

# BIM306 Operating Systems

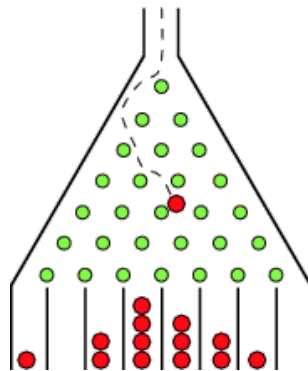
## Project-I

### Galton Board

Due: May 9, 2021

#### Project Definition

The Galton board is a device for statistical experiments named after English scientist Sir Francis Galton. It consists of an upright board with evenly spaced nails (or pegs) driven into its upper half, where the nails are arranged in staggered order, and a lower half divided into a number of evenly-spaced rectangular slots. The front of the device is covered with a glass cover to allow viewing of both nails and slots. In the middle of the upper edge, there is a funnel into which balls can be poured. The funnel is located precisely above the central nail of the second row so that each ball, if perfectly centered, would fall vertically and directly onto the uppermost point of this nail. Each time a ball hits one of the nails, it can bounce right (or left) with **equal probability**.



In the project, you are asked to implement this idea using threads in the C programming language. You can consider the ball in the above figure as threads and rectangular slots as array cells.

You need to create 1,000,000 threads if supported by your OS. Also, you need an array to count incoming threads. At any point (green circles in the figure), the thread can move either right or left. This choice is done randomly. When the thread finished its way, increase the value of the array cell by one. The below figure presents an example of the program output for a run. The values may naturally change for each run. Be sure that created thread count is equal to the sum of the values. Furthermore, run your code several times and write your comments on the distribution of the outputs in a paragraph. Submit your C code and your comment applying .zip

```
Cell: Value
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0: 0
1: 3
2: 11
3: 73
4: 236
5: 750
6: 1726
7: 3136
8: 4761
9: 5782
10: 5747
11: 4743
12: 3060
13: 1648
14: 742
15: 250
16: 67
17: 14
18: 4
19: 0
Successfully created threads: 32753
Sum of values in the cells: 32753
```