Database Schema - Transport and Logistics System

DBMS Lab Project

MIT Manipal, CCEB

Submitted by:

- Anvita Warjri (230953100)
- Riddhima Jain (230953108)
- Adriteyo Das (230953244)

Overview

This document outlines the database schema for a comprehensive Transport and Logistics System. The database consists of 12 tables that manage various aspects of logistics operations including user management, customer data, shipment tracking, vehicle fleet management, and route planning.

Tables Structure

1. Users

Stores information about all system users including admins, drivers, and customers.

Field	Type	Null	Key	Default	Extra
user_id	int	NO	PK	NULL	auto_increment
username	varchar(50)	NO	UNI	NULL	
full_name	varchar(100)	YES		NULL	
email	varchar(100)	NO	UNI	NULL	
phone	varchar(15)	NO		NULL	
user_type	enum('admin','driver','customer')	NO	MUL	NULL	
status	enum('active','inactive')	YES		active	
created_at	timestamp	YES		CURRENT_TIMESTAMP	DEFAULT_GENERATED
last_login	timestamp	YES		NULL	
password	text	YES		NULL	

2. Admins

Stores admin-specific information linked to users.

Field	Type	Null	Key	Default	Extra
admin_id	int	NO	PK	NULL	auto_increment
user_id	int	NO	FK, UNI	NULL	References users(user_id)
access_level	enum('super','regular')	NO		NULL	

3. Customers

Stores customer-specific information linked to users.

Field	Type	Null	Key	Default	Extra
customer_id	int	NO	PK	NULL	auto_increment
user_id	int	NO	FK, UNI	NULL	References users(user_id)
company_name	varchar(100)	YES		NULL	
tax_id	varchar(20)	YES		NULL	
credit_limit	decimal(10,2)	YES		0.00	
payment_terms	varchar(50)	YES		NULL	

4. Drivers

Stores driver-specific information linked to users.

Field	Type	Null	Key	Default	Extra
driver_id	int	NO	PK	NULL	auto_increment
user_id	int	NO	FK, UNI	NULL	References users(user_id)
license_number	varchar(20)	NO	UNI	NULL	
license_expiry	date	NO		NULL	
medical_check_date	date	YES		NULL	
training_certification	varchar(100)	YES		NULL	
status	enum('available','on_leave','assigned')	YES		available	

5. Locations

Stores information about different locations in the system.

Field	Type	Null	Key	Default	Extra
location_id	int	NO	PK	NULL	auto_increment
address	varchar(255)	NO		NULL	
city	varchar(50)	NO	MUL	NULL	
state	varchar(50)	NO		NULL	
country	varchar(50)	YES		India	
postal_code	varchar(10)	NO		NULL	
latitude	decimal(10,8)	YES		NULL	
longitude	decimal(11,8)	YES		NULL	
location_type	enum('warehouse','customer','drop_point')	NO	MUL	NULL	

6. Warehouses

Stores information about warehouses linked to locations.

Field	Type	Null	Key	Default	Extra
warehouse_id	int	NO	PK	NULL	auto_increment
location_id	int	NO	FK, UNI	NULL	References locations(location_id)
warehouse_name	varchar(100)	NO		NULL	
capacity	decimal(10,2)	NO		NULL	
current_occupancy	decimal(10,2)	YES		0.00	
manager_id	int	YES	FK, MUL	NULL	References users(user_id)
operating_hours	varchar(100)	YES		NULL	

7. Vehicles

Stores information about the fleet of vehicles.

Field	Type	Null	Key	Default	Extra
vehicle_id	int	NO	PK	NULL	auto_increment
license_plate	varchar(15)	NO	UNI	NULL	
make	varchar(50)	NO		NULL	
model	varchar(50)	NO		NULL	
year	int	NO		NULL	
capacity_kg	decimal(10,2)	NO		NULL	
vehicle_type	enum('truck','van','trailer','pickup')	NO		NULL	
status	enum('available','in_maintenance','in_use')	YES		available	
current_location_id	int	YES	FK, MUL	NULL	References locations(location_i
last_inspection_date	date	YES		NULL	

8. Routes

Stores information about predefined routes.

Field	Type	Null	Key	Default	Extra
route_id	int	NO	PK	NULL	auto_increment
route_name	varchar(100)	NO		NULL	
origin_id	int	NO	FK, MUL	NULL	References locations(location_id)
destination_id	int	NO	FK, MUL	NULL	References locations(location_id)
distance_km	decimal(6,2)	NO		NULL	
estimated_duration_min	int	NO		NULL	
status	enum('active','inactive')	YES		active	
hazard_level	enum('low','medium','high')	YES		low	

9. Waypoints

Stores intermediate points on routes.

Field	Type	Null	Key	Default	Extra
waypoint_id	int	NO	PK	NULL	auto_increment
route_id	int	NO	FK, MUL	NULL	References routes(route_id)
location_id	int	NO	FK, MUL	NULL	References locations(location_id)
sequence_number	int	NO		NULL	
estimated_arrival	time	YES		NULL	
estimated_departure	time	YES		NULL	

10. Shipments

Stores information about shipments.

Field	Type	Null	Key	Default
shipment_id	int	NO	PK	NULL
tracking_number	varchar(20)	NO	UNI	NULL
customer_id	int	NO	FK, MUL	NULL
origin_id	int	NO	FK, MUL	NULL
destination_id	int	NO	FK, MUL	NULL
route_id	int	YES	FK, MUL	NULL
vehicle_id	int	YES	FK, MUL	NULL
driver_id	int	YES	FK, MUL	NULL
status	enum('pending','picked_up','in_transit','delivered','returned')	YES		pending
total_weight	decimal(10,2)	NO		NULL
total_volume	decimal(10,2)	NO		NULL
shipment_value	decimal(12,2)	NO		NULL
insurance_required	tinyint(1)	YES		0
special_instructions	text	YES		NULL
created_at	timestamp	YES		CURRENT_TIM
pickup_date	datetime	YES		NULL
estimated_delivery	datetime	YES		NULL
actual_delivery	datetime	YES		NULL

11. Shipment_Items

Stores details about items within shipments.

Field	Type	Null	Key	Default	Extra
item_id	int	NO	PK	NULL	auto_increment
shipment_id	int	NO	FK, MUL	NULL	References shipments(shipment_id)
description	varchar(255)	NO		NULL	
quantity	int	NO		NULL	
weight	decimal(10,2)	NO		NULL	
volume	decimal(10,2)	NO		NULL	
item_value	decimal(10,2)	NO		NULL	
is_hazardous	tinyint(1)	YES		0	
is_fragile	tinyint(1)	YES		0	

12. Tracking_Events

Stores events related to shipment tracking.

Field	Type	Null	Key	Default
event_id	int	NO	PK	NULL
shipment_id	int	NO	FK, MUL	NULL
event_type	enum('pickup','departure','arrival','delivery','delay','issue')	NO		NULL
location_id	int	YES	FK, MUL	NULL
event_timestamp	timestamp	YES		CURRENT_TIMESTA
recorded_by	int	YES	FK, MUL	NULL
notes	text	YES		NULL

Relationships

Primary Key to Foreign Key Relations:

- users (user_id) → admins (user_id)
- users (user_id) → customers (user_id)
- users (user_id) → drivers (user_id)
- users (user_id) → warehouses (manager_id)
- users (user_id) → tracking_events (recorded_by)
- locations (location_id) → warehouses (location_id)
- locations (location_id) → vehicles (current_location_id)
- locations (location_id) → routes (origin_id, destination_id)
- locations (location_id) → waypoints (location_id)
- locations (location_id) → shipments (origin_id, destination_id)

- locations (location_id) → tracking_events (location_id)
- routes (route_id) → waypoints (route_id)
- routes (route_id) → shipments (route_id)
- customers (customer_id) → shipments (customer_id)
- vehicles (vehicle_id) → shipments (vehicle_id)
- drivers (driver_id) → shipments (driver_id)
- shipments (shipment_id) → shipment_items (shipment_id)
- shipments (shipment_id) → tracking_events (shipment_id)

Notes

- The schema follows a normalized structure to minimize data redundancy
- Enum types are used to enforce data integrity for status fields and categorizations
- Timestamp fields track creation times and important events
- Foreign key relationships maintain referential integrity across the database