

## Problem Set 4 Exercise #26: Fast Food or Heath Food?

**Reference:** Lecture 12 notes

**Learning objective:** Recursion

**Estimated completion time:** 30 minutes

### Problem statement:

[CS1010 AY2011/12 Semester 1 Practical Exam 2 Exercise 1]

Fabulous Hong wants to find out how many ways he can take  $n$  meals ( $n > 0$ ), if he is only given the choice of fast-food meal or health-food meal. Being a very health-conscious person, he does **NOT** want to take two consecutive fast-food meals.

For example, if he has to take 4 meals, he can have 8 different ways of doing it, which are shown below, where 'F' stands for a fast-food meal and 'H' a health-food meal:

FHFH, FHFF, FHHH, HFHF, HFHH, HHFH, HHHF, HHHH

You are to help Fabulous. Write a program **PS4\_Ex26\_Food.java** that asks for  $n$  (the number of meals, a positive integer), and calculates how many ways Fabulous can take these  $n$  meals. You must write a static recursive method:

```
int enumerate(int n)
```

to compute the number of ways to take the  $n$  meals.

You should not use any loop structures (*for*, *while* or *do-while* loop) in your program.

### Sample run #1:

```
Enter total number of meals: 3
Number of combinations = 5
```

### Sample run #2:

```
Enter total number of meals: 4
Number of combinations = 8
```

**Useful tips:**

1. There are 2 base cases here, one is  $n = 1$ , and the other is  $n = 2$ . When  $n = 1$ , the function should return 2 since there are 2 ways ('F' or 'H') to take one meal.
2. For the general case, you need to find out how many ways to take  $n$  meals. You can take this approach. If the first meal is a fast-food meal, how many ways are there to take the rest of the meals? On the other hand, if the first meal is a health-food meal, how many ways are there to take the rest of the meals? You then combine the answers.