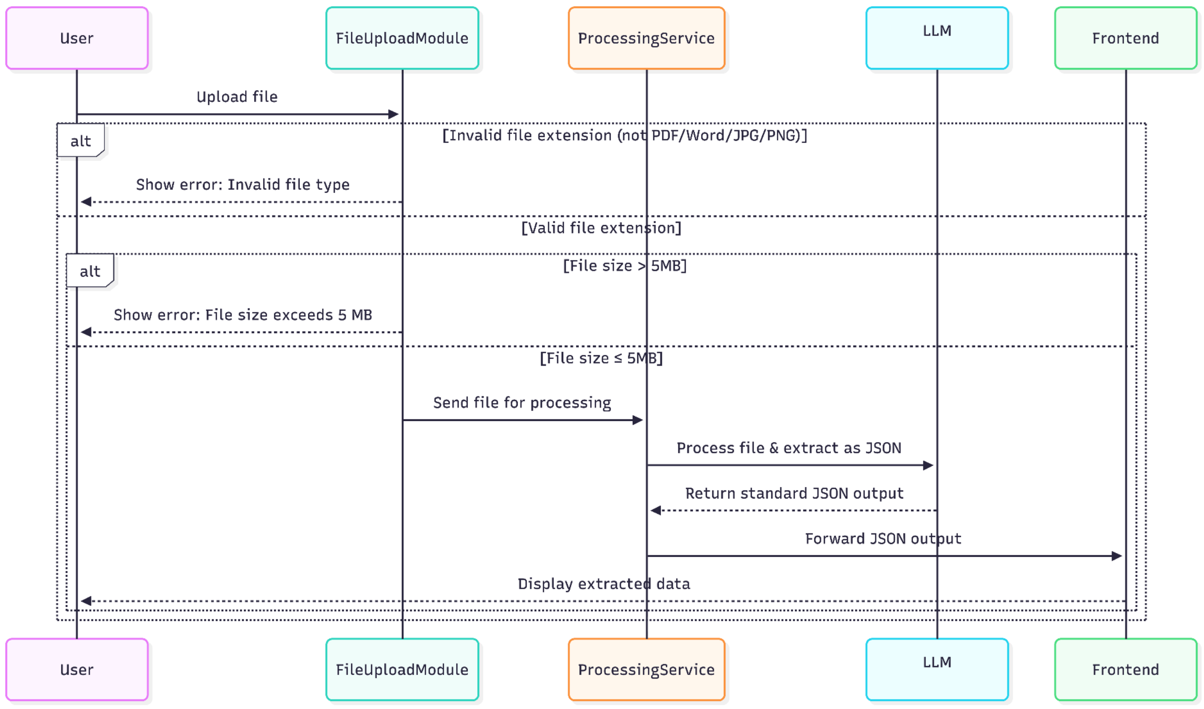
Deliverables

End to End Workflow
File upload → Processing → Extraction → Frontend Display.

Sequence Diagram – Suggested Tool - MermaidChart.com



Recommended tools, frameworks, and programming languages for: - File ingestion and preprocessing.
- OCR or document parsing (especially for tables or images).
- LLM integration.
- Backend orchestration.
- Frontend rendering.

Development / IDE

Google Antigravity

OCR or Document Parsing (Tables and Images)
DeepSeek OCR / GPT-4V or GPT-4o
Finally GPT-4o performed better.

LLM Integration
Factory Pattern - Can use OpenAI, Anthropic or Deep Seek

Backend Orchestration
Node JS / Python Fast API

Front end Rendering
NextJS / React / Svelte

Learning Yogi – Assignment – Time Table Parser

Database Schema
PostgreSQL with JSONB for flexible timetable data

Additional information on your LLM Integration strategy:

I use Multi-stage Approach
Stage 1 : Document Understanding
Use LLM to validate extracted data for logical consistency

- Check time overlaps, duration reasonableness
- Confidence scoring for each extraction

Stage 2 : Validation and Correction

Stage 3 : Fallback Strategy

If confidence < 70%, using vision model , Manual review queue for ambiguous cases

- What part of the pipeline uses it?
    Processing Service uses the LLM Integration

- What is the prompt strategy?

```
# Prompt strategy for initial extraction
system_prompt = """You are a timetable extraction expert. Extract structured timetable data from the provided text.

Output Format (JSON):
{
  "days": ["Monday", "Tuesday", ...],
  "timeblocks": [
    {
      "day": "Monday",
      "subject": "Mathematics",
      "start_time": "09:00",
      "end_time": "10:00",
      "teacher": "optional",
      "notes": "optional"
    }
  ]
}

Rules:
```

1. Preserve original subject names exactly
2. Infer missing times from context
3. Handle varied formats (12h/24h)
4. Extract all additional notes
"""

- How do you ensure accuracy and reproducibility?

- Error handling & fallbacks: - How do you handle bad uploads, ambiguous data, or missing fields?
  - **Bad uploads:** File validation (type, size, corruption check)
  - **Ambiguous data:** Confidence scoring + manual review queue
  - **Missing fields:** LLM inference with explicit uncertainty markers
  - **OCR failures:** Fallback to vision models

- How will you ensure the system is flexible, for possible future updates and needs?

I will implement Plugin architecture for new file formats

- Webhook support for processing completion
- Template library for common timetable formats
- AI training feedback loop (human corrections → fine-tuning)

Prompt Used for Backend Development

You are an expert Node JS Developer with 10+ Years of experience in developing Backend API's for processing PDF / Images and extract text and return output as JSON
Your job is to build a small backend prototype in Node.js that:
- Exposes a POST endpoint to receive an uploaded file (image, PDF, or DOCX).
- Processes that file and attempts to extract timetable blocks. - You can hardcode assumptions or provide a sample file.
- Use any combination of OCR libraries (e.g., Tesseract), document readers (e.g., PyMuPDF, pdfplumber), or LLM calls (OpenAI, Claude, etc.).
Implement Logic to verify the File TypeAllowed file Types are PDF / Images (JPG / PNG) / DOCX / DOC Files
Flie size is limited to 5 MB only and can be configured in future also
Use LLM Factory Pattern so that different LLM Models can used based on future availability
Use ZOD for Schemas
Use only Postgres Database for schema
Validate the Output with Other LLM like Claude and retrieve the confidence scores and verify that confidence less is greater of equal to 70%,
Accept only responses with more than 70% confidence score.
Document all the end points using OpenSwagger standards
- Returns a JSON response.

Add unit tests for verifying file types and file size to validated the uploaded file. File types to verify are PDF Images (PNG / JPG) Doc and docx file . and File upload size should be not more than 5 MB. Always update the README file whenever we implement any new features

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