

# Funcons-beta: Abrupting \*

The P<sub>Plan</sub>CompS Project

Abrupting.cbs | PLAIN | PRETTY

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## Abruptly terminating

[ *Funcon* **stuck**  
  *Entity* **abrupted**  
  *Funcon* **finalise-abrupting**  
  *Funcon* **abrupt**  
  *Funcon* **handle-abrupt**  
  *Funcon* **finally** ]

*Meta-variables*  $T, T', T'' <: \text{values}$

*Funcon* **stuck** :  $\Rightarrow \text{empty-type}$

**stuck** does not have any computation. It is used to represent the result of a transition that causes the computation to terminate abruptly.

*Entity*  $\_ \xrightarrow{\text{abrupted}(\_ : \text{values?})} \_$

**abrupted**( $V$ ) in a label on a transition indicates abrupt termination for reason  $V$ . **abrupted**( ) indicates the absence of abrupt termination.

*Funcon* **finalise-abrupting**( $X : \Rightarrow T$ ) :  $\Rightarrow T \mid \text{null-type}$   
   $\rightsquigarrow \text{handle-abrupt}(X, \text{null-value})$

**finalise-abrupting**( $X$ ) handles abrupt termination of  $X$  for any reason.

*Funcon* **abrupt**( $\_ : \text{values}$ ) :  $\Rightarrow \text{empty-type}$

**abrupt**( $V$ ) terminates abruptly for reason  $V$ .

*Rule* **abrupt**( $V : \text{values}$ )  $\xrightarrow{\text{abrupted}(V)}$  **stuck**

*Funcon* **handle-abrupt**( $\_ : T' \Rightarrow T, \_ : T'' \Rightarrow T$ ) :  $T' \Rightarrow T$

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\*Suggestions for improvement: [plancomps@gmail.com](mailto:plancomps@gmail.com).  
Reports of issues: <https://github.com/plancomps/CBS-beta/issues>.

**handle-abrupt**( $X, Y$ ) first evaluates  $X$ . If  $X$  terminates normally with value  $V$ , then  $V$  is returned and  $Y$  is ignored. If  $X$  terminates abruptly for reason  $V$ , then  $Y$  is executed with  $V$  as **given** value.

**handle-abrupt**( $X, Y$ ) is associative, with **abrupt(given)** as left and right unit. **handle-abrupt**( $X, \text{else}(Y, \text{abrupt(given)})$ ) ensures propagation of abrupt termination for the given reason if  $Y$  fails

$$\text{Rule} \quad \frac{X \xrightarrow{\text{abrupted}(\ )} X'}{\text{handle-abrupt}(X, Y) \xrightarrow{\text{abrupted}(\ )} \text{handle-abrupt}(X', Y)}$$

$$\text{Rule} \quad \frac{X \xrightarrow{\text{abrupted}(V:T'')} X'}{\text{handle-abrupt}(X, Y) \xrightarrow{\text{abrupted}(\ )} \text{give}(V, Y)}$$

$$\text{Rule} \quad \text{handle-abrupt}(V : T, Y) \rightsquigarrow V$$

$$\text{Funcon} \quad \text{finally}(\_ : \Rightarrow T, \_ : \Rightarrow \text{null-type}) : \Rightarrow T$$

**finally**( $X, Y$ ) first executes  $X$ . If  $X$  terminates normally with value  $V$ , then  $Y$  is executed before terminating normally with value  $V$ . If  $X$  terminates abruptly for reason  $V$ , then  $Y$  is executed before terminating abruptly with the same reason  $V$ .

$$\text{Rule} \quad \frac{X \xrightarrow{\text{abrupted}(\ )} X'}{\text{finally}(X, Y) \xrightarrow{\text{abrupted}(\ )} \text{finally}(X', Y)}$$

$$\text{Rule} \quad \frac{X \xrightarrow{\text{abrupted}(V:\text{values})} X'}{\text{finally}(X, Y) \xrightarrow{\text{abrupted}(\ )} \text{sequential}(Y, \text{abrupt}(V))}$$

$$\text{Rule} \quad \text{finally}(V : T, Y) \rightsquigarrow \text{sequential}(Y, V)$$