

### 0.0.1 Update

The operation *update* will return a Collection *coll!* which is the same as the input Collection *coll?* except for at index *idx?*. The existing member *coll?*<sub>*idx?*</sub> is replaced by the provided Value *v?* at *idx?* in *coll!* such that

$$idx? \mapsto v? \in coll! \wedge idx? \mapsto coll?_{idx?} \notin coll!$$

The functionality of *update* is further explained in the following schema.

$ \begin{array}{l} \text{Update}[Collection, \mathbb{N}, V] \text{ —————} \\ idx? : \mathbb{N} \\ coll?, coll! : Collection \\ v? : V \\ update\_ : Collection \times \mathbb{N} \times V \mapsto Collection \end{array} $
$ \begin{array}{l} 1 = \# idx? \\ coll! = update(coll?, idx?, v?) \bullet \\ \text{let } coll' == front(\{ i : \mathbb{N} \mid i \in 0 .. idx? \} \upharpoonright coll?) \cap v? \\ \text{ } \quad coll'' == \{ j : \mathbb{N} \mid j \in idx? + 1 .. \# coll? \} \upharpoonright coll? \\ = coll' \cap coll'' \Rightarrow \\ \text{ } \quad (front(coll') \cap v? \cap coll'') \wedge \\ \text{ } \quad (v? \mapsto idx? \in coll!) \wedge \\ \text{ } \quad (\# coll! = \# coll?) \wedge \end{array} $

The value which previously existed at  $idx? \in coll?$  is replaced with *v?* to result in *coll!*

- *coll'* is the items in *coll?* up to and including *idx?* but the value at *idx?* is replaced with *v?* such that  $idx? \mapsto coll?_{idx?} \notin coll'$
- *coll''* is the items in *coll?* from *idx? + 1* to  $\# coll? \Rightarrow coll?_{idx?} \notin coll''$

The following example illustrates these properties.

$$\begin{aligned}
X &= \langle x_0, x_1, x_2 \rangle \\
x_0 &= 0 \\
x_1 &= foo \\
x_2 &= \langle a, b, c \rangle \\
v? &= bar \\
update(X, v?, 0) &= \langle bar, foo, \langle a, b, c \rangle \rangle \\
update(X, v?, 1) &= \langle 0, bar, \langle a, b, c \rangle \rangle \\
update(X, v?, 2) &= \langle 0, foo, bar \rangle \\
update(X, v?, 3) &= \langle 0, foo, \langle a, b, c \rangle, bar \rangle \\
update(X, v?, 4) &= append(X, v?, 3) = update(X, v?, 3) \iff 3 \notin \text{dom } X
\end{aligned}$$