

Question 1: Enterprise System Design [30 points]

KayJay World:

KayJay World is a small vacation theme park that operates a circular, six-train mono-rail system connecting a parking lot, a theme park, a hotel, and a concert hall/restaurant complex. There are four stations, each with a ticket booth and a boarding queue.

Passengers obtain tickets for one of the possible destination stations and enter the boarding queue. The boarding queue is arranged in such a way that every seat on a train will be filled up before any passenger can be left at a station. Trains consist of an engine and one to six passenger cars, each car with carrying capacity of 50 passengers.

The rail system consists of fifteen safety segments of track and each train in service occupies one of these segments. A train may not enter a segment occupied by another train. Each station counts as one segment, and each link between stations is divided into two to three segments. There is a barn capable of storing all six trains with two access segments: one exit segment (S14) leading to the barn and yard, and one entrance segment (S15) departing from the barn and yard. There are other details such as junction switch and fixed junction which we will not worry about at this time.

The capacity manager initializes the system by ordering one train to leave the barn and thus be placed in service. At least one train remains in service until the capacity manager shuts down the system ordering the last train out of service. The capacity manager is in charge of adding or removing trains from the system depending on the crowd and using a predetermined policy. There is a yard manager which checks the trains and declares them operable or inoperable. Inoperable trains will go into service yard and get repaired.

There are station managers to take care the passengers, ticketing and queuing. Kayjay World is completely automated system. That is, all the operations are managed by computers. You have been assigned the task of simulating the KayJay World (Enterprise) on a computer so that the problems in automating such an elaborate system can be checked out before physically building the system.

Analyze and come up with a complete design for your simulation. Your deliverable is set of class diagrams, sequence diagrams and any other diagrams (use case, state diagram) and algorithmic (stepwise explanation) explanation of the processes involved.

More specifically,

- Identify the modules in the application. Justify your choice.
- For each module identify the services offered.
- For each module identify users (clients).
- For each module identify entities, processes, and rules.
- Provide a class diagram for each module, which shows the classes and relationships among the classes. Give the classes meaningful names

- Define each of the classes: properties and behavior.
- Provide list of data that is to be persisted.
- Partition the features into client-side, middleware and server-side ones.
- Use sequence diagrams to explain the inter-module and intra-module interactions.
- Provide a algorithm explaining the simulator that will control all the modules.

Please do not write an essay but provide brief explanation or justification for the design decisions you make. You may have to go through a draft before you arrive at your final answer.

Question 2: Implementation Technology: Simple Client/Server [20 points]

Assuming that Java Technology is the technology of choice of KayJay World, provide a block diagram (class diagram) of the classes involved in a simple client/server system communicating through RMI and an oracle database for persistence. This is similar to your Project1.

Question 3: Implementation Technology: EJB [25 points]

Using J2EE's EJB specification, provide a design consisting of different types of beans for the components of the application. Provide details of the beans at the interface level. Use diagrams where ever needed.

Question 4: Distributed Systems: Fundamental Concepts [25 points]

- a. What is an IOR as defined in the CORBA specification? Explain. What are the common services provided by an ORB?
- b. How does IDL help in designing CORBA systems? What is the input to an IDLCompiler and what are its outputs? Explain the purpose of each output.
- c. Consider an RMI-based distributed system. What does the bind/rebind operation do in this system? Give an example and explain.
- d. Compare connectionless (UDP) and connection-oriented (TCP) for the implementation of each of the application-level or presentation-level protocols:
 - (i) virtual terminal access (ex: telnet)
 - (ii) file transfer (ex: ftp)
 - (iii) user location (ex: rwho, finger)
 - (iv) information browsing (ex: http)
 - (v) remote procedure call.

STATE UNIVERSITY OF NEW YORK AT BUFFALO
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CSE510/410 Enterprise Systems
Spring 2001
Exam 1
Instructor: Bina Ramamurthy

Time: 120 minutes

Instructions:	Question	Points	Grade
<ol style="list-style-type: none">1. This exam consists of 4 questions, and 3 pages. PLEASE CHECK.2. Write your name and person number on this page NOW.3. This exam is OPEN BOOK, OPEN NOTES, and CLOSED NEIGHBORS.4. For full credit, show ALL of your work, not just the results.5. You are allowed only one sheet of handwritten information.6. Write your answers in the spaces provided. You may use the backs of pages if you find it necessary.7. Raise your hand if you have any questions.8. There are severe penalties for academic dishonesty.9. Please RETURN the ENTIRE EXAM before leaving the room.			
	Total	100	_____
		LETTER GRADE	_____