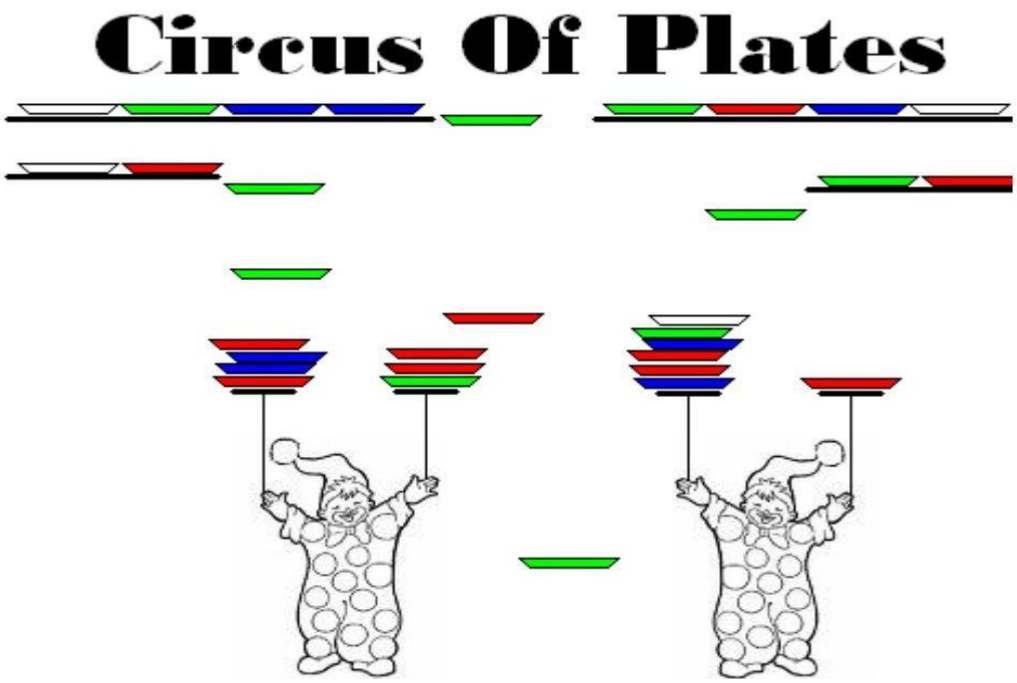
Alexandria
University Faculty
of Engineering
Computer and Communication
Engineering
Specialized Scientific Programs

CC272
Programming II
Fall 2022
Due date 30/12/2022

Circus of Plates – Game



Description

It is a single player-game in which each clown carries two stacks of plates, and there are a set of colored plates queues that fall and he tries to catch them, if he manages to collect three consecutive plates of the same color, then they vanish and his score increases. You are free to put rules ending the game.

Prof. Dr. Khaled Magdy Nagy

Tasks

- You should not support only plates; you should support other shapes (you should have a class Shape). The shapes classes should be dynamically loaded at the start of the execution from a specific folder. You should support at least two shapes.
- You must have more than one kind of falling object (ex: plates, bombs, ... etc)
- These shapes must be loaded dynamically into the game before the user can start playing, either from a specific general path as (Documents or any other general path), or a specific folder by the user choice.
- The user gets a point when he collects three consecutive shapes from the same color (even if they are different shapes).
- **You should use (at least) 5 design patterns in your design from the following**
    1. Singleton
    2. Factory or Pool
    3. Iterator
    4. Dynamic Linkage
    5. Snapshot
    6. State
    7. Strategy
    8. Flyweight
    9. Observer

This assignment mainly tackles the application of the design patterns you studied during the course, so you are supposed to give time for the design.
You should of course use MVC.

- You need to support at least 3 levels of difficulties, but you are free to choose any criteria for difficulty (e.g., different speed, multiple clowns, more queues, changing plates colors or sizes, etc.).
- You are provided with a custom game engine that supports three types of objects: movable, constant and user-controlled objects.
  Note: you may have look on the **sample game** on this link see how the engine is included, and how the sample game interacts with the game engine

- Two interfaces define the interaction with the game engine:
    1. World: defines a level of the game and its objects
    2. GameObject: an object of the game, it could be a shape, clown, etc.

Integration

You will use the game engine provided with the pdf.

The source code and the javadoc of the interfaces are shown below:

```
package eg.edu.alexu.csd.oop.game;

public interface GameObject {
    /** setter/getter for X position*/
    int getX();
    void setX(int x);
    /** setter/getter for Y position*/
    int getY();
    void setY(int y);
    /** @return  object width   */
    int getWidth();
    /** @return  object height  */
    int getHeight();
    /** @return  object visible or not */
    boolean isVisible();
    /** @return  object movement frames */
    java.awt.image.BufferedImage[] getSpriteImages();
}
```

```java
package eg.edu.alexu.csd.oop.game;

public interface World {
    /** @return  list of immovable object   */
    java.util.List<GameObject> getConstantObjects();
    /** @return  list of moving object   */
    java.util.List<GameObject> getMovableObjects();
    /** @return  list of user controlled object   */
    java.util.List<GameObject> getControlableObjects();

    /** @return  screen width   */
    int getWidth();

    /** @return  screen height  */
    int getHeight();

    /**
     * refresh the world state and update locations
     * @return    false means game over
     */
    boolean refresh();

    /**
     * status bar content
     * @return    string to be shown at status bar
     */
    String getStatus();

    /** @return    frequency of calling refresh */
    int getSpeed();

    /** @return    frequency of receiving user input */
    int getControlSpeed();
}
```

Report

The report should contain the following:

- Class diagram of your design.
- Section for each pattern (the required and any other patterns you used) and how you used it in your design, and a class diagram explaining this.

Deliverables

- For a better understanding of the game engine concept, you can find the **SampleGame** project, feel free to have a look at it before rushing into the project.
- In this project, you are given a game engine (**engine_v3.jar**).
- You should work in groups of **three or four**.
- The implementation for the given interfaces.
- You should pack your game in an executable JAR file.
- This assignment mainly tackles the design issues. Heavy load will be on the good design in addition to the required patterns.
- Develop this assignment in Java.
- You should deliver your source code using your Bitbucket repository.
- Upload your **report**, **jar file**, **zipped source code** to the materials folder in your git repository.
- Delivering a copy will be severely penalized for both parties, so delivering nothing is so much better than delivering a copy.

Good luck ISA.