Domain Description:

The domain of Smart home has been fuzzified in this project with FuzzyJess. The variables I have fuzzified are:

1. Time
2. Environment temperature
3. Thermostat (replaces Ac and Heat boolean values)
4. Daylight factor
5. Lights

The sixth variable is a Boolean variable "windowsOpen" which is not fuzzified.

- The first fuzzy variable has following fuzzy terms:
  a. Earlymorning, morning, afternoon, midafternoon, evening, lateevening
- The next two fuzzy variables have a relationship where the temperature & thermostat has these fuzzy terms respectively:
  a. hot, extremelyHot, cold, extremelyCold, slightlyHot, slightlyCold
  b. low, medium, high

  The temperature is the antecedent and the thermostat setting is the conclusion.
- The next two fuzzy variables have a relationship where the daylight factor & lights have these fuzzy terms respectively:
  a. Less, mid, more
  b. Dim, midway, bright

  The daylight factor is the antecedent & the lights are the conclusion.
- The sixth variable has two values: true and false

Rules:

The rules are written for the following relations

1. Time – antecedent, windows – conclusion
2. Temperature – antecedent, thermostat – conclusion
3. Daylight – antecedent, lights – conclusion
4. Daylight & time – antecedent, lights – conclusion

   The fourth rule caters to anomalies wrt to time & daylight for e.g. its morning but daylight is less (because its cloudy or something)

Usecases:

1. Time – earlymorning
   Daylight – more
   Temperature – very cold

   Time is earlymorning so windows are open.
   In this usecase, the time is early morning but somehow there is abundant natural light, so the output will accordingly dim the lights to a very low value (i.e. fuzzy value - very dim)
   As for the temperature, since its very cold, the thermostat is set to a very high temperature.

2. Time – evening
   Daylight – less
   Temperature – very medium

   Time is evening so windows are closed.
   In this usecase, the time is evening and accordingly daylight is less so only daylight & lights rule will happen. And brighten the lights to a high value (i.e. fuzzy value - bright)
   As for the temperature, since its very medium, the thermostat is set to a medium temperature.

3. Time – midafternoon
   Daylight – more
   Temperature – hot

   Time is midafternoon so windows are open.
   In this usecase, the time is midafternoon and accordingly daylight is more so only daylight & lights rule will happen. And dim the lights to a very low value (i.e. fuzzy value – very dim)
   As for the temperature, since its hot, the thermostat is set to a low temperature.

Note: The outputs do not tell the extent of a value like “very dim” or “very low” so you can check that it is very low by checking the fuzzy set or fuzzy terms.

Build & run:

1. Open “main.clp” and in the place where the input facts are asserted change values according to use case and save.
2. Now open the file in eclipse and run it as a jess application.
3. The output shows the crisp values of the fuzzy rule reasoning for the different fuzzy variables and how they are related.