Paper duration[90 minutes]

CS603 – Software Architecture and Design

Final Term Spring2023 (Sample Paper)

MCQs

Question#1
Normally complexity increases when size is _____. A. increasing B. decreasing C. Getting small D. Getting zero
Question#2
Software design will be _____ if two designer design an airline system separately. A. probably different B. same C. identical D. uniform
Question#3
_____ is a problem that can only be clearly defined by completely solving it. A. Wicked problem B. Simple problem C. Machine problem D. Different problem
Question#4
_____ process is the one which produces the same output given the same inputs. A. Continuous B. Deterministic C. Non-deterministic D. Finite
Question#5
Design is a _____ process. A. deterministic B. non-deterministic C. non-repeatable D. non-iterative
Question#6
In an unexplored domain, _____ will be used to show the tentative system to the client. A. coding

B. Requirement
C. prototyping
D. testing

Question#7

A design must be _____ to change.
A. easy
B. difficult
C. hidden
D. hard

Question#8

In maintainable design,cost of change is _____.
A. high
B. Standard
C. minimal
D. zero

Question#9

A/an _____ represent similar objects.
A. object
B. variable
C. Loop
D. class

Question#10

Sub-class is a specialized form of _____.
A. Child class
B. Super Object
C. Super class
D. Super function

Question#11

Vehicle is an example of _____.
A. duplicate class
B. abstract class
C. concrete class
D. master class

Question#12

Parent and child relationship in classes is called _____.
A. polymorphism
B. inheritance
C. association
D. abstraction

Question#13

In _____ , it is easy to query from one table.
A. filtered Mapping
B. rational Mapping
C. horizontal Mapping
D. vertical Mapping

Question#14

In _____ , all classes of inheritance hierarchy are mapped to single table.
A. filtered Mapping
B. rational Mapping
C. horizontal Mapping

D. vertical Mapping

Question#15

Class Date
{
Date();
}

In the above code snippet, Date(); is a _____.
A. Class
B. Constructor
C. Variable
D. Loop

Question#16

_____ association is a very simple way to relate two class with each other.
A. Uni-directional
B. Bi-directional
C. Looping
D. Conditional

Question#17

In a_____ association, both classes must include a reference to the linked object.
A. Non-directional
B. Uni-directional
C. Bi-directional
D. Conditional

Question#18

In _____, a software module should do one thing and should do it well.
A. Component principle
B. Class principle
C. SOLID principle
D. ACID principle

Question#19

Which of the SOLID principle deals with the design of inheritance hierarchies?
A. Single responsibility principle
B. Open close principle
C. Interface segregation principle
D. Liskov's substitution principle

Question#20

Duplication would require _____ all the occurrence when the common information changes.
A. updating
B. deleting
C. saving
D. copying

Question#21

_____ deal with dynamic interactions among societies of classes and objects?
A. Structural pattern
B. Creational pattern
C. Behavioral pattern
D. Category pattern

Question#22

A problem in which an instance changes its class is called _____.

A. Object morphing
B. SOLID morphing
C. Structure morphing
D. Open morphing

Question#23

```
if (isSpecialDeal()) {
   total = price * 0.95;
   send ();
}
else {
   total = price * 0.98;
   send ();
}
```

How the above code can be improved using refactoring?

A. Common method will be taken out from the if-else brackets
B. Use for loop to make it better
C. Remove all discount to increase profits
D. Change the total calculation formula

Question#24

```
if (isSpecialDeal()) {
   total = price * 0.95;
   send ();
}
else {
   total = price * 0.98;
   send ();
}
```

which method (in the above code) will be taken out from the if-else brackets after code refactoring?
A. isSpecialDeal()
B. send()
C. else{}
D. if() {}

Question#25

In a large method, _____ is easily applicable during refactoring?
A. extract method
B. Code restructuring
C. Code re-generator
D. Object orientation

Question#26

Improved cohesion in design will _____.
A. be hard to modify
B. be hard to maintain
C. bring ease in modification
D. increase coupling

Question#27



Which of the following is the suitable name of the above interface?

A. GUI based input and output
B. Console based input and output
C. Console-based Input and GUI based Output
D. Command line input and output

Question#28



Which of the following is the suitable name of the above interface?

A. Graphical user interface
B. Console based interface
C. MS DOS
D. Laptop interface

Question#29

```
public class MonolithicConsoleUI {
public static void main(String[] args) {
        int counter = 0;
        while (true) {
                System.out.println("Counter: " + counter);
                int nextInput = Console.readInt();
                if (nextInput == 0) break;
                counter += nextInput;
        }
   }
}
```

Identify the output command in the above code.

A. counter += nextInput;
B. System.out.println("Counter: " + counter);
C. int nextInput = Console.readInt();
D. while (true)

Question#30

Layered structure is an example of _____.

A. Static structures
B. Dynamic structures
C. Deployment structures
D. Allocation structures

Question#31

In layered structure, modules are aggregated (organized) into _____.

A. cubes
B. parts
C. layers
D. blocks

Question#32

Class diagram is an example of _____.

A. Static structures
B. Dynamic structures
C. Deployment structures
D. Allocation structures

Question#33

The set of architectural structures is _____.

A. fixed
B. not fixed
C. limited
D. fixed and limited

Question#34

A. Every system includes _____ among them to support some type of reasoning.
B. Elements
C. Relations
D. Elements and relations
E. classes

Question#35

_____ helps you to turn core features such as caching, data access, validation,

A. and workflow into actions.
B. Architecture style
C. Architecture frame
D. Application type
E. Architecture pattern

Question#36

Which of the following is not a component of the Architecture Meta-Frame?

A. Architecture frame
B. Application types
C. Interpreters
D. Quality attributes

Question#37

The key difference of service-oriented architecture from a traditional distributed architecture is _____.

A. its distributed nature
B. the use of web services
C. its loosely coupled nature
D. how its core components are designed

Question#38

In service-oriented architecture, organizations have the flexibility to choose whether they want to replace certain systems, allowing them to use a phased approach to_____.

A. deployment
B. migration
C. installation
D. maintenance

Question#39

_____ is very important for decomposing a complex system into a right set of micro-services.

A. Development skills
B. Programming tools
C. Domain knowledge
D. Deploying environment

Question#40

Architects' focus is on the boundaries and interfaces. Internal details are dealt at the _____ level.

A. requirements elicitation
B. design
C. deployment
D. maintenance

Subjective Questions (3 Marks)

Question#1

Model/Interactor Patterns is a technique which is used to remove the code duplication from three types of applications. Write down the names of those applications.

Answer:

1. Web Applications
2. Mobile Applications
3. Desktop Applications

Question#2

Describe the major cause of rounding-off error while dealing with extract method type of refactoring?

Answer:

The major cause of rounding-off error while dealing with Extract Method type of refactoring is:
Changing the order of mathematical operations

Question#3

As we know that, caching improves the performance and responsiveness of an application. However, incorrect caching choices and poor caching design can degrade performance, security and responsiveness. Which types of common mistakes we do at the time of designing cache for our web application?

Answer:

1. Caching too much data
2. Caching sensitive data without security
3. No cache expiration or invalidation strategy
4. Ignoring cache invalidation after data updates

Question#4

What could be the impact of adding new layers to Service-Oriented software architecture?

Answer:

1) Improved Modularity
2) Better Maintainability
3) Increased Complexity
4) Performance Overhead

Question#5

What do you know about the term "Ubiquitous network access" used in cloud computing?

Answer:

"Ubiquitous network access" in cloud computing means:
Cloud services are available anytime, anywhere, and from any device through a standard internet connection.

Question#6

Name the three service models used in cloud computing?

Answer:

1. IaaS – Infrastructure as a Service
2. PaaS – Platform as a Service
3. SaaS – Software as a Service

Subjective Questions (5 Marks)

Question#1

Briefly describe the Pitfalls related to extract method type of refactoring?

Answer:

1) Rounding-off Errors: Moving floating-point calculations can cause precision issues.
2) Loss of Context: Extracted method may lose access to variables or class context, leading to logic errors.
3) Too Many Small Methods: Over-extraction can reduce readability and increase complexity.
4) Inappropriate Method Names: Poor naming can make the code harder to understand.
5) Performance Overhead: Extra method calls may slightly affect performance in tight loops.

Question#2

Write down the names of bad smells that fall in the "Change preventers" category along-with a one-line definition of each.

Answer:

Divergent Change
– When one class is changed for different reasons in different ways.
Shotgun Surgery
– When a single change needs to be applied to many different classes simultaneously.
Parallel Inheritance Hierarchies
– When changes in one class hierarchy require corresponding changes in another hierarchy.

Question#3

Caching improves the performance and responsiveness of an application. However, incorrect caching choices and poor caching design can degrade performance, security and responsiveness. What are the guidelines to be followed at the time of designing cache for a web application?

Answer:

Cache only frequently accessed and stable data

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Set proper cache expiration (TTL) to keep data fresh
Avoid caching sensitive or personal data
Use appropriate cache invalidation strategies
Monitor cache performance (hit/miss ratio) and optimize accordingly

Question#4

Mention at least five characteristics of a micro-service architecture?

Answer:

1. Loosely Coupled – Services operate independently with minimal dependencies.
2. Independently Deployable – Each microservice can be deployed without affecting others.
3. Organized Around Business Capabilities – Each service focuses on a specific business function.
4. Decentralized Data Management – Each service manages its own database.
5. Technology Diversity – Different services can use different programming languages or technologies.

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