

## Idea

The Idea behind the ADT of a Stack is to provide a collection of data with two primary operations:

- *push*: Push a new item on top of the stack.
- *pop*: Take the item on top of the stack off.

## Definition

We define the ADT as the following 5-Tuple:

$$\mathcal{D} = (N, P, Fs, Ts, Ax),$$

where the components are defined as follows:

1.  $N := \text{Stack}$
2.  $P := \{\text{Element}\}$
3.  $Fs := \{\text{stack}, \text{push}, \text{pop}, \text{top}, \text{isEmpty}\}$
4.  $Ts$  is the set containing the following type specifications:
  - (a)  $\text{stack} : \text{Stack}$
  - (b)  $\text{push} : \text{Stack} \times \text{Element} \rightarrow \text{Stack}$
  - (c)  $\text{pop} : \text{Stack} \rightarrow \text{Stack} \cup \{\Omega\}$
  - (d)  $\text{top} : \text{Stack} \rightarrow \text{Stack} \cup \{\Omega\}$
  - (e)  $\text{isEmpty} : \text{Stack} \rightarrow \mathbb{B}$
5.  $Ax$  is the set containing the following axioms:
  - (a)  $\text{stack}().\text{top}() = \Omega$
  - (b)  $\text{stack}().\text{pop}() = \Omega$
  - (c)  $S.\text{push}(x).\text{top}() = x$
  - (d)  $S.\text{push}(x).\text{pop}() = S$
  - (e)  $S.\text{top}() = \Omega \iff S.\text{isEmpty}() = \text{true}$

## Implementation

TBD