**AI Solutions Candidate Project**

# **Candidate Project Brief**

**Title:** Menu Cost Shock & Substitution Chatbot

## **Overview**

You will build a lightweight **chatbot application** that helps a restaurant (<https://pennepazze.net/>) reason about **ingredient price shocks** and **supply delays** for a subset of its menu.

The chatbot should:

1. Estimate **ingredient cost per menu item**.
2. Simulate impacts of **price shocks** and **supply delays**.
3. Recommend **menu-level adjustments** using **one-to-one substitution rules**.
4. Provide a clear **trace of calculations and substitutions applied**.

## **Constraints**

* **Timebox:** ~10 hours total, including slide preparation.
* **Tools:** All tools must be free.
* **LLM:** Required (e.g., Ollama, Hugging Face free models).
* **n8n:** Required for orchestration.
* **Data:** You will receive prepared CSVs (menu, ingredients, BOM, substitutions).
* **Costs:** Ingredient costs are scaled to be ~30% of dish price.

## **Data Provided**

1. **menu.csv** — curated list of 5 pinsas, 5 pastas, 2 salads with menu prices.
2. **ingredients.csv** — base ingredient costs, supplier, and lead time.
3. **menu\_bom.csv** — headline ingredient quantities per dish (scaled to 30% cost).
4. **substitutions.csv** — allowed **one-to-one substitutions** with context (pinsa/pasta/salad) and rationale.

## **Example Inputs**

Your chatbot should handle free-text questions such as:

* *“The price of tomatoes has increased by 22% — how will this impact our monthly costs and what menu changes can mitigate it?”*
* *“Shipments of flour are delayed by 5–6 days — how will this impact us?”*

## **Functional Requirements**

1. **Natural Language Parsing (LLM required)**
   * Parse free-text input into structured JSON describing shocks/delays.
2. Example:

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"price\_shocks": [{"ingredient": "tomato\_sauce", "pct": 22}],

"delays": [{"ingredient": "00\_flour", "extra\_days": 6}],

"assumptions": {"lead\_time\_threshold\_days": 5}

}

1.   
   **Cost Engine (deterministic)**
   * Compute pre/post dish costs.
   * Aggregate to monthly COGS (define a simple sales mix; document your assumption).
   * Rank dishes by exposure.
2. **Substitution Engine**
   * Apply **only allowed one-to-one rules** from substitutions.csv.
   * Recompute costs with substitutions.
   * Explain rationale (e.g., “Roasted tomato → tomato sauce allowed in pasta context”).
3. **Explainability**
   * Provide a **traceable output**:  
     + Which dishes are impacted.
     + Which rules were applied.
     + Cost deltas before/after.

## **n8n Requirements**

You must integrate **n8n** as part of your solution. Options include:

* Workflow triggered by HTTP that passes a scenario to your chatbot API and returns the result.
* Scheduled job that replays scenarios and logs results.
* Exported **workflow JSON** must be included in your submission.

## **Deliverables**

* Source code and **README** with setup instructions.
* Exported **n8n workflow JSON**.
* **4–6 slide deck** covering:  
  + Problem framing
  + Architecture
  + Demo flow
  + Assumptions/trade-offs
  + Future improvements
* Demo (CLI or simple web) showing at least the two example inputs.

## **Optional Extension**

Incorporate public commodity price context using USDA AMS Market News:  
 👉<https://www.ams.usda.gov/market-news>

## **Evaluation Rubric**

| **Area** | **Criteria** | **Weight** |
| --- | --- | --- |
| Architecture | Clean separation of components | 25% |
| Correctness | Accurate cost calculations & substitution logic | 25% |
| LLM Usage | Used only for NL parsing & narrative, not math | 15% |
| n8n Integration | Workflow works and is clearly documented | 10% |
| UX & Explainability | Clear outputs and rationale | 15% |
| Slides | Professional and concise | 10% |

**IMPORTANT NOTE**:

This project was created entirely using AI and the sample data may be nonsensical. You are permitted to change any aspect of the sample data or make simplifying assumptions to allow you to complete this project within the allocated time. Just make sure to share the modifications you made.

Most importantly, make sure to have fun with project!

We are looking forward to your presentation.