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SCENARIO:

Consider the KQML interface to an agent we developed for one agent. In addition:

- The **`respondkqml.pl`** can now handle multiple responses. Therefore, the **`broadcast`** performative is implemented:

Performative	Meaning (S: sender, R: receiver)	Response Required
`broadcast`	*S wants R to send a message to all agents that R knows*	Yes

- There are now four agents, each of which is (in principle) capable of doing various thinks:

Agent Name	Capability:
`petros`	*nothing*
`steffen`	*depth_first_search, iterative_deepening*
`john`	*iterative_deepening*
`maria`	*best_first_search, spagetti, destroy*

- For every agent, there exists a directory in which the messages address to it are put. Therefore there should be four different directories, namely, **`petros, steffen, john`** and **`maria`**.

- One a message is read, e.g. agent **`petros`** is receiving a message:
  `?-incoming('petros/msg.txt').`
  the message file is renames to **`.bak`**, e.g**`. msg.bak`**

- The file name that contains a message is (unless otherwise stated) the name of the sender followed by a unique id, e.g. if **`petros`** sends a message with id **`13`** to **`maria`**, then the message is contained in the file **`./maria/petros13.txt`**

PREPARATION:

You are provided with the following files:

- **`parsekqml.pl`**: the parser of the KQML messages, written in simple DCG rules
- **`readsentence.pl`**: reads the KQML message character by character
- **`respondkqml.pl`** : takes the appropriate action according to message
- **`petros.pl`**: the agent **`petros`**
- **`maria.pl`**: the agent **`maria`**
- **`john.pl`**: the agent **`john`**
- **`steffen.pl`**: the agent **`steffen`**
- **`petros/msg.txt`**: An incoming message to be processed by **`petros`** agent

You should create the four different directories as previously stated in order to simulate the network communication. You may assume that the message is read from the network and the new message is put in the network (but we would need a router plus some other things to do this).

The message in **./petros/msg.txt** is the following:

```
(broadcast
      :sender petros
      :receiver petros
      :in-reply-to id1
      :reply-with id2
      :language kqml
      :content (ask-if
                  :sender petros
                  :receiver any
                  :in-reply-to id2
                  :reply-with id3
                  :language prolog
                  :content "capable(iterative_deepening)")
).
```

Which is a (peculiar indeed) way for **petros** to ask itself to broadcast a request to whoever agent it knows, asking them if they are capable of performing iterative deepening search.

Open four different windows, one for each agent, and an explorer (file manager) window and perform the following steps:

Window	Step
petros	**?-incoming('petros/msg.txt').**
explorer	Check whether 3 new messages appear in the directories of **maria**, **john** and **steffen**.
Maria	**?-incoming('maria/<filename>.txt').**
John	**?-incoming('john/<filename>.txt').**
steffen	**?-incoming('steffen/<filename>.txt').**
explorer	Check whether the 3 messages in the three directories have been renamed.
explorer	Check whether there are 3 new messages in the directory **petros**.
editor	Check the content of these 3 new messages.

PRACTICAL WORK:

- Have a look at the code and understand the changes that have been made compared to that of KQML for one agent.

- On the basis of the above, try to implement the Contract Net Protocol we discussed in the classes. How would the contractor decide to which agent it should award the task? What would be the KQML messages required?

  Hint: In addition to the new code that you have to write, you may be required to alter the **respond/2** definition so that the agent had been told of something, keeps (asserts) what it is being told, in order to process it later on.

- Assume that the capabilities come with some confidence expressed as an integer number. Make the appropriate modifications so that the contractor awards the task to the agent with the highest confidence.