Project N°1 - LLM Powered Translation App

- Documentation Guide -

Supervised by

Mr. El Habib NFAOUI

Created by

EL BAKKOURI Salma

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Table of contents

1. Description

This project focuses on developing an **LLM-based application**, which involves creating a RESTful web service to be accessed by **two client** platforms: **a web/mobile app** built with the technology of our choice and a **Chrome extension** for enhanced flexibility and ease of use.

In this README document, I will provide an **overview of the project**, outline the **technologies used**, describe the **implemented features**, and offer a step-by-step **guide** on how to install and run the application locally.

2. Project Overview

This project provides translation services from multiple languages using an LLM model, integrating 3 main components:

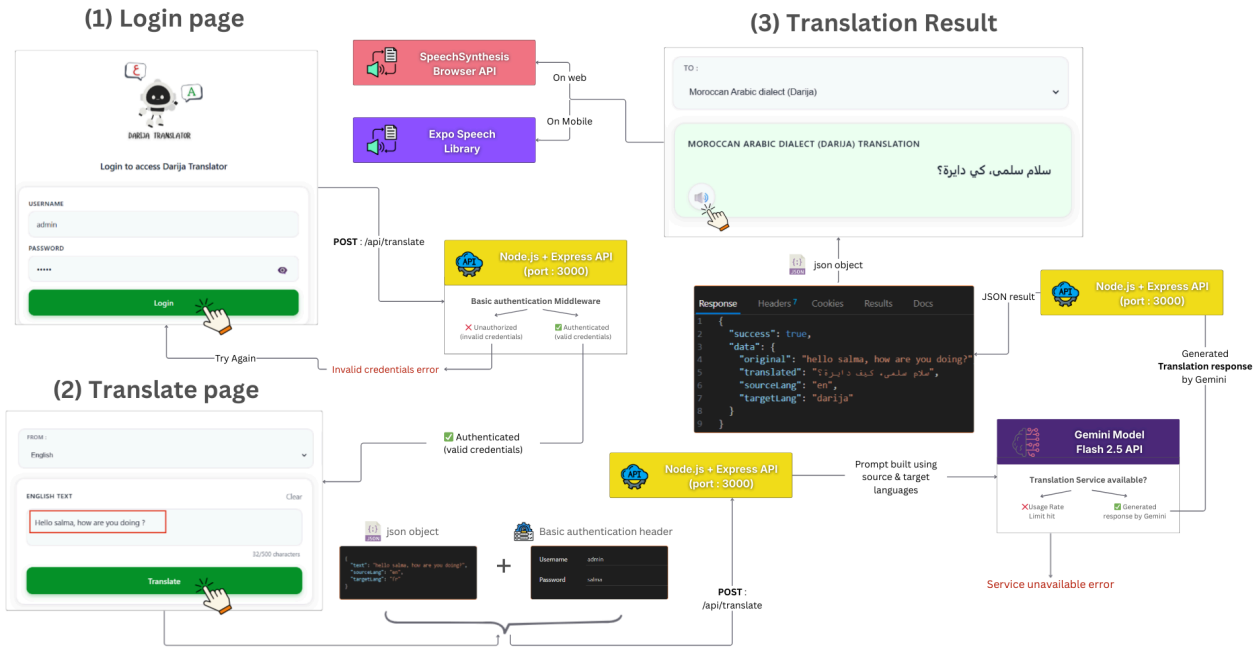
Component	Technologies Used
Backend (API)	Node.js, Express, Gemini AI API
Frontend (Web & Mobile App)	React Native, Expo
Frontend (Extension)	HTML, CSS, JavaScript, Manifest V3

Extra Components:

Component	Tools/APIs Used
Testing	Postman, Thunder Client
Backend Communication	Fetch API
Text-to-Speech (Web)	Speech Synthesis Browser API
Text-to-Speech (Mobile)	Expo Speech Library

2.1 Full Pipeline of the Application

The following diagram represents the complete pipeline of the application, illustrating the full flow from user interaction through the backend processing to the final output:



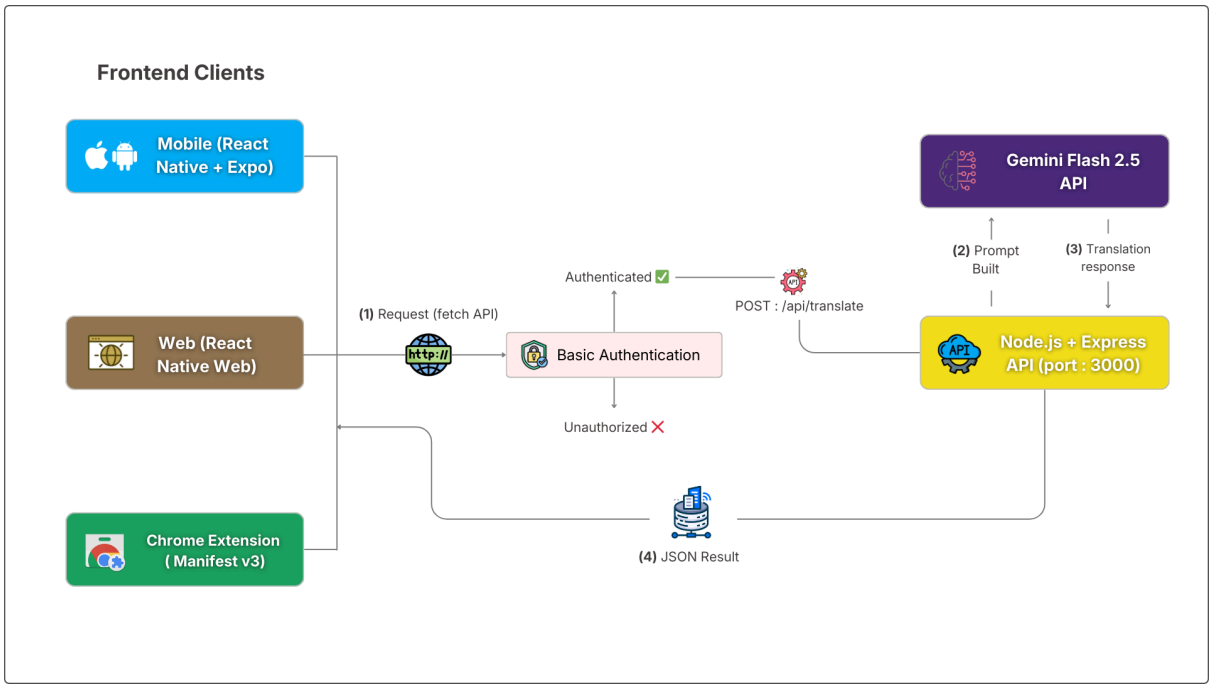
Project Architecture

The project follows a **client-server architecture** where :

→ three frontend clients (Web, Mobile, and Extension) consume the backend API (Node.js server) via HTTP requests using the Fetch API.

→ The backend communicates with the Gemini AI model by building and sending prompts, then returns the translation response to the clients.

The API is secured with authentication, meaning translation can only be performed if the user is authenticated correctly.



2.2 Backend API

The backend is a RESTful API built with Node.js and Express that handles translation requests.

Key Features:

→ **Basic Authentication**: Secures the API endpoints using username:password authentication

→ **Two Routes Exposed**:

- **Public Route**: GET /languages - Returns all supported languages
- **Protected Route**: POST /translate - Performs translation (requires authentication)

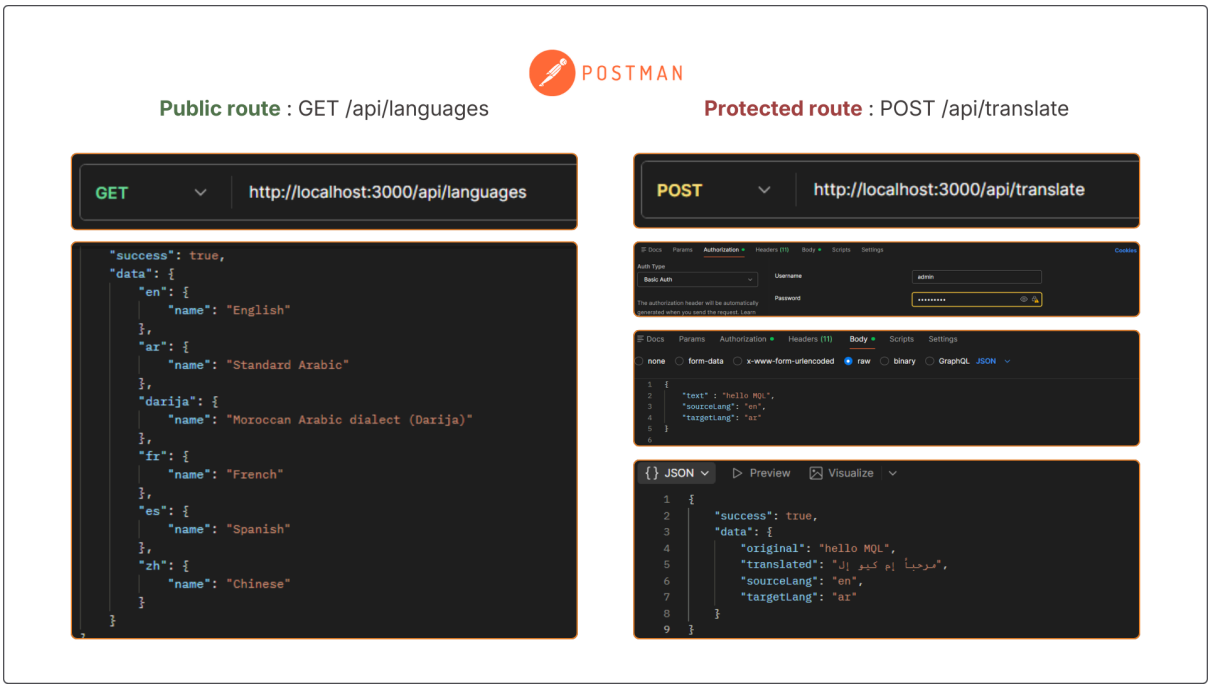
→ **Gemini AI Model**: Gemini is used for its free tier and accessibility. I specifically chose Gemini Flash 2.5 because it provides the most accurate translation results and has reasonable usage limits, making it perfect for simple projects like this.

2.3 Testing the API

I tested my API using two tools to ensure everything works correctly:

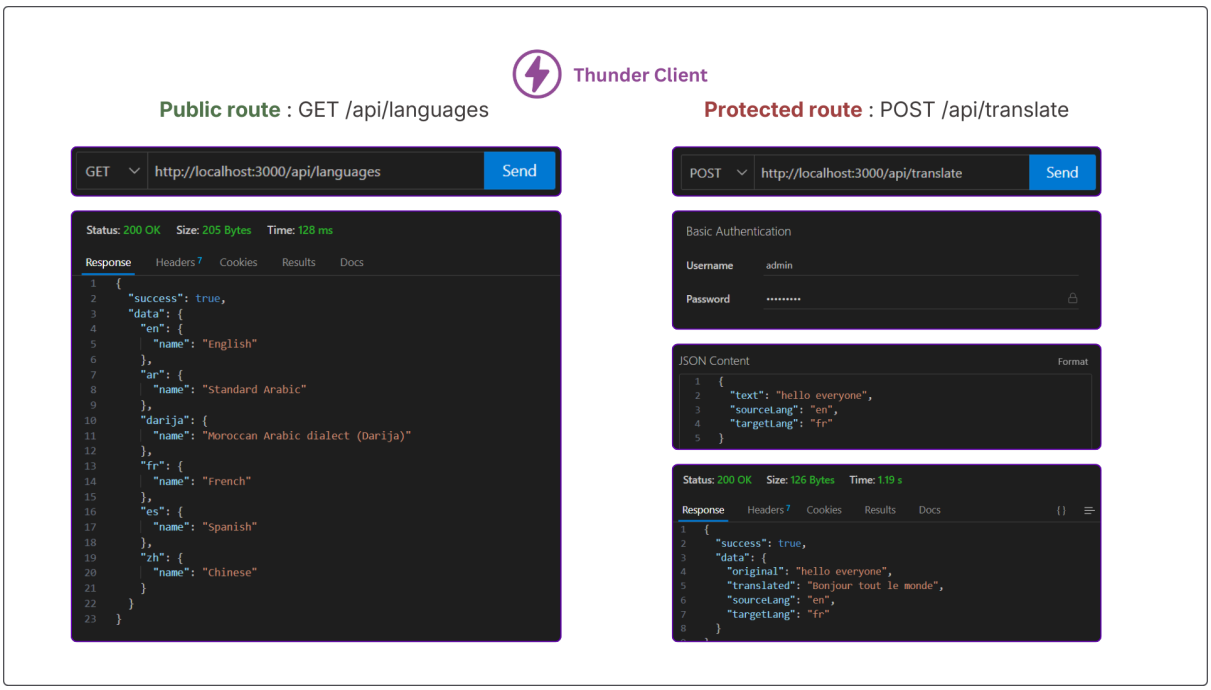
a) Postman

I first tested my API using Postman to verify both the public and protected routes.



b) Thunder Client

I then moved to using Thunder Client, which is a REST client integrated directly into VS Code for easier and faster testing during development.



2.4 Web & Mobile App

I used React Native for building a cross-platform application that works on both web and mobile devices, and Expo for streamlined development and configuration.

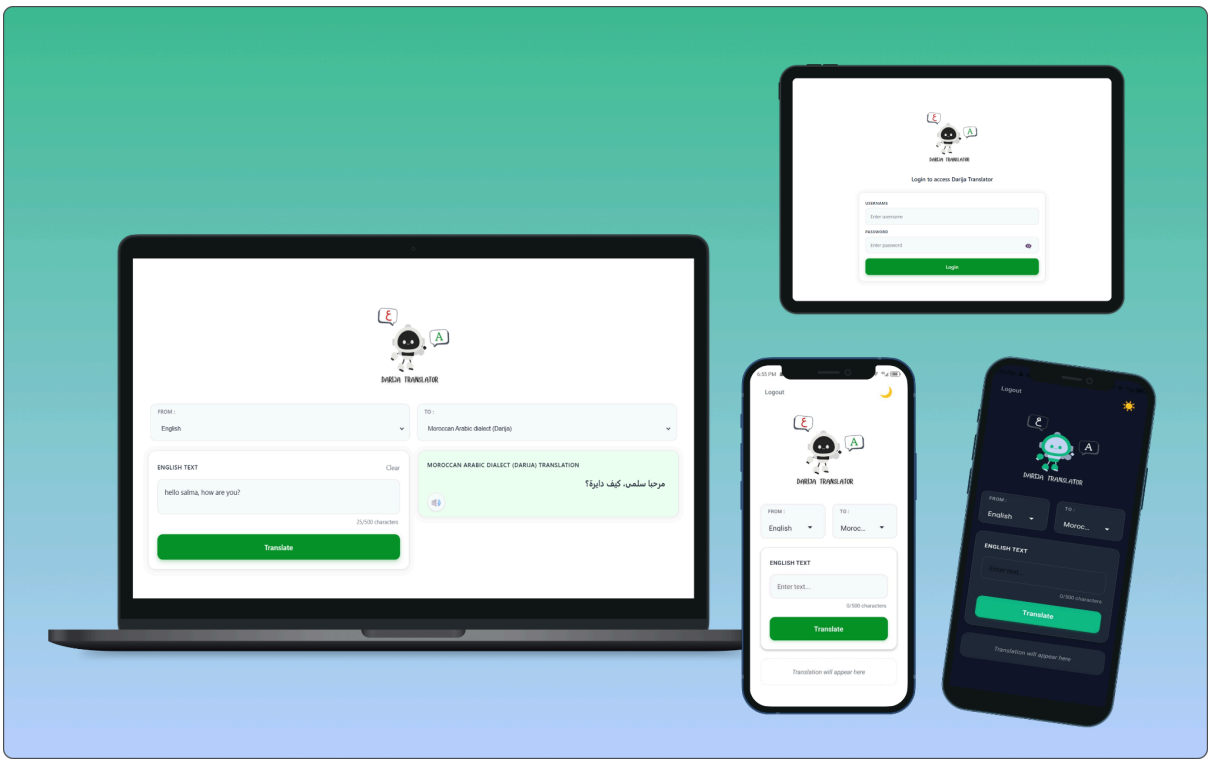
Key Features:

→ **Text-to-Speech Functionality**:

- Mobile: Expo Speech library
- Web: Speech Synthesis Browser API

→ **Backend Communication**: Fetch API to communicate with the backend

→ **Dark Mode & Responsive Design**: Added for a smooth & intuitive user experience across all devices



2.5 Chrome Extension

A lightweight browser extension with a side panel interface for quick translations.

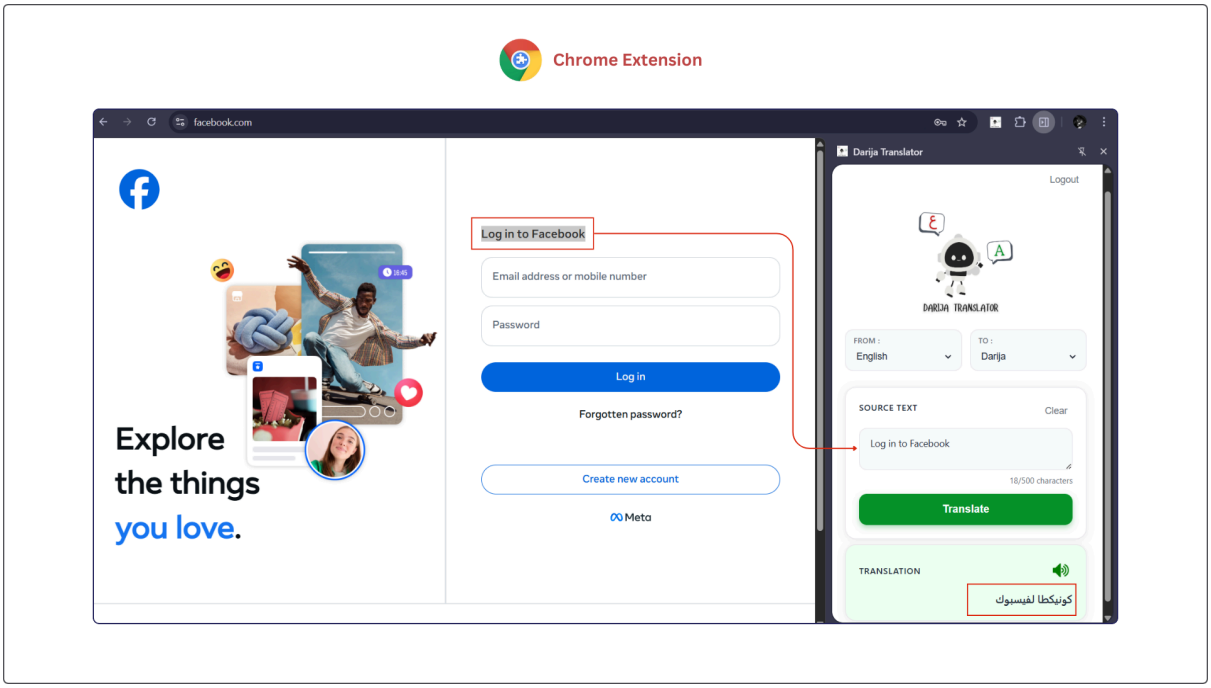
Key Features:

→ **Side Panel UI**: Clean interface built with HTML and CSS

→ **Text-to-Speech Functionality**: Speech Synthesis Browser API

→ **Manifest V3**: Using the latest Chrome extension standard for better security and performance

→ **Backend Communication**: Fetch API to communicate with the backend API



3. Installing & Running the project

First, clone the project to your local machine:

```
git clone https://github.com/salma-elbakkouri/Darija-Translator.git
cd Darija-Translator
```

3.1 Prerequisites

→ VS code

→ Node.js

→ Expo Go app (for mobile testing)

→ Gemini API key (Get one here: https://makersuite.google.com/app/apikey)

3.2 API Setup

(1) Navigate to the API folder :

```
cd API
```

(2) Create your environment file :

```
cp .env.example .env
```

(3) Edit *.env* and add your credentials :

```
PORT=3000
GEMINI_API_KEY=your_actual_api_key_here
AUTH_USERS=admin:salma,user2:password2
```

(4) Install dependencies :

```
npm install
```

(5) Start the server :

```
npm start
```

The API will run on http://localhost:3000

3.3 Mobile App Setup

(1) Navigate to the Mobile folder:

```
cd Mobile
```

(2) Install dependencies:

```
npm install
```

(3) Start the development server:

```
npx expo start
```

→ Run the app:

- On your phone : Install **Expo Go app** and **scan** the **QR code**
- On web : Press **'w'** in the terminal

3.4 Chrome Extension Setup

(1) Open Chrome and navigate to *chrome://extensions/*

(2) Enable "*Developer mode*" (toggle in top-right corner)

(3) Click "**Load unpacked**" and select the Extension folder

(4) The extension will appear in your browser toolbar

(5) Click the extension icon to open the side panel

Notes

- node_modules folders are excluded from the repository (install via npm install)
- *.env* files are excluded for security (create your own .env file and use .env.example as a template)