

Ship Management System

Data and Applications

Project Phase -1

Our System

Our mini-world, i.e. the Ship Management system, will facilitate the

- Passengers to enquire about the Ships available on the basis of source and destination, booking and cancellation of tickets, enquiring about the status of a ticket, enquiring about the status/delay in a ship, etc. The purpose of this is to design and develop a database maintaining the records of different passenger ships, passengers, routes, employees, etc.
- Traders to enquire about the Ships available on the basis of type of goods they want to ship, their capacity, source and destination. The purpose of this to design and develop a database maintaining the records of cargo ships, their capacities, the type of goods it can ship, and the costs that would be incurred, etc.

Database Requirements

1. Entity Types

Entity Type	Attributes	Data type	Domain
Passenger	Passenger ID	INT	Any 7 digit number
	First Name	VARCHAR	Atmax 15 letters
	Middle Name	VARCHAR	Atmax 15 letters
	Last Name	VARCHAR	Atmax 15 letters
	Date of Birth	DATE	Any valid date
	// Age (Derived from Date of Birth)	INT	$[0, \infty) \cap \text{INT}$
	Gender	VARCHAR	{Male, Female, Others}
	Seat No.	INT	$[1, 2000] \cap \text{INT}$
	Ticket ID	INT	Any 7 digit number
	Email	VARCHAR	Any valid email (Atmax 320 characters) (Can put multiple emails separated by commas)
	Phone Number	INT	Any 10 digit number (Can put multiple phone numbers separated by commas)
	Address	VARCHAR	Atmax 100 letters
	Pin Code	INT	Any 6 digit number
	State	VARCHAR	Atmax 30 letters

	Country	VARCHAR	Atmax 30 letters
Ship	Ship ID	INT	Any 5 digit number
	Ship Name	VARCHAR	Atmax 50 letters
	Ship Type	VARCHAR	Atmax 30 letters
	Last Service Date	DATE	Any valid date
	Source Port ID	INT	Any 5 digit number
	Destination Port ID	INT	Any 5 digit number
Cargo Ship	Ship ID	INT	Any 5 digit number
	Capacity (in TEU)	FLOAT	(0, 21413]
	Cost (Rupees per TEU)	FLOAT	(0, 100000000]
Passenger Ship	Ship ID	INT	Any 5 digit number
	Capacity (Number of people)	INT	[1, 2000] \cap INT
	Facilities	VARCHAR	Comma Separated (total length \leq 200)
Employee	Employee ID	INT	Any 7 digit number
	First Name	VARCHAR	Atmax 15 letters
	Middle Name	VARCHAR	Atmax 15 letters
	Last Name	VARCHAR	Atmax 15 letters
	Date of Birth	DATE	Any valid date
	// Age (Derived from Date of Birth)	INT	[0, ∞) \cap INT
	Gender	VARCHAR	{Male, Female, Others}
	Salary	INT	(0, ∞) \cap INT

	Department Name	VARCHAR	Atmax 30 letters
	Phone Number	INT	Any 10 digit number (Can put multiple phone numbers separated by commas)
	Email	VARCHAR	Any valid email (Atmax 320 characters) (Can put multiple emails separated by commas)
	Address	VARCHAR	Atmax 100 letters
	Pin Code	INT	Any 6 digit number
	State	VARCHAR	Atmax 30 letters
	Country	VARCHAR	Atmax 30 letters
Port	Port ID	INT	Any 5 digit number
	Port Name	VARCHAR	Atmax 30 letters
	Port Capacity	INT	[1-200] \cap INT
Route	Arrival Time	TIME	Any valid time
	Departure Time	TIME	Any valid time
	Stop Number	INT	Any 5 digit number
	Port ID	INT	Any 5 digit number
	Ship ID	INT	Any 5 digit number
Ticket	Ticket ID	INT	Any 7 digit number
	Ship ID	INT	Any 5 digit number
	Port ID	INT	Any 5 digit number
	Arrival Time	TIME	Any valid time
	Passenger ID	INT	Any 7 digit number

Employee Dependent	Employee ID	INT	Any 7 digit number
	First Name	VARCHAR	Atmax 15 letters
	Middle Name	VARCHAR	Atmax 15 letters
	Last Name	VARCHAR	Atmax 15 letters
	Date of Birth	DATE	Any valid date
	// Age (Derived from Date of Birth)	INT	$[0, \infty) \cap \text{INT}$
	Gender	VARCHAR	{Male, Female, Others}
	Phone Number	INT	Any 10 digit number (Can put multiple phone numbers separated by a comma)
	Email	VARCHAR	Any valid email (Atmax 320 characters) (Can put multiple emails separated by commas)
Department	Department ID	INT	Any 4 digit number
	Department Name	VARCHAR	Atmax 30 letters
	Number of Employes	INT	$[1-200] \cap \text{INT}$
Driver	Employee ID	INT	Any 7 digit number
	Years Of Experience	INT	$(0-30] \cap \text{INT}$
	Driving License ID	INT	Any 7 digit number
	Ship Type	VARCHAR	Atmax 30 letters
Booking Agent	Agent ID	INT	Any 7 digit number
	Agent Name	VARCHAR	Atmax 45 letters
Security	Employee ID	INT	Any 7 digit number
	Years Of Experience	INT	$(0-30] \cap \text{INT}$

	Ship ID	INT	Any 5 digit number
	Security Company Name	VARCHAR	Atmax 30 letters
Other Staff	Employee ID	INT	Any 7 digit number
	Years Of Experience	INT	(0-30] \cap INT

- a. Passenger
- b. Ship
 - i. Cargo Ship
 - ii. Passenger Ship
- c. Employee
- d. Port
- e. Ticket
- f. Booking Agent
- g. Department
 - i. Driver
 - ii. Security
 - iii. Other Staff

2. Weak-Entity Types

- a. Route
- b. Employee Dependent

3. Relationship Types

- a. **BOOK TICKET** → Relationship between Passenger, Booking Agent, Ticket and Port
- b. Ship **STARTS, STOPS and ENDS** at Ports
- c. Passenger **OWNS** Ticket
- d. Dependent **RELATIVE OF** Employee
- e. Ship **FOLLOWS** Route
- f. Employee **WORKS AT** Port

4. $n > 3$ Relationship Type

- a. **BOOK TICKET** → Relationship between Passenger, Booking Agent, Ticket and Port.

5. Subclass

- a. Cargo Ships and Passenger Ships are Subclasses of the Super-Class Ship
- b. Drivers and Security are Subclasses of Super-Class Departments

6. Composite Attributes

- a. Name → First Name and Last name
- b. Address → Address, Pin Code, State, Country

7. Multi-Valued Attributes

- a. Email → Allows Multiple Comma Separated Emails
- b. Phone Number → Allows Multiple Comma Separated Phone Numbers

8. Derived Attributes

- a. Age → Age of the Passengers can be derived from their Date of Birth, by subtracting the date of birth from the current date

Functional Requirements

1. Insert Operations

- a. Adding a new Passenger.
- b. Adding a new Route to a Ship.
- c. Adding a new Employee.
- d. Adding a new Dependents of Employee.

2. Update Operations

- a. Updating Route of a Ship.
- b. Updating Employee/Dependent Details.
- c. Updating Passenger Details.

3. Delete Operations

- a. Removing a Ship.
- b. Removing an Employee.
- c. Deleting a Passenger after the Completion of his/her journey.
- d. Deleting a Route

4. Changing Data Requirements

- a. Adding/Modifying/Deleting a new attribute of Festival Offers in the Ticket entity.
- b. Adding new Department entity. For eg. if a 'ship repair service' opens at a port, a new Repair/Service Department needs to be added.

5. Reports that can be generated

- a. Generating a status report that prints the arrival time and the departure time of a ship when it arrives at a port following its route.

The report will be useful to know if there are any delays in the schedule, and how can it possibly affect other ships.

- b. Generating a report about the amount of goods transported through each route and the money consumed per container. This can be used to analyze which route is most busy, and whether or not the number of ships need to be increased for that route.