**JAGATH KUMAR REDDY KATAMA REDDY**

**Transportation Management Company Database**  
This database is designed to support the operational and business needs of a transportation company in India, focusing on road-based transportation services. The company operates in two main capacities: providing direct transport services to individual customers and acting as an intermediary for other service providers. This dual role allows the company to cater to a broad spectrum of customer requirements, including individual rides, group transport, goods transportation, or a combination of passengers and goods.

The primary users of this database include company employees and administrative staff. Employees, such as customer service representatives, drivers, and managers, use the system to handle day-to-day tasks like managing bookings, scheduling rides, tracking vehicles, and processing invoices. Administrative users have broader access to ensure data consistency and oversee operations, with the Admin having unrestricted access to manage data and configure user roles.

In addition to individual customers, the company also offers a Software as a Service (SaaS) platform to external organizations. By subscribing to this service, these organizations can optimize their internal transportation management, leveraging the company’s infrastructure. Each subscribing organization is assigned an Organization Manager from the company, who is responsible for overseeing the organization’s account and ensuring efficient use of the SaaS platform.

The database captures and manages key entities, including customers, bookings, rides, vehicles, service providers, drivers, and invoicing. It tracks customer details and allows for the management of multiple bookings, each associated with a single customer. Bookings are classified based on the requested service type, such as individual rides or vehicle rentals. Once a booking is made, a corresponding ride is created, with all relevant details recorded, including customer information, service type, and scheduled time.

The system also manages service providers and vehicles. Individual service providers can own one or two vehicles, while entity service providers must own at least two. Vehicles are linked to rides based on booking requirements, and while a vehicle may participate in multiple rides, it can only be assigned to one active ride at a time, ensuring smooth scheduling. This constraint helps avoid conflicts and ensures efficient operations.

Rides are assigned a specific vehicle and driver based on availability and the ride’s requirements. Drivers can be employed by the company or contracted through service providers. For longer rides, such as those spanning overnight, up to three drivers may be assigned to ensure compliance with safety regulations. This driver assignment process is critical to maintaining operational safety and efficiency.

The database also supports invoicing and financial record-keeping. Invoices are generated for completed rides, detailing the services provided and the associated charges. For individual customers, invoices are billed directly, while for shared rides, each customer is billed separately based on the same ride ID. This flexibility allows the system to handle various billing scenarios and ensures transparent financial records.

External organizations using the SaaS platform subscribe to specific plans that define their access to different features and services. The database tracks these subscriptions and ensures that only the features permitted by each plan are accessible to the corresponding client. Each organization is also linked to an Organization Manager, who ensures proper oversight and support.

The database enforces critical constraints to ensure data integrity. One key constraint is temporal, preventing the double-booking of vehicles and ensuring that each vehicle is only assigned to one active ride at a time. Customers are also limited to one active ride at any given moment, preventing scheduling conflicts. The system incorporates role-based access controls, ensuring sensitive information is protected and only accessible to authorized users. The admin has full control over data access permissions, ensuring the security and integrity of the system.

Overall, the database is structured to support the diverse needs of both individual and organizational clients, offering scalable and flexible solutions for transportation management. By capturing and managing key operational data, enforcing business rules, and ensuring secure access controls, the database facilitates the smooth functioning of the company’s transportation services.

**DATA DICTIONARY**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TABLE NAME | ATTRIBUTE NAME | CONTENTS | TYPE | FORMAT | RANGE | REQUIRED | P K OR FK | FK REFERENCE TABLE |
| CUSTOMER-INDIVIDUAL | CUSIN\_ID | Unique ID for customer individual | CHAR (8) | XX999999 |  | Y | PK |  |
|  | CUSIN\_FNAME | Customer first name | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | CUSIN\_LNAME | Customer Last name | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | CUSIN\_MOBILENO | Customer Mobile | NUMBER(10) | 9999999999 |  | Y |  |  |
|  | CUSIN\_MAILID | Customer email id | VARCHAR(20) | xxxx@xxx.xxx |  | Y |  |  |
|  | CUSIN\_GENDER | Customer gender | CHAR(1) | X |  |  |  |  |
|  | CUSIN\_ADDRESS | Customer Billing Address | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | CUSIN\_CITY | Customer Address City | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | CUSIN\_ZIPCODE | Customer Address Zipcode | CHAR(6) | XXXXXX |  |  |  |  |
|  | CUSIN\_STATE | Customer Address State | VARCHAR(20) | Xxxxxx |  |  |  |  |
| CUSTOMER-ENTITY | CUSEN\_ID | Customer Entity ID | CHAR(8) | XX999999 |  | Y | PK |  |
|  | CUSIN\_ID | Customer Individual ID | CHAR(8) | XX999999 |  | Y | FK | CUSTOMER |
|  | CUSEN\_NAME | Entity name | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | CUSEN\_BRANCH | Entity branch, headquaters or a branch | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | CUSEN\_CON\_PERSON | Entity’s person of contact, - Customer individual key(if the person of contact is different from person who is registering) | CHAR(8) | XX999999 |  |  | FK | CUSTOMER |
|  | CUSEN\_ADDRESS | Entity main address | VARCHAR(50) | Xxxxxx |  |  |  |  |
|  | CUSEN\_CITY | Entity address city | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | CUSEN\_STATE | Entity address state | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | CUSEN\_ZIPCODE | Entity address zipcode | CHAR(6) | XXXXXX |  |  |  |  |
|  | CUSEN\_MOBILENO | Entity contact number | NUMBER(10) | 9999999999 |  | Y |  |  |
|  | CUSEN\_GST\_NO | Entity registered GST (Tax Number) | CHAR(15) | 99XXXXX9999X9X9 |  | Y |  |  |
| EMPLOYEE | EMP\_ID | Employee Unique ID | CHAR(8) | XX999999 |  | Y | PK |  |
|  | EMP\_FNAME | Employee First name | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | EMP\_LNAME | Employee Last Name | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | EMP\_MOBILE\_NO | Employee Mobile number | CHAR(13) | XXXXXXXXXXXXX |  | Y |  |  |
|  | EMP\_DOB | Employee date of birth | DATE | DD-MM-YYYY | 31-12-1999  TO  31-12-2099 |  |  |  |
|  | EMP\_GENDER | Employee Gender | CHAR(1) | X |  |  |  |  |
|  | EMP\_ROLE | Employee’s Job Title Code | CHAR (2) | XX |  | Y |  |  |
|  | EMP\_MAILID | Employee Mail ID | VARCHAR(30) | Xxxxxx |  | Y |  |  |
|  | EMP\_ADDRESS | Employee Living Address | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | EMP\_CITY | Address city | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | EMP\_STATE | Address State | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | EMP\_ZIPCODE | Address zipcode | CHAR(6) | XXXXXX |  |  |  |  |
|  | EMP\_MONTHLY\_PAY | Employee monthly salary | NUMBER(7,2) | 999999.99 |  |  |  |  |
| CUSTOMER-ORGANISATION | CUSOG\_ID | Customer Organisation unique ID | CHAR(8) | XX999999 |  |  |  |  |
|  | CUSOG\_NAME | Organisation Name | VARCHAR(50) | Xxxxxx |  |  |  |  |
|  | CUSOG\_BRANCH | Organization Branch, whether Head Quarters or Branch | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | CUSOG\_PERSON\_CONTACT | Organisations’ person of contact – must have registered as Customer Individual | CHAR(8) | XX999999 |  | Y | FK | CUSTOMER |
|  | SUBPLAN\_CODE | Type of subscription Organization has enrolled for | CHAR(4) | XXXX |  | Y | FK |  |
|  | EMP\_ID | External Manager EMP\_ID | CHAR(8) | XX999999 |  | Y | FK | EMPLOYEE |
| SERVICE\_PROVIDER- INDIVIDUAL | SPIN\_ID | Individual Service provider | CHAR(8) | XX999999 |  | Y | PK |  |
|  | SPIN\_FNAME | Service provider’ First name | VARCHAR(20) | Xxxxxx |  | Y |  |  |
|  | SPIN\_LNAME | Service Provider’s  Last name | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | SPIN\_MOBILENO | Service provider | CHAR(10) | 9999999999 |  | Y |  |  |
|  | SPIN\_MAILID | Service provider | VARCHAR(20) | Xxxxxx |  | Y |  |  |
|  | SPIN\_GENDER | Service Provider’  Gender | CHAR(1) | X |  |  |  |  |
|  | SPIN\_ADDRESS | Service Provider Address | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | SPIN\_CITY | Service Provider Address | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | SPIN\_ZIPCODE | Service Provider Address | CHAR(6) | XXXXXX |  |  |  |  |
|  | SPIN\_STATE | Service Provider Address | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | SPIN\_JOIN\_DATE | Service Provider Date of Registration | DATE | DD-MM-YYYY | 31-12-1999  TO  31-12-2099 | Y |  |  |
| SERVICE\_PROVIDER - ENTITY | SPIN\_ID | Service Provider’s Individual ID | CHAR(8) | XX999999 |  | Y | FK | SERVICE PROVIDER INDIVIDUAL |
|  | SPEN\_ID | Service Provider as an Entity | CHAR(8) | XX999999 |  | Y | PK |  |
|  | SPEN\_NAME |  | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | SPEN\_BRANCH |  | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | SPEN\_CON\_PERSON | If the person of contact is different from individual registering entity | CHAR(8) | XX999999 |  | Y | FK | SERVICE\_PROVIDER\_INDIVIDUAL |
|  | SPEN\_ADDRESS | Entity Address | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | SPEN\_CITY | Entity Address City | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | SPEN\_STATE | Entity Address | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | SPEN\_ZIPCODE | Entity Address | CHAR(6) | XXXXXX |  |  |  |  |
|  | SPEN\_MOBILE\_NO | Entity contact number | NUMBER(10) | 9999999999 |  | Y |  |  |
|  | SPEN\_GST\_NO | Entity registered GST (Tax) Number | CHAR(15) | 99XXXXX9999X9X9 |  | Y |  |  |
|  | SPEN\_JOIN\_DATE | Entity registered Date | DATE | DD-MM-YYYY | 31-12-1999  TO  31-12-2099 | Y |  |  |
| VEHICLE | VEHICLE\_ID | Vehicle ID | CHAR(8) | XX999999 |  | Y | PK |  |
|  | VEHICLE\_NUM\_PLATE | Vehicle number plate(natural key) | CHAR(10) | XX99XX9999 |  | Y |  |  |
|  | SPIN\_ID | Vehicle owner ID | CHAR(8) | XX999999 |  | Y | FK | SERVICE\_PROVIDER\_INDIVIDUAL |
|  | VEHICLE\_POLICYNO | Insurance policy Number | CHAR(10) | 999999999 |  | Y |  |  |
|  | VEHICLE\_MODEL | Vehicle company and model name | VARCHAR(50) | Xxxxxx |  | Y |  |  |
|  | VEHICLE\_TYPE | Type of vehicle  Mini-van etc | VARCHAR(20) | Xxxxxx |  |  |  |  |
|  | VEHICLE\_USE | Used for rentals or regular transportation | VARCHAR(20) | Xxxxxx |  | Y |  |  |
| DRIVER | SPIN\_ID | Service provider ID | CHAR(8) | XX999999 |  | Y | FK | SERVICE PROVIDER |
|  | DRIVER\_LICENSE\_NO | Govt driving license number/code | CHAR(16) | XX99999999999999 |  | Y |  |  |
|  | DRIVER\_SPEN\_ID | Is he affiliated to an entity | CHAR(8) | XX999999 |  | Y | FK | SERVICE PROVIDER ENTITY |
|  | DRIVER\_OPENAGREE | Agreement between Entity and Driver | VARCHAR(3) | Xxx |  | Y |  |  |
| RIDE | RIDE\_ID | Unique ride for each Ride | CHAR(8) | XX999999 |  | Y | PK |  |
|  | INVOICE\_NO | Invoice number if generated | NUMBER(8) | 99999999 |  | Y | FK | INVOICE |
|  | DRIVER\_ID | Driver of the ride | CHAR(8) | XX999999 |  | Y | FK | DRIVER |
|  | VEHICLE\_NO\_PLATE | Vehicle number | CHAR(10) | XX99XX9999 |  | Y | FK | VEHICLE |
|  | RIDE\_START\_DATE | Ride journey start date | DATE | DD-MM-YYYY | 31-12-1999  TO  31-12-2099 | Y |  |  |
|  | RIDE\_END\_DATE | Ride journey end date | DATE | DD-MM-YYYY | 31-12-1999  TO  31-12-2099 | Y |  |  |
|  | RIDE\_START\_TIME | Ride journey start time | TIME | HH:MM:SS:mm | 00:00:00:01-  23:59:59:99 | Y |  |  |
|  | RIDE\_END\_TIME | Ride journey end time | TIME | HH:MM:SS:mm | 00:00:00:01-  23:59:59:99 | Y |  |  |
|  | RIDE\_MEANS | Was it rental or regular or goods | VARCHAR(10) |  |  | Y |  |  |
|  | RIDE\_START\_LOC\_LON | Ride journey start(GPS)-LONGITUDE – in decimal degrees | DECIMAL(8,6) |  | -90 TO +90 | Y |  |  |
|  | RIDE\_START\_LOC\_LAT | Ride journey start(GPS)-LATITUDE – in decimal degrees | DECIMAL(9,6) |  | -179.999999  TO +179.999999 | Y |  |  |
|  | RIDE\_END\_LOC\_LOG | Ride journey end(GPS)- LONGITUDE – in decimal degrees | DECIMAL(8,6) |  | -90 TO +90 | Y |  |  |
|  | RIDE\_END\_LOC\_LAT | Ride journey END(GPS)-LATITUDE – in decimal degrees | DECIMAL(9,6) |  | -179.999999  TO +179.999999 | Y |  |  |
|  | BOOKING\_ID | Unique Booking ID | CHAR(8) | XX999999 |  | Y | FK | BOOKING |
| BOOKING | BOOKING\_ID | Automatic generated Booking ID | CHAR(8) | XX999999 |  | Y | PK |  |
|  | CUSIN\_ID | Customer individual ID | CHAR(8) | XX999999 |  | Y | FK | CUSTOMER |
|  | BOOK\_TYPE | Rental or pick and drop  Based on type | VARCHAR(20) |  |  | Y |  |  |
|  | BOOK\_TIME | Booking time | TIME | HH:MM:SS:mm | 00:00:00:01-  23:59:59:99 | Y |  |  |
|  | BOOK\_DATE | Booking Date | DATE | DD-MM-YYYY | 31-12-1999  TO  31-12-2099 | Y |  |  |
| SUB\_TYPE\_FOR\_BOOKING-RENTAL | BOOK\_TRIP\_PURPOSE | Reason for rental | VARCHAR (50) | Xxxxxx |  | Y |  |  |
|  | VISITING PLACE | Destination place | VARCHAR(20) | Xxxxxx |  | Y |  |  |
|  | PICK\_PLACE | Vehile pick up location | VARCHAR(20) | Xxxxxx |  | Y |  |  |
|  | DROP\_PLACE | Vehicle drop location | VARCHAR(20) | Xxxxxx |  | Y |  |  |
|  | VEHICLE\_TYPE\_REQUESTED | Type of vehicle requested by customer can be cars, trucks,etc | VARCHAR(20) | Xxxxxx |  | Y |  |  |
|  | VEHICLE\_ID | Assigned vehicle ID | CHAR(8) | XX999999 |  | Y | FK | VEHICLE |
| SUB\_TYPE\_FOR\_BOOKING – PICK AND DROP | PICK\_UP\_LOC\_LON | Pick up location  GPS form of data -LOGITUDE | DECIMAL(8,6) | 99 | -90 TO +90 | Y |  |  |
|  | PICK\_UP\_LOC\_LAT | Pick up location  GPS form of data -LATITUDE | DECIMAL(9,6) | 199.999999 | -179.999999  TO +179.999999 | Y |  |  |
|  | DROP\_OFF\_LOC\_LON | Dropping location GPS – LONGITUDE- in decimal degress | DECIMAL(8,6) | 99 | -90 TO +90 | Y |  |  |
|  | DROP\_OFF\_LOC\_LAT | Dropping location GPS – LATITUDE- in decimal degress | DECIMAL(9,6) | 199.999999 | - 179.999999 TO +179.999999 | Y |  |  |
|  | VEHICLE\_TYPE\_REQUESTED | Type of vehicle requested by customer can be cars, trucks,etc | VARCHAR(20) | Xxxxxx |  |  |  |  |
| INVOICE | INVOICE\_NO | Invoice number generated from 1 | NUMBER(6) | 999999 | 1-999999 | Y | PK |  |
|  | RIDE\_ID | Ride ID of the invoice | CHAR(8) | XX999999 |  | Y | FK | RIDE |
|  | REFERENCE\_ID | Reference ID is used to have a common ID for two companies to access it | NUMBER(10) | 9999999999 | 1000000000  -  9999999999 |  |  |  |
|  | CUSTOMER\_ID | Customer ID to which the Invoice is billed | CHAR(8) | XX999999 |  | Y | FK | CUSTOMER |
|  | SPEN\_ID | If its valid else SPIN\_ID | CHAR(8) | XX999999 |  | Y | FK | SERVICE-PROVIDER -INDIVIDUAL |
|  | INVOICE\_BILL\_AMOUNT | Total amount of the bill generated | NUMBER(8,2) | 99999999.99 | 0.01-99999999.99 | Y |  |  |
|  | INVOICE\_STATUS | Invoice status either Complete or Pending | CHAR(8) | XXXXXXXX |  | Y |  |  |
| SUBSCRIPTION\_PLAN | | SUBPLAN\_CODE | Unique code for each subscription plan | CHAR(4) | XXXX |  | Y | PK |  |
|  | | SUBPLAN\_DESC | Description about the plans | VARCHAR(100) | Xxxxxx |  |  |  |  |
|  | | SUBPLAN\_PRICE | Amount of payment due | NUMBER(8,2) | 99999999.99 |  |  |  |  |

**BUSINESS RULES:**

CUSTOMER / BOOKING

1. A CUSTOMER can have NO BOOKING or MANY BOOKINGs
2. A BOOKING must have only ONE CUSTOMER

SERVICE PROVIDER – INDIVIDUAL /VEHICLE

1. An INDIVIDUAL SERIVE PROVIDER can own either ONE or TWO VEHICLES.
2. A VEHICLE must be owned by ONLY ONE SERIVE PROVIDER (either Individual or entity).

SERVICE PROVIDER – ENTITY /VEHICLE

1. An ENTITY SERVICE PROVIDER must own at least TWO VEHICLES and can have MANY VEHICLES
2. A VEHICLE must have ONLY ONE SERIVE PROVIDER (either Individual or entity).

RIDE/VEHICLE

1. A RIDE must be associated to ONLY ONE VEHICLE
2. A VEHICLE can be associated with ZERO or MANY RIDEs
3. A VEHICLE can be running ZERO or ONE RIDE at single time instance\*

INVOICE/RIDE

1. An INVOICE must be associated to only ONE RIDE
2. A RIDE must have ONE or MANY INVOICEs associated to it.

RIDE/CUSTOMER

1. A CUSTOMER can have ZERO or MANY RIDEs.
2. A CUSTOMER can only have ZERO or ONE RIDE at single instance in time\*
3. A RIDE can carry ONE or MORE CUSTOMERS.

INVOICE/CUSTOMER

1. An INVOICE can be billed to ONLY ONE CUSTOMER
2. A CUSTOMER can have NO INVOICE or MANY INVOICES associated to them.

DRIVER/SERVICE PROVIDER -ENTITY

1. A DRIVER must be associated ZERO or ONE ENTITY-SERVICE PROVIDER
2. An ENTITY-SERVICE PROVIDER must have at least ONE DRIVER associated.

DRIVER/RIDE

1. A DRIVER can have 0 RIDE or MANY RIDES in their account
2. A RIDE can have NO DRIVERS and up to THREE DRIVERS (if ride is overnight)

RIDE/BOOKING

1. A RIDE can have ONE BOOKING only.
2. A successful BOOKING can have only ONE RIDE.

BOOKING/VEHICLE-RENTAL

1. A successful BOOKING for Rental must be associated to only ONE RENTAL-VEHICLE
2. A RENTAL-VEHICLE can have ZERO or MANY BOOKING (including past BOOKING)
3. A RENTAL – VEHICLE can have ZERO BOOKING or ONE BOOKING at a single instance of time\*.

SERVICE PROVIDER/INVOICE

1. A SERVICE PROVIDER can generate NO INVOICE or MANY INVOICE
2. An INVOICE has to be generated by ONLY ONE SERVICE PROVIDER.

EMPLOYEE-ORGANISATION\_MANGAER/CUSTOMER-ORGANISATIONS

1. AN ORGANISATION\_MANAGER must manage at least ONE CUSTOMER\_ORGANISATION and can manage MANY CUSTOMER\_ORGANISATION
2. An ORGANISATION has ONLY ONE ORGANISATION MANAGER (from the company)

CUSTOMER-ORGANISATION/SUBSCRIPTION\_PLAN

1. CUSTOMER-ORGANISATION can only subscribe to ONE SUBSCRIPTION PLAN.
2. A SUBSCRIPTION PLAN can have ZERO or MANY CUSTOMER-ORGAINSATION as subscribers.

**ERM MODELING**

|  |  |  |  |
| --- | --- | --- | --- |
| ENTITY | REALTIONSHIP | CONNECTIVITY | ENTITY |
| CUSTOMER | can have | 1:M | BOOKING |
| DRIVER | drives | M:N | VEHICLE |
| SERVICE PROVIDER | generates | 1:M | INVOICE |
| CUSTOMER | has to pay | 1:M | INVOICE |
| RIDE | generates | 1:M | INVOICE |
| RIDE | Has a | 1:1 | BOOKING |
| SERVICE PROVIDER | | Owns | 1:M | VEHICLE |
| VEHICLE | | Associated to | 1:M | BOOKING |
| RIDE | | Associated with | M:N | CUSTOMERS |
| RIDE | | Can have | M:N | DRIVERS |
| EXTERNAL MANAGER | | | Manages | 1:M | ORGANISATION |
| ORGANISATION | | | Subscribes to | 1:1 | SUBSCRIPTION\_PLAN |