

## Assessment: HSN Code Validation Agent

**LINK FOR ADK FRAMEWORK DOCUMENTATION:** <https://google.github.io/adk-docs/>

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### Objective:

This task assesses your ability to design and outline the development of an intelligent agent using the (conceptual) ADK - Agent Developer Kit Google Framework. The agent's primary function will be to validate Harmonized System Nomenclature (HSN) codes based on a provided master dataset in an Excel file.

### Problem Description:

You are tasked with creating an agent that can validate HSN codes. HSN codes are an internationally standardized system of names and numbers to classify traded products. They vary in length, typically from 2 to 8 digits, where each level of digits represents a more specific classification. For instance:

- 01 might represent "LIVE ANIMALS."
- 0101 might represent "LIVE HORSES, ASSES, MULES AND HINNIES."
- 01011010 might represent a very specific type of horse under the "LIVE HORSES..." category.

The agent will be provided with a master Excel file containing known HSN codes and their corresponding descriptions. The agent should be able to take an HSN code (or a list of HSN codes) as input and determine its validity based on this master data.

### Dataset Description:

You will be provided with an Excel file (HSN\_Master\_Data.xlsx) containing at least two columns:

1. HSNCode: (Text/String format) The HSN code.
2. Description: (Text/String format) The description of the goods corresponding to the HSN code.

### Sample Data Snippet from Excel:

HSNCode	Description
01	LIVE ANIMALS
0101	LIVE HORSES, ASSES, MULES AND HINNIES
01011010	LIVE HORSES, ASSES, MULES AND HINNIES PURE-BRED BREEDING ANIMALS HORSES
010121	PURE-BRED BREEDING ANIMALS
01012100	PURE-BRED BREEDING ANIMALS
...	...

*(The complete Excel file will be shared for the actual task implementation.)*

**LINK FOR HSN CODE EXCEL FILE:**

[https://docs.google.com/spreadsheets/d/1UD4JAAQ6Fgeyc5a1OwBiLV2cPTAK\\_D2q/edit?usp=sharing&ouid=116706160084886050181&rtpof=true&sd=true](https://docs.google.com/spreadsheets/d/1UD4JAAQ6Fgeyc5a1OwBiLV2cPTAK_D2q/edit?usp=sharing&ouid=116706160084886050181&rtpof=true&sd=true)

**Task Requirements using ADK - Agent Developer Kit Google Framework:**

**1. Agent Design:**

- Describe the overall architecture of your agent. How would it be structured using the ADK framework?
- What are the key components of your agent (e.g., intents, entities, fulfillment logic, data stores)?
- How will the agent handle user input (e.g., a single HSN code, multiple HSN codes)?
- How will the agent provide its validation output?

**2. Data Handling:**

- Explain how the agent will access and process the HSN\_Master\_Data.xlsx file. Consider efficiency for potentially large datasets.
- Will the data be pre-processed or loaded on demand? Discuss the trade-offs.

**3. Validation Logic:**

- Detail the HSN code validation rules you would implement. At a minimum, this should include:
  - **Format Validation:** Checking if the input code adheres to expected structural characteristics (e.g., is it numeric, what are acceptable lengths based on the provided dataset?).
  - **Existence Validation:** Verifying if the exact HSN code exists in the HSNCode column of the master Excel data.
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- (Optional - for advanced discussion) Consider and describe how you might implement:
  - **Hierarchical Validation:** For an 8-digit code (e.g., 01011010), how could you check if its parent codes (e.g., 010110, 0101, 01) are also present or implied by the dataset structure? How would this add value to the validation?
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**4. Agent Response:**

- What information will the agent return for a valid HSN code? (e.g., a confirmation and its description).
- What information will the agent return for an invalid HSN code? (e.g., an error message and a reason, such as "not found" or "invalid format").

**Expected Deliverables (for this interview discussion):**

- A verbal or written explanation of your agent's design, including the ADK components you would leverage.
- A clear description of the data handling strategy and validation logic.
- An outline of the steps involved in building this agent using the ADK.

*(Deliverables would include code, documentation, and run instructions.)*

**Evaluation Criteria:**

You will be evaluated on:

- **Clarity of Design:** Your ability to clearly articulate the agent's architecture and how it leverages the ADK framework.
- **Problem Understanding:** Your grasp of the HSN validation requirements.
- **Data Processing Strategy:** The thoughtfulness of your approach to handling the Excel data.
- **Validation Logic Thoroughness:** The completeness and correctness of your proposed validation rules.
- **Feasibility:** The practicality of your proposed solution within the context of an agent development framework.
- **Consideration of Edge Cases/Robustness:** How well you anticipate potential issues or edge cases (e.g., malformed input, missing data in Excel).

**Bonus Points (for discussion):**

- Suggesting ways to make the agent more interactive or conversational.
  - Discussing how the agent could be extended to support updates to the HSN master data without requiring a full redeployment.
  - Ideas for providing feedback on the quality or consistency of the HSN master data itself, if patterns of invalidity suggest issues with the source.
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