# Normalization

## Heap

- Room

| Room | Type | Amenities | ADA Accessible | Standard Occupancy | Maximum Occupancy | Base Price | Extra Person |
|---|---|---|---|---|---|---|---|
| 201 | Double | Microwave, Jacuzzi | No | 2 | 4 | $199.99 | $10 |
| 202 | Double | Refrigerator | Yes | 2 | 4 | $174.99 | $10 |

- Guest

| Name | Address | City | State | Zip | Phone |
|---|---|---|---|---|---|
| Your Name | Your Address | City | State | Zip | Phone |
| Mack Simmer | 379 Old Shore Street | Council Bluffs | IA | 51501 | (291) 553-0508 |

- Reservation

| Room Number | Name | Adults | Children | Start Date | End Date | Total Room Cost |
|---|---|---|---|---|---|---|
| 308 | Mack Simmer | 1 | 0 | 2/2/2023 | 2/4/2023 | $299.98 |
| 203 | Bettyann Seery | 2 | 1 | 2/5/2023 | 2/10/2023 | $999.95 |

## First Normal Form (1NF)

To achieve 1NF, the table must satisfy the following conditions:

- There is no top-to-bottom ordering to the rows.
- There is no left-to-right ordering to the columns.
- Every row can be uniquely identified.
- Every row/column intersection (field) contains only one value.

- Room: Amenities (Microwave, Refrigerator) | *Every row/column intersection (field) contains only one value*
- Guest: Primary Key/Surrogate Key | *Every row can be uniquely identified*
- Reservation: Primary Key/Surrogate Key | *Every row can be uniquely identified*

| Room | Type | Amenities | ADA Accessible | Standard Occupancy | Maximum Occupancy | Base Price | Extra Person |
|---|---|---|---|---|---|---|---|
| 201 | Double | Microwave | No | 2 | 4 | $199.99 | $10 |
| 201 | Double | Jacuzzi | No | 2 | 4 | $199.99 | $10 |

| GuestID | Name | Address | City | State | Zip | Phone |
|---|---|---|---|---|---|---|
| 1 | Mack Simmer | 379 Old Shore Street | Council Bluffs | IA | 51501 | (291) 553-0508 |

| ReservationID | Room Number | Name | Adults | Children | Start Date | End Date | Total Room Cost |
|---|---|---|---|---|---|---|---|
| 1 | 308 | Mack Simmer | 1 | 0 | 2/2/2023 | 2/4/2023 | $299.98 |

## Second Normal Form (2NF)

In academic terms, a table is in 2NF if and only if it is in 1NF and every non-primary-key column is functionally dependent on the entire primary key but not functionally dependent on any proper subset of the primary key.

In plain English, you must already be in 1NF and then all of the columns except the primary key need to be strictly related to each other. Additionally, we should not repeat data across rows.

- **Room**

  Room has ***One-to-Many relationship*** with Type, Amenity, Occupancy, BasePrice, and ExtraPersonPrice

| RoomNumber | *TypeID* | *AmenityID* | ADA Accessible | *OccupancyID* | *BasePriceID* | *ExtraPersonPriceID* |
|---|---|---|---|---|---|---|
| 201 | 2 | 5 | No | 2 | 3 | 1 |
| 202 | 2 | 3 | Yes | 2 | 2 | 1 |

| AmenityID | AmenityName |
|---|---|
| 1 | Microwave |
| 2 | Jacuzzi |
| 3 | Refrigerator |
| 4 | Oven |
| 5 | Microwave, Jacuzzi |
| 6 | Microwave, Refrigerator |
| 7 | Microwave, Jacuzzi, Refrigerator |
| 8 | Microwave, Refrigerator, Oven |

| TypeID | Type |
|---|---|
| 1 | Single |
| 2 | Double |
| 3 | Suite |

| OccupancyID | StandardOccupancy | MaximumOccupancy |
|---|---|---|
| 1 | 2 | 2 |
| 2 | 2 | 4 |
| 3 | 3 | 8 |

| BasePriceID | Price |
|---|---|
| 1 | $149 |
| 2 | $174.99 |
| 3 | $199.99 |
| 4 | $399.99 |

| ExtraPersonPriceID | Price |
|---|---|
| 1 | $10 |
| 2 | $20 |

- Guest (I didn't make another table with City, State, and Zip bc there are 41,683 zip codes in USA and I don't think it is worth it to store that big fixed-size table yet, maybe later when there are many traffic - clients)

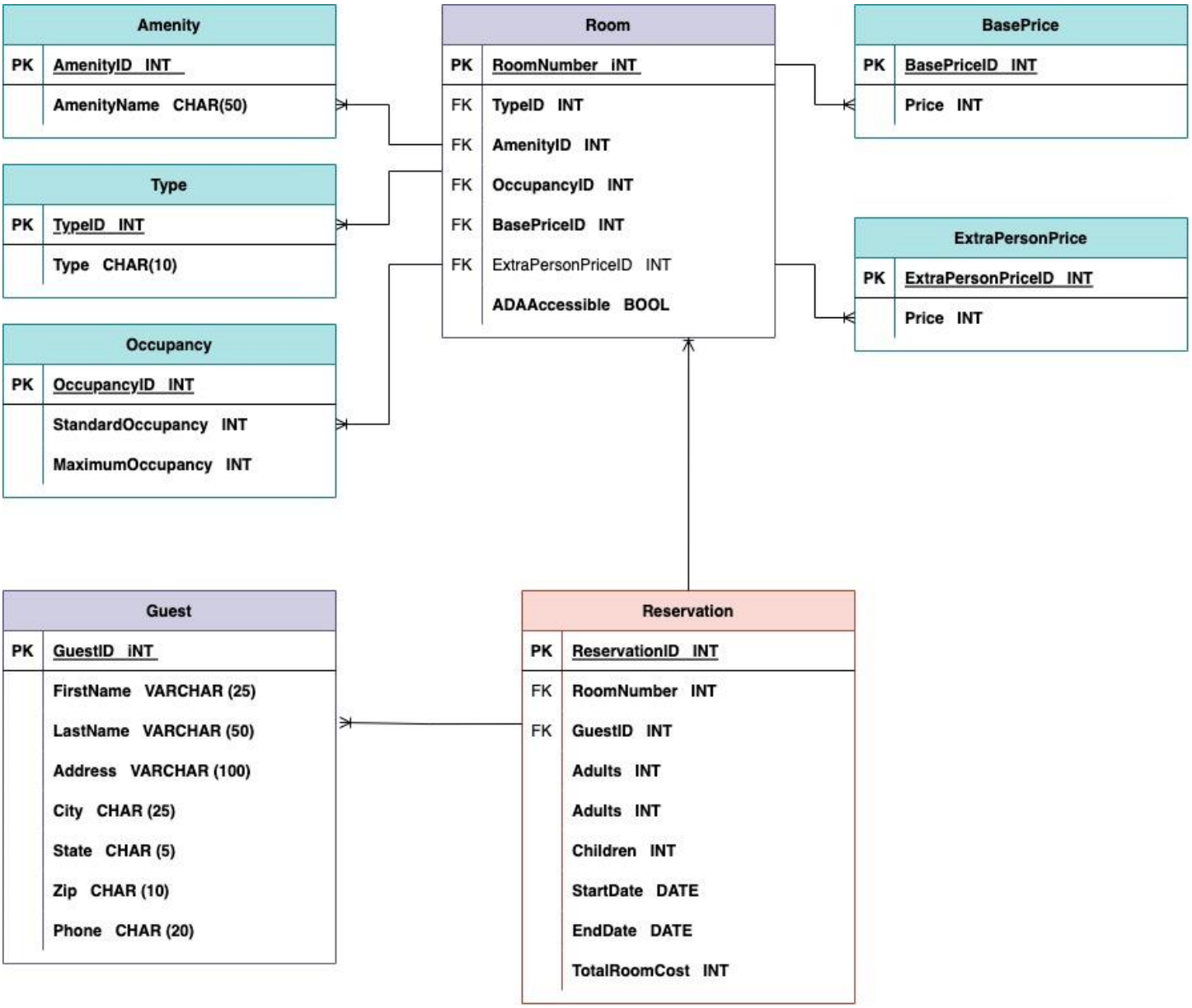
| GuestID | FirstName | LastName | Address | City | State | Zip | Phone |
|---|---|---|---|---|---|---|---|
| 1 | Mack | Simmer | 379 Old Shore Street | Council Bluffs | IA | 51501 | (291) 553-0508 |
| 2 | Bettyann | Seery | 750 Wintergreen Dr. | Wasilla | AK | 99654 | (478) 277-9632 |

- Reservation

  Reservation has ***Many-to-Many (One-to-Many?)*** relationship with Guest and Room

| ReservationID | *RoomNumber* | *GuestID* | Adults | Children | Start Date | End Date | Total Room Cost |
|---|---|---|---|---|---|---|---|
| 1 | 308 | 1 | 1 | 0 | 2/2/2023 | 2/4/2023 | $299.98 |
| 2 | 203 | 2 | 2 | 1 | 2/5/2023 | 2/10/2023 | $999.95 |

- Bridge Table (Many-to-Many)
  - ReservationRoom
  - ReservationGuest


Amenity
PK AmenityID INT
AmenityName CHAR(50)
Room
PK RoomNumber INT
FK TypeID INT
FK AmenityID INT
FK OccupancyID INT
FK BasePriceID INT
FK ExtraPersonPriceID INT
ADAAccessible BOOL
BasePrice
PK BasePriceID INT
Price INT
Type
PK TypeID INT
Type CHAR(10)
ExtraPersonPrice
PK ExtraPersonPriceID INT
Price INT
Occupancy
PK OccupancyID INT
StandardOccupancy INT
MaximumOccupancy INT
Guest
PK GuestID INT
FirstName VARCHAR (25)
LastName VARCHAR (50)
Address VARCHAR (100)
City CHAR (25)
State CHAR (5)
Zip CHAR (10)
Phone CHAR (20)
Reservation
PK ReservationID INT
FK RoomNumber INT
FK GuestID INT
Adults INT
Adults INT
Children INT
StartDate DATE
EndDate DATE
TotalRoomCost INT


Amenity
PK AmenityID INT
AmenityName CHAR(50)
FK RoomNumber INT
Type
PK TypeID INT
Type CHAR(10)
FK RoomNumber INT
Occupancy
PK OccupancyID INT
StandardOccupancy INT
MaximumOccupancy INT
FK RoomNumber INT
BasePrice
PK BasePriceID INT
Price INT
FK RoomNumber INT
ExtraPersonPrice
PK ExtraPersonPriceID INT
Price INT NULL
FK RoomNumber INT
Room
PK RoomNumber INT
ADAAccessible BOOL
ReservationRoom
PK, FK ReservationID INT
PK, FK RoomNumber INT
Reservation
PK ReservationID INT
Adults INT
Adults INT
Children INT
StartDate DATE
EndDate DATE
TotalRoomCost INT
ReservationGuest
PK, FK ReservationID INT
PK, FK GuestID INT
Guest
PK GuestID INT
FirstName VARCHAR (25)
LastName VARCHAR (50)
Address VARCHAR (100)
City CHAR (25)
State CHAR (5)
Zip CHAR (10)
Phone CHAR (20)