

The TIOA Language User Manual and Reference Manual

This handout is a user guide designed to introduce the TIOA formal modeling language, which can be used for describing distributed algorithms and systems. The mathematical basis of the language is a mathematical model called “Timed Input/Output Automata”, which are essentially I/O automata without the tasks for describing fairness, and with additional facilities for describing timing constraints. For this part of the course, while we are studying asynchronous systems, you should ignore the timing features. (This will be easy to do—just avoid defining any “trajectories”, which are the mechanism used to describe timing constraints.) Later in the course, when we study timing-dependent algorithms, these timing features will come in handy.

The language (without the timing features) is based directly on the precondition-effect notation used from Chapter 8 onward in the Lynch “Distributed Algorithms” textbook.

The language has a front end (parser and static semantic checker), which you can use to check the syntactic correctness of the code you write this term. You should use it to check code that you hand in on future homework assignments.

Although the language also has some other tools, namely, a simulator and a connection to the PVS theorem-prover, these aren’t yet polished and packaged well enough for us to expect you to use them for this class. If you are interested in trying them at some point, let us know and we will try to make some special arrangements for you.