Ntigi: System Entity & Functional Overview

1. The Agency & Branch Configuration

In many African urban centers, a single city might have multiple "neighborhood hubs" or "bus stations" rather than one central postal office. Ntigi treats an **Agency** as the parent entity (the brand) and **Branches/Stops** as the specific geographic locations.

- **Function:** Each stop is configured with its specific city, neighborhood, and contact person. This allows the system to calculate routes not just from "City A to City B," but specifically from "Mvan Station in Yaoundé to Akwa Hub in Douala," ensuring customers know exactly where to drop off and pick up items.

2. The Identity & Notification Engine

Because email penetration remains lower than mobile connectivity, the **User Entity** (Sender and Receiver) is built around the **Mobile Phone Number**.

- **Function:** While emails are optional fields for corporate clients, the phone number is a strict primary key. Upon order creation, the system triggers SMS or WhatsApp notifications. This entity handles the "Know Your Customer" (KYC) aspect, storing the sender’s history and the receiver’s preferred delivery stop.

3. Package Classification & Dynamic Pricing

Not all cargo is created equal. Ntigi categorizes **Packages** into types: **Documents, Perishables (food/flowers), and Non-Perishables (electronics/clothing).**

- **Function:** Each category has its own pricing logic. For instance, documents might have a flat "envelope rate," while perishables might include a "fragile/handling surcharge." The system allows agents to define units—be it weight (kg), volume (m^3), or item count—to automatically calculate the final cost during the intake process.

4. Visual Verification (The Photo Attachment)

To mitigate disputes regarding damaged goods or "lost" items, the **Shipment Entity** includes a mandatory or optional **Photo Attachment** feature.

- **Function:** When an agent accepts a package, they use the mobile interface to snap a real-time photo of the item. This image is timestamped and linked to the tracking number. It provides "Proof of Condition" at the point of departure, protecting the agency from claims regarding pre-existing damage.

5. Fleet Management & Vehicle Assignment

The **Fleet Entity** represents the physical assets used for transport, ranging from motorbikes for "last-mile" delivery to large inter-city buses or trucks.

- **Function:** Each shipment must be "Manifested" or assigned to a specific **Vehicle**. By selecting a vehicle (identified by plate number and type), the system knows the capacity used and the current location of the cargo. This creates a chain of custody: the package is no longer just "at the agency"—it is "on Bus X."

6. The 7-Digit Tracking & Live Mapping

The **Tracking Entity** is the public-facing bridge between the agency and the client. It utilizes a **7-digit alphanumeric code** (e.g., TRK-892L) for simplicity.

- **Function:** When a user enters this code on the Ntigi web portal, the system fetches the shipment's status. If the assigned vehicle is equipped with GPS or the driver's app is active, it pulls a **Google Maps live view**. If no live signal is available, it defaults to a "Milestone View," showing the last confirmed stop the vehicle checked into.

7. The Thermal Receipt (Ticket Format)

Standard A4 printers are bulky and expensive to maintain in busy stalls. Ntigi is designed for **Thermal Printers** (58mm or 80mm rolls).

- **Function:** Upon completing an order, the system generates a "Ticket." This receipt includes the agency's custom logo, taxpayer ID, and a QR code. The layout is optimized for vertical scrolling, ensuring it is legible on thin thermal paper, which is the standard for "Proof of Payment" in local markets.

8. The Dashboard & Analytical Reporting

The **Dashboard** is the command center for agency owners to monitor health across all branches.

- **Function:** It provides real-time stats like **Daily Tonnage**, **Cash-on-Hand per Branch**, and **Peak Shipping Hours**. For deeper dives, the **Reporting Entity** allows for downloads of "Revenue Summaries" (for tax compliance) and "Delayed Shipment Logs" (to identify which routes or vehicles are underperforming).

9. Internationalization (i18n) & Branding

To remain "market-ready" for diverse regions (e.g., Francophone vs. Anglophone Africa), the **i18n Entity** handles more than just language.

- **Function:** Beyond translating the UI, it allows each agency to inject their **Fiscal Identity**—Taxpayer Identification Numbers (TIN), business addresses, and custom

footers (e.g., "No refunds after 24 hours"). This ensures that every receipt generated is legally compliant with local commercial laws.

DATA MODEL DIAGRAMS

1. Agencies

The root entity for the courier brand and its legal/fiscal identity.

Attribute	Data Type	Description
agency_id	UUID / INT	Unique identifier for the courier company.
name	VARCHAR	The trading name of the agency.
tax_id	VARCHAR	Government-issued taxpayer identification number.
logo_url	TEXT	URL to the high-res logo used for receipts and UI.
base_currency	CHAR(3)	Local currency code (e.g., XAF, NGN, KES).
fiscal_address	TEXT	Legal physical address for tax compliance.

2. Branches / Stops

Specific physical locations within a city where goods are dropped or picked up.

Attribute	Data Type	Description
stop_id	UUID / INT	Unique identifier for the station/hub.
agency_id	FK (Agency)	Links the stop to the parent agency.
stop_name	VARCHAR	Specific name (e.g., "Mvan Station", "Akwa Hub").

city	VARCHAR	The city where the stop is located.
latitude	DECIMAL	GPS latitude for map mapping.
longitude	DECIMAL	GPS longitude for map mapping.
printer_type	ENUM	Configuration for 58mm or 80mm thermal printers.

3. Users (Agents)

Internal staff members who manage shipments and vehicles.

Attribute	Data Type	Description
user_id	UUID / INT	Unique identifier for the staff member.
branch_id	FK (Stop)	The primary branch where the agent is stationed.
full_name	VARCHAR	Agent's name.
phone_number	VARCHAR	**Mandatory** primary login/contact credential.
role	ENUM	Permissions: SuperAdmin, Manager, Agent, Driver.

4. Clients (Senders & Receivers)

The customers are interacting with the system.

Attribute	Data Type	Description
client_id	UUID / INT	Unique identifier.
phone_number	VARCHAR	**Mandatory** Unique key (No email required).
full_name	VARCHAR	Customer name.
email	VARCHAR	**Optional** (Nullable) for digital receipts.
is_verified	BOOLEAN	Indicates if the phone number was verified via OTP.

5. Package_Types

The classification rules for different types of cargo.

Attribute	Data Type	Description
type_id	INT	Unique ID for the category.
label	VARCHAR	e.g., Document, Perishable, Electronics.
unit_type	ENUM	How it is charged: WEIGHT, VOLUME, FLAT_RATE.
price_per_unit	DECIMAL	The monetary value assigned to the unit_type.
handling_notes	TEXT	Specific instructions (e.g., "Keep refrigerated").

6. Shipments

The core transaction record for every package sent.

Attribute	Data Type	Description
tracking_no	CHAR(7)	**Unique Alphanumeric Code** for client tracking.
sender_id	FK (Client)	Link to the person sending the item.
receiver_id	FK (Client)	Link to the person receiving the item.
origin_id	FK (Stop)	Where the package was dropped off.
dest_id	FK (Stop)	Where the package is going.
status	ENUM	PENDING, IN_TRANSIT, ARRIVED, DELIVERED.
total_weight	DECIMAL	Measured weight of the package.
total_cost	DECIMAL	Final calculated price.

7. Shipment_Photos

Visual proof of the item's condition.

Attribute	Data Type	Description
photo_id	UUID / INT	Unique ID.

shipment_id	FK (Shipment)	Link to the specific order.
image_url	TEXT	Path to the stored image file.
captured_at	TIMESTAMP	Exact time the photo was taken.
stage	ENUM	INTAKE (Departure) or DELIVERY (Arrival).

8. Fleet (Vehicles)

The assets used for transportation.

Attribute	Data Type	Description
vehicle_id	UUID / INT	Unique ID.
plate_number	VARCHAR	Registration number for physical identification.
vehicle_type	ENUM	BIKE, VAN, BUS, TRUCK.
is_trackable	BOOLEAN	Flag for Google Maps real-time API support.

9. Manifests

The "loading list" links packages to vehicles for a specific trip.

Attribute	Data Type	Description
manifest_id	UUID / INT	Unique trip ID.
vehicle_id	FK (Vehicle)	The vehicle assigned to this trip.
driver_id	FK (User)	The agent/driver responsible for the trip.

departure_time	TIMESTAMP	When the vehicle left the origin.
arrival_time	TIMESTAMP	When the vehicle reached the destination.

10. Tracking_Logs

High-frequency data for live mapping.

Attribute	Data Type	Description
log_id	BIGINT	Unique log ID.
vehicle_id	FK (Vehicle)	The vehicle being tracked.
latitude	DECIMAL	Real-time GPS coordinate.
longitude	DECIMAL	Real-time GPS coordinate.
timestamp	TIMESTAMP	Time of location ping.

11. Transactions / Payments

Financial records for every order.

Attribute	Data Type	Description
txn_id	UUID / INT	Unique payment ID.
shipment_id	FK (Shipment)	The order being paid for.
method	ENUM	CASH, MOBILE_MONEY, WALLET.
amount	DECIMAL	Total amount paid.
tax_amount	DECIMAL	Component of price designated as tax.

12. Localization_Settings (i18n)

Handling language and regional output.

Attribute	Data Type	Description
lang_id	INT	Unique ID.
iso_code	VARCHAR	e.g., "en", "fr", "sw".
translation_json	JSONB	Key-value pairs for UI and Receipt text.

13. Receipt_Templates

Layout definitions for thermal printers.

Attribute	Data Type	Description
template_id	INT	Unique ID.
agency_id	FK (Agency)	Which agency this layout belongs to.
header_text	TEXT	Custom greeting or instructions.
footer_text	TEXT	Terms and conditions for the ticket.
show_qr_code	BOOLEAN	Toggle for including the tracking QR code.