CS 3005: Programming in C++

Grid Runner

The Grid Runners are a collection of young people dropped in the center of a large grid. The grid consists of straight streets in the cardinal directions of the compass. The interior of the blocks are 1000 foot high concrete blocks, covered with teflon, so the runners can’t climb to the top. The only way that the runners can move is going from one intersection to the next.

A collection runners are dropped at the origin of the grid and each given a device of chance. Each runner rolls their chance device, and it tells them which direction to travel. They move to the next intersection in that direction, then use the chance device again, following its direction. This process is repeated some specified number of times.

The overseers wait until every runner has completed the required number of steps, then they record the number of runners at each location. The runners are then collected, their memories are wiped, and they are returned to society, unaware of their role in this diabolical simulation.

The chance device looks much like a many-sided die. Each of the faces has a single letter on it: N, S, E, or W. Depending on the whims of the overseers, the number of sides on the chance device and the number of times each letter is represented may be different. For example, the device may only have 4 sides: one for each letter. In another case, it may have 10 sides, 3 for N, 3 for S, 3 for E and 1 for W.

Assignment

In this assignment, you will create a program that simulates the progress of a group of runners, and record the result.

Step three is to create images using your runner simulation program and the color choosing and PPM file creation programs from the previous assignments. These images will provide a visualization of the effects of different chance devices.

Requirements

Create the following images. For each image, the colors are up to you and your previous code, as long as the visualization is clear. Your simulations should use at least 10000 runners and 500 steps. The images represent the number of runners that end at each of the intersections. Note that most of the images will be about 100x100 pixels in size.

- 1111.ppm - use a chance device where every direction has equal chance.
- 1011.ppm - use a chance device where north, east and west have equal chance, but south has no chance.
- 1001.ppm - use a chance device where north and west have equal chance, but south and east have no chance.
- 9119.ppm - use a chance device where north and west have chance of 9 units, and south and east have chance of 1 unit.
- mystery1.ppm - create an image that has the same qualitative shape as this one. Note the colors should not match, because you have your own coloring program.
- mystery2.ppm - create an image that has the same qualitative shape as this one. Note the colors should not match, because you have your own coloring program.

Show Off Your Work

To receive credit for this assignment, you must upload the source code (.h and .cpp files), the Makefile, and the images (.ppm files) to the CIT submission system linked at the top of the page.

Additionally, the programs must build, run and give correct output.