**Project Definition**

The postal and delivery service business faces a huge problem in providing consistent transparent, and secure solutions at all levels of operation.

To address this, we plan to integrate small-scale postal deliveries with large-scale moving assistance while maintaining high service quality and transparency. Our primary focus will be on examining essential subjects such as real-time tracking and routing optimization, offering clear pricing breakdowns, and efficiently scheduling and validating delivery workers. In addition, we plan to improve customer service response times, improve package security and delivery confirmation procedures, and meet international shipping regulations.

We also want to streamline scheduling for specialty services like moving and bulk shipment, while incorporating client feedback and responding to issue reports to continuously optimize the overall experience.

**Operational Database Design**

***ER Diagram:***

A diagram of a software company

AI-generated content may be incorrect.

***Relational Schema & Model:***

A diagram of a data flow

AI-generated content may be incorrect.

**Data Warehouse Design and Implementation**

***Conceptual DW Model:***

A diagram of a computer

AI-generated content may be incorrect.

**Slowly Changing Dimensions:**

* Identified a few SCD in the project that we implemented in DB.
* The tracked attributes along with its significance are given below:
* Dim\_Client
  + Tracked Attributes:
    - client\_name
    - client\_phone
    - client\_email
    - client\_location\_key
  + Business Need: Track customer contact history and location changes for service quality analysis
* Dim\_DeliveryPerson
  + Tracked Attributes:
    - license\_no
    - license\_exp\_date
    - can\_lift\_heavy\_truck
    - can\_drive\_out\_state
    - base\_location\_key
  + Business Need: Monitor driver qualifications and compliance
* Dim\_DeliveryTruck
  + Tracked Attributes:
    - insurance\_no
    - insurance\_exp\_date\_key
  + Business Need: Track insurance compliance and coverage history
* Dim\_StoreWarehouse
  + Tracked Attributes:
    - c\_capacity
    - worker\_count
  + Business Need: Monitor facility capacity changes and staffing levels
* We added a few columns to monitor and implement SCD properly in the DB.
  + start\_date: Records when changes became effective
  + end\_date: Shows when version became inactive
    - Enables point-in-time analysis Null end\_date indicates current version
  + is\_current BOOLEAN NOT NULL DEFAULT TRUE,
  + version\_number INT NOT NULL
    - is\_current: Quick filtering for current records
    - version\_number: Track change sequence Improves query performance for current state Helps in audit trails

***Logical DW Model:***

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***Primary Events:***

* In the above scheme, primary events are necessary for maintaining an integral balance of the delivery monitoring system. It supports events like registering a client, making an order, updating the tracking system, and lodging a complaint.
* When a new client is added, the system checks if it is personal or store-based and updates the corresponding tables. When a new client is added to either **Dim\_PersonalClient** or **Dim\_StoreClient**, they will never appear in both.
* Upon making an order, primary events ensure that order type, payment method, and if a tracking number exists, they are accurately recorded in the **Dim\_Order** table. The automation works to limit data input errors and ensure a seamless transfer of information between systems, while encouraging accuracy and reliability in the client and order records.
* Tracking delivery attempts and updating delivery statuses is another important aspect of primary events. A record is maintained of every delivery attempt for every order in a push table, the **Fact\_DeliveryTracking**, recording the Delivery person, Truck assigned to deliver, and estimated delivery completion date.
* Every time a new delivery attempt is logged, it raises an event and the remaining deliveries, time of last status updates and current location metrics are updated automatically.
* In addition, the details of delivery persons, including base location and license information, are automatically created in the **Dim\_DeliveryPerson** table. This will allow businesses to track the real-time delivery process, optimize allocation of pull resources, and provide accurate delivery information for further statistical analysis.
* A complaint management system is yet another very crucial aspect handled in the schema by the primary events; whenever the customer places a complaint regarding delivery issues, an event will log the complaint details into an appropriately built table called the **Fact\_DeliveryComplaints**.
* Some of the data elements stored may be customer ID, the order ID, complaint reason, and a tracking number. The system ensures that complaints are associated with the order and delivery attempt in question.