House Mate Controller Service Requirements

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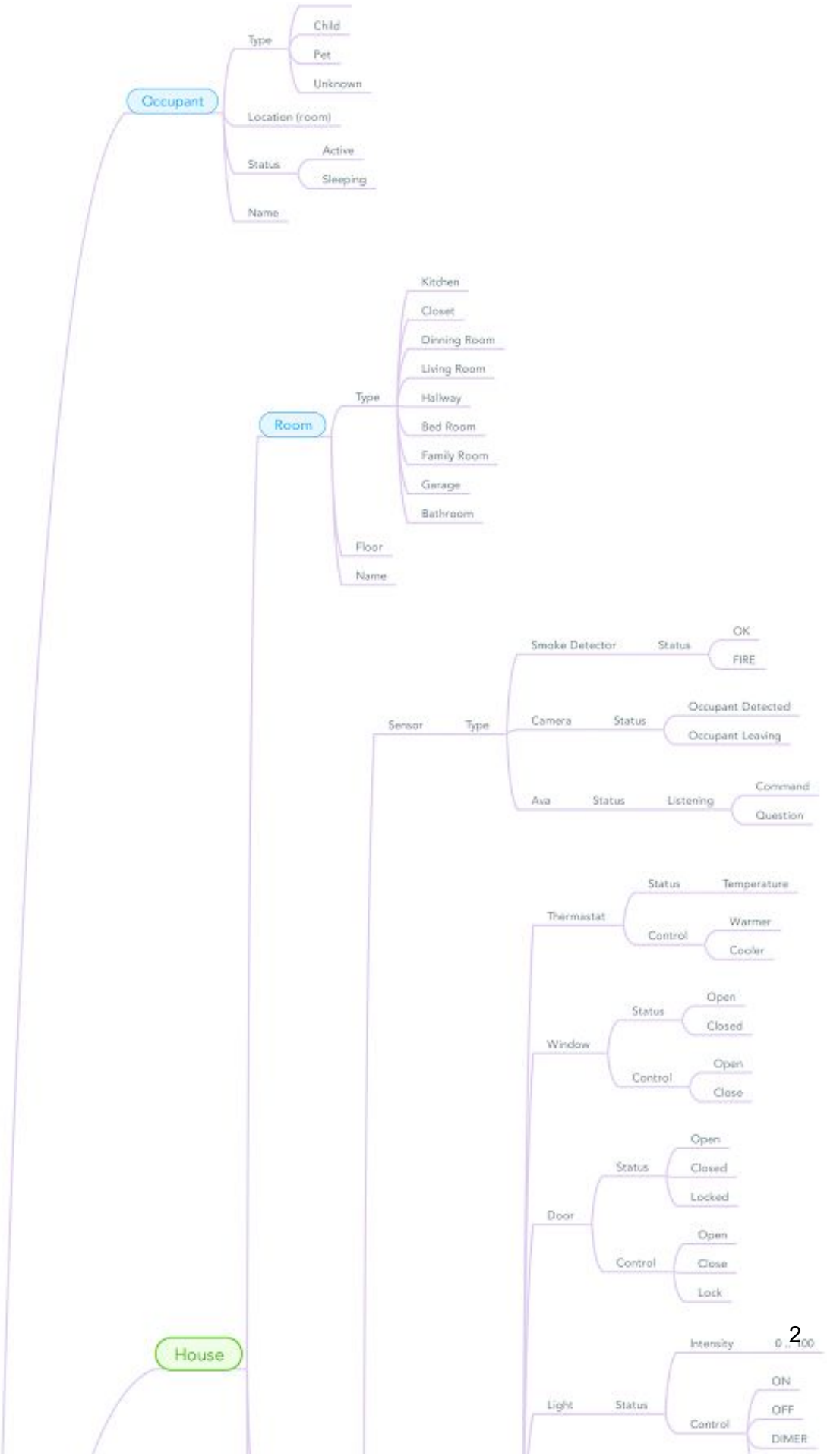
Introduction

This document provides the requirements for the House Mate Controller Service.

Overview

The House Mate Controller Service is responsible for montitoring the state of the sensors and appliances within the home. In addition, the Controller Service is able to generate actions to controll the appliances based on rules, in response to status updates from the sensors and appliances.

Sensors are able to collect and share data. Like Sensors, Appliances can collect and share data. However, appliances can also be controlled. The following diagram provides a mind map that captures the various aspects of the House Mate Model Service.


House
Occupant
Type
Child
Pet
Unknown
Location (room)
Status
Active
Sleeping
Name
Room
Type
Kitchen
Closet
Dinning Room
Living Room
Hallway
Bed Room
Family Room
Garage
Bathroom
Floor
Name
Sensor
Type
Smoke Detector
Status
OK
FIRE
Camera
Status
Occupant Detected
Occupant Leaving
Ava
Status
Listening
Command
Question
Thermastat
Status
Temperature
Control
Warmer
Cooler
Window
Status
Open
Closed
Control
Open
Close
Door
Status
Open
Closed
Locked
Control
Open
Close
Lock
Light
Status
Intensity
0 - 100
Control
ON
OFF
DIMER

House Mate Controller Requirements

This section defines the requirements for the House Mate Controller Service.

The House Mate Controller Service should support the following functions:

- Monitor Sensor and Appliances for status updates.
- Apply rules that respond to the status updates from sensors and appliances and generate actions.
- Sensor input includes voice commands received via the Ava devices. Note that Ava devices are now considered appliances since they can provide voice feedback to occupants.
- In response to actions, generate and send control messages to Appliances.

The House Mate Controller Service should use the interface of the House Mate Model Serivce to monitor the status of each of the IOT devices installed within the houses. In response to inputs, the Controller Service will use rules to invoke actions. The actions will be executed through the appliance controls.

All rule execution and resulting actions should be logged.

Design Input:

- Apply the Command Pattern and Observer Pattern to implement the interaction between the Model Service and the Controller Service.

- Use the Knowledge Graph to track location and status of occupants.

Sensor,Stimulous, Rule, Action

The following table defines the behavior for the Controller Service. The Controller Service will monitor all sensors and appliances for each of the houses and rooms. For each stimulous, apply the appropriate rule and action.

Sensor or Appliance	Stimulous	Rule	Action
Ava	Command: “open door”	open the door to the room	set door status to open.
Ava	Commnad: “close door”	close the door to the room.	set door status to closed

Ava	Command: “lights off”	turn off all the lights in the room	set light status to off
Ava	Command: “lights on”	turn on all the lights in the room	set light status to on
Ava	Generic Command: “applicance_type status_name value”	send the command to appliance with matching type in the current room.	forward command to appliance and echo command via Ava.
Ava	Question: “where is <occupant_name>?” For example, “where is Rover?”	use the Knowledge Graph to determine location of occupant.	send response to Ava. “Rover is_located_in kitchen”
Camera	Occupant detected.	turn on the lights in the room, and increase the thermastat	send command to turn lights on, increase the temperature of the thermastat, update location of occupant in the KG.
Camera	Occupant leaving	if no more occupants are in the room, then turn the lights off, and lower the thermastat	turn off lights, descrease the temperature of the thermastat, Update the location of occupant in the KG.
Camera	Occupant is inactive	if the only occupant, dim the lights and update the status of the occupant to resting.	update occupant status in KG to resting.
Camera	Occupant is active	update occupant status to active	update occupant status in KG to be active.
Smoke Detector	Mode Fire	if occupants are in the house, turn on all lights in the house and ask occupants to leave the house. If room has a window and is on the first	send command to turn on lights send AVA text to speech: “Fire in the Kitchen, please leave the house immediately”.

		floor, recommend exiting through the window. Call 911 to let them know there is a fire.	Call 911.
Oven	TimeToCook goes to 0	if oven is on, turn oven off and alert occupants that food is ready.	Turn oven off. send Ava text to speach. “Food is ready”
Refrigerator	Beer count changes.	If beer count is less than 4, ask Occupant if they would like to order more beer. If occupant says yes, order more beer.	Send email to store requesting more beer.

Since this is a new service, feel free to experiment with other types of Rules.

Testing

Continue to use the House Mate Model Service Command Langauge to test your system.