CSE/IT 326: Software Engineering
# Spring 2021

2nd *Midterm Exam, April* 7th*, 2021*

Your Name: _____ **Student ID:**_____

Instruction: *Please read each question carefully. Explain your answers in the space provided. Present your answer clearly. Points will be deducted for irrelevant discussion. Answer all questions.*

|		POINTS	YOUR SCORES
1		20	
2		20	
3		20	
4		20	
5		20	
Total		100	

1. [**Object Design, 20 points**] Object design is the process of adding details to the requirements analysis and making implementation decisions. Answer the following questions on object design:

    a. Briefly discuss the <u>four key activities</u> for object design. [**6 points**]

    b. What are the <u>two most common techniques for reusing functionality</u> in object-oriented systems? Briefly discuss them with their advantages and disadvantages [**6 points**]

    c. Briefly discuss the principle of "*Programming to an Interface, not an Implementation*", along with at least one example and one benefit. [**8 points**]

2. [**Design Patterns I, 20 points**] Answer the following questions.

    a. Briefly discuss what <u>design patterns</u> are, along with their <u>four</u> essential elements. [**8 points**]

b. Modify the following design using the **Facade** design pattern so that the *Client* only interacts with only one class. You will need to introduce one new class to apply this design pattern. Comment all the methods of the new class. **[12 points]**
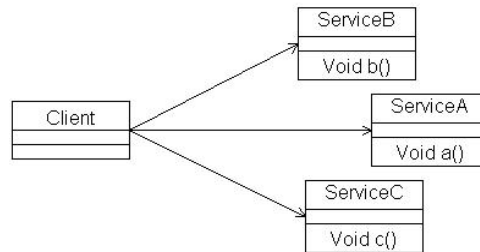

3. **[Design Patterns II, 20 points]** Answer the following questions.

Modify the following design using the **bridge** design pattern so that you can vary the implementation over two TVs as well as the interface (*RemoteControl*). Use two new concrete classes, *TouchRemoteControl* and *VoiceRemoteControl*, as variations of the interface. Comment all the methods of the new classes.
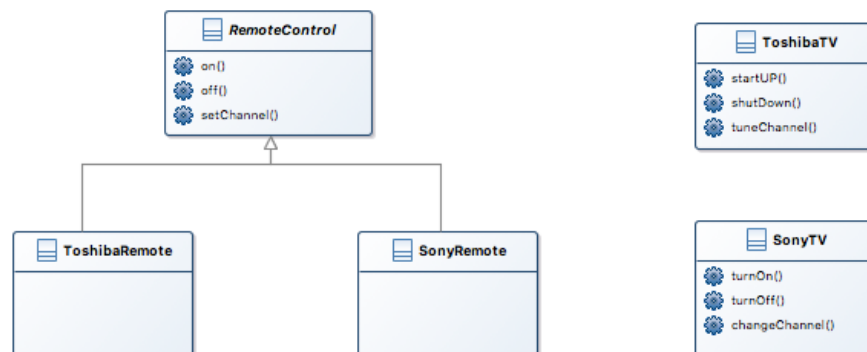
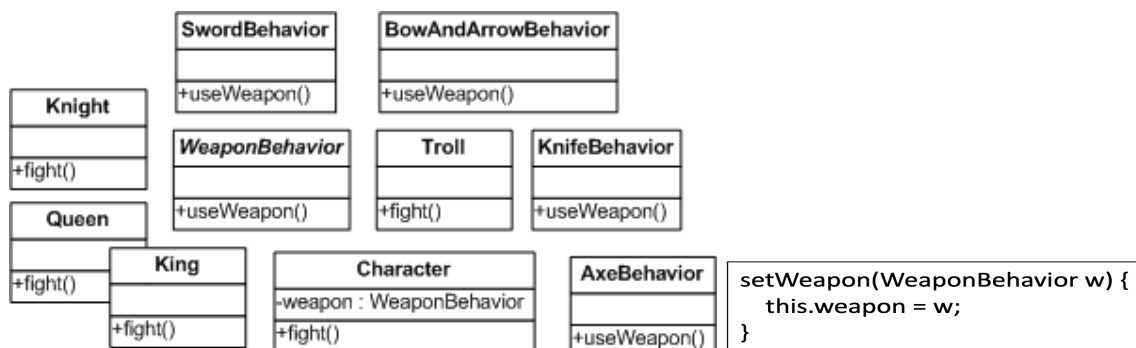4. **[Design Patterns III, 20 points]** Answer the following questions.

    a. Modify the following design using the **proxy** design pattern so that only a Client running under the system administrator privilege can access a *CmdExecutor*. Comment all the methods of the new classes. **[12 points]**
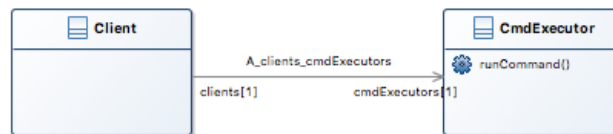
    b. Discuss <u>three situations</u> where it would be appropriate to apply the **Proxy** design pattern, along with at least one example for each. **[9 points]**

5. **[Design Patterns IV, 20 points]** Below you will find a mess of classes and interfaces for an action adventure game. You will find classes for game characters along with classes for weapon behaviors the characters can use in the game. Each character can make use of one weapon at a time, but *can change weapons at any time during the game*. Your tasks are

    a. Arrange (relate) the classes by identifying one **abstract** class, one **interface** and eight classes. **[15 points]**
    b. Put the method **setWeapon()** into the right class. **[5 points]**