Normalisation

i) Tours which are available at a given port

UNF

PORT (port_code, port_name, country_code, country_name, (port_temp_month, port_temp_average_high, port_temp_average_low), (tour_number, tour_name, tour_description, tour_hours_required, tour_cost_per_person, tour_wheel_chair_access, tour_availability, tour_start_time))

1NF

PORT (<u>port_code</u>, port_name, country_code, country_name)

PORT_TEMP (<u>port_temp_month</u>, <u>port_code</u>, port_temp_average_high, port_temp_average_low)

PORT_AVAILABLE_TOUR (<u>tour_number</u>, <u>port_code</u>, tour_name, tour_description, tour_hours_required, tour_cost_per_person, tour_wheel_chair_access, tour_availability, tour_start_time)

Candidate keys

For PORT

- (port_code)

For PORT_TEMP

- (temp_month, port_code)

For PORT_AVAILABLE_TOUR

- (tour_number, port_code)
- (port_code, tour_name)

Partial dependencies:

For PORT

- No partial dependencies present

For PORT_TEMP

- No partial dependencies present

For PORT_AVAILABLE_TOUR

- No partial dependencies present

Normalisation

2NF

PORT (port_code, port_name, country_code, country_name)

PORT_TEMP (port_temp_month, port_code, port_temp_average_high, port_temp_average_low)

PORT_AVAILABLE_TOUR (tour_number, port_code, tour_name, tour_description, tour_hours_required, tour_cost_per_person, tour_wheel_chair_access, tour_availability, tour_start_time)

Transitive dependencies:

For PORT

- country_code -> country_name

For PORT_TEMP

- No transitive dependencies present

For PORT_AVAILABLE_TOUR

- No transitive dependencies present

3NF

PORT (port_code, port_name, country_code)

PORT_TEMP (port_temp_month, port_code, port_temp_average_high, port_temp_average_low)

PORT_AVAILABLE_TOUR (tour_number, port_code, tour_name, tour_description, tour_hours_required, tour_cost_per_person, tour_wheel_chair_access, tour_availability, tour_start_time)

COUNTRY (country_code, country_name)

Full Dependency

port_code -> port_name, coutry_code

port_temp_month, port_code -> port_temp_average_high, port_temp_average_low

tour_number, port_code -> tour_name, tour_description, tour_hours_required, tour_cost_per_person, tour_wheel_chair_access, tour_availability, tour_start_time

country_code -> country_name

Normalisation

ii) Participants for a particular tour instance

UNF

TOUR (port_code, tour_number, tour_name, tour_date, tour_start_time, (passenger_id, passenger_name, passenger_spoken_language, cruise_id, cruise_name, payment_received))

1NF

TOUR (<u>port_code</u>, <u>tour_number</u>, <u>tour_date</u>, tour_name, tour_start_time)

TOUR_PARTICIPANT (<u>passenger_id</u>, <u>port_code</u>, <u>tour_number</u>, <u>tour_date</u>, cruise_id, passenger_name, passenger_spoken_language, cruise_name, payment_received)

Candidate keys

For TOUR

- (port_code, tour_number, tour_date)

For TOUR_PARTICIPANT

- (<u>passenger_id</u>, <u>port_code</u>, <u>tour_number</u>, <u>tour_date</u>)

Partial dependencies:

For TOUR

- No partial dependencies present

For TOUR_PARTICIPANT

- passenger_id -> passenger_name, passenger_spoken_language

Normalisation

2NF

TOUR (port_code, tour_number, tour_date, tour_name, tour_start_time)

TOUR_PARTICIPANT (passenger_id, port_code, tour_number, tour_date, cruise_id, cruise_name, payment_received)

PASSENGER (passenger_id, passenger_name, passenger_spoken_language)

Transitive dependencies:

For TOUR

- No transitive dependencies present

For TOUR_PARTICIPANT

- cruise_id -> cruise_name

For PASSENGER

- No transitive dependencies present

3NF

TOUR (port_code, tour_number, tour_date, tour_name, tour_start_time)

TOUR_PARTICIPANT (passenger_id, port_code, tour_number, tour_date, cruise_id, payment_received)

PASSENGER (passenger_id, passenger_name, passenger_spoken_language)

CRUISE (cruise_id, cruise_name)

Full Dependency

port_code, tour_number, tour_date -> tour_name, tour_start_time

passenger_id, port_code, tour_number, tour_date -> cruise_id, payment_received

passenger_id -> passenger_name, passenger_spoken_language

cruise_id -> cruise_name

Normalisation

Collected 3NF Relations

1. PORT (port_code, port_name, country_code)
2. PORT_TEMP (port_temp_month, port_code, port_temp_average_high, port_temp_average_low)
3. PORT_AVAILABLE_TOUR (tour_number, port_code, tour_name, tour_description, tour_hours_required, tour_cost_per_person, tour_wheel_chair_access, tour_availability, tour_start_time)
4. COUNTRY (country_code, country_name)
5. TOUR (port_code, tour_number, tour_date, tour_name, tour_start_time)
6. TOUR_PARTICIPANT (passenger_id, port_code, tour_number, tour_date, cruise_id, payment_received)
7. PASSENGER (passenger_id, passenger_name, passenger_spoken_language)
8. CRUISE (cruise_id, cruise_name)

Attribute Synthesis

1.

PORT (port_code, port_name, country_code)

2.

PORT_TEMP (port_temp_month, port_code, port_temp_average_high, port_temp_average_low)

3. and 5.

PORT_AVAILABLE_TOUR (tour_number, port_code, tour_name, tour_description, tour_hours_required, tour_cost_per_person, tour_wheel_chair_access, tour_availability, tour_start_time)

TOUR (port_code, tour_number, tour_date, tour_name, tour_start_time)

Even though both relations do not have exactly the same key, they both represent the same entity. We could combine them as we would want to store **tour_datetime** as a single attribute (composite of **tour_date** and **tour_start_time**) as we would also be storing datetime as a single attribute in our logical model

Combined Relation
TOUR(port_code, tour_number, tour_datetime, tour_name, tour_description, tour_hours_required, tour_cost_per_person, tour_wheel_chair_access, tour_availability)

Normalisation

4.

COUNTRY (country_code, country_name)

6.

TOUR_PARTICIPANT (passenger_id, port_code, tour_number, tour_date, cruise_id, payment_received)

Change the attribute name “payment_received” to “tour_participant_paid”
Change the attribute name “tour_date” to “tour_datetime” as it is a foreign key from PORT_TOUR

TOUR_PARTICIPANT (passenger_id, port_code, tour_number, tour_datetime, cruise_id, tour_participant_paid)

7.

PASSENGER (passenger_id, passenger_name, passenger_spoken_language)

8.

CRUISE (cruise_id, cruise_name)