**Lab 3**

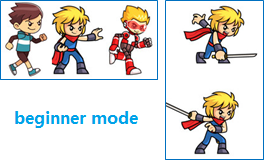
|  |  |  |  |
| --- | --- | --- | --- |
| Student Name | | Student CSUSM ID | Contribution percentage |
| 1 | Lauren Gonzalez | gonza823 | 50 |
| 2 | Sirena Murphree | murph135 | 50 |

**Grading Rubrics (for instructor only):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Criteria | 1. Beginning | 2. Developing | 3. Proficient | 4. Exemplary |
| Modeling | 0-14 | 15-19 | 20-24 | 25-30 |
|  |  |  |  |
| Program: functionality  *correctness* | 0-9 | 10-14 | 15-19 | 20 |
|  |  |  |  |
| Program: functionality  *Behavior Testing* | 0-9 | 10-14 | 15-19 | 20 |
|  |  |  |  |
| Program: quality ->  *Readability* | 0-2 | 3-5 | 6-9 | 10 |
|  |  |  |  |
| Program: quality ->  *Modularity* | 0-2 | 3-5 | 6-9 | 10 |
|  |  |  |  |
| Program: quality ->  *Simplicity* | 0-2 | 3-5 | 6-9 | 10 |
|  |  |  |  |
| Total Grade (100) |  | | | |

**Problems:**

A video game has three modes: beginner, intermediate and advanced. For each mode chosen by a player, the game GUI shows two control objects: a character selection panel and a weapon selection panel. Note that (a) under different modes the system displays different character selection panels and weapon selection panels, and (b) it is possible that new modes and/or new control objects may be added in the future.



1. Apply a design pattern to design the system such that the model can be easily extended to cover future changes without affecting the code on the client side. You should use a UML class diagram to document your design.
2. Write Java code to implement your design. You should have a simple test class to show how it works.

**Solution:**

* First, remember to zip the src folder of your project and submit the zip file to the ungraded assignment named “Lab3CodeSubmission”. One submission from each team.
* Paste a screenshot of a run of your program here.
* Also paste all you source code here.
* Save this report in PDF, then **each student** needs to submit the pdf report to the graded assignment named “Lab3ReportSubmission”.

Diagram

Description automatically generated

Screenshots

ACharacter.java

public abstract class ACharacter {

/\*\*

\* Enumerated Types of Character Class Archetypes

\*/

public enum *Archetype* {

***KNIGHT***("Knight"),

***CLAIRIC***("Clairic"),

***WIZARD***("Wizard"),

***ROUGE***("Rouge");

String charclass;

Archetype(String c){ charclass = c;}

public String toString() {return charclass;}

}

/\*\*

\* The name of the character

\*/

private String name;

/\*\*

\* the level of the character

\*/

private int lvl;

/\*\*

\* the Class archetype of the character

\*/

private *Archetype* arch;

/\*\*

\* string that holds standard greeting

\*/

protected String greeting = "Greeting Not Defined";

/\*\*

\* constructor

\* **@param** name

\* **@param** charClass

\*/

public ACharacter(String name, *Archetype* charClass){

this.name = name;

this.arch = charClass;

this.lvl = 1;

}

/\*\*

\* returns a string that describes the character

\* **@return** string

\*/

public String toString() {

return String.*format*("%s - Level %d %s", name, lvl, arch.toString());

}

/\*\*

\* level up the character

\*/

public void levelUp() {

lvl++;

}

/\*\*

\* returns a string of the character's greeting

\* **@return** null if undefined

\*/

public String greeting() {

return greeting;

}

/\*\*

\* return the name of the character

\* **@return** string

\*/

public String getName() { return name;}

/\*\*

\* return the current level of the character

\* **@return** int

\*/

public int getLevel() {return lvl;}

}

AdvancedPlayerCharacter.java

public class AdvancedPlayerCharacter extends ACharacter {

/\*\*

\* constructor for an advanced Game of Thrones themed character

\* **@param** name

\* **@param** charClass

\*/

public AdvancedPlayerCharacter(String name, *Archetype* charClass) {

super(name, charClass);

this.greeting = String.*format*("%s I am %s , first of my name, of Game of Thrones. \n", "Evening.", this.getName());

}

}

AdvancedPlayerFactory.java

import java.util.ArrayList;

import java.util.List;

public class AdvancedPlayerFactory implements IPlayerFactory {

/\*\*

\* @return List<ACharacter> a list of pre-made Game of Thrones themed Characters

\*/

@Override

public List<ACharacter> getCharacterModels() {

List<ACharacter> futuramaCharacters = new ArrayList<ACharacter>();

futuramaCharacters.add(new AdvancedPlayerCharacter("Arya Stark", ACharacter.Archetype.ROUGE));

futuramaCharacters.add(new AdvancedPlayerCharacter("Jon Snow", ACharacter.Archetype.KNIGHT));

futuramaCharacters.add(new AdvancedPlayerCharacter("Pyat Pree", ACharacter.Archetype.WIZARD));

futuramaCharacters.add(new AdvancedPlayerCharacter("Melisandre", ACharacter.Archetype.CLAIRIC));

return futuramaCharacters;

}

/\*\*

\* @return List<AWeapon> a list of pre-made Game of Thrones themed Weapons

\*/

@Override

public List<AWeapon> getWeaponsModels() {

List<AWeapon> weapons = new ArrayList<AWeapon>();

weapons.add(new AdvancedPlayerWeapon("Dragonglass", AWeapon.WeaponType.DAGGER, AWeapon.DamageType.PIERCING));

weapons.add(new AdvancedPlayerWeapon("Crossbow", AWeapon.WeaponType.GUN, AWeapon.DamageType.NECROTIC));

weapons.add(new AdvancedPlayerWeapon("Heartsbane", AWeapon.WeaponType.SWORD, AWeapon.DamageType.SLASHING));

weapons.add(new AdvancedPlayerWeapon("Ruby Neclace", AWeapon.WeaponType.SPELLFOCUS, AWeapon.DamageType.RADIENT));

weapons.add(new AdvancedPlayerWeapon("Longbow", AWeapon.WeaponType.BOW, AWeapon.DamageType.PIERCING));

return weapons;

}

}

AdvancedPlayerWeapon.java

public class AdvancedPlayerWeapon extends AWeapon {

/\*\*

\* Constructor for Advanced Weapon

\* **@param** name

\* **@param** weaponType

\* **@param** damageType

\*/

public AdvancedPlayerWeapon(String name, *WeaponType* weaponType, *DamageType* damageType) {

super(name, 1, weaponType, damageType);

}

}

AWeapon.java

public abstract class AWeapon {

/\*\*

\* Enumeration of damage that a weapon can cause

\*/

public enum *DamageType* {

***SLASHING***,

***BLUDGENING***,

***PIERCING***,

***NECROTIC***,

***FIRE***,

***RADIENT***

}

/\*\*

\* Weapon types

\*/

public enum *WeaponType*{

***SWORD***("Sword", 8, 5),

***SPELLFOCUS***("Spell Focus", 8, 90),

***DAGGER***("Dagger", 4, 25),

***BOW***("Bow and Arrow", 6, 120),

***GUN***("Gun", 8, 90);

String weapon;

int damage;

int range;

WeaponType(String w, int d, int r){

weapon = w;

damage = d;

range = r;

}

public String toString(){ return String.*format*("%dD %s", damage, weapon);}

}

/\*\*

\* the damage modifier of the weapon

\*/

private int damage;

/\*\*

\* the type of damage the weapon imposes

\*/

private *DamageType* type;

/\*\*

\* the type of weapon as defined by enumeration

\*/

private *WeaponType* weaponType;

/\*\*

\* the name of the weapon

\*/

private String name;

/\*\*

\* constructor for abstract weapon

\* **@param** name

\* **@param** damageMod

\* **@param** weaponType

\* **@param** damageType

\*/

public AWeapon(String name, int damageMod, *WeaponType* weaponType, *DamageType* damageType) {

this.name = name;

this.damage = damageMod;

this.weaponType = weaponType;

this.type = damageType;

}

/\*\*

\* **@return** int - how much damage this weapon causes

\*/

public int getDamage() {

return weaponType.damage + damage;

}

/\*\*

\* **@return** DamageType - return the type of damage that the weapon

\*/

public *DamageType* getDamageType() {

return type;

}

/\*\*

\* **@return** a string that describes the weapon

\*/

public String toString() {

return String.*format*("%-20s [%dhp %+2d %-15s]", name, weaponType.damage, damage, weaponType.weapon);

}

/\*\*

\* **@return** the name of the weapon

\*/

public String getName() { return name;}

}

BeginnerPlayerCharacter.java

public class BeginnerPlayerCharacter extends ACharacter {

/\*\*

\* constructor for a beginner Futurama themed character

\* **@param** name

\* **@param** charClass

\*/

public BeginnerPlayerCharacter(String name, *Archetype* charClass) {

super(name, charClass);

this.greeting = String.*format*("%s I'm %s from Futurama. \n", "Good News Everyone!", this.getName());

}

}

BeginnerPlayerFactory.java

import java.util.ArrayList;

import java.util.List;

public class BeginnerPlayerFactory implements IPlayerFactory {

/\*\*

\* @return List<ACharacter> a list of pre-made Futurama themed Characters

\*/

@Override

public List<ACharacter> getCharacterModels() {

List<ACharacter> futuramaCharacters = new ArrayList<ACharacter>();

futuramaCharacters.add(new BeginnerPlayerCharacter("Bender", ACharacter.Archetype.ROUGE));

futuramaCharacters.add(new BeginnerPlayerCharacter("Leela", ACharacter.Archetype.KNIGHT));

futuramaCharacters.add(new BeginnerPlayerCharacter("Dr. Farnsworth", ACharacter.Archetype.WIZARD));

futuramaCharacters.add(new BeginnerPlayerCharacter("Dr. Zoidburge", ACharacter.Archetype.CLAIRIC));

return futuramaCharacters;

}

/\*\*

\* @return List<AWeapon> a list of pre-made Futurama themed Weapons

\*/

@Override

public List<AWeapon> getWeaponsModels() {

List<AWeapon> weapons = new ArrayList<AWeapon>();

weapons.add(new BeginnerPlayerWeapon("Broken Beer Bottle", AWeapon.WeaponType.DAGGER, AWeapon.DamageType.BLUDGENING));

weapons.add(new BeginnerPlayerWeapon("Blaster", AWeapon.WeaponType.GUN, AWeapon.DamageType.NECROTIC));

weapons.add(new BeginnerPlayerWeapon("Norwal Horn", AWeapon.WeaponType.SWORD, AWeapon.DamageType.SLASHING));

weapons.add(new BeginnerPlayerWeapon("7 Leaf Clover", AWeapon.WeaponType.SPELLFOCUS, AWeapon.DamageType.RADIENT));

weapons.add(new BeginnerPlayerWeapon("Sling Shot", AWeapon.WeaponType.BOW, AWeapon.DamageType.PIERCING));

return weapons;

}

}

BeginnerPlayerWeapon.java

public class BeginnerPlayerWeapon extends AWeapon {

/\*\*

\* constructor for beginner weapon

\* **@param** name

\* **@param** weaponType

\* **@param** damageType

\*/

public BeginnerPlayerWeapon(String name, *WeaponType* weaponType, *DamageType* damageType) {

super(name, -1, weaponType, damageType);

}

}

Driver.java

import java.util.List;

import java.util.Scanner;

public class Driver {

public static void main(String[] args) {

IPlayerFactory pf = null;

/\*\*

\* while selection is null determine player selection

\*/

Scanner scanner = new Scanner(System.in);

int menuselection;

do {

printLevelMenu();

menuselection = scanner.nextInt();

switch(menuselection){

case 1: pf = GameUtility.createPlayerFactory(GameUtility.Level.BEGINNER);

break;

case 2: pf = GameUtility.createPlayerFactory(GameUtility.Level.INTERMEDIATE);

break;

case 3: pf = GameUtility.createPlayerFactory(GameUtility.Level.ADVANCED);

break;

default:

break;

}

}while(pf == null);

/\*\*

\* get player character model from list

\*/

List<ACharacter> charOptions = pf.getCharacterModels();

ACharacter myCharacter = null;

do {

printCharMenu(charOptions);

menuselection = scanner.nextInt();

if(menuselection >0 && menuselection <= charOptions.size()) {

myCharacter = charOptions.get(menuselection - 1);

}

}while(myCharacter == null);

/\*\*

\* get player weapon model from list

\*/

List<AWeapon> wepOptions = pf.getWeaponsModels();

AWeapon myWeapon = null;

do {

printWeaponMenu(wepOptions);

menuselection = scanner.nextInt();

if(menuselection >0 && menuselection <= wepOptions.size()) {

myWeapon = wepOptions.get(menuselection - 1);

}

}while(myWeapon == null);

/\*\*

\* print selected greeting based on player input

\*/

System.out.println(myCharacter.greeting());

}

/\*\*

\* print select level menu

\*/

public static void printLevelMenu() {

System.out.println("\n-----------------------------------------");

System.out.printf("%-19s [%d] %-20s\n","Select a level:", 0, "Exit");

System.out.printf("[%d] %-15s [%d] %-20s\n", 1, "Beginner", 3, "Advanced");

System.out.printf("[%d] %-15s \n", 2, "Intermediate");

System.out.println("-----------------------------------------");

System.out.print("Selection: ");

}

/\*\*

\* @param charOptions prints all options in chosen level characters

\*/

public static void printCharMenu(List<ACharacter> charOptions) {

System.out.println("\n-----------------------------------------");

System.out.printf("%-19s [%d] %-20s\n","Select a Character:", 0, "Exit");

int i = 0;

for(ACharacter c : charOptions) {

i++;

System.out.printf("[%d]\t%s\n", i,c.toString());

}

System.out.println("-----------------------------------------");

System.out.print("Selection: ");

}

/\*\*

\* @param wepOptions prints all options in chosen level weapons

\*/

public static void printWeaponMenu(List<AWeapon> wepOptions) {

System.out.println("\n-----------------------------------------");

System.out.printf("%-19s [%d] %-20s\n","Select a Weapon:", 0, "Exit");

int i = 0;

for(AWeapon w : wepOptions) {

i++;

System.out.printf("[%d]\t%s\n", i,w.toString());

}

System.out.println("-----------------------------------------");

System.out.print("Selection: ");

}

}

GameUtility.java

public class GameUtility {

/\*\*

\* Enumeration of Levels

\*/

public enum *Level* {

***BEGINNER***,

***INTERMEDIATE***,

***ADVANCED***;

}

/\*\*

\* Creates and returns the appropriate PlayerFactory

\* **@param** l the level the player wants to play at

\* **@return** IPlayerFactory

\*/

public static IPlayerFactory createPlayerFactory(*Level* l) {

switch(l) {

case ***BEGINNER*** : return new BeginnerPlayerFactory();

case ***INTERMEDIATE*** : return new IntermediatePlayerFactory();

case ***ADVANCED*** : return new AdvancedPlayerFactory();

default: return null;

}

}

}

IntermediatePlayerCharacter.java

public class IntermediatePlayerCharacter extends ACharacter {

/\*\*

\* constructor for intermediate Expanse themed character

\* **@param** name

\* **@param** charClass

\*/

public IntermediatePlayerCharacter(String name, *Archetype* charClass) {

super(name, charClass);

this.greeting = String.*format*("%s this is %s from Expanse. \n", "Hello,", this.getName());

}

}

IntermediatePlayerFactory.java

import java.util.ArrayList;

import java.util.List;

public class IntermediatePlayerFactory implements IPlayerFactory {

/\*\*

\* @return List<ACharacter> a list of pre-made Expanse themed Characters

\*/

@Override

public List<ACharacter> getCharacterModels() {

List<ACharacter> futuramaCharacters = new ArrayList<ACharacter>();

futuramaCharacters.add(new IntermediatePlayerCharacter("Amos Burton", ACharacter.Archetype.ROUGE));

futuramaCharacters.add(new IntermediatePlayerCharacter("James Holden", ACharacter.Archetype.KNIGHT));

futuramaCharacters.add(new IntermediatePlayerCharacter("Naomi Nagata", ACharacter.Archetype.WIZARD));

futuramaCharacters.add(new IntermediatePlayerCharacter("Alex Kamal", ACharacter.Archetype.CLAIRIC));

return futuramaCharacters;

}

/\*\*

\* @return List<AWeapon> a list of pre-made Expanse themed Weapons

\*/

@Override

public List<AWeapon> getWeaponsModels() {

List<AWeapon> weapons = new ArrayList<AWeapon>();

weapons.add(new IntermediatePlayerWeapon("Wrench", AWeapon.WeaponType.DAGGER, AWeapon.DamageType.BLUDGENING));

weapons.add(new IntermediatePlayerWeapon("Rail Gun", AWeapon.WeaponType.GUN, AWeapon.DamageType.NECROTIC));

weapons.add(new IntermediatePlayerWeapon("Broken Beam", AWeapon.WeaponType.SWORD, AWeapon.DamageType.SLASHING));

weapons.add(new IntermediatePlayerWeapon("Comunicator", AWeapon.WeaponType.SPELLFOCUS, AWeapon.DamageType.RADIENT));

weapons.add(new IntermediatePlayerWeapon("Standard UN Pistol", AWeapon.WeaponType.BOW, AWeapon.DamageType.PIERCING));

return weapons;

}

}

IntermediatePlayerWeapon.java

public class IntermediatePlayerWeapon extends AWeapon {

/\*\*

\* constructor for intermediate weapon

\* **@param** name

\* **@param** weaponType

\* **@param** damageType

\*/

public IntermediatePlayerWeapon(String name, *WeaponType* weaponType, *DamageType* damageType) {

super(name, 0, weaponType, damageType);

}

}

IPlayerFactory.java

import java.util.List;

public interface IPlayerFactory {

public List<ACharacter> getCharacterModels();

public List<AWeapon> getWeaponsModels();

}