FUNCTIONAL DECOMPOSITION

Functional decomposition is used to break down the overall system and its requirements into smaller, manageable, and logical components, making it easier to analyze and implement the system effectively. Below is the functional decomposition of the **Real-Time Supply Chain Visibility Platform**.

Level 1: High-Level Function (Main System)

1. **Real-Time Supply Chain Visibility Platform**

Level 2: Major Functional Areas

1. **Shipment Tracking and Management**
2. **Inventory Management**
3. **Integration with External Systems (Suppliers/Carriers)**
4. **Data Processing and Management**
5. **Reporting and Analytics**
6. **Notifications and Alerts**
7. **User Management and Security**
8. **System Administration and Support**

Level 3: Breakdown of Each Functional Area

1. Shipment Tracking and Management

- **1.1. Shipment Data Collection**
  - Collect real-time shipment data from carriers.
  - Collect batch shipment data from carriers with legacy systems.
- **1.2. Update Shipment Status**
  - Automatically update shipment status (In Transit, Delivered, etc.).
  - Record Estimated Time of Arrival (ETA) for each shipment.
- **1.3. View Shipment Details**
  - Provide detailed shipment information (origin, destination, contents).
  - View history of shipment statuses and movements.
- **1.4. Delay and Exception Handling**
  - Identify and flag delayed shipments.
  - Generate exception reports for missed deadlines or other shipment issues.

2. Inventory Management

- **2.1. Inventory Data Collection**
  - Collect real-time inventory updates from warehouses and suppliers.
  - Ensure inventory levels are updated automatically after shipment receipts.
- **2.2. Monitor Inventory Levels**
  - Track current inventory levels for each product in each warehouse.
  - Set minimum and maximum thresholds for stock levels.
- **2.3. Reorder Management**
  - Trigger reorder notifications when stock reaches minimum thresholds.
  - Automate order creation with suppliers based on predefined rules.
- **2.4. Stock Allocation**
  - Allocate stock to customer orders based on real-time inventory levels.

3. Integration with External Systems (Suppliers/Carriers)

- **3.1. API Integration**
  - Enable real-time data exchange via API with external suppliers and carriers.
- **3.2. EDI Integration**
  - Support batch data exchange via Electronic Data Interchange (EDI) for partners with legacy systems.
- **3.3. Data Validation and Transformation**
  - Standardize data from external partners before feeding it into the system.
  - Validate and format data to ensure consistency and accuracy.

4. Data Processing and Management

- **4.1. Data Ingestion**
  - Ingest real-time and batch data into the system.
  - Process external data from APIs and EDI connections.
- **4.2. Data Storage**

    - Store shipment, inventory, and partner data in a central database.
    - Ensure data is stored in structured formats for easy retrieval.
- **4.3. Data Cleansing**
    - Automatically clean and validate data to remove duplicates and errors.
- **4.4. Historical Data Management**
    - Archive historical data for analysis and compliance purposes.
    - Provide users with access to past shipment and inventory data.

5. Reporting and Analytics

- **5.1. Generate Reports**
    - Generate predefined reports (e.g., shipment performance, inventory status).
    - Enable users to customize and create their own reports.
- **5.2. Real-Time Dashboards**

    - Provide real-time dashboards showing shipment status, inventory levels, and key performance indicators (KPIs).
- **5.3. Predictive Analytics**
    - Use predictive models to forecast shipment delays or inventory shortages.
- **5.4. Data Export**
    - Allow users to export data and reports in various formats (Excel, CSV, PDF).

6. Notifications and Alerts

- **6.1. Shipment Delay Alerts**
    - Send real-time alerts for delayed shipments.
    - Notify users of any discrepancies or exceptions in shipment tracking.
- **6.2. Stock Threshold Alerts**
    - Notify users when stock levels fall below the minimum threshold.
    - Trigger automatic reordering alerts.
- **6.3. System Alerts**
    - Send alerts for system issues, data validation errors, or downtime.

- Allow users to customize alert thresholds and types.

7. User Management and Security

- **7.1. User Authentication**
  - Implement multi-factor authentication (MFA) for system access.
  - Support single sign-on (SSO) integration.
- **7.2. Role-Based Access Control**
  - Define roles (Admin, User, Supervisor) and their access rights.
  - Restrict access to sensitive data based on user roles.
- **7.3. Audit Trails**
  - Maintain logs of user activity within the system.
  - Provide audit reports to monitor access and data changes.

8. System Administration and Support

- **8.1. System Configuration**

    - Allow administrators to configure system settings (e.g., thresholds, alert parameters).
- **8.2. Data Backup and Recovery**
    - Implement automated backups and data recovery solutions.
    - Ensure business continuity in case of system failure.
- **8.3. System Monitoring**
    - Continuously monitor system performance and health.
    - Alert administrators for any system failures or performance issues.
- **8.4. Post-Implementation Support**
    - Provide ongoing technical support and user training post-deployment.
    - Offer a helpdesk and knowledge base for troubleshooting.

This functional decomposition breaks down the overall functionality of the Real-Time Supply Chain Visibility Platform into manageable components. Each functional area is further broken down into its

respective features, making it easier to analyze and address specific requirements. This approach ensures that the platform's design and implementation address all necessary business functions while aligning with stakeholder needs.