

Hotel management system

Problem statement:-

- Hotel management system is divided into many departments like reservation, food and beverages, services, guests, rooms, employees, events.
 - Each department has list of services to be offered to customers. Each department has its own id, name and employees working as well as services offered to guests.
 - **Employees** are the one who works in the hotel, like managers, front desk, housekeeping, chefs ... etc. Each employee has unique id, name, salary.
 - **Manager** who manages entire hotel.
 - **Guests** are identified by their id. Each guest has a name, contact info, purpose of visit, nationality, date of birth and allotted rooms based on their reservations.
 - **Rooms** are identified by their unique id. Each room has room number, type, capacity, status. Each guest can reserve upto 5 room(1,5). Each room can have only (1,1)guests.
 - **Reservations:** - info about guest reservations, including guest id, date of arrival and departure, room number.
 - **Service** category. Like Spa, laundry, room service. Etc. Each service has its id, name description, cost.
 - **Events:** - info about events held in hotel. Type of event, date, location, no of attendees.
 - **Food and beverages:** - types of food and drinks offered (south tili, north tili, Chinese cusins, hot drinks, soft drinks.)
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S.no	Entity	Attributes	Type	S.no	Entity	Attributes	Type
1	Employee	Emp_name	single	5	Reservation	Guest name	Composite
		Emp_id	Single			Room type	Simple
		Salary	Simple			Check in date	Simple
		Position	Simple			Chec out date	Simple
		Age	single			Cost	Single
2	Guest	Guest_name	Simple	6	Service	Service_id	Single
		Guest_id	Simple			Service type	Simple
		Contact info	multi valued			Cost	Single
		Nationality	Simple			Location	single
		Age	Simple				
		Purpose of visit	Required				
3	Room	Religion	Optional	7	Food & beverages	Food_id	Single
						Guest_id	single
		Room_no	Simple			Emp_id	Single
		Room_type	Simple			Flavor	Multi valued
		Capacity	Simple			Type	Single
		Status	Simple			Cooking_method	Single
4	Function & conference	Cost	Simple			Flavour	Single
		Type	Simple				
		Attendees	Simple				
		Theme	Simple				
		Organizers	Simple				
4	Function & conference	Cost					

Relationships:

Attend , ask , order , works , gives .

ENTITY: -

1. Person: - employee, guest.
2. Place: - room.
3. Event: - function_conference, services
4. Concept: - reservation.
5. Object: - food and beverages.

Unary Relation:- Manager Who Manages Employees.

Binary Relations:-

Guest Can Stay In Room

Food Is Served By Employee

Food Is Ordered By Guest

N Employees Can Work In **1** Reservation

1 Employee Can Give **N** Services

M Guest Can Attend **N** Conferences

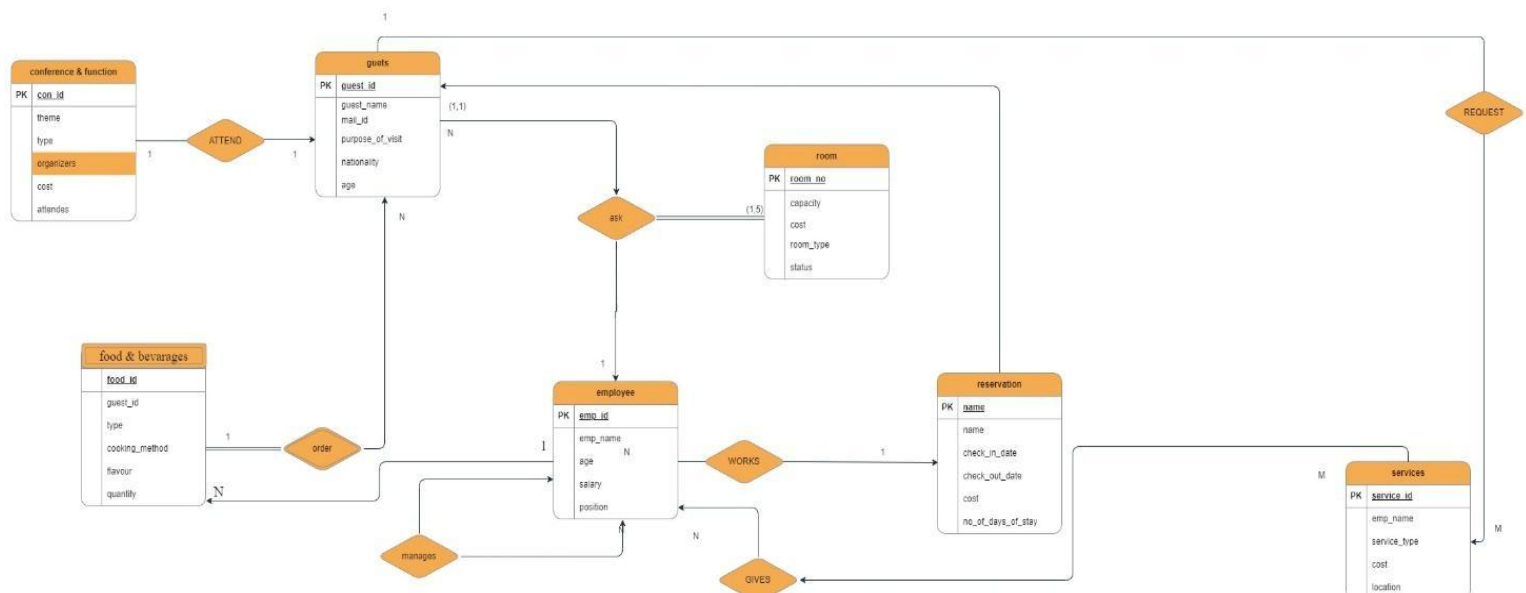
N Services Are Requested By **1** Guest.

Ternary Relations:-

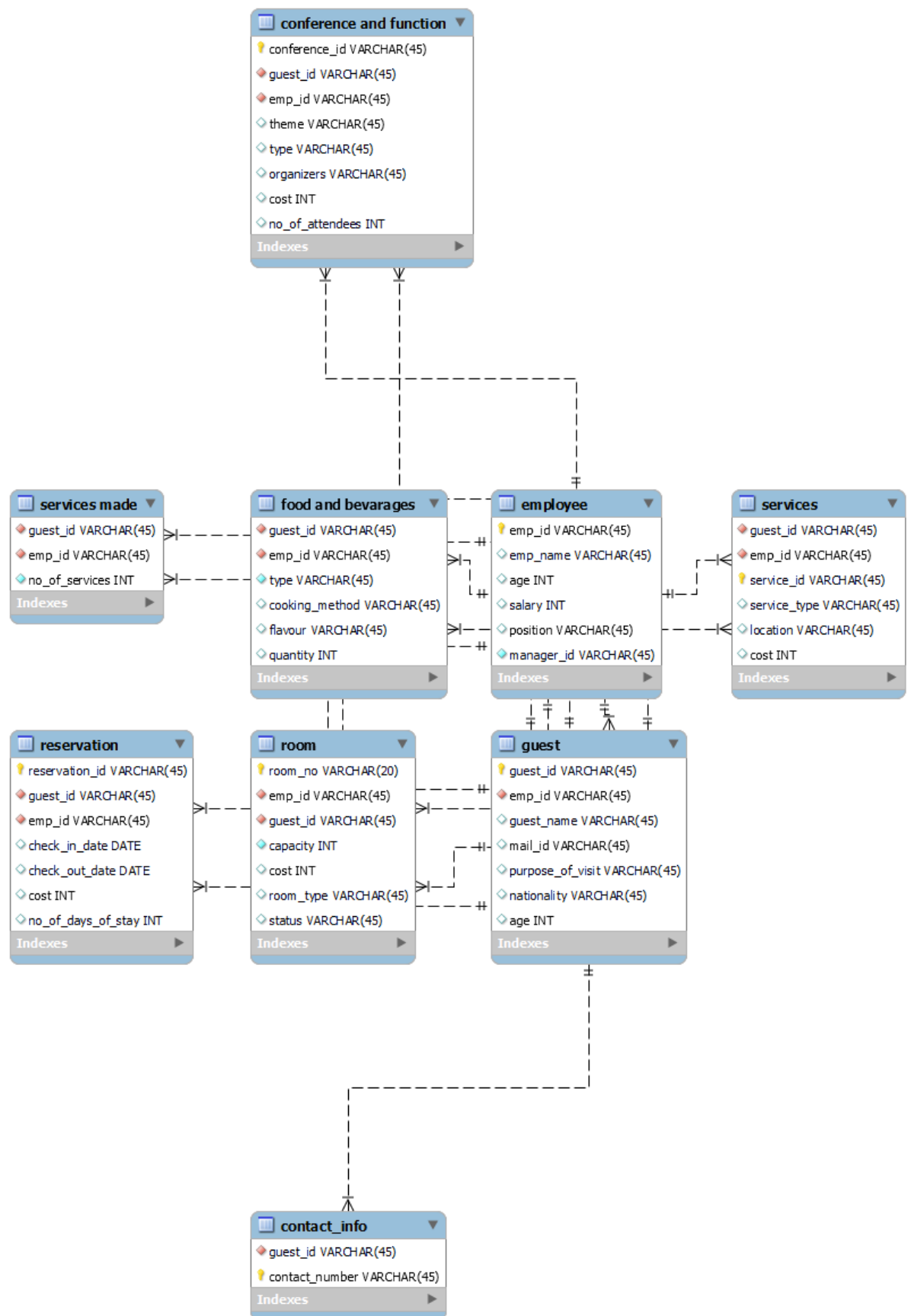
N Employees Deliver **N** Food And Beverages Ordered By **M** Guests.

N Employees Can Avail **M** Services To **N** Guest

ER-DIAGRAM



ER-DIAGRAM GENERATED FROM MYSQL WORKBENCH



Relations:-

Employee (Emp_id, Emp_name, Age, Salary, Position, Manager_id)

Conference And Function(Conference_id, Guest_id, Employee_id, Theme, Type, Organizer, Cost, No_of_attendees)

Contact_info(Guest_id, Contact_number)

Food And Beverages(Guest_id, Emp_id, Type, Cooking_method, Flavor, Quantity)

Guest(Guest_id, Emp_id, Type, Cooking_method, Flavor, Quantity)

Reservation(Reservation_id, Guest_id, Emp_id, Check_in_date, Check_out_date, Cost, No_of_attendees)

Room(Room_no, Emp_id, Guest_id, Capacity, Cost, Room_type, Status)

Services(Guest_id, Emp_id, Service_id, Service_type, Location, Cost)

Services_made(Guest_id, Emp_id, No_of_services)

FUNCTIONAL DEPENDENCY & NORMALIZATION

Table selected to find normalization is **Services made**.

A	B	C	D	E	F
guest_id	emp_id	service_id	service_type	location	cost
guest_2	emp_3	service_2	Laundry	Laundry Room	300
guest_3	emp_4	service_3	Catering	Conference Hall	1500
guest_4	emp_1	service_4	Room Service	Room 104	450
guest_5	emp_5	service_5	Spa	Spa Center	800
guest_6	emp_7	service_6	Transportation	Front Desk	700
guest_7	emp_9	service_7	Room Service	Room 207	550

1NF

The Above Relation Room Is Already in 1nf Form Because There Are No Multivalued Attributes (Atomic in Nature).

Checking for 2NF

Steps:

1. identify the prime and non-prime attributes
 2. check if the candidate key is a composite key.
 3. check if the non-prime attributes are fully dependent on the prime attributes.
 4. check if the non-prime attribute is partially dependent on the prime attributes.
- The key for the given relation is (Guest_id, emp_id, service_id) where (emp_id, service_id) are foreign keys and guest_id is a primary key of relation room where three of them combine to form candidate key.
 - The set of functional dependencies are $f = \{abc \rightarrow def, abc \rightarrow d, \}$
 - {Def} may have redundant values so they cannot form the key.
 - From the relation room prime attributes are {abc}
 - From the relation non-prime attributes are {def}

Checking For Partial Dependency

$\{A \rightarrow D, B \rightarrow D, C \rightarrow D\}$

$\{A \rightarrow E, B \rightarrow E, C \rightarrow E\}$

$\{A \rightarrow F, B \rightarrow F, C \rightarrow F\}$

The Non-Prime Attributes {D, E, F} Are Partially Dependent On the Part of the Primary Key.

2nf Decomposition

$\{A \rightarrow D, B \rightarrow D, C \rightarrow D\}$

{A → E , B → E , C → E}

{A → F , B → F , C → F}

CONVERTING INTO 2NF

All The Above 9 Functional Dependencies Are Creating Problems Because There Are Non-Prime Attributes That Are Partially Dependent On The Candidate Key.

So All These 9 Functional Dependencies Are Broken into 9 New Different Relations.

So The New 9 Relations are

1. (Guest_id,Service_type)
2. (Guest_id,Location)
3. (Guest_id, Cost)
4. (Emp_id,Service_type)
5. (Emp_id,Location)
6. (Emp_id , Cost)
7. (Service_id,Service_type)
8. (Service_id,Location)
9. (Service_id , Cost)

3NF FORM: -

Already in 2NF

NO transitive Dependency

In the above relation there are no transitive dependency relations so the given relation is in 3nf form.