Construction and Verification of Software

2017 - 2018

MIEI - Integrated Master in Computer Science and Informatics
Consolidation block

Handout 4
João Costa Seco (joao.seco@fct.unl.pt)
based on previous editions by **Luís Caires** (lcaires@fct.unl.pt)

FACULDADE DE
CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Consider a domotic system that provides a hub for a set of devices, sensors or actuators, and control rules.

Sensors A sensor is updated (internally) by an internal timer that updates its state with readings that can be read concurrently by threads in the domotic control system. In this case, sensor readings are simulated by with a random value, or by some function over time. A sensor can be read concurrently. Sensors have a scale, and if a reading is out of the scale, the registered value is either the maximum or the minimum of the scale.

Actuators Actuators have an internal state with a property named "value" (setter and getter). The value can be read and written concurrently.

Rules Rules are objects that have references to sensors and actuators. Their behavior is triggered by an internal timer. There are several examples of rules: Indoor lighting (if someone is present and external light is below a certain value, turn lights on); Office hours (lock doors outside the working hours); AutoWindows (Close windows automatically after 5PM); Rain/Wind Protection (Close windows if rain sensor or wind sensor is above a threshold).

CVS 17/18 - Handout 4

- Implement a class to represent an **actuator** as a simple concurrent memory cell (get & set) for an integer value.

- Implement a class to represent a **rule** (Indoor lights), that has an internal timer, reads a set of sensors and changes a set of actuators (Lamps).

- Implement a class to represent a **rule** (Rain/Wind Protection), that has an internal timer, reads a set of sensors and changes a set of actuators (Windows).

- Implement a class to **log** the triggering of rules. Every time a rule is triggered (and produces results) the name of the rule, the input and output values are logged. (Use a NR1W monitor.)

- Implement **the domotic system** that hosts both rules running concurrently and sharing the same log system, and a dashboard that lists the actions triggered in the system.

- You need to establish contracts and verify your code with verifast so that it contains no execution errors.