Assignment: Building "Movi" - The Multimodal Transport Agent

🚀 Project Scenario

Welcome to MoveInSync! We are building a next-generation, supply-first admin console called **MoveInSync Shuttle**. Our platform operates on a clear, layered logic:

- **Layer 1 (Static Assets):** Transport managers first define the "static" assets.
    1. **Stops** are created (e.g., "Gavipuram", "Peenya").
    2. A **Path** is created as an ordered sequence of `Stops`
    3. A **Route** is created by assigning a specific time to a `Path`. This is all managed in our **`manageRoute`** page.
- **Layer 2 (Dynamic Operations):** On a daily basis, managers perform "dynamic" operations on the **`busDashboard`**. They **Deploy** vehicles onto these `Routes`, which then generates **Trips**, and finally, daily **Trip-Sheets** for drivers and riders.

Your task is to build a working prototype of our new AI assistant, **"Movi"**.

Movi is a "knowledge-aware" AI agent that helps transport managers perform their complex tasks. It's a true multimodal assistant that understands **voice, text, images, and video** to process commands and learn from our product documentation.

Critically, Movi understands this `Stop` -> `Path` -> `Route` -> `Trip` data flow and the **consequences** of changing dynamic operations (e.g., removing a vehicle from a `Trip` will affect bookings and break the `Trip-Sheet` generation).

🤖 Core Agent Architecture Requirement

The backend for the Movi assistant **must** be built using **`langgraph`**. We are specifically testing your ability to build a robust, stateful, and multi-step agent that can manage conditional logic (like checking for consequences), orchestrate multiple tools, and handle complex user interactions.

📋 Core Objective

Deliver a working web application prototype that includes:

1. A dummy database of our transport operations based on the `Stop` -> `Path` -> `Route` logic.

2. A basic, functional **two-page admin UI** (cloned from our screenshots) that displays and manages data from the database.
3. A **multimodal AI assistant ("Movi")** integrated into the UI, powered by a `langgraph` agent.

Part 1: The Data Layer (Dummy Database)

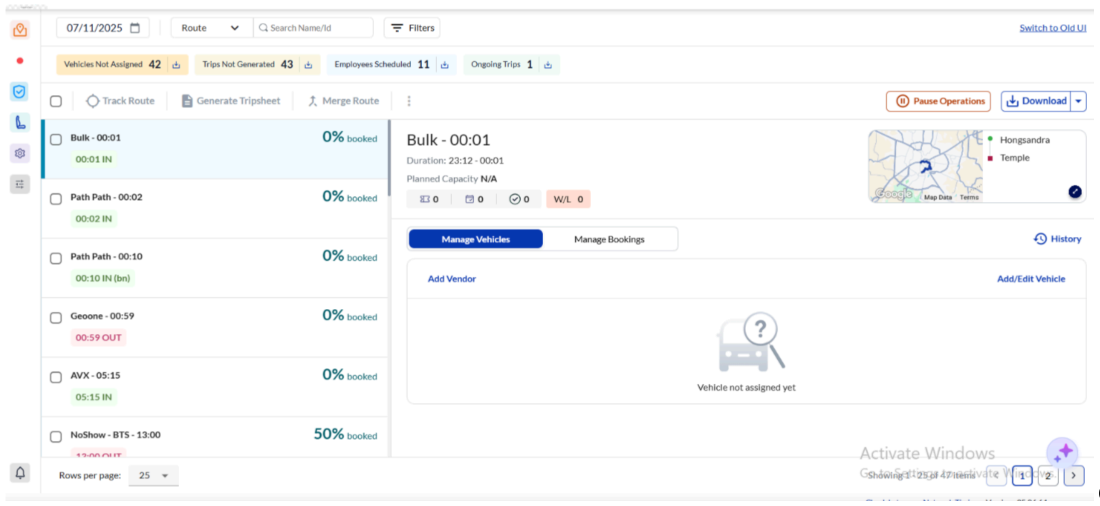
Your first task is to design and populate a simple database that reflects our precise operational flow.

- **Technology:** You are free to use any database (e.g., PostgreSQL, MySQL, SQLite, MongoDB).
- **Task:**
    1. **Define a schema** that can store the following interconnected data:
        - **Static Assets (for `manageRoute` page):**
            - `Stops` (e.g., `stop_id`, `name`, `latitude`, `longitude`)
            - `Paths` (e.g., `path_id`, `path_name`, `ordered_list_of_stop_ids`)
            - `Routes` (This table combines a Path + Time, as seen in the UI): `route_id`, `path_id`, `route_display_name` (e.g., "Path2 - 19:45"), `shift_time`, `direction`, `start_point`, `end_point`, `status` ('active', 'deactivated')
        - **Dynamic Assets & Operations (for `busDashboard` page):**
            - `Vehicles` (e.g., `vehicle_id`, `license_plate`, `type` (Bus/Cab), `capacity`)
            - `Drivers` (e.g., `driver_id`, `name`, `phone_number`)
            - `DailyTrips` (The items in the left panel like 'Bulk - 00:01'): `trip_id`, `route_id`, `display_name`, `booking_status_percentage`, `live_status` (e.g., '00:01 IN')
            - `Deployments` (The link between vehicles and trips): `deployment_id`, `trip_id`, `vehicle_id`, `driver_id`
    2. **Populate** your database with realistic dummy data to fill both pages as seen in the screenshots. Ensure your `Routes` table data is derived from `Paths` and `Stops`.

Part 2: The Context Layer (Admin Console UI)

You need to build a simple UI for the transport manager similar to the provided screenshots. Movi must be present and context-aware on both pages.

- **Technology:** You are free to use any web framework (e.g., React, Vu



Vehicles Not Assigned 42 | Trips Not Generated 43 | Employees Scheduled 11 | Ongoing Trips 1

Bulk - 00:01	00:01 IN	0% booked
Path Path - 00:02	00:02 IN	0% booked
Path Path - 00:10	00:10 IN (bn)	0% booked
Geoone - 00:59	00:59 OUT	0% booked
AVX - 05:15	05:15 IN	0% booked
NoShow - BTS - 13:00		50% booked

Bulk - 00:01
Duration: 23:12 - 00:01
Planned Capacity N/A
0 0 0 W/L 0

Vehicle not assigned yet

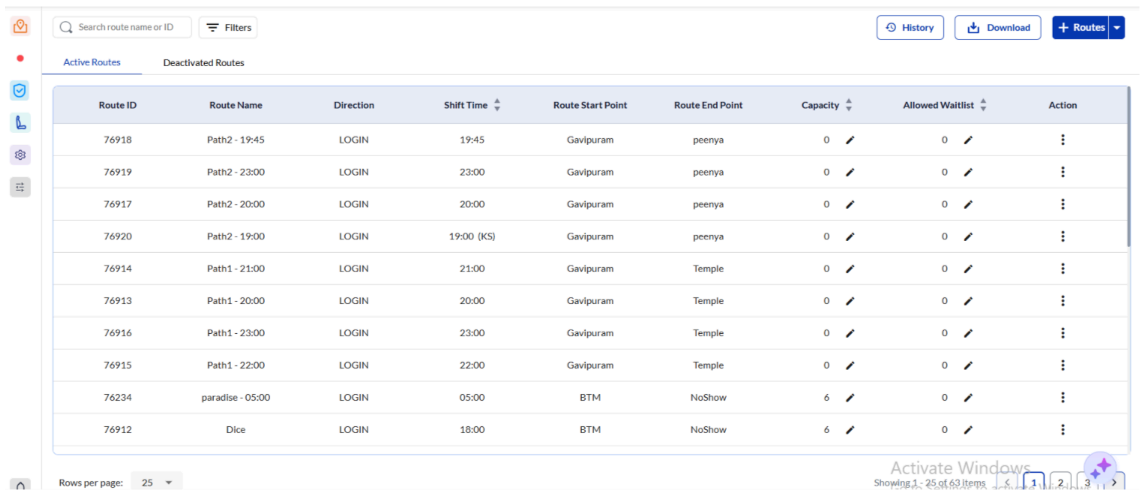
Rows per page: 25
Showing 1 - 25 of 47 items

e, Angular).

Note: You are **allowed and encouraged** to use AI coding assistants (e.g., GitHub Copilot, Cursor, etc) for the UI and the DB part. We are evaluating your AI agent architecture, not your HTML/CSS skills.

- **Task:**
  1. **Page 1: `busDashboard`**

  2. **Page 2: `manageRoute`**



Route ID	Route Name	Direction	Shift Time	Route Start Point	Route End Point	Capacity	Allowed Waitlist	Action
76918	Path2 - 19:45	LOGIN	19:45	Gavipuram	peenya	0	0	⋮
76919	Path2 - 23:00	LOGIN	23:00	Gavipuram	peenya	0	0	⋮
76917	Path2 - 20:00	LOGIN	20:00	Gavipuram	peenya	0	0	⋮
76920	Path2 - 19:00	LOGIN	19:00 (KS)	Gavipuram	peenya	0	0	⋮
76914	Path1 - 21:00	LOGIN	21:00	Gavipuram	Temple	0	0	⋮
76913	Path1 - 20:00	LOGIN	20:00	Gavipuram	Temple	0	0	⋮
76916	Path1 - 23:00	LOGIN	23:00	Gavipuram	Temple	0	0	⋮
76915	Path1 - 22:00	LOGIN	22:00	Gavipuram	Temple	0	0	⋮
76234	paradise - 05:00	LOGIN	05:00	BTM	NoShow	6	0	⋮
76912	Dice	LOGIN	18:00	BTM	NoShow	6	0	⋮

Rows per page: 25
Showing 1 - 25 of 63 items

3. **UI-Context-Aware AI:** Movi's chat interface must be present on **both** pages. The agent's `langgraph` state should be aware of which page the user is currently on (e.g., by you passing `currentPage: 'busDashboard'`).
    - **Example:** If the user is on the `manageRoute` page and asks, "Help me create a new route," Movi should provide guidance relevant to that page.

Part 3: The Intelligence Layer ("Movi" `langgraph` Agent)

This is the core of the assignment. You will build the Movi AI assistant.

Movi's Required Capabilities (to be orchestrated by `langgraph`):

1. **Voice & Text I/O:**
    - **Input:** The user must be able to interact with Movi using **both text and voice** (Speech-to-Text).
    - **Output:** Movi's responses should be rendered as **text in the chat and spoken aloud** (Text-to-Speech).
2. **Perform >10 Actions:** Movi must be able to understand user intent and perform *at least 10 distinct actions* (as tools/functions called by your graph) that reflect the new data model.
    - **Examples (You must implement these):**
        - **Read (Dynamic):** "How many vehicles are not assigned?"
        - **Read (Dynamic):** "What's the status of the 'Bulk - 00:01' trip?"
        - **Read (Static):** "List all stops for 'Path-2'."
        - **Read (Static):** "Show me all routes that use 'Path-1'."
        - **Create (Dynamic):** "Assign vehicle 'MH-12-3456' and driver 'Amit' to the 'Path Path - 00:02' trip."
        - **Delete (Dynamic):** "Remove the vehicle from 'Bulk - 00:01'."
        - **Create (Static):** "Create a new stop called 'Odeon Circle'."
        - **Create (Static):** "Create a new path called 'Tech-Loop' using stops [Gavipuram, Temple, Peenya]."
    - ...you must add at least 2 more actions of similar complexity.
3. 🧠 **"Tribal Knowledge" (The `langgraph` "Consequence" Flow):** This is the most critical requirement for your `langgraph` implementation. Your agent must model our product logic.
    - **Example Scenario:**
        - **User:** (On the `busDashboard`) "Movi, remove the vehicle from 'Bulk - 00:01'."
        - **`langgraph` State:** Your graph should move from `[agent_entry]` to a `[check_consequences]` node.

        - `[check_consequences]` **Node:** This node queries the DB and finds that this `trip` is `25% booked` (or has any bookings) and is scheduled to run. It updates the `agent_state` with this critical info.
        - **`langgraph` Edge:** The graph must conditionally route to a `[get_confirmation]` node instead of an `[execute_action]` node.
        - **Movi Response (from `[get_confirmation]`):** "I can remove the vehicle. However, please be aware the 'Bulk - 00:01' trip is already 25% booked by employees. Removing the vehicle will **cancel these bookings** and a trip-sheet will fail to generate. **Do you want to proceed?**"
        - **`langgraph` State:** The graph now *persists* in this state, waiting for the user's "yes/no" response.
4. **True Multimodal Input (Mandatory):** Your `langgraph` agent must orchestrate tools that process these inputs.
    - **Image Input:**
        - **Example:** The user uploads a screenshot of the **`busDashboard`** and says, "Remove the vehicle from this trip" (the screenshot could have a red arrow pointing to the "Bulk - 00:01" row). Your agent must use a vision tool to identify the trip, update its state, and trigger the "Tribal Knowledge" flow.

📦 Deliverables

1. A **Git repository** (GitHub, GitLab) containing your full source code.
2. A detailed **`README.md`** file that includes:
    - **Architecture & `langgraph` Graph Explanation:**
        - A brief description of your overall architecture (frontend, backend, DB).
        - **Crucially:** A detailed explanation of your **`langgraph` design**. You must describe your `agent_state`, your main `nodes`, and the `conditional_edges` you used to manage the "Tribal Knowledge" and multimodal flows. A simple diagram is highly recommended.
    - **Setup Instructions:** Instructions on how to install dependencies and run the project locally.
3. A **short demo video** (2-5 minutes) showing your complete, working application. You **must** demonstrate:
    - Both UI pages (`busDashboard` and `manageRoute`) functionally working.
    - The "Tribal Knowledge" `langgraph` flow (showing the "consequence" question).
    - The **Image Input** feature (e.g., uploading a screenshot of the `busDashboard`).
    - The **UI-Context-Awareness** (asking for help on the `manageRoute` page).

Good luck! We are excited to see your `langgraph` agent in action.