AE2DMS-CW-20214701

Swing -> JavaFX

1.JFrame -> Application

add stage and scene

in **com.ae2dms.BubbleBobble.Main**

2.JComponent -> Canvas

(1) add canvas

(2) using drawOn() method

see **com.ae2dms.BubbleBobble.World.InteractableWorld**

3.GamePanel -> GameController

Jpanel -> StackPane gamePane

in **com.ae2dms.BubbleBobble.Controller.GameController**

4.Clip -> AutoClip

(1) change volume value between 0-1

(2) modify setLoop and setLoud

in **com.ae2dms.BubbleBobble.Database.SoundEffect**

5.Graphics2D -> GraphicsContext

(1) Point2D.Double -> Point2D

(2) Rectangle2D.Double -> Rectangle2D

(3) setColor -> setFill

in **com.ae2dms.BubbleBobble.World.GameObject**

(4) xxx.getHitbox().getCenterX() -> xxx.getHitbox().getMaxX()-xxx.getHitbox().getWidth()/2

in **com.ae2dms.BubbleBobble.UnitBehavior.MapCollideBehavior.WallCollide#collide**

Refactoring

1. Replace magic number with symbolic content

（1） stunTimer = 250; -> stunTimer = STUNNED_TIME;

see **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Hero**

（2） activeFrames -> (global constant) ACTIVE_FRAMES = 200;

see **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Projectile.ProjectileObject**

2. Extract method from a larger block of code based on comments

(1) rename method updatePosition() -> updateWorld() and split it into sub methods

see **com.ae2dms.BubbleBobble.World.InteractableWorld#updateWorld()**

(2) split initiateCollisions() into sub methods

see **com.ae2dms.BubbleBobble.World.InteractableWorld#initiateCollisions()**

3. Single responsibility with extract class

(1) move add methods into **com.ae2dms.BubbleBobble.Factory.UnitFactoryImpl**

(2) move data into **com.ae2dms.BubbleBobble.Database.DataManager**

4. Type embedded in name

merge add methods into addUnit()

see **com.ae2dms.BubbleBobble.Factory.UnitFactoryImpl**

5.Encapsulate fields

（1） all variables : public -> protected/private

in **com.ae2dms.BubbleBobble.World.GameObject** and its sub classes

（2） volume : public -> private

in **com.ae2dms.BubbleBobble.Database.SoundEffect**

（3） add getter and setter in
com.ae2dms.BubbleBobble.Unit.UpdatableUnit.UpdatableObject

and in **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Enemy**

6.Access constants outside class

private static final int xxx-> public ...HEIGHT,WIDTH in **com.ae2dms.BubbleBobble.Main**

7.Pull up methods

(1) Enemy & Hero -> **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Creature**

(2) CeilingUnit, FloorUnit & WallUnit -> **com.ae2dms.BubbleBobble.Unit.MapUnit.MapObject**

(3) EnemyProjectile & HeroProjectile -> **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Projectile.ProjectileObject**

(4) Creature, Projectile & Fruit -> **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.UpdatableObject**

8.Extract Interface

(1) **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.CollectableUnit.Collectable**

(2) **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Alive**

(3) **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Updatable**

9.Replace temporary with query

delete xLow,xHigh,yLow,yHigh and modify the method

see **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.UpdatableObject #isOffScreen()**

10.Remove duplicates

private static final int WIDTH/HEIGHT = Main.UNIT_SIZE + 10; -> public static final int SIZE = 30;

in **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Enemy**

11.Extends existing code

add the shootProjectile method in **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Enemy**

12.Rename variables to achieve self documentation

WALK/RUN -> WALK_SPEE/RUN_SPEED in **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Hero**

Design Pattern

1. Strategy

add CollideBehavior in **com.ae2dms.BubbleBobble.UnitBehavior**

- game objects exhibit various collide behaviours with each other.

2. Singleton

com.ae2dms.BubbleBobble.Database.DataManager

- The project only requires one instance of DataManager.

3. Factory Method

com.ae2dms.BubbleBobble.Factory

- hide the creation logic of the classes from the caller.

4. State

com.ae2dms.BubbleBobble.UnitState

- Integrate states and transitions of Hero.

5. Decorator

com.ae2dms.BubbleBobble.Unit.UpdatableUnit.CollectableUnit.DropDecorator

- combinatorial explosion of subclasses of Fruit.

6. MVC

(1) addKeyBindings() ->
com.ae2dms.BubbleBobble.Controller.GameController#addKeyBindings()

- keyboard inputs from "model" to “controller”

(2) GamePanel -> StackPane in **src/main/resources/fxml/game.fxml**

- pane display in "view"

(3) Create fxml files with Controllers in **com.ae2dms.BubbleBobble.Controller**

- using **com.ae2dms.BubbleBobble.Main#setScene()** to change the root of the scene

Additions

1. Add hero appearance choose.

   see **com.ae2dms.BubbleBobble.Controller.GameController.onHero1/2/3 Click()**
2. Add task for fruit periodically generation in level3.

see **com.ae2dms.BubbleBobble.Database.TaskService**

3. Add portal for level change.

   see **com.ae2dms.BubbleBobble.Unit.SpecialUnit.DoorUnit**

4. Set five initial health points to heroes, health drops when they die, and health can be restored by potions and a progress bar to see the charging process condition of hero.
5. Add home, pause and play button.

   see **com.ae2dms.BubbleBobble.Controller.GameController.onHome/Pause/PlayButtonClick()**

6. Add mute sound effect function.

   see **com.ae2dms.BubbleBobble.Controller.GameController.onSoundButtonClick()**

7. Add BGM & volume control.

   see **com.ae2dms.BubbleBobble.Controller.SettingController**

8. Add special fruits - treasure,star and portion that will drop sometimes.

   see **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.CollectableUnit**

9. Add special enemy - boss.

   see **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Boss**

10. Add image for each game object.

    see **com.ae2dms.BubbleBobble.World.GameObject**

11. Generate enemies and fruits randomly, and image changes direction when game objects change direction.

    see **com.ae2dms.BubbleBobble.Unit.UpdatableUnit.Creature.Enemy**,**com.ae2dms.BubbleBobble.Unit.UpdatableUnit.CollectableUnit.Fruit**

Testing

1.Class: UnitFactoryImplTest

Test	Details	Inputs	Expected Outcome	Test Outcome
test_addUnit	test adding bubble unit into the world	null	world.getBubbles().get(0) instanceof Bubble	world.getBubbles().get(0) instanceof Bubble
test_addUnit_IllegalDirection	test invalid direction argument	int direction = 0	"The direction value is invalid!"	"The direction value is invalid!"
test_addUnit_IllegalDirection	test invalid direction argument	int direction = 6	"The direction value is invalid!"	"The direction value is invalid!"
test_addUnit_IllegalType	test invalid unit type argumen	String type = Projectile	"The type is invalid!"	"The type is invalid!"
test_addUnit_IllegalColNum	test invalid colNum argument	int colNum = -5	"The position is invalid!"	"The position is invalid!"
test_addUnit_IllegalRowNum	test invalid rowNum argument	int rowNum = -1	"The position is invalid!"	"The position is invalid!"

2.Class: CollideBehaviorTest

Test	Details	Inputs	Expected Outcome	Test Outcome
test_collideWithFloor	test the yVelocity after hero collide with floor	null	hero.getyVelocity()=0	hero.getyVelocity()=0
test_collideWithCeiling	test the yVelocity after hero collide with ceiling	null	hero.getyVelocity()=0	hero.getyVelocity()=0
test_collideWithWall	test the direction change after hero collide with wall	null	hero.getDirection()=direction*(-1)	hero.getDirection()=direction*(-1)

3.Class: DataManagerTest

Test	Details	Inputs	Expected Outcome	Test Outcome
test_getLevel	test getLevel to get initial level	null	1	2
test_getScore	test getLevel to get initial score	null	0	0
test_getLives	test getLevel to get initial lives	null	5	5
test_getCurrentScore	test getLevel to get initial current score	null	0	0
test_setLives	test setLives with valid value	int lives = 4	4	4
test_setLives_Invalid	test setLives with invalid value	int lives = 6	"The lives value is invalid!"	"The lives value is invalid!"
test_setCurrentScore	test setCurrentScorewith valid value	int score = 100	100	100
test_setCurrentScore_Invalid	test setCurrentScore with negative value	int score = -4	"The score value is invalid!"	"The score value is invalid!"
test_setCurrentScore_Invalid	test setCurrentScore with large value	int score = 56512135451220	"The score value is invalid!"	"The score value is invalid!"