OOADP/OOSE Exam 14 June 2013

Aalborg

Answers

1.

a.

USEFUL: must help to carry out a task that people want to do

USABLE: user-interface must allow task to be carried out effectively

FLEXIBLE: easily improved and maintained

AFFORDABLE: both to buy and maintain - implies easy to build and maintain

AVAILABLE: must run on available hardware and software platforms, project must complete successfully

[1 mark each]

b.

SPAGHETTI CODE: any part of a program may refer to or jump to any other part of a program (e.g., GOTO statement)

MODULARITY: organising a piece of software as a collection of semi-independent modules (classes, functions, packages)

ENCAPSULATION: hiding implementational details that the user does not need to know about, making available in an interface exactly what the user needs in order to effectively use the module

Main problem with spaghetti code: makes code almost impossible to understand, debug, maintain, modify or reuse

Modularity and encapsulation solve the spaghetti code problem by limiting and controlling the interdependencies between parts of a program, so that parts of the program can easily be debugged, improved or re-used.

[1 mark each]

2.

a.

a = -4, b = 3, c = -1: a - (c * b) = -1

a = -3, b = 3, c = -1: a - (c * b) = 0

a = -2, b = 3, c = 0: a - (c * b) = -2

a = -1, b = 3, c = 0: a - (c * b) = -1

So output is

-1

0

-2

-1

0

1

2

0

[5 marks]

b.

that's right

[5 marks]

3.

public void myMethod(int a, int b) : int

i. just the name of a method. E.g. selector of method above is "myMethod"

ii. signature is selector and pattern of argument types (e.g., myMethod(int, int))

iii. member visibility is the scope within which the definition of the member is visible (i.e., the scope within which the member can be referenced). Visibility of example above is "public".

iv. public interface is the set of members of an object that are publicly visible. Usually only contains public methods but sometimes also static constants.

v. Inheritance is where a class *inherits* definitions of members from a superclass. For example, if class B is a subclass of class A and class A defines a method myMethod(int int) which is visible to class B (e.g., public, protected or package in Java) then class B will inherit the definition of method myMethod(int int) and this method can be called on an instance of class B.

[2 marks each]

4.

a. A static structural model describes the *structure* of a software system, how the different parts of the system relate to each other and depend on each other. A class model and an object model are example of such a model. A dynamic behavioural model describes how parts of a system interact while the system is running and carrying out a particular task. Examples of such models are sequence diagrams or activity diagrams.

[4 marks]

b.

i. use case diagram

ii. actor

iii. the system

iv. use case

v. yes

vi. requirements capture

[1 mark each]

5.

a.

an object of one class sends a message to an object of another class

an object of one class creates an instance of an object of another class

an object of one class has an attribute whose type is another class

an object of one class receives a message with an argument whose type is another class

[1 mark each]

b.

i. class diagram

ii. zero or more

iii. 1

iv. by using a solid triangle next to the association between Copy and Book, pointing in the direction of Book.

v. 0 to 2

vi. when designing the class structure of the software, deciding which classes to use.

[1 mark each]

6.

i. (5,12)

ii. because otherwise each instance of Point would have to belong to an instance of the Question6 class. By marking it as static, the Point constructor can be called on the class definition belonging statically to the Question6 class. This means that a new Point object can be created in the main method without it having to belong to a particular instance of the Question6 class.

iii. Because it inherits from the toString method defined in the Object class, which is public and visibility cannot be decreased when a method is overridden.

iv. Java automatically provides a no-args constructor if no other constructor is defined by the user.

v. PrintStream.

[2 marks each]

7.

a. **public** int c(int k) {

b. variable d is final so cannot be re-assigned (also needs to be static)

c. variable d needs to be static

d. class B needs to be static

e.

line 5: static final int d = 2;

line 11: static class B implements A {

line 12: public int c(int k)   {

line 19: delete

[2 marks for each part]

8.

a. To indicate that PeronnelOfficer is the type of this actor, not its name

b. Indicates that "David Meredith" is the value returned by the getName() method and stored in the variable n.

c. indicates that the lifeline of anonymous Lecturer object is terminated (the object is destroyed)

d. new HeadOfDepartment(n)

e. the Lecturer object

[2 marks for each part]

9.

a. state machine diagram

b. CD

c. Radio

d. Time

e. To show how the state of an object changes in response to various events.

[2 marks for each part]

10

a. Any sequence where the numbers 100, 99, 98, 97, 96 appear in that order and the numbers 0, 1, 2, 3, 4 appear in that order, interleaved in any way. For example:

Output 1:

0

100

99

98

97

96

1

2

3

4

Output 2:

0

1

100

99

98

97

96

2

3

4

Output 3:

0

1

100

99

2

98

97

96

3

4

[3 marks]

b. Between lines 33 and 34, insert following line:

thread1.join()

join() method throws an InterruptedException, so line 5 has to be changed to:

public static void main(String[] args) throws InterruptedException {

[4 marks]

c. Two different threads would run, but one after the other. So the program would not really be multi-threaded.

[3 marks]

11.

a. 4446

b. A MulticastSocket allows the client to be a member of a Multicast group. Messages sent by a server to a multicast group are received by all members of that group.
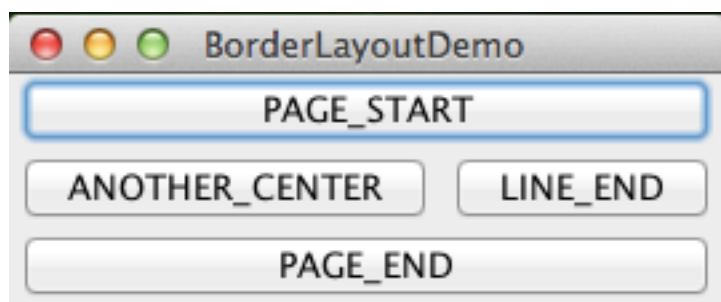
c. MulticastServer should be started first.

d. Any number of clients may be run, limited only by memory of the system.

e. Converts a byte array into a String to be printed out.

[2 marks each]

12.

a.

[5 marks]

b.

Ensures that program terminates when close button is pressed or when window is closed.

[1 mark]

c.

Calculates size and positioning of all GUI components in the window in preparation for displaying the window.

[2 marks]

d. The Menubar, menus and menu items.

[2 marks]