

Step Details¹

A step depends on the status, whose components are:

- **a list of the states in which the system currently resides (i.e., the configuration)**
- **a list of activities that are currently active**
- **current values of conditions and data items**
- **a list of generated and derived events that were generated internally in the preceding step**
- **a list of timeout events and their time for occurrence**
- **a list of scheduled actions and their time for execution**
- **relevant information on the history of states**

¹ excerpted from *Modeling Reactive Systems with Statecharts* by D. Harel & M. Politi.

Step Details continued

The input for executing a step consists of:

- the current system status**
- the set of external changes (events and changes in the values of conditions and data items)**
- the current time**

Based on these parameters, step execution occurs in three phases.

Step Execution – phase I

- **calculate the events derived from the external changes and add them to the list of events (e.g., if a false condition C is set to true, the event $tr(C)$ is added to the list)**
- **perform the scheduled actions whose scheduled time has been exceeded, and calculate their derived events**
- **update the occurrence time of timeout events if their triggering events have happened**
- **generate the timeout events whose occurrence time has been exceeded.**

This first phase may modify the input status for the step, and the resulting status is the one to be used in the following two phases.

Step Execution – phase II

- **evaluate the triggers of all relevant transition reactions to compute the enabled transitions that will be taken in this step (conflict options later)**
- **prepare a list of all (including non-basic) states that will be exited and entered; this may involve the use of default entrances and history information**
- **evaluate the triggers of all relevant static reactions to compute the ones that are enabled, excluding the states exited in this step.**

The second phase ends with a list of actions to be performed in the current step. Actions specifying exit from and entrance to states are included. This phase may end with *no* enabled reactions. If this occurs, the system has reached a *stationary status*, and the third phase is not performed at all -- effectively there is no step execution. In such cases, execution will remain suspended until new external changes occur or time is advanced – at that point a new step is initiated at Phase I.

Step Execution – Phase III

- **update the information on the history of states**
- **carry out all computations prescribed by the actions in the list produced in Phase II, but without event generation or the value updates associated with assignments to data items and conditions (except context variables)**
- **add scheduled actions from the list produced in Phase II to the list of scheduled actions**
- **carry out all updates required by the actions on the list produced in Phase II, including making value assignments to data items and conditions and updating the list of events**
- **update the list of current states.**