Week 3 Self Review Exercises – Suggested Solutions

1. What is the primary benefit of a 3-tier software architecture?
   a) Improved performance
   b) Scalability
   c) Easier maintenance
   d) All of the above

2. Which layer in a 3-tier architecture is responsible for the bulk of computation processing?
   a) Presentation Layer
   b) Business Logic Layer
   c) Data Access Layer
   d) None of the above

3. In a 3-tier architecture, where does the Presentation Layer typically reside?
   a) On the client side.
   b) On the server side.
   c) On both the client and server sides.
   d) In the database.

4. Which of the following is NOT a component of 3-tier architecture?
   a) Client Layer
   b) Business Logic Layer
   c) Integration Layer
   d) Data Layer

5. Which layer of the 3-tier architecture is responsible for client communication?
   a) Data Layer
   b) Business Logic Layer
   c) Presentation Layer
   d) None of the above

6. In a 3-tier architecture, the Data Layer is primarily designed to:
   a) Interact directly with the end-user.
   b) Handle business logic and computations.
   c) Facilitate data storage and retrieval operations.
   d) Manage the application's security and user authentication.

7. Which of the following best describes the 3-tier architecture?
   a) It is a linear architecture with no distinct layers.
   b) It consists of client, server, and database layers.
   c) It is a monolithic architecture where all components are interconnected.
   d) It is a single-layered architecture focused on user interface.

8. How does the 3-tier architecture improve scalability compared to a 2-tier architecture?

a) By reducing the amount of data stored in the database.
b) By allowing each layer to be scaled independently.
c) By combining the presentation and business logic into a single layer.
d) By eliminating the need for a separate presentation layer.

9. What is the purpose of a UML sequence diagram?
   a) To show the static structure of the system.
   b) To model the dynamic behavior of objects.
   c) To depict the deployment of the system.
   d) To illustrate the system's use cases.

10. Which of the following is represented by a dashed line in a sequence diagram?
    a) A synchronous message
    b) An asynchronous message
    c) A lifeline
    d) A return message

11. In a sequence diagram, what does an activation bar represent?
    a) The time an object is active during an interaction.
    b) The sequence of messages exchanged.
    c) The creation of a new object.
    d) The destruction of an object.

12. Cohesion within a module is achieved when:
    a) The tasks performed by the module are functionally unrelated.
    b) The tasks performed by the module are functionally related.
    c) The module performs tasks that are scattered throughout the system.
    d) The module is divided into smaller modules.

13. Coupling between modules is considered low when:
    a) Modules share global data.
    b) Modules have direct access to each other's implementation.
    c) Modules interact through simple interfaces.
    d) Modules perform tasks for each other.

14. Functional cohesion is when:
    a) A module performs several related functions.
    b) A module performs exactly one function.
    c) A module performs functions that are executed in sequence.
    d) A module performs functions that are executed conditionally.

15. In software design, the principle of 'high cohesion and low coupling' suggests that:
    a) Modules should be specified with tightly related functionalities and minimal dependencies on other modules.
    b) Modules should have a wide variety of functionalities and strong dependencies on other modules.

c) Modules should have a single functionality and no interaction with other modules.
d) Modules should have overlapping functionalities with other modules.

16. Sequence the following steps correctly in order to construct the sequence diagrams.

    a. Identify the responsibilities for each of these objects
    b. Identify the various analysis objects
    c. Read the use case description carefully
    d. Check the sequence diagram does not contain the common mistakes discussed during the lecture

17. Which of the following message-sending are recommended as they offer better design of a system?

    a. Actor to boundary object
    b. Actor to control object
    c. Actor to entity object
    d. Boundary object to control object
    e. Boundary object to entity object
    f. Control object to entity object
    g. Entity object to entity object

18. List and explain the disadvantages of the 3-tier architecture.

19. What is the purpose of Analysis and Design in Software Engineering?

20. In the context of software engineering, what does the statement “to realise a use case” means and how can we achieve that?

21. What are the two analysis models required to derive a detail sequence diagram? Explain the information used in each of these models in the creation of a detail sequence diagram.