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## - README –

## Interfaces –

Animation – *this interface describes different animations that we will run while playing the game.*

BallCreator - *in charge of creating both: Aliens' and player's bullets (Ball).*

Collidable - *This interface describes Objects we can collide with (in this assignment:*
 *Block and Spacecraft).*

HitListener - *describes Objects that need to be notified of hit events.*

HitNotifier - *describes Objects that send notifications when they are being hit.*

LevelInformation - *specifies the information required to fully describe a level.*

Menu - *each menu selection contains a key (when this key is pressed in the menu*
*the specific Animation runs), message (describes the next Animation), returnVal (creating and running the specific Animation).*

Sprite - *Sprite is a game object that can be drawn to the screen (and which is not just a background image.*
*Sprites can be drawn on the screen, and can be notified that time has passed,*
*so they know to change their position, shape, appearance, etc.*

Task – *Describes Objects that need to happen, or something that we can run and return a value.*

## Classes –

AnimationRunner – *gets an Animation object and runs it.*

CountdownAnimation - *At the beginning of a level, and after a player loses a life, we would like to have a few seconds of wait before the game starts. The feature we will add now is an on-screen countdown from 3 to 1, which will show up at the beginning of each turn. Only after the countdown reaches zero, things will start moving and we will start with the game play.*

EndScreen - *this Class implements Animation and does the following: If the game ended with the player losing all his lives, the end screen displays the message: "Game Over. Your score is X" (X indicates the final score).*

KeyPressStoppableAnimation - *extracts the "waiting-for-key-press" behavior away from the different Animations into a KeyPressStoppableAnimation decorator-class that will wrap an existing animation and add a "waiting-for-key" behavior to it.*

MenuAnimation - *describes menu Animation and implements Menu Animation. When the game starts, the user will see a screen stating the game name (space invaders), maybe some graphics, and a list of several options of what to do next. Currently, the options will include: Press "s" to start a new game. Press "h" to see the high scores.*

PauseScreen - *This Animation pauses the game when we press the 'p' Key. We resume the game once we press SPACE Key.*

Block - *blockandpaddle.Block is the Obstacle on the screen. it's initialized with a geometricshapes.Rectangle, Color and blockLife. It implements interfaces.Collidable and interfaces.Sprite. when the geometricshapes. Ball of the game hits a blockandpaddle.Block the geometricshapes.Ball changes its geometricshapes.Velocity.*

BlockRemover - *a blockandpaddle.BlockRemover is in charge of removing blocks and Aliens from the game, as well as keeping count of the number of blocks that remain.*

PlayerBullet - *this Class extends and defines the Bullet(Balls) of the Player the are shot towards the Aliens.*

SpaceRemover - *once the Spacecraft (the Player) was hit, we remove the Paddle, and reduce the lives Counter by 1.*

BallRemover - *a geometricshapes.BallRemover is in charge of removing balls from the game, as well as keeping count of the number of balls that remain.*

**CollisionInfo -** *this Object contains a geometricshapes.Point and a interfaces.Collidable. given the fact there was a collision between an other object and a collidable, the geometricshapes. Point of this object contains the collision geometricshapes.Point, and the interfaces.Collidable contains the collidable that collided with the ball.*

**Line -** *geometricshapes.Line describes geometricshapes.Line object. A geometricshapes.Line contain start, end Points.*

**Point -** *geometricshapes.Point describes geometricshapes.Point object. A point contains x,y coordinates*

**Rectangle -** *geometricshapes.Rectangle describes a geometricshapes.Rectangle object. A geometricshapes. Rectangle contains upperLeft geometricshapes.Point, width and height.*

**Velocity -** *geometricshapes.Velocity specifies the change in position on the `x` and the `y` axes.*

**Ass7Game -** *the main method of highscorestablep.Ass7Game. it implements what written above.*

**GameFlow -** *This Class is responsible for moving from one level to the next and creating the different levelsandgame.*

**HighScoresAnimation -** *creates a graphical representation of the scores, It will display the scores in the high-scores table, until a SPACE KEY is pressed.*

**HighScoresTable -** *Table that stores the historic high scores which will manage a table of size high-scores.*

**ScoreInfo -** *Describes each member in HighScoreTable. contains the name and the player's score*

**GameEnvironment -** *levelsandgame.GameEnvironment contains an ArrayLIst which contains all the collidables Object in the game.*

**GameLevel -** *levelsandgame.GameLevel contains an ArrayList allSprites that contains all the Sprites of the game, levelsandgame.GameEnvironment Object(contains all the collidables) and the GUI of the game.*

**SpriteCollection -** *levelsandgame.SpriteCollection contains an ArrayLIst of all the Sprites Object in the game.*

**StartGame -** *describes how the level (levels) in this Game (space invaders) will look like. it implements LevelInformation.*

Alien - *this class describes an Alien in each level. it extends a Block and has 1 hitPoint. it can move left,right down and shoots the player.*

AliensCollection - *this Class describes the Aliens group in each level. first it contains 50 Aliens and each one of them is removed once being hit. they move together. only one of them can shoot at a time and it must be the lowest one.*

Bullets – *this Object describes the Aliens' Bullets (Balls) they shoot towards the player.*

Spacecraft - *spaceinvaders.Spacecraft describes the player in the Game. it's a geometricshapes.Rectangle which implements interfaces. Sprite and interfaces.Collidable. it can move right al left according to the key presses.*

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CloseGameTask - *Once "q" is pressed in the menu, this task closes the Game.*

ShowGameTask - *Once "s" is pressed in the menu, this task run the Levels of the Game through highscorestablep.GameFlow it contains. called from highscorestablep.Ass7Game.*

ShowHiScoresTask - *Once "h" is pressed in the menu, this task run the interfaces.Animation it contains. called from levelsandgame. Ass7Game.*

## **Classes Implementation Description –**

Aliens Formation – I created an Alien Class which describes a single Alien. It can move, notifies once was hit, it extend Block, it can add and remove itself from the game. In addition the Class AliensCollection – describes 50 Alians that are created once a new level is starts. The Alians move together, once an Alian got shot it is removed, an arbitrary Alien can Shoot at a time and it must be the lowest one in a specific column. The Collection go back to the upper left point of the screen once the player lost a round or a new game was started.

Shields – each shield consists with many small Blocs. Those Block are initialized as part of implementing "LevelInformation" Interface, thus the shields are created in "StartLevel" Class which implements "LevelInformation" Interface.

Shots by the Aliens – An Alien can shoot once in 0.5 sec and it must be the lowest one in each column, thus the shooting is implemented in

AliensCollection Class, because we must know each Alien position and it needs to be a random Alien. Each Alien is called to move by itself but its done in the same time with all the Group, therefore they move together. The last time random Alien shot is saved and only when a half of second passes the next one can shoot. Once a random Alien shoots a new Ball is created in Bullet Class, the bullet is marked as the Alien's and not the player's bullet and added to the Game.

Shots by the player – The Class SpaceCraft describes the player. It can move by pressing the arrows and shoot by pressing the Space key. Once the player pressed SPACE button a Bullet is created from PlayerBullt Class which extends Ball, this Ball is added to the LevelGame Animation, marked as the player's Bullet and once hits an Alien the Alien and the Ball are Removed from the Game.