Project 1 – CMSC 202

Chase the Rabbit

1. Overview

In this project, you will:

- Practice basic C++ syntax including branching structures
- Write a program that calls multiple functions
- Manage a two-dimensional array
- Use simple file input/output

2. Background

In 1902, Beatrix Potter released her first work entitled, “The Tale of Peter Rabbit” which was the first of her 23 tales. It is estimated that that book has sold 45 million copies, which puts in the top 50 best selling books of all time.

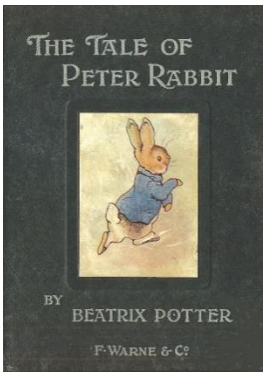

Figure 1. The Tale of Peter Rabbit

“The Tale of Peter Rabbit” is a children’s book that describes the story of how Peter tries to sneak into Mr. McGregor’s vegetable garden. For this project, we are going to design and implement a simple, text-based version of this story.

The vegetable garden will be represented by a two-dimensional grid. The actual implementation of how you want to create the garden is up to your design decisions, but you must meet all requirements listed below for full points.

The farmer can start anywhere in the garden searching for the rabbit. The rabbit will start somewhere randomly. While we can make the grid of any size, we will start with a standard 10 by 10.

		Columns									
		0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Rows	**0**	0,0	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9
	1	1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9
	2	2,0	2,1	2,2	2,3	2,4	2,5	2,6	2,7	2,8	2,9
	3	3,0	3,1	3,2	3,3	3,4	3,5	3,6	3,7	3,8	3,9
	4	4,0	4,1	4,2	4,3	4,4	4,5	4,6	4,7	4,8	4,9
	5	5,0	5,1	5,2	5,3	5,4	5,5	5,6	5,7	5,8	5,9
	6	6,0	6,1	6,2	6,3	6,4	6,5	6,6	6,7	6,8	6,9
	7	7,0	7,1	7,2	7,3	7,4	7,5	7,6	7,7	7,8	7,9
	8	8,0	8,1	8,2	8,3	8,4	8,5	8,6	8,7	8,8	8,9
	9	9,0	9,1	9,2	9,3	9,4	9,5	9,6	9,7	9,8	9,9

Figure 2. Sample Grid

3. Assignment Description

Your assignment is to develop a simple game where a farmer chases a rabbit. On each turn, the rabbit can either move in a random direction or stay where they are.

The game continues until the farmer catches the rabbit. It should then prompt the user for another game.

4. Requirements:

This is a list of the requirements of this application. For this project, it is up to you exactly how you want to implement it. For you to earn all the points, however, you will need to meet all the defined requirements.

- The project must be completed in C++. You may not use any libraries or data structures that we have not learned in class. These are the only libraries that you are allowed to use in this project **<iostream>, <ctime>, <fstream>, <iomanip>, <cmath>, and <cstlib>.** You may NOT use **<string>**. You should only use **namespace std**.
- You must use a variety of functions (at least 5) including passing parameters to those functions and returning information from those functions. At least one time, an array must be passed to a function (although you may do this more than once).
- All user input must be validated. For example, if a menu allows for 1, 2, or 3 to be entered and the user enters a 4, it will re-prompt the user. However, the user is expected to always enter the correct data type. i.e. If the user is asked to enter an integer, they will. If they are asked to enter a character, they will. You do not need to worry about checking for correct data types.
- You must use at least one multi-dimensional array in this project.
- Ask the user where in the grid the farmer starts.
- Have a menu that asks if the user wants to move the farmer (north, east, south, or west)
- A way to display the farmer's field using an R as the rabbit and the F as the farmer.
- The rabbit must be able to move every turn (but may not actually move). The rabbit may move exactly one space in any direction (north, east, south, or west) that is available. A space is available if it is inside of the limits of the grid.

- After the farmer searches in a specific direction, it indicates which direction the rabbit is (north, east, south, or west). If the rabbit is 3 west and 4 north of the farmer, it should say the rabbit is north of the farmer. If it is 3 west and 3 north, then it can say either.
- You should be able to play this with the game grid being hidden just using the directions above.
- When the farmer finds the rabbit, the game should indicate that the rabbit was found and end the game.
- Neither the farmer or the rabbit can leave the field. If the user tries to make the farmer leave the field, the user is notified that is not an option. The user is not notified if the rabbit randomly tries to leave the field and the rabbit instead does not move for that turn.
- Exit and include a thank you message for the user.

- Specific coding requirements include:
    - Must use at least 5 different functions.
    - Must use at least two different arrays.
    - Must pass an array to a function.
    - Must use at least one multidimensional array
    - Must pass at least one array to a function
    - Must not use any global variables
    - Must use at least one switch statement.
    - Must use input validation (assume the data is the correct type).
    - Must use at least one do..while loop.
    - Must use constants as needed.