



**TAYLOR'S UWE DUAL AWARDS PROGRAMMES  
SEPTEMBER 2025 SEMESTER  
(ITS62904) DATABASE SYSTEMS  
(GROUP ASSIGNMENT- 30%)**

***based on***

**MLO3: Construct solutions, interact positively in a group of peers and foster stable and harmonious relationships in solving computational problems related to database modelling and SQL based reporting of a selected scenario.**

**DUE DATE:17/12/2025, 11.59 pm (Midnight)**

**STUDENT DECLARATION:**

1. I confirm that I am aware of the University's Regulation Governing Cheating in a University Test and Assignment and of the guidance issued by the School of Computer Science (SCS) concerning plagiarism and proper academic practice, and that the assessed work now submitted is in accordance with this regulation and guidance.
2. I understand that, unless already agreed with the School of Computer Science (SCS), assessed work may not be submitted that has previously been submitted, either in whole or in part, at this or any other institution.
3. I recognise that should evidence emerge that my work fails to comply with either of the above declarations, then I may be liable to proceedings under Regulation.

**GROUP NO. 8**

No	Student Name	Student ID	Date	Signature	Contribution Details	Score
1	TAN JING HONG	0378974	15/12/2025	<i>Hong</i>	Contribute in all parts	
2	CHANG HUI YII	0375028	15/12/2025	<i>Hui Yii</i>	Contribute in all parts	
3	TAN PEI XI	0378644	15/12/2025	<i>Pei Xi</i>	Contribute in all parts	
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5	-					
6	-					

**Important Notes:**

**Note 1:** Copying, cheating, attempts to cheat, plagiarism, collusion and any other attempts to gain an unfair advantage in assessment result in to award 0 marks to all parties concerned.

**Note 2:** The Turnitin similarity for this module is **20% overall** and lesser than **5% from a single source** excluding program source codes.

**Note 3:** All the submitted documents will be cross-checked with other students' reports in this current and previous semesters. Therefore, any similarities rather than whatever is highlighted in Note 2, will be considered as violating assessment rules and a Zero (0) mark will be given to all group members.

**Note 4:** Severe disciplinary action will be taken against those caught violating assessment rules such as colluding, plagiarizing or transcribing.

**Note 5:** The assignment submission document should be within 10 - 30 pages in total with a spacing of 1.5 and a font of 12pt Times New Roman.

**Note 6:** While making use of AI tools, below instructions must be followed

- a. The AI tool must be cited properly.
- b. The output of the AI tool must be interpreted and attached with the declaration form.
- c. The signed declaration form must be submitted along with other documents.
- d. Student needs to present the report in report in class, defend the answers, and provide required justifications if needed.

**0 mark and barring from sitting final examination may be implemented for those who do not submit any assignments.**

**Instructions:**

**This is a Group assignment.** It will be assessed over 100 marks and is worth 30% of the final marks for this module. Marks will typically be awarded on the basis of the following broad criteria, although other constructive factors will be taken into account:

- ✓ You are allowed to make references and records all referenced being used for completion of the assignment.
- ✓ You should be able to explain the references made for your answer in detail.
- ✓ You can download and use Visual Paradigm/draw.io to draw the ER- model.
- ✓ Using at least one of the tools “MYSQL server” or “phpMyAdmin” or “Oracle Database” or “MySQL Workbench” is required for database development.
- ✓ Fulfilment of requirements (i.e. No error, if your code does not compile, your mark will be capped at 60%)
- ✓ Correctness of logic and use of appropriate sequel scripting technique.
- ✓ Correct results/output - example output database, tables, relationship and data stored.
- ✓ The cover page of the assignment should be included.

- ✓ Scripting style:
  - Adherence to MySQL/HeidiSQL/TOAD naming convention and program readability
  - Choice of attributes names and column naming has to adhere to MySQL Documentation.

#### **Submission:**

It should be made electronically to the assignment submission section through your TIMeS account. If there appears to be any problem at all with your submission, it is your responsibility to inform your lecturer immediately, via email,

**Documentation: 2 separate files (Full assignment report (with the YouTube link) & SQL File)**

**File name : Group Name ( only one submission per group)**

**Example : Group 13.docx, Group 13.sql**

#### **Attachments to be included with the report:**

1. Cover page (*Uploaded in MyTimes*)
2. Marking rubrics+ Marksheets (*Uploaded in MyTimes*)
3. Assessment submission declaration form (*Uploaded in MyTimes*)

**NOTE: The group that doesn't attach the above with the report will be deducted 10 marks from the total marks scored.**

**Note: Late submission will be capped at 60 %**

#### **Academic Impropriety:**

Submitting the course work means you have agreed that your work is original and comply with the rules and regulations of Academic Impropriety.

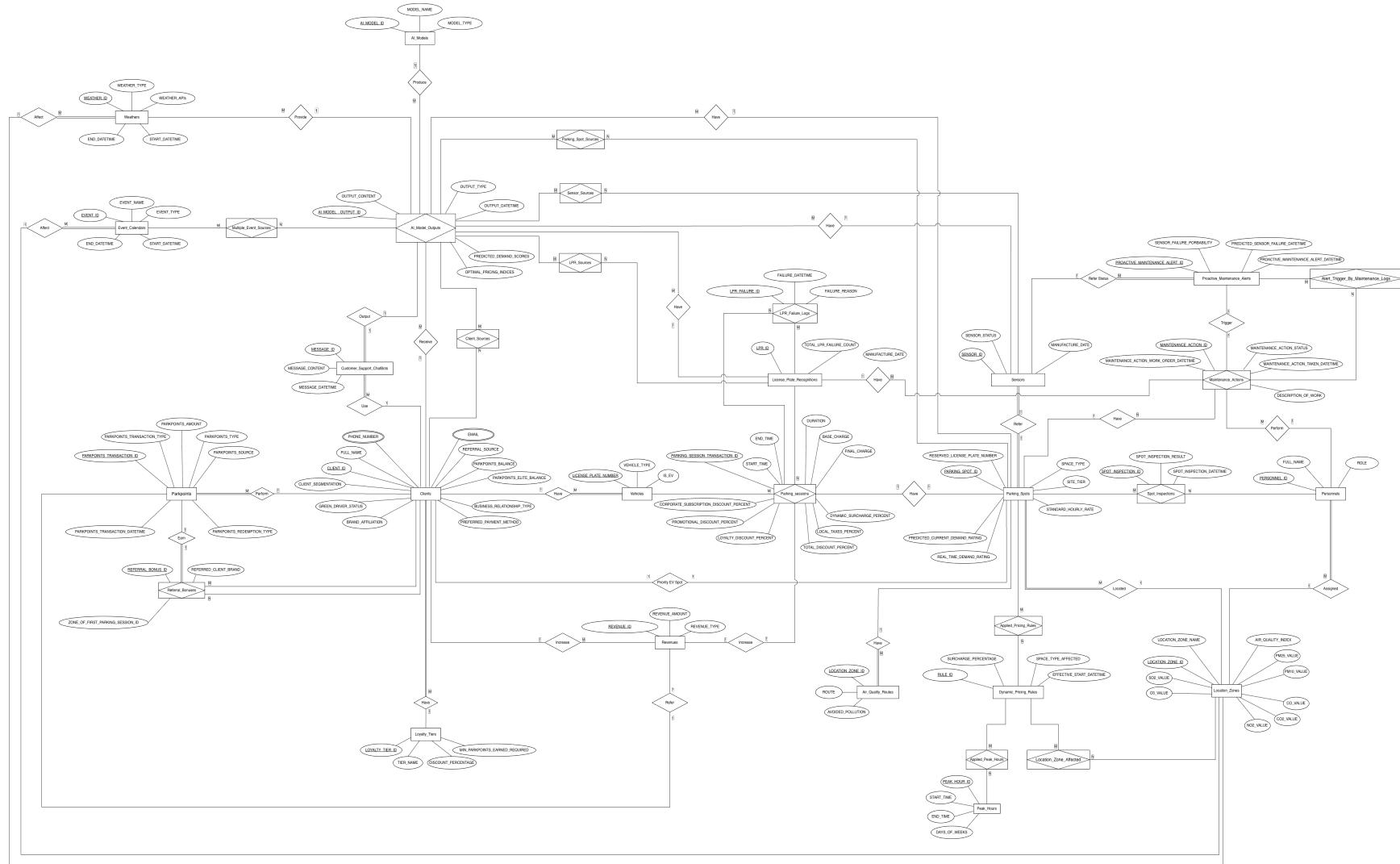
**Note: Copying, cheating, attempts to cheat, plagiarism, collusion and any other attempts to gain an unfair advantage in assessment, result in awarding 0 marks to all parties concerned.**

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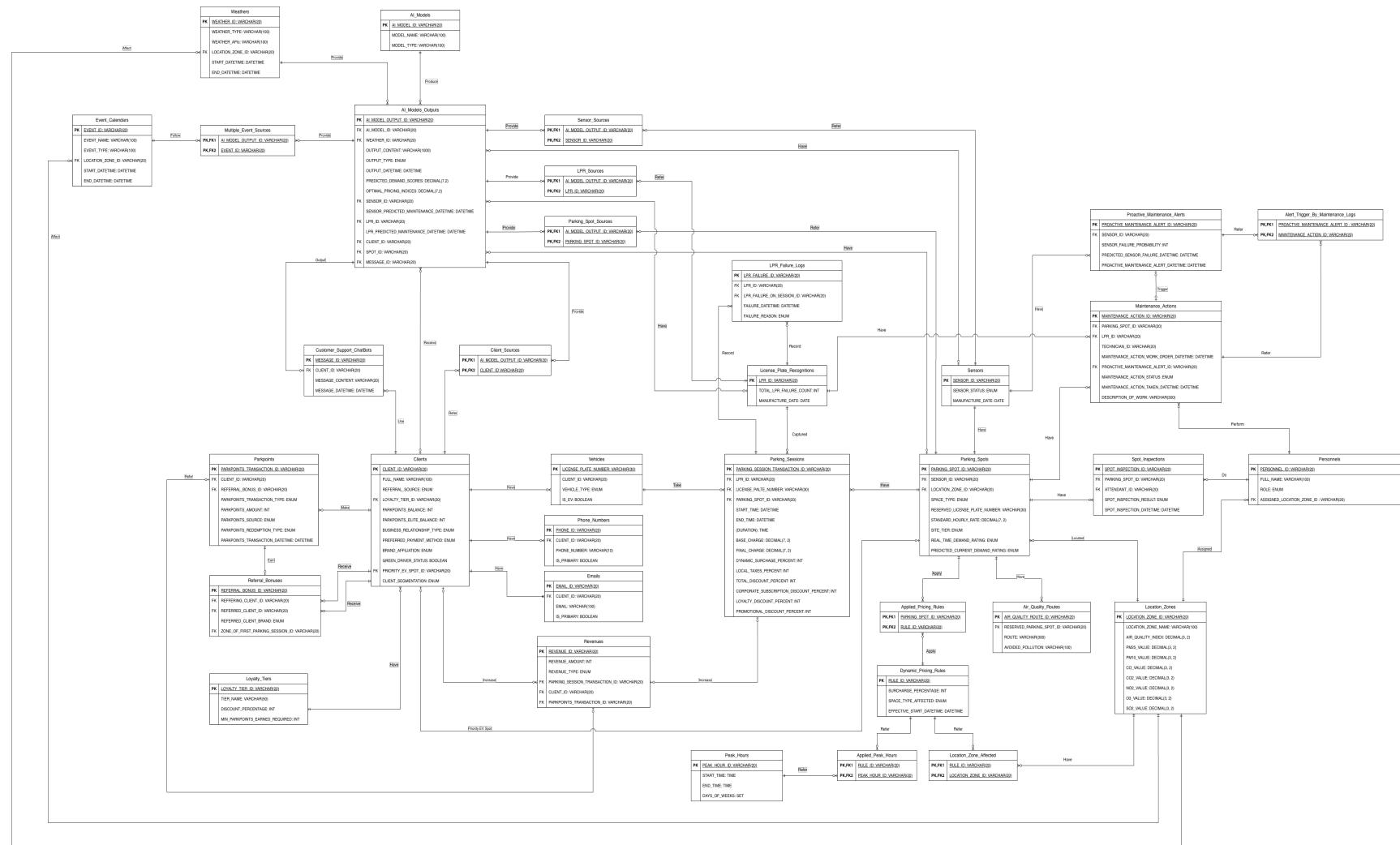
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### A. Design

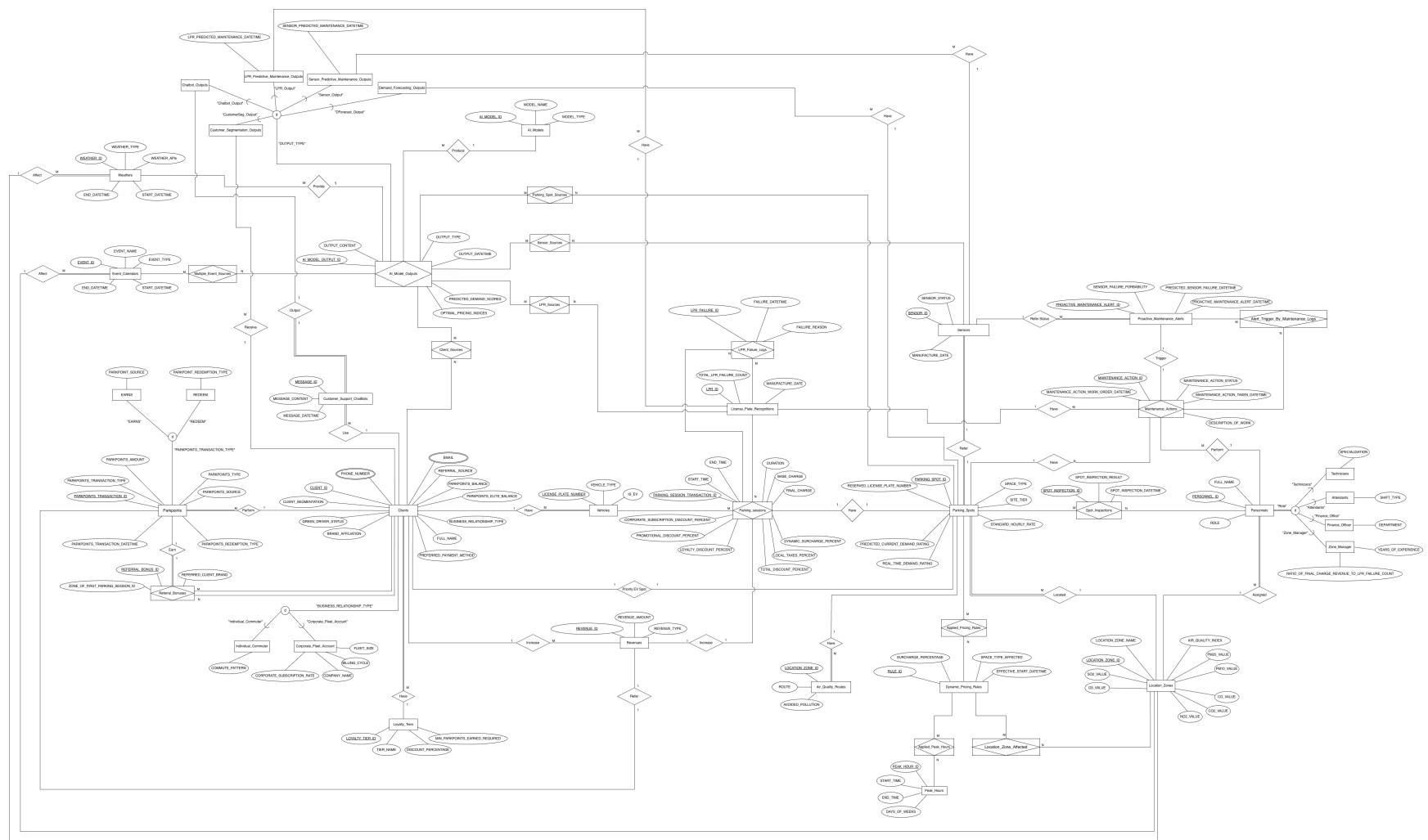
## Entity-Relationship Diagram (ERD)



## Physical Model



## Enhanced Entity-Relationship Diagram (EER)



**Kindly refer to the draw.io link below to review all diagrams in Part A clearly. Please note that the link is shortened URL redirected via one of the members' GitHub as the original draw.io link was excessive long.**

**<https://hhong214.github.io/DBMS-Link/>**

## B. Deployment

The database below implements the EER model designed in Part A.

```
DROP DATABASE IF EXISTS kl_park_easy;
CREATE DATABASE kl_park_easy;
USE kl_park_easy;
```

✓ 122 21:04:33	DROP DATABASE IF EXISTS kl_park_easy	49 row(s) affected	0.093 sec
✓ 123 21:04:33	CREATE DATABASE kl_park_easy	1 row(s) affected	0.00083 sec
✓ 124 21:04:33	USE kl_park_easy	0 row(s) affected	0.00015 sec

```
CREATE TABLE loyalty_tiers(
    loyalty_tier_id VARCHAR(20) NOT NULL,
    tier_name VARCHAR(50) NOT NULL,
    discount_percentage INT NOT NULL,
    min_parkpoints_earned_required INT NOT NULL,
    PRIMARY KEY(loyalty_tier_id)
);

CREATE TABLE sensors(
    sensor_id VARCHAR(20) NOT NULL,
    sensor_status ENUM('operational', 'need_calibration', 'offline') NOT NULL,
    manufacture_date DATE NOT NULL,
    PRIMARY KEY(sensor_id)
);

CREATE TABLE location_zones(
    location_zone_id VARCHAR(20) NOT NULL,
    location_zone_name VARCHAR(100) NOT NULL,
    air_quality_index DECIMAL(5,2) NULL DEFAULT NULL,
    pm25_value DECIMAL(5,2) NULL DEFAULT NULL,
    pm10_value DECIMAL(5,2) NULL DEFAULT NULL,
    co_value DECIMAL(5,2) NULL DEFAULT NULL,
    co2_value DECIMAL(5,2) NULL DEFAULT NULL,
    no2_value DECIMAL(5,2) NULL DEFAULT NULL,
    o3_value DECIMAL(5,2) NULL DEFAULT NULL,
    so2_value DECIMAL(5,2) NULL DEFAULT NULL,
    PRIMARY KEY(location_zone_id)
);

CREATE TABLE parking_spots(
    parking_spot_id VARCHAR(20) NOT NULL,
    sensor_id VARCHAR(20) NOT NULL,
    location_zone_id VARCHAR(20) NOT NULL,
```

```

    space_type ENUM('standard', 'premium_covered', 'ev_charger', 'motorbike',
'reserved') NOT NULL,
    reserved_license_plate_number VARCHAR(30) NULL DEFAULT NULL,
    standard_hourly_rate DECIMAL(7,2) NOT NULL,
    site_tier ENUM('tier_1','tier_2','tier_3') NOT NULL,
    real_time_demand_rating ENUM('low','moderate','high') NOT NULL,
    predicted_current_demand_rating ENUM('low','moderate','high') NULL DEFAULT
NULL,
    PRIMARY KEY(parking_spot_id),
    UNIQUE(sensor_id),
    FOREIGN KEY(sensor_id) REFERENCES sensors(sensor_id),
    FOREIGN KEY(location_zone_id) REFERENCES location_zones(location_zone_id)
);

CREATE TABLE clients(
    client_id VARCHAR(20) NOT NULL,
    full_name VARCHAR(100) NOT NULL,
    referral_source ENUM('google_ad', 'social_media') NULL DEFAULT NULL,
    loyalty_tier_id VARCHAR(20) NOT NULL,
    parkpoints_balance INT NOT NULL,
    parkpoints_elite_balance INT NOT NULL,
    business_relationship_type ENUM('individual_commuter',
'corporate_fleet_account') NOT NULL,
    preferred_payment_method ENUM('credit_card', 'e-wallet', 'blockchain_token')
NULL DEFAULT NULL,
    brand_affiliation ENUM('pro', 'tourist', 'both') NULL DEFAULT NULL,
    green_driver_status BOOLEAN NOT NULL,
    priority_ev_spot_id VARCHAR(20) NULL DEFAULT NULL,
    client_segmentation ENUM('basic', 'regular', 'vip') NULL DEFAULT NULL,
    PRIMARY KEY(client_id),
    FOREIGN KEY(loyalty_tier_id) REFERENCES loyalty_tiers(loyalty_tier_id),
    FOREIGN KEY(priority_ev_spot_id) REFERENCES parking_spots(parking_spot_id)
);

CREATE TABLE phone_numbers(
    phone_id INT NOT NULL AUTO_INCREMENT,
    client_id VARCHAR(20) NOT NULL,
    phone_number VARCHAR(10) NOT NULL,
    is_primary BOOLEAN NOT NULL,
    PRIMARY KEY(phone_id),
    FOREIGN KEY(client_id) REFERENCES clients(client_id)
);

```

```

CREATE TABLE emails(
    email_id INT NOT NULL AUTO_INCREMENT,
    client_id VARCHAR(20) NOT NULL,
    email VARCHAR(100) NOT NULL,
    is_primary BOOLEAN NOT NULL,
    PRIMARY KEY(email_id),
    FOREIGN KEY(client_id) REFERENCES clients(client_id)
);

CREATE TABLE individual_commuter(
    client_id VARCHAR(20) NOT NULL,
    commute_pattern ENUM('weekday_peak', 'weekday_offpeak', 'weekday_evening',
    'weekend_shopper', 'mixed_schedule', 'flexible_remote', 'early_bird',
    'evening_leisure') NOT NULL,
    PRIMARY KEY(client_id),
    FOREIGN KEY(client_id) REFERENCES clients(client_id)
);

CREATE TABLE corporate_fleet_account(
    client_id VARCHAR(20) NOT NULL,
    company_name VARCHAR(100) NOT NULL,
    fleet_size INT NOT NULL,
    corporate_subscription_rate DECIMAL(10,2) NOT NULL,
    billing_cycle ENUM('monthly', 'quarterly', 'annually') NOT NULL,
    PRIMARY KEY(client_id),
    FOREIGN KEY(client_id) REFERENCES clients(client_id)
);

CREATE TABLE referral_bonuses(
    referral_bonus_id VARCHAR(20) NOT NULL,
    referring_client_id VARCHAR(20) NOT NULL,
    referred_client_id VARCHAR(20) NOT NULL,
    referred_client_brand ENUM('pro', 'tourist', 'both') NOT NULL,
    zone_of_first_parking_session_id VARCHAR(20) NULL DEFAULT NULL,
    PRIMARY KEY(referral_bonus_id),
    FOREIGN KEY(referring_client_id) REFERENCES clients(client_id),
    FOREIGN KEY(referred_client_id) REFERENCES clients(client_id),
    FOREIGN KEY(zone_of_first_parking_session_id) REFERENCES
location_zones(location_zone_id)
);

CREATE TABLE parkpoints(
    parkpoints_transaction_id VARCHAR(20) NOT NULL,
    client_id VARCHAR(20) NOT NULL,
    referral_bonus_id VARCHAR(20) NULL DEFAULT NULL,

```

```

parkpoints_transaction_type ENUM('earn', 'redeem') NOT NULL,
parkpoints_amount INT NOT NULL,
parkpoints_type ENUM('basic', 'elite') NOT NULL,
parkpoints_transaction_datetime DATETIME NOT NULL,
PRIMARY KEY(parkpoints_transaction_id),
UNIQUE(referral_bonus_id),
FOREIGN KEY(client_id) REFERENCES clients(client_id),
FOREIGN KEY(referral_bonus_id) REFERENCES referral_bonuses(referral_bonus_id)
);

CREATE TABLE earns(
    parkpoints_transaction_id VARCHAR(20) NOT NULL,
    parkpoints_source ENUM('parking_session', 'referral_bonus',
'green_driver_bonus', 'off_peak', 'ev_charger', 'multi_vehicle') NOT NULL,
    PRIMARY KEY(parkpoints_transaction_id),
    FOREIGN KEY(parkpoints_transaction_id) REFERENCES
parkpoints(parkpoints_transaction_id)
);

CREATE TABLE redeems(
    parkpoints_transaction_id VARCHAR(20) NOT NULL,
    parkpoints_redemption_type ENUM('free_parking', 'mobile_wallet_credit',
'premium_covered_spots_discounts', 'merchandise') NOT NULL,
    PRIMARY KEY(parkpoints_transaction_id),
    FOREIGN KEY(parkpoints_transaction_id) REFERENCES
parkpoints(parkpoints_transaction_id)
);

CREATE TABLE vehicles(
    license_plate_number VARCHAR(30) NOT NULL,
    client_id VARCHAR(20) NOT NULL,
    vehicle_type ENUM('sedan', 'suv', 'motorbike', 'van', 'mpv') NULL DEFAULT
NULL,
    is_ev BOOLEAN NOT NULL,
    PRIMARY KEY(license_plate_number),
    FOREIGN KEY(client_id) REFERENCES clients(client_id)
);

CREATE TABLE dynamic_pricing_rules(
    rule_id VARCHAR(20) NOT NULL,
    surcharge_percentage INT NULL DEFAULT NULL,
    space_type_affected SET('standard', 'premium_covered', 'ev_charger',
'motorbike', 'reserved') NULL DEFAULT NULL,
    effective_start_datetime DATETIME NULL DEFAULT NULL,
    PRIMARY KEY(rule_id)
);

```

```

);

CREATE TABLE applied_pricing_rules(
    parking_spot_id VARCHAR(20) NOT NULL,
    rule_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(parking_spot_id, rule_id),
    FOREIGN KEY(parking_spot_id) REFERENCES parking_spots(parking_spot_id),
    FOREIGN KEY(rule_id) REFERENCES dynamic_pricing_rules(rule_id)
);

CREATE TABLE location_zone_affected(
    rule_id VARCHAR(20) NOT NULL,
    location_zone_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(rule_id, location_zone_id),
    FOREIGN KEY(rule_id) REFERENCES dynamic_pricing_rules(rule_id),
    FOREIGN KEY(location_zone_id) REFERENCES location_zones(location_zone_id)
);

CREATE TABLE peak_hours(
    peak_hour_id VARCHAR(20) NOT NULL,
    start_time TIME NULL DEFAULT NULL,
    end_time TIME NULL DEFAULT NULL,
    days_of_weeks SET('Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday',
'Saturday', 'Sunday') NULL DEFAULT NULL,
    PRIMARY KEY(peak_hour_id)
);

CREATE TABLE applied_peak_hours(
    rule_id VARCHAR(20) NOT NULL,
    peak_hour_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(rule_id, peak_hour_id),
    FOREIGN KEY(rule_id) REFERENCES dynamic_pricing_rules(rule_id),
    FOREIGN KEY(peak_hour_id) REFERENCES peak_hours(peak_hour_id)
);

CREATE TABLE air_quality_routes(
    air_quality_route_id VARCHAR(20) NOT NULL,
    reserved_parking_spot_id VARCHAR(20) NOT NULL,
    route VARCHAR(300) NOT NULL,
    avoided_pollution VARCHAR(100) NOT NULL,
    PRIMARY KEY(air_quality_route_id),
    UNIQUE(reserved_parking_spot_id),
    FOREIGN KEY(reserved_parking_spot_id) REFERENCES
parking_spots(parking_spot_id)
);

```

```

CREATE TABLE license_plate_recognitions(
    lpr_id VARCHAR(20) NOT NULL,
    manufacture_date DATE NOT NULL,
    PRIMARY KEY(lpr_id)
);

CREATE TABLE parking_sessions(
    parking_session_transaction_id VARCHAR(20) NOT NULL,
    lpr_id VARCHAR(20) NOT NULL,
    license_plate_number VARCHAR(30) NOT NULL,
    parking_spot_id VARCHAR(20) NOT NULL,
    start_datetime DATETIME NOT NULL,
    end_datetime DATETIME NULL DEFAULT NULL,
    base_charge DECIMAL(7,2) NULL DEFAULT NULL,
    dynamic_surcharge_percent INT NULL DEFAULT NULL,
    local_taxes_percent INT NULL DEFAULT NULL,
    total_discount_percent INT NULL DEFAULT NULL,
    corporate_subscription_discount_percent INT NULL DEFAULT NULL,
    loyalty_discount_percent INT NULL DEFAULT NULL,
    promotional_discount_percent INT NULL DEFAULT NULL,
    PRIMARY KEY(parking_session_transaction_id),
    FOREIGN KEY(lpr_id) REFERENCES license_plate_recognitions(lpr_id),
    FOREIGN KEY(license_plate_number) REFERENCES vehicles(license_plate_number),
    FOREIGN KEY(parking_spot_id) REFERENCES parking_spots(parking_spot_id)
);

CREATE TABLE lpr_failure_logs(
    lpr_failure_id VARCHAR(20) NOT NULL,
    lpr_id VARCHAR(20) NOT NULL,
    lpr_failure_on_session_id VARCHAR(20) NOT NULL,
    lpr_failure_datetime DATETIME NOT NULL,
    lpr_failure_reason ENUM('plate_not_detected', 'plate_no_entry_record',
    'low_image_quality', 'plate_number_blocked', 'other') NOT NULL,
    PRIMARY KEY(lpr_failure_id),
    FOREIGN KEY(lpr_id) REFERENCES license_plate_recognitions(lpr_id),
    FOREIGN KEY(lpr_failure_on_session_id) REFERENCES
    parking_sessions(parking_session_transaction_id)
);

CREATE TABLE revenues(
    revenue_id VARCHAR(20) NOT NULL,
    revenue_amount DECIMAL(7,2) NOT NULL,

```

```

revenue_type ENUM('parking_session', 'corporate_subscription',
'parkpoints_redemption', 'penalties_for_unauthorized_parking_in_reserved_spot')
NOT NULL,
parking_session_transaction_id VARCHAR(20) NULL DEFAULT NULL,
client_id VARCHAR(20) NULL DEFAULT NULL,
parkpoints_transaction_id VARCHAR(20) NULL DEFAULT NULL,
PRIMARY KEY(revenue_id),
UNIQUE(parking_session_transaction_id),
UNIQUE(parkpoints_transaction_id),
FOREIGN KEY(parking_session_transaction_id) REFERENCES
parking_sessions(parking_session_transaction_id),
FOREIGN KEY(client_id) REFERENCES clients(client_id),
FOREIGN KEY(parkpoints_transaction_id) REFERENCES
parkpoints(parkpoints_transaction_id)
);

CREATE TABLE personnels(
personnel_id VARCHAR(20) NOT NULL,
full_name VARCHAR(100) NOT NULL,
role ENUM('technician', 'attendant', 'finance_officer', 'zone_manager') NOT
NULL,
assigned_location_zone_id VARCHAR(20) NOT NULL,
PRIMARY KEY(personnel_id),
FOREIGN KEY(assigned_location_zone_id) REFERENCES
location_zones(location_zone_id)
);

CREATE TABLE technicians(
personnel_id VARCHAR(20) NOT NULL,
specialization VARCHAR(50) NOT NULL,
PRIMARY KEY(personnel_id),
FOREIGN KEY(personnel_id) REFERENCES personnels(personnel_id)
);

CREATE TABLE attendants(
personnel_id VARCHAR(20) NOT NULL,
shift_type VARCHAR(20) NOT NULL,
PRIMARY KEY(personnel_id),
FOREIGN KEY(personnel_id) REFERENCES personnels(personnel_id)
);

CREATE TABLE finance_officers(
personnel_id VARCHAR(20) NOT NULL,
department VARCHAR(50) NOT NULL,
PRIMARY KEY(personnel_id),

```

```

    FOREIGN KEY(personnel_id) REFERENCES personnels(personnel_id)
);

CREATE TABLE zone_managers(
    personnel_id VARCHAR(20) NOT NULL,
    years_of_experience DECIMAL(3,2) NOT NULL,
    PRIMARY KEY(personnel_id),
    FOREIGN KEY(personnel_id) REFERENCES personnels(personnel_id)
);

CREATE TABLE proactive_maintenance_alerts(
    proactive_maintenance_alert_id VARCHAR(20) NOT NULL,
    sensor_id VARCHAR(20) NOT NULL,
    sensor_failure_probability INT NOT NULL,
    predicted_sensor_failure_datetime DATETIME NOT NULL,
    proactive_maintenance_alert_datetime DATETIME NOT NULL,
    PRIMARY KEY(proactive_maintenance_alert_id),
    FOREIGN KEY(sensor_id) REFERENCES sensors(sensor_id)
);

CREATE TABLE maintenance_actions(
    maintenance_action_id VARCHAR(20) NOT NULL,
    parking_spot_id VARCHAR(20) NULL DEFAULT NULL,
    lpr_id VARCHAR(20) NULL DEFAULT NULL,
    technician_id VARCHAR(20) NOT NULL,
    maintenance_action_work_order_datetime DATETIME NOT NULL,
    proactive_maintenance_alert_id VARCHAR(20) NULL DEFAULT NULL,
    maintenance_action_status ENUM('pending', 'in_progress', 'completed',
    'cancelled') NOT NULL,
    maintenance_action_taken_datetime DATETIME NULL DEFAULT NULL,
    description_of_work VARCHAR(300) NULL DEFAULT NULL,
    PRIMARY KEY(maintenance_action_id),
    UNIQUE(proactive_maintenance_alert_id),
    FOREIGN KEY(parking_spot_id) REFERENCES parking_spots(parking_spot_id),
    FOREIGN KEY(lpr_id) REFERENCES license_plate_recognitions(lpr_id),
    FOREIGN KEY(technician_id) REFERENCES personnels(personnel_id),
    FOREIGN KEY(proactive_maintenance_alert_id) REFERENCES
proactive_maintenance_alerts(proactive_maintenance_alert_id)
);

CREATE TABLE alert_trigger_by_maintenance_logs(
    proactive_maintenance_alert_id VARCHAR(20) NOT NULL,
    maintenance_action_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(proactive_maintenance_alert_id, maintenance_action_id),

```

```

    FOREIGN KEY(proactive_maintenance_alert_id) REFERENCES
proactive_maintenance_alerts(proactive_maintenance_alert_id),
    FOREIGN KEY(maintenance_action_id) REFERENCES
maintenance_actions(maintenance_action_id)
);

CREATE TABLE spot_inspections(
    spot_inspection_id VARCHAR(20) NOT NULL,
    parking_spot_id VARCHAR(20) NOT NULL,
    attendant_id VARCHAR(20) NOT NULL,
    spot_inspection_result ENUM('pass', 'warning', 'requires_maintenance') NOT
NULL,
    spot_inspection_datetime DATETIME NOT NULL,
    PRIMARY KEY(spot_inspection_id),
    FOREIGN KEY(parking_spot_id) REFERENCES parking_spots(parking_spot_id),
    FOREIGN KEY(attendant_id) REFERENCES personnels(personnel_id)
);

CREATE TABLE ai_models(
    ai_model_id VARCHAR(20) NOT NULL,
    ai_model_name VARCHAR(100) NOT NULL,
    ai_model_type VARCHAR(100) NOT NULL,
    PRIMARY KEY(ai_model_id)
);

CREATE TABLE weathers(
    weather_id VARCHAR(20) NOT NULL,
    weather_type VARCHAR(100) NOT NULL,
    weather_APIS VARCHAR(100) NOT NULL,
    location_zone_id VARCHAR(20) NOT NULL,
    start_datetime DATETIME NOT NULL,
    end_datetime DATETIME NOT NULL,
    PRIMARY KEY(weather_id),
    FOREIGN KEY(location_zone_id) REFERENCES location_zones(location_zone_id)
);

CREATE TABLE customer_support_chatbots(
    message_id VARCHAR(20) NOT NULL,
    message_content VARCHAR(500) NOT NULL,
    message_datetime DATETIME NOT NULL,
    client_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(message_id),
    FOREIGN KEY(client_id) REFERENCES clients(client_id)
);

```

```

CREATE TABLE ai_model_outputs(
    ai_model_output_id VARCHAR(20) NOT NULL,
    ai_model_id VARCHAR(20) NOT NULL,
    weather_id VARCHAR(20) NULL DEFAULT NULL,
    output_content VARCHAR(1000) NOT NULL,
    output_type ENUM('predictive_maintenance', 'demand_forecasting',
'customer_segmentation', 'chatbot') NOT NULL,
    output_datetime DATETIME NOT NULL,
    predicted_demand_scores DECIMAL(7,2) NULL DEFAULT NULL,
    optimal_pricing_indices DECIMAL(7,2) NULL DEFAULT NULL,
    PRIMARY KEY(ai_model_output_id),
    FOREIGN KEY(ai_model_id) REFERENCES ai_models(ai_model_id),
    FOREIGN KEY(weather_id) REFERENCES weathers(weather_id)
);

CREATE TABLE sensor_predictive_maintenance_outputs(
    ai_model_output_id VARCHAR(20) NOT NULL,
    sensor_id VARCHAR(20) NOT NULL,
    sensor_predicted_maintenance_datetime DATETIME NOT NULL,
    PRIMARY KEY(ai_model_output_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(sensor_id) REFERENCES sensors(sensor_id)
);

CREATE TABLE lpr_predictive_maintenance_outputs(
    ai_model_output_id VARCHAR(20) NOT NULL,
    lpr_id VARCHAR(20) NOT NULL,
    lpr_predicted_maintenance_datetime DATETIME NOT NULL,
    PRIMARY KEY(ai_model_output_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(lpr_id) REFERENCES license_plate_recognitions(lpr_id)
);

CREATE TABLE customer_segmentation_outputs(
    ai_model_output_id VARCHAR(20) NOT NULL,
    client_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(ai_model_output_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(client_id) REFERENCES clients(client_id)
);

```

```

CREATE TABLE demand_forecasting_outputs(
    ai_model_output_id VARCHAR(20) NOT NULL,
    parking_spot_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(ai_model_output_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(parking_spot_id) REFERENCES parking_spots(parking_spot_id)
);

CREATE TABLE chatbot_outputs(
    ai_model_output_id VARCHAR(20) NOT NULL,
    message_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(ai_model_output_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(message_id) REFERENCES customer_support_chatbots(message_id)
);

CREATE TABLE event_calendars(
    event_id VARCHAR(20) NOT NULL,
    event_name VARCHAR(100) NOT NULL,
    event_type VARCHAR(100) NOT NULL,
    location_zone_id VARCHAR(20) NOT NULL,
    start_datetime DATETIME NOT NULL,
    end_datetime DATETIME NOT NULL,
    PRIMARY KEY(event_id),
    FOREIGN KEY(location_zone_id) REFERENCES location_zones(location_zone_id)
);

CREATE TABLE multiple_event_sources(
    ai_model_output_id VARCHAR(20) NOT NULL,
    event_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(ai_model_output_id, event_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(event_id) REFERENCES event_calendars(event_id)
);

CREATE TABLE sensor_sources(
    ai_model_output_id VARCHAR(20) NOT NULL,
    sensor_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(ai_model_output_id, sensor_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(sensor_id) REFERENCES sensors(sensor_id)
);

```

```

);

CREATE TABLE lpr_sources(
    ai_model_output_id VARCHAR(20) NOT NULL,
    lpr_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(ai_model_output_id, lpr_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(lpr_id) REFERENCES license_plate_recognitions(lpr_id)
);

CREATE TABLE client_sources(
    ai_model_output_id VARCHAR(20) NOT NULL,
    client_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(ai_model_output_id, client_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(client_id) REFERENCES clients(client_id)
);

CREATE TABLE parking_spot_sources(
    ai_model_output_id VARCHAR(20) NOT NULL,
    parking_spot_id VARCHAR(20) NOT NULL,
    PRIMARY KEY(ai_model_output_id, parking_spot_id),
    FOREIGN KEY(ai_model_output_id) REFERENCES
ai_model_outputs(ai_model_output_id),
    FOREIGN KEY(parking_spot_id) REFERENCES parking_spots(parking_spot_id)
);

```

```
INSERT INTO loyalty_tiers (loyalty_tier_id, tier_name, discount_percentage, min_parkpoints_earned_required) VALUES
('1', 'bronze', 0, 0),
('2', 'silver', 0, 1000),
('3', 'gold', 5, 2000),
('4', 'elite', 5, 3000);

INSERT INTO sensors (sensor_id, sensor_status, manufacture_date) VALUES
('S1', 'operational', '2023-01-15'),
('S2', 'operational', '2023-02-20'),
('S3', 'need_calibration', '2023-03-10'),
('S4', 'offline', '2023-04-05'),
('S5', 'offline', '2023-05-12'),
('S6', 'offline', '2023-06-18'),
('S7', 'offline', '2023-07-22'),
('S8', 'operational', '2023-08-30'),
('S9', 'need_calibration', '2023-09-14'),
('S10', 'operational', '2023-10-25'),
('S11', 'operational', '2023-11-08'),
('S12', 'operational', '2023-12-16');
```

```

('S13', 'operational', '2024-01-20'),
('S14', 'need_calibration', '2024-02-11'),
('S15', 'operational', '2024-03-19'),
('S16', 'operational', '2024-04-23'),
('S17', 'operational', '2024-05-07'),
('S18', 'offline', '2024-06-14'),
('S19', 'operational', '2024-07-28'),
('S20', 'operational', '2024-08-03'),
('S21', 'operational', '2024-09-12'),
('S22', 'operational', '2024-10-18'),
('S23', 'need_calibration', '2023-01-25'),
('S24', 'operational', '2023-02-28'),
('S25', 'operational', '2023-03-15'),
('S26', 'operational', '2023-04-20'),
('S27', 'offline', '2023-05-25'),
('S28', 'operational', '2023-06-30'),
('S29', 'operational', '2023-07-15'),
('S30', 'operational', '2023-08-20'),
('S31', 'operational', '2023-09-25'),
('S32', 'need_calibration', '2023-10-30'),
('S33', 'operational', '2023-11-15'),
('S34', 'operational', '2023-12-20'),
('S35', 'operational', '2024-01-25'),
('S36', 'operational', '2024-02-28'),
('S37', 'offline', '2024-03-15'),
('S38', 'operational', '2024-04-20'),
('S39', 'operational', '2024-05-25'),
('S40', 'operational', '2024-06-30'),
('S41', 'need_calibration', '2024-07-15'),
('S42', 'operational', '2024-08-20'),
('S43', 'operational', '2024-09-25'),
('S44', 'operational', '2024-10-30'),
('S45', 'operational', '2023-01-10'),
('S46', 'offline', '2023-02-15'),
('S47', 'operational', '2023-03-20'),
('S48', 'operational', '2023-04-25'),
('S49', 'need_calibration', '2023-05-30'),
('S50', 'operational', '2023-06-15');

INSERT INTO location_zones (location_zone_id, location_zone_name,
air_quality_index, pm25_value, pm10_value, co_value, co2_value, no2_value,
o3_value, so2_value) VALUES
('ZN1', 'kl_sentral', 72.00, 25.40, 40.80, 0.80, 420.00, 18.20, 30.10, 4.50),
('ZN2', 'jalan_ampang', 58.00, 18.90, 28.30, 0.50, 390.00, 14.60, 35.70, 3.80),
('ZN3', 'bukit_bintang', 42.00, 10.50, 15.20, 0.30, 370.00, 9.10, 40.80, 2.90),
('ZN4', 'cyberjaya', 96.00, 33.10, 52.70, 1.10, 460.00, 22.80, 25.40, 6.20),

```

```

('ZN5', 'the_gradens_mall', 65.00, 20.70, 31.60, 0.60, 400.00, 15.30, 33.50,
4.10);

INSERT INTO parking_spots (parking_spot_id, sensor_id, location_zone_id,
space_type, reserved_license_plate_number, standard_hourly_rate, site_tier,
real_time_demand_rating, predicted_current_demand_rating) VALUES
('PS1', 'S1', 'ZN1', 'ev_charger', 'VQH1234', 5.00, 'tier_3', 'moderate',
'moderate'),
('PS2', 'S2', 'ZN1', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS3', 'S3', 'ZN1', 'ev_charger', 'VZX7766', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS4', 'S4', 'ZN1', 'reserved', 'WNM8821', 6.00, 'tier_3', 'low', 'moderate'),
('PS5', 'S5', 'ZN1', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS6', 'S6', 'ZN1', 'ev_charger', 'BLT5678', 5.00, 'tier_3', 'moderate',
'moderate'),
('PS7', 'S7', 'ZN1', 'standard', NULL, 4.00, 'tier_2', 'moderate', 'high'),
('PS8', 'S8', 'ZN1', 'premium_covered', 'LHY5589', 8.00, 'tier_3', 'low', 'low'),
('PS9', 'S9', 'ZN1', 'motorbike', NULL, 3.80, 'tier_1', 'high', 'high'),
('PS10', 'S10', 'ZN1', 'motorbike', NULL, 3.50, 'tier_1', 'low', 'moderate'),
('PS11', 'S11', 'ZN2', 'ev_charger', 'JQK3219', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS12', 'S12', 'ZN2', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS13', 'S13', 'ZN2', 'ev_charger', 'WAD5532', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS14', 'S14', 'ZN2', 'reserved', 'PNF8823', 6.00, 'tier_3', 'low', 'moderate'),
('PS15', 'S15', 'ZN2', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS16', 'S16', 'ZN2', 'ev_charger', 'VLB2197', 5.00, 'tier_3', 'moderate',
'moderate'),
('PS17', 'S17', 'ZN2', 'standard', NULL, 4.00, 'tier_2', 'moderate', 'high'),
('PS18', 'S18', 'ZN2', 'premium_covered', 'WCT4408', 8.00, 'tier_3', 'low',
'low'),
('PS19', 'S19', 'ZN2', 'motorbike', NULL, 3.80, 'tier_1', 'high', 'high'),
('PS20', 'S20', 'ZN2', 'motorbike', NULL, 3.50, 'tier_1', 'low', 'moderate'),
('PS21', 'S21', 'ZN3', 'ev_charger', 'JLT9982', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS22', 'S22', 'ZN3', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS23', 'S23', 'ZN3', 'ev_charger', 'NBM7736', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS24', 'S24', 'ZN3', 'reserved', 'WYY3207', 6.00, 'tier_3', 'low', 'moderate'),
('PS25', 'S25', 'ZN3', 'ev_charger', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS26', 'S26', 'ZN3', 'ev_charger', 'BLS2211', 5.00, 'tier_3', 'moderate',
'moderate'),
('PS27', 'S27', 'ZN3', 'standard', NULL, 4.00, 'tier_2', 'moderate', 'high'),
('PS28', 'S28', 'ZN3', 'premium_covered', 'NBM7736', 8.00, 'tier_3', 'low',
'low'),

```

```

('PS29', 'S29', 'ZN3', 'motorbike', NULL, 3.80, 'tier_1', 'high', 'high'),
('PS30', 'S30', 'ZN3', 'motorbike', NULL, 3.50, 'tier_1', 'low', 'moderate'),
('PS31', 'S31', 'ZN4', 'ev_charger', 'VKP6624', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS32', 'S32', 'ZN4', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS33', 'S33', 'ZN4', 'ev_charger', 'WNB8876', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS34', 'S34', 'ZN4', 'reserved', 'JQS4392', 6.00, 'tier_3', 'low', 'moderate'),
('PS35', 'S35', 'ZN4', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS36', 'S36', 'ZN4', 'ev_charger', 'PLY6723', 5.00, 'tier_3', 'moderate',
'moderate'),
('PS37', 'S37', 'ZN4', 'standard', 'NRK1109', 4.00, 'tier_2', 'moderate',
'high'),
('PS38', 'S38', 'ZN4', 'premium_covered', 'VKT5564', 8.00, 'tier_3', 'low',
'low'),
('PS39', 'S39', 'ZN4', 'motorbike', NULL, 3.80, 'tier_1', 'high', 'high'),
('PS40', 'S40', 'ZN4', 'motorbike', NULL, 3.50, 'tier_1', 'low', 'moderate'),
('PS41', 'S41', 'ZN5', 'ev_charger', 'NDK3342', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS42', 'S42', 'ZN5', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS43', 'S43', 'ZN5', 'ev_charger', 'JLV8821', 6.00, 'tier_3', 'moderate',
'moderate'),
('PS44', 'S44', 'ZN5', 'reserved', 'PKM5539', 6.00, 'tier_3', 'low', 'moderate'),
('PS45', 'S45', 'ZN5', 'standard', NULL, 4.00, 'tier_2', 'high', 'high'),
('PS46', 'S46', 'ZN5', 'ev_charger', 'WQL7861', 5.00, 'tier_3', 'moderate',
'moderate'),
('PS47', 'S47', 'ZN5', 'standard', NULL, 4.00, 'tier_2', 'moderate', 'high'),
('PS48', 'S48', 'ZN5', 'premium_covered', 'WTC9027', 8.00, 'tier_3', 'low',
'low'),
('PS49', 'S49', 'ZN5', 'motorbike', NULL, 3.80, 'tier_1', 'high', 'high'),
('PS50', 'S50', 'ZN5', 'motorbike', NULL, 3.50, 'tier_1', 'low', 'moderate');

INSERT INTO clients (client_id, full_name, referral_source, loyalty_tier_id,
parkpoints_balance, parkpoints_elite_balance, business_relationship_type,
preferred_payment_method, brand_affiliation, green_driver_status,
priority_ev_spot_id, client_segmentation) VALUES
('C1', 'Alice Tan', 'social_media', '3', 500, 150, 'individual_commuter', NULL,
'pro', 1, 'PS1', 'basic'),
('C2', 'Benjamin Lim', 'google_ad', '1', 0, 0, 'individual_commuter',
'credit_card', 'tourist', 0, 'PS3', 'basic'),
('C3', 'Chloe Wong', NULL, '3', 2000, 500, 'corporate_fleet_account', 'e-wallet',
'pro', 1, 'PS6', 'regular'),
('C4', 'Daniel Lee', 'google_ad', '4', 3000, 1200, 'individual_commuter',
'credit_card', 'tourist', 0, 'PS11', 'vip'),

```

```

('C5', 'Elaine Ng', 'social_media', '2', 1000, 0, 'corporate_fleet_account', 'e-wallet', NULL, 1, 'PS16', 'basic'),
('C6', 'Farid Ahmad', 'social_media', '4', 4000, 800, 'individual_commuter', 'e-wallet', 'pro', 1, NULL, 'vip'),
('C7', 'Grace Lim', NULL, '3', 2600, 400, 'individual_commuter',
'blockchain_token', 'pro', 0, NULL, 'regular'),
('C8', 'Isabel Goh', NULL, '2', 1500, 80, 'corporate_fleet_account', NULL,
'tourist', 0, 'PS21', 'basic'),
('C9', 'Haziq', 'google_ad', '2', 1080, 120, 'corporate_fleet_account',
'credit_card', NULL, 0, NULL, 'basic'),
('C10', 'Jason Chong', NULL, '1', 980, 0, 'individual_commuter', NULL, NULL, 1,
'PS41', 'basic'),
('C11', 'Aaron Lee', 'google_ad', '3', 3100, 900, 'corporate_fleet_account',
'blockchain_token', 'pro', 1, 'PS31', 'regular'),
('C12', 'Bella Tan', 'social_media', '3', 2900, 700, 'corporate_fleet_account',
'blockchain_token', 'pro', 1, 'PS36', 'regular'),
('C13', 'Darren Khoo', 'google_ad', '4', 4200, 1200, 'corporate_fleet_account',
'blockchain_token', 'pro', 1, 'PS33', 'vip'),
('C14', 'Emily Ho', 'social_media', '3', 3600, 800, 'individual_commuter',
'blockchain_token', 'tourist', 1, NULL, 'regular'),
('C15', 'Nur Aisyah', 'google_ad', '3', 3400, 700, 'individual_commuter',
'blockchain_token', 'both', 0, 'PS21', 'regular'),
('C16', 'Leonard Tan', NULL, '2', 2800, 400, 'corporate_fleet_account',
'blockchain_token', 'pro', 1, 'PS12', 'regular'),
('C17', 'Mei Ling', NULL, '3', 2650, 450, 'individual_commuter',
'blockchain_token', 'tourist', 0, NULL, 'basic'),
('C18', 'Raj Kumar', 'social_media', '4', 3900, 1100, 'corporate_fleet_account',
'blockchain_token', 'both', 1, 'PS25', 'vip'),
('C19', 'Siti Nur', 'google_ad', '2', 2950, 500, 'individual_commuter',
'blockchain_token', 'pro', 1, 'PS42', 'regular');

```

```
INSERT INTO phone_numbers (client_id, phone_number, is_primary) VALUES
```

```

('C1', '0123456789', 1),
('C2', '0105566778', 1),
('C4', '0132244668', 1),
('C6', '0127788990', 1),
('C7', '0179988776', 1),
('C8', '0147788123', 1),
('C10', '0162233445', 1),
('C11', '0191112233', 1),
('C12', '0162223344', 1),
('C14', '0174455667', 1),
('C15', '0137788991', 1),
('C17', '0129988776', 1),
('C18', '0191122334', 1),

```

```

('C19', '0146677002', 1);

INSERT INTO emails (client_id, email, is_primary) VALUES
('C1', 'alice.tan@gmail.com', 1),
('C2', 'ben.lim@gmail.com', 1),
('C3', 'chloe.wong@gmail.com', 1),
('C4', 'daniel.lee@gmail.com', 1),
('C5', 'elaine.ng@gmail.com', 1),
('C6', 'farid.ahmad@gmail.com', 1),
('C7', 'grace.lim@gmail.com', 1),
('C8', 'isabel.goh@gmail.com', 1),
('C9', 'haziq.rah@gmail.com', 1),
('C10', 'jason.ch@gmail.com', 1),
('C11', 'aaron.lee@gmail.com', 1),
('C12', 'bella.tan@gmail.com', 1),
('C13', 'darren.khoo@gmail.com', 1),
('C14', 'emily.ho@gmail.com', 1),
('C15', 'nur.aisyah@gmail.com', 1),
('C16', 'leonard.tan@gmail.com', 1),
('C17', 'mei.ning.client@gmail.com', 1),
('C18', 'raj.kumar.client@gmail.com', 1),
('C19', 'siti.nur.client@gmail.com', 1);

INSERT INTO individual_commuter (client_id, commute_pattern) VALUES
('C1', 'weekday_peak'),
('C2', 'weekday_offpeak'),
('C4', 'early_bird'),
('C6', 'flexible_remote'),
('C7', 'mixed_schedule'),
('C10', 'weekend_shopper'),
('C14', 'weekday_peak'),
('C15', 'weekday_offpeak'),
('C17', 'flexible_remote'),
('C19', 'weekend_shopper');

INSERT INTO corporate_fleet_account (client_id, company_name, fleet_size,
corporate_subscription_rate, billing_cycle) VALUES
('C3', 'TechCorp Solutions Sdn Bhd', 25, 5000.00, 'monthly'),
('C5', 'Green Energy Malaysia', 40, 8500.00, 'quarterly'),
('C8', 'Logistics Plus Sdn Bhd', 60, 12000.00, 'annually'),
('C9', 'Digital Services Co', 35, 7200.00, 'monthly'),
('C11', 'Metro Logistics Sdn Bhd', 55, 9500.00, 'monthly'),
('C12', 'EcoCity Mobility Sdn Bhd', 40, 7800.00, 'quarterly'),
('C13', 'Urban Mobility Sdn Bhd', 70, 15000.00, 'monthly'),
('C16', 'MetroRide Logistics Sdn Bhd', 45, 9000.00, 'monthly'),

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('C18', 'CityShuttle Services Sdn Bhd', 55, 13500.00, 'quarterly');

INSERT INTO referral_bonuses (referral_bonus_id, referring_client_id,
referred_client_id, referred_client_brand, zone_of_first_parking_session_id)
VALUES
('RB1', 'C1', 'C2', 'pro', 'ZN3'),
('RB2', 'C2', 'C4', 'tourist', 'ZN5'),
('RB3', 'C3', 'C7', 'pro', 'ZN2'),
('RB4', 'C5', 'C9', 'pro', 'ZN1'),
('RB5', 'C7', 'C10', 'tourist', 'ZN4'),
('RB6', 'C9', 'C6', 'both', 'ZN1'),
('RB7', 'C4', 'C8', 'tourist', 'ZN2'),
('RB8', 'C10', 'C1', 'tourist', 'ZN3'),
('RB9', 'C6', 'C3', 'both', 'ZN4'),
('RB10', 'C8', 'C5', 'pro', 'ZN5');

INSERT INTO parkpoints (parkpoints_transaction_id, client_id, referral_bonus_id,
parkpoints_transaction_type, parkpoints_amount, parkpoints_type,
parkpoints_transaction_datetime) VALUES
('PT1', 'C1', 'RB1', 'earn', 200, 'basic', '2025-10-10 09:45:32'),
('PT2', 'C2', 'RB2', 'earn', 150, 'basic', '2025-10-11 14:22:10'),
('PT3', 'C3', 'RB3', 'earn', 500, 'elite', '2025-10-12 18:10:45'),
('PT4', 'C4', NULL, 'earn', 300, 'basic', '2025-10-13 07:55:20'),
('PT5', 'C5', 'RB4', 'earn', 800, 'elite', '2025-10-14 16:40:58'),
('PT6', 'C6', NULL, 'redeem', -100, 'basic', '2025-10-15 11:12:47'),
('PT7', 'C7', 'RB5', 'earn', 400, 'elite', '2025-10-16 13:30:19'),
('PT8', 'C8', NULL, 'redeem', -250, 'basic', '2025-10-17 10:05:50'),
('PT9', 'C9', 'RB6', 'earn', 1000, 'elite', '2025-10-18 20:44:31'),
('PT10', 'C10', NULL, 'redeem', -200, 'basic', '2025-10-19 09:12:16');

INSERT INTO earns (parkpoints_transaction_id, parkpoints_source) VALUES
('PT1', 'parking_session'),
('PT2', 'referral_bonus'),
('PT3', 'green_driver_bonus'),
('PT4', 'parking_session'),
('PT5', 'off_peak'),
('PT7', 'ev_charger'),
('PT9', 'multi_vehicle');

INSERT INTO redeems (parkpoints_transaction_id, parkpoints_redemption_type)
VALUES
('PT6', 'free_parking'),
('PT8', 'mobile_wallet_credit'),
('PT10', 'premium_covered_spots_discounts');

```

```

INSERT INTO vehicles (license_plate_number, client_id, vehicle_type, is_ev)
VALUES
('VQH1234', 'C1', 'sedan', 1),
('BLT5678', 'C2', 'motorbike', 0),
('WNM8821', 'C3', 'suv', 1),
('JDK4455', 'C4', 'sedan', 0),
('PEA9910', 'C5', 'sedan', 1),
('KTR3344', 'C6', 'van', 0),
('VZX7766', 'C7', 'suv', 1),
('MLP2201', 'C8', 'mpv', 0),
('LHY5589', 'C9', 'sedan', 1),
('QAZ9012', 'C10', 'sedan', 1),
('JQK3219', 'C11', 'suv', 1),
('WAD5532', 'C12', 'suv', 1),
('PNF8823', 'C13', 'van', 0),
('VLB2197', 'C14', 'sedan', 0),
('WCT4408', 'C15', 'sedan', 1),
('JLT9982', 'C16', 'mpv', 1),
('NBM7736', 'C17', 'van', 0),
('WYY3207', 'C18', 'motorbike', 0),
('BLS2211', 'C19', 'sedan', 0),
('NBM7735', 'C10', 'suv', 1),
('VKP6624', 'C1', 'suv', 1),
('WNB8876', 'C2', 'sedan', 0),
('JQS4392', 'C3', 'mpv', 1),
('PLY6723', 'C4', 'sedan', 1),
('VKT5564', 'C5', 'sedan', 1),
('NDK3342', 'C6', 'motorbike', 0),
('JLV8821', 'C7', 'sedan', 1),
('PKM5539', 'C8', 'mpv', 1),
('WQL7861', 'C9', 'van', 0),
('WTC9027', 'C10', 'van', 0),
('NRK1109', 'C11', 'sedan', 1),
('JTH8801', 'C12', 'mpv', 1),
('WXL6888', 'C13', 'suv', 1);

INSERT INTO dynamic_pricing_rules (rule_id, surcharge_percentage,
space_type_affected, effective_start_datetime) VALUES
('R1', 20, 'ev_charger', '2025-10-01 00:00:00'),
('R2', 10, 'standard', '2025-10-05 00:00:00'),
('R3', 15, 'standard', '2025-10-07 00:00:00'),
('R4', 25, 'premium_covered', '2025-10-10 00:00:00'),
('R5', 5, 'motorbike', '2025-10-12 00:00:00'),
('R6', 30, 'ev_charger', '2025-10-15 00:00:00'),
('R7', 8, 'motorbike', '2025-10-18 00:00:00'),

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('R8', 12, 'standard', '2025-10-20 00:00:00'),
('R9', 18, 'ev_charger', '2025-10-25 00:00:00'),
('R10', 22, 'reserved', '2025-10-28 00:00:00');

INSERT INTO applied_pricing_rules (parking_spot_id, rule_id) VALUES
('PS1', 'R1'),
('PS2', 'R2'),
('PS3', 'R6'),
('PS4', 'R10'),
('PS5', 'R3'),
('PS6', 'R9'),
('PS7', 'R8'),
('PS8', 'R4'),
('PS9', 'R5'),
('PS10', 'R7');

INSERT INTO location_zone_affected (rule_id, location_zone_id) VALUES
('R1', 'ZN1'),
('R2', 'ZN5'),
('R3', 'ZN4'),
('R4', 'ZN1'),
('R5', 'ZN2'),
('R6', 'ZN3'),
('R7', 'ZN2'),
('R8', 'ZN3'),
('R9', 'ZN1'),
('R10', 'ZN2');

INSERT INTO peak_hours (peak_hour_id, start_time, end_time, days_of_weeks) VALUES
('PH1', '07:00:00', '09:00:00', 'Monday'),
('PH2', '17:00:00', '23:00:00', 'Friday'),
('PH3', '11:30:00', '13:30:00', 'Tuesday'),
('PH4', '10:00:00', '12:00:00', 'Wednesday'),
('PH5', '14:00:00', '16:00:00', 'Saturday'),
('PH6', '08:00:00', '10:00:00', 'Thursday'),
('PH7', '18:00:00', '21:00:00', 'Saturday'),
('PH8', '06:30:00', '08:30:00', 'Monday'),
('PH9', '12:00:00', '14:00:00', 'Sunday'),
('PH10', '19:00:00', '22:00:00', 'Friday');

INSERT INTO applied_peak_hours (rule_id, peak_hour_id) VALUES
('R1', 'PH1'),
('R2', 'PH2'),
('R3', 'PH3'),
('R4', 'PH7');

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('R5', 'PH4'),
('R6', 'PH6'),
('R7', 'PH9'),
('R8', 'PH8'),
('R9', 'PH10'),
('R10', 'PH5');

INSERT INTO air_quality_routes (air_quality_route_id, reserved_parking_spot_id, route, avoided_pollution) VALUES
('AQ1', 'PS1', 'From Gate A to Zone 1', 'industrial haze'),
('AQ2', 'PS3', 'From Gate B to Zone 3', 'vehicle exhaust'),
('AQ3', 'PS5', 'From Gate C to Zone 2', 'construction dust'),
('AQ4', 'PS6', 'From Gate D to Zone 5', 'carbon monoxide'),
('AQ5', 'PS8', 'From Gate A to Basement Zone', 'roadside smoke'),
('AQ6', 'PS10', 'From Gate E to Rooftop Area', 'exhaust emissions'),
('AQ7', 'PS4', 'From Gate F to Zone 4', 'factory fumes'),
('AQ8', 'PS2', 'From Gate G to Zone 6', 'engine idling'),
('AQ9', 'PS9', 'From Gate H to Zone 2', 'urban haze'),
('AQ10', 'PS7', 'From Gate I to VIP Zone', 'traffic pollution');

INSERT INTO license_plate_recognitions (lpr_id, manufacture_date) VALUES
('LPR1', '2023-01-15'),
('LPR2', '2023-02-20'),
('LPR3', '2023-03-25'),
('LPR4', '2023-04-30'),
('LPR5', '2023-05-15'),
('LPR6', '2023-06-20'),
('LPR7', '2023-07-25'),
('LPR8', '2023-08-30'),
('LPR9', '2023-09-15'),
('LPR10', '2023-10-20'),
('LPR11', '2023-11-25');

INSERT INTO parking_sessions (parking_session_transaction_id, lpr_id, license_plate_number, parking_spot_id, start_datetime, end_datetime, base_charge, dynamic_surcharge_percent, local_taxes_percent, total_discount_percent, corporate_subscription_discount_percent, loyalty_discount_percent, promotional_discount_percent) VALUES
('PST1', 'LPR1', 'VQH1234', 'PS1', '2025-10-10 08:00:00', '2025-10-10 12:00:00', 20.00, 20, 6, 8, 2, 5, 1),
('PST2', 'LPR2', 'BLT5678', 'PS26', '2025-10-11 09:30:00', '2025-10-11 11:00:00', 6.30, 8, 6, 3, 1, 1, 1),
('PST3', 'LPR3', 'WNM8821', 'PS24', '2025-10-12 14:00:00', '2025-10-12 17:00:00', 16.50, 12, 6, 4, 2, 1, 1),

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('PST4', 'LPR4', 'JDK4455', 'PS25', '2025-10-13 07:00:00', '2025-10-13 08:30:00',
5.25, 5, 6, 2, 1, 0, 0),
('PST5', 'LPR5', 'PEA9910', 'PS45', '2025-10-14 18:00:00', '2025-10-14 21:00:00',
24.00, 10, 6, 5, 3, 1, 1),
('PST6', 'LPR6', 'KTR3344', 'PS7', '2025-10-15 12:00:00', '2025-10-15 13:30:00',
9.75, 10, 6, 4, 2, 1, 1),
('PST7', 'LPR7', 'VZX7766', 'PS23', '2025-10-16 10:00:00', '2025-10-16 12:00:00',
11.60, 10, 6, 5, 2, 2, 1),
('PST8', 'LPR8', 'MLP2201', 'PS9', '2025-10-17 13:00:00', '2025-10-17 15:00:00',
16.00, 8, 6, 4, 2, 1, 1),
('PST9', 'LPR9', 'LHY5589', 'PS18', '2025-10-18 09:00:00', '2025-10-18 11:30:00',
16.25, 10, 6, 5, 2, 2, 1),
('PST10', 'LPR10', 'QAZ9012', 'PS31', '2025-10-19 08:30:00', '2025-10-19
09:30:00', 3.80, 5, 6, 2, 1, 0, 0),
('PST11', 'LPR11', 'NRK1109', 'PS7', '2025-10-20 10:00:00', '2025-10-20
13:00:00', 15.00, 20, 6, 5, 0, 5, 0),
('PST12', 'LPR3', 'WNM8821', 'PS5', '2025-10-20 08:30:00', '2025-10-20
10:00:00', 6.00, 10, 6, 3, 1, 1, 1),
('PST13', 'LPR4', 'JDK4455', 'PS3', '2025-10-21 09:00:00', '2025-10-21
11:30:00', 18.00, 12, 6, 4, 2, 2, 1),
('PST14', 'LPR5', 'PEA9910', 'PS31', '2025-10-22 14:00:00', '2025-10-22
16:00:00', 16.00, 15, 6, 5, 2, 2, 1),
('PST15', 'LPR6', 'KTR3344', 'PS42', '2025-10-23 11:30:00', '2025-10-23
13:00:00', 12.00, 10, 6, 4, 1, 1, 1),
('PST16', 'LPR11', 'VZX7766', 'PS12', '2025-10-24 08:00:00', '2025-10-24
10:30:00', 18.00, 12, 6, 5, 2, 2, 1),
('PST17', 'LPR1', 'WQL7861', 'PS15', '2025-10-24 09:30:00', '2025-10-24
11:00:00', 10.50, 8, 6, 3, 1, 1, 1),
('PST18', 'LPR4', 'JQS4392', 'PS9', '2025-10-25 14:00:00', '2025-10-25 17:30:00',
21.00, 15, 6, 5, 2, 2, 1),
('PST19', 'LPR3', 'JLV8821', 'PS21', '2025-10-26 07:30:00', '2025-10-26
09:00:00', 7.25, 5, 6, 2, 1, 0, 0),
('PST20', 'LPR2', 'PKM5539', 'PS33', '2025-10-26 18:00:00', '2025-10-26
20:00:00', 13.50, 10, 6, 4, 1, 1, 1),
('PST21', 'LPR8', 'NBM7735', 'PS36', '2025-10-27 08:00:00', '2025-10-27
12:00:00', 22.00, 20, 6, 5, 2, 2, 1),
('PST22', 'LPR8', 'JTH8801', 'PS48', '2025-10-27 13:00:00', '2025-10-27
15:00:00', 15.00, 10, 6, 4, 2, 1, 1),
('PST23', 'LPR9', 'NRK1109', 'PS35', '2025-10-28 09:00:00', '2025-10-28
11:30:00', 16.00, 12, 6, 3, 1, 2, 1),
('PST24', 'LPR10', 'JTH8801', 'PS20', '2025-10-28 14:00:00', '2025-10-28
17:00:00', 18.50, 15, 6, 5, 2, 2, 1),
('PST25', 'LPR1', 'WXL6888', 'PS41', '2025-10-29 08:30:00', '2025-10-29
10:30:00', 12.00, 10, 6, 4, 1, 1, 1),

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('PST26', 'LPR2', 'BLS2211', 'PS11', '2025-10-29 12:00:00', '2025-10-29
13:30:00', 8.00, 8, 6, 3, 1, 1, 1),
('PST27', 'LPR5', 'VKT5564', 'PS8', '2025-10-30 10:00:00', '2025-10-30 12:00:00',
14.50, 10, 6, 5, 2, 2, 1),
('PST28', 'LPR8', 'PLY6723', 'PS32', '2025-10-30 13:30:00', '2025-10-30
16:00:00', 19.00, 12, 6, 4, 2, 1, 1),
('PST29', 'LPR11', 'JLV8821', 'PS14', '2025-10-31 08:00:00', '2025-10-31
10:00:00', 12.00, 10, 6, 3, 1, 1, 0),
('PST30', 'LPR9', 'NDK3342', 'PS9', '2025-10-31 11:00:00', '2025-10-31 12:30:00',
6.50, 5, 6, 2, 1, 0, 0),
('PST31', 'LPR1', 'VZX7766', 'PS12', '2025-11-04 08:00:00', '2025-11-04
10:30:00', 18.00, 12, 6, 5, 2, 2, 1),
('PST32', 'LPR11', 'WQL7861', 'PS15', '2025-11-08 09:30:00', '2025-11-08
11:00:00', 10.50, 8, 6, 3, 1, 1, 1),
('PST33', 'LPR10', 'JQS4392', 'PS19', '2025-11-08 14:00:00', '2025-11-08
17:30:00', 21.00, 15, 6, 5, 2, 2, 1),
('PST34', 'LPR5', 'JLV8821', 'PS21', '2025-11-11 07:30:00', '2025-11-11
09:00:00', 7.25, 5, 6, 2, 1, 0, 0),
('PST35', 'LPR6', 'PKM5539', 'PS43', '2025-11-12 18:00:00', '2025-11-12
20:00:00', 13.50, 10, 6, 4, 1, 1, 1),
('PST36', 'LPR10', 'NBM7735', 'PS26', '2025-11-12 08:00:00', '2025-11-12
12:00:00', 22.00, 20, 6, 5, 2, 2, 1),
('PST37', 'LPR11', 'JTH8801', 'PS38', '2025-11-13 13:00:00', '2025-11-13
15:00:00', 15.00, 10, 6, 4, 2, 1, 1),
('PST38', 'LPR9', 'NRK1109', 'PS25', '2025-11-15 09:00:00', '2025-11-15
11:30:00', 16.00, 12, 6, 3, 1, 2, 1),
('PST39', 'LPR2', 'JTH8801', 'PS40', '2025-11-16 14:00:00', '2025-11-16
17:00:00', 18.50, 15, 6, 5, 2, 2, 1),
('PST40', 'LPR1', 'WXL6888', 'PS21', '2025-11-20 08:30:00', '2025-11-20
10:30:00', 12.00, 10, 6, 4, 1, 1, 1),
('PST41', 'LPR5', 'BLS2211', 'PS11', '2025-11-21 12:00:00', '2025-11-21
13:30:00', 8.00, 8, 6, 3, 1, 1, 1),
('PST42', 'LPR3', 'VKT5564', 'PS40', '2025-11-21 10:00:00', '2025-11-21
12:00:00', 14.50, 10, 6, 5, 2, 2, 1),
('PST43', 'LPR7', 'PLY6723', 'PS32', '2025-11-22 13:30:00', '2025-11-22
16:00:00', 19.00, 12, 6, 4, 2, 1, 1),
('PST44', 'LPR11', 'JLV8821', 'PS34', '2025-11-25 08:00:00', '2025-11-25
10:00:00', 12.00, 10, 6, 3, 1, 1, 0),
('PST45', 'LPR10', 'NDK3342', 'PS49', '2025-11-25 11:00:00', '2025-11-25
12:30:00', 6.50, 5, 6, 2, 1, 0, 0);

INSERT INTO lpr_failure_logs (lpr_failure_id, lpr_id, lpr_failure_on_session_id,
lpr_failure_datetime, lpr_failure_reason) VALUES
('LPRF1', 'LPR1', 'PST1', '2025-10-10 08:02:15', 'plate_not_detected'),
('LPRF2', 'LPR4', 'PST4', '2025-10-12 09:00:32', 'plate_no_entry_record'),

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('LPRF3', 'LPR2', 'PST2', '2025-10-14 19:01:05', 'low_image_quality'),
('LPRF4', 'LPR2', 'PST2', '2025-10-15 18:03:48', 'low_image_quality'),
('LPRF5', 'LPR3', 'PST3', '2025-10-17 14:00:27', 'plate_not_detected'),
('LPRF6', 'LPR1', 'PST1', '2025-10-16 08:31:50', 'plate_number_blocked'),
('LPRF7', 'LPR6', 'PST6', '2025-10-13 07:16:11', 'plate_not_detected'),
('LPRF8', 'LPR8', 'PST8', '2025-10-18 12:01:09', 'plate_number_blocked'),
('LPRF9', 'LPR7', 'PST7', '2025-10-11 17:30:42', 'low_image_quality'),
('LPRF10', 'LPR2', 'PST2', '2025-10-19 09:01:17', 'low_image_quality'),
('LPRF11', 'LPR1', 'PST11', '2025-10-20 10:05:00', 'plate_not_detected'),
('LPRF12', 'LPR3', 'PST12', '2025-10-20 08:32:10', 'plate_not_detected'),
('LPRF13', 'LPR3', 'PST12', '2025-10-20 09:15:45', 'low_image_quality'),
('LPRF14', 'LPR4', 'PST13', '2025-10-21 09:05:20', 'plate_number_blocked'),
('LPRF15', 'LPR4', 'PST13', '2025-10-21 10:45:33', 'plate_not_detected'),
('LPRF16', 'LPR5', 'PST14', '2025-10-22 14:10:05', 'low_image_quality'),
('LPRF17', 'LPR6', 'PST15', '2025-10-23 11:35:42', 'plate_not_detected'),
('LPRF18', 'LPR6', 'PST15', '2025-10-23 12:20:18', 'plate_number_blocked');

INSERT INTO revenues (revenue_id, revenue_amount, revenue_type,
parking_session_transaction_id, client_id, parkpoints_transaction_id) VALUES
('RV1', 8.00, 'parking_session', 'PST1', 'C1', NULL),
('RV2', 120.00, 'corporate_subscription', NULL, 'C2', NULL),
('RV3', 5.00, 'parkpoints_redemption', NULL, 'C3', 'PT1'),
('RV4', 50.00, 'penalties_for_unauthorized_parking_in_reserved_spot', 'PST2',
'C4', NULL),
('RV5', 9.00, 'parking_session', 'PST3', 'C5', NULL),
('RV6', 10.00, 'parking_session', 'PST4', 'C6', NULL),
('RV7', 60.00, 'corporate_subscription', NULL, 'C7', NULL),
('RV8', 4.50, 'parkpoints_redemption', NULL, 'C8', 'PT2'),
('RV9', 80.00, 'penalties_for_unauthorized_parking_in_reserved_spot', 'PST5',
'C9', NULL),
('RV10', 7.50, 'parking_session', 'PST6', 'C10', NULL);

INSERT INTO personnels (personnel_id, full_name, role, assigned_location_zone_id)
VALUES
('P1', 'Ahmad Zulkifli', 'technician', 'ZN1'),
('P2', 'Siti Nurhaliza', 'attendant', 'ZN2'),
('P3', 'Lim Wei Jian', 'finance_officer', 'ZN3'),
('P4', 'Aisyah Rahman', 'zone_manager', 'ZN1'),
('P5', 'Raj Kumar', 'technician', 'ZN2'),
('P6', 'Nur Izzati', 'attendant', 'ZN4'),
('P7', 'Tan Boon Seng', 'finance_officer', 'ZN5'),
('P8', 'Mei Ling', 'zone_manager', 'ZN3'),
('P9', 'Faizal Hassan', 'technician', 'ZN4'),
('P10', 'Jessica Wong', 'attendant', 'ZN5');

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INSERT INTO technicians (personnel_id, specialization) VALUES
('P1', 'Electrical Systems'),
('P5', 'Sensor Calibration'),
('P9', 'Network Infrastructure');

INSERT INTO attendants (personnel_id, shift_type) VALUES
('P2', 'Morning'),
('P6', 'Afternoon'),
('P10', 'Night');

INSERT INTO finance_officers (personnel_id, department) VALUES
('P3', 'Revenue Management'),
('P7', 'Financial Planning');

INSERT INTO zone_managers (personnel_id, years_of_experience) VALUES
('P4', 5.50),
('P8', 8.20);

INSERT INTO proactive_maintenance_alerts (proactive_maintenance_alert_id, sensor_id, sensor_failure_probability, predicted_sensor_failure_datetime, proactive_maintenance_alert_datetime) VALUES
('PA1', 'S1', 85, '2025-11-05 09:00:00', '2025-11-01 08:00:00'),
('PA2', 'S2', 73, '2025-11-06 10:15:00', '2025-11-02 09:30:00'),
('PA3', 'S3', 90, '2025-11-07 11:00:00', '2025-11-03 09:00:00'),
('PA4', 'S4', 65, '2025-11-07 13:30:00', '2025-11-03 10:00:00'),
('PA5', 'S5', 80, '2025-11-08 08:45:00', '2025-11-04 09:15:00'),
('PA6', 'S6', 78, '2025-11-09 10:00:00', '2025-11-04 11:00:00'),
('PA7', 'S7', 92, '2025-11-09 15:00:00', '2025-11-05 10:30:00'),
('PA8', 'S8', 68, '2025-11-10 09:30:00', '2025-11-05 11:15:00'),
('PA9', 'S9', 83, '2025-11-10 14:45:00', '2025-11-06 08:45:00'),
('PA10', 'S10', 95, '2025-11-11 16:00:00', '2025-11-06 09:30:00'),
('PA11', 'S18', 76, '2025-11-12 09:00:00', '2025-11-08 08:30:00'),
('PA12', 'S27', 81, '2025-11-13 11:00:00', '2025-11-09 09:15:00'),
('PA13', 'S37', 79, '2025-11-14 14:30:00', '2025-11-10 10:45:00'),
('PA14', 'S46', 88, '2025-11-15 16:00:00', '2025-11-11 11:20:00');

INSERT INTO maintenance_actions (maintenance_action_id, parking_spot_id, lpr_id, technician_id, maintenance_action_work_order_datetime, proactive_maintenance_alert_id, maintenance_action_status, maintenance_action_taken_datetime, description_of_work) VALUES
('MA1', 'PS1', 'LPR1', 'P1', '2025-11-01 08:30:00', 'PA1', 'pending', NULL, 'Sensor Replacement'),
('MA2', 'PS2', 'LPR2', 'P5', '2025-11-01 09:15:00', 'PA2', 'in_progress', '2025-11-01 10:00:00', 'Camera recalibration'),

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('MA3', 'PS3', 'LPR1', 'P1', '2025-11-01 09:45:00', 'PA3', 'completed', '2025-11-01 11:00:00', 'Firmware update for LPR'),
('MA4', 'PS4', 'LPR4', 'P1', '2025-11-02 10:00:00', 'PA4', 'pending', NULL, 'Replace broken LED display'),
('MA5', 'PS5', 'LPR5', 'P9', '2025-11-02 10:30:00', 'PA5', 'completed', '2025-11-02 12:00:00', 'Gate arm motor service'),
('MA6', 'PS6', 'LPR3', 'P9', '2025-11-02 11:15:00', 'PA6', 'in_progress', '2025-11-02 12:00:00', 'Software patch installation'),
('MA7', 'PS7', 'LPR7', 'P5', '2025-11-02 13:00:00', 'PA7', 'cancelled', NULL, 'Scheduled maintenance cancelled due to weather'),
('MA8', 'PS8', 'LPR6', 'P9', '2025-11-03 08:00:00', 'PA8', 'completed', '2025-11-03 09:30:00', 'Replaced faulty wiring'),
('MA9', 'PS9', 'LPR8', 'P1', '2025-11-03 09:45:00', 'PA9', 'pending', NULL, 'Diagnostic test initiated'),
('MA10', 'PS10', 'LPR9', 'P5', '2025-11-03 10:15:00', 'PA10', 'completed', '2025-11-03 11:45:00', 'Calibration of entry sensors'),
('MA11', 'PS18', 'LPR10', 'P9', '2025-11-04 09:00:00', 'PA11', 'completed', '2025-11-04 10:30:00', 'Replaced corroded connector and tested EV charger'),
('MA12', 'PS27', 'LPR6', 'P5', '2025-11-05 14:00:00', 'PA12', 'completed', '2025-11-05 15:15:00', 'Fixed intermittent network drop on sensor'),
('MA13', 'PS37', 'LPR4', 'P1', '2025-11-06 09:30:00', 'PA13', 'completed', '2025-11-06 11:00:00', 'Cleaned housing, updated firmware, recalibrated sensor'),
('MA14', 'PS46', 'LPR11', 'P9', '2025-11-07 16:00:00', 'PA14', 'completed', '2025-11-07 17:20:00', 'Replaced faulty power module for LPR and sensor');

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INSERT INTO alert_trigger_by_maintenance_logs (proactive_maintenance_alert_id, maintenance_action_id) VALUES
('PA1', 'MA1'),
('PA2', 'MA2'),
('PA3', 'MA3'),
('PA4', 'MA4'),
('PA5', 'MA5'),
('PA6', 'MA6'),
('PA7', 'MA7'),
('PA8', 'MA8'),
('PA9', 'MA9'),
('PA10', 'MA10'),
('PA11', 'MA11'),
('PA12', 'MA12'),
('PA13', 'MA13'),
('PA14', 'MA14');

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INSERT INTO spot_inspections (spot_inspection_id, parking_spot_id, attendant_id, spot_inspection_result, spot_inspection_datetime) VALUES
('SI1', 'PS1', 'P2', 'pass', '2025-11-01 08:00:00'),

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('SI2', 'PS2', 'P6', 'warning', '2025-11-01 09:15:00'),
('SI3', 'PS3', 'P10', 'requires_maintenance', '2025-11-01 10:00:00'),
('SI4', 'PS4', 'P2', 'pass', '2025-11-01 11:30:00'),
('SI5', 'PS5', 'P6', 'pass', '2025-11-02 08:45:00'),
('SI6', 'PS6', 'P10', 'warning', '2025-11-02 09:30:00'),
('SI7', 'PS7', 'P2', 'requires_maintenance', '2025-11-02 10:15:00'),
('SI8', 'PS8', 'P6', 'pass', '2025-11-03 08:00:00'),
('SI9', 'PS9', 'P10', 'warning', '2025-11-03 09:45:00'),
('SI10', 'PS10', 'P2', 'requires_maintenance', '2025-11-03 10:30:00');

INSERT INTO ai_models (ai_model_id, ai_model_name, ai_model_type) VALUES
('AI1', 'ParkGPT', 'chatbot'),
('AI2', 'VisionEye', 'image_recognition'),
('AI3', 'ParkPredict', 'predictive_analytics'),
('AI4', 'ParkGuard', 'anomaly_detection'),
('AI5', 'LPRPro', 'license_plate_recognition'),
('AI6', 'ZoneAI', 'parking_zone_optimizer'),
('AI7', 'FeeMaster', 'dynamic_pricing_model'),
('AI8', 'ParkAssist', 'voice_assistant'),
('AI9', 'SmartCount', 'vehicle_counting'),
('AI10', 'DataMind', 'data_analysis_engine');

INSERT INTO weathers (weather_id, weather_type, weather_APIS, location_zone_id,
start_datetime, end_datetime) VALUES
('W1', 'Sunny', 'weatherapi.com', 'ZN1', '2025-11-01 07:00:00', '2025-11-01
19:00:00'),
('W2', 'Rain', 'weatherapi.com', 'ZN2', '2025-11-02 08:00:00', '2025-11-02
20:00:00'),
('W3', 'Cloudy', 'weatherapi.com', 'ZN3', '2025-11-03 06:30:00', '2025-11-03
18:30:00'),
('W4', 'Thunderstorm', 'weatherapi.com', 'ZN4', '2025-11-04 09:00:00', '2025-11-
04 21:00:00'),
('W5', 'Drizzle', 'weatherapi.com', 'ZN5', '2025-11-05 07:15:00', '2025-11-05
19:15:00'),
('W6', 'Sunny', 'weatherapi.com', 'ZN1', '2025-11-06 06:45:00', '2025-11-06
18:45:00'),
('W7', 'Foggy', 'weatherapi.com', 'ZN2', '2025-11-07 05:30:00', '2025-11-07
17:30:00'),
('W8', 'Windy', 'weatherapi.com', 'ZN3', '2025-11-08 08:00:00', '2025-11-08
20:00:00'),
('W9', 'Rain', 'weatherapi.com', 'ZN4', '2025-11-09 07:30:00', '2025-11-09
19:30:00'),
('W10', 'Cloudy', 'weatherapi.com', 'ZN5', '2025-11-10 08:15:00', '2025-11-10
20:15:00');

```

```

INSERT INTO customer_support_chatbots (message_id, message_content,
message_datetime, client_id) VALUES
('MS1', 'Hello! How can I assist you with parking today?', '2025-11-01 08:00:00',
'C1'),
('MS2', 'Your payment has been successfully processed.', '2025-11-01 08:05:00',
'C2'),
('MS3', 'The nearest parking zone is Zone 3.', '2025-11-01 08:10:00', 'C3'),
('MS4', 'Rain is expected later today, consider covered parking.', '2025-11-02
09:00:00', 'C4'),
('MS5', 'Your parking session will expire in 10 minutes.', '2025-11-02 09:15:00',
'C5'),
('MS6', 'Welcome back! Would you like to view your parking history?', '2025-11-03
10:00:00', 'C6'),
('MS7', 'System maintenance scheduled at midnight.', '2025-11-03 22:00:00',
'C7'),
('MS8', 'Your loyalty points balance is 120.', '2025-11-04 08:00:00', 'C8'),
('MS9', 'Camera #4 is under maintenance; please use another entry.', '2025-11-05
07:30:00', 'C9'),
('MS10', 'Thank you for contacting ParkGPT. Have a great day!', '2025-11-05
09:00:00', 'C10');

INSERT INTO ai_model_outputs (ai_model_output_id, ai_model_id, weather_id,
output_content, output_type, output_datetime, predicted_demand_scores,
optimal_pricing_indices) VALUES
('AI01', 'AI1', 'W1', 'Predicted high parking demand in Zone A, 9-11AM.',
'demand_forecasting', '2025-11-01 07:00:00', 0.85, 1.10),
('AI02', 'AI2', 'W2', 'Chatbot responded to 15 customer queries.', 'chatbot',
'2025-11-01 08:00:00', NULL, NULL),
('AI03', 'AI3', 'W3', 'Recommended optimal pricing: +5% for covered spots.',
'predictive_maintenance', '2025-11-01 09:00:00', 0.78, 1.05),
('AI04', 'AI4', 'W4', 'Sensor 3 predicted failure risk 90%.',
'predictive_maintenance', '2025-11-01 10:00:00', NULL, NULL),
('AI05', 'AI5', 'W5', 'Customer segmentation complete: 120 frequent users.',
'customer_segmentation', '2025-11-02 08:30:00', NULL, NULL),
('AI06', 'AI6', 'W6', 'Rainy weather predicted – apply 10% discount.',
'demand_forecasting', '2025-11-02 09:45:00', 0.65, 0.90),
('AI07', 'AI7', 'W7', 'License Plate Reader #4 needs maintenance check.',
'predictive_maintenance', '2025-11-02 10:00:00', NULL, NULL),
('AI08', 'AI8', 'W8', 'Chatbot summary: 30% queries about payment issues.',
'chatbot', '2025-11-03 08:15:00', NULL, NULL),
('AI09', 'AI9', 'W9', 'High occupancy predicted 95% for evening peak.',
'demand_forecasting', '2025-11-03 09:00:00', 0.95, 1.15),
('AI10', 'AI10', 'W10', 'Predicted LPR downtime for sensor 6 in 2 days.',
'predictive_maintenance', '2025-11-03 10:30:00', NULL, NULL);

```

```

INSERT INTO sensor_predictive_maintenance_outputs (ai_model_output_id, sensor_id, sensor_predicted_maintenance_datetime) VALUES
('AI03', 'S2', '2025-11-02 08:00:00'),
('AI04', 'S3', '2025-11-05 12:00:00'),
('AI010', 'S6', '2025-11-05 09:00:00');

INSERT INTO lpr_predictive_maintenance_outputs (ai_model_output_id, lpr_id, lpr_predicted_maintenance_datetime) VALUES
('AI07', 'LPR4', '2025-11-04 11:00:00'),
('AI010', 'LPR6', '2025-11-05 09:00:00');

INSERT INTO customer_segmentation_outputs (ai_model_output_id, client_id) VALUES
('AI02', 'C1'),
('AI05', 'C2'),
('AI08', 'C3');

INSERT INTO demand_forecasting_outputs (ai_model_output_id, parking_spot_id) VALUES
('AI01', 'PS1'),
('AI03', 'PS2'),
('AI06', 'PS4'),
('AI09', 'PS5'),
('AI010', 'PS6');

INSERT INTO chatbot_outputs (ai_model_output_id, message_id) VALUES
('AI02', 'MS1'),
('AI05', 'MS2'),
('AI08', 'MS3');

INSERT INTO event_calendars (event_id, event_name, event_type, location_zone_id, start_datetime, end_datetime) VALUES
('E1', 'Deepavali Public Holiday', 'holiday', 'ZN1', '2025-11-01 00:00:00', '2025-11-01 23:59:59'),
('E2', 'Weekend Night Market', 'community', 'ZN2', '2025-11-01 18:00:00', '2025-11-01 23:00:00'),
('E3', 'Indie Band Live', 'concert', 'ZN3', '2025-11-02 19:30:00', '2025-11-02 22:00:00'),
('E4', 'Football Match Viewing', 'sports', 'ZN4', '2025-11-03 20:00:00', '2025-11-03 23:00:00'),
('E5', 'Mall Mega Sale', 'promotion', 'ZN5', '2025-11-04 10:00:00', '2025-11-04 22:00:00'),
('E6', 'Rain Advisory', 'weather', 'ZN1', '2025-11-05 08:00:00', '2025-11-05 20:00:00'),
('E7', 'Food Truck Festival', 'festival', 'ZN2', '2025-11-06 11:00:00', '2025-11-06 21:00:00'),

```

```

('E8', 'University Convocation', 'ceremony', 'ZN3', '2025-11-07 08:00:00', '2025-11-07 14:00:00'),
('E9', 'New Year Countdown Rehearsal', 'rehearsal', 'ZN4', '2025-11-08 18:00:00', '2025-11-08 21:00:00'),
('E10', 'Charity Run', 'sports', 'ZN5', '2025-11-09 06:30:00', '2025-11-09 11:00:00');

INSERT INTO multiple_event_sources (ai_model_output_id, event_id) VALUES
('AIO1', 'E1'),
('AIO2', 'E2'),
('AIO3', 'E3'),
('AIO4', 'E4'),
('AIO5', 'E5'),
('AIO6', 'E6'),
('AIO7', 'E7'),
('AIO8', 'E8'),
('AIO9', 'E9'),
('AIO10', 'E10');

INSERT INTO sensor_sources (ai_model_output_id, sensor_id) VALUES
('AIO1', 'S1'),
('AIO1', 'S2'),
('AIO2', 'S3'),
('AIO3', 'S4'),
('AIO3', 'S5'),
('AIO4', 'S6'),
('AIO5', 'S7'),
('AIO6', 'S8'),
('AIO7', 'S9'),
('AIO8', 'S10');

INSERT INTO lpr_sources (ai_model_output_id, lpr_id) VALUES
('AIO1', 'LPR1'),
('AIO2', 'LPR2'),
('AIO3', 'LPR3'),
('AIO3', 'LPR4'),
('AIO4', 'LPR5'),
('AIO5', 'LPR6'),
('AIO6', 'LPR7'),
('AIO7', 'LPR8'),
('AIO8', 'LPR9'),
('AIO9', 'LPR10');

INSERT INTO client_sources (ai_model_output_id, client_id) VALUES
('AIO1', 'C1'),

```

```

('AI02', 'C2'),
('AI02', 'C3'),
('AI03', 'C4'),
('AI04', 'C5'),
('AI05', 'C6'),
('AI06', 'C7'),
('AI07', 'C8'),
('AI08', 'C9'),
('AI09', 'C10');

INSERT INTO parking_spot_sources (ai_model_output_id, parking_spot_id) VALUES
('AI01', 'PS1'),
('AI01', 'PS2'),
('AI02', 'PS3'),
('AI03', 'PS4'),
('AI03', 'PS5'),
('AI04', 'PS6'),
('AI05', 'PS7'),
('AI06', 'PS8'),
('AI07', 'PS9'),
('AI08', 'PS10');

```

✓ 173	21:12:13	INSERT INTO loyalty_tiers (loyalty_tier_id, tier_name, discount_percentage, min_parkpoints_earned_required) VALUES ('1', 'bronze', 0, 0), ('2', 'silver', 0, 1000), ... 4 row(s) affected Records: 4 Duplic... 0.0022 sec
✓ 174	21:12:13	INSERT INTO sensors (sensor_id, sensor_status, manufacture_date) VALUES ('S1', 'operational', '2023-01-15'), ('S2', 'operational', '2023-02-20'), ('S3', 'need_replacement', '2023-03-15') 50 row(s) affected Records: 50 Duplic... 0.0016 sec
✓ 175	21:12:13	INSERT INTO location_zones (location_zone_id, location_zone_name, air_quality_index, pm25_value, pm10_value, co_value, co2_value, no2_value, o3_value, s... 5 row(s) affected Records: 5 Duplic... 0.0015 sec
✓ 176	21:12:13	INSERT INTO parking_spots (parking_spot_id, sensor_id, location_zone_id, space_type, reserved_license_plate_number, standard_hourly_rate, site_tier, real_time_update, ... 50 row(s) affected Records: 50 Duplic... 0.0026 sec
✓ 177	21:12:13	INSERT INTO clients (client_id, full_name, referral_source, loyalty_tier_id, parkpoints_balance, parkpoints_elite_balance, business_relationship_type, preferred_email, ... 19 row(s) affected Records: 19 Duplic... 0.0024 sec
✓ 178	21:12:13	INSERT INTO phone_numbers (client_id, phone_number, is_primary) VALUES ('C1', '0123456789', 1), ('C2', '0105566778', 1), ('C4', '0132244668', 1), ('C6', '01... 14 row(s) affected Records: 14 Duplic... 0.0014 sec
✓ 179	21:12:13	INSERT INTO emails (client_id, email, is_primary) VALUES ('C1', 'alice.tan@gmail.com', 1), ('C2', 'ben.lim@gmail.com', 1), ('C3', 'chloe.wong@gmail.com', 1), ('C... 19 row(s) affected Records: 19 Duplic... 0.0013 sec
✓ 180	21:12:13	INSERT INTO individual_commuter (client_id, commute_pattern) VALUES ('C1', 'weekday_peak'), ('C2', 'weekday_offpeak'), ('C4', 'early_bird'), ('C6', 'flexible_r... 10 row(s) affected Records: 10 Duplic... 0.00086 sec
✓ 181	21:12:13	INSERT INTO corporate_fleet_account (client_id, company_name, fleet_size, corporate_subscription_rate, billing_cycle) VALUES ('C3', 'TechCorp Solutions Sdn Bhd', 10, 'Annual', '2023-01-01') 9 row(s) affected Records: 9 Duplic... 0.00097 sec
✓ 182	21:12:13	INSERT INTO referral_bonuses (referral_bonus_id, referring_client_id, referred_client_id, referred_client_brand, zone_of_first_parking_session_id) VALUES ('P1', 'C1', 'C2', 'TechCorp Solutions Sdn Bhd', 'Zone 1') 10 row(s) affected Records: 10 Duplic... 0.0011 sec
✓ 183	21:12:13	INSERT INTO parkpoints (parkpoints_transaction_id, client_id, referral_bonus_id, parkpoints_transaction_type, parkpoints_amount, parkpoints_type, parkpoint... 10 row(s) affected Records: 10 Duplic... 0.00011 sec
✓ 184	21:12:13	INSERT INTO earns (parkpoints_transaction_id, parkpoint_source) VALUES ('PT1', 'parking_session'), ('PT2', 'referral_bonus'), ('PT3', 'green_driver_bonus') 7 row(s) affected Records: 7 Duplic... 0.00065 sec
✓ 185	21:12:13	INSERT INTO redeems (parkpoints_transaction_id, parkpoints_redemption_type) VALUES ('PT6', 'free_parking'), ('PT8', 'mobile_wallet_credit'), ('PT10', 'premi... 3 row(s) affected Records: 3 Duplic... 0.00058 sec
✓ 186	21:12:13	INSERT INTO vehicles (license_plate_number, client_id, vehicle_type, is_ev) VALUES ('VQH1234', 'C1', 'sedan', 0), ('BLT5678', 'C2', 'motorbike', 0), ('WNM8821', 'C3', 'bus', 0) 33 row(s) affected Records: 33 Duplic... 0.00096 sec
✓ 187	21:12:13	INSERT INTO dynamic_pricing_rules (rule_id, surcharge_percentage, space_type_affected, effective_start_datetime) VALUES ('R1', 20, 'ev_charger', '2025-10-01') 10 row(s) affected Records: 10 Duplic... 0.00011 sec
✓ 188	21:12:13	INSERT INTO applied_pricing_rules (parking_spot_id, rule_id) VALUES ('PS1', 'R1'), ('PS2', 'R2'), ('PS3', 'R3'), ('PS4', 'R10'), ('PS5', 'R9'), ('PS7', 'R7') 10 row(s) affected Records: 10 Duplic... 0.00093 sec
✓ 189	21:12:13	INSERT INTO location_zone_affected (rule_id, location_zone_id) VALUES ('R1', 'Z1N1'), ('R2', 'ZN51'), ('R3', 'ZN41'), ('R4', 'ZN11'), ('R5', 'ZN21'), ('R6', 'ZN31'), ('R7', 'ZN42') 10 row(s) affected Records: 10 Duplic... 0.00085 sec
✓ 190	21:12:13	INSERT INTO peak_hours (peak_hour_id, start_time, end_time, days_of_weeks) VALUES ('PH1', '07:00:00', '09:00:00', 'Monday'), ('PH2', '17:00:00', '23:00:00', 'Wednesday') 10 row(s) affected Records: 10 Duplic... 0.00092 sec
✓ 191	21:12:13	INSERT INTO applied_peak_hours (rule_id, peak_hour_id) VALUES ('R1', 'PH1'), ('R2', 'PH2'), ('R3', 'PH3'), ('R4', 'PH7'), ('R5', 'PH4'), ('R6', 'PH6'), ('R7', 'PH9') 10 row(s) affected Records: 10 Duplic... 0.0014 sec
✓ 192	21:12:13	INSERT INTO air_quality_routes (air_quality_route_id, reserved_parking_spot_id, route, avoided_pollution) VALUES ('AQ1', 'PS1', 'From Gate A To Zone 1', 'Indus... 10 row(s) affected Records: 10 Duplic... 0.0014 sec
✓ 193	21:12:13	INSERT INTO license_plate_recognitions (lpr_id, manufacture_date) VALUES ('LPR1', '2023-01-15'), ('LPR2', '2023-02-20'), ('LPR3', '2023-03-25'), ('LPR4', '2023-04-15') 11 row(s) affected Records: 11 Duplic... 0.00076 sec
✓ 194	21:12:13	INSERT INTO parking_sessions (parking_session_transaction_id, lpr_id, license_plate_number, parking_spot_id, start_datetime, end_datetime, base_charge, ... 45 row(s) affected Records: 45 Duplic... 0.0019 sec
✓ 195	21:12:13	INSERT INTO lpr_failure_logs (lpr_failure_id, lpr_id, lpr_failure_on_session_id, lpr_failure_datetime, lpr_failure_reason) VALUES ('LPRF1', 'LPR1', 'PS1', '2025-01-01') 18 row(s) affected Records: 18 Duplic... 0.00080 sec
✓ 196	21:12:13	INSERT INTO revenues (revenue_id, revenue_amount, revenue_type, parking_session_id, client_id, parkpoints_transaction_id) VALUES ('RV1', 'C1', 'C2', 'C3', 'C4', 'C5', 'C6', 'C7', 'C8', 'C9', 'C10') 10 row(s) affected Records: 10 Duplic... 0.00089 sec
✓ 197	21:12:13	INSERT INTO personnels (personnel_id, full_name, role, assigned_location_zone_id) VALUES ('P1', 'Ahmad Zulkifli', 'technician', 'Z1N1'), ('P2', 'Siti Nurhaliza', 'admin... 10 row(s) affected Records: 10 Duplic... 0.00089 sec
✓ 198	21:12:13	INSERT INTO technicians (personnel_id, specialization) VALUES ('P1', 'Electrical Systems'), ('P5', 'Sensor Calibration'), ('P9', 'Network Infrastructure') 3 row(s) affected Records: 3 Duplic... 0.00049 sec
✓ 199	21:12:13	INSERT INTO attendants (personnel_id, shift_type) VALUES ('P2', 'Morning'), ('P6', 'Afternoon'), ('P10', 'Night') 3 row(s) affected Records: 3 Duplic... 0.00043 sec
✓ 200	21:12:13	INSERT INTO financeOfficers (personnel_id, department) VALUES ('P3', 'Revenue Management'), ('P7', 'Financial Planning') 2 row(s) affected Records: 2 Duplic... 0.00049 sec
✓ 201	21:12:13	INSERT INTO zone_managers (personnel_id, years_of_experience) VALUES ('P4', '5.50'), ('P8', '2.80') 2 row(s) affected Records: 2 Duplic... 0.00037 sec
✓ 202	21:12:13	INSERT INTO proactive_maintenance_alerts (proactive_maintenance_alert_id, sensor_id, sensor_failure_probability, predicted_sensor_failure_datetime, proact... 14 row(s) affected Records: 14 Duplic... 0.00081 sec
✓ 203	21:12:13	INSERT INTO maintenance_actions (maintenance_action_id, parking_spot_id, lpr_id, technician_id, maintenance_action_work_order_datetime, proactive_main... 14 row(s) affected Records: 14 Duplic... 0.00089 sec
✓ 204	21:12:13	INSERT INTO alert_trigger_by_maintenance_logs (proactive_maintenance_alert_id, maintenance_action_id) VALUES ('PA1', 'MA1'), ('PA2', 'MA2'), ('PA3', 'MA3') 14 row(s) affected Records: 14 Duplic... 0.00066 sec
✓ 205	21:12:13	INSERT INTO spot_inspections (spot_inspection_id, parking_spot_id, attendant_id, spot_inspection_result, spot_inspection_datetime) VALUES ('S1', 'PS1', 'P1', 'A1') 10 row(s) affected Records: 10 Duplic... 0.00069 sec
✓ 206	21:12:13	INSERT INTO ai_models (ai_model_id, ai_model_name, ai_model_type) VALUES ('AI1', 'ParkGPT', 'chatbot'), ('AI2', 'VisionEye', 'image_recognition'), ('AI3', 'Par... 10 row(s) affected Records: 10 Duplic... 0.00046 sec
✓ 207	21:12:13	INSERT INTO weathers (weather_id, weather_type, weather APIs, location_zone_id, start_datetime, end_datetime) VALUES ('W1', 'Sunny', 'weatherapl.com', 'Z1N1', '2025-01-01') 10 row(s) affected Records: 10 Duplic... 0.00062 sec
✓ 208	21:12:13	INSERT INTO customer_support_chatbots (message_id, message_content, message_datetime, client_id) VALUES ('MS1', 'Hello! How can I assist you with parki... 10 row(s) affected Records: 10 Duplic... 0.00052 sec
✓ 209	21:12:13	INSERT INTO ai_model_outputs (ai_model_output_id, ai_model_id, weather_id, output_content, output_type, output_datetime, predicted_demand_scores, opti... 10 row(s) affected Records: 10 Duplic... 0.00090 sec
✓ 210	21:12:13	INSERT INTO sensor_predictive_maintenance_outputs (ai_model_output_id, sensor_id, sensor_predicted_maintenance_datetime) VALUES ('AIO1', 'S2', '2025-01-01') 3 row(s) affected Records: 3 Duplic... 0.00041 sec
✓ 211	21:12:13	INSERT INTO lpr_predictive_maintenance_outputs (ai_model_output_id, lpr_id, lpr_predicted_maintenance_datetime) VALUES ('AIO7', 'LPR4', '2025-11-04 11:00:00') 2 row(s) affected Records: 2 Duplic... 0.00036 sec

```

✓ 212 21:12:13 INSERT INTO customer_segmentation_outputs (ai_model_output_id, client_id) VALUES ('AIO2', 'C1'), ('AIO5', 'C2'), ('AIO8', 'C3') 3 row(s) affected Records: 3 Duplic... 0.00035 sec
✓ 213 21:12:13 INSERT INTO demand_forecasting_outputs (ai_model_output_id, parking_spot_id) VALUES ('AIO1', 'PS1'), ('AIO3', 'PS2'), ('AIO6', 'PS4'), ('AIO9', 'PS5'), ('AIO1...', 5 row(s) affected Records: 5 Duplic... 0.00037 sec
✓ 214 21:12:13 INSERT INTO chatbot_outputs (ai_model_output_id, message_id) VALUES ('AIO2', 'MS1'), ('AIO5', 'MS2'), ('AIO8', 'MS3') 3 row(s) affected Records: 3 Duplic... 0.00035 sec
✓ 215 21:12:13 INSERT INTO event_calendars (event_id, event_name, event_type, location_zone_id, start_datetime, end_datetime) VALUES ('E1', 'Deepavali Public Holiday', 'h...', 10 row(s) affected Records: 10 Duplic... 0.00055 sec
✓ 216 21:12:13 INSERT INTO multiple_event_sources (ai_model_output_id, event_id) VALUES ('AIO1', 'E1'), ('AIO2', 'E2'), ('AIO3', 'E3'), ('AIO4', 'E4'), ('AIO5', 'E5'), ('AIO6', 'E6',...) 10 row(s) affected Records: 10 Duplic... 0.00045 sec
✓ 217 21:12:13 INSERT INTO sensor_sources (ai_model_output_id, sensor_id) VALUES ('AIO1', 'S1'), ('AIO1', 'S2'), ('AIO2', 'S3'), ('AIO3', 'S4'), ('AIO3', 'S5'), ('AIO4', 'S6'), ('AIO5', 'S7'), ('AIO6', 'S8') 10 row(s) affected Records: 10 Duplic... 0.00046 sec
✓ 218 21:12:13 INSERT INTO lpr_sources (ai_model_output_id, lpr_id) VALUES ('AIO1', 'LPR1'), ('AIO2', 'LPR2'), ('AIO3', 'LPR3'), ('AIO3', 'LPR4'), ('AIO4', 'LPR5'), ('AIO5', 'LPR6',...) 10 row(s) affected Records: 10 Duplic... 0.00040 sec
✓ 219 21:12:13 INSERT INTO client_sources (ai_model_output_id, client_id) VALUES ('AIO1', 'C1'), ('AIO2', 'C2'), ('AIO2', 'C3'), ('AIO3', 'C4'), ('AIO4', 'C5'), ('AIO5', 'C6'), ('AIO6', 'C7') 10 row(s) affected Records: 10 Duplic... 0.00062 sec
✓ 220 21:12:13 INSERT INTO parking_spot_sources (ai_model_output_id, parking_spot_id) VALUES ('AIO1', 'PS1'), ('AIO1', 'PS2'), ('AIO2', 'PS3'), ('AIO3', 'PS4'), ('AIO3', 'PS5'),... 10 row(s) affected Records: 10 Duplic... 0.00039 sec

```

## C. SQL Report

5. Write an SQL query to list the name and vehicle identifier of all clients designated as 'Corporate' who have an electric vehicle registered and are affiliated with the 'KLParkEasy Pro' brand.

This query displays the full name and license plate number of all clients who are registered as corporate fleet accounts, own electric vehicles, and are affiliated with the 'Pro' brand service.

```
SELECT c.full_name, v.license_plate_number
FROM clients c
JOIN vehicles v ON c.client_id = v.client_id
WHERE c.business_relationship_type = 'corporate_fleet_account'
AND v.is_ev = TRUE
AND c.brand_affiliation = 'pro';
```

full_name	license_plate_number
Aaron Lee	JQK3219
Aaron Lee	NRK1109
Bella Tan	JTH8801
Bella Tan	WAD5532
Darren Khoo	WXL6888
Leonard Tan	JLT9982
Chloe Wong	JQS4392
Chloe Wong	WNM8821

```
✓ 101 21:19:14   SELECT c.full_name,      v.license_plate_number FROM clients c JOIN vehicles v... 8 row(s) returned          0.00063 sec / 0.000...
```

6. Write an SQL query to calculate the Total BaseCharge revenue generated from all parking transactions that occurred in the 'Bukit Bintang' zone.

This query provides the sum of all base charges from parking sessions that occurred in parking spots located within the Bukit Bintang zone, before any surcharges, taxes, or discounts are applied.

```
SELECT SUM(pst.base_charge) AS total_basecharge_revenue
FROM parking_sessions pst
JOIN parking_spots ps ON ps.parking_spot_id = pst.parking_spot_id
JOIN location_zones lz ON lz.location_zone_id = ps.location_zone_id
WHERE lz.location_zone_name = 'bukit_bintang';
```

total\_basecharge\_revenue

104.15

✓ 102 21:22:54 SELECT SUM(pst.base\_charge) AS total\_basecharge\_revenue FROM parking\_se... 1 row(s) returned 0.00069 sec / 0.000...

7. Write an SQL query to list the spot identifier, its LocationZone, and its last service date for all parking spaces where the sensor status is reported as 'Offline'.

This query displays the parking spot identifier, its location zone name, and the most recent maintenance action date for all parking spaces where the associated sensor status is currently reported as 'offline'.

```
SELECT ps.parking_spot_id, lz.location_zone_name,
MAX(ma.maintenance_action_taken_datetime)
FROM parking_spots ps
JOIN sensors s ON ps.sensor_id = s.sensor_id
JOIN location_zones lz ON ps.location_zone_id = lz.location_zone_id
LEFT JOIN maintenance_actions ma ON ps.parking_spot_id = ma.parking_spot_id
WHERE s.sensor_status = 'offline'
GROUP BY ps.parking_spot_id, lz.location_zone_name;
```

<code>parking_spot_id</code>	<code>location_zone_name</code>	<code>MAX(ma.maintenance_action_taken_datetime)</code>
PS4	kl_sentral	NULL
PS5	kl_sentral	2025-11-02 12:00:00
PS6	kl_sentral	2025-11-02 12:00:00
PS7	kl_sentral	NULL
PS18	jalan_ampang	2025-11-04 10:30:00
PS27	bukit_bintang	2025-11-05 15:15:00
PS37	cyberjaya	2025-11-06 11:00:00
PS46	the_gradens_mall	2025-11-07 17:20:00

```
✓ 103 21:24:31   SELECT ps.parking_spot_id, lz.location_zone_name, MAX(ma.maintena... 8 row(s) returned 0.00099 sec / 0.000...
```

8. Calculate the FinalCharge for a Gold Tier client who parked a vehicle for 3.0 hours in a lot with a Standard Hourly Rate of 5.00 (RM) during a Peak Hour where a 20% surcharge was applied (Gold Tier discount must be factored in after the surcharge is applied).

This query computes the final charge for Gold tier members who parked for 3 or more hours at a standard hourly rate of RM5.00 during peak hours with a 20% surcharge applied. The loyalty discount is factored in after the surcharge calculation.

```
SELECT c.client_id, ROUND((TIMESTAMPDIFF(MINUTE, pst.start_datetime,
pst.end_datetime)/60.0 * ps.standard_hourly_rate * (1 +
pst.dynamic_surcharge_percent/100)) * (1 - pst.loyalty_discount_percent/100),
2) AS final_charge
FROM parking_sessions pst
JOIN vehicles v ON v.license_plate_number = pst.license_plate_number
JOIN clients c ON v.client_id = c.client_id
JOIN loyalty_tiers lt ON lt.loyalty_tier_id = c.loyalty_tier_id
JOIN parking_spots ps ON pst.parking_spot_id = ps.parking_spot_id
WHERE ps.standard_hourly_rate = 5
AND pst.dynamic_surcharge_percent = 20
AND lt.tier_name = 'gold'
AND TIMESTAMPDIFF(MINUTE, pst.start_datetime, pst.end_datetime) >= 180;
```

client_id	final_charge
C1	22.80

```
✓ 104 21:26:37   SELECT c.client_id,      ROUND((      TIMESTAMPDIFF(MINUTE, pst.start_datet... 1 row(s) returned          0.00086 sec / 0.000...
```

9. Provide a report showing the total count of parking transactions that experienced one or more license plate reading failures, segmented by LocationZone.

This query provides a report showing the total count of distinct parking transactions that experienced one or more license plate recognition failures, grouped by each location zone for maintenance prioritization.

```
SELECT lz.location_zone_name, COUNT(DISTINCT  
pst.parking_session_transaction_id) AS transactions_with_lpr_failures  
FROM lpr_failure_logs lprfl  
JOIN parking_sessions pst ON pst.parking_session_transaction_id =  
lprfl.lpr_failure_on_session_id  
JOIN parking_spots ps ON ps.parking_spot_id = pst.parking_spot_id  
JOIN location_zones lz ON lz.location_zone_id = ps.location_zone_id  
GROUP BY lz.location_zone_name;
```

location_zone_name	transactions_with_lpr_failur...
bukit_bintang	4
cyberjaya	1
kl_sentral	6
the_gradens_mall	1

```
✓ 105 21:27:36 SELECT lz.location_zone_name, COUNT(DISTINCT pst.parking_session_tra... 4 row(s) returned 0.00090 sec / 0.000...
```

10. Write an SQL query to identify the 10 clients with the highest total ParkPoints Balance whose PreferredPaymentMethod is 'Blockchain Token', and list their Loyalty Tier and Brand Affiliation.

This query displays the client ID, ParkPoints balance, preferred payment method, loyalty tier name, and brand affiliation for the 10 clients with the highest ParkPoints balance whose preferred payment method is 'blockchain\_token'.

```
SELECT c.client_id, c.parkpoints_balance, c.preferred_payment_method,
lt.tier_name, c.brand_affiliation
FROM clients c
JOIN loyalty_tiers lt ON c.loyalty_tier_id = lt.loyalty_tier_id
WHERE c.preferred_payment_method = 'blockchain_token'
ORDER BY c.parkpoints_balance DESC
LIMIT 10;
```

client_id	parkpoints_balance	preferred_payment_method	tier_name	brand_affiliation
C13	4200	blockchain_token	elite	pro
C18	3900	blockchain_token	elite	both
C14	3600	blockchain_token	gold	tourist
C15	3400	blockchain_token	gold	both
C11	3100	blockchain_token	gold	pro
C19	2950	blockchain_token	silver	pro
C12	2900	blockchain_token	gold	pro
C16	2800	blockchain_token	silver	pro
C17	2650	blockchain_token	gold	tourist
C7	2600	blockchain_token	gold	pro

```
✓ 106 21:29:18   SELECT c.client_id,      c.parkpoints_balance,      c.preferred_payment_metho... 10 row(s) returned          0.0011 sec / 0.00001...
```

## D. Analysing database structure and designing useful reports

11. Prepare five (5) different types of reports of your own using SQL query language requiring multiple joins and aggregation concept. These reports should demonstrate your ability to analyse data stored in various tables and provide meaningful insights. The following is an example:

### Report 1: Zone Demand Report

This query displays each location zone name and its total parking demand, measured by the count of parking session transactions. Zones are ranked from highest to lowest demand for resource allocation and expansion planning.

```
WITH session_count AS (
    SELECT ps.location_zone_id, COUNT(pst.parking_session_transaction_id) AS demand
    FROM parking_spots ps
    LEFT JOIN parking_sessions pst ON pst.parking_spot_id = ps.parking_spot_id
    GROUP BY ps.location_zone_id
)
SELECT lz.location_zone_name, sc.demand
FROM location_zones lz
LEFT JOIN session_count sc ON sc.location_zone_id = lz.location_zone_id
ORDER BY sc.demand DESC;
```

location_zone_name	demand
cyberjaya	11
jalan_ampang	10
kl_sentral	9
bukit_bintang	9
the_gradens_mall	6

```
✓ 107 21:45:46 WITH session_count AS ( SELECT ps.location_zone_id, COUNT(pst.parking... 5 row(s) returned 0.0014 sec / 0.00000...
```

## Report 2: Monthly Parking Revenue by Zone

This query creates a reusable view that calculates session revenue including surcharges, taxes, and discounts. The main query then aggregates this revenue by location zone and month for financial trend analysis and reporting.

```
CREATE VIEW vw_session_revenue AS
SELECT pst.parking_spot_id, pst.start_datetime, (pst.base_charge * (1 +
pst.dynamic_surcharge_percent/100) * (1 + pst.local_taxes_percent/100) * (1 -
pst.total_discount_percent/100)) AS revenue
FROM parking_sessions pst;

SELECT lz.location_zone_name, MONTH(vr.start_datetime) AS month,
ROUND(SUM(vr.revenue), 2) AS monthly_revenue
FROM vw_session_revenue vr
JOIN parking_spots ps ON ps.parking_spot_id = vr.parking_spot_id
JOIN location_zones lz ON ps.location_zone_id = lz.location_zone_id
GROUP BY lz.location_zone_name, month
ORDER BY monthly_revenue DESC;
```

location_zone_name	month	monthly_revenue
kl_sentral	10	144.80
cyberjaya	10	104.45
jalan_ampang	10	93.84
cyberjaya	11	89.50
the_gradens_mall	10	70.24
bukit_bintang	11	66.35
jalan_ampang	11	65.16
bukit_bintang	10	52.28
the_gradens_mall	11	22.20

```
✓ 108 21:51:48 CREATE VIEW vw_session_revenue AS SELECT pst.parking_spot_id, pst.star... 0 row(s) affected          0.0027 sec
✓ 109 21:51:48 SELECT lz.location_zone_name, MONTH(vr.start_datetime) AS month, R... 9 row(s) returned          0.0017 sec / 0.00000...
```

## Report 3: Revenue by Parking Type

This query provides the total revenue generated by each parking space type (standard, premium\_covered, ev\_charger, motorbike, reserved). Revenue is calculated including surcharges, taxes, and discounts for pricing strategy optimization across different space categories.

```
WITH type_revenue AS (
    SELECT pst.parking_spot_id, (pst.base_charge * (1 +
pst.dynamic_surcharge_percent/100)* (1 + pst.local_taxes_percent/100)* (1 -
pst.total_discount_percent/100)) AS revenue
    FROM parking_sessions pst
)
SELECT ps.space_type AS Parking_Type, ROUND(SUM(tr.revenue), 2) AS
Total_Revenue
FROM parking_spots ps
RIGHT JOIN type_revenue tr ON tr.parking_spot_id = ps.parking_spot_id
WHERE ps.space_type IS NOT NULL
GROUP BY ps.space_type;
```

Parking_Type	Total_Revenue
ev_charger	254.43
standard	201.50
reserved	45.95
premium_covered	67.64
motorbike	139.31

```
✓ 110 21:56:04 WITH type_revenue AS ( SELECT pst.parking_spot_id, ... (pst.base_charge... 5 row(s) returned 0.00091 sec / 0.0000...
```

## Report 4: Average Parking Duration by Brand Affiliation

This query displays the average parking duration and transaction count for each brand category (pro, tourist, no\_brand) per location zone. Clients with 'both' affiliation are counted in both pro and tourist categories to accurately represent their contribution to each brand segment's parking behaviour patterns.

```
WITH brand_expanded AS (
    SELECT client_id, 'pro' AS brand_category
    FROM clients WHERE brand_affiliation = 'pro'
    UNION ALL
    SELECT client_id, 'tourist' AS brand_category
    FROM clients WHERE brand_affiliation = 'tourist'
    UNION ALL
    SELECT client_id, 'pro' AS brand_category
    FROM clients WHERE brand_affiliation = 'both'
    UNION ALL
    SELECT client_id, 'tourist' AS brand_category
    FROM clients WHERE brand_affiliation = 'both'
    UNION ALL
    SELECT client_id, 'no_brand' AS brand_category
    FROM clients WHERE brand_affiliation IS NULL
)
SELECT lz.location_zone_name, be.brand_category,
COUNT(pst.parking_session_transaction_id) AS transaction_count,
ROUND(AVG(TIMESTAMPDIFF(MINUTE, pst.start_datetime, pst.end_datetime)/60.0),
2) AS average_parking_duration_hours
FROM location_zones lz
JOIN parking_spots ps ON ps.location_zone_id = lz.location_zone_id
JOIN parking_sessions pst ON pst.parking_spot_id = ps.parking_spot_id
JOIN vehicles v ON v.license_plate_number = pst.license_plate_number
JOIN brand_expanded be ON be.client_id = v.client_id
GROUP BY lz.location_zone_name, be.brand_category
ORDER BY lz.location_zone_name, be.brand_category;
```

location_zone_name	brand_category	transaction_count	average_parking_duration_hours
bukit_bintang	no_brand	1	4.00
bukit_bintang	pro	6	2.08
bukit_bintang	tourist	2	1.50
cyberjaya	no_brand	4	2.25
cyberjaya	pro	4	2.38
cyberjaya	tourist	3	2.33
jalan_ampang	no_brand	3	1.83
jalan_ampang	pro	7	2.36
kl_sentral	no_brand	1	2.00
kl_sentral	pro	6	2.50
kl_sentral	tourist	2	2.25
the_gradens_mall	no_brand	1	3.00
the_gradens_mall	pro	4	1.75
the_gradens_mall	tourist	1	2.00

✓ 111 21:59:17 WITH brand\_expanded AS ( SELECT client\_id, 'pro' AS brand\_category FROM... 14 row(s) returned 0.0015 sec / 0.00001...

## Report 5: Revenue by Loyalty Tier

This query displays each client's total hours spent using EV charger parking spots. It tracks electric vehicle charging station utilization to identify green drivers for eco-friendly rewards, sustainability reporting, and promoting environmentally conscious parking behaviour.

```
SELECT lt.tier_name, ROUND(SUM((pst.base_charge * (1 +  
pst.dynamic_surcharge_percent/100) * (1 + local_taxes_percent/100)) * (1 -  
total_discount_percent/100)),2) AS Total_Revenue  
FROM parking_sessions pst  
JOIN vehicles v ON v.license_plate_number = pst.license_plate_number  
JOIN clients c ON c.client_id = v.client_id  
JOIN loyalty_tiers lt ON lt.loyalty_tier_id = c.loyalty_tier_id  
GROUP BY lt.tier_name
```

tier_name	Total_Revenue
bronze	64.31
silver	184.13
gold	325.45
elite	134.94

```
✓ 112 22:01:41 SELECT lt.tier_name, ROUND( SUM( (pst.base_charge * (1 + pst.dynamic... 4 row(s) returned 0.0014 sec / 0.00000...
```

## **E. Unforeseen challenges**

### **Monsoon Climate Impact**

To deal with monsoon climate impact, this project will need to implement flood risk tracking and automatic discount feature for KLParkEasy. To support this feature, a few modifications must be made to the existing database.

Firstly, a new attribute *flood\_risk\_level* can be added to the *parking\_spots* entity. It will be an ENUM field with the values 'low', 'medium' or 'high'. It stores the current flood risk status for each parking space based on its location.

For the weather integration, a well-built *weathers* entity has already existed to deal with environment data. The only enhancement required is to incorporate additional data from a third-party flood monitoring API. Since the *weather* table already has a *weather\_APIS* attribute, hence the new flood API source can be stored there alongside the existing weather data.

In addition, the AI Systems are already linked to both *parking\_spots* and *weathers* entities through the existing relationships. This setup allows the AI Systems to use the weather API data to predict flood risk levels and automatically update each parking spot's *flood\_risk\_level*.

Finally, for the discount feature, a new attribute *flood\_warning\_discount\_percent* can be added to the *parking\_sessions* entity. When a user parks at a high flood risk spot which can be captured and detected by the sensor, they will receive a 50% discount when paying for parking. However, medium and low risk levels do not receive any discount.

Here is the new final charge formula where the flood warning discount is applied to the base charge:

```
ROUND(((pst.base_charge * (1 - pst.flood_warning_discount_percent/100)) * (1 +  
pst.dynamic_surcharge_percent/100) * (1 + pst.local_taxes_percent/100)) * (1 -  
pst.total_discount_percent/100), 2) AS final_charge
```

### **Investment Pitch**

YouTube Link: [https://youtu.be/\\_uHKSyZmMf8](https://youtu.be/_uHKSyZmMf8)



## ASSESSMENT SUBMISSION DECLARATION FORM

<b>Module Code:</b>	ITS62904
<b>Module Name:</b>	Database Systems
<b>Assessment:</b>	Group Assignment

<b>Student Name:</b>	TAN JING HONG
<b>Student ID:</b>	0378974
<b>Semester/Year:</b>	September 2025

Dear Students,

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### Flexible use of Gen AI

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### Use of Gen AI is not applicable

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Where Gen AI tools have been used, you must attach your chat history and an appendix listing the prompt used, the output generated by the generative AI tools, how the output was used and the pages where the AI-generated content can be found as per the table below:

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Example: ChatGPT	"Describe principles of marketing in 30 words"	The principles of marketing focus on understanding customer needs, creating value, building relationships, targeting specific markets, using effective promotion, ensuring product accessibility, pricing strategically, and fostering long-term loyalty and satisfaction.	The principles of marketing, as outlined by Kotler and Keller (2016), emphasize the importance of understanding customer needs, creating value, and building strong relationships. Key elements include targeting specific market segments, implementing effective promotional strategies, ensuring product accessibility, employing strategic pricing, and fostering long-term customer loyalty and satisfaction through a customer-centric approach (ChatGPT, 2024).	Page 1

The Gen AI-generated content must be appropriately cited and referenced. Any work submitted using AI tools without proper citation and referenced will be treated as though it was plagiarised.

## INFORMATION ON PENALTIES RELATING TO ACADEMIC MISCONDUCT

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- Counseling or cautioning.
- Awarding zero marks for the assignment.
- Failing the module.
- Suspension from enrollment at Taylor's University/College.
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### Acknowledgment by the student

When Gen AI is allowed to be used, acknowledgement of how Gen AI is used can be included as follows: (Place a tick '✓' in the checkbox where relevant)

Type	Acknowledgement
✓ Gen AI is allowed but student chooses not to use it	I did not use any Gen AI tools for this assignment.
Generate content which is modified in the final assessment submission	I acknowledge the use of ..... to general materials such as ..... in this assessment. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was used and the pages where the Gen AI-generated content can be found.
Use Gen AI to polish language before further modification for final submission	I acknowledge the use of ..... to improve the academic tone and accuracy of language, including grammatical structures, punctuation and vocabulary. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was modified further to better represent my tone and style of writing.  <i>Note: Please modify the above as per your lecturers' needs</i>
	I attached Appendix in this assignment the chat history, including all the prompts that I used and the output from the Gen AI tool(s) for this assignment.

The use of GenAI has to be referenced appropriately according to the referencing style as required:

Referencing Style*	In-text citation	Reference
APA	... (AI platform, year)	Company. (year). <i>Platform Used</i> (version) [model]. URL  <b>Example:</b> OpenAI. (2023). <i>ChatGTP</i> (Mar 14 version) [Large language model]. <a href="https://chat.openai.com/chat">https://chat.openai.com/chat</a>
MLA	.... ("prompt").	"Description of prompt" prompt. <i>Name of AI tool</i> , version of AI tool, Company, date text was generated. URL.  <b>Example (Text):</b> "Identify the themes in McTeague by Frank Norris" prompt. ChatGPT, 21 November version, OpenAI, 4 Dec. 2023. <a href="https://chat.openai.com/share/2f2be19d-eadd-4151-8ceb-0785319074b3">https://chat.openai.com/share/2f2be19d-eadd-4151-8ceb-0785319074b3</a>

		<b>Example (Image):</b> Fig. 2. "Create impressionist painting of a cat using neutral colors" prompt. DALL-E, version 2, OpenAI, 27 Nov. 2023. <a href="https://labs.openai.com/">https://labs.openai.com/</a>
Harvard	... (AI platform year)	<p>There is no guideline for Harvard style on referencing the use of AI. The following format is recommended by most universities.</p> <p>Name of AI (Year of communication) Medium of communication. Receiver of communication, Day/month of communication.</p> <p><b>Example</b> OpenAI ChatGPT (2023) ChatGPT response to Mary Jane, 25 January 2024</p>

\*Please refer to the latest referencing style.

### Declaration

I confirm that:

- a) I understand what constitutes academic integrity violations, including plagiarism, collusion, fabrication, falsification, contract cheating, and improper use of Gen AI.
- b) I confirm that my work or any part of this assessment has neither been previously and is not concurrently submitted for any other programme at Taylor's University or any other institution, save except when re-use of the same work is permitted by the module leader.
- c) I acknowledge that using Gen AI or any external assistance without proper attribution constitutes academic misconduct and may be sanctioned accordingly.
- d) I understand that if there are indications of academic integrity breaches, including improper Gen AI use, my work will be subject to investigation.
- e) This assignment is my own work, and I have properly acknowledged all sources, tools, and external contributions, including the use of Gen AI where applicable.
- f) I acknowledge and authorize the submission and/or storage of my work in a database for the purpose of verifying its originality and/or conducting tests using artificial intelligence software, and I hereby consent to this process.
- g) I acknowledge that this submission is subject to Taylor's University/College Academic Integrity Procedure (THE-ACA-PROC-AINT) and all applicable university regulations.

<b>Name &amp; Student ID</b>	<b>TAN JING HONG (0378974)</b>
<b>Signature</b>	
<b>Date</b>	02/12/2025



## ASSESSMENT SUBMISSION DECLARATION FORM

<b>Module Code:</b>	ITS62904
<b>Module Name:</b>	Database Systems
<b>Assessment:</b>	Group Assignment

<b>Student Name:</b>	CHANG HUI YII
<b>Student ID:</b>	0375028
<b>Semester/Year:</b>	September 2025

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Gen AI is allowed but student chooses not to use it	I did not use any Gen AI tools for this assignment.
✓ Generate content which is modified in the final assessment submission	I acknowledge the use of ChatGPT to generate materials such as ideas of useful business-related report for part D in this assessment. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was used and the pages where the Gen AI-generated content can be found.
Use Gen AI to polish language before further modification for final submission	I acknowledge the use of ..... to improve the academic tone and accuracy of language, including grammatical structures, punctuation and vocabulary. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was modified further to better represent my tone and style of writing.  <i>Note: Please modify the above as per your lecturers' needs</i>
✓ I attached Appendix in this assignment the chat history, including all the prompts that I used and the output from the Gen AI tool(s) for this assignment.	

The use of GenAI has to be referenced appropriately according to the referencing style as required:

Referencing Style*	In-text citation	Reference
APA	... (AI platform, year)	Company. (year). <i>Platform Used</i> (version) [model]. URL  <b>Example:</b> OpenAI. (2023). <i>ChatGTP</i> (Mar 14 version) [Large language model]. <a href="https://chat.openai.com/chat">https://chat.openai.com/chat</a>
MLA	.... ("prompt").	"Description of prompt" prompt. <i>Name of AI tool</i> , version of AI tool, Company, date text was generated. URL.  <b>Example (Text):</b> "Identify the themes in McTeague by Frank Norris" prompt. ChatGPT, 21 November version, OpenAI, 4 Dec. 2023. <a href="https://chat.openai.com/share/2f2be19d-eadd-4151-8ceb-0785319074b3">https://chat.openai.com/share/2f2be19d-eadd-4151-8ceb-0785319074b3</a>

		<b>Example (Image):</b> Fig. 2. "Create impressionist painting of a cat using neutral colors" prompt. DALL-E, version 2, OpenAI, 27 Nov. 2023. <a href="https://labs.openai.com/">https://labs.openai.com/</a>
Harvard	... (AI platform year)	<p>There is no guideline for Harvard style on referencing the use of AI. The following format is recommended by most universities.</p> <p>Name of AI (Year of communication) Medium of communication. Receiver of communication, Day/month of communication.</p> <p><b>Example</b> OpenAI ChatGPT (2023) ChatGPT response to Mary Jane, 25 January 2024</p>

\*Please refer to the latest referencing style.

### Declaration

I confirm that:

- a) I understand what constitutes academic integrity violations, including plagiarism, collusion, fabrication, falsification, contract cheating, and improper use of Gen AI.
- b) I confirm that my work or any part of this assessment has neither been previously and is not concurrently submitted for any other programme at Taylor's University or any other institution, save except when re-use of the same work is permitted by the module leader.
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- e) This assignment is my own work, and I have properly acknowledged all sources, tools, and external contributions, including the use of Gen AI where applicable.
- f) I acknowledge and authorize the submission and/or storage of my work in a database for the purpose of verifying its originality and/or conducting tests using artificial intelligence software, and I hereby consent to this process.
- g) I acknowledge that this submission is subject to Taylor's University/College Academic Integrity Procedure (THE-ACA-PROC-AINT) and all applicable university regulations.

<b>Name &amp; Student ID</b>	<b>CHANG HUI YII 0375028</b>
<b>Signature</b>	<i>huiyii.</i>
<b>Date</b>	02/12/2025

## Appendix

AI Tool Used	Prompts	Outputs	How the output was changed for use into the assignment	Specify the page(s) in the assignment where the output is used
ChatGPT	<p>"Suggest 10 business-related reports that can be produced by a parking system database."</p>	<p>"Here are <b>10 business-related reports</b> that a parking system database can produce. These focus on revenue, operations, and decision-making:</p> <ul style="list-style-type: none"> <li><b>1. Revenue Summary Report</b> Shows total revenue collected by day/week/month, broken down by zones, parking types, or payment methods. Useful for monitoring business performance.</li> <li><b>2. Parking Demand by Zone Report</b> Counts total parking sessions in each zone to identify high-demand or underutilized areas. Helps with pricing and capacity planning.</li> <li><b>3. Occupancy Rate Report</b> Shows peak/average occupancy by time of day. Useful for understanding patterns (e.g., lunch hour peaks) and optimizing staffing or pricing.</li> <li><b>4. Payment Method Utilization Report</b> Breakdown of cash vs e-wallet vs credit card usage. Helps with financial planning and identifying preferred payment channels.</li> <li><b>5. Session Duration Distribution Report</b> Shows how long customers usually park (e.g., &lt;1 hour, 1–2 hours, &gt;3 hours). Useful for improving product packages or pricing tiers.</li> <li><b>6. Revenue Leakage / Unpaid Session Report</b> Lists sessions with incomplete payments, failed transactions, or exits without payment. Helps detect fraud, system issues, or operational loopholes.</li> <li><b>7. Membership / Season Pass Performance Report</b> Shows active passes, renewals, usage frequency, and total revenue contributed by season parking users.</li> <li><b>8. Enforcement &amp; Violation Report</b> Tracks overstays, illegal parking attempts, and clamp/penalty fees. Useful for security and operations teams.</li> <li><b>9. Device / Gate Performance Report</b> Monitors errors, downtime, and success rates for barriers, ticket machines, or ANPR cameras. Helps reduce operational disruptions.</li> <li><b>10. Customer Flow &amp; Peak Time Analysis</b> Shows entry and exit counts by hour/day to identify busiest times and resource needs. Useful for staffing, traffic planning, and</li> </ul>	<ul style="list-style-type: none"> <li>• Parking demand by zone report idea and revenue summary report idea are taken but modified to propose highest zone demand report and calculate monthly parking revenue by zone. (ChatGPT, 2025).</li> <li>• Session duration distribution report idea and occupancy rate report idea are taken but the idea is integrated to propose revenue by parking type report and to get the average parking duration for brand affiliation pattern.</li> </ul>	Page 61

		marketing promotions. "	
--	--	----------------------------	--

Suggest 10 business-related reports that can be produced by a parking system database.

Here are **10 business-related reports** that a parking system database can produce. These focus on revenue, operations, and decision-making:

### **1. Revenue Summary Report**

Shows total revenue collected by day/week/month, broken down by zones, parking types, or payment methods. Useful for monitoring business performance.

### **2. Parking Demand by Zone Report**

Counts total parking sessions in each zone to identify high-demand or underutilized areas. Helps with pricing and capacity planning.

### **3. Occupancy Rate Report**

Shows peak/average occupancy by time of day. Useful for understanding patterns (e.g., lunch hour peaks) and optimizing staffing or pricing.

### **4. Payment Method Utilization Report**

Breakdown of cash vs e-wallet vs credit card usage. Helps with financial planning and identifying preferred payment channels.

### **5. Session Duration Distribution Report**

Shows how long customers usually park (e.g., <1 hour, 1–2 hours, >3 hours). Useful for improving product packages or pricing tiers.

### **6. Revenue Leakage / Unpaid Session Report**

Lists sessions with incomplete payments, failed transactions, or exits without payment. Helps detect fraud, system issues, or operational loopholes.

### **7. Membership / Season Pass Performance Report**

Shows active passes, renewals, usage frequency, and total revenue contributed by season parking users.

### **8. Enforcement & Violation Report**

Tracks overstays, illegal parking attempts, and clamp/penalty fees. Useful for security and operations teams.

### **9. Device / Gate Performance Report**

Monitors errors, downtime, and success rates for barriers, ticket machines, or ANPR cameras. Helps reduce operational disruptions.

### **10. Customer Flow & Peak Time Analysis**

Shows entry and exit counts by hour/day to identify busiest times and resource needs. Useful for staffing, traffic planning, and marketing promotions.



Figure 1: Generated outputs based on prompts



## ASSESSMENT SUBMISSION DECLARATION FORM

<b>Module Code:</b>	ITS62904
<b>Module Name:</b>	Database Systems
<b>Assessment:</b>	Group Assignment

<b>Student Name:</b>	TAN PEI XI
<b>Student ID:</b>	0378644
<b>Semester/Year:</b>	September 2025

Dear Students,

Taylor's University/College upholds the highest standards of academic integrity. Students must complete their work honestly and ethically, ensuring that all submitted assessments reflect their own understanding and efforts. Any form of academic misconduct, including but not limited to plagiarism, collusion, contract cheating, falsification, and unauthorised use of Gen AI tools, is strictly prohibited and will be subject to disciplinary action in accordance with university regulations.

In this form, there are two (2) sections namely: **Section 1 Instruction on the use of Generative Artificial Intelligence** (to be completed by the module leader) and **Section 2 Student Acknowledgement and Declaration** (to be completed, signed and submitted by the students together with their assessment).

Students are responsible for properly acknowledging all sources, tools, and external contributions in their work. Misuse of AI-generated content, failure to attribute sources, or engagement in dishonest practices may result in penalties ranging from warnings to expulsion, as outlined in the **Student Handbook** ([link](#)).

This Assessment Submission Declaration Form is attached to the assessment brief. **Students are required to complete the Assessment Submission Declaration Form in any piece of work submitted** at Taylor's University/College, except for assessments completed and submitted in controlled environments. **For group assessments, each member of the group must complete an Assessment Submission Declaration Form.**

## SECTION 1: INSTRUCTION ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE FOR THIS ASSESSMENT

*The section below is to be completed by the module leader, i.e. module leader is to put a 'v' in the relevant checkbox.*

### Guided use of Gen AI

Students are allowed to use Gen AI as stipulated by lecturers in the assessment brief:

1. Use lecturer-approved Gen AI tools only for certain parts of an assessment (e.g. brainstorming, proofreading etc.) or the entire assessment.
2. Use Gen AI for specific purposes only, such as generating drafts, refining language, or conducting exploratory analysis, but not for creating final outputs or core analytical tasks.

### Flexible use of Gen AI

You are allowed to use Gen AI tools in any way you find appropriate for the task, provided you acknowledge and explain their usage. This emphasises transparency, critical engagement, and ethical practices.

### Use of Gen AI is not applicable

Assessment is conducted under controlled environments (final exams, practical assessment without written assignment etc). Students are to complete the task independently, without the assistance of Gen AI tools.

Where Gen AI tools have been used, you must attach your chat history and an appendix listing the prompt used, the output generated by the generative AI tools, how the output was used and the pages where the AI-generated content can be found as per the table below:

AI Tool Used	Prompts	Outputs	How the output was changed for use into the assignment	Specify the page(s) in the assignment where the output is used
Example: ChatGPT	"Describe principles of marketing in 30 words"	The principles of marketing focus on understanding customer needs, creating value, building relationships, targeting specific markets, using effective promotion, ensuring product accessibility, pricing strategically, and fostering long-term loyalty and satisfaction.	The principles of marketing, as outlined by Kotler and Keller (2016), emphasize the importance of understanding customer needs, creating value, and building strong relationships. Key elements include targeting specific market segments, implementing effective promotional strategies, ensuring product accessibility, employing strategic pricing, and fostering long-term customer loyalty and satisfaction through a customer-centric approach (ChatGPT, 2024).	Page 1

The Gen AI-generated content must be appropriately cited and referenced. Any work submitted using AI tools without proper citation and referenced will be treated as though it was plagiarised.

## INFORMATION ON PENALTIES RELATING TO ACADEMIC MISCONDUCT

Any student found to have engaged in academic misconduct, including but not limited to plagiarism, falsification, contract cheating, or improper AI usage, will be subject to disciplinary action. Penalties may include but are not limited to plagiarism, falsification, contract cheating, or improper AI usage, and will be subject to disciplinary action. Penalties may include but are not limited to:

The penalties that can be imposed on a student who is found to have engaged in academic misconduct include, but not limited to:

- Counseling or cautioning.
- Awarding zero marks for the assignment.
- Failing the module.
- Suspension from enrollment at Taylor's University/College.
- Expulsion from Taylor's University/College.

For full details, refer to the Student Handbook ([link](#))

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- b) **Filing of Report** -A Report on Academic Misconduct (THE-ACA-FORM-AINT) is submitted to the Academic Integrity Officer (AIO).
- c) **Review & Evidence Collection** – The AIO compiles relevant materials, including previous submissions, Turnitin reports, and AI usage logs.
- d) **Student Explanation** – The student may be required to provide additional evidence of their work process, including drafts and source materials.
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## SECTION 2: STUDENT ACKNOWLEDGEMENT AND DECLARATION

(\*This section is to be completed by students. Students must submit the completed and signed copy of this form together with their assessment)

### Acknowledgment by the student

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Type	Acknowledgement
Gen AI is allowed but student chooses not to use it	I did not use any Gen AI tools for this assignment.
✓ Generate content which is modified in the final assessment submission	I acknowledge the use of ChatGPT to generate materials such as dummy data for parking_spots and other necessary entities in this assessment. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was used and the pages where the Gen AI-generated content can be found.
Use Gen AI to polish language before further modification for final submission	I acknowledge the use of ..... to improve the academic tone and accuracy of language, including grammatical structures, punctuation and vocabulary. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was modified further to better represent my tone and style of writing.  <i>Note: Please modify the above as per your lecturers' needs</i>
✓ I attached Appendix in this assignment the chat history, including all the prompts that I used and the output from the Gen AI tool(s) for this assignment.	

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APA	... (AI platform, year)	Company. (year). <i>Platform Used</i> (version) [model]. URL  <b>Example:</b> OpenAI. (2023). <i>ChatGTP</i> (Mar 14 version) [Large language model]. <a href="https://chat.openai.com/chat">https://chat.openai.com/chat</a>
MLA	.... ("prompt").	"Description of prompt" prompt. <i>Name of AI tool</i> , version of AI tool, Company, date text was generated. URL.  <b>Example (Text):</b> "Identify the themes in McTeague by Frank Norris" prompt. ChatGPT, 21 November version, OpenAI, 4 Dec. 2023. <a href="https://chat.openai.com/share/2f2be19d-eadd-4151-8ceb-0785319074b3">https://chat.openai.com/share/2f2be19d-eadd-4151-8ceb-0785319074b3</a>

		<b>Example (Image):</b> Fig. 2. "Create impressionist painting of a cat using neutral colors" prompt. DALL-E, version 2, OpenAI, 27 Nov. 2023. <a href="https://labs.openai.com/">https://labs.openai.com/</a>
Harvard	... (AI platform year)	<p>There is no guideline for Harvard style on referencing the use of AI. The following format is recommended by most universities.</p> <p>Name of AI (Year of communication) Medium of communication. Receiver of communication, Day/month of communication.</p> <p><b>Example</b> OpenAI ChatGPT (2023) ChatGPT response to Mary Jane, 25 January 2024</p>

\*Please refer to the latest referencing style.

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- g) I acknowledge that this submission is subject to Taylor's University/College Academic Integrity Procedure (THE-ACA-PROC-AINT) and all applicable university regulations.

<b>Name &amp; Student ID</b>	<b>TAN PEI XI 0378644</b>
<b>Signature</b>	<i>peixi</i>
<b>Date</b>	02/12/2025

## Appendix

AI Tool Used	Prompts	Outputs	How the output was changed for use into the assignment	Specify the page(s) in the assignment where the output is used
ChatGPT	<b>Generate sample data for the attributes below:</b> parking_spot_id sensor_id location_zone_id space_type reserved_license_plate_number standard_hourly_rate site_tier real_time_demand_rating predicted_current_demand_rating	Refer to Figure 1	The data generated will be used as dummy data in our database and they are modified based on advanced requirements of the query.	Page 27

parking_spot_id	sensor_id	location_zone_id	space_type	reserved_license_plate_number	standard_hourly_rate	site_tier	real_time_demand_rating	predicted_current_demand_rating
PS001	S101	ZN01	EV Charging	VQH1234	6.00	Premium	4.8	4.6
PS002	S102	ZN02	Regular	—	4.00	Standard	3.5	3.8
PS003	S103	ZN03	EV Charging	WNM8821	5.50	Premium	4.2	4.4
PS004	S104	ZN04	Compact	—	3.50	Basic	3.1	3.0
PS005	S105	ZN05	Regular	BLT5678	4.20	Standard	3.8	4.0
PS006	S106	ZN06	EV Charging	LHY5589	6.50	Elite	4.9	5.0
PS007	S107	ZN07	Regular	—	4.00	Standard	3.2	3.4
PS008	S108	ZN08	Luxury Reserved	PEA9910	8.00	Elite	5.0	5.0
PS009	S109	ZN09	Regular	—	3.80	Basic	2.9	3.2
PS010	S110	ZN10	EV Charging	VZX7766	5.80	Premium	4.5	4.7

Figure 1: Generated outputs based on prompt



## ASSESSMENT SUBMISSION DECLARATION FORM

<b>Module Code:</b>	ITS62904
<b>Module Name:</b>	Database Systems
<b>Assessment:</b>	Group Assignment

<b>Student Name:</b>	MOK QA YAN
<b>Student ID:</b>	0378911
<b>Semester/Year:</b>	September 2025

Dear Students,

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Use Gen AI to polish language before further modification for final submission	I acknowledge the use of ..... to improve the academic tone and accuracy of language, including grammatical structures, punctuation and vocabulary. I have also provided the prompt used, the output generated by the Gen AI tools, how the output was modified further to better represent my tone and style of writing.  <i>Note: Please modify the above as per your lecturers' needs</i>
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		<b>Example (Image):</b> Fig. 2. "Create impressionist painting of a cat using neutral colors" prompt. DALL-E, version 2, OpenAI, 27 Nov. 2023. <a href="https://labs.openai.com/">https://labs.openai.com/</a>
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<b>Name &amp; Student ID</b>	<b>MOK QA YAN 0378911</b>
<b>Signature</b>	<i>qayan</i>
<b>Date</b>	03/12/2025

## Appendix

AI Tool Used	Prompts	Outputs	How the output was changed for use into the assignment	Specify the page(s) in the assignment where the output is used
ChatGPT	"Generate sample dataset for customer_support_chatbots table. The attributes are message_id, message_content, message_datetime."	Refer to Figure 1	The output was used as dummy data to fill the <i>customer_support_chatbots</i> table, enabling realistic examples for analysis and SQL demonstrations in the assignment.	Page 49

### 💬 customer\_support\_chatbots

message_id	message_content	message_datetime
1	"Hello! How can I assist you with parking today?"	2025-11-01 08:00:00
2	"Your payment has been successfully processed."	2025-11-01 08:05:00
3	"The nearest parking zone is Zone 3."	2025-11-01 08:10:00
4	"Rain is expected later today, consider covered parking."	2025-11-02 09:00:00
5	"Your parking session will expire in 10 minutes."	2025-11-02 09:15:00
6	"Welcome back! Would you like to view your parking history?"	2025-11-03 10:00:00
7	"System maintenance scheduled at midnight."	2025-11-03 22:00:00
8	"Your loyalty points balance is 120."	2025-11-04 08:00:00
9	"Camera #4 is under maintenance; please use another entry."	2025-11-05 07:30:00
10	"Thank you for contacting ParkGPT. Have a great day!"	2025-11-05 09:00:00

Figure 1:Generated outputs based on prompt

# DATABASE SYSTEMS

## ITS62904 Assignment – Group Marking Rubrics (April 2025)

Criteria	Score			
	Excellent	Good	Average	Poor
	>= 90% of the marks	< 90% to >= 75% of the marks	< 75% to >= 40% of the marks	< 40% of the marks
A. Database design (ERD, Physical Model and EER)	Both ERD, EER and Physical models are designed and drawn accurately. All the relationships are considered and highlighted properly. All the primary and foreign keys are defined and linked correctly. Necessary information for the physical model is provided sufficiently. The similarity is less than 2%.	Both ERD, EER and Physical models are designed and drawn accurately. Most of the relationships are considered and highlighted properly. All the primary and foreign keys are defined and linked correctly. Necessary information for the physical model is provided acceptably. The similarity is less than 4%.	Both ERD, EER and Physical models are designed and drawn with minor mistakes. Some of the relationship are considered and highlighted properly. Some the primary and foreign keys are defined and linked correctly. Necessary information for the physical model is provided acceptably or the information is missing. The similarity is less than 4%.	Both ERD, EER and Physical models having major mistakes or any of them is missing. A few of the relationships are considered and highlighted. Rarely the primary and foreign keys are defined and linked correctly. Necessary information for the physical model is missing. The similarity is more than 5%.
B. Database deployment	The deployment is done with no error. All the tables having a sufficient number or records. The similarity is less than 2%.	The deployment is done with minor errors. Most of the tables having a sufficient number or records. The similarity is less than 4%.	The deployment is done with Major errors OR only a few of the tables having a sufficient number or records. The similarity is less than 4%.	The deployment is done with Major errors AND only a few of the tables having a sufficient number or records. The similarity is more than 5%.

C. SQL Report	All the SQL script are accurate with no error and the results are demonstrated. The similarity is less than 2%.	Most of the SQL script are accurate with no error and the results are demonstrated. The similarity is less than 4%.	Some of the SQL script are accurate with no error and the results are demonstrated with minor errors. The similarity is less than 4%.	Only a few of the SQL script are accurate with no error and the results are demonstrated with major errors. The similarity is more than 5%.
D. Analysing database structure and designing useful reports	All the SQL script are accurate with no error and the results are demonstrated. The similarity is less than 2%.	Most of the SQL script are accurate with no error and the results are demonstrated. The similarity is less than 4%.	Some of the SQL script are accurate with no error and the results are demonstrated with minor errors. The similarity is less than 4%.	Only a few of the SQL script are accurate with no error and the results are demonstrated with major errors. The similarity is more than 5%.
E. Handling with unforeseen challenges and video presentation	Explanation and video are detailed and valid with relevant samples. The similarity is less than 2%.	Explanation and video are detailed and valid with samples but not very relevant. The similarity is less than 4%.	Explanation and video are available with samples but not very relevant. The similarity is less than 4%.	The explanation and video are not detail and valid. It's without relevant examples. The similarity is more than 5%.

## Assessment Criteria

For Lecturer's/Tutor's use

**Lecturer's/Tutor's Comments:**

**TOTAL:**

Lecturer Signature

Date

# Group 8

## ORIGINALITY REPORT



## PRIMARY SOURCES

1	Submitted to City University of Hong Kong Student Paper	2%
2	Submitted to IPMC Kumasi Student Paper	2%
3	Submitted to Macquarie University Student Paper	1%
4	Submitted to Taylor's Education Group Student Paper	1%
5	Submitted to AUT University Student Paper	1%
6	Submitted to Kingston University Student Paper	1%
7	Submitted to Canadian University of Dubai Student Paper	1%
8	Submitted to PSB Academy (ACP eSolutions) Student Paper	<1%
9	Submitted to QA Learning Student Paper	<1%

10	Submitted to Hogeschool Leiden Student Paper	<1 %
11	Submitted to SIM Global Education Student Paper	<1 %
12	Submitted to University of Technology, Sydney Student Paper	<1 %
13	sharedmemorydump.net Internet Source	<1 %
14	Submitted to University of Wales Institute, Cardiff Student Paper	<1 %
15	www.openkaart.org Internet Source	<1 %
16	Submitted to University of Greenwich Student Paper	<1 %
17	essuir.sumdu.edu.ua Internet Source	<1 %
18	github.com Internet Source	<1 %
19	Submitted to Anglia Ruskin University Student Paper	<1 %
20	Submitted to Abdullah Gul University Student Paper	<1 %

21	Submitted to Colorado Technical University Online Student Paper	<1 %
22	Fayyad, Fady. "Using Mobile Technology in Warehouse Management System", Dokuz Eylul Universitesi (Turkey), 2024 Publication	<1 %
23	Submitted to George Mason University Student Paper	<1 %
24	Submitted to EDMC Student Paper	<1 %
25	Submitted to Arab Open University Student Paper	<1 %
26	Submitted to Flinders University Student Paper	<1 %
27	Submitted to RMIT University Student Paper	<1 %
28	Submitted to University of Missouri, Kansas City Student Paper	<1 %
29	Submitted to NCC Education Student Paper	<1 %
30	<a href="http://www.anusains.com.my">www.anusains.com.my</a> Internet Source	<1 %

31	Internet Source	<1 %
32	technodocbox.com Internet Source	<1 %
33	svn.kolmisoft.com Internet Source	<1 %
34	Submitted to Leeds Beckett University Student Paper	<1 %
35	Submitted to School of Accounting & Management Student Paper	<1 %
36	docplayer.es Internet Source	<1 %
37	forums.sqlteam.com Internet Source	<1 %
38	git.friendi.ca Internet Source	<1 %

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