G011

Normalization

(i) Paris Arrow Transport Vehicle Assets

UNF

VEHICLE(v_id, v_registrationplate, m_vehiclemake, m_vehiclemodel, v_manufacture_year, v_odometerreading, v_nopassengers, (f_features))

1NF

VEHICLE(v_id, v_registrationplate, m_vehiclemake, m_vehiclemodel, v_manufacture_year, v_odometerreading, v_nopassengers)

Candidate keys: v_id
v_registrationplate
No partial dependencies present

FEATURE(v_id, f_features)

Candidate keys: v_id

No partial dependencies present

2NF

VEHICLE(v_id, v_registrationplate, m_vehiclemake, m_vehiclemodel, v_manufacture_year, v_odometerreading, v_nopassengers)

Transitive dependencies:
m_vehiclemodel → m_vehiclemake
FEATURE(v_id, f_features)

No transitive dependencies present
3NF

VEHICLE(v_id, v_registrationplate, m_vehiclemodel, v_manufacture_year, v_odometerreading, v_nopassengers)

MANUFACTURER(m_vehiclemodel, m_vehiclemake)

FEATURE(v_id, f_features)

Full dependencies:
v_id → v_registrationplate, m_vehiclemodel, v_manufacture_year, v_odometerreading, v_nopassengers
m_vehiclemodel → m_vehiclemake
v_id → f_features

(ii) Paris Arrow Transit Driver Job Sheet

UNF

TRIP(t_id, v_id, v_registrationplate, d_id, d_name, o_id, o_name, t_passengernum, pickup_location_id, pickup_location_name, pickup_location_type, pickup_location_address, t_intended_pickup_time, t_actual_pickup_time, dropoff_location_id, dropoff_location_name, dropoff_location_type, dropoff_location_address, t_intended_dropoff_time, t_actual_dropoff_time)

1NF

TRIP(t_id, v_id, v_registrationplate, d_id, d_name, o_id, o_name, t_passengernum, pickup_location_id, pickup_location_name, pickup_location_type, pickup_location_address, t_intended_pickup_time, t_actual_pickup_time, dropoff_location_id, dropoff_location_name, dropoff_location_type, dropoff_location_address, t_intended_dropoff_time, t_actual_dropoff_time)

Candidate keys: t_id
v_id, t_intended_pickup_time
v_registrationplate, t_intended_pickup_time

No partial dependencies present

2NF

TRIP(t_id, v_id, v_registrationplate, d_id, d_name, o_id, o_name, t_passengernum, pickup_location_id, pickup_location_name, pickup_location_type, pickup_location_address, t_intended_pickup_time, t_actual_pickup_time, dropoff_location_id, dropoff_location_name, dropoff_location_type, dropoff_location_address, t_intended_dropoff_time, t_actual_dropoff_time)

Transitive dependencies:
d_id → d_name
o_id → o_name
pickup_location_id → pickup_location_name, pickup_location_type, pickup_location_address
dropoff_location_id → dropoff_location_name, dropoff_location_type, dropoff_location_address
v_id → v_registrationplate

3NF

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DRIVER(d_id, d_name)

OFFICIAL(o_id, o_name)

PICKUP_LOCATION(pickup_location_id, pickup_location_name, pickup_location_type, pickup_location_address)

DROPOFF_LOCATION(dropoff_location_id, dropoff_location_name, dropoff_location_type, dropoff_location_address)

TRIP(t_id, v_id, d_id, o_id, t_passengernum, pickup_location_id, t_intended_pickup_time, t_actual_pickup_time, dropoff_location_id, t_intended_dropoff_time , t_actual_dropoff_time)

VEHICLE(v_id, v_registrationplate)

Full dependencies:
d_id → d_name
o_id → o_name
pickup_location_id → pickup_location_name, pickup_location_type, pickup_location_address
dropoff_location_id → dropoff_location_name, dropoff_location_type, dropoff_location_address
t_id → v_id, v_registrationplate, d_id, o_id, t_passengernum, pickup_location_id, t_intended_pickup_time, t_actual_pickup_time, dropoff_location_id, t_intended_dropoff_time, t_actual_dropoff_time
v_id → v_registrationplate

Attribute Synthesis

Combine PICKUP_LOCATION and DROPOFF_LOCATION into LOCATION(loc_id, loc_name, loc_type, loc_streetnumber, loc_streetname, loc_postalcode, loc_city) since they are identical relations.

Updated 3NF

DRIVER(d_id, d_name)

OFFICIAL(o_id, o_name)

LOCATION(loc_id, loc_name, loc_type, loc_streetnumber, loc_streetname, loc_postalcode, loc_city)

TRIP(t_id, v_id, d_id, o_id, t_passengernum, loc_id, t_intended_pickup_time, t_actual_pickup_time, t_intended_dropoff_time, t_actual_dropoff_time)

VEHICLE(v_id, v_registrationplate)

Attribute Synthesis for normalization (i) and normalization (ii)

Combine VEHICLE from normalization (i) and normalization (ii) because VEHICLE from normalization (ii) has matching attributes with VEHICLE from normalization (i) with the same primary key.

Final 3NF

DRIVER(d_id, d_name)

OFFICIAL(o_id, o_name)

LOCATION(loc_id, loc_name, loc_type, loc_streetnumber, loc_streetname, loc_postalcode, loc_city)

TRIP(t_id, v_id, d_id, o_id, t_passengernum, loc_id, t_intended_pickup_time, t_actual_pickup_time, t_intended_dropoff_time, t_actual_dropoff_time)

VEHICLE(v_id, v_registrationplate, m_vehiclemodel, v_manufacture_year, v_odometerreading, v_nopassengers

MANUFACTURER(m_vehiclemodel, m_vehiclemake)

FEATURE(v_id, f_features)