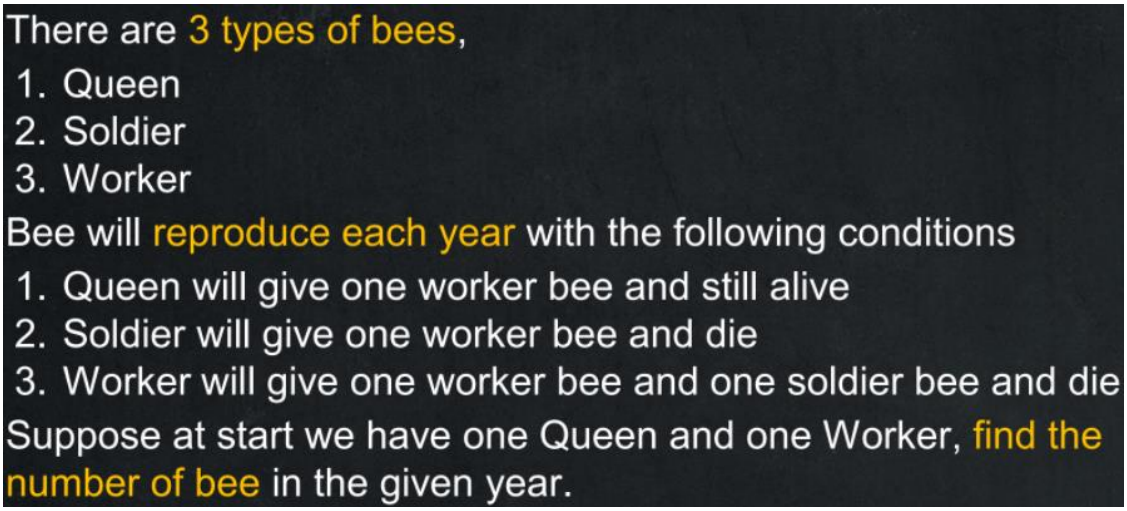
Bee Reproduction

1 The solution, pseudocode, instance of the problems, and all possible cases

1.1 The problem



1.2 The solution

1.2.1 instance of the problems

1.2.1 input and output

- input: the number of the year
- output: the number of the bee

1.2.2 condition

- in this be hive there have a 3 type of bee Q, W and S
- Q will product 1 W
- W product 1 W and 1 S and die
- S product 1 W and die
- repeat this in every year

1.2.2 The solution in all possible case

To do this kind of problem we need to find pattern of each year that bee will product thus I will use Y as a year representative like Y_0 mean year 0

Initial year or year 0 has Q and W bee or 2 bees in total

$Y_0 = 2$

And Q product 1 W then W product 1 W and 1 S so

W + W + S + Q now in first Y will have 4 bees

$Y_1 = 4$ (WWSQ)

And process will be repeat like first year
W product 1 W and S then die

S product 1 W then dies

Q product W

So second year will have WSWSWWQ or 7 bee in total

$Y_2 = 7$

And third year will be WSWSWSWSWWWQ following by repeat condition

$Y_3 = 12$

So, if we make them as an equation will be something like this

$Y_0 = 2$

$Y_1 = 4$

$Y_2 = 7$ or $Y_2 = Y_1 + Y_0 + 1$

$Y_3 = 12$ or $Y_3 = Y_2 + Y_1 + 1$

Thus

$Y_n = Y_{n-1} + Y_{n-2} + 1$

And this equation ($Y_n = Y_{n-1} + Y_{n-2} + 1$) can represent all possible case

1.3 pseudocode

Define : Read() mean function that receive input from user
Function BeeEachYear (Integer:n) -> Integer :
    If n == 0 Then
        Return 2
    Endif
    If n == 1 Then
        Return 4
    Endif
    Return BeeEachYear(n-2) + BeeEachYear(n-1) + 1
Endfunction

Start
    Let n <- Read()
    Display BeeEachYear(n)
End

2 implement a code

implement with python 3.8 on visual studio code with python extension

```python
def bee_each_year(n):
    if n == 0 :
        return 2
    if n == 1 :
        return 4
    return bee_each_year(n-2) + bee_each_year(n-1) + 1

n = int(input())
print(bee_each_year(n))
```

```
input:
8
output
143
```

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