Question Paper

Exam Date & Time: 07-Oct-2020 (09:30 AM - 01:00 PM)

BMS COLLEGE OF ENGINEERING

Autonomous Institute Affiliated to VTU, Supplementary Semester End Examination October 2020

Object Oriented Modelling and Design [16CS6DCOOM]

Marks: 100 **Duration: 210 mins.**

Computer Science And Engineering, VI SEM

Answer all the questions.

Instructions: 1. Answer Five Full questions using given internal choices.
2. Missing data, if any, may be suitably assumed.

1)		Prepare a class model for banking system and provide necessary relationship, association names and multiplicity.	(10)
	a)		
	b)	Discuss the importance of an association end names with an example.	(5)
	c)	Categorize the following relationships into generalization, aggregation or association. 1. A country has a capital city 2. A dining philosopher uses a fork 3. A file is an ordinary file or a directory file 4. Files contains record 5. A polygon is composed of an ordered set of points	(5)
[OR] 2)		Explain differences between aggregation and association with a suitable example.	(6)
	a)		
	b)	Prepare a State diagram for the following scenario. Consider the class for telephone line with following activities and states: At the start of a call, the telephone line is idle. When the phone receiver is picked from hook, it gives a dial tone and can accept the dialing of digits. If after getting dial tone, if the user doesn't dial number within time interval then time out occurs and phone line gets idle. After dialing a number, if the number is invalid then some recorded message is played. Upon entry of a valid number, the phone system tries to connect a call & routes it to proper destination. If the called person answers the phone, the conversation can occur. When called person hangs up, the phone disconnects and goes to idle state. Draw the state transition diagram for above description of telephone line.	(8)
	c)	Explain guard condition with an example	(6)
3)		Prepare and discuss use case diagram for a coffee vending machine.	(7)
	a)		
	b)	With schematic diagram discuss the nested state diagram for a telephone line.	(8)
	c)	Discuss the relation of class and state models.	(5)
[OR] 4)		Prepare and discuss activity diagram for a stock trade processing system.	(7)
	a)		

b) Discuss procedural sequence models with suitable illustrations (7)

c) Consider an online frequent flyer program. Some use cases are listed below. Prepare a use case diagram and include the appropriate relationships for the use cases. You can add an abstract parent for each use case generalization (6)

- View credits : View the frequent flyer points currently available in the account
- Submit missing credit : Request credit for a activity that was not credited
- Change address: Submit a new mailing address
- Change user name: Change the user name for the account
- Change Password: Change the password for the account
- Book a free flight: Use frequent flyer credits to obtain a free flight
- Book a free hotel: Use frequent flyer credits to obtain a free hotel
- Book a free rental car: Use frequent flyer credits to obtain a free rental car
- Request a frequent flyer credit card: Fill out an application for a credit card that gives frequent flyer points as a bonus for purchases
- Check prices and routes : Find possible routings and corresponding prices for a paid flight
- Check availability for a free flight: Check a availability of free travel for a specified flight

5) Define system conception list and explain the questions that must be answered by a good system concept. (7)

a)

b) List the steps to construct domain class module. (7)

c) Analyze the following systems, identify the relative importance of the three aspects of modeling: 1) class modeling 2) state modeling 3) interaction modeling. Explain your answer. (6)

1. Change-making machine
2. Electronic typewriter
3. Telephone answering machine
4. Spelling checker

6) (8)

a)

Analyze the following systems, list the applicable style of system architecture: batch transformation, continuous transformation, interactive interface, dynamic simulation, real-time system, and transaction manager. Explain your answer.

i. An electronic chess companion: The system consists of a chess board with a built-in computer, lights, and membrane switches. The human player registers moves by pressing chess pieces on the board, activating membrane switches mounted under each square. The computer indicates moves through lights also mounted under each square. The human moves the chess pieces for the computer. The computer should make only legal moves, should reject attempted illegal moves, should reject attempted illegal human moves, and should try to win.

ii. An airplane flight simulator for a video game system: The video game system has already been implemented and consists of a computer with joystick and pushbutton inputs and an output interface for a color television. Your job is to develop the software for the computer to display the view from the cockpit of an airplane. The joystick and pushbutton control the airplane. The display should be based on a terrain description stored in memory. When your program is complete, it will be sold on cartridges that plug into the video game system.

iii. A floppy disk controller chip: The chip is going to use a microprogram for internal control. You are concerned with the microprogram. Th chip bridges the gap between a computer and a floppy disk drive. Your portion of the control will be responsible for positioning the read/write head and reading the data. Information on the diskette is organized into tracks and sectors. Tracks are equally spaced circles of data on the diskette. Data within a track is organized into sectors. Your architecture will need to support the following operations: Find track 0, find a given track, read a track, read a sector, write a track, and write a sector.

iv. A sonar system: You are concerned with the portion of the system that detects undersea objects and computes how far away they are. This is done by transmitting an acoustic pulse and analyzing any resulting echo. A technique called correlation is used to perform the analysis, in which a time-delayed copy of the transmitted pulse is multiplied by the returned echo and integrated for many values of time delay. If the result is large for a particular value of time delay, it is an indication that there is an object with a range that corresponds to that delay.

b) Discuss the reusable components used in System Design. (7)

c) Explain the ways of downward recursion in the design process. (5)

7) (7)

a)

Consider a system for interactive symbolic manipulation of polynomials. The basic idea is to allow a mathematician to be more accurate and productive in developing formulas. The user enters mathematical expressions and commands a line at a time. Expressions are ratios of polynomials, which are constructed from constants and variables. Intermediate expressions may be assigned to variables for later recall. Operations include addition, subtraction, multiplication, division and differentiation with respect to a variable.

Design an architecture for the system described above could involve the following subsystem. Organize them into partitions and layers

i. Line syntax-- Scan a line of user input for tokens
ii. Line semantics—determine the meaning of a line of input
iii. Command processing—execute user input, error checking
iv. Construct expression—build an internal representation of an input expression
v. Apply operation—carry out an operation on one or more expressions
vi. Save work—save the current context
vii. Load work—read in previously saved context
viii. Substitute—substitute one expression for a variable in another expression
ix. Rationalize—convert an expression to canonical form
x. Evaluate—replace a variable in an expression with a constant and simplify the expression

b) (8)

A product is to be installed for control elevators in a building with m floors. The problem concerns the logic required to move elevators between floors according to the following constraints:

i. Each elevator has a set of m buttons, one for each floor. These illuminate when pressed and cause the elevator to visit the corresponding floor. The illumination is canceled when the elevator visits the corresponding floor.
ii. Each floor, except the first floor and top floor has two buttons, one to request and up-elevator and one to request a down-elevator. These buttons illuminate when pressed. The illumination is canceled when an elevator visits the floor and then moves in the desired direction.
iii. When an elevator has no requests, it remains at its current floor with its doors closed.

Draw the sequence diagram for the above scenario.

c) Explain the different steps involved in design optimization. (5)

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