Learning Java by Design Examples

PROJECT 2: DARTS

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ACTIVITY 1

Random Number Generator

Activity 1: Random Number Generator

Random Integer Generator Formula:

(int) (Math.random()*Count) * Step + Baseline;

Random Double Generator Formula: [Baseline, Baseline+Range]

Math.random()*Range + Baseline;

Deliverable

Write a double random number generator to generate double number from -3 to 3. Write these in main() method

Hint: Baseline = ?

Range = ?

ACTIVITY 2

2D Point Generator

Activity 2:

Generation of a 2D point with coordination of (x, y) in the range 0f [-3, 3], [-3, 3].

Then, Write a function to calculate the distance of this point P to the original point (0, 0).

- **public static double distance(x, y);**

ACTIVITY 3

Dart Board Game

Darts Board Game

Darts throwing is a favorite game. It is fun and exciting.

In this chapter project, we will be simulating such a game.

Assume that a board of three circles, each has radius of 1 Stripe (10cm), 2 Stripes and 3 Stripes respectively is used.

Hitting the smallest circle scores 3 points.

Hitting the middle circle scores 2 points

Hitting the largest circle scores 1 points.

Missing the board, no point.

Activity 3: Simulated Darts Game Rule

We use the unit Stripes to make the programming job easier. So, the distance from the original point will be from 0 stripe to 3 stripes. The Board range will be from -3 stripes to 3 stripes.

Now, write a throw() method that simulate one dart throw.

public static int throwDart();

// which will return the score in double

ACTIVITY 4

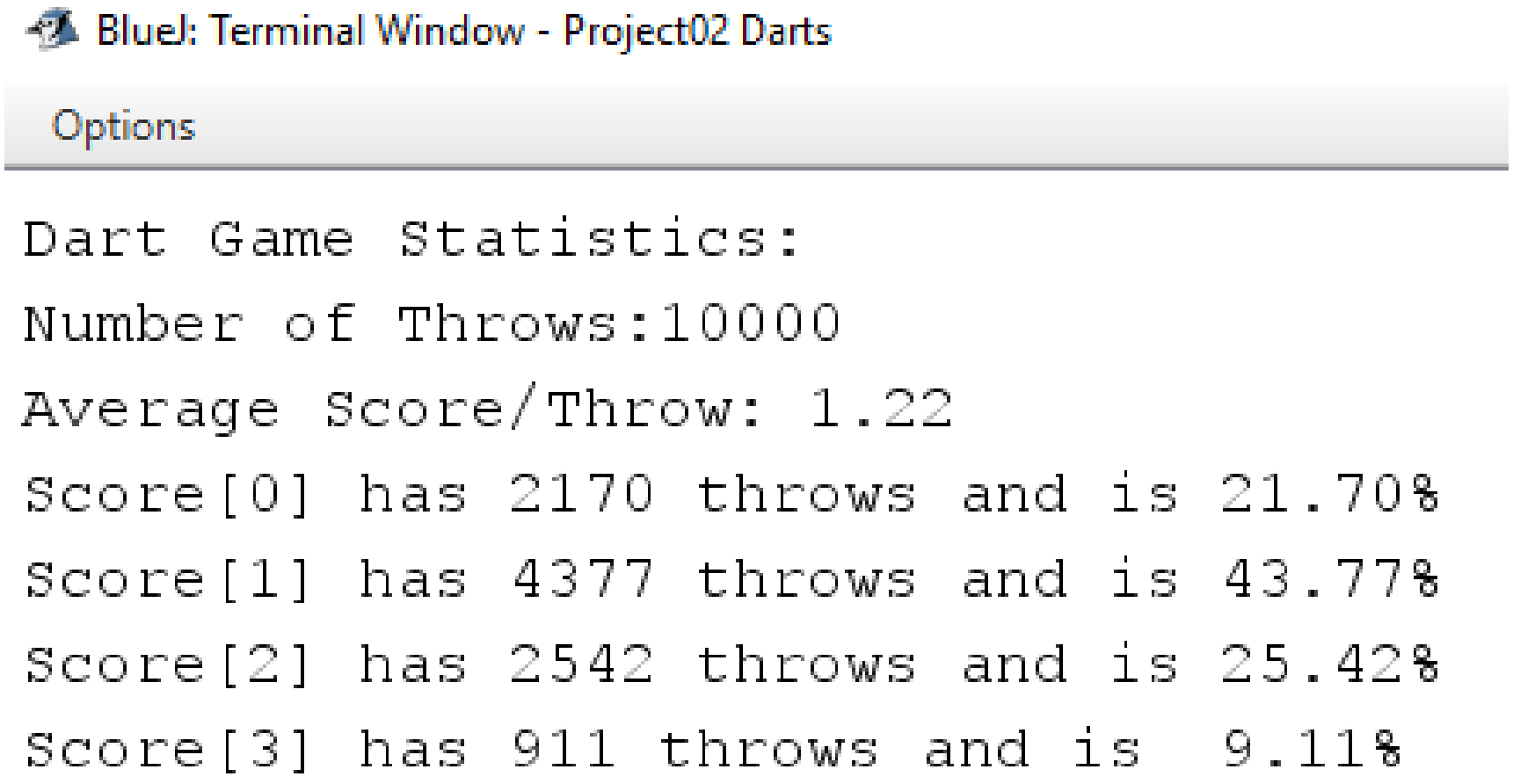
Multiple Dart Throws Collect Numbers of misses, 1, 2, and 3 Throws

Activity 4: Collect the Numbers of Throws for Each Game and Calculate the Percentage

Try 10000 Throws, collect the number of throws for score 3, 2, 1, 0, respectively.

Collect the sum of score for all throws, then calculate for the average score per throw

Your Output Should Look Like:



ACTIVITY 5

Discussion

Activity 5:

- Can you find the theoretical percentage value for each score?
- Which quantity can be used to predict the percentage of each score?
- Try to come out the mathematical model for this Darts game.

ACTIVITY 6

Summary

Program Patterns

- Random double numbers
- Calculation of distance between 2D points
- Buckets for collecting numbers of throws
- Sum of an array and the average