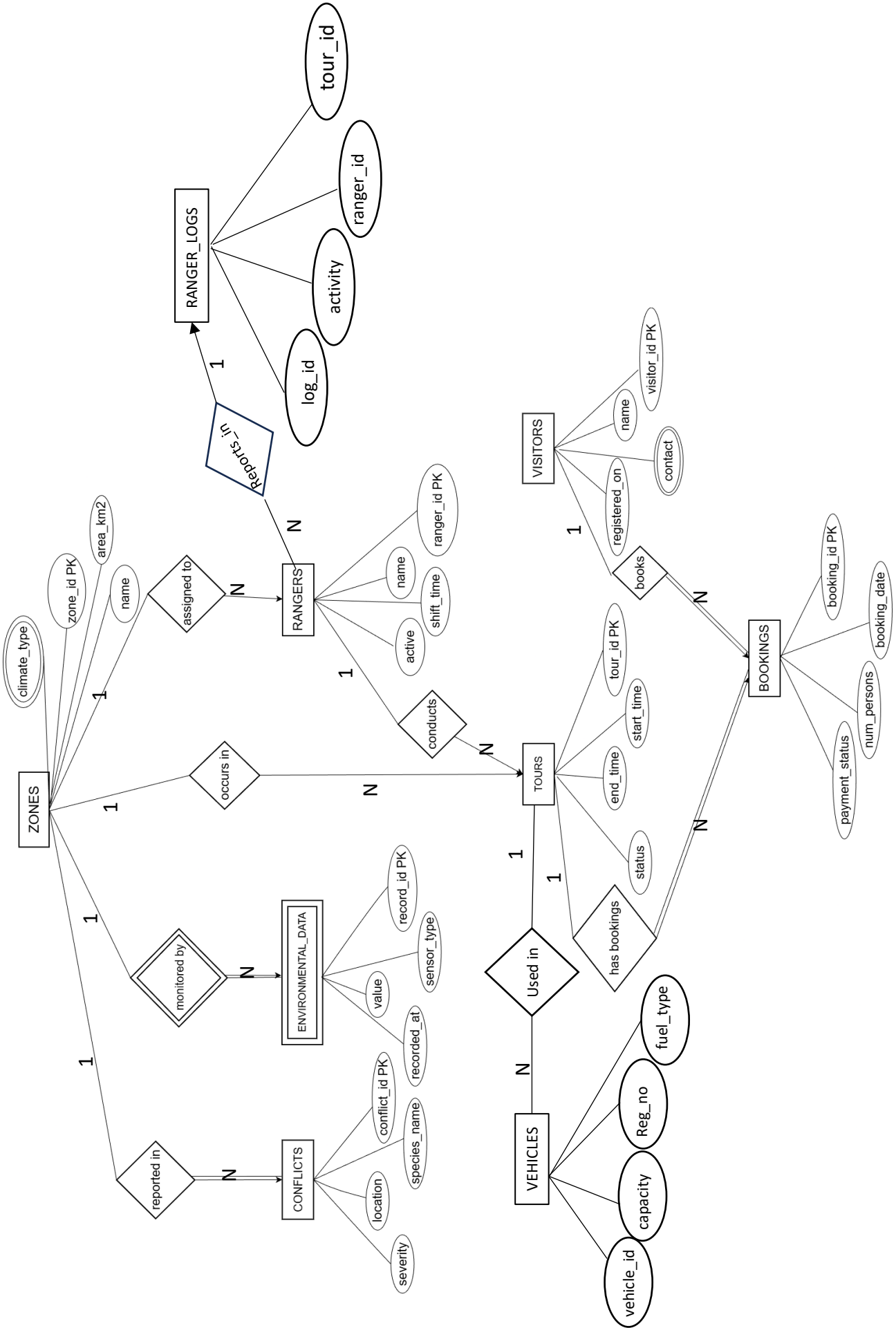# ER-DIAGRAM

ER MAPPING

ZONES

Zone_id	Name	area_km2	climate_type

ENVIRONMENTAL_DATA

Zone_id	Record_ID	sensor_type	value	recorded_at

CONFLICTS

Conflicts_id	species_name	location	severity	Zone_id

RANGERS

ranger_id	Name	Shift_Time	active	Zone_id

VISITORS

visitor_id	Name	contact_no	registored_on

TOURS

tour_id	start_time	end_tijme	status	Zone_id	ranger_id

BOOKINGS

booking_id	booking_date	num_person	payment_status	visitor_id	tour_id

RANGER_LOGS

log_id	ranger_id	tour_id	num_person	activity

VEHICLES

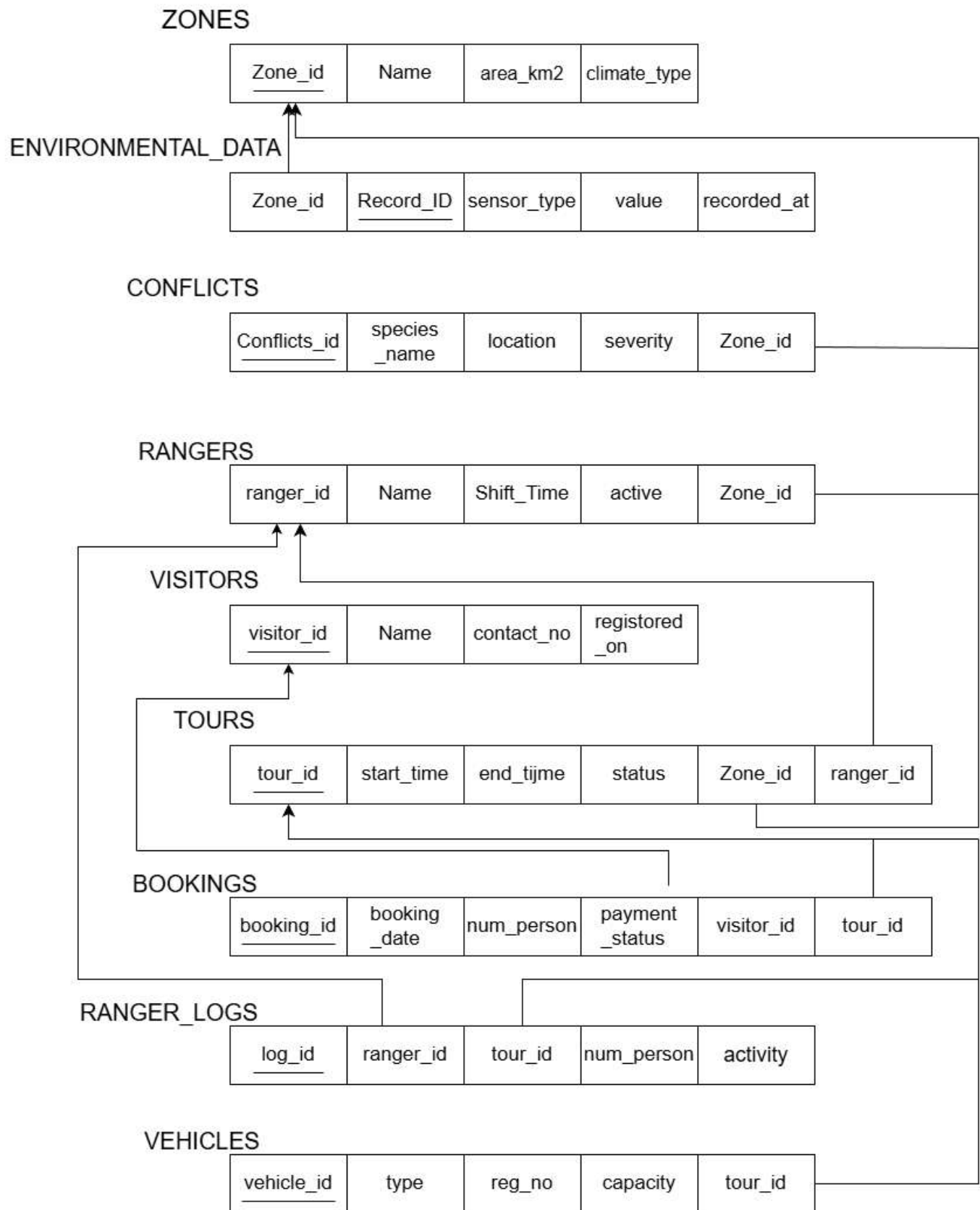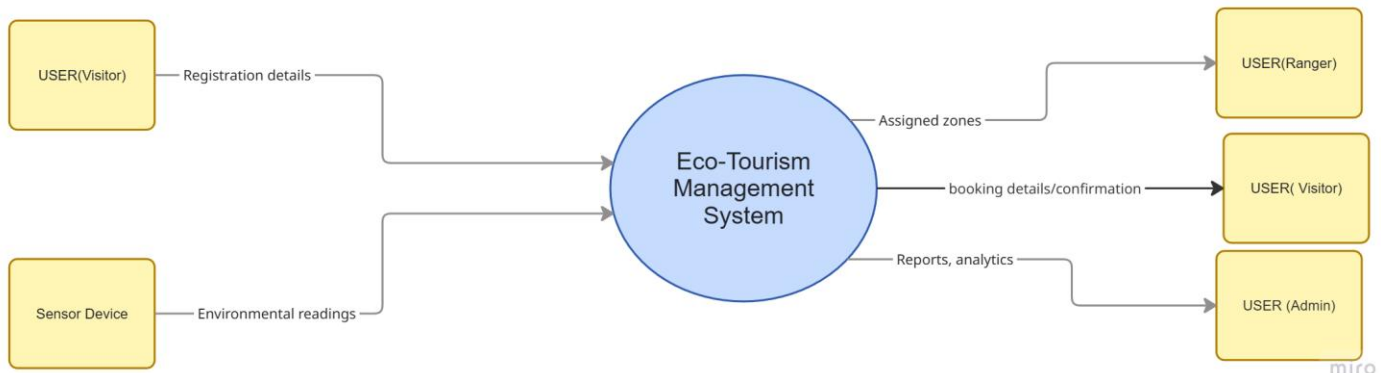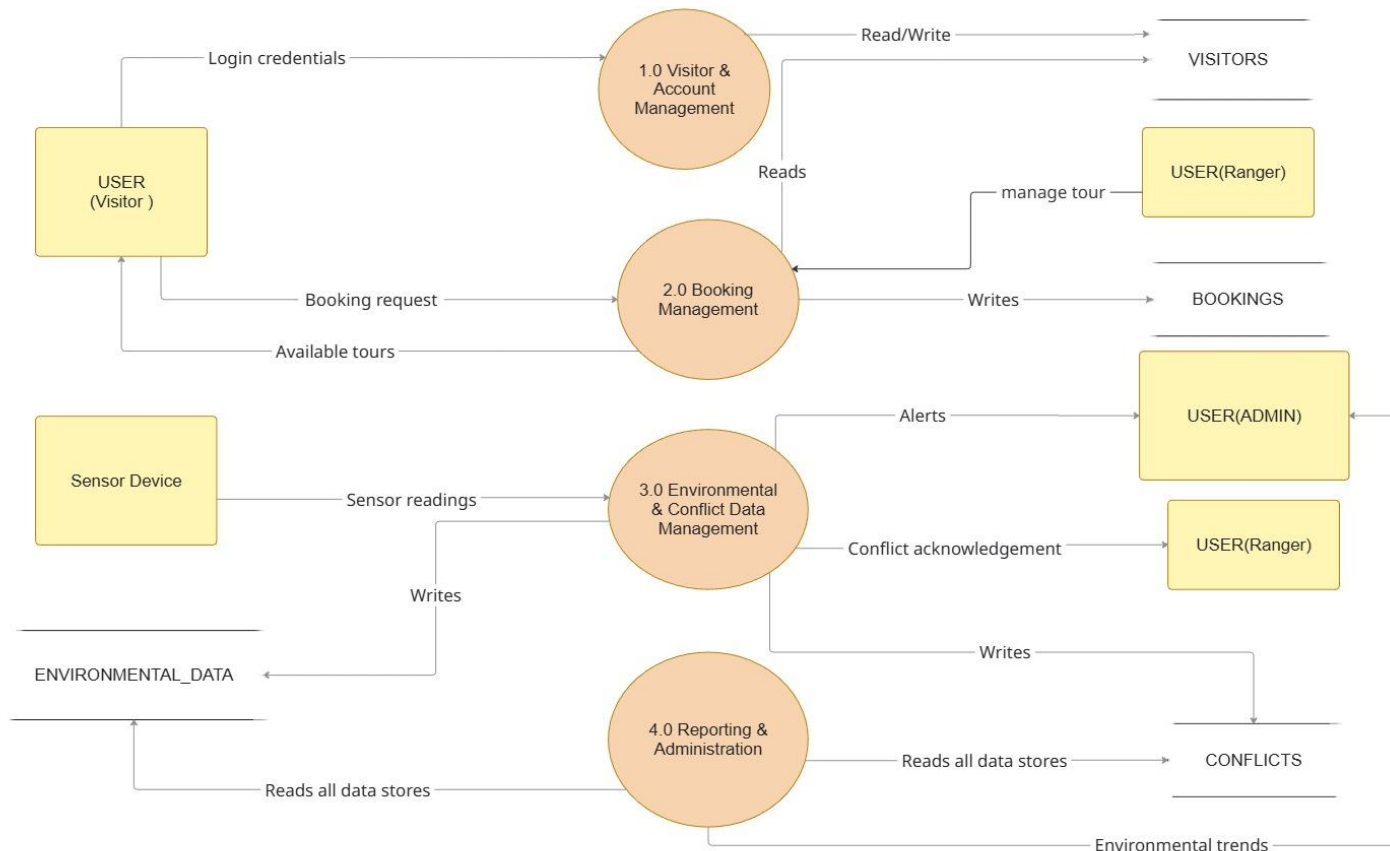| vehicle_id	type	reg_no	capacity	tour_id

DATA FLOW DIAGRAMS

LEVEL-0 DFD

LEVEL-1 DFD

Normalization Tables

Project Title: EcoTrack – Eco-Tourism & Wildlife Conflict Management System

Un-Normalized Form (UNF)

EcoTourism_Management
(zone_id, zone_name, area_km2, climate_type,ranger_id, ranger_name, shift_time, active, visitor_id, visitor_name, contact_no, registered_on,tour_id, start_time, end_time, tour_status, booking_id, booking_date, num_person, payment_status,sensors(sensor_type, value, recorded_at),conflicts(conflict_id, species_name, location, severity),vehicles(vehicle_id, type, reg_no, capacity), ranger_logs(log_id, activity))

Problems in UNF
- Multiple **repeating groups** (sensors, conflicts, vehicles, logs)
- Zone, ranger, visitor data repeated across record.
- Tour, booking, and vehicle details stored together
- High **data redundancy**
- Update, insertion, and deletion anomalies
- Difficult to manage environmental data and conflict records efficiently

First Normal Form (1NF)

EcoTourism_Transactions_1NF

EcoTourism_1NF
(zone_id,ranger_name,visitor_name,tour_id,sensor_type,conflict_species,payment_status)

Zone_ID	Ranger_Name	Visitor_Name	Tour_ID	Sensor_Type	Conflict_Species	Payment_Status
Z01	Ravi Kumar	Anil Sharma	T101	Temperature	elephant	Paid
Z01	Ravi Kumar	Anil Sharma	T101	Humidity	elephant	Paid

Why this is in 1NF
- Each attribute contains **only atomic values**
- Repeating data (multiple sensors) represented as **multiple rows**
- No multi-valued or composite attributes

Second Normal Form (2NF)

Rule Applied

- Relation is already in 1NF
- Partial dependencies removed
- Non-key attributes fully depend on the entire primary key

2NF Decomposition

ZONES

Zone_ID	Name	Area_km²	Climate_Type
Z01	Bandipur	874	Tropical
Z02	Nagarhole	643	Humid

RANGERS

Ranger_ID	Name	Shift_Time	Active	Zone_ID
R01	Ravi Kumar	Morning	Yes	Z01
R02	Meena Rao	Evening	Yes	Z02

VISITORS

Visitor_ID	Name	Contact_No	Registered_On
V01	Anil Sharma	9876543210	2025-01-10
V02	Sneha Patel	9123456789	2025-01-12

BOOKINGS

Booking_ID	Booking_Date	No_of_Persons	Payment_Status	Visitor_ID	Tour_ID
B501	2025-02-01	2	Paid	V01	T101
B684	2025-02-02	3	Pending	V02	T205

What is done in 2NF

- Zone details separated from tours
- Visitor details separated from bookings

- Ranger details separated from operational data
- **Partial dependency removed**
- Some transitive dependencies still exist

Third Normal Form (3NF)

Rule Applied

- Relation is already in **2NF**
- **Transitive dependencies removed**
- Non-key attributes depend only on the primary key

3NF DECOMPOSITION

ENVIRONMENTAL_DATA

Record_ID	Zone_ID	Sensor_Type	Value	Recorded_At
E01	Z01	Temperature	32°C	2025-02-10 08:30
E02	Z02	Humidity	70%	2025-02-10 17:15

CONFLICTS

Conflict_ID	Species_Name	Location	Severity	Zone_ID
C01	Elephant	Near Waterhole	High	Z02
C02	Leopard	Forest Edge	Medium	Z01

VEHICLES

Vehicle_ID	Type	Registration_No	Capacity	Tour_ID
V01	Jeep	KA09AB1234	6	T101
V02	Canter	KA05CD7788	12	T205

RANGER_LOGS

Log_ID	Ranger_ID	Tour_ID	No_of_Persons	Activity
L01	R01	T101	8	Routine Patrol
L02	R02	T205	5	Conflict Monitoring

What is done in 3NF

- Environmental sensor data isolated from zones
- Conflict records separated from tour and ranger data
- Vehicle details removed from booking information
- Ranger activities stored independently
- No transitive dependency
- Minimal redundancy and high data integrity.

The Eco-Tourism database was initially unnormalized with repeating groups and redundant data. By systematically applying First, Second, and Third Normal Forms, repeating groups, partial dependencies, and transitive dependencies were eliminated, resulting in a fully normalized schema with minimal redundancy and improved data integrity.