

400 (resettable variable) A resettable variable is defined as follows. There are three new names: *value* (of type *X*), *set* (a procedure with one parameter of type *X*), and *reset* (a program). Here are the axioms:

$$\begin{aligned} value' = x &\Leftarrow set\ x \\ value' = value &\Leftarrow set\ x. reset \\ reset. reset &= reset \end{aligned}$$

Implement this data structure, with proof.

§ Let *value*: *X* be a user's variable, and let *old*: *X* be an implementer's variable.
 $set = \langle x: X \rightarrow old := value. value := x \rangle$
 $reset = value := old$

Proof:

$$\begin{aligned} &(value' = x \Leftarrow set\ x) \\ = &(value' = x \Leftarrow old := value. value := x) \\ = &(value' = x \Leftarrow old' = value \wedge value' = x) \\ = &\top \\ &(value' = value \Leftarrow set\ x. reset) \\ = &(value' = value \Leftarrow old := value. value := x. value := old) \\ = &(value' = value \Leftarrow old' = value' = value) \\ = &\top \\ &(reset. reset = reset) \\ = &(value := old. value := old = value := old) \\ = &\top \end{aligned}$$

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