CSSE 373 - Formal Methods in Spec. and Design

Lab 7

Purpose

Learn how to apply NuSMV for model checking.

Setup

1. Download your OS-specific binaries from: http://www.rose-hulman.edu/class/csse/binaries/csse373/NuSMV/.
2. For a Window's machine, run the install file as an **Administrator**. For Linux/Unix machine extract and go to #8.
3. Please check all of the options under **Installation Options**, including **Development.**
4. Go to the **bin** directory of the NuSMV install location. It should be: **C:\Program Files\NuSMV\2.5.4\bin**.
5. Open a Directory Browser -> Right click on the Computer icon -> Properties -> Advanced system settings -> Advanced Tab -> Environment Variables.
6. Under System variable, find Path -> Edit … -> Append the path to bin directory as shown below:
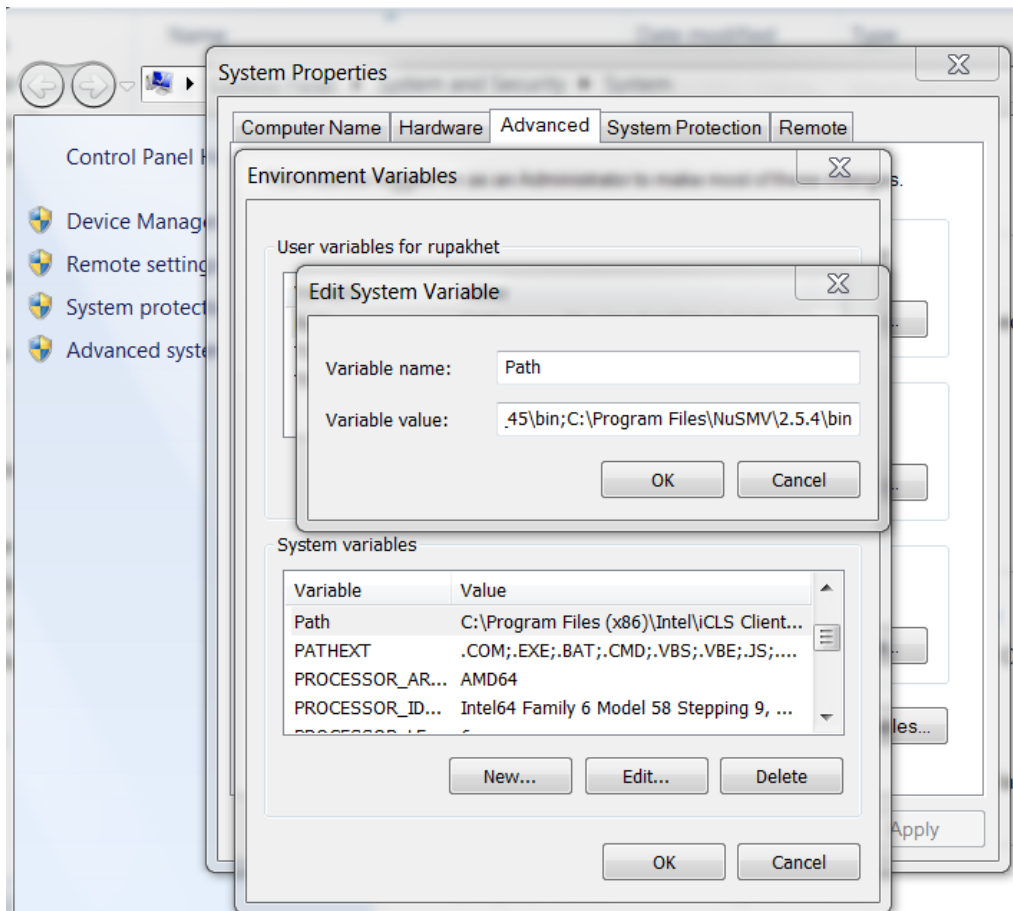
7. Press OK a few times and you should be all set.
8. For Linux/Unix machine, setup you PATH variable to include the bin directory of the extracted folder.
9. To test your installation, open command prompt and type NuSMV. It should display some info. Press CTRL + C.

Instruction

This lab assumes that you have the NuSMV tutorial (pdf) with you. Please download it from Moodle if you do not already have it on your machine (Find it on Moodle -> Week 7 Reading). Also download and extract the **Lab7.zip** file, which serves as your workspace. You will next read and execute some of the exercises in Chapter 2, 3, and 5 of the tutorial.

Answer the following questions based on the simulation exercises. Create **/turnins/Lab8.pdf** file to record your answer. Note that this is a solo homework but you are allowed to discuss the problems with your teammates.

1. Code the model shown in Section 3.2 (create **/modules/short.smv**) and briefly explain the function of the following commands:
a. NuSMV –int short.smv
b. pick_state –r
c. print_current_state –v
d. simulate –r –k 3
e. show_traces –t
f. show_traces –v
g. goto_state 1.4
h. show_traces 2
i. pick_state -i
j. show_traces 3
k. pick state -c "request = TRUE" -i

2. Code the model shown in Sections 2.1.2 (create **/modules/bcounter.smv**) and repeat commands 1.a-1.f. This time no explanation is needed; just understand what is happening.

3. Code the model shown in Sections 2.2.1 (create **/modules/inverter.smv**) and repeat commands 1.a-1.f. Now include the *FAIRNESS running* constraint and repeat commands 1.a-1.f. Did you notice any differences in the two traces?

4. Code the model shown in Section 5.2 (create **/modules/semaphore.smv**). Draw the FSM for the model. Explain what the two LTL formulas specify. Run the model by typing the following command on the console: "*NuSMV semaphore.smv*". Explain, using the trace, how a process that wants to enter its critical section cannot eventually do so.

Turnins

Bundle your Lab7 workspace (create **Lab7.zip** file) and turn it in on Moodle.