Lab 3

Student Name		Student CSUSM ID	Contribution percentage
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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)				

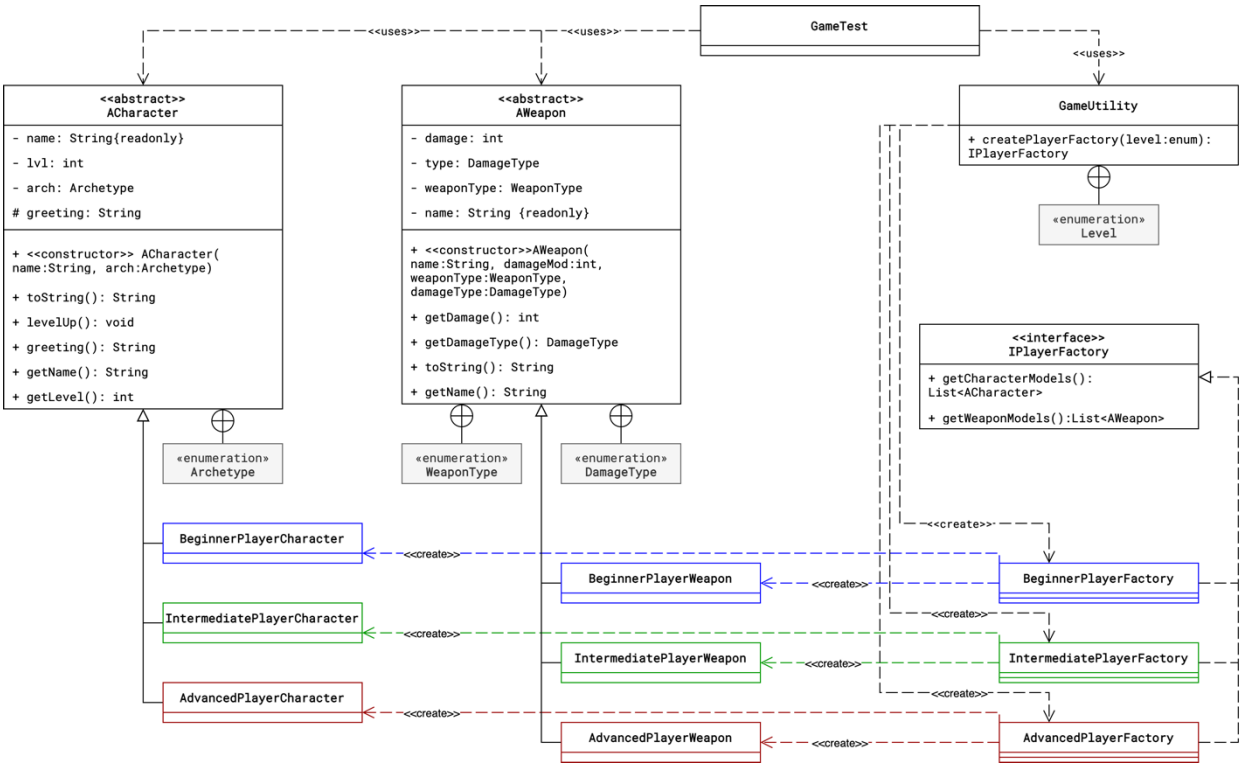
Problems:

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".



Screenshots

```
_____________________________________________
Select a level:     [0] Exit
[1] Beginner        [3] Advanced
[2] Intermediate
_____________________________________________
Selection: 3

_____________________________________________
Select a Character: [0] Exit
[1]     Arya Stark - Level 1 Rouge
[2]     Jon Snow - Level 1 Knight
[3]     Pyat Pree - Level 1 Wizard
[4]     Melisandre - Level 1 Clairic
_____________________________________________
Selection: 4

_____________________________________________
Select a Weapon:    [0] Exit
[1]     Dragonglass         [4hp +1 Dagger        ]
[2]     Crossbow            [8hp +1 Gun           ]
[3]     Heartsbane          [8hp +1 Sword         ]
[4]     Ruby Neclace        [8hp +1 Spell Focus   ]
[5]     Longbow             [6hp +1 Bow and Arrow ]
_____________________________________________
Selection: 4
Evening. I am Melisandre , first of my name, of Game of Thrones.
```

```
_____________________________________________
Select a level:     [0] Exit
[1] Beginner        [3] Advanced
[2] Intermediate
_____________________________________________
Selection: 1

_____________________________________________
Select a Character: [0] Exit
[1]     Bender - Level 1 Rouge
[2]     Leela - Level 1 Knight
[3]     Dr. Farnsworth - Level 1 Wizard
[4]     Dr. Zoidburge - Level 1 Clairic
_____________________________________________
Selection: 1

_____________________________________________
Select a Weapon:    [0] Exit
[1]     Broken Beer Bottle  [4hp -1 Dagger        ]
[2]     Blaster             [8hp -1 Gun           ]
[3]     Norwal Horn         [8hp -1 Sword         ]
[4]     7 Leaf Clover       [8hp -1 Spell Focus   ]
[5]     Sling Shot          [6hp -1 Bow and Arrow ]
_____________________________________________
Selection: 1
Good News Everyone! I'm Bender from Futurama.
```

```
_____________________________________________
Select a level:     [0] Exit
[1] Beginner        [3] Advanced
[2] Intermediate
_____________________________________________
Selection: 2

_____________________________________________
Select a Character: [0] Exit
[1]     Amos Burton - Level 1 Rouge
[2]     James Holden - Level 1 Knight
[3]     Naomi Nagata - Level 1 Wizard
[4]     Alex Kamal - Level 1 Clairic
_____________________________________________
Selection: 3

_____________________________________________
Select a Weapon:    [0] Exit
[1]     Wrench              [4hp +0 Dagger        ]
[2]     Rail Gun            [8hp +0 Gun           ]
[3]     Broken Beam         [8hp +0 Sword         ]
[4]     Comunicator         [8hp +0 Spell Focus   ]
[5]     Standard UN Pistol  [6hp +0 Bow and Arrow ]
_____________________________________________
Selection: 4
Hello, this is Naomi Nagata from Expanse.
```

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();
}
```