Product Requirements Prompt (PRP)

Project: Smart Reasoning System (SRS)

Version: 1.0

Type: College MVP (2-Day Build)

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1. Project Objective

```
Build a web-based AI system that:
• Accepts complex textual problems
• Breaks them into smaller logical components
• Solves step-by-step
• Explains why each step is logically valid
• Validates reasoning using a secondary verification step
• Displays structured output in a clean UI
```

2. Core Functional Requirements

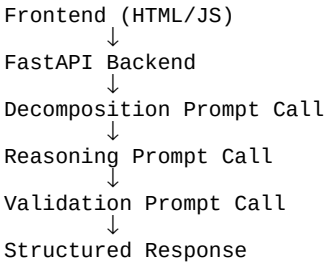
```
FR-1 Input Handling:
• Multiline text input (up to 4000 words)
• Reasoning modes: Basic, Deep

FR-2 Problem Analysis:
• Identify problem type
• Extract constraints and assumptions

FR-3 Decomposition Layer:
• Break problem into logical sub-units
• List assumptions and edge cases

FR-4 Reasoning Engine:
• Solve sequentially
• Explain why each step is valid

FR-5 Validation Layer:
• Re-check logic
• Identify gaps
• Confirm final answer

FR-6 Structured Output:
■ Problem Understanding
■ Decomposition
■ Step-by-Step Reasoning
■■ Edge Cases
■ Validation Summary
■ Final Answer
```

3. Non-Functional Requirements

```
• Response time under 15 seconds
• Modular architecture
• Replaceable LLM provider
• Secure environment variables
```

• Clean and responsive UI

4. System Architecture



5. Technical Stack

Backend:
• Python 3.10+
• FastAPI
• Uvicorn
• python-dotenv
• LLM API

Frontend:
• HTML
• CSS
• JavaScript (Fetch API)

6. Folder Structure

```
smart-reasoning-system/
■
■■■ backend/
■   ■■■ main.py
■   ■■■ prompts.py
■   ■■■ reasoning.py
■   ■■■ validator.py
■   ■■■ config.py
■   ■■■ utils.py
■
■■■ frontend/
■   ■■■ index.html
■   ■■■ style.css
■   ■■■ script.js
■
■■■ .env
■■■ requirements.txt
■■■ README.md
```

7. Success Criteria

• Works for math, coding, and logic problems
• Produces structured reasoning
• Includes validation layer
• Clean UI display

8. Academic Positioning

"A Modular Multi-Agent Explainable AI Framework for Structured Problem Decomposition and Logical Vali