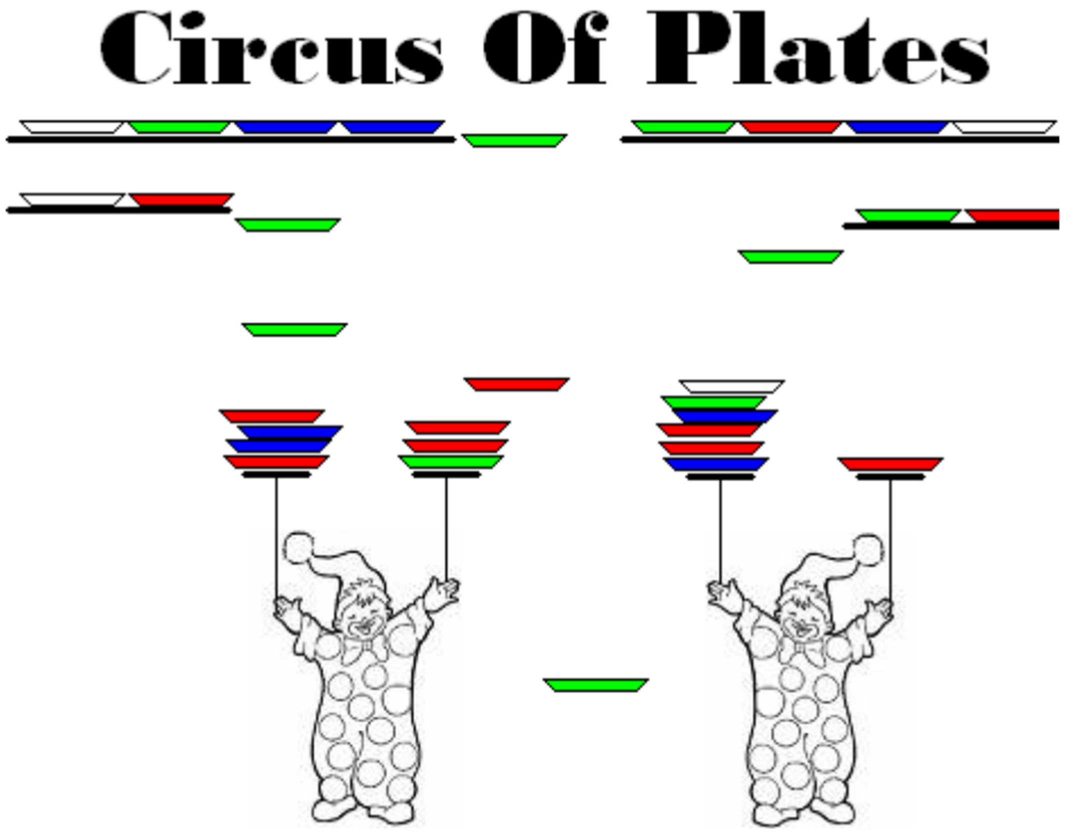
Alexandria University
Faculty of Engineering
Computer and Systems Engineering Dept.

CSE272: Programming 2
Programming Assignment 3
Spring 2017
Due date: 14 May 2017

Circus of Plates - Game

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



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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.

- The user gets a point when he collects three consecutive shapes from the same color (even if they are different shapes).

- It is required that you employ (at least) the following ten patterns in your design:
    1. Singleton,
    2. Factory or Pool,
    3. Iterator,
    4. Dynamic Linkage,
    5. Snapshot,
    6. State,
    7. Strategy,
    8. Flyweight,
    9. Observer,
    10. and choose another one you feel it suits your design.

  This assignment mainly tackles the application of what you studied in the course of design patterns, so you are supposed to give time for the design.

- You are provided with a custom game engine that supports three types of objects: movable, constant and user-controlled objects. Attached with the project at Piazza resources the engine library (engine_v3.jar), and an eclipse project contains 5 games samples that use the engine. To run the games, uncomment few code lines at ***eg.edu.alexu.csd.oop.game.sample.Main*** class.

- 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.).

- Two interfaces defines 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.

  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();
}
```

```
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:

- Describe your design thoroughly.
- Class diagram of your design.
- Sequence diagram showing the typical scenarios of the game.
- 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.
- Any design decisions that you have made should be listed clearly.

Notes

- Download the sample eclipse project that uses our game engine. It is available at Piazza resources page.
- You should work in groups of 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 git repository.
- Delivering a copy will be severely penalized for both parties, so delivering nothing is so much better than delivering a copy.