CSE 400 Final

Olcay Taner YILDIZ

I. QUESTION (18 POINTS)

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

II. QUESTION (20 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.

  a. Big bang strategy
  b. Top-to-bottom strategy
  c. Bottom-up strategy
  d. Sandwich strategy

III. QUESTION (18 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.

IV. QUESTION (24 POINTS)

Consider the following design goals. For each of them, indicate the candidate patterns (draw UML diagram for each design pattern) you would consider to satisfy each goal:

- Given a legacy banking application, encapsulate the existing business logic component
- Given a chess program, enable future developers to substitute the planning algorithm that decides on the next move with a better one
- Given a chess program, enable a monitoring component to switch planning algorithms at runtime, based on the opposing player's style and response time
- Given a chess program, enable undoing and redoing moves in a game.

V. QUESTION (20 POINTS)

Assign architectural style names to the following definitions that are given below:

  a. Subsystems access and modify a single data structure.
  b. Subsystems are classified into three different types. First group maintain domain knowledge, second group display it to the user, and third group manage the sequence of interactions with the user.
  c. A subsystem provides services to instances of other subsystems.
  d. Each subsystem can request and provide services.