KUTAISI INTERNATIONAL UNIVERSITY

Midterm task 2
Fundamentals of Databases 1
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1. Two candidate keys:
   - {BookingID, RoomID}
   - {ArrivalDate, RoomID}
2. Functional dependencies
   - {RoomID} → {roomPrice}
   - {GuestID} → {GuestName}
   - {BookingID} → {ArrivalDate, Nights, GuestID, GuestName}
   - {BookingID, RoomID} → {RoomID}
   - {ArrivalDate, RoomID} → {BookingID}
3. Currently, the relation is not even in the 1NF, since it doesn't have a primary key. We can select one of the candidate keys (the one we deem most useful) as the PK. I'll choose {BookingID, RoomID}, since its the most descriptive logically.

   The relation now would look like this:

   - Stay: {[BookingID, ArrivalDate, Nights, RoomID, roomPrice, GuestID, GuestName]}

   Now we move onto the 2nd normal form. We need to eliminate all partial dependencies on the candidate keys. Those include:

   - {RoomID} → {roomPrice}
   - {BookingID} → {ArrivalDate, Nights, GuestID, GuestName}

   I would extract the relations in such a way:

   - Stay: {[BookingID (FK), RoomID (FK)]}
   - Booking: {[BookingID, ArrivalDate, GuestID, GuestName]}
   - Room: {[RoomID, roomPrice]}

   Now, we move onto the 3rd normal form by eliminating all transitive dependencies on the keys. That's just:

   - {GuestID} → {GuestName}

   So we get:

   - Stay: {[BookingID (FK), RoomID (FK)]}
   - Booking: {[BookingID, ArrivalDate, GuestID (FK)]}
   - Guest: {[GuestID, GuestName]}
   - Room: {[RoomID, roomPrice]}

   Now, we can see that the table no longer needs any decomposition, since it's already in BCNF — every attribute is dependenty only on the candidate keys.

   The resulting tables will look like this:

BookingID (FK)	RoomID (FK)
2021-001	3
2021-002	11
2021-002	21
2021-002	30
2021-003	30
2021-003	11
2021-004	3

BookingID	ArrivalDate	GuestID (FK)
2021-001	2024-01-06	1
2021-002	2024-01-06	2
2021-003	2024-01-07	3
2021-004	2024-01-07	3

GuestID	GuestName
1	Miller
2	Summer
3	Mais

RoomID	roomPrice
3	65.00
11	65.00
21	65.00
30	35.00