



Institute of Information Technology
University of Dhaka
Bachelor of Science in Software Engineering (BSSE)
5th Semester Final Examination, 2020
SE 506: Design Patterns
Marks: 30 # Duration: 1 Hour 15 Minutes



Professionalism	Excellence	Respect
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[Answer all of the following questions. When answering a question, please answer all the subsections of it at once]

1. Consider the following code snippets and answer the following questions.

```
public List<Book> findBooks(String title, String author,
    LocalDate firstDate, LocalDate endDate) {
    List<Book> foundBooks = new ArrayList<Book>();
    if (validateTitle(title) && validateAuthor(author)) {
        for (int i = 0; i < books.size(); i++) {
            Book book = books.get(i);
            if (book.getPublishedOn().isAfter(firstDate) &&
                book.getPublishedOn().isBefore(endDate)) {
                foundBooks.add(book);
            } else if (book.getTitle().contentEquals(title) &&
                book.getTitle().contentEquals(author)) {
                foundBooks.add(book);
            }
        }
    }
    return foundBooks;
}

public boolean validateTitle(String title) {
    return !title.isEmpty() && !title.contains("\n");
}

public boolean validateAuthor(String author) {
    if (author.isEmpty())
        return false;

    if (author.contains("\n"))
        return false;

    return true;
}
```

- a) Identify the code smells associated with these code snippets with brief explanation. 4
- b) Refactor the given code snippets to eradicate the identified code smells. 6

2. Consider the following code snippets and answer the following questions.

```
public interface Image {
    void display();
}

public class RealImage implements Image {

    private String fileName;

    public RealImage(String fileName){
        this.fileName = fileName;
        loadFromDisk(fileName);
    }

    @Override
    public void display() {
        System.out.println("Displaying " + fileName);
    }

    private void loadFromDisk(String fileName){
        System.out.println("Loading " + fileName);
    }
}
```

- a)

Describe the problems with this image loading mechanism. Which design pattern/ patterns can you use to solve these problems? Show your solution for this scenario in a UML diagram.

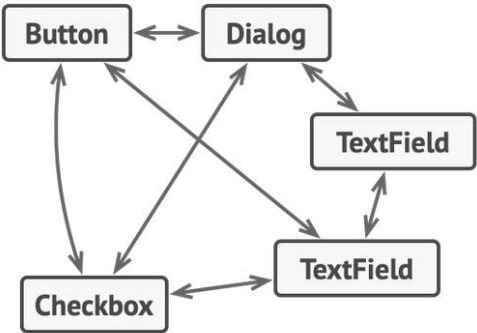
5
- b)

Consider the following scenario. When RealImage fails to load, another image called SimpleImage is loaded. If SimpleImage fails to load, a class named ImageContent is used to load the textual description of that image. Which design pattern is appropriate to address this scenario? Provide your solution for this scenario in a UML diagram.

5

3. a)

6



The diagram above shows the dependencies among several UI components of a specific program. What are the problems associated with such a design? Which design pattern/ patterns can you use to solve these problems? Modify and redraw the diagram to show your solution.

- b)

Briefly describe the differences between the Builder pattern and the Abstract Factory Pattern.

4

GOOD LUCK!