

CS377 – Fall 2007

Homework 2

Due in class at 12:30pm, Thursday, October 4, 2007

In class we have discussed several different types of formal models, including axiomatic, abstract model, algebraic, and state-transition based. You have seen these in the context of the clock example. In this assignment you will have the opportunity to apply some of these models in the context of a different example —automobile cruise control— which is specified below.

- A. Select two operations of the cruise control and model one using a VDM-like notation and another using an OBJ-like notation. Both VDM and OBJ were presented in class. “VDM-like” and “OBJ-like” means that you should try to adhere to the syntax of each language, but since neither language was studied in detail, some departures from it will be tolerated. State any assumptions you have made in your models.
- B. Generate a finite state machine model for the cruise control system. Use the technique discussed in class on September 20 and 25. Make sure to identify any ambiguous or incomplete aspects of the below specification. Note how you decided to address them in your solution.
- C. Simplify your state machine using “transition guards” discussed in class on September 25.

Cruise Control System Specification

1. You may assume an automatic transmission vehicle.
2. You may assume a flat, straight road.
3. For any of the cruise control (CC) functions to take effect, CC must be turned on first.
4. CC can be in the following states: off, enabled (i.e., on and cruising), and disabled (on, but not cruising).
5. The CC system should be automatically disabled below 30mph and above 90mph.
6. Four actions are permitted during CC: set speed, accelerate, decelerate, and resume speed.
7. When the system is under CC and the brake is pressed, CC is disabled. When the resume button is pressed, the system resumes at the last set CC speed.
8. When the system is under CC and the accelerator pedal is pressed, CC is disabled and the speed increases correspondingly. When the accelerator is released, the CC resumes at its last set CC speed. If at any point of time during acceleration the CC speed is set, CC replaces the old set speed with the new speed.