

SOEN331: Introduction to Formal Methods for Software Engineering

Assignment 1 on extended finite state machines

Tarek Ait Hamouda (40044119), Abhijit Gupta (40066502),
Ethel Narra Pangan (40061530)

February 8, 2019

1 Room temperature control formal specification

The EFSM of the room temperature control is the tuple $S = (Q, \Sigma_1, \Sigma_2, q_0, V, \Lambda)$, where

$Q = \{idle, warmup, configuration\}$

$\Sigma_1 = \{interrupt, after(3min), after(2s), cancel\}$

$\Sigma_2 = \{fan\ on, fan\ off, furnace\ on, furnace\ off, prolonged\ beep\ sound\}$

$q_0 : idle$

$V : \{C, T, D, T.F\}$

Λ : Transition specifications

1. $\rightarrow idle$
2. $idle \xrightarrow{\text{shut off / (fan off ; furnace off)}} off$
3. $idle \xrightarrow{[C \geq D]} idle$
4. $idle \xrightarrow{[C \leq D-1] / (\text{fan off ; furnace on})} warm\ up$
5. $warm\ up \xrightarrow{[T.F < D+1]} warm\ up$
6. $warm\ up \xrightarrow{[T.F \geq D+1]} idle$
7. $warm\ up \xrightarrow{\text{interrupt/furnace off}} configuration$

The EFSM of the configuration is the tuple $S = (Q, \Sigma_1, \Sigma_2, q_0, V, \Lambda)$, where

$$Q = \{input, add, override, exit\}$$

$$\Sigma_1 = \{after(1min)\}$$

$$q_0 : input$$

$$V : triplet$$

Λ : Transition specifications

1. $\rightarrow input$
2. $input \xrightarrow{[triplet \text{ does not exist}]} add$
3. $input \xrightarrow{[triplet \text{ exist}]} override$
4. $input \xrightarrow{\text{after 1 inactive min}} exit$
5. $add \xrightarrow{[else]} input$
6. $add \xrightarrow{[completed]} exit$
7. $override \xrightarrow{[else]} input$
8. $override \xrightarrow{[completed]} exit$

The UML state diagram is shown in Figure 1.

2 UML state diagrams

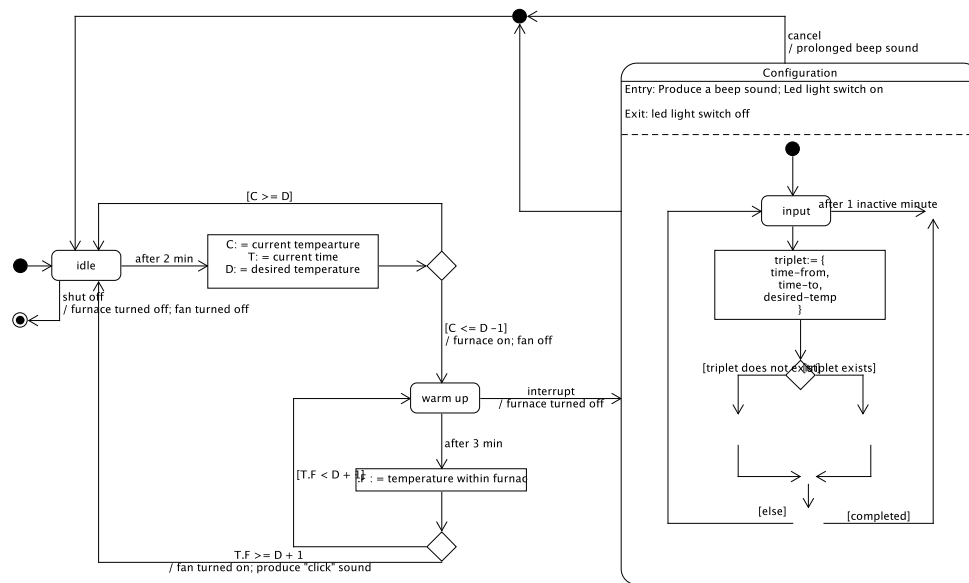


Figure 1: temperature.