Typing

$x : C \; ; \; ocap \vdash t : \sigma$

T-Task
$$\frac{\Gamma ; a \vdash b : \quad Q \triangleright Box[C]}{\Gamma ; a \vdash \; task\,(b)\,\{x \Rightarrow t\} : \; q \triangleright Task[C]}$$

$NCPerm[\,Q\,] \in \Gamma$

T-Async
$$\frac{\Gamma \setminus NCPerm[\,Q\,] \; ; a \vdash u \qquad \Gamma ; a \vdash t : \; Q \triangleright Task[C]}{\Gamma ; a \; \vdash \; async\,(t)\,\{ \quad u \,\} : \bot}$$

$\forall\, x \in \Gamma.\;\; x = CPerm\,[Q] \Rightarrow NCPerm\,[Q] \in \Gamma' \;\wedge\; x \neq CPerm\,[Q] \Rightarrow x \in \Gamma'$

$\Gamma' = \Gamma\,[CPerm \setminus NCPerm]$

$\forall\, CPerm[Q] \in \Gamma.\; CPerm[Q] \notin \Gamma' \wedge NCPerm\,[Q] \in \Gamma'$

T-Finish
$$\frac{(\sigma \neq \bot \wedge \sigma = \tilde{\tau}) \vee (\sigma = \bot \wedge \tilde{\tau} = Null) \qquad \Gamma' ; a \vdash t : \sigma}{\Gamma ; a \vdash \; finish\,\{\,t\,\} : \tilde{\tau}}$$

How to write this properly?

T-OPEN and T-BOX identical besides $Perm[Q] \rightarrow NCPerm[Q]$

$$\frac{\Gamma \; ; \; a \vdash x : Q \triangleright \mathsf{Box}[C] \qquad \Gamma \; ; \; a \vdash y : Q' \triangleright \mathsf{Box}[D] \qquad \{\mathsf{Perm}^{NC}[Q], \mathsf{Perm}^{C}[Q']\} \subseteq \Gamma \qquad D <: ftype(C, f) \qquad \Gamma \setminus \{\mathsf{Perm}^{C}[Q']\}, z : Q \triangleright \mathsf{Box}[C] \; ; \; a \vdash t : \sigma}{\Gamma \; ; \; a \vdash \mathsf{capture}(x.f, y)\,\{z \Rightarrow t\} : \bot}$$

(T-CAPTURE)

$$\frac{\Gamma \; ; \; a \vdash x : Q \triangleright \mathsf{Box}[C] \qquad \Gamma \; ; \; a \vdash y : Q' \triangleright \mathsf{Box}[D'] \qquad \{\mathsf{Perm}^{NC}[Q], \mathsf{Perm}^{C}[Q']\} \subseteq \Gamma \qquad ftype(C, f) = \mathsf{Box}[D] \qquad D' <: D \qquad R \text{ fresh} \qquad \Gamma \setminus \{\mathsf{Perm}^{C}[Q']\}, z : R \triangleright \mathsf{Box}[D], \mathsf{Perm}^{C}[R] \; ; \; a \vdash t : \sigma}{\Gamma \; ; \; a \vdash \mathsf{swap}(x.f, y)\,\{z \Rightarrow t\} : \bot}$$

(T-SWAP)

SUB-Perm $\quad C\,Perm\,[Q] <: \mathcal{N}C\,Perm\,[Q]$

Evaluation

$$\text{Switch}\ \frac{}{H,\ FS, FS' \uplus TS \Rightarrow H,\ FS',\ \{FS\} \uplus TS}$$

$$\text{Task}\ \frac{L(b) = b(o,p)}{H, \langle L,\ let\ x = task(b)\{x \Rightarrow t\}\ in\ y, P\rangle^{L}, TS \rightarrow H, \langle L[x \rightarrow task(b(o,p), t)],\ y,\ P\rangle^{L}, TS}$$

$$\nexists F \in FS.\ F = \langle [],\ finish\ \{*\},\ \emptyset\rangle^{\varepsilon}$$

$$Handler = \langle [],\ finish\ \{*\},\ \emptyset\rangle^{\varepsilon}$$

$$L(x) = task(b(o,p), t)$$

$$\text{Async}\ \frac{T = \langle [x \rightarrow o], t, \emptyset\rangle^{\varepsilon} \qquad p \in P}{H, \langle L, let\ x = async(x)\{y\}\ in\ z,\ P\rangle^{L} \circ FS \circ Handler \circ FS', TS \rightarrow H, \langle L,\ y,\ P \setminus \{p\}\rangle^{\varepsilon} \circ Handler \circ FS', T \cup TS}$$

$$F_1 = \langle L, t, \textcircled{P}^{z}\rangle^{\varepsilon}$$

$$F_2 = \langle [], finish\{*\}, \emptyset\rangle^{\varepsilon}$$

$$F_3 = \langle L[x \rightarrow Null], y, P\rangle^{L}$$

$$\text{Finish}\ \frac{}{H, \langle L, let\ x = finish\ \{t\}\ in\ y, P\rangle^{L} \circ FS, TS \rightarrow H, F_1 \circ F_2^{z} \circ F_3 \circ FS, TS}$$