and, what was terrible at the time, he could not provide a good dowry to his two daughters. The father made the only possible decision - to give the girls a good education, along with their only son, so that they could take care of themselves. It was her father, as Grace Murray later admitted, who inspired her to get a higher education, despising public opinion, which prepared her for the standard role of a housewife. And she took full advantage of the opportunity.

In 1923, sixteen-year-old Grace Murray filed documents at Vassar College in New York and unfortunately was unsuccessful in the Latin exam. Grace had to thoroughly study this "dead" language, and the next attempt, made a year later, was successful.

Grace Murray graduated in 1928. The woman received a bachelor's degree in mathematics and physics, and her successes were marked by an honorary diploma of the oldest academic society "Phi Beta Kappa" (The Phi Beta Kappa Society is the oldest academic honour society in the United States, and is often described as its most prestigious honour society, due to its long history and academic selectivity. -Wikipedia)

In 1930, she successfully graduated from Yale University, becoming a master of mathematics. And in the same year, Grace Murray became Mrs. Hopper, marrying Vincent Foster Hopper, a teacher of English literature at the New York Commercial School.
In 1931, Mrs. Grace Murray Hopper returned to Vassar College as a math teacher with a salary of $ 800 a year, or around $ 67 a month. It would seem that a quiet family life begins, but not for Grace. In 1934, Grace Murray Hopper became the first woman in history to defend her doctoral dissertation in mathematics at Yale University. The recognition of her mathematical merits came, and for Mrs. Hopper a new life began. Participation in international conferences and seminars, reports and speeches at American universities, successful research, own department, professorship and ... the collapse of personal life. In 1940, the couple broke up. And after this, Professor Hopper decided to enter the military service.

The fact is that the recruit Grace Murray Hopper was by no means suitable for military service. To begin with, her age was already far from conscription (34 years), by the standards of the military, she weighed too little to be called up for service, and besides, she suffered from gastritis, weak lungs, and in addition to everything she was also a professor of mathematics. Do you imagine a skinny professor of mathematics rushing across the field with a rifle at the ready? So the army authorities could not imagine such a picture, and therefore tried in every possible way to prove "to this foolish lady" that neither the army nor the US Navy needed her services. But the recruit Hopper had her own opinion on this.

Oddly enough, Grace was again helped by misfortune. The Second World War began, and recruits were required. For three years, Mrs. Hopper did her best by collecting all kinds of commissions and getting special military decisions on her issue ("as an exception", "taking into account", "taking into account circumstances" ...). Finally, in 1943, under the pressure of this fragile woman, the US armed forces surrendered. Grace Murray Hopper was called up for the fleet. After taking a military oath in December 1943 and taking an accelerated course of military training, Lt. Grace Murray Hopper was seconded to the US Navy Command of the United States. Her Place of Service was Bureau of Artillery Computing Projects at Harvard University. Position - the third programmer of the Mark I computer, almost the first in the world automatic electronic computer with fantastic speed - up to three arithmetic operations per second.

All this magnificence was used to calculate the ballistic tables, necessary for artillery firing. This work was rather tedious and required enormous perseverance and attention from the programmers, since for the implementation of repeated calculations it was necessary to re-create the program each time. So when working on a Mark I computer, for the first time, some techniques were introduced, which later found practical application in programming, becoming a kind of classic. In particular, the first tools that saved the work

of programmers were the subroutines: in August 1944, the first subroutine was written for Mark I to calculate sin (x).

The further course of events was explained by eternal human laziness, it's insulting and boring to re-write the same programs every time, knowing that someone has already done this. And the solution that was already in the air was brought exactly to the practice of programming by Grace Hopper. She took up "collecting" ... routines. The collection was replenished fairly quickly, and soon a whole "library of subprograms" from the best examples of the work of her colleagues had accumulated. A simple approach made it possible to kill two birds with one stone. Firstly, the time required to develop new programs was reduced, since only those elements of the program that had not yet been tested before needed to be developed again. And secondly, the number of errors sharply decreased, since the previously developed program was debugged by its predecessors and, as a rule, no longer contained errors. The gain was obvious.

For perfect service and work on computers of the Mark series (Mark-I, II, III), Grace Murray was awarded the naval command. By the way, around the same time there was another, truly anecdotal situation that led to the emergence of a new term in programming - debugging. It so happened that a moth flew into the Mark II computer and ... shorted the contacts of one of the countless relays inside the computational "monster". Later, Grace Murray Hopper told about this incident: "When an officer came to us to find out what we were doing, we replied that we were cleaning the computer from insects (debugging). The term debugging has since taken root and has been used to refer to troubleshooting a computer, especially in software. "

In 1949, Grace Hopper went to work as a senior mathematician in the newly formed company Eckert-Mauchly, which was engaged in the development of the first electronic computers. Hopper participated in the development of software for the commercial computer UNIVAC-1.

And then the tireless Grace again came up with what can be upgraded. I must say that at that time, to facilitate the process of compiling programs in machine language, instead of writing commands in the binary number system, the octal number system was used. Grace Hopper has mastered this system so well that she even once filled the balance of her bank account in the octal number system, forgetting that banks still work in the decimal system. "I faced the problem of life in two worlds," Grace Hopper recalled, "- probably this was one of the reasons that prompted me to get rid of octal numbers as much as possible." How can I do that? Make the computer "understand" more or less ordinary human language! The idea for that time was just revolutionary. However, Grace Hopper already had a predecessor.

In 1949, John Mouchley created a system called Short Code. It allowed us to write down the problem to be solved in the form of mathematical formulas. Further, with the help of a special auxiliary table, it was necessary to transform these formulas into two-letter codes character by character. In the next step, a special computer program turned these codes into binary machine code. Although the system facilitated the process of writing a program, it was still quite cumbersome and inconvenient. "Lazy" Grace Hopper decided to

simplify it. Of course, to simplify from the point of view of the potential user, and not the structure of the system itself.

In 1951, Grace Hopper invented the first compiler. By the way, she coined the term itself. The developed compiler carried out the function of combining and during the translation, organised subprograms, allocated computer memory, and converted high-level commands. (pseudo-codes at that time) into machine instructions. The first compiler received the designation A-0, then, as it expanded and improved, versions A-1, A-2, A-3 appeared in subsequent years.

In 1954, a group led by Grace Hopper developed the AT-3 system, which included a programming language and a compiler. Subsequently, the system received the commercial name MATH-MATIC and was sold by Remington Rand (new name Eckert-Mauchly) together with the UNIVAC-1 computer.

When creating a new programming language, Grace Hopper took a revolutionary approach at that time. To begin with, about 30 easily remembered words of the type: add, compare, send were selected. The words were not simply selected - each of them contains a unique combination of the first and third letters, so the compiler when generating machine code, could ignore all the other letters in the word. In the future, this principle began to be used when creating other programming languages.
In 1956, the creation of an "unusual" language and compiler was completed. It was called B-0, and since 1958, the B-0 system entered the market under the commercial name FLOW-MATIC. In contrast to the FORTRAN language, oriented for the development of scientific applications, FLOW-MATIC was the first language for processing commercial data.

In 1959, work began on creating an even more advanced, device-independent language for commercial applications. It successfully ended in 1961 with the creation of COBOL (Common Business Oriented Language). One of the main consultants in the creation of the language was, of course, Grace Murray Hopper, who has since received the funny nickname "Grandma COBOLA". COBOL is still used in many financial applications.

At the age of sixty, Grace Hopper received the rank of captain of the third rank, and she went on a well-deserved rest. But if captain Grace Hopper herself could do without the fleet, doing her favourite math and programming, then, as it turned out, the fleet could not do without her. A year later, in 1967, "pensioner" returned to active military service. A "lifetime contract" was signed with her, and Grace Murray Hopper was appointed chief system analyst for the US Navy. The rarest, almost the only case in the history of the American Navy, when a female soldier was again called up for military service!

By 1980, Grace Hopper became the captain of the Office of Computer Science in Washington. In 1983, she received the rank of captain of the first rank, and in November 1985 - the rank of rear admiral, becoming the first and only woman in the world to be awarded such a title at the end of the eighth decade. And from 1982 until her final retirement in 1986, she was the oldest active officer in the American army.