

CS120 – Computer Science 1

Assignment #3

Spring 2014

Due: Wednesday February 19, 11:30am (start of class).

In this week's assignment, we create a game called "*A Tourist's Tour of Moscow*" as a means of gaining more experience with loops. It is also an exercise in careful reading. The game is a game of chance that revolves around a visitor who is new to Moscow and who has to visit a number of points of interest (POI).

The player starts off at a user-specified position in a simplified representation of Moscow. A map of Moscow is included as figure 1. From this starting position, the player moves randomly in one of the four cardinal directions (north, east, south or west). The player will make 10,000 such moves. If, upon any of these moves, the player arrives at the location of one of the points of interest, he/she will get a number of points. How many points are earned depends on how far away the point is from the initial start position of the player. The player may get points for visiting a given POI only once, so one cannot get twice as many points for visiting a given POI twice.

The map is 100 by 100 units large, which means both the horizontal and vertical positions range from 0 to 99 units (however we define units). If the player's location goes outside these boundaries - so if the player's horizontal or vertical position is negative, or if the player's horizontal or vertical position exceeds 99 - the player makes another move instead.

The value v of a point of interest POI is calculated as follows:

$$v(\text{POI}) = (|\text{player_x} - x| + |\text{player_y} - y|)^2$$

where \mathbf{x} is the horizontal position of the POI and \mathbf{y} is the vertical position of the POI, $\mathbf{player_x}$ and $\mathbf{player_y}$ are the x and y coordinates the player starts out at, and " $|a|$ " means "the absolute (= nonnegative) value of a ".

Starting a new game of Tourist's Tour

Upon starting Tourist's Tour, the player should be asked where in Moscow he/she would like to start out on the map. The starting position should be a valid one.

The program should subsequently ask the user to enter the positions of three points of interest in Moscow. Example POIs and their respective positions are given in figure 1. The program should calculate the number of points that each position is worth.

The program should then (1) choose a direction for the player to walk to, (2) make the player move in that direction, and (3) check to see if the player has arrived at one of the points of interest. If he/she has, update the player's point total to reflect this. *Repeat these three steps 10,000 times.*

When the program has moved the player 10,000 times, it should print the player's point total and end the game. Once you are sure that the program works properly, submit your source file via `cscheckin`.

Example program execution

```
-bash-4.1$ ./a.out
Welcome to A Tourist's Tour of Moscow!
Where on the map would you like to start? Please enter two numbers
between 0 and 100 (not including 100), one for the X coordinate and one
for the Y coordinate:
25 33

Excellent! Now please enter the X and Y coordinates for point of
interest 1:
47 53
Thank you! This POI is worth 1764 points.

Now please enter the X and Y coordinates for point of interest 2:
52 50
Thank you! This POI is worth 1936 points.

And finally, please enter the X and Y coordinates for point of interest
3:
52 57
Thank you! This POI is worth 2601 points.

The tourist obtains... 1764 points.
Thank you for playing!
-bash-4.1$
```

Hints and suggestions

- This assignment is as much an exercise about loops as it is about careful reading. Read through the description step by step, write down which variables you think you will need and look at the example execution to see what kind of interaction with the user you should expect to include. Reason about which kinds of loops are appropriate for a given situation.

- Because your program will contain a number of loops, try to make sure your code is indented properly with tabs and/or spaces. This will help you find certain bugs quickly, for instance, when your program seems to be stuck in a loop and executes indefinitely.
- Feel free to ask your TA for help if any part of the assignment is unclear, but also remember to make use of the experience of your classmates through the CS forums! The forums can be found here: <https://forums.cs.uidaho.edu>. You will be asked to log in with the same credentials you would use to log into the Wormulon server.

Submitting your solution

When your program works as expected, turn it in online through *cscheckin*. Use the name "Assign3.cpp" for your source code (the ".cpp" file) and the name "Assign3script" for your script file, this helps the TAs find your submissions among those of your classmates. N.B.: the *cscheckin* command is **`cscheckin -f filename -c coursename`**, where "filename" is the name of the file you want to submit and "coursename" is "cs120".

Map of Moscow

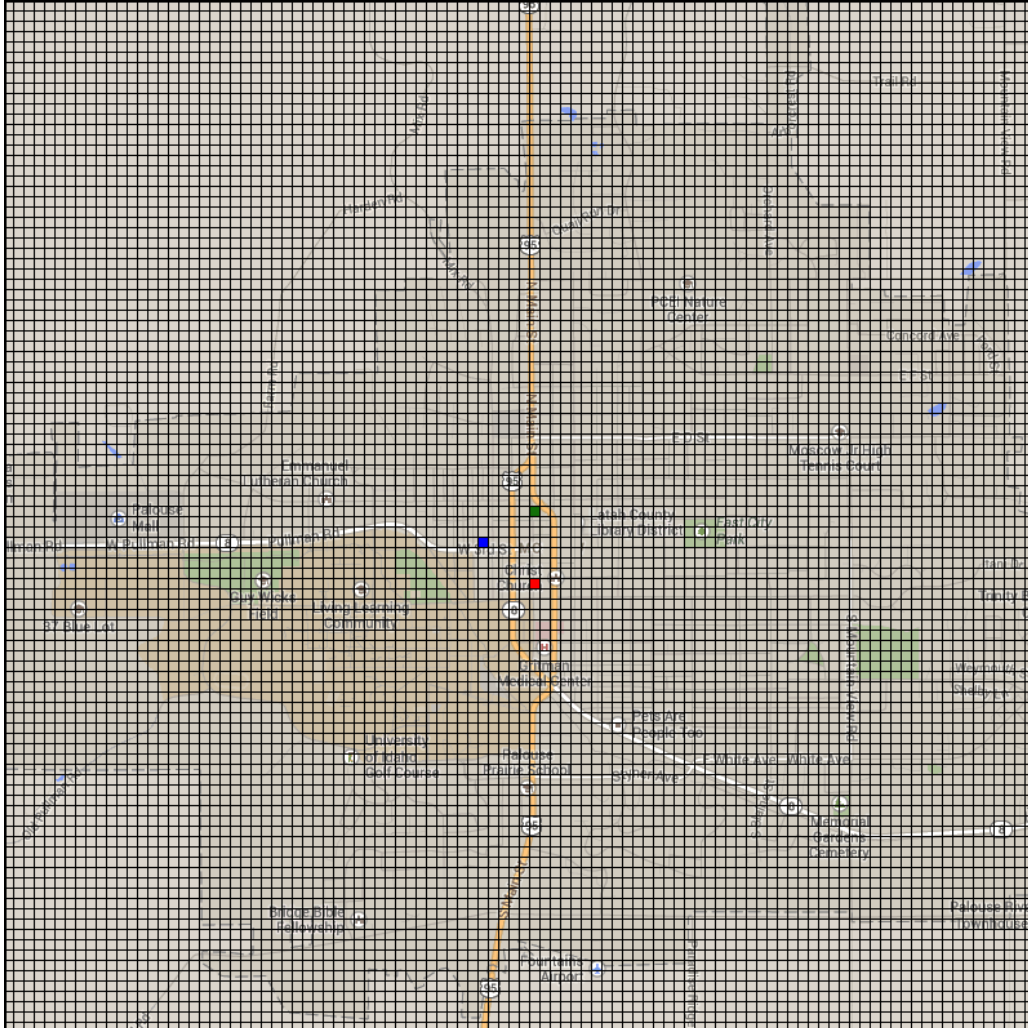


Figure 1: map of Moscow with grid overlay. It contains three example points of interest the player could use when he/she runs the application:

- The blue section at location (47, 53) is the location of *Red Bento*.
- The red section at location (52, 50) is the location of *Maialina Pizzeria Napoletana*.
- The green section at location (52, 57) is the location of *Bucer's Coffee House Pub*.