SWE 4101

Assignment On

"An example of a software failure that led real-life consequences"

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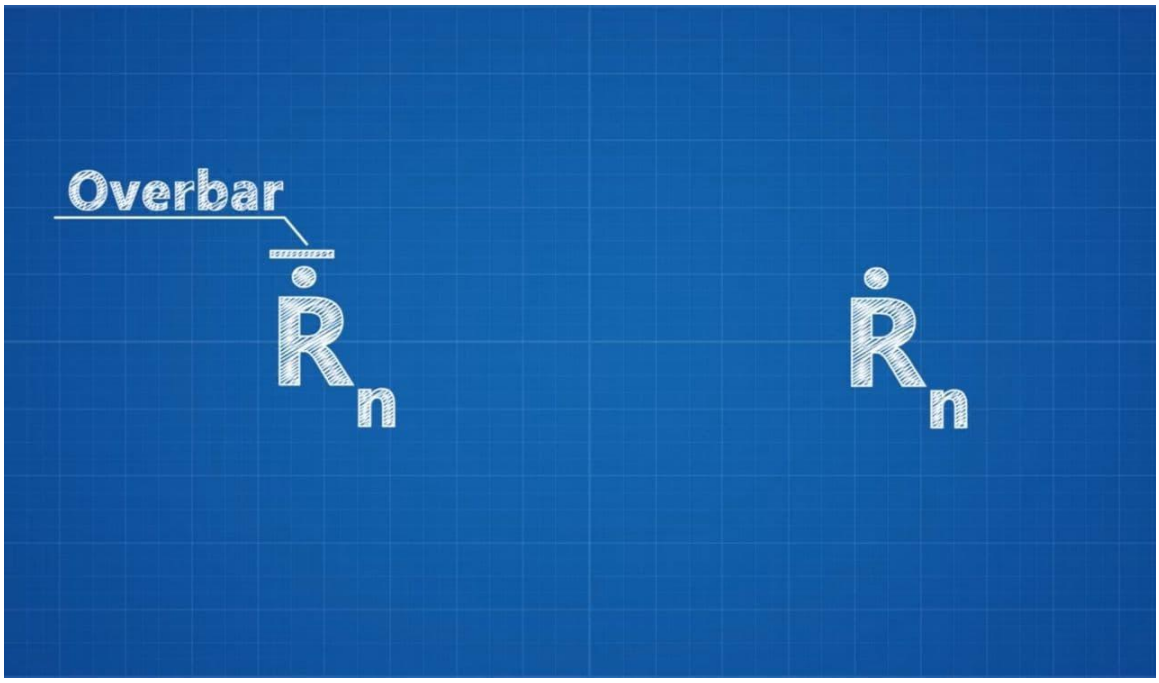
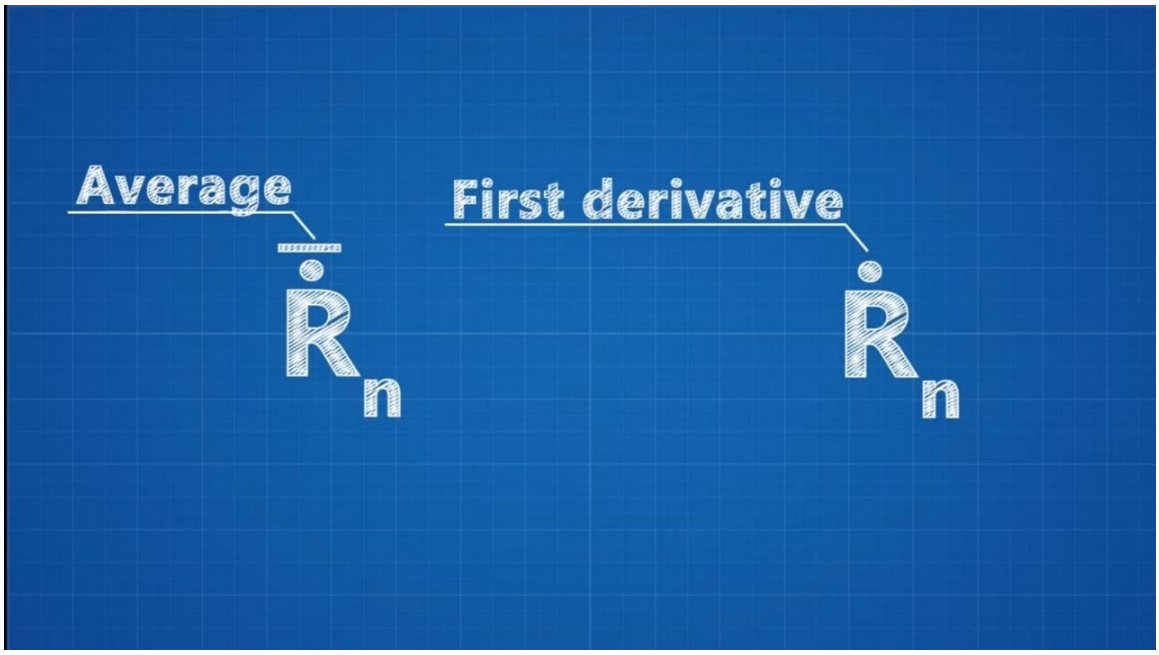
Our everyday life has become a lot easier due to technological development and for that we depend on software. Our brilliant programmers write thousands lines of codes to make large machines function properly .But to err is human and sometimes mistakes are made and that causes a big amount of loss and troubles. These mistakes causes huge money and industrial loss even sometimes loss of people. These events even make histories. When a software program fails to function properly due to mistakes made in codes, it is called ***"Software Failure"*** . We are discussing about such kind of historical software failure. This happened in July 22, 1962 ,with the first American planetary flyby Mariner-1,which is also the first spacecraft of NASA's interplanetary Mariner program. It had to be destroyed 293 seconds after the launch due to a simple error in the code, self destructing the probe in Atlantic.

Cause of failure:

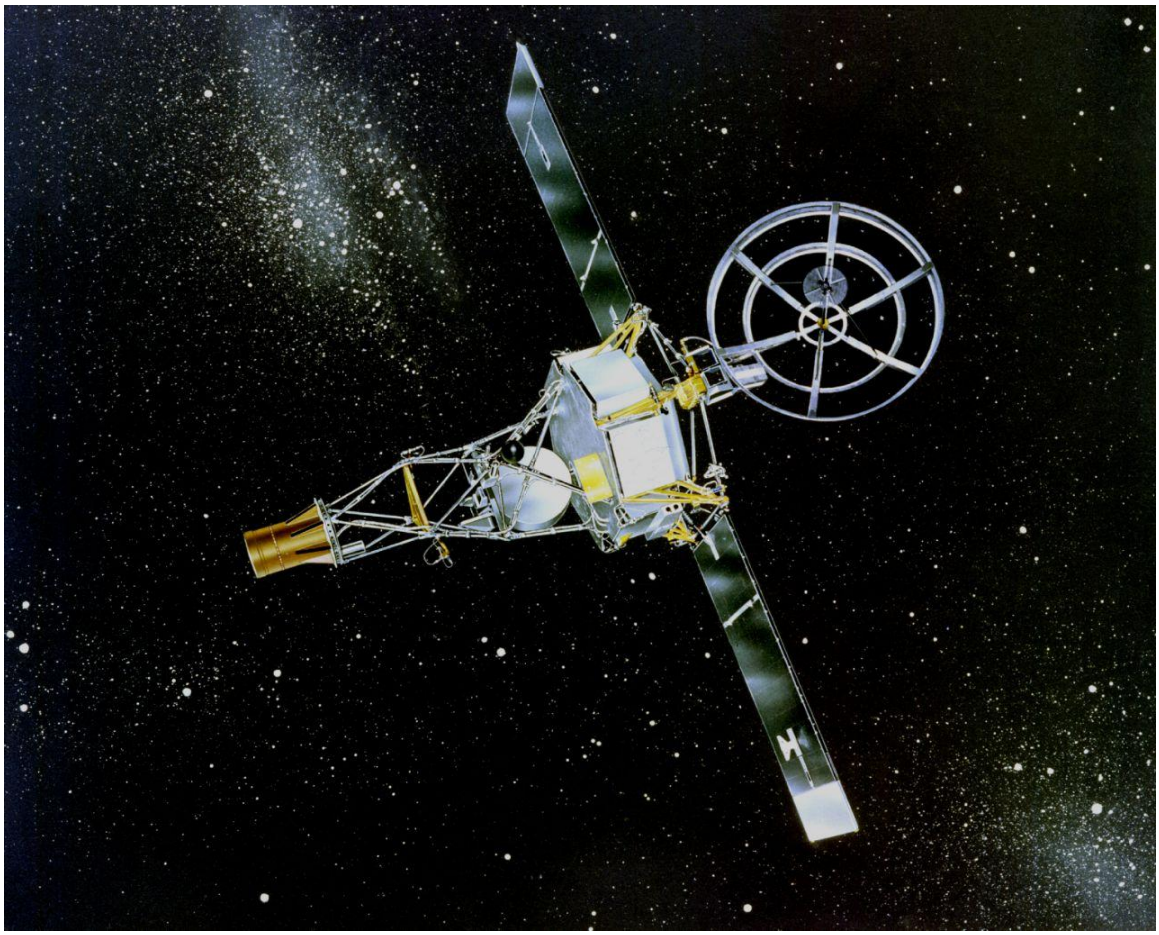
In 1962 there was no super power computer like today . Programmers used to write their code by using their hand and programmed into the guidance computer . In that case they had to measure the radius . There were many lines of codes . In one line it contained the symbol "R" which meant the radius . They needed to write an line over R (which is "R-bar" or $\bar{R}$) and it indicated that the guidance computer should average (smooth) the data it was receiving and ignore what was likely to be spurious data . But they somehow forgot to do this (They wrote R instead of R-bar or $\bar{R}$) . that's why during its rise, Mariner 1's booster briefly lost guidance-lock with the ground. Because this was a fairly common occurrence, the Atlas-Agena(an American expendable launch system) was designed to continue on a preprogrammed course until guidance-lock with the ground resumed. When lock was reestablished, however, the faulty line of code caused the ground computer to determine that the now slightly off course rocket was seriously off course and to send faulty signals in an attempt correct its trajectory. The hyphen based symbol that caused the error is called "the most expensive hyphen in history" by Arthur C. Clarke. This fatal accident occurred because of a small mistake of programmers . It occurred due to a small hyphen over R.





Death/expense/loss :

As people were trying to fly spacecraft ,they use a lot amount money for it .They tried and tried but they failed again and again . This time they were succeeded but for this silly mistake they lost a huge amount of money . In 1962, in this time, they had a loss of 18.5 million US dollar which is equivalent to 150 million in 2017(Source :Wikipedia). So, we can easily say that ,they had to lose a big amount of money due to this fatal accident. As there was no human in this craft , no human died due to this failure. But only the USA realized the cost of such kind of coding error.



Mariner 1

Resource: https://en.wikipedia.org/wiki/Mariner_1