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Pages 206 ***Java Programming A Comprehensive Introduction***

Section 1: Define / Answer

Encapsulation- Encapsulation is one of the four fundamental OOP concepts. The other three are inheritance, polymorphism, and abstraction.

Encapsulation is the technique of making the fields in a class private and providing access to the fields via public methods. If a field is declared private, it cannot be accessed by anyone outside the class, thereby hiding the fields within the class. For this reason, encapsulation is also referred to as data hiding.

Encapsulation can be described as a protective barrier that prevents the code and data being randomly accessed by other code defined outside the class. Access to the data and code is tightly controlled by an interface.

The main benefit of encapsulation is the ability to modify our implemented code without breaking the code of others who use our code. With this feature Encapsulation gives maintainability, flexibility and extensibility to our code.

default- The "default" access (specified by the absence of a keyword) is also called **package-private**.

public- exposes to classes outside the package.

private- `private` hides from other classes within the package

In very short

- `Public` are accessible from everywhere.
- `Protected` are accessible by the classes of the same package and the subclasses residing in any package.
- `Default` are accessible by the classes of the same package.
- `private` are accessible within the same class only.

As a rule of thumb:

- **private**: class scope.
- **default** (or *package-private*): package scope.
- **protected**: package scope **+ child** (like package, but we can subclass it from different packages). The protected modifier always keeps the "parent-child" relationship.
- **public**: everywhere.

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As a result, if we divide access right into three rights:

- **(D)irect** (invoke from a method inside the same class).
- **(R)eference** (invoke a method using a reference to the class, or via "dot" syntax).
- **(I)nheritance** (via subclassing).

then we have this simple table:

Task 1:

USE OBJECT ORIENTATED PROGRAM DESIGN TO SOLVE PROBLEM

Update Assignment #10, Task 1.

Create a Parent SuperClass Student. Containing First Name, Last Name, DOB, Social Security Number.

Create a subclass containing Street Address, and Zip Code

Create a subclass containing Student ID number, Major

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The program should execute in way that student objects are created. Then create a menu where the user can print various portions of information about a given student.

Override the method for printing in each class to display the required print information.

Create private modifiers for sensitive materials.

Return redacted versions of social security, DOB.

For example – Social security = XXX-XX-8010

DOB – XX/XX/1980

Attach Snipping Photos Below

****

*** Main Menu: ***

*** Enter # to run program or Quit ***

*** 1) Print Student Name ***

*** 2) Print Student Address ***

*** 3) Print all Student info ***

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*** 4) Quit ***

****

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```
1  /*
2   * To change this license header, choose License Headers in Project Properties.
3   * To change this template file, choose Tools | Templates
4   * and open the template in the editor.
5   */
6
7  //github and bigdog
8  package javaapplication1;
9  import java.util.Scanner;
10
11 class Student{
12     String firstName, lastName;
13     private String dob, ssid;
14
15     Student(String firstName, String lastName){
16         this.firstName = firstName;
17         this.lastName = lastName;
18     }
19
20     public void setdob(String dob){
21         this.dob = dob;
22     }
23
24     public String getdob(){
25         return dob;
26     }
27
28     public void setssid(String ssid){
29         this.ssid = ssid;
30     }
31
32     public String getssid(){
33         return ssid;
34     }
35
36     void print(){
37         System.out.println("FirstName: " + firstName +
38                 "\nLastName: " + lastName +
39                 "\nDate of Birth: " + "XX-XX-" + dob.substring(4) +
40                 "\nSSID: " + "XXX-XX-" + ssid.substring(5));
41     }
42
43
44 }
45
46 class Address extends Student{
47     String streetAddress, zipCode;
48
49     Address(String firstName, String lastName,
50             String streetAddress, String zipCode){
51         super(firstName, lastName);
52         this.streetAddress = streetAddress;
53         this.zipCode = zipCode;
54     }
55
56     @Override
57     void print(){
```

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```
58              System.out.println("StreetAddress: " + streetAddress +
59                      "\nZipCode: " + zipCode);
60          }
61
62      }
63
64      class Info extends Address{
65          String studentID, major;
66
67          Info(String firstName, String lastName,
68                  String streetAddress, String zipCode,
69                  String studentID, String major){
70              super(firstName, lastName, streetAddress, zipCode);
71              this.studentID = studentID;
72              this.major = major;
73          }
74
75          @Override
76          void print(){
77              System.out.println("FirstName: " + firstName +
78                      "\nLastName: " + lastName +
79                      "\nDate of Birth: " + "XX-XX-" + getdob().substring(4) +
80                      "\nSSID: " + "XXX-XX-" + getssid().substring(5) +
81                      "\nStreetAddress: " + streetAddress +
82                      "\nZipCode: " + zipCode +
83                      "\nStudentID: " + studentID +
84                  "\nMajor: " + major);
85          }
86
87
88      }
89
90      public class JavaApplication12 {
91
92          public static void main(String[] args) {
93
94              Info[] ary = new Info[10];
95              ary[0] = new Info("Kachi", "Lau", "Oakland", "94612", "10819338", "CS");
96              ary[0].setdob("01081993");
97              ary[0].setssid("123456789");
98              ary[1] = new Info("Jacky", "Chan", "San Deigo", "94111", "10719922", "Math");
99              ary[1].setdob("07021992");
100             ary[1].setssid("888888888");
101             ary[2] = new Info("Tank", "Lam", "San Franscio", "94512", "10325361", "CS");
102             ary[2].setdob("02021997");
103             ary[2].setssid("111111111");
104             ary[3] = new Info("Kitty", "Lu", "Oakland", "12354", "12345678", "Physic");
105             ary[3].setdob("03031988");
106             ary[3].setssid("777777777");
107             ary[4] = new Info("Ken", "chang", "SanFrancisco", "94512", "10232153", "CS");
108             ary[4].setdob("04041987");
109             ary[4].setssid("222222222");
110             ary[5] = new Info("Ryu", "Kawasaki", "Oakland", "94612", "15123524", "CS");
```

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```
111             ary[5].setdob("12311993");
112             ary[5].setssid("234567890");
113             ary[6] = new Info("Alex", "Taco", "Oakland", "94612", "21231523", "Math");
114             ary[6].setdob("07071996");
115             ary[6].setssid("579134628");
116             ary[7] = new Info("Chicken", "Chicken", "USA", "12325", "12314823", "CS");
117             ary[7].setdob("01011991");
118             ary[7].setssid("264831597");
119             ary[8] = new Info("Mc", "Donald", "Oakland", "94612", "21353262", "CS");
120             ary[8].setdob("02031995");
121             ary[8].setssid("791346528");
122             ary[9] = new Info("FirstName", "LastName", "Oakland", "94612", "12381234", "CS");
123             ary[9].setdob("08081998");
124             ary[9].setssid("231535648");
125
126             menu(ary);
127
128         }
129
131         public static void menu(Info[] ary){
132             try{
133                 Scanner input = new Scanner(System.in);
134                     int option;
135                     String id;
136                     System.out.println(
137                             "\n*************************************"+
138                             "\n*          Main Menus               *" +
139                               "\n*1)Print Student Name              *" +
140                               "\n*2)Print Student Address           *" +
141                               "\n*3)Print all Student Info         *" +
142                               "\n*4)Exit                           *" +
143                               "\n*************************************\"+");
144
145                         do {
146                             System.out.print("Please Enter Option: ");
147                             option = input.nextInt();
148                             switch(option){
149                                 case 1:
150                                     System.out.print("Please input Student ID: ");
152                                     id = input.next();
153                                     for(int i = 0; i < ary.length; i++) {
154                                         if(ary[i].studentID.equals(id)){
155                                             Student first = new Student(ary[i].firstName, ary[i].lastName);
156                                             first.setdob(ary[i].getdob());
157                                             first.setssid(ary[i].getssid());
158                                             first.print();
159                                         }
160                                     }
161                                     break;
162                                 case 2:
164                                     System.out.print("Please input Student ID: ");
                                        id = input.next();
                                        for(int i = 0; i < ary.length; i++) {
                                            if(ary[i].studentID.equals(id)){
```

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```
                                Address second = new Address(ary[i].firstName, ary[i].lastName,
                                        ary[i].streetAddress, ary[i].zipCode);
                                second.setdob(ary[i].getdob());
                                second.setssid(ary[i].getssid());
                                second.print();
                            }
                        }
                        break;
                    case 3:
                        System.out.print("Please input Student ID: ");
                        id = input.next();
                        for(int i = 0; i < ary.length; i++) {
                            if(ary[i].studentID.equals(id)){
                                Info third = new Info(ary[i].firstName, ary[i].lastName,
                                        ary[i].streetAddress, ary[i].zipCode,
                                        ary[i].studentID, ary[i].major);
                                third.setdob(ary[i].getdob());
                                third.setssid(ary[i].getssid());
                                third.print();
                            }
                        }
                        break;

                    case 4:
                        System.out.println("You Exited the Menu.");
                        break;
                    default:
                                System.out.println("Invalid Option");


                        }
                    } while(option != 4);
                } catch (Exception e) {
                    System.out.println("Invalid Input");
                }
            }

    }

```

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