e-Portfolio Element - Creating Agent Dialogues

Activity Guidance

Create an agent dialogue, using KQML and KIF, between two agents (named Alice and Bob).

Alice is an agent designed to procure stock and Bob is an agent that controls the stock levels for a warehouse. This dialogue should see Alice asking Bob about the available stock of 50-inch televisions and querying the number of HDMI slots the televisions have.

Agent Dialogue

This activity demonstrates the use of **agent communication languages** by constructing a dialogue between two software agents using **KQML** (Knowledge Query and Manipulation Language) and **KIF** (Knowledge Interchange Format).
In this scenario:

- **Alice** is a procurement agent responsible for ordering stock.
- **Bob** is a warehouse agent that manages and reports on stock levels.

The dialogue shows Alice querying Bob about the **availability of 50-inch televisions** and then requesting details about their **HDMI ports**. The exchange illustrates how KQML performatives (such as ASK-ALL and TELL) wrap structured KIF content, allowing the agents to exchange machine-interpretable knowledge. This example highlights the importance of using formal ontologies and logical predicates to ensure that agent communication is precise, unambiguous, and automatable.

Relevant KQML Performatives

Performative	Description
ask-if	Alice wants to know if any 50-inch TVs are in stock
ask-one	If Alice just wants the first TV in the list. (Used in the dialogue to request a single, definite value, such as the total count).
Ask-all	Alice wants a list of all the available stock of 50-inch TVs, not just the first one.
Tel	Bob replies to Alice

Relevant KQML Parameters

Parameter	Description
: sender	Alice or Bob
: receiver	Alice or Bob
: language	KIF
: ontology	Stock-Ontology (an agreed ontology between them)
: reply-wth	Send a reply and tag it with an identifier
: in-reply-to	The reply-with identifier.
: content	The question or response.

1) Alice → Bob: ask about stock of 50-inch TVs

```
(KQML

  :performative ASK-ALL

  :sender Alice

  :receiver Bob

  :language KIF

  :ontology Stock-Ontology

  :reply-with q-50-stock

  :content

   (and

     (Television ?tv)

     (screen-size-inches ?tv 50)

     (sku-of ?tv ?sku)

     (stock-level ?sku ?qty)))
```

2) Bob → Alice: tell available stock per SKU

```
(KQML
  :performative TELL
  :sender Bob
  :receiver Alice
  :in-reply-to q-50-stock
  :language KIF
  :ontology Stock-Ontology
  :content
    (and
      (Television TV-50-ULTRA)
      (screen-size-inches TV-50-ULTRA 50)
      (sku-of TV-50-ULTRA "TV-50-ULTRA")
      (stock-level "TV-50-ULTRA" 24)
      (Television TV-50-BASIC)
      (screen-size-inches TV-50-BASIC 50)
      (sku-of TV-50-BASIC "TV-50-BASIC")
      (stock-level "TV-50-BASIC" 12)))
```

3) Alice → Bob: ask about HDMI slots for those models

```
(KQML
  :performative ASK-ALL
  :sender Alice
  :receiver Bob
  :language KIF
  :ontology Stock-Ontology
  :reply-with q-50-hdmi
  :content
    (and
      (Television ?tv)
      (screen-size-inches ?tv 50)
      (sku-of ?tv ?sku)
```

```
(hdmi-ports ?sku ?n)))
```

4) Bob → Alice: tell HDMI slot counts

```
(KQML
  :performative TELL
  :sender Bob
  :receiver Alice
  :in-reply-to q-50-hdmi
  :language KIF
  :ontology Stock-Ontology
  :content
    (and
      (hdmi-ports "TV-50-ULTRA" 4)
      (hdmi-ports "TV-50-BASIC" 2)))
```

5) Alice → Bob: acknowledgement of received information

```
(KQML
  :performative TELL
  :sender Alice
  :receiver Bob
  :language KIF
  :ontology Stock-Ontology
  :in-reply-to q-50-hdmi
  :content
    (and
      (acknowledged "Stock and HDMI slot details received")
      (comment "Proceeding with procurement process")))
```

Conclusion

This dialogue demonstrates how KQML performatives can wrap structured KIF facts and queries, enabling two agents (Alice and Bob) to communicate about inventory in a precise and machine-readable way. Alice was able to request stock information and technical specifications, while Bob provided structured, ontology-driven responses. This structure ensures that multi-agent systems can cooperate effectively without ambiguity.