



Multimodal Dialogue System for Interaction in Aml Environment by Means of File-Based Services



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ABSTRACT

This paper presents our ongoing work on the development of a multimodal dialogue system called Mayordomo, which has been designed to enable user control of home appliances in an Ambient Intelligence (Aml) environment. The physical interaction with the appliances is carried out by means of Octopus, a system developed in a previous study to ease communication with hardware devices by abstracting them as network files. To operate the appliances and get information about their state, the dialogue system writes and reads files using WebDAV. This architecture presents an important advantage since the appliances are considered abstract objects, which notably simplifies the dialogue system's interaction with them.

1. Mayordomo system

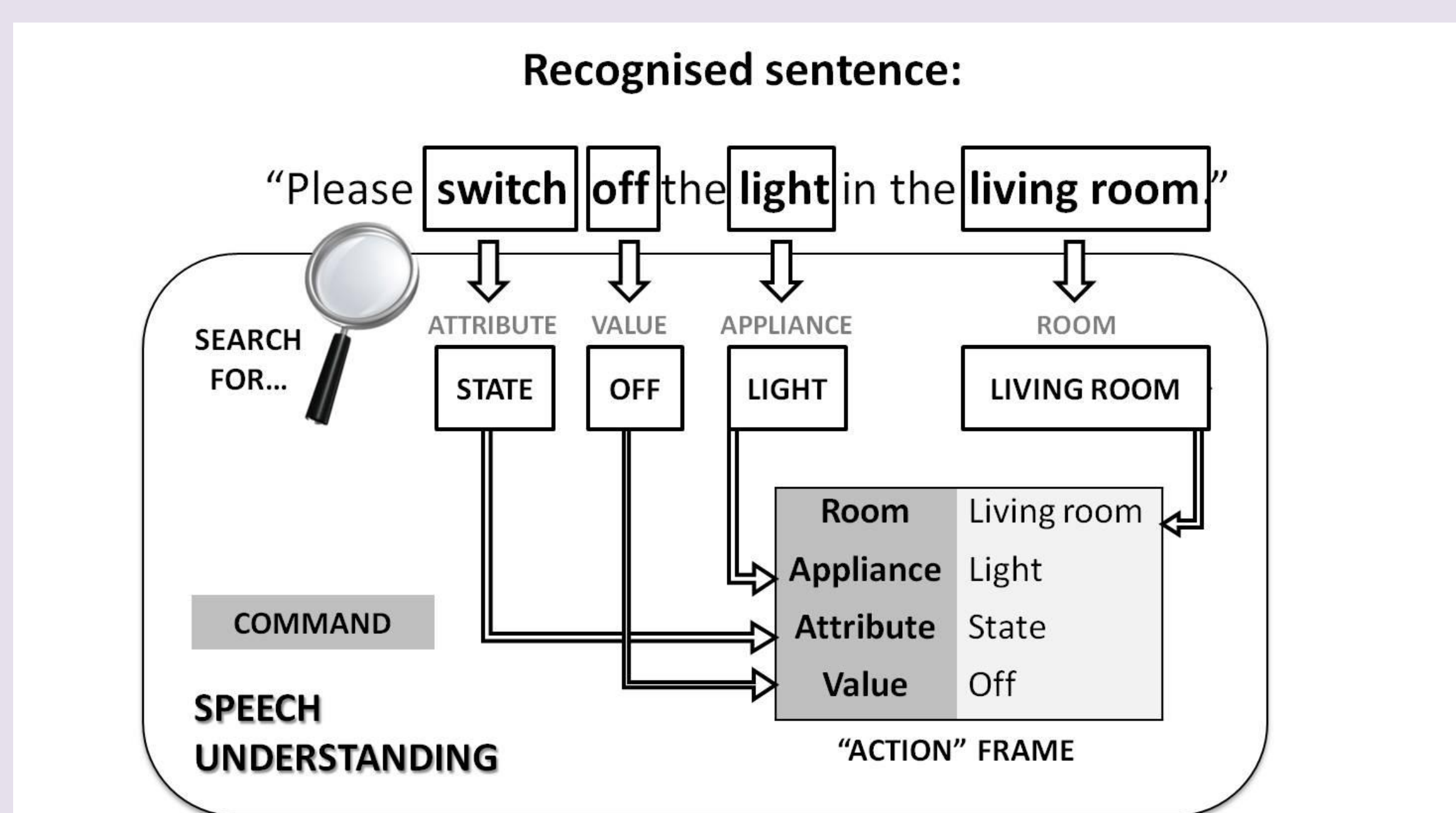
Mayordomo is a multimodal dialogue system under development in our lab to centralise control of home appliances. The system is multimodal as it provides several methods (speech and GUI) for interacting with the appliances.

1.1 Speech recognition and understanding

System users can ask questions to request information about the state of appliances and execute commands to change their state.

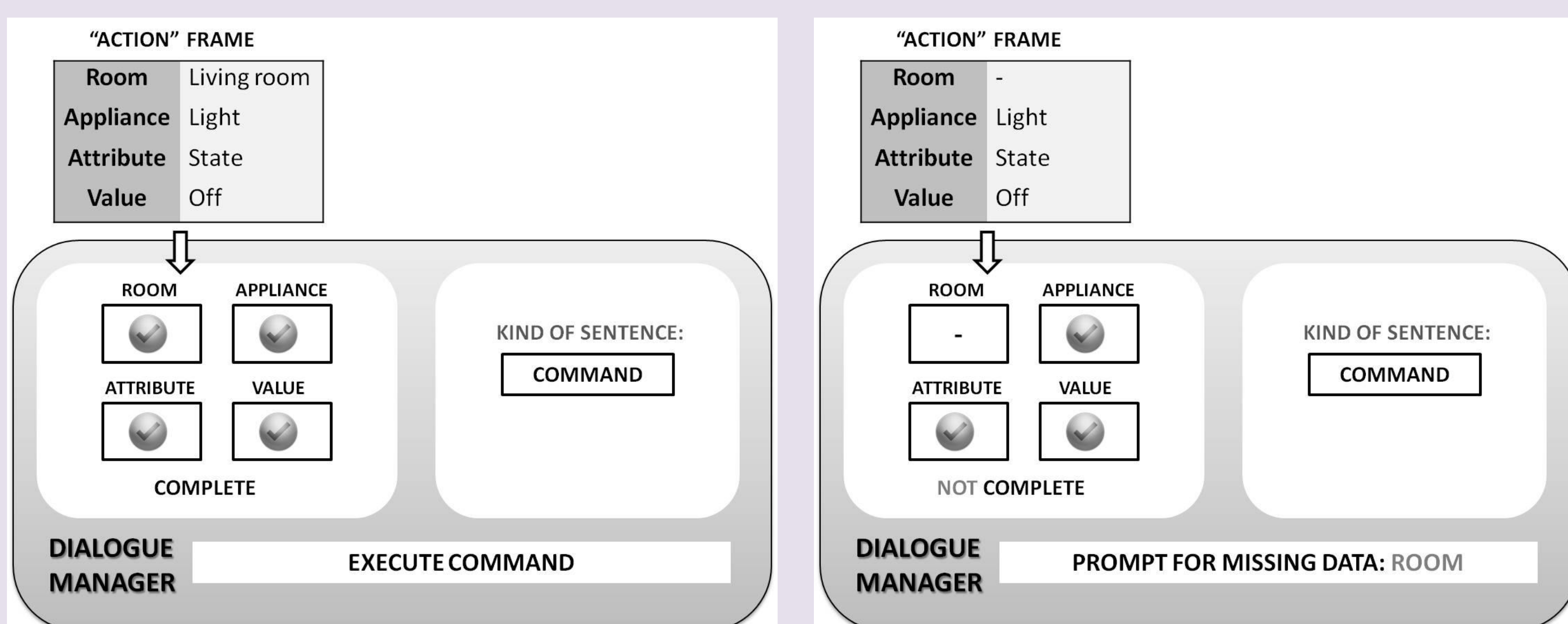
Speech understanding is implemented using a frame structure called "action", which is comprised of four slots:

Room	Room where the appliance is placed
Appliance	Appliance on which the command is executed
Attribute	Characteristic of the appliance that is affected by the command
Value	New value for the attribute



1.2 Dialogue management

The system's dialogue manager checks the data stored in the "action" frame and determines whether to provide information to the user, prompt the user for additional data or execute a command.



2. Octopus system

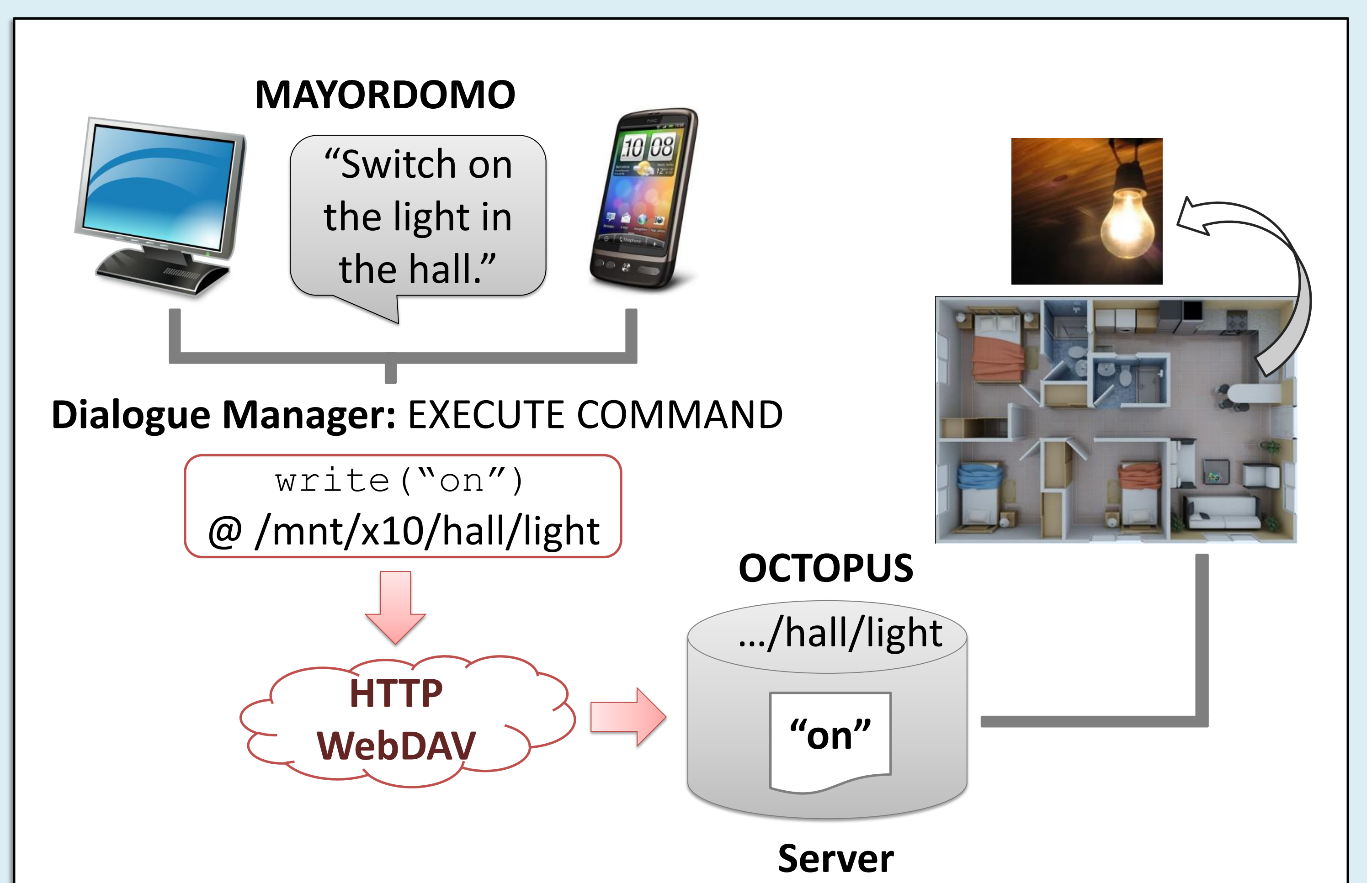
Octopus enables Aml applications and personal pervasive environments. It permits to access the services of an heterogeneous set of devices and machines in a portable and distribute manner.

1. Employs X10 services for implementing the connection with hardware devices.
2. Provides a unified name space and a set of operations (`open`, `read`, `write` and `close`) to access resources represented by means of network files.
3. The state of a device can be accessed by reading its associated file and updated by writing to this file.
4. The interface for the resulting service is very simple as each file contains either the value `on` or `off` depending on the state of the corresponding device.

3. Interaction between Mayordomo and home appliances

Using WebDAV, Mayordomo interacts with home appliances by means of network files handled by Octopus. The appliances are considered abstract objects, which enables getting rid of the problems concerned with the physical interaction with them. WebDAV is a protocol that defines how basic file functions such as `copy`, `move`, `delete` and `create` are performed by using HTTP. For example, for switching on a light the system executes the following instructions:

```
fd=open("/mnt/x10/hall/light", OWRITE);  
write(fd, "on", 3);  
close(fd);
```



4. Future work

1. Add new devices to the experimental environment, such as RFID and motion sensors, in order to consider information about user location during dialogue management, which would be very useful to implement context-dependent Mayordomo's responses.
2. Carry out objective and subjective evaluation of Mayordomo system.