

CSE 400 Bütünleme Exam

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I. QUESTION (16 POINTS)

In a class hierarchy, A is the parent class of B, C, and D. B is the parent class of E and F. D is the parent class of G. Considering that A is in the top layer, B, C, and D are in the middle layer and E, F, and G are in the bottom layer; apply the following testing strategies.

- Big bang strategy
- Top-to-bottom strategy
- Bottom-up strategy
- Sandwich strategy

II. QUESTION (18 POINTS)

- Draw a class diagram representing a book defined by the following statement: "A book is composed of a number of parts, which in turn are composed of a number of chapters. Chapters are composed of sections. A book includes a publisher, publication date, and an ISBN. A part includes a title and a number. A chapter includes a title, a number, and an abstract. A section includes a title and a number".
- In Part a), note that the Part, Chapter, and Section classes all include title and number attributes. Add an abstract class and inheritance relationship to factor out these two attributes into the abstract class.
- Draw a class diagram representing the relationship between parents and children. Take into account that a person can have both a parent and a child. Annotate associations with roles and multiplicities.

III. QUESTION (24 POINTS)

Consider the design patterns with the following examples.

For each of example, draw the corresponding UML diagram:

- Composite** The software lifecycle consists of activities which consist of activities or tasks.
- Adapter** Consider realizing the set data structure with the hash table data structure. Hashtable class has the method put, where the corresponding method in the class set is add.
- Bridge** Let say you want to support multiple database vendors such as Xml, JDBC, or stub.
- Proxy** The ReallImage is stored and loaded separately. If the ReallImage is not loaded, a ProxyImage draws a grey rectangle in place of the image.

IV. QUESTION (12 POINTS)

Consider the following implementation of the numDays() method.

```
public boolean isLeapYear(int year){
    boolean leap;
    if (year % 4 == 0)
```

```
        return true;
        return false;
    }
    public int numDays(int month, int year){
        if (year < 1)
            throw("Year out of bounds");
        else
            if (month == 1 || month == 3 ||
                month == 5 || month == 7 ||
                month == 10 || month == 12)
                return 31;
            else
                if (month == 4 || month == 6 ||
                    month == 9 || month == 11)
                    return 30;
                else
                    if (month == 2){
                        if (isLeapYear(year))
                            return 29;
                        else
                            return 28;
                    } else
                        throw("Month out of bounds"); }
    }
```

By exercising all possible paths generate example test cases.

V. QUESTION (12 POINTS)

Explain the following architectural styles by giving examples:

- Repository
- Model/View/Controller
- Peer-to-peer

VI. QUESTION (18 POINTS)

Apply the appropriate transformations (map associations to collections) to the following object model:

- A project involves a number of participants
- Participants can take part in a project either as project manager, team leader, or developer.
- Within a project, each developer and team leader is part of at least one team.
- A participant can take part in many projects, possible in different roles. For example, a participant can be a developer in project A, a team leader in project B, and a project manager in project C. However, the role of a participant within a project does not change.

Write the source code needed to manage the associations, including class, field, and method declarations, method bodies, and visibility.