Deleting Drafts

In this example, we have a list of drafts that can be deleted. The user selects one or more drafts, by checking the corresponding checkboxes, and clicks "Delete". A confirmation dialog is shown, and the user can either cancel or confirm the deletion.

We want to show that when drafts are selected for deletion and the user has clicked "Delete", entering the *confirming* state, the deletion is either:

1. *cancelled*, meaning that no drafts are deleted, the same set of drafts are selected, and the confirmation dialog is hidden, or
2. *confirmed*, meaning that the set of selected drafts are deleted from the drafts list and that the confirmation dialog is hidden

These are the only two valid actions when in the *confirming* state.

The following formula defines the /confirming/ state as the existence of an element e returned by querying the current DOM for the CSS selector `confirm`, that is visible and has the text content "Are you sure?".

$$\mathit{confirming} = \exists e \in \mathit{query}(\texttt{.confirm}) : e.\text{visible} \wedge e.\text{text} = \text{"Are you sure?"} \quad (1)$$

We also need a version of *confirming* that instead refers to the next state. This is done using the primed querying operator query'.

$$\mathit{confirmingNext} = \exists e \in \mathit{query}'(\texttt{.confirm}) : e.\text{visible} \wedge e.\text{text} = \text{"Are you sure?"} \quad (2)$$

We can now define the *cancel* action. It says that the set of drafts (or their checkboxes, rather) are the same in the current and next state, that the same checkboxes are checked, and that we're no longer *confirming* in the next state.

$$\begin{aligned} \mathit{cancel} = {} & \mathit{query}(\texttt{.checkbox}) = \mathit{query}'(\texttt{.checkbox}) \\ & \wedge \{c \in \mathit{query}(\texttt{.checkbox}) : c.\mathit{checked}\} = \{c \in \mathit{query}'(\texttt{.checkbox}) : c.\mathit{checked}\} \\ & \wedge \neg \mathit{confirmingNext} \end{aligned} \quad (3)$$

The *confirm* action is the other possibility. It says that the resulting set of checkboxes is equal to the currently non-checked ones, and that we're no longer *confirming* in the next state.

$$\begin{aligned} \mathit{confirm} = {} & \{c \in \mathit{query}(\texttt{.checkbox}) : \neg c.\mathit{checked}\} = \mathit{query}'(\texttt{.checkbox}) \\ & \wedge \neg \mathit{confirmingNext} \end{aligned} \quad (4)$$

Finally, we can compose our building blocks to define the safety property. At all times ($\Box$) when we're confirming the deletion of selected drafts, we can either *cancel* or *confirm*.

$$\Box(\mathit{confirming} \implies \mathit{cancel} \vee \mathit{confirm}) \tag{5}$$

That's it.

Reading material

- LTL patterns survey
- Intro to TLA
- Specifiying Concurrent Systems with TLA+