**Vehicle Management System (VMS)**

1. **Project Overview:** This is a Vehicle Management System that efficiently manages all the aspects of vehicle-related operations, including vehicle tracking, driver management, bookings, geofencing, maintenance and expense tracking.
2. **Possible Entities:**
3. Users
4. Permissions
5. Vehicle Groups
6. Vehicles
7. Customers
8. Drivers
9. Bookings
10. Geofence Events
11. Income/Expense
12. Maintenance
13. Maintenance Parts
14. Parts Inventory
15. Fuel
16. Reminders
17. Tracking
18. Email Templates
19. Settings
20. SMTP Configuration
21. **Schemas:***Note: The attributes are just imagination based on the figma design*.

| **1. Users** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| user\_id | INT | Yes | Yes | - |
| name | VARCHAR(255) | - | - | - |
| email | VARCHAR(255) | - | - | - |
| username | VARCHAR(255) | - | - | - |
| password | VARCHAR(255) | - | - | - |

| **2. Permissions** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| permission\_id | INT | Yes | Yes | - |
| user\_id | INT | Yes | - | Yes (users) |
| entity\_name | VARCHAR(255) | - | - | - |
| can\_view | BOOLEAN | - | - | - |
| can\_edit | BOOLEAN | - | - | - |
| can\_add | BOOLEAN | - | - | - |
| can\_delete | BOOLEAN | - | - | - |

| **3. VehicleGroups** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| group\_id | INT | Yes | Yes | - |
| group\_name | VARCHAR(255) | Yes | - | - |

| **4. Vehicles** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| vehicle\_id | INT | Yes | Yes | - |
| registration\_number | VARCHAR(255) | Yes | - | - |
| name | VARCHAR(255) | - | - | - |
| model | VARCHAR(255) | - | - | - |
| chassis\_no | VARCHAR(255) | - | - | - |
| engine\_no | VARCHAR(255) | - | - | - |
| manufacturer | VARCHAR(255) | - | - | - |
| vehicle\_type | VARCHAR(100) | - | - | - |
| status | ENUM | - | - | - |
| registration\_expiry\_date | DATE | - | - | - |
| vehicle\_group\_id | INT | Yes | - | Yes (vehicle\_groups) |
| vehicle\_image | VARCHAR(255) | - | - | - |
| mileage\_per\_litre | DECIMAL(5,2) | - | - | - |
| gps\_api\_username | VARCHAR(255) | - | - | - |
| gps\_api\_password | VARCHAR(255) | - | - | - |
| api\_url | VARCHAR(255) | - | - | - |

| **5. Customers** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| customer\_id | INT | Yes | Yes | - |
| name | VARCHAR(255) | - | - | - |
| mobile | VARCHAR(20) | - | - | - |
| email | VARCHAR(255) | - | - | - |
| address | TEXT | - | - | - |

| **6. Drivers** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| driver\_id | INT | Yes | Yes | - |
| name | VARCHAR(255) | - | - | - |
| mobile | VARCHAR(20) | - | - | - |
| age | INT | - | - | - |
| license\_no | VARCHAR(255) | Yes | - | - |
| license\_expiry\_date | DATE | - | - | - |
| experience\_years | INT | - | - | - |
| joining\_date | DATE | - | - | - |
| address | TEXT | - | - | - |
| status | ENUM | - | - | - |
| driver\_photo | VARCHAR(255) | - | - | - |
| driver\_document | VARCHAR(255) | - | - | - |

| **7. Bookings** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| booking\_id | INT | Yes | Yes | - |
| customer\_id | INT | Yes | - | Yes (customers) |
| vehicle\_id | INT | Yes | - | Yes (vehicles) |
| driver\_id | INT | Yes | - | Yes (drivers) |
| trip\_type | VARCHAR(100) | - | - | - |
| trip\_start\_location | VARCHAR(255) | - | - | - |
| trip\_end\_location | VARCHAR(255) | - | - | - |
| trip\_start\_date | DATE | - | - | - |
| trip\_end\_date | DATE | - | - | - |
| approx\_total\_km | DECIMAL(10,2) | - | - | - |
| total\_amount | DECIMAL(10,2) | - | - | - |
| trip\_status | ENUM | - | - | - |

| **8. GeofenceEvents** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| geofence\_event\_id | INT | Yes | Yes | - |
| vehicle\_id | INT | Yes | - | Yes (vehicles) |
| geo\_name | VARCHAR(255) | - | - | - |
| geo\_event | ENUM | - | - | - |
| event\_time | TIMESTAMP | - | - | - |

| **9. IncomeExpenses** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| transaction\_id | INT | Yes | Yes | - |
| vehicle\_id | INT | Yes | - | Yes (vehicles) |
| type | ENUM | - | - | - |
| date | DATE | - | - | - |
| description | TEXT | - | - | - |
| amount | DECIMAL(10,2) | - | - | - |

| **10. PartsInventrory** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| part\_id | INT | Yes | Yes | - |
| part\_name | VARCHAR(255) | - | - | - |
| description | TEXT | - | - | - |
| stock | INT | - | - | - |
| status | ENUM | - | - | - |

| **11. Maintenance** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| maintenance\_id | INT | Yes | Yes | - |
| vehicle\_id | INT | Yes | - | Yes (vehicles) |
| start\_date | DATE | - | - | - |
| end\_date | DATE | - | - | - |
| service\_details | TEXT | - | - | - |
| vendor\_name | VARCHAR(255) | - | - | - |
| total\_cost | DECIMAL(10,2) | - | - | - |
| maintenance\_status | ENUM | - | - | - |

| **12. MaintenanceParts** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| maintenance\_part\_id | INT | Yes | Yes | - |
| maintenance\_id | INT | Yes | - | Yes (vehicles) |
| part\_id | INT | Yes | - | Yes (parts\_inventories) |
| quantity | INT | - | - | - |

| **13. Fuel** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| fuel\_id | INT | Yes | Yes | - |
| vehicle\_id | INT | Yes | - | Yes (vehicles) |
| driver\_id | INT | Yes | - | Yes (drivers) |
| fill\_date | DATE | - | - | - |
| quantity | DECIMAL(10,2) | - | - | - |
| odometer\_reading | DECIMAL(10,2) | - | - | - |
| amount | DECIMAL(10,2) | - | - | - |
| comments | TEXT | - | - | - |

| **14. Reminders** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| reminder\_id | INT | Yes | Yes | - |
| vehicle\_id | INT | Yes | - | Yes (vehicles) |
| reminder\_date | DATE | - | - | - |
| message | TEXT | - | - | - |

| **15. Tracking** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| tracking\_id | INT | Yes | Yes | - |
| vehicle\_id | INT | Yes | - | Yes (vehicles) |
| history\_tracking | JSON | - | - | - |
| live\_location | TEXT | - | - | - |

| **16. EamilTemplate** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| template\_id | INT | Yes | Yes | - |
| template\_name | VARCHAR(255) | Yes | - | - |
| template\_content | TEXT | - | - | - |

| **17. Settings** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| setting\_id | INT | Yes | Yes | - |
| company\_name | VARCHAR(255) | - | - | - |
| address | TEXT | - | - | - |
| invoice\_prefix | VARCHAR(50) | - | - | - |
| currency\_prefix | VARCHAR(10) | - | - | - |
| api\_key | VARCHAR(255) | - | - | - |
| service\_name | VARCHAR(255) | - | - | - |
| date\_format | VARCHAR(50) | - | - | - |
| logo | VARCHAR(255) | - | - | - |
| invoice\_terms | TEXT | - | - | - |

| **18. SMTPConfiguration** | | | | |
| --- | --- | --- | --- | --- |
| **Attributes** | **Data Types** | **Indexed?** | **PK** | **FK** |
| smtp\_id | INT | Yes | Yes | - |
| host | VARCHAR(255) | - | - | - |
| auth | BOOLEAN | - | - | - |
| username | VARCHAR(255) | - | - | - |
| password | VARCHAR(255) | - | - | - |
| secure\_type | ENUM | - | - | - |
| port | INT | - | - | - |
| email\_from | VARCHAR(255) | - | - | - |
| reply\_to | VARCHAR(255) | - | - | - |

1. **Entity Relationship Diagram (ERD)**

* **Directory:** *root/diagrams/ERD/VMS\_ERD.pdf*
* **Google Draw Link:** [*https://docs.google.com/drawings/d/1-MjBpQfqXzzkcGdPOpZ\_xrsNHFQG24lkjvLfdtqshy0/edit?usp=sharing*](https://docs.google.com/drawings/d/1-MjBpQfqXzzkcGdPOpZ_xrsNHFQG24lkjvLfdtqshy0/edit?usp=sharing)

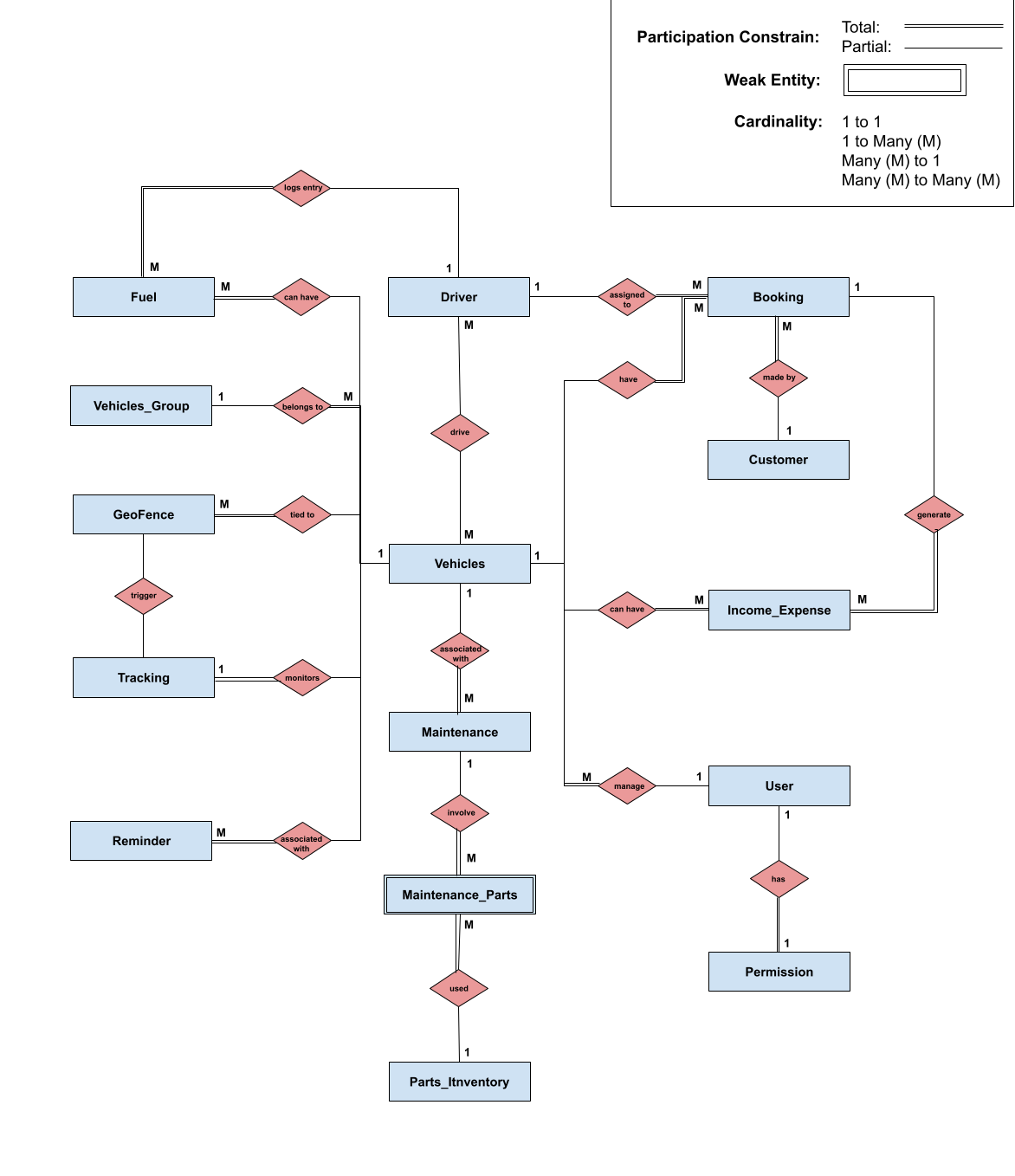


Figure: ERD of VMS

1. **Data Flow Diagram**

* **Directory:** *root/diagrams/DFD/VMS\_Context\_Level\_Diagram.pdf*
* **Google Draw Link:** [*https://docs.google.com/drawings/d/1ojXcYALvts0DZ9lvhOrlGbAS-dnsKIV58rZUGNod-70/edit?usp=sharing*](https://docs.google.com/drawings/d/1ojXcYALvts0DZ9lvhOrlGbAS-dnsKIV58rZUGNod-70/edit?usp=sharing)

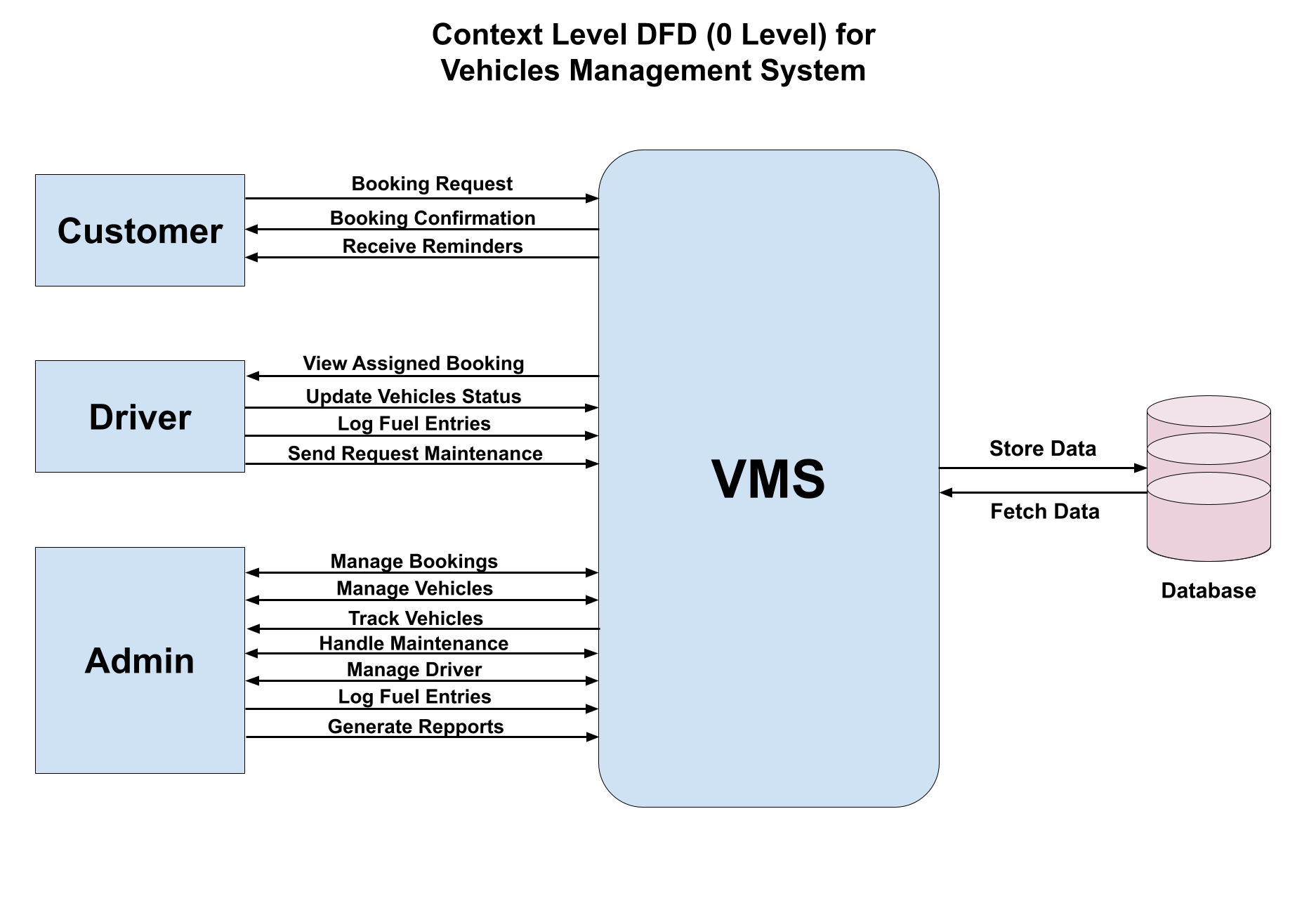


Figure: 0 Level Diagram for VMS

1. **SQL Script:**

* **Directory:** *root/sql/vms\_db\_schema.sql*

In conclusion, the **Vehicle Management System (VMS)** database model organizes vehicles, bookings, maintenance, and fuel records efficiently. It ensures clear relationships between entities, supporting scalability and data integrity. This model provides a solid structure for smooth and effective Vehicle Management.