Midterm Exam Practice

1. Explain the difference between the structural properties and behavioral properties within the context of object-oriented analysis and design
2. What are the primary notations used in UML to capture and analyze the system behavior?
3. To produce a reusable, flexible and extensible object-oriented software application, we must design and program to an interface/supertype, Explain.
4. A class may have multiple types and two classes may share the same type, explain by an example.
5. Explain the relationship between UP (Unified Process) and UML
6. If the requirements specify the problem space and design specifies the solution space in the object-oriented methodology, what is the role object-oriented analysis?
7. The information system must be analyzed from two perspectives: structure and behavior, explain
8. Explain the relationship between features and use cases
9. Compare and contrast structured analysis and object-oriented analysis.
10. Explain the relationship between activity diagram and system sequence diagram
11. Is there a relationship between the use-case in the use-case diagram and the system sequence diagram? Explain.
12. Explain the differences/similarities between the use-case diagram and context-diagram
13. Can the use-case diagram be considered a black-box behavioral representation of the customer's needs? Explain
14. Data flow diagrams are best for the structured analysis. Explain.
15. Explain why refinement is essential for Requirement, Analysis, and Design for object-oriented software applications

16. What is the **domain dictionary?**

17. What is the architectural analysis?

18. What are the artifacts used to capture requirements?

19. What kinds of classes should NOT be part of the analysis model?

20. Describe how encapsulation complements abstraction

21. We discussed the way in which user interactions, use cases, and scenarios are related.
    a) Explain the relationship between user interactions with the system, and use cases.
    b) What is the relationship between use cases and scenarios?
22. How does decomposition help us manage complexity in a system?
23. Why should the highest-risk use cases be addressed early in development?

24. Consider the following high-level description for the startup company, **Nimble Commuting**, that offers different commuting services within the city of Chicago.

Deliverable:
- Create the Domain Dictionary
- Create the UML Use-Case Diagram
- Create the UML analysis class diagram

High-Level Requirements:

Consider the following high-level description for the Nimble Commuting provider:
- The intent is to build an application that will be used to enroll a customer in a plan or order/purchase services
    1. Bus plan
        1. Basic - 60 passes/rides for $100/month
        2. Flex – 120 passes/rides for $150/month
        3. Ultimate - unlimited passes/rides for $250/month
    2. Train plan
        1. Basic - 60 passes/rides for $75/month
        2. Flex – 120 passes/rides for $100/month
        3. Ultimate - unlimited passes/rides for $150/month
    3. Bike plan
        1. Basic - 60 passes/rides for $20/month
        2. Flex – 120 passes/rides for $30/month
        3. Ultimate - unlimited passes/rides for $50/month

    4. Convenience Plan
        1. Basic - 60 passes/rides (For any ride/pass using Bike, Bus, Train) for $60/month

       2. Ultimate - unlimited passes/rides for $300/month

   5. Daily Plan
       1. Bike $1 for 2 hours usage
       2. Bus $3 ride/pass
       3. Train $2 ride/pass

- Nimble Commuting has three different roles/logins/webpages :
    1. Managers
    2. Account Specialists (Customer Support)
    3. Customers

- A manager can
    1. Add/delete routes for bus/train
    2. cancel/update/delete any type of order
    3. Add/delete commuting plans

- Account Specialist can
    1. Create an account for a new customer
    2. Update customer account
    3. Create an incident ticket

- Customer that has an existing account can do the following online:
    1. Update Record (credit card, personal info, etc.)
    2. Pay Monthly Bill
    3. Change/Cancel/Add personal commuting plan

25. Consider the following high-level description for an online application for the SportsDepot store:

1. Store offers the following types of Shoes : Basketball Shoes, Running Shoes, Casual Shoes

2. Store offers the following Clothing : T-Shirt, Shorts, Jersey, Jacket

3. Store offers the following Accessories : Backpack, Duffle Bags, Gym Sack, Socks, Hat, Sunglasses

A customer shall be able to create an order and the customer shall be able to cancel an order.

Salesman shall be able to add new products to the store homepage and create or cancel orders on behalf of the customer.

The store manager can create store coupons that are applicable to any item purchased from the store.

Based on the requirements/description listed above, provide answers for the following questions:

1. Actor dictionary

2. Provide the list (only name them) of the **use-cases** (NO textual format documentation is required for the identified use cases).

3. UML use-case Diagram

26. A retailer sells software games , accessories, devices, and consoles for a number of gaming platforms: Xbox, Wii, and PlayStation. The games have three rating categories: EveryOne, Teen, and Mature. The retailer would like you to build an object-oriented application that will meet the following requirements:

High-Level Requirements:

Consider the following high-level description for the retailer:
- The intent is to build an application that will allow customer to buy/trade-in products from the retailer either in-store or online
- The store has a StoreManager, Customers, and Salesmen
- The retailers sells new and pre-owned different game consoles, games, and tablets
- The StoreManager can Add/Delete/Update products
- Salesman can create Customer accounts
- There are 3 Console Manufacturers and each offers its own models:
    1. Microsoft
        1. XBOX One
        2. XBOX 360
    2. Sony
        1. PS3
        2. PS4
    3. Nintendo
        1. Wii
        2. WiiU

- There are 3 Game Makers
    1. Electronic Arts
    2. Activision
    3. Take-Two Interactive

- Every console might have accessories that could be bought separately
- Retailer offers warranty that can be purchased by the customer for every console
- The customer can pre-order products
- The customer can trade-in products
- The customer can place an order online, check the status of the order, or cancel the order.
- The customer can pay in cash, check, or credit card
- The customer has the choice to enroll (or cancel) and become PowerMember in order to receive 5% discount for every item purchased for an annual fee of $100
- Some of the products may have store special-discounts
- Some of the products may have manufacturer rebates
- The customer can choose one of the following options when buying a new console
    1. Buy the new console with no replacement
    2. Buy the new console with 1 year replacement for 50% fee of the console retail price; under this plan the customer can replace the console by a new one any time during the year (The console can be replaced only once for the customer).
    3. Buy the new console with lifetime replacement for 65% fee of the console retail price; under this plan the customer can replace the console by another new one any time (The console can be replaced only once for the customer).
- The customer can rent a console. However, there are a number of lease plans that the store like to offer its customers
    1. Daily rental (for example renting the console for 2 days)
    2. Monthly rental (for example rent the XBOX ONE console for 2 months with rental $20/month)
    3. Yearly rental (for example rent the XBOX ONE console for $100/year)

Provide your answers for the following:
1. Context Diagram
2. Feature tree

27. In this question, you will:

   a. Provide actor Dictionary for the following problem statement.
   b. Develop a use case text with at least one alternate scenario
   c. Draw a use-case diagram.

Detailed instructions for each of these tasks follow the *Description*.

Course Registration System

At the beginning of each semester, students may request an on-line course catalog containing a list of course offerings for the semester, and view each entry. In addition, the on-line Course Catalog includes information such as professor, department and prerequisites. The new system will allow students to select four course offerings for the coming semester. In addition, each student will indicate two alternatives. No course offering will have more than ten students or fewer than three students. The system will cancel the course with fewer than three students. After the registration process, the registration system sends information to the billing system. The billing system will bill the student for the semester. The system will allow professors to select the courses to teach and to see the students signed up for the courses. For each semester, students can change the schedule during a period of time. Students will access the system during this time to add or drop courses.

28. A consulting firm accepts orders from customers for building custom-made network-based computing environments. The customers have the choice to choose their routers, server machines, client machines, and printers. For simplicity, assume each of these components has the following properties: price, speed, and warranty cost per year. We have the following manufactures for the different parts, assume each manufacture has only one model for each of the following components:

Router	Server	Client	Printer
3Com	DELL	DELL	Xerox
Juniper	IBM	GATEWAY	Lexmark
Cisco	COMPAQ	IBM	IBM

Write the UML analysis class diagram that will allow the user select the different parts needed, and then calculate the total price along with total the warranty cost for five years; for example, a client my order 2 routers, 3 servers, 100 clients, 4 printers.