

# Data And Applications - Project Phase 1

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## Introduction:

The mini-world is a Hotel Management System where we implement a database to efficiently record and manage the different crucial aspects required to successfully run a hotel.

- **Purpose:** We record bookings, their payment statuses and the party who was responsible for the booking with their credentials. We store information regarding the type of room which was booked and the employees who are responsible for maintaining the standards of the room and organization of the hotel. The recording is also made of the different types of services offered by the hotel to its customers. For effective workforce management, we store all employees including their dependents.
- **Users:** The users of such a database are the hotel management.
- **Applications:** The database can be applied to effectively record, store, organise and implement bookings, customer and responsible personnel records and essential services provided by any qualified hotel. It is highly interactive and accounts for vast functionality for hotel management purposes.

## Database Requirements

### I. Entities:

CUSTOMER			
Attribute		Constraints	
CustomerID		Required	Key Attribute
CustomerName		Required	
AdhaarID		Required	Key Attribute
Email		Required, valid domain	Multi-valued attribute
Address		Required	Composite attribute
	House No.		

	Street Address	Required	
	City	Required, must be a valid city in the state	
	State	Required, must be a valid state in the country	
	Country	Required, must be a valid country	
	Pincode	Required, Should be exactly 6 digits and correspond to the city	
DOB		Required. Valid DOB	
Age			Derived attribute from DOB
PhoneNo.		Required, Valid 10 digit entry	Multi-valued attribute

**BONUS:**

CustomerID: Candidate key

CustomerName: Super Key

AdhaarID: Alternate Key

BOOKING		
Attribute	Constraint	
BookingID	Required	
DateOfBooking	Valid Date	
CheckIn	Required, must be a valid date (Should not be before the date of booking)	
CheckOut	Required, must be valid dates (should not be before the check-in date)	
TotalNights		Derived from check-in and check-out dates

NumberOfRooms	Required, must be valid input (greater than zero)	
BookingStatus	Required	
NumberOfAdults	Required, must be valid input (cannot be negative)	
NumberOfChildren	Required, must be valid input (cannot be negative)	

PAYMENT (Weak Entity of Booking)		
Attribute	Constraint	
Mode	Required	
Amount		Derived from the sum of all corresponding room charges <sup>1</sup> (all rooms under the booking)
Status	Paid/Unpaid -- boolean input	

<sup>1</sup> Room charge = No. of nights × cost per night + additional service costs

DEPARTMENTS		
Attribute	Constraint	
DepartmentCode	Required	Key Attribute
DepartmentName	Required	

EMPLOYEE		
Attribute	Constraints	
EmployeeID	Required	Key attribute
Email	Required, valid domain	Multi-valued attribute

Address		Required	Composite attribute
	House No.	Optional	
	Street Address	Required	
	City	Required, must be a valid city in the state	
	State	Required, must be a valid state in the country	
	Country	Required, must be a valid country	
	Pincode	Required, Should be exactly 6 digits and correspond to the city	
DOB		Required, Valid DOB	
Age			Derived attribute from DOB
Gender		Required	
PhoneNo.		Required, Valid 10 digit entry	Multi-valued attribute
Salary		Required, Must be positive	

<b>DEPENDENT (Weak Entity of Employee)</b>		
Attribute	Constraint	
Name	Required	
DOB	Required, valid DOB	
Age		Derived attribute from DOB
Phone number	Required, must be a valid 10 digit entry	Multi-valued attribute

ROOM		
Attribute	Constraint	
RoomNo	Required	Key Attribute
RoomType	Required	
PricePerNight	Required, must be greater than 0	
Description	Required	

SERVICE		
Attribute	Constraint	
Service ID	Required	Key Attribute

RESTAURANT SERVICE (Subclass of SERVICE)		
Attribute	Constraint	
DishCode	Required	
Special Requests	Optional	
Price	Required, Must be positive	

CAB SERVICE (Subclass of SERVICE)			
Attribute		Constraints	
CabNumber		Required	Key attribute
DriverName		Required, valid domain	Multi-valued attribute
PickupLocation			Composite attribute
	Street Address 1	Required	
	Street Address 2	Optional	

	Landmark	Optional	
DropLocation			Composite attribute
	Street Address 1	Required	
	Street Address 2	Optional	
	Landmark	Optional	
KmTravelled		Required, must be greater than zero	
ArrivalTime		Required, must be a valid time	
Cost		Required, must be greater than zero	

RECREATIONAL SERVICE (Subclass of SERVICE)		
Attribute	Constraint	
ActivityType	Required	
NumberOfPeople	Required, must be greater than zero	Number of people who will be engaging in the activity
Price	Required, must not be negative	Can be zero when the service is complementary

## II. Relations:

1. Booking OF room, payment, customer (n>3)
  - a. Cardinality constraints:
    - i. Booking (MIN,MAX) :- (1,1)
    - ii. Room (MIN,MAX) :- (1,N)
    - iii. Payment(MIN,MAX) :- (1,1)
    - iv. Customer(MIN,MAX) :- (1,1)
  - b. Participation Constraint:
    - i. Partial for room
    - ii. Total for payment
    - iii. Total for customer
    - iv. Total for booking

**BONUS:** Let us consider a weak entity called REGISTRATION. This can be used to replace the above quaternary relationship. This weak entity can have three identifying relationships with entities BOOKING, ROOM, PAYMENT and CUSTOMER.

2. Employee RELATED TO dependant
  - a. Cardinality Ratio:
    - i. Employee: dependant - 1:1
  - b. Participation Constraint:
    - i. Partial for Employee
    - ii. Total for Dependant
3. Employee MANAGES department
  - a. Cardinality Ratio:
    - i. Employee: Department - 1:1
  - b. Participation Constraint:
    - i. Partial for Employee
    - ii. Total for department
4. Employee BELONGS TO department
  - a. Cardinality Ratio:
    - i. Employee: Department - N:1
  - b. Participation Constraint:
    - i. Total Participation for both entities
5. Room ORDERS Services.
  - a. Cardinality Ratio:
    - i. Room: Service - 1:N
  - b. Participation Constraint:
    - i. Partial participation for Room
    - ii. Total for Service

**BONUS:**

6. Employee SUPERVISES employee
  - a. Cardinality Ratio:
    - i. Employee(Supervisee) : Employee(Supervisor) - N:1
  - b. Participation Constraint:
    - i. Partial participation for both entities

**III. Functional Requirements:**

i) Modifications:

1. Insert:
  - a. A new booking
  - b. New customers' details

- c. New employees' details
  - d. New service orders
- 2. Delete:
  - a. When an employee leaves, their details are to be removed.
  - b. Bookings (change status to cancelled).
- 3. Update:
  - a. Booking details can be updated (such as check-in/check-out dates).
  - b. Employees can update their dependents.
  - c. Supervisors of an employee.
  - d. Managers of a department
  - e. Customers may change their rooms (updating a relation).
  - f. Salaries of employees.
  - g. Room prices per day.

## ii) Retrievals:

- 1. Selection:
  - a. The user can obtain a list of all Employees under a certain department.
  - b. All bookings under a particular date.
- 2. Projection:
  - a. The user could list all rooms that are available on a particular date.
  - b. Room and services above/below a certain price.
- 3. Aggregate:
  - a. Sum of all bookings in a specific year.
  - b. Sum of total revenue earned by providing services.
- 4. Search:
  - a. All rooms under/above a certain price.
  - b. Search based on Customer Name.
  - c. All services ordered by a room.
- 5. Analysis:
  - a. Increase in bookings as compared to previous years.
  - b. Increase in total revenue generated as compared to previous years.

## iii) Extras:

- c. Seasonal or special occasion discounts and offers can be provided by the hotel.
- d. Rooms can be upgraded under the discretion of the hotel management.