

RECEIPTRADAR

A Privacy-First, Self-Hosted Financial Operating System

By Minh Triet Vu

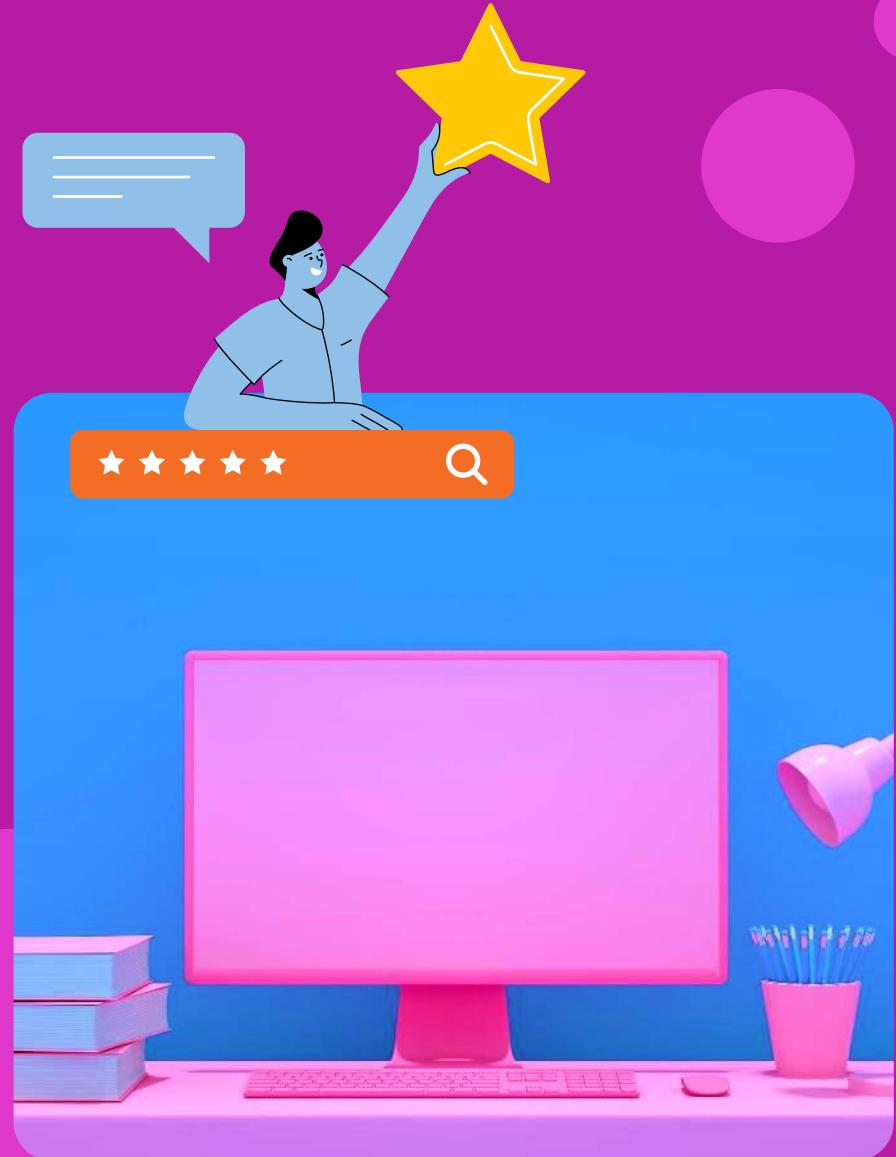
FINANCIAL BLIND SPOTS



- Tracking expenses manually is high-friction and error-prone
- Current Market Failures:
 - Manual Apps
 - Bank Sync
 - Commercial Scanners
- The mission: To build to zero friction, real-time tracker that acts like an accountant in your pocket, with data privacy in mind

YOUR ACCOUNTANT IN WHATSAPP

- Core concept: A headless, chat-based interface powered by a self-hosted AI backend
- Features:
 - Smart vision: Instantly reads receipt photos, extracting vendors, dates, and line items
 - Intent Understanding: Handles natural language commands like "Set food budget to \$500" without buttons
 - Live Visualization: Auto-generates professional financial dashboards in Google Sheets
 - Privacy-First: Self-hosted architecture ensures financial data never leaves the user's-controlled ecosystem



SYSTEM DESIGN & STACK



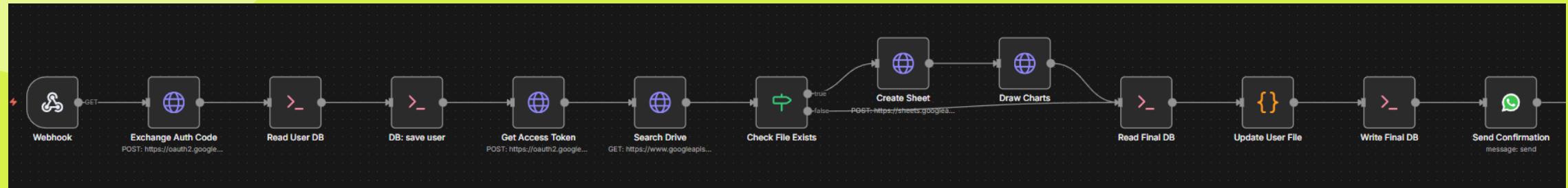
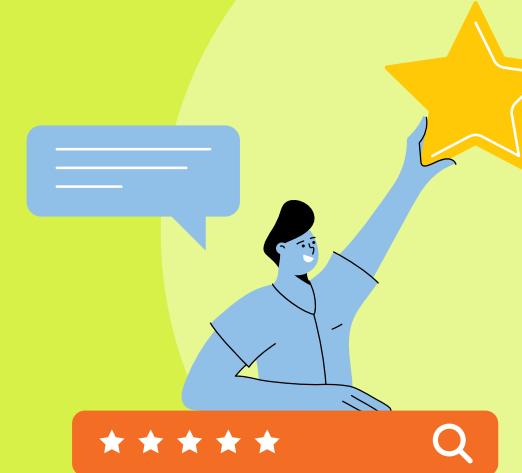
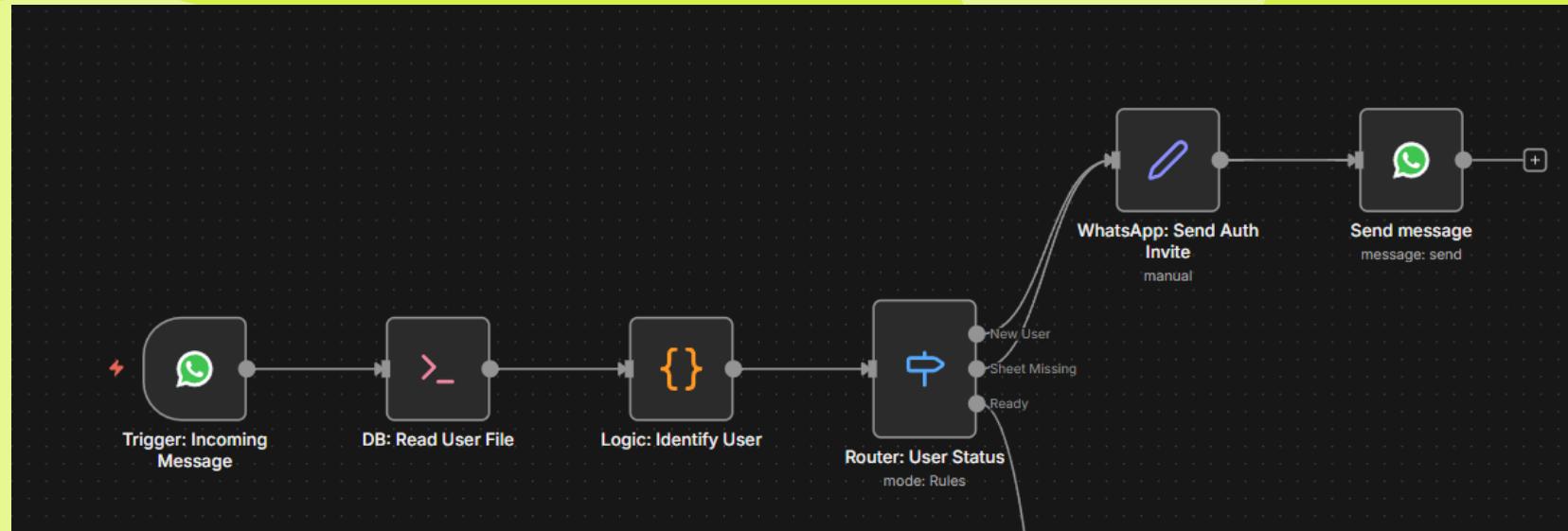
Infrastructure:

- Containerization: Docker & Docker Compose
- Orchestration: n8n
- Tunneling: Ngrok

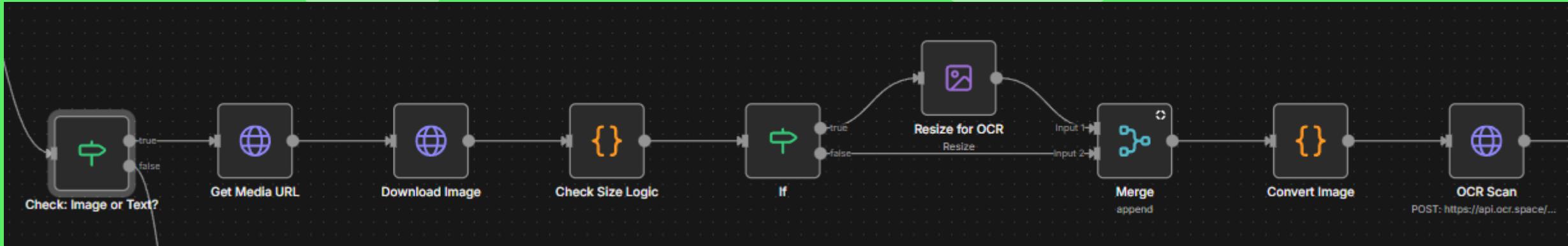
Tech Stack:

- Frontend: WhatsApp Cloud API.
- Database: JSON-based state management (Hot-swappable to PostgreSQL).
- AI Layer: Google Gemma 3 (via OpenRouter) + OCR.space.
- Storage: Google Sheets API v4.

HEADLESS AUTHENTICATION



INTELLIGENT IMAGE PROCESSING



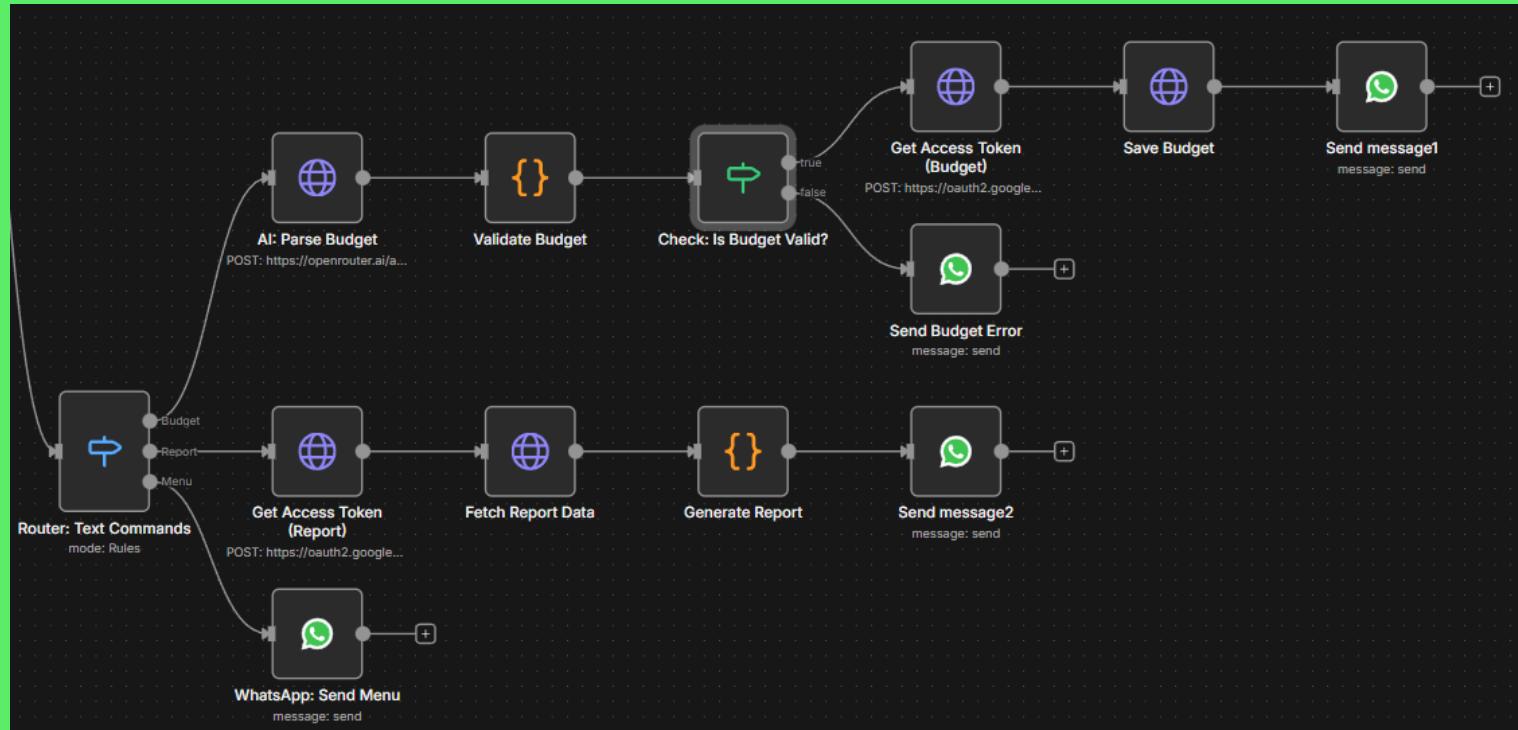
- **Challenge:** Balancing API limits
- **Solution:**
 - Analysis: System checks payload size/dimensions
 - The fork:
 - $> 1\text{MB}$: Route through Resize Node (Downscale to 1600px)
 - $< 1\text{MB}$: Bypass directly to preserve maximum fidelity
 - The merge: Path reconverge for Base64 conversion and AI ingestion

AI ANALYSIS & DATA LOGIC



- The AI Layer:
 - Contextual Correction: Fixes OCR errors
 - Smart Categorization
- Backend logic:
 - Deduplication:
 - Batching

NATURAL LANGUAGE COMMAND CENTER



Setup Complete! 🚀

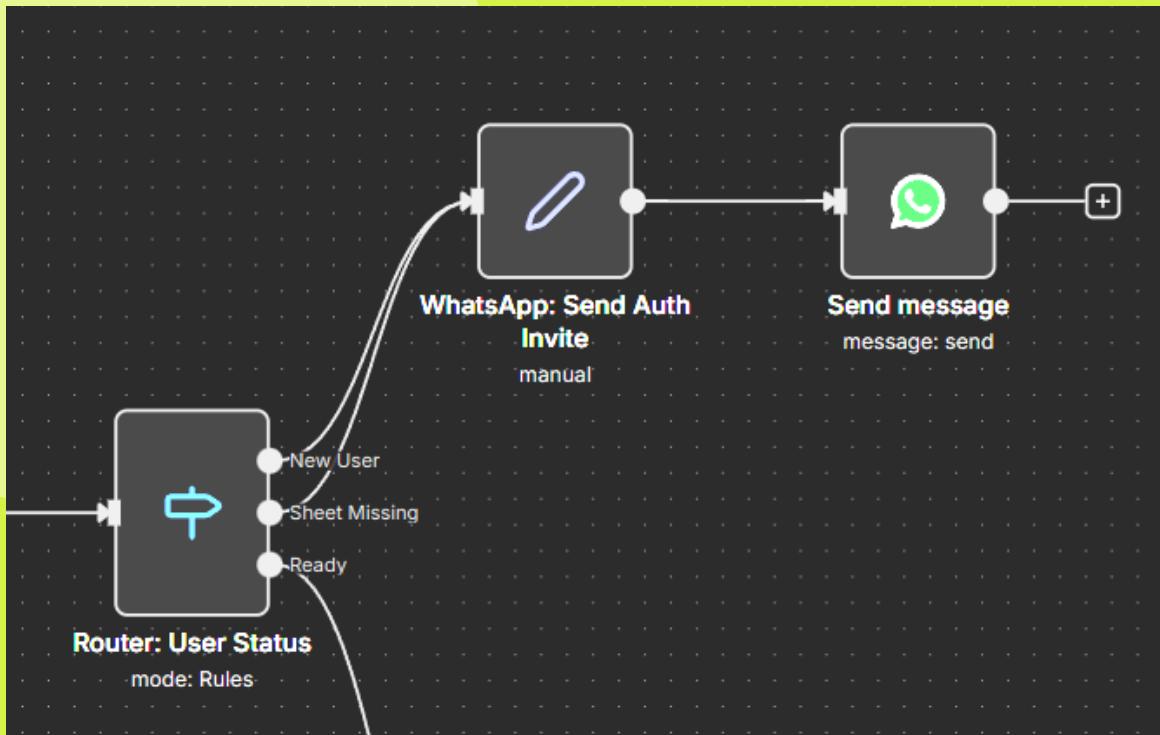
I have successfully connected to your spreadsheet:
YOUR AI TRACKER

HOW TO USE ME

- Scan a Receipt**
Just send me a photo! I will extract the data and log it.
- Set Budgets**
Type **Budget** to set your monthly spending limits.
- Check Spending**
Type **Report** to see how much you have spent.
- Need Help?**
Type **Menu** to see this list again.

Ready when you are! Try sending a receipt photo now. 8:25 p.m.

HANDLING EDGE CASES

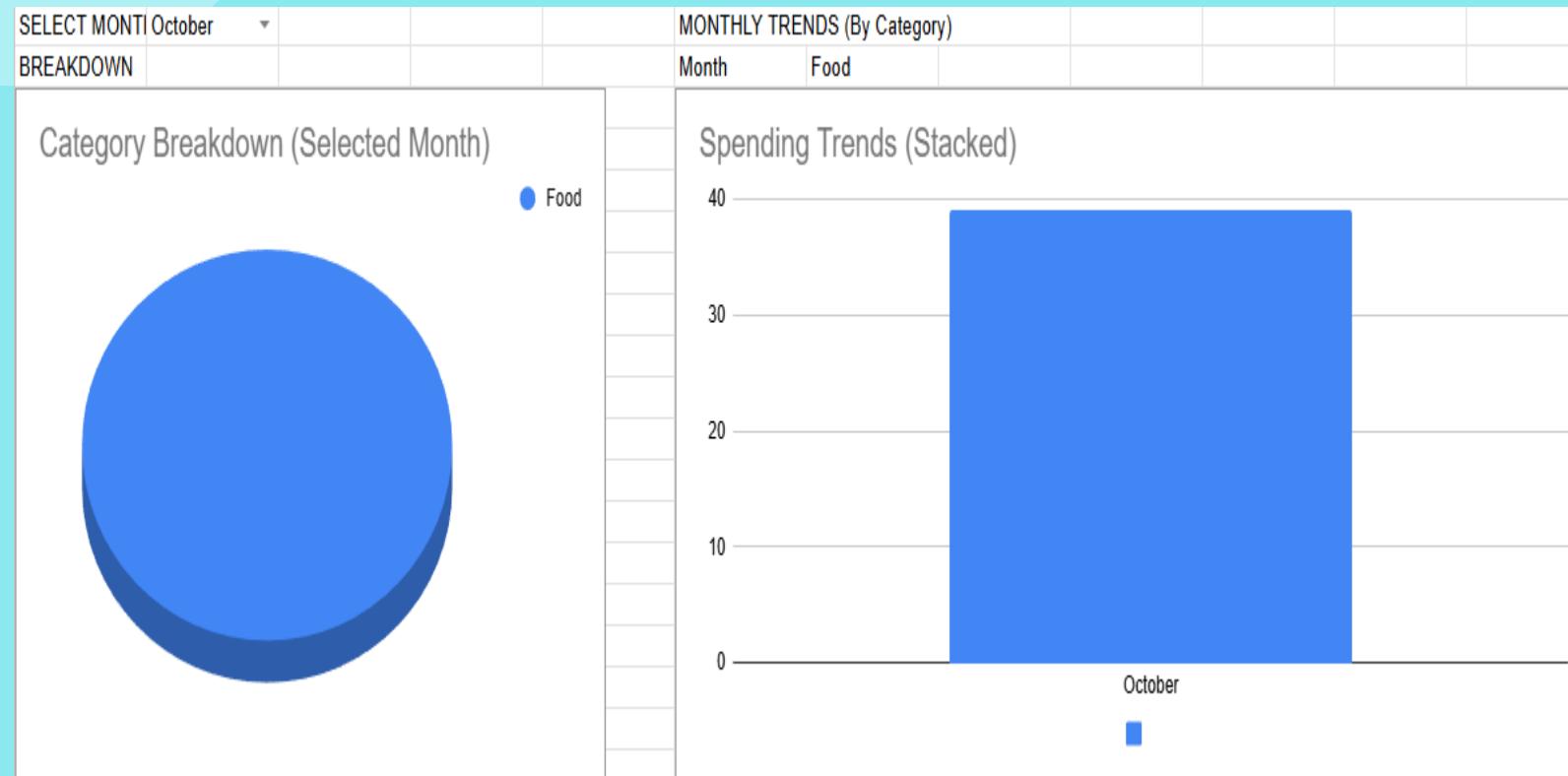


- The Scenario: A “zombie user”
- The Challenge: A valid auth token pointing to a missing resource
- The Solution: Intelligent Routing
 - Router Node validates 2 flags: User Exists? And Sheet ID Valid?
 - Auto-repair: Sheet ID is missing, reroute user back to Onboarding Flow

INSTANT FINANCIAL CLARITY AND PRIVACY

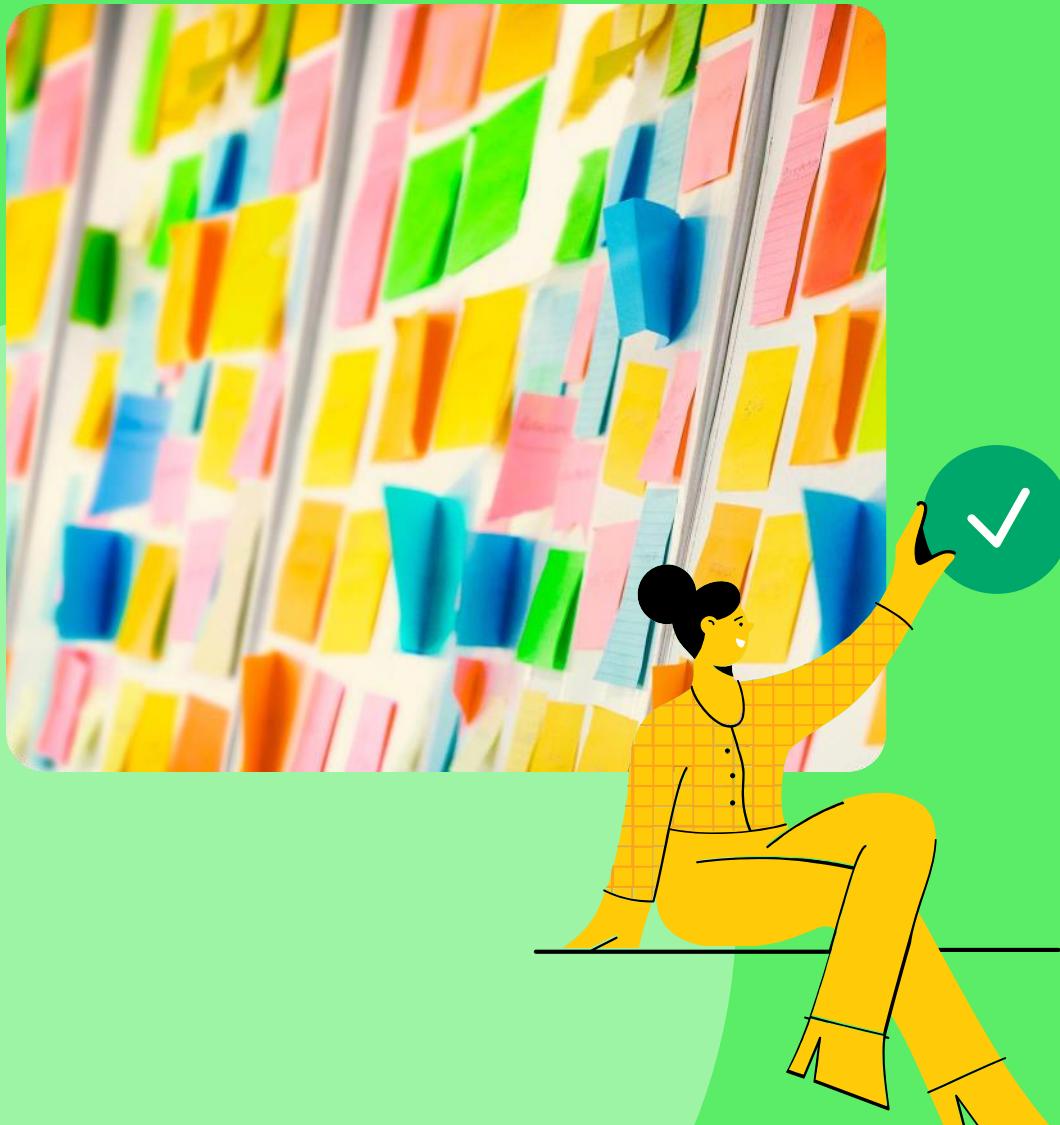
- **The Engineering:**

- Programmatic Build: The system uses the Google Sheets API batchUpdate method.
- Dynamic Injection:
 - Injects complex =QUERY() formulas for real-time pivot tables
 - Creates Data Validation dropdowns for date filtering
 - Generates native Charts (Pie & Stacked Bar) that update live



FUTURE ROADMAP

- **Scalability:** Switch JSON storage to Postgre
- **Temporal Scaling:** Aggregates data by Month Name
- **Conversational Analytics**
- **Duplicate Detection Engine**
- **Multi-Currency Support**
- **Multi-Language Support**



THANK YOU

