Homework 5 (Alloy)
Due Date: Mar 7, 2000

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Note: This homework is deliberately open ended. You will have to make a lot of design decisions. First, write a detailed design document. After that, express the design in Alloy and check relevant assertions using Alcoa. This homework requires you to model a publish/subscribe system using Alloy. *This homework will count for 1.5 times the other homeworks.* Homework number 6 will be a small one and count for 0.5 times a regular homework.

A publish/subscribe system has a set of *components*, an *event dispatcher*, and a set of *events*. Each component can *publish* an event at any time and can also *subscribe* to a set of events. When a component C publishes an event, it first is put in queue associated with the event dispatcher. At any time an event dispatcher takes an event off the queue, and sends it to the components that have subscribed to that event. As a simplifying assumption you can assume that the set of events a component announces and the set of events that it subscribes to are *fixed*.

Hint: You should first write a complete design document in plain english. In the design phase determine what the state of the publish/subscribe system consists of, i.e, what are the relations, sets, and scalars you will have to maintain. Also be sure that you figure out their types. After that, decide what operations will you support in the publish/subscribe system. The last thing you should think about are invariants and assertions. This is a long homework, so please start early. Once you are done with the design document,

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then start expressing it in Alloy. Don't forget to give the graphical description of your design. You should justify all design decisions and simplifying assumptions you had to make during this whole process. Approximately *sixty percent* of the grade will be based on the design document and *forty percent* on the Alloy model.