DATA-STRUCTURES PROJECT

Gaming Estate

Made By:

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Submitted to:

Mrs. Sherry Garg

Acknowledgement

We extend our deepest appreciation to our esteemed guide, Mrs. Sherry Garg for providing us with the possibility to complete this project with the right guidance and advice. We would also like give gratitude for allowing us to use the facilities available and also help me to coordinate my project Furthermore, We would also like to acknowledge with much appreciation the crucial role of faculty members on this occasion. Last but not least, We would like to thank friends who help us to assemble the parts and gave a suggestion about the project.

GamingEstate

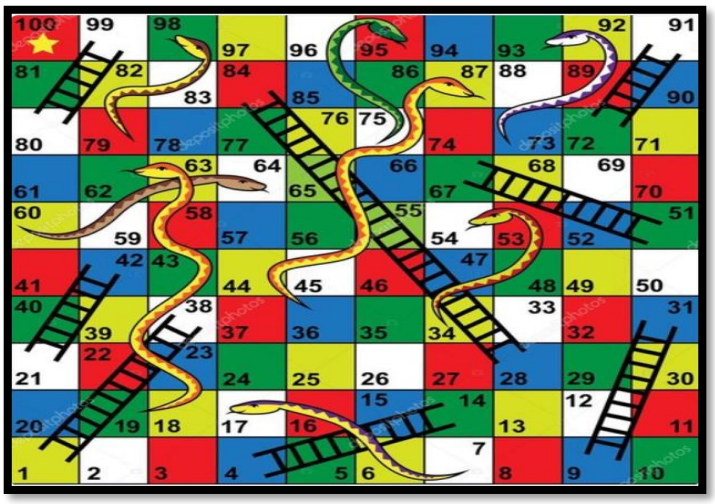
In our aspiring project, we are aiming to make an interesting and gripping game “Gaming Estate, if you can then break it”. This is a three-level game where the user will be given three games and if the user passes all the games, then they will be receiving a Chicken Dinner from Gaming Estate.

There is a rule in this game, once you enter the game you can’t leave the Game in between without getting whole thrill 😈

The first game is “Snake and Ladders” in which user will be having the whole right to select dice numbers from 1-6. Computer will generate different ladders and snakes, now user will have to tell the minimum steps to reach 100, if the user gives the correct answer, then user will be promoted to level 2 which will be “The Knights move”, in which the user has to guess minimum steps to be travelled by the Knight from the source position to the target position, if the user answers it correctly then the level will be upgraded to level 3 ,the last game “Mastermind, Break the code” in which the user will have to break the code in less than 12 attempts.

If user answers correctly then a Chicken Dinner will be given to user.

Snake and Ladders



Problem Statement:

You are the square 1 and have to reach the square 100. You have complete control over the die and can get any number from 1-6. There will be several ladders and snake in between. If you moved to the square having ladder then you will climb up to the square till which the ladder ends. But if you moved to the square having the head of the snake then you have to move down back to the square having the tail of that particular snake.

For the given snakes and ladders you have to find the minimum steps to reach the square 100.

Theory used:

This problem can be solved using the concept of graphs. We have to apply Breadth First Search (BFS) traversal algorithm find the most appropriate path having minimum steps to reach the target location.

We have to use FIFO concept for BFS hence Queue will be the most appropriate data structure to be implemented. There could be a possibility that the user can get into a loop hence to avoid this problem, we have to maintain an array ‘visited’ to keep a track on the path. We have to add start vertex to the Queue, in the visited array mark that start as visited . Now we have to run a while loop for finding whether the queue is empty or not, if it is not empty then we have to print the front element of the queue and then pop it out, then we have to check the adjacent vertex of the start and check whether its visited or not if it is not visited then we have to add it to the queue

and print it as it would be the front element then pop it out. The similar steps will be applied again and again until the best path is obtained.
To check that at particular position ladder or snake is there we can use map to avoid the linear search. Here rand() function is used to generate the ladder's and snake's top and bottom.

The Knight's Move

A knight is a piece in the game of chess that is traditionally shaped like a horse. The knight moves unconventionally compared to other chess pieces. Whereas other pieces move in straight lines, knights move in an "L-shape"—that is, they can move two squares in any direction vertically followed by one square horizontally, or two squares in any direction horizontally followed by one square vertically.

Given a square chessboard of N x N size, the position of Knight and position of a target is given, the task is to find out the minimum steps a Knight will take to reach the target position. This problem can be seen as shortest path in unweighted graph. Therefore, we use Breadth First Search to solve this problem.

Breadth-first search (**BFS**) is an algorithm for searching a tree data structure for a node that satisfies a given property. It starts at the tree root and explores all nodes at the present depth prior to moving on to the nodes at the next depth level. Extra memory, usually a queue, is needed to keep track of the child nodes that were encountered but not yet explored.

For a Knight positioned on any cell of the board, there can be at most eight valid moves, which can be defined by the relative positions

({ { 2, 1 }, { 2, -1 }, { 1, 2 }, { 1, -2 }, { -2, 1 }, { -2, -1 }, { -1, 2 }, { -1, -2 } }

We try all 8 possible positions where a Knight can reach from its position.

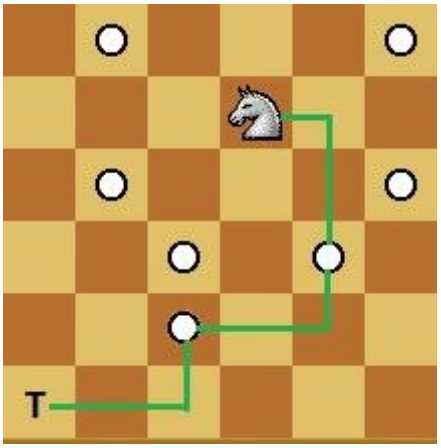
We have to use FIFO concept for BFS hence Queue will be the most appropriate data structure to be implemented. There could be a possibility that the user can get into a loop hence to avoid this problem, we have to maintain an array 'visited' to keep a track on the path. If reachable position is not already visited and is inside the board, we push this state into queue with distance 1 more than its parent state. The loop runs till the queue is empty. Finally we return distance of target position, when it gets poped out from queue.

Defining Safe Move: - So, let us define, which is a safe cell to move for the Knight. There are primarily three conditions:

• The target cell must be within the boundaries of the board

• It must not be visited already

• It must be reachable from the current cell position by applying any of the above moves.



Here we will ask the player to guess the minimum no of moves of the knight to reach the target position. If he guesses correctly then he wins the game, otherwise we will display the answer with its explanation.

In this we will create a function having the knightPos[],targetPos[],N as its parameter where N is the chess board

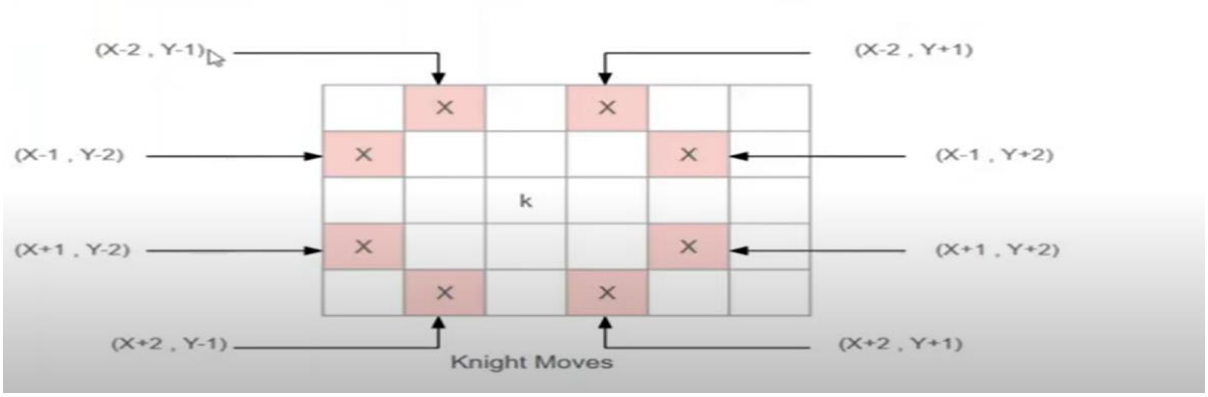
We have two direction arrays dx= {-2,-1,1,2,2,1,-1,-2};

dy= {1,2,2,1,-1,-2,-2,-1}

x,y ⟶ x+x[i],y+y[i]

we will also have a visited array to check whether a cell is already visited or not.

In BFS, one vertex is selected at a time when it is visited and marked then its adjacent are visited and stored in the queue.



BFS is applicable in those situations in which each operation costs equally

MASTERMIND

In this part of game, we are aiming to make an interesting and gripping game Mastermind, “break the code”.

There will be one code setter and one code breaker, in our game the computer will be the code setter and user will be the code breaker.

Now coming on to the rules-

User will try to guess a computer generated 4-digit code, that code can be numeric or color coded (as opted by user).
- If a digit/color is correct and is at correct position then it will get marked with @
- If a digit/color is correct but at incorrect position then it will get marked with!
-If the digit/color is not in the code then it will get marked with *

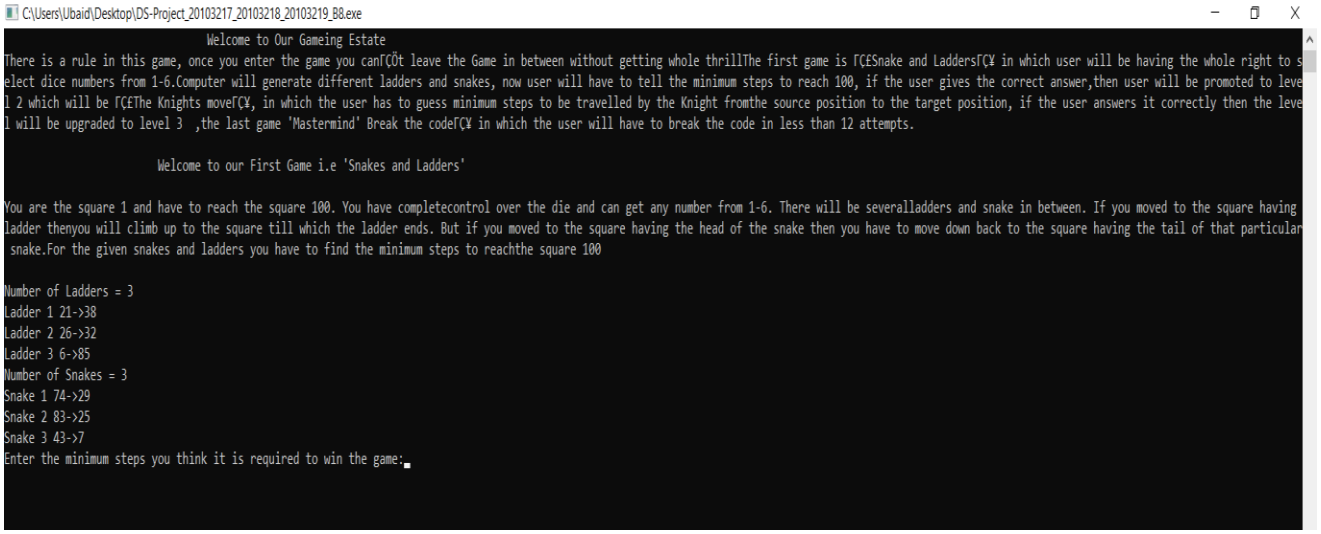
User will get maximum 12 attempts to guess, if the user guesses the number in less than or equal to 12 attempts then user wins otherwise user will lose the game.

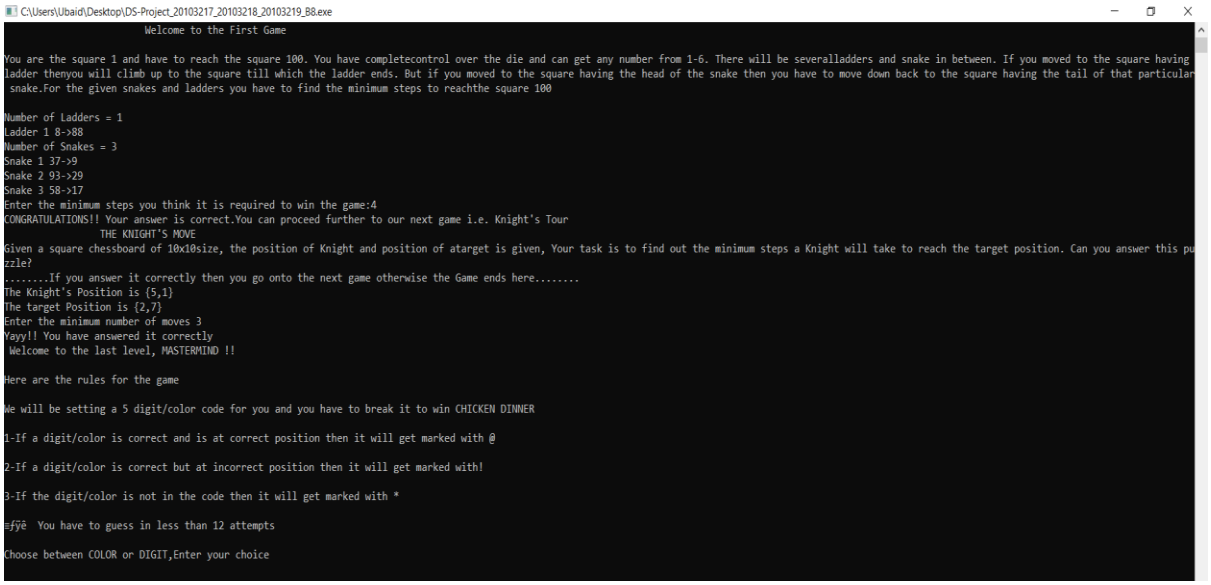
Detailed Description-

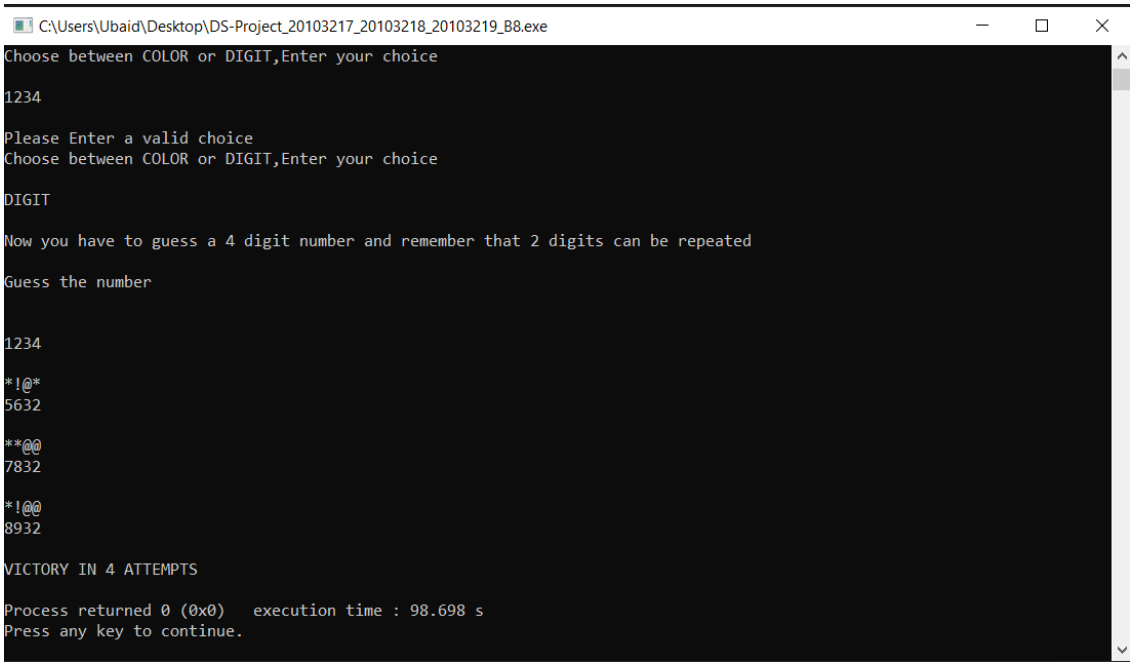
We will be using Array and Stack as primarily Datastructures for Mastermind. Firstly, we will take the input from user that whether number or color should be coded and will apply if else for that. Then we will generate a 4 digit color/number using rand() function after that we will take the guessed input from the user, if the user enters correct number then victory otherwise we will print the hint code of mastermind and again we will take the input from the user, if the input is correct then victory otherwise we will repeat the loop until the entered number is correct or the number of attempts is less than or equal to 12.
If the user is unable to guess in less than or equal to 12 attempts then user will lose the game otherwise if user wins CHICKEN DINNER, then the game will get exit by thanking user.

Screenshot:

IF Right Answers given: As right answers are given so the game will proceed to the end level and the game will be won.

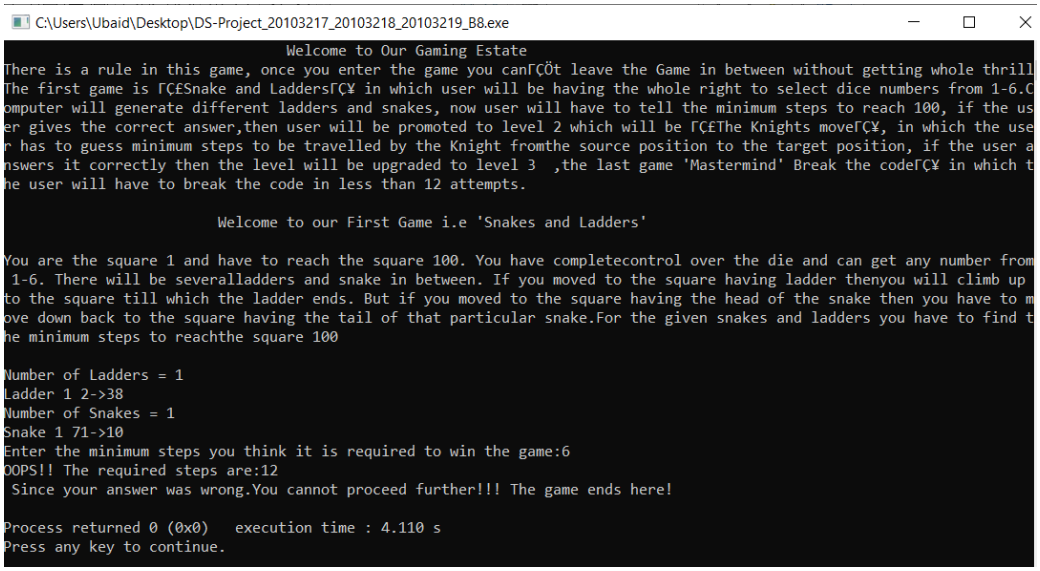

C:\Users\Ubaid\Desktop\DS-Project_20103217_20103218_20103219_B8.exe
Welcome to Our Gameing Estate
There is a rule in this game, once you enter the game you canΓÇÖt leave the Game in between without getting whole thrillThe first game is ΓÇ£Snake and LaddersΓÇ¥ in which user will be having the whole right to s
elect dice numbers from 1-6.Computer will generate different ladders and snakes, now user will have to tell the minimum steps to reach 100, if the user gives the correct answer,then user will be promoted to leve
l 2 which will be ΓÇ£The Knights moveΓÇ¥, in which the user has to guess minimum steps to be travelled by the Knight fromthe source position to the target position, if the user answers it correctly then the leve
l will be upgraded to level 3 ,the last game 'Mastermind' Break the codeΓÇ¥ in which the user will have to break the code in less than 12 attempts.
Welcome to our First Game i.e 'Snakes and Ladders'
You are the square 1 and have to reach the square 100. You have completecontrol over the die and can get any number from 1-6. There will be severalladders and snake in between. If you moved to the square having
ladder thenyou will climb up to the square till which the ladder ends. But if you moved to the square having the head of the snake then you have to move down back to the square having the tail of that particular
snake.For the given snakes and ladders you have to find the minimum steps to reachthe square 100
Number of Ladders = 3
Ladder 1 21->38
Ladder 2 26->32
Ladder 3 6->85
Number of Snakes = 3
Snake 1 74->29
Snake 2 83->25
Snake 3 43->7
Enter the minimum steps you think it is required to win the game:


C:\Users\Ubaid\Desktop\DS-Project_20103217_20103218_20103219_B8.exe
Welcome to the First Game
You are the square 1 and have to reach the square 100. You have completecontrol over the die and can get any number from 1-6. There will be severalladders and snake in between. If you moved to the square having
ladder thenyou will climb up to the square till which the ladder ends. But if you moved to the square having the head of the snake then you have to move down back to the square having the tail of that particular
snake.For the given snakes and ladders you have to find the minimum steps to reachthe square 100
Number of Ladders = 1
Ladder 1 8->88
Number of Snakes = 3
Snake 1 37->9
Snake 2 93->29
Snake 3 58->17
Enter the minimum steps you think it is required to win the game:4
CONGRATULATIONS!! Your answer is correct.You can proceed further to our next game i.e. Knight's Tour
THE KNIGHT'S MOVE
Given a square chessboard of 10x10size, the position of Knight and position of atarget is given, Your task is to find out the minimum steps a Knight will take to reach the target position. Can you answer this pu
zzle?
.....If you answer it correctly then you go onto the next game otherwise the Game ends here.....
The Knight's Position is {5,1}
The target Position is {2,7}
Enter the minimum number of moves 3
Yayy!! You have answered it correctly
Welcome to the last level, MASTERMIND !!
Here are the rules for the game
We will be setting a 5 digit/color code for you and you have to break it to win CHICKEN DINNER
1-If a digit/color is correct and is at correct position then it will get marked with @
2-If a digit/color is correct but at incorrect position then it will get marked with!
3-If the digit/color is not in the code then it will get marked with *
You have to guess in less than 12 attempts
Choose between COLOR or DIGIT,Enter your choice


C:\Users\Ubaid\Desktop\DS-Project_20103217_20103218_20103219_B8.exe
Choose between COLOR or DIGIT,Enter your choice
1234
Please Enter a valid choice
Choose between COLOR or DIGIT,Enter your choice
DIGIT
Now you have to guess a 4 digit number and remember that 2 digits can be repeated
Guess the number
1234
!@
5632
**@@
7832
*!@@
8932
VICTORY IN 4 ATTEMPTS
Process returned 0 (0x0) execution time : 98.698 s
Press any key to continue.

IF Wrong Answer given:

1.At stage 1:



2.At stage 2:

THANKYOUUU!!!!

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