Life --

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Outline

1. Description
    a. Demo
2. Design
    a. Activity
    b. Sequence
    c. State
    d. Class
3. Testing
    a. Unit Testing

Description

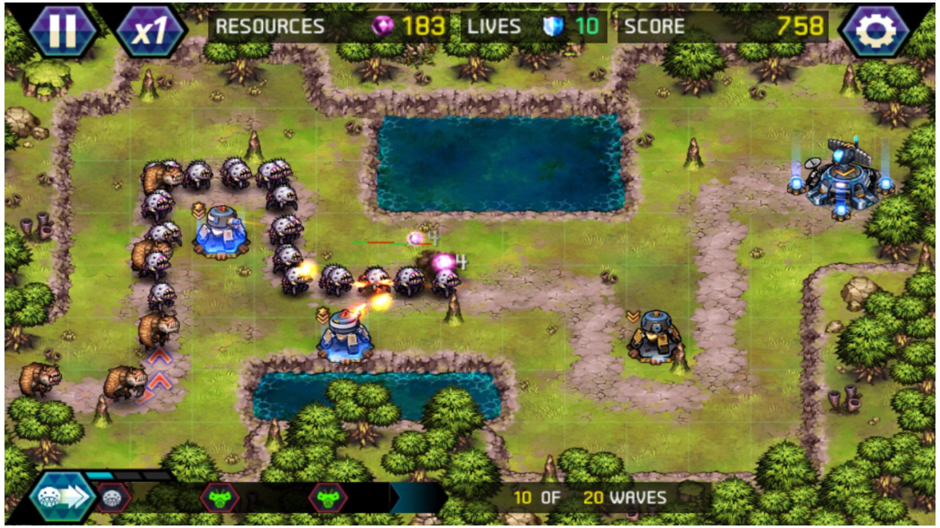
Context - Terminology

Tower Defense

Hack-and-slash

Problem

- Most games focus on defensive strategy or frenzied attacking
- Player idly sits and watches action



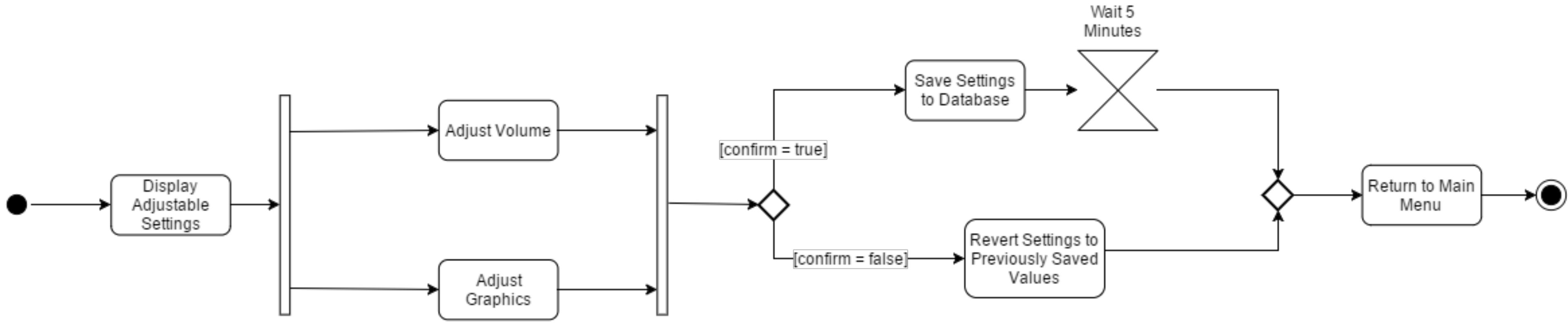
Aim/Goal

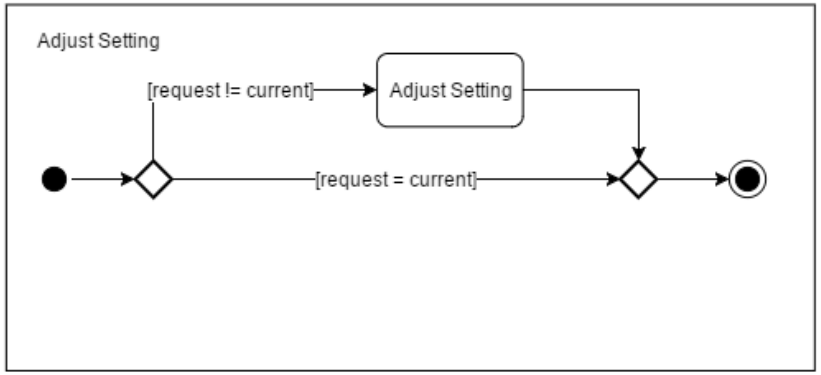
- Combine the two genres
- Actively engaging
- Require some thought

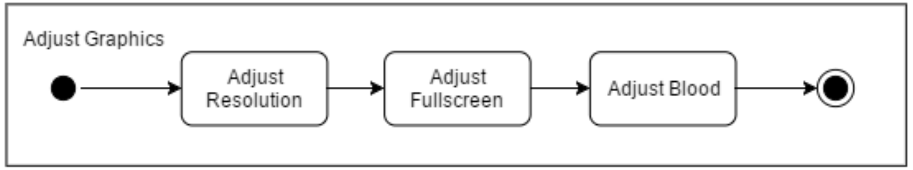
Demo

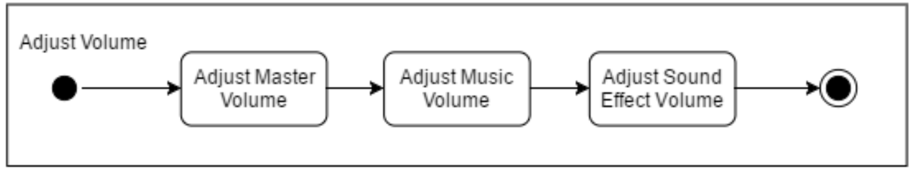
Activity Diagrams

Change Settings

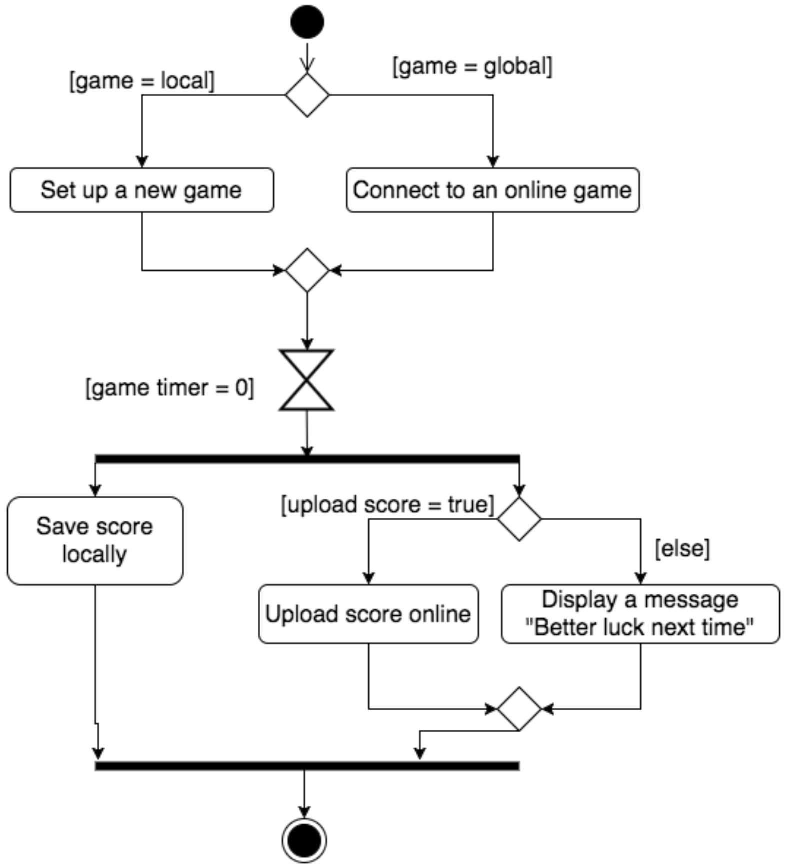

Display Adjustable Settings
Adjust Volume
Adjust Graphics
[confirm = true]
Save Settings to Database
Wait 5 Minutes
[confirm = false]
Revert Settings to Previously Saved Values
Return to Main Menu



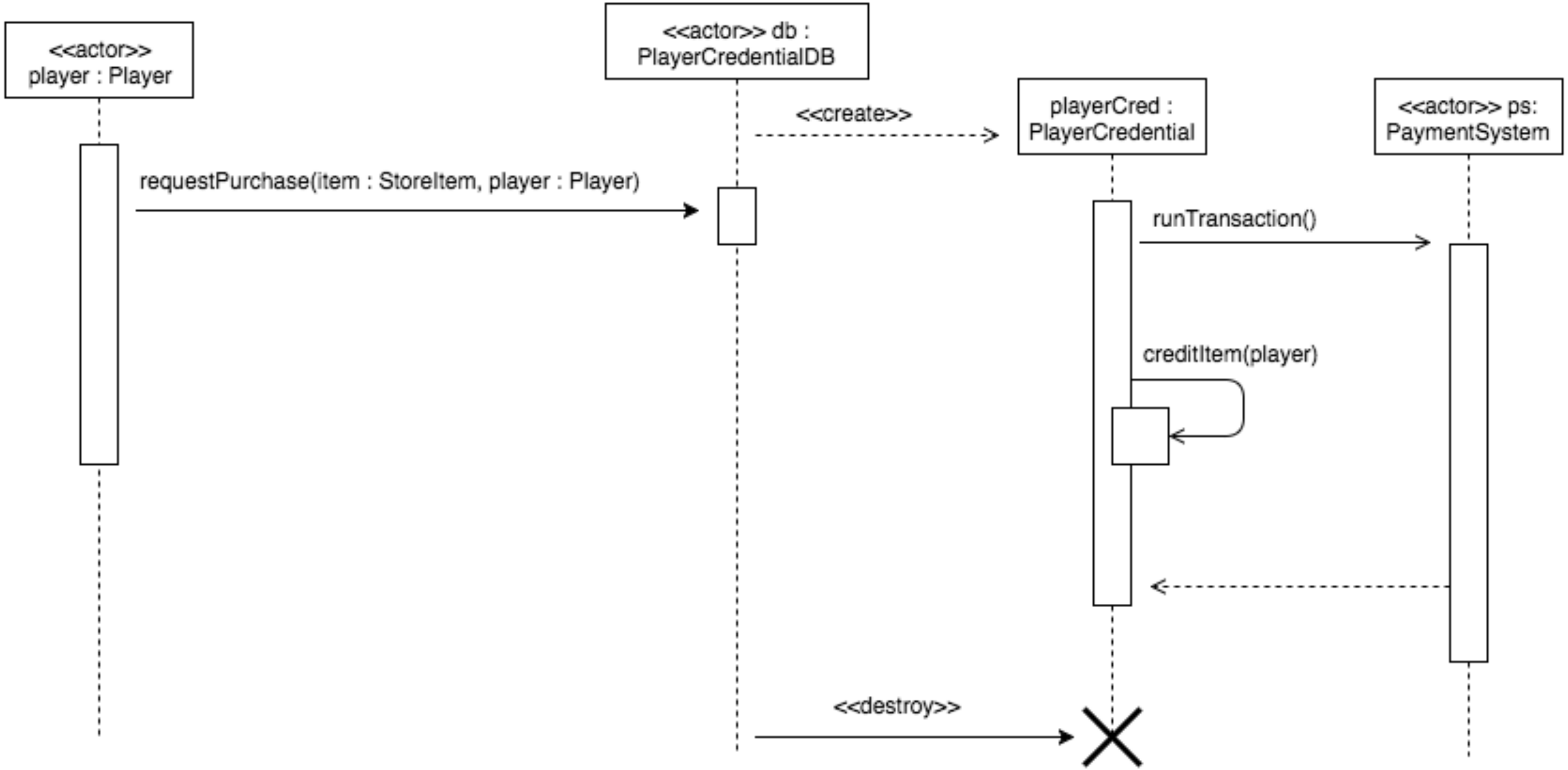




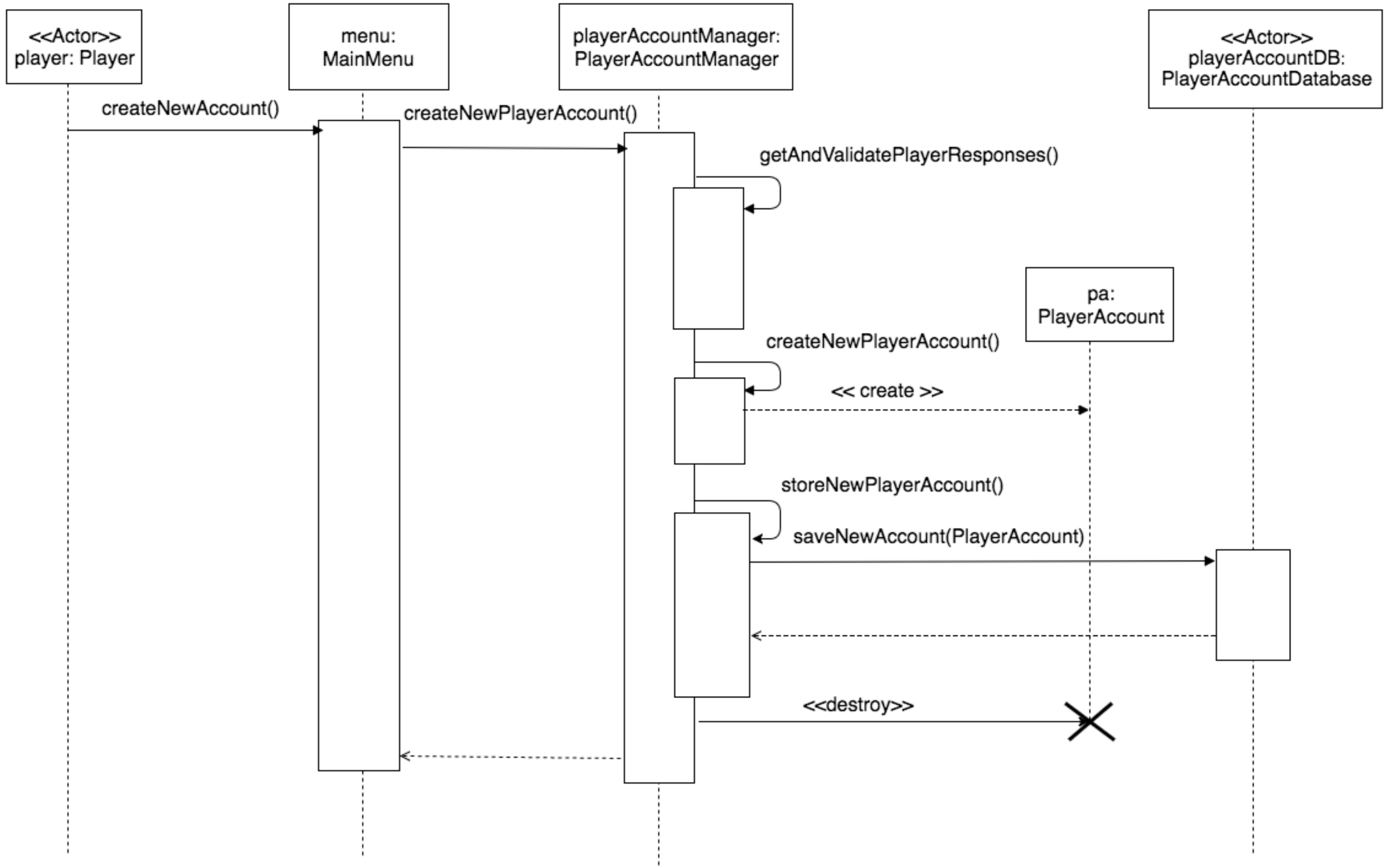
Play Game


[game = local]
[game = global]
Set up a new game
Connect to an online game
[game timer = 0]
Save score locally
[upload score = true]
[else]
Upload score online
Display a message "Better luck next time"

Sequence Diagram

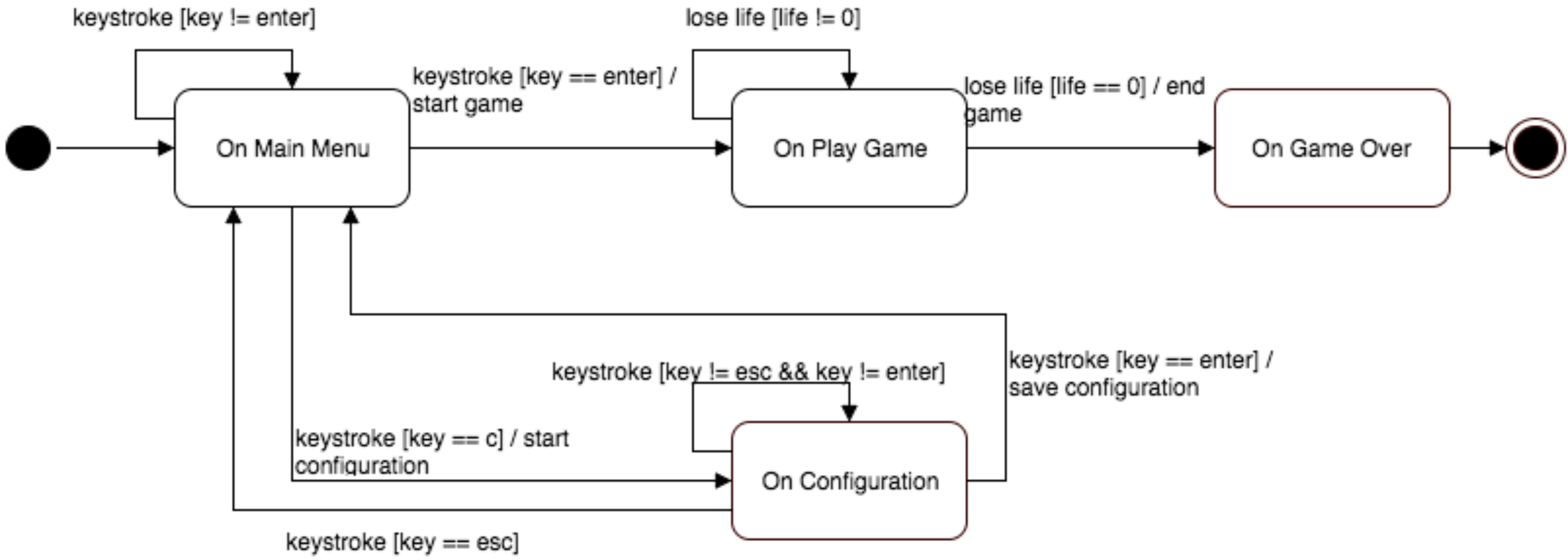

<<actor>> player : Player
<<actor>> db : PlayerCredentialDB
<<create>>
playerCred : PlayerCredential
<<actor>> ps: PaymentSystem
requestPurchase(item : StoreItem, player : Player)
runTransaction()
creditItem(player)
<<destroy>>

Create New Player Account



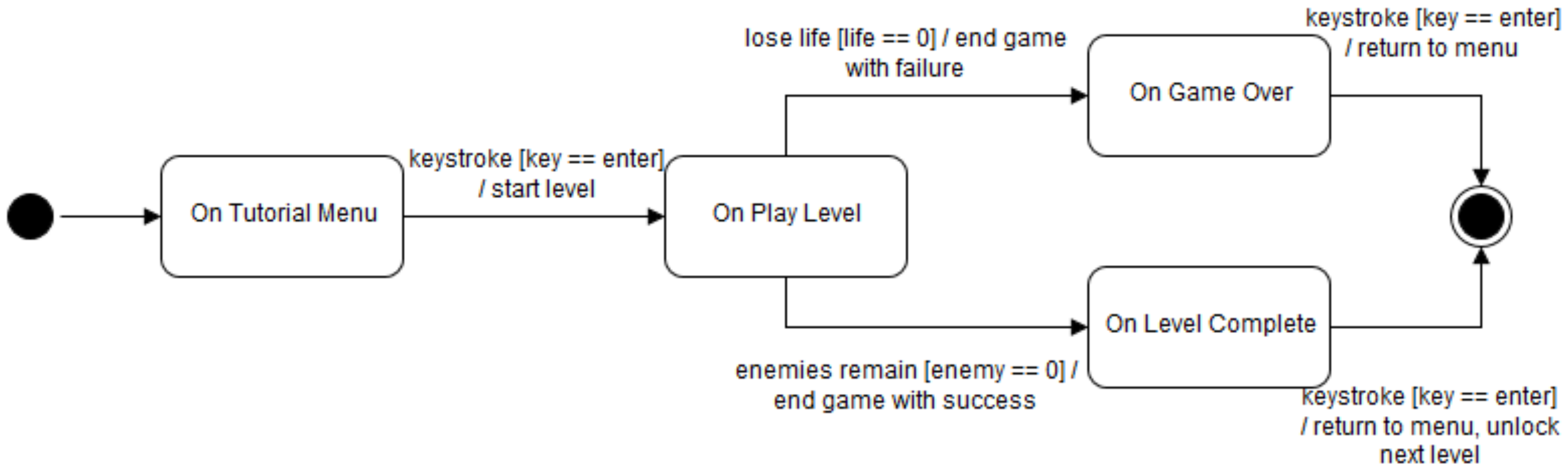
State Diagrams

Play Game

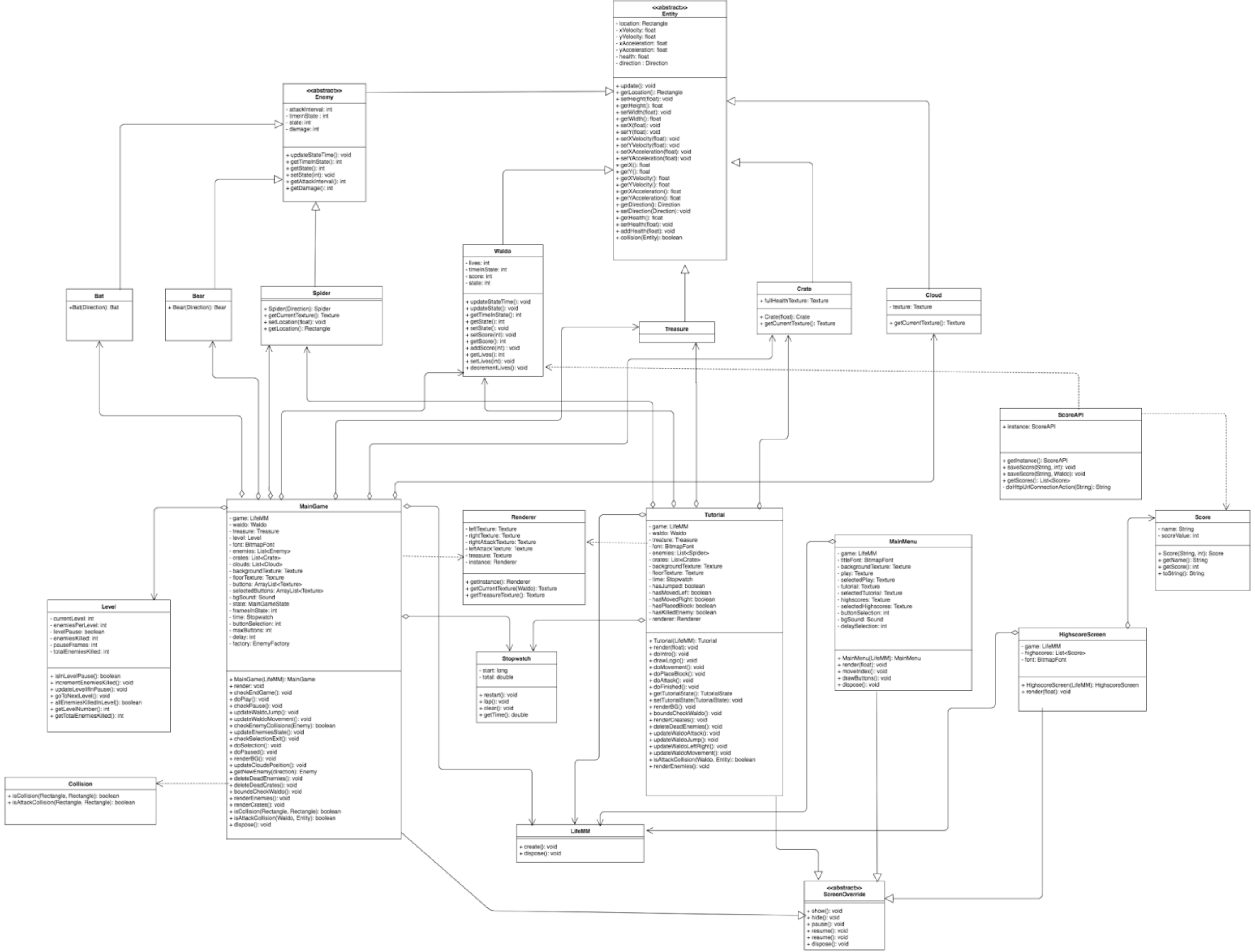


keystroke [key != enter]
lose life [life != 0]
keystroke [key == enter] / start game
lose life [life == 0] / end game
On Main Menu
On Play Game
On Game Over
keystroke [key != esc && key != enter]
keystroke [key == enter] / save configuration
keystroke [key == c] / start configuration
On Configuration
keystroke [key == esc]

Play Tutorial


On Tutorial Menu
keystroke [key == enter] / start level
On Play Level
lose life [life == 0] / end game with failure
On Game Over
keystroke [key == enter] / return to menu
enemies remain [enemy == 0] / end game with success
On Level Complete
keystroke [key == enter] / return to menu, unlock next level

Class Diagram


<<abstract>>
Entity
- location: Rectangle
- xVelocity: float
- yVelocity: float
- xAcceleration: float
- yAcceleration: float
- health: float
- direction : Direction
+ update(): void
+ getLocation(): Rectangle
+ setHeight(float): void
+ getHeight(): float
+ setWidth(float): void
+ getWidth(): float
+ setX(float): void
+ setY(float): void
+ setXVelocity(float): void
+ setYVelocity(float): void
+ setXAcceleration(float): void
+ setYAcceleration(float): void
+ getX(): float
+ getY(): float
+ getXVelocity(): float
+ getYVelocity(): float
+ getXAcceleration(): float
+ getYAcceleration(): float
+ getDirection(): Direction
+ setDirection(Direction): void
+ getHealth(): float
+ setHealth(float): void
+ addHealth(float): void
+ collision(Entity): boolean
<<abstract>>
Enemy
- attackInterval: int
- timeInState : int
- state: int
- damage: int
+ updateStateTime(): void
+ getTimeInState(): int
+ getState(): int
+ setState(int): void
+ getAttackInterval(): int
+ getDamage(): int
Bat
+Bat(Direction): Bat
Bear
+ Bear(Direction): Bear
Spider
+ Spider(Direction): Spider
+ getCurrentTexture(): Texture
+ setLocation(float): void
+ getLocation(): Rectangle
Waldo
- lives: int
- timeInState: int
- score: int
- state: int
+ updateStateTime(): void
+ updateState(): void
+ getTimeInState(): int
+ getState(): int
+ setState(): void
+ setScore(int): void
+ getScore(): int
+ addScore(int) : void
+ getLives(): int
+ setLives(int): void
+ decrementLives(): void
Treasure
Crate
+ fullHealthTexture: Texture
+ Crate(float): Crate
+ getCurrentTexture(): Texture
Cloud
- texture: Texture
+ getCurrentTexture(): Texture
ScoreAPI
+ instance: ScoreAPI
+ getInstance(): ScoreAPI
+ saveScore(String, int): void
+ saveScore(String, Waldo): void
+ getScores(): List<Score>
- doHttpUrlConnectionAction(String): String
Score
- name: String
- scoreValue: int
+ Score(String, int): Score
+ getName(): String
+ getScore(): int
+ toString(): String
MainGame
- game: LifeMM
- waldo: Waldo
- treasure: Treasure
- level: Level
- font: BitmapFont
- enemies: List<Enemy>
- crates: List<Crate>
- clouds: List<Cloud>
- backgroundTexture: Texture
- floorTexture: Texture
- buttons: ArrayList<Texture>
- selectedButtons: ArrayList<Texture>
- bgSound: Sound
- state: MainGameState
- framesInState: int
- time: Stopwatch
- buttonSelection: int
- maxButtons: int
- delay: int
- factory: EnemyFactory
+ MainGame(LifeMM): MainGame
+ render: void
+ checkEndGame(): void
+ doPlay(): void
+ checkPause(): void
+ updateWaldoJump(): void
+ updateWaldoMovement(): void
+ checkEnemyCollisions(Enemy): boolean
+ updateEnemiesState(): void
+ checkSelectionExit(): void
+ doSelection(): void
+ doPaused(): void
+ renderBG(): void
+ updateCloudsPosition(): void
+ getNewEnemy(direction): Enemy
+ deleteDeadEnemies(): void
+ deleteDeadCrates(): void
+ boundsCheckWaldo(): void
+ renderEnemies(): void
+ renderCrates(): void
+ isCollision(Rectangle, Rectangle): boolean
+ isAttackCollision(Waldo, Entity): boolean
+ dispose(): void
Level
- currentLevel: int
- enemiesPerLevel: int
- levelPause: boolean
- enemiesKilled: int
- pauseFrames: int
- totalEnemiesKilled: int
+ isInLevelPause(): boolean
+ incrementEnemiesKilled(): void
+ updateLevelIfInPause(): void
+ goToNextLevel(): void
+ allEnemiesKilledInLevel(): boolean
+ getLevelNumber(): int
+ getTotalEnemiesKilled(): int
Collision
+ isCollision(Rectangle, Rectangle): boolean
+ isAttackCollision(Rectangle, Rectangle): boolean
Renderer
- leftTexture: Texture
- rightTexture: Texture
- rightAttackTexture: Texture
- leftAttackTexture: Texture
- treasure: Texture
- instance: Renderer
+ getInstance(): Renderer
+ getCurrentTexture(Waldo): Texture
+ getTreasureTexture(): Texture
Stopwatch
- start: long
- total: double
+ restart(): void
+ lap(): void
+ clear(): void
+ getTime(): double
Tutorial
- game: LifeMM
- waldo: Waldo
- treature: Treasure
- font: BitmapFont
- enemies: List<Spider>
- crates: List<Crate>
- backgroundTexture: Texture
- floorTexture: Texture
- time: Stopwatch
- hasJumped: boolean
- hasMovedLeft: boolean
- hasMovedRight: boolean
- hasPlacedBlock: boolean
- hasKilledEnemy: boolean
- renderer: Renderer
+ Tutorial(LifeMM): Tutorial
+ render(float): void
+ doIntro(): void
+ drawLogic(): void
+ doMovement(): void
+ doPlaceBlock(): void
+ doAttack(): void
+ doFinished(): void
+ getTutorialState(): TutorialState
+ setTutorialState(TutorialState): void
+ renderBG(): void
+ boundsCheckWaldo(): void
+ renderCreates(): void
+ deleteDeadEnemies(): void
+ updateWaldoAttack(): void
+ updateWaldoJump(): void
+ updateWaldoLeftRight(): void
+ updateWaldoMovement(): void
+ isAttackCollision(Waldo, Entity): boolean
+ renderEnemies(): void
MainMenu
- game: LifeMM
- titleFont: BitmapFont
- backgroundTexture: Texture
- play: Texture
- selectedPlay: Texture
- tutorial: Texture
- selectedTutorial: Texture
- highscores: Texture
- selectedHighscores: Texture
- buttonSelection: int
- bgSound: Sound
- delaySelection: int
+ MainMenu(LifeMM): MainMenu
+ render(float): void
+ moveIndex(): void
+ drawButtons(): void
+ dispose(): void
HighscoreScreen
- game: LifeMM
- highscores: List<Score>
- font: BitmapFont
+ HighscoreScreen(LifeMM): HighscoreScreen
+ render(float): void
LifeMM
+ create(): void
+ dispose(): void
<<abstract>>
ScreenOverride
+ show(): void
+ hide(): void
+ pause(): void
+ resume(): void
+ resume(): void
+ dispose(): void

SonarQube Demo

Design Patterns

High Score Singleton

Uploads high score to server

Need single instance of uploader

```
public class ScoreAPI {
    private static ScoreAPI instance;
    private ScoreAPI() {

    }
    /**
     * Gets or creates an instance of the ScoreAPI.
     * @return The instance of ScoreAPI.
    */
    public static ScoreAPI getInstance() {
        if (instance == null) {
            instance = new ScoreAPI();
        }
        return instance;
    }
    // Additional methods for instance.
```

Renderer Singleton

Stores textures to draw on screen

Separate GUI and logic

```
public class Renderer {

          private Renderer() {
                    this.leftTexture = new Texture(“playersmall.png”);
                    this.rightTexture = new Texture(“playersmallr.png”);
                    this.treasure = new Texture(“heart.png”);
          }

          public static Renderer getInstance() {
                    if (instance == null) {
                              instance = new Renderer();
                    }
                    return instance;
          }
}
```

Enemy Factory

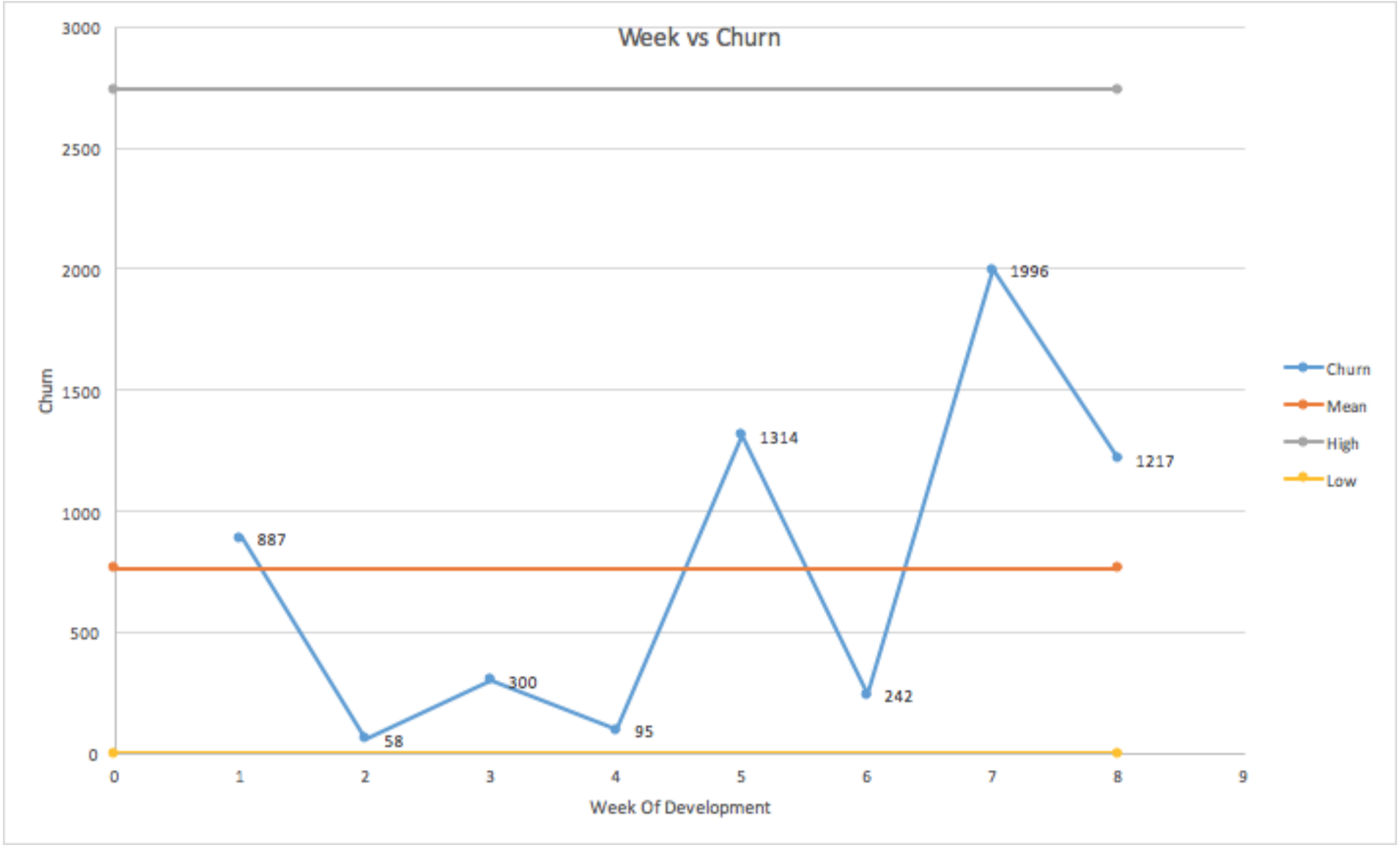
Enemies are created randomly

Factory used to generate specific enemy

```
if (enemyType.equalsIgnoreCase("SPIDER")) {
         return new Spider();
      } else if (enemyType.equalsIgnoreCase("BEAR")) {
         return new Bear();
      } else if (enemyType.equalsIgnoreCase("BAT")) {
         return new Bat();
      }
}
```

Tests (Demo)

Statistical Process Control Chart



Conclusions

Game met all functional requirements

- Basic movement
- Attacking
- Scores
- Dynamic enemies

Future

- Implement more non-gameplay features (Transactions)
- Add animations
- Add interactions with players/enemies and blocks

Questions?