

CSE 400 Final

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I. QUESTION (16 POINTS)

- In a class hierarchy, A is the parent class of B, and B is the parent class of C. B and C can see the variable a2 of A, but they can not see the variable a1 of A. A and C can not see the variable b2 of B, but only C can see the variable b1 of B. A and B can not see the variable c2 of C but they can see the variable c1 of C. What are the visibilities of the variables a1, a2, b1, b2, c1 and c2?
- What is the difference between implementation inheritance and specification inheritance?

II. 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

III. QUESTION (18 POINTS)

Apply the appropriate transformations (map associations to collections) to the following object model: A *League* consists of multiple *tournaments*, where a single *advertiser* can give advertisement to a single *tournament*. Also for each tournament there is only a single *advertiser*. A *player* can play in multiple *tournaments* and of course a *tournament* is possible only with multiple *players*. Assume League, Tournament, Player and Advertiser have a name attribute and a unique identifier. Assume also that all associations are bidirectional. Write the source code needed to manage the associations, including class, field, and method declarations, method bodies, and visibility.

IV. QUESTION (16 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 RealImage is stored and loaded separately. If the RealImage is not loaded, a ProxyImage draws a grey rectangle in place of the image.

V. QUESTION (18 POINTS)

Draw a class diagram representing the application domain facts below, and map it to a relational schema.

- 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.

VI. QUESTION (16 POINTS)

Consider the following implementation of the magic() method.

```
public void magic(int N){
    if (N < 0){
        throw new IllegalArgumentException();
        return;
    }
    while (N > 0){
        if (N % 2 == 0)
            System.out.print("0");
        else
            System.out.print("1");
        N = N / 2;
    }
}
```

By exercising all possible paths generate example test cases.