

Assignment 3 - Tuple Calculus

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1. 5.12 problems

b) List all single rooms with a price below £20 per night.

- $\{ R \mid \text{Room}(R) \wedge R.\text{price} < 20 \}$

c) List the names and cities of all guests.

- $\{ G.\text{guestName}, H.\text{city} \mid \text{Hotel}(H) \wedge (\exists R)(\exists G)(\text{Room}(R) \wedge \text{Guest}(G) \wedge H.\text{hotelNo} = R.\text{hotelNo} \wedge G.\text{guestNo} = R.\text{guestNo}) \}$

e) List all guests currently staying at the Grosvenor Hotel.

- $\{ G.\text{guestName} \mid \text{Guest}(G) \wedge (\exists H)(\exists B)(\text{Hotel}(H) \wedge \text{Booking}(B) \wedge B.\text{guestNo} = G.\text{guestNo} \wedge H.\text{hotelNo} = B.\text{hotelNo} \wedge B.\text{dateFrom} < "15-SEP-2020" \wedge B.\text{dateTo} > "15-SEP-2020" \wedge H.\text{hotelName} = "Grosvenor") \}$

g) List the guest details (guestNo, guestName, and guestAddress) of all guests staying at the Grosvenor Hotel.

- $\{ G.\text{guestNo}, G.\text{guestName}, G.\text{guestAddress} \mid \text{Guest}(G) \wedge (\exists H)(\exists B)(\text{Hotel}(H) \wedge \text{Booking}(B) \wedge B.\text{guestNo} = G.\text{guestNo} \wedge H.\text{hotelNo} = B.\text{hotelNo} \wedge H.\text{hotelName} = "Grosvenor") \}$

2. More queries

a) Get a listing of the names of hotels that have a hotel in Cambridge.

- $\{ H.\text{hotelName} \mid \text{Hotel}(H) \wedge H.\text{city} = "Cambridge" \}$

b) Get a listing of the names of hotels that do *not* have a hotel in Cambridge.

- $\{ H.\text{hotelName} \mid \text{Hotel}(H) \wedge H.\text{city} \neq "Cambridge" \}$

c) Get a listing of the guest numbers of guests who have had a booking with every hotel in Stratford.

- $\{ B.\text{guestNo} \mid \text{Booking}(B) \wedge (\exists H)(\text{Hotel}(H) \wedge B.\text{hotelNo} = H.\text{hotelNo} \wedge H.\text{hotelName} = "Stratford") \}$

3. 5.10 problems

a) Lists all hotel names where the hotel is in the city London

b) Lists all hotel names that have a room with a price greater than £50

c) Lists all hotel names which have had a guest named "John Smith"

4. 5.9 problems (tuple equivalents)

a) $\{ R.\text{hotelNo} \mid \text{Room}(R) \wedge R.\text{price} > 50 \}$

b) $\{ T \mid (\exists R)(\exists H)(\text{Hotel}(H) \wedge \text{Room}(R) \wedge T.\text{hotelNo} = R.\text{hotelNo} \wedge T.\text{hotelName} = H.\text{hotelname} \wedge T.\text{city} = H.\text{city} \wedge T.\text{roomNo} = R.\text{roomNo} \wedge T.\text{type} = R.\text{type} \wedge T.\text{price} = H.\text{price} \wedge H.\text{hotelNo} = R.\text{hotelNo}) \}$

c) $\{ H.\text{hotelName} \mid \text{Hotel}(H) \wedge (\exists R)(\text{Room}(R) \wedge H.\text{hotelNo} = R.\text{hotelNo} \wedge R.\text{price} > 50) \}$

f) $\{ T.\text{hotelName}, T.\text{hotelNo} \mid T \wedge (\exists B)(\exists G)(\exists H)(\text{Booking}(B) \wedge \text{Guest}(G) \wedge \text{Hotel}(H) \wedge T.\text{hotelNo} = B.\text{hotelNo} \wedge T.\text{guestNo} = B.\text{guestNo} \wedge T.\text{dateFrom} = B.\text{dateFrom} \wedge T.\text{dateTo} = B.\text{dateTo} \wedge T.\text{roomNo} = B.\text{roomNo} \wedge B.\text{guestNo} = G.\text{guestNo} \wedge T.\text{hotelName} = H.\text{hotelName} \wedge (T.\text{hotelNo} = H.\text{hotelNo} \rightarrow H.\text{city} \neq \text{"london"})) \}$