Project Documentation: HSN Code Validation Agent (Google ADK Framework)
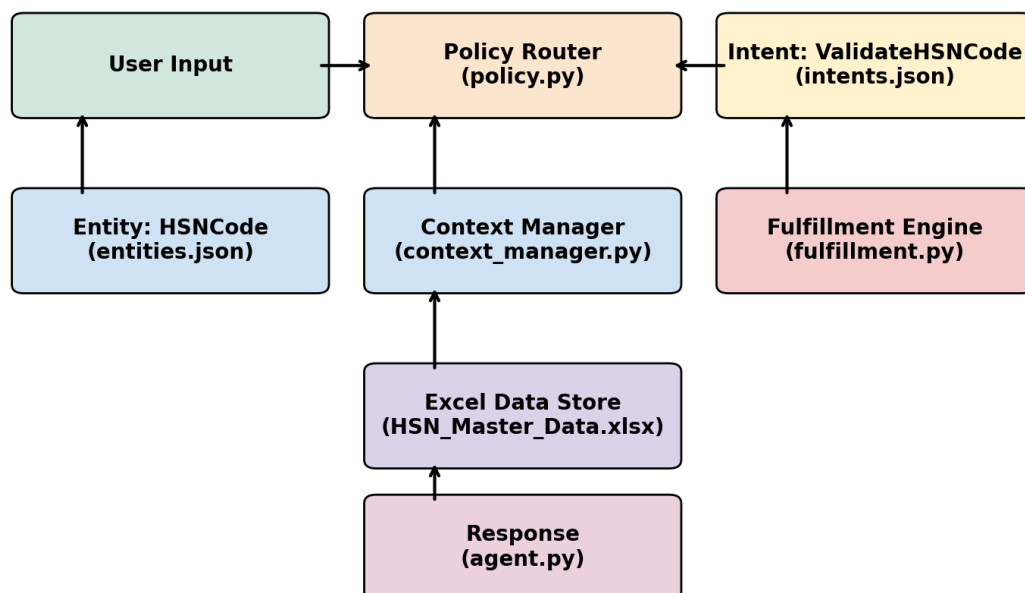
Project Overview

The **HSN Code Validation Agent** is a modular intelligent agent built using the Google ADK (Agent Developer Kit) framework principles. It validates one or more HSN (Harmonized System Nomenclature) codes by checking:

- Format (length and numeric check)
- Existence in a provided master Excel dataset
- Hierarchical code validity

This agent is designed for **command-line** interface operation and is structured for future integration into chatbot or web applications.

System Architecture

ADK Component Mapping

ADK Component	Implementation
Intent	`ValidateHSNCode` (via keyword check)
Entity	`HSNCode` (extracted via regex)
Policy	`policy.py` (routes based on keywords or digit detection)
Context Manager	`context_manager.py` (extracts codes)
Fulfillment	`fulfillment.py` (loads Excel & validates)
Data Source	`HSN_Master_Data.xlsx`

Data Details

File: `data/HSN_Master_Data.xlsx`

- Columns:
  - `HSNCode` (string): e.g., `01012100`
  - `Description` (string): e.g., `PURE-BRED BREEDING ANIMALS`

- Format Validity Rules:
  - Must be numeric only
  - Allowed lengths: 2, 4, 6, or 8 digits

How to Run

Installation

- pip install -r requirements.txt

Run the Agent

- python agent.py

Sample Inputs

- >> validate 01012100, 9999, 01A2

Expected Outputs

- 01012100 → Valid: PURE-BRED BREEDING ANIMALS
- 9999 → Code not found
- 01A2 → Invalid format (non-numeric)

```
PS D:\hsn-code-agent-adk> .venv\Scripts\activate
(.venv) PS D:\hsn-code-agent-adk> python agent.py
HSN Code Validation Agent (Google ADK Structured)
>> validate 0101
0101: Valid: LIVE HORSES, ASSES, MULES AND HINNIES.
>> validate 010121
010121: Valid: PURE-BRED BREEDING ANIMALS
```

Directory Structure

hsn-code-agent-adk/
- adk_components/
  - intents.json
  - entities.json
  - policy.py
  - context_manager.py
  - fulfillment.py

- data/
  - HSN_SAC.xlsx

- adk_agent_architecture.png
- agent.py
- requirements.txt
- README.md

Extensibility Ideas

- Chatbot Integration: Extend to Dialogflow or Rasa.
- Google Sheets Sync: Live updates from a shared dataset.
- Web Interface: Add a simple Flask or Streamlit UI.
- Suggestions: Recommend close matches if code is invalid.
- Data Feedback: Flag inconsistencies if patterns of invalid codes are seen.