ECE 264 Advanced C Programming
2009/03/04

1 Group Exercise (Integer Partition)

Partition an integer n into the sums of positive integers. For example, $n = 4$ can be partitioned to $4 = 3 + 1 = 2 + 2 = 1 + 1 + 2$.

1. The orders are considered, $1 + 1 + 1 + 2 = 1 + 1 + 2 + 1$ are two different partitions. Similarly, $1 + 3 = 3 + 1$ are different.

2. The orders of the numbers are **not** considered, i.e. no permutation. Hence, $1 + 1 + 1 + 2 = 1 + 1 + 2 + 1$ are the same and should **not** repeat. Similarly, $1 + 3 = 3 + 1$ are the same.

3. The numbers must be distinct and increasing. For example, $1 + 3$ is accepted but $2 + 2$ is not accepted. Nor is $3 + 1$ accepted.

4. For number n, how many ways can it be partitioned based on one of the three rules? List the answers for n between 1 and 10. Can you derive general formulas? In all cases, the number n itself is included as one partition.

Write a program that can partition any positive number n and follow one of these different rules. The output for $n = 5$ and the first rule will be in this format:

```
[1, 1, 1, 1, 1]
[1, 1, 1, 2]
[1, 1, 2, 1]
[1, 1, 3]
[1, 2, 1, 1]
[1, 2, 2]
[1, 3, 1]
[1, 4]
[2, 1, 1, 1]
[2, 1, 2]
[2, 2, 1]
[2, 3]
[3, 1, 1]
[3, 2]
[4, 1]
[5]
```

The class is divided into eight groups. Each group has an *initial* leader (marked with "L"). The initial leader is responsible calling a meeting for electing a new leader. The new leader can the initial leader. On March 25 (Wednesday), four groups will be selected to present their solutions for solving one of the four problems. The first three solutions are shown in C code and the last is shown in mathematical derivation. If your group volunteers, everyone in the group receives 1.0 bonus point as part of class participation. The group leader and the presenter (if they are different) receive 1.5 bonus points. If your group wants to volunteer, please post in Blackboard - Discussion - Lecture and specify which problem your group will present and the name of the presenter.

If fewer than four groups volunteer, the instructor will select more groups; everyone in these groups receives 0.5 bonus point. Since the chance of being selected is high (4 / 8), it is advised that your group volunteers for receiving the additional 0.5 bonus point.

This group exercise is voluntary. If a person does not to participate, the group leader will report to the instructor and this person does not receive the bonus point. There is no penalty if a person does not participate.

Group Discussion (03/25)

1L Ahuja Karan
1 Fetter Daniel
1 Geng Junzhe
1 Hudepohl Daniel
1 Kim Wesley
1 Pulliam Stuart
1 Shutt Benjamin
1 Swindler Joshua

2L Pesyna Kenneth
2 Brener Gregory
2 Christman Jacob
2 Kim Do Hyung
2 Smith Sean
2 Whyland Jon
2 Yuki Zeno

3L Kim Do-Hyoung
3 Al Shehhi Hamad
3 Zhou Yang
3 Herdzina-Huss Darien
3 Mall Rishabh
3 Mehta H'rsh
3 Mohammed Razip Ahmad Mujahid
3 Wetherill Julia

4L Li Hetong
4 Al Aryani Khaled
4 Granger William
4 Guo Yicheng
4 Hall Ethan
4 Lakhmani Vashisht
4 Penmetsa Prithvi
4 Raj Vishwaman

5L Phillips Collin
5 Chunduru Nag Varun
5 Grover Animesh
5 Izturriaga Manuel
5 Ko Seongwoon
5 Liu Sirui
5 Schieler Curt
5 Hall Loren

6L Malik Abish
6 Bajaj Arjun
6 Faber Darrell
6 Jhajaria Krishna
6 Robles Derrick
6 Schmidt Susanne
6 Wolfer Michael

7L Oliver Ian
7 Bansal Nikhil
7 Conaboy Michael
7 Jain Rajat
7 Neuenschwander Tyler
7 Park Junhyeong
7 Vadlamudi Ramanth

8L Chen Yi-Kai
8 Dinkledine Aaron
8 Jesse Skylar
8 Mahmood Zaeem
8 Mc Lean Ryan
8 Mishra Ankur
8 Schuman Richard