Funcons-beta: Abrupting

The PLanCompS Project

`Funcons-beta/Computations/Abnormal/Abrupting/Abrupting.cbs`*

Abruptly terminating

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

Meta-variables T, T', T'' <: values

Funcon stuck : ⇒ 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 tranistion indicates abrupt termination for reason V. abrupted( ) indicates the absence of abrupt termination.

Funcon finalise-abrupting(X : ⇒ T) : ⇒ T | null-type
  ⇝ handle-abrupt(X,
      null-value)

*Suggestions for improvement: `plancomps@gmail.com`.
Issues: `https://github.com/plancomps/CBS-beta/issues`.

$\mathsf{finalise\text{-}abrupting}(X)$ handles abrupt termination of X for any reason.

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

$\mathsf{abrupt}(V)$ terminates abruptly for reason V.

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

Funcon $\mathsf{handle\text{-}abrupt}(\_ : T' \Rightarrow T, \_ : T'' \Rightarrow T) : T' \Rightarrow T$

$\mathsf{handle\text{-}abrupt}(X, Y)$ 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.

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

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

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

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

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

$\mathsf{finally}(X, Y)$ 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.

$$\textit{Rule}\ \frac{X \xrightarrow{\mathsf{abrupted}(\ )} X'}{\mathsf{finally}(X, Y) \xrightarrow{\mathsf{abrupted}(\ )} \mathsf{finally}(X', Y)}$$

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

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