Assignment # 4
Aggregation, Composition, Inheritance, Polymorphism
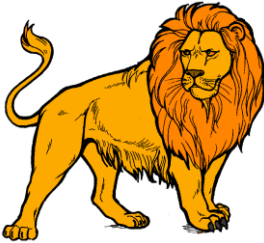### Submission Dead Line: Thursday 10/6/2021

— PROVIDE PROPER INDENTATION AND COMMENTS WITH YOUR CODE
— YOU MUST DEALLOCATE ALL MEMORY PROPERLY, YOUR CODE SHOULD NOT HAVE ANY **MEMORY LEAKS** OR **DANGLING POINTERS**.
— NO ASSIGNMENT WILL BE ACCEPTED VIA EMAIL.

Game of Life is a two-player game, played on a 2-D board, in which both players try to reach the goal state (middle cell of Board) with maximum points and money. Initially both players are given some gold and silver coins and they will move to next cell on their turn. Players will also try to block the passage of opponent player by placing some hurdles, which can be bought with coins and they will lose some points too.

When a player finds any hurdle in his path, he can either wait for some time (skip some turns) or buy some helper objects in exchange of coins. Game board also contains some gold and silver coins placed in random cells, a player can pick and place them in his/her box, points of player should update accordingly.

Money		
Gold Coins		10 Points for each coin
Silver Coins		5 Points for each coin
Helping Objects		**Lose points for buying**	**Use of Objects**
Sword		40 Points	When a player enters in a cell with snake or lion then, he can kill them with sword and move on. Sword can be used only twice in life of a player.
Shield		30 Points	A player can use shield to protect him against ghost attack, this will be used once.
Water		50 Points	A player can use water to protect him from fire only one time.
Key		70 Points	A player can open the door of locked cell by using key.

Hurdles		Lose points for buying	Use of Objects
Fire		50 Points	Fire up the cell of opponent and the player will be blocked there for 2 turns.
Snake		30 Points	Block the opponent for 3 turns and sent him back by 3 cells.
Ghost		20 Points	Block the opponent for single turn.
Lion		50 Points Can buy using only gold coins	Block the opponent for 4 turns.
Lock		60 Points Can buy using only silver coins	Keep the player blocked in locked cell untill he use a key.

A basic layout of Game board is presented in figure below.

Path of both players is shown in different colors and they will move forward in next cell on turn.

Rules of game are listed here.

1. **Winner/Loser**: The winner of this game is decided on the basis of two things number of points and goal. If a player reached at goal first but with a smaller number of points, then game will draw. A winner must reach to the goal state with more points.

2. When game is started both players will be given same amount of money and points. Whenever a player will buy and place hurdle in path of other player the game board should be updated and hurdle should be visible on board.

3. Whenever a player buys a helping object, it must be added in his box. If a player found an object (coins) in any cell he can put that in his box, and gain points. Once a player picked an object, then it will be removed from that cell and game board should update accordingly.

Other Requirements:

1. **Dynamic Board:** Your game should support dynamic (odd) size of board minimum 5×5 (25 cells) to maximum 11×11 (121 cells). On completion of one game, you can move the players to next level by increasing size of board or exit the game.

2. The initial money for 5×5 board will be 10 gold and 20 silver coins. You will pass the remaining money of both players to next level, if they want to continue game, with some additional money (same for both).

3. **Objects:** Each time a new game is started, number and placement of objects gold or silver coins will be random. You can place minimum 4 and maximum 5+5 objects on the 5×5 (25 cells) board similar calculations will be used for larger board like minimum 10 to maximum 20 objects on 11×11 board.

4. **User Interaction:** Your game should be user interactive and should provide proper options to player, which he can use for every move. Like pick an object from cell, kill the snake, use an object, buy hurdle or buy helping object etc.

5. Think about the hierarchical (inheritance) structure of your game, and design a class Game of Life for final Game which will contain (Board of Items objects, and Players Objects). Polymorphism for Items and abstract classes should be used in accurate way.

6. A player can stop game in the middle and can continue next time with that game or new game. So, you need to do filing for saving Game state.

7. **You will provide a graphical user interface for game, create neat and clean board on console and write name of objects in cells with proper updates of moves. Similarly, you will update both user's boxes, money and points information accordingly.**

HAPPY PROGRAMMING