



# Qtec Solution Limited

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## Senior AI Engineer Task

### Goal

Build a document-aware AI chatbot with memory, document retrieval, and real-time streaming using Django, PostgreSQL, and LangGraph.

Additionally, prepare a short Research & Analysis report to explain your approach and reasoning.

This assignment is designed to evaluate your AI engineering capability, system design sense, and code quality — not just completion.

### Part 1: Research & Analysis

Before coding, create a short file **RESEARCH\_AND\_ANALYSIS.md** explaining your approach.

#### Include:

1. System Architecture Overview
2. Technology Justifications
3. Document Retrieval Plan
4. Chat Memory Design
5. Streaming Implementation
6. Scalability & Extensibility
7. Testing & Validation

### Part 2: Technical Implementation

#### 1. Backend (Django + PostgreSQL)

##### Models:

- **ChatSession** – Represents a single conversation.
- **ChatMessage** – Stores each user and AI message.
- **Document** – Stores one uploaded `.txt` file.



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## REST API Endpoints:

Method	Endpoint	Description
POST	<code>/api/chat/</code>	Send message → receive streamed AI reply
POST	<code>/api/document/</code>	Upload a text file for knowledge retrieval
GET	<code>/api/session/&lt;id&gt;/messages/</code>	Retrieve previous chat history

## Requirements:

- Save all sessions and messages to the database.
- Include chat history (context) in the next AI response.
- Use LangGraph for orchestrating LLM prompts and responses.
- Use any LLM API (e.g., Groq, OpenAI, Claude, or Gemini).

## 2. Document Retrieval

- Accept `.txt` uploads.
- Split into chunks (semantic or fixed-size).
- Use embeddings (e.g., SentenceTransformers) for semantic search.
- Retrieve relevant chunks and inject them into the LLM prompt.

## 3. Streaming Response

- The `/api/chat/` endpoint should return token-by-token streamed responses (via Server-Sent Events or chunked response).

## Deliverables

Deliverable	Description
Django backend	Source code with migrations
Research document	RESEARCH_AND_ANALYSIS.md
REST API	Working chat, document, and history endpoints



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README.md	Setup guide + screenshots
Example <code>.env</code>	API keys & configuration sample

## Submission Guidelines

### 1. Commit early and often

- Start by committing your initial Django setup.
- Continue committing meaningful changes as you progress.
- Avoid one giant commit at the end – your commit history shows your approach.

### 2. Push to Gitlab

- Make your repository **public**.
- Include all code, README, `.env.example`, screenshots and RESEARCH\_AND\_ANALYSIS.md file.

### 3. README File

- Must include:
  - Project overview
  - Setup instructions
  - Example API usage or screenshots

### 4. Submission

- Email your **public Gitlab repository link** (and demo link if any) in the same email thread.
- Even if incomplete, submit what you have – partial implementations are accepted.

We look forward to **meeting you at our office in Nikunja 2, Dhaka.**

**Deadline:** ASAP

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