Puzzle 19| (Poison and Rat)

There are 1000 wine bottles. One of the bottles contains poisoned wine. A rat dies after one hour of drinking the poisoned wine. How many minimum rats are needed to figure out which bottle contains poison in hour.

Solution:

We need to figure out in hour. We need 10 rats to figure out the poisoned bottle. The result is based on binary number system. We get 10 using $\lceil \text{Log}_2 1000 \rceil$.

The idea is to number bottles from 1 to 1000 and write their corresponding binary numbers on the bottle. Each rat is assigned a position in the binary numbers written on bottles. Let us take an example. Rat 1 represents first bit in every bottle, rat 2 represents second bit and so on. If rat numbers 5, 7 and 9 die, then bottle number 42 (Binary 0000101010) is poisoned.