Al... Iria University
Fac... v of Engineering
De... ...nent of Computer & Systems
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قسم الحاسب وهندسة النظم

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Co... title Number: Programming -2 221 ٢٢١ اسم المقرر والرقم الكودي له برمجة-2
2nd Y... ar السنة الدراسية: الثانية
Tim... allowed: 3 Hours الزمن: 3 ساعات

...ad these requirements carefully:

... is required to build a simplified management system for a property development company ...lled ACME. ACME develops several housing compounds across Egypt. Each site contains a ...rtain number of Villas, Twin houses, townhouses and apartments. For each category, there are 3-4 designs. For example, for Villas, the customer can choose between Villa Type A, Type ..., and Type C. The type of the Villa heavily affects the calculation of its price. Other optional features can be also added to each category for further enhancements, such as a basement or a penthouse for non-apartment units. These extra features also increase the price.
The customer can decde on the finishing of each room individually. In case of sleeping rooms, ...e floor can be wooden or marble. In the kitchens and bathrooms, the customer can choose the ceramics to match his/her individual taste. Of course, all these choices must be managed by the system and these parameters are used in determining the final price of the unit. For each room, there are lots of such configuration parameters, which can be grouped. E.g., all sleeping rooms of villa 815 are the same. They have wooden floor.
ACME allows also to design units from scratch. They do not follow any predefined type. The customer must pay extra design fees. The company has the right to reuse this new design and add it to its portfolio (library).

The system must manage:

- The configuration of all units sold
- The price of each unit
- The configuration of each sold unit using the existing options or even creating a design from scratch.
- All different types of engineering drawings as attachments to the units in the system.
- The payment installments: dates, amounts and bank account information for each installment.

Answer All 25 Questions. Choose between A, B, C, D, and E

1. Drawing the use case diagram, the diagram will have:
   a. 1 person: representing a typical customer
   b. 2 persons: 1 representing the customer and 1 representing the company
   c. 2 persons: 1 representing the customer and 1 representing the administrator of the system
   d. 3 persons: 1 representing the customer, 1 representing the architect of the company and 1 representing the accountant of the company
   e. 4 persons: 1 representing the customer, 1 representing the architect of the company, 1 representing the accountant of the company and 1 representing the administrator of the company

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2. Drawing the use case diagram, where can we find villa 815?
   a. As a person
   b. As a process
   c. As an object
   d. As a label on the arrows
   e. Nowhere. It is not present

3. The relationship between the unit and its rooms is
   a. a dependency relationship because there is a semantic relationship in which a change in the value of the rooms affects the price of the unit.
   b. an aggregation since the unit *has* rooms and rooms are considered as *parts* of the unit
   c. a composition since the rooms cannot *exist* without the unit and it does not make sense that a unit *exists* without having rooms.
   d. a simple association since rooms and units can exist independent of each other. There is only a *one*-to-*many* relationship between unit and room.
   e. a simple association since rooms and units can exist independent of each other. There is only a *many*-to-*many* relationship between unit and room.

4. In UML 2.2 standard, the best diagram to describe the behavior of this system is
   a. the sequence diagram
   b. the class diagram
   c. the state diagram
   d. the deployment diagram
   e. the profile diagram

5. In order to calculate the price of the unit, the system must visit each of its rooms and calculate its price according to its configuration using the
   a. Iterator design pattern
   b. Iterator design pattern and interface or abstract class fundamental design pattern
   c. marker interface and the iterator design patterns
   d. immutable design pattern
   e. self-reflection design pattern

6. In order to create a new unit from a unit previously designed from scratch, the best design pattern to use would be
   a. Object pool
   b. Factory
   c. Cache Management
   d. Prototype
   e. Adapter

7. In order to create a new unit from the predefined designs, the best design pattern would be
   a. Object pool
   b. Factory
   c. Cache Management
   d. Prototype
   e. Adapter

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8. The best design pattern to represent the design enhancements such as basement or penthouses for villas would be
    a. Builder design pattern
    b. Decorator design pattern
    c. Strategy design pattern
    d. Façade design pattern
    e. Adapter design pattern

9. The relationship between the unit sold and the payment installment in the class diagram is:
    a. One-to-one
    b. One-to-many
    c. Many-to-many
    d. No relation
    e. None of the above

10. The wizard, configurating a villa to be sold to a potential customer, uses the following design pattern to help the customer configure his/her villa using a long questionnaire form:
    a. The builder because the wizard uses complicated logic to configure the villa.
    b. The façade to protect the customer from the details of the engineering.
    c. The factory since the type are already predefined
    d. The object pool since the system will create many user-defined villas later-on.
    e. The command to enable the undo of the creation.

11. The best way to manage and group the huge number of attributes of a room and group of rooms in a unit is the
    a. Chain of Responsibility
    b. Flyweight
    c. Cache management
    d. Abstract Factory
    e. None of the above

12. In order to guarantee that no one copies the URL from a user browser and use it to hijack the session on another computer, the system installs a cookie at the web browser of the client and couples it to the session id. With each incoming request, the system has an object that intercepts the call and makes sure that the http request is coming from the same web browser. If this is true, the request is served otherwise the system returns an error message and logs out the user. This object (or group of objects) follow(s) the design pattern
    a. Decorator
    b. Visitor
    c. Proxy
    d. Façade
    e. Adapter

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13. Creating a new session for a newly logging user is resource intensive. Also, the system wants to limit the maximum number of concurrent users to 1000. The best way to achieve this target is to manage the session objects using the following design pattern:
    a. Proxy
    b. Observer
    c. Object pool
    d. State
    e. Strategy

14. In case of a large change of the price of the basic building material, e.g. concrete or steel or wood, the company would like to reconsider all the rooms in all units regardless of their storage patterns to query their attributes to re-calculate the total cost of construction. The best design pattern to use is the:
    a. Visitor design pattern
    b. Command design pattern
    c. Strategy design pattern
    d. Cache management design pattern
    e. None of the above

15. In general, what is the drawback of the object pool design pattern?
    a. The programmer must manage the release of resources
    b. The programmer must implement a lot of small classes that confuse the reader maintaining the code later-on
    c. The object pool is slow
    d. The object pool consumes lots of memory
    e. The object pool has no drawbacks

16. If we decide to have a tablet version of the application in addition to the web-based version, the MVC would make this extension easier because:
    a. MVC is based on Swing, which is available on tablet devices.
    b. the view and controller classes can be reused, only the model classes must be newly implemented.
    c. the model and view classes can be reused, only the controller classes must be newly implemented.
    d. the model and controller classes can be reused, only the view classes must be newly implemented.
    e. MVC will not make things easier because it is hard to debug

17. If the user changes the value of an attribute in a room in a villa in the web browser, the tablet application should show the change at once. This is best implemented using the
    a. Command design pattern
    b. Observer design pattern
    c. Auto-notify design pattern
    d. Producer-consumer design pattern
    e. State design pattern

18. The user is mentally prepared to the fact that the login process would take several seconds. Yet, once navigating inside the system, the user wants to retrieve his/her unit very quickly. The best way to do this is to implement

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a. the cache management design pattern loading all attributes of the unit (villa, apartment, etc.) during login and keeping them in memory throughout the session.
b. the object pool to keep the units in memory after the user logs out for a future login.
c. the MVC design pattern to speed up the display of drawings.
d. the interface design pattern since it will speed up the implementation of the system.
e. Nothing helps, we just need faster servers.

19. In order to implement the façade design pattern properly, the following should hold:
a. the number of exposed classes in the package is reduced to the minimum, preferably one
b. methods in classes other that the façade class should be declared public
c. methods in classes other that the façade class should be declared private or protected
d. (a) and (b)
e. (a) and (c)

20. In the cache management design pattern, which object is removed from the cache?
a. Least recently used
b. Least frequently used
c. Most recently used
d. Configurable (a) or (b)
e. Configurable (b) or (c)

21. We use the adapter design pattern in the case of:
a. Adapting a new system to the logic of an old system
b. Adapting to a different interface of another system
c. Adapting the code to a different coding style
d. Adapting the observer to the subject
e. Adapting the order of execution of commands

22. State one unhappy case in the modelling of the application.
a. The server gets a hardware failure.
b. The UI looks messy and bad.
c. The user gives in a wrong combination of username and password.
d. The user configures a villa to its maximum configuration.
e. The user orders a palace.

23. The following holds in a mutli-threaded program:
a. A thread can start on any object that implements the Runnable interface.
b. The Runnable interface has only single method called "run" which is the start code of the associated thread.
c. A thread can be either in state: running, or sleeping, or suspended, or stopped, or busy
d. All the above is true
e. Some but not all of the above hold

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24. Java Package containing lots of abstract classes should:

a. Change regularly
b. Not change often
c. Contain lots of concrete classes ×
d. Contain all concrete classes depending on the abstract classes in the same package
e. Take long time to compile. ×

25. Circular dependency between java packages is

a. Good since it increases the bond between unrelated packages ×
b. Good since it double checks on the consistency of the packages
c. Bad since it breaks the modularity of the system
d. Bad since it makes the compiler go into infinite loops. ×
e. Neither good or bad.

GOOD LUCK

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