Fractional Permissions—Summary

ECOOP Summer School, June 2012

John Boyland

Permission: Π, Ψ	Notation	Modeling with Fractional Heap: $h; \Psi \models_N \Pi$
empty	$\emptyset$	$0; \emptyset \models_N \emptyset$
fraction	$q\Pi$	$\dfrac{h; \Psi \models_N \Pi}{qh; q\Psi \models_N q\Pi}$
combination	$\Pi + \Pi'$	$\dfrac{h; \Psi \models_N \Pi \qquad h'; \Psi' \models_N \Pi'}{h + h'; \Psi + \Psi' \models_N \Pi + \Pi'}$
unit permission	$o.f \to o'$	$\dfrac{h; \Psi \models_N N(o, f)}{h + [(o, f) \mapsto (1, o')]; \Psi \models_N o.f \to o'}$
existential	$\exists r \cdot \Pi[r]$	$\dfrac{h; \Psi \models_N \Pi[o]}{h; \Psi \models_N \exists r \cdot \Pi[r]}$
fact	Γ	$\dfrac{\cdot \vdash_N \Gamma \Downarrow \mathrm{T}}{0; \emptyset \models_N \Gamma}$
conditional	$\Gamma \,?\, \Pi : \Pi'$	$\dfrac{\cdot \vdash_N \Gamma \Downarrow b \qquad h; \Psi \models_N \Pi_b}{h; \Psi \models_N \Gamma \,?\, \Pi_\mathrm{T} : \Pi_\mathrm{F}}$
implication	$\Psi \multimap \Pi$	$\dfrac{h; \Psi' + \Psi \models_N \Pi}{h; \Psi' \models_N \Psi \multimap \Pi}$ $\qquad 0; \Psi \models_N \Psi$

Formula: Γ	Notation	Evaluation: $A \vdash_N \Gamma \Downarrow b$
true	$\top$	$A \vdash_N \top \Downarrow \mathrm{T}$
negation	$\neg\Gamma$	$\dfrac{A \vdash_N \Gamma \Downarrow b \qquad b \neq b'}{A \vdash_N \neg\Gamma \Downarrow b'}$
conjunction	$\Gamma_1 \wedge \Gamma_2$	$\dfrac{A \vdash_N \Gamma_1 \Downarrow \mathrm{F}}{A \vdash_N \Gamma_1 \wedge \Gamma_2 \Downarrow \mathrm{F}}$ $\qquad \dfrac{A \vdash_N \Gamma_2 \Downarrow \mathrm{F}}{A \vdash_N \Gamma_1 \wedge \Gamma_2 \Downarrow \mathrm{F}}$ $\qquad \dfrac{A \vdash_N \Gamma_1 \Downarrow \mathrm{T} \qquad A \vdash_N \Gamma_2 \Downarrow \mathrm{T}}{A \vdash_N \Gamma_1 \wedge \Gamma_2 \Downarrow \mathrm{T}}$
existential	$\exists x \cdot \Gamma[x]$	$\dfrac{A \vdash_N \Gamma[X] \Downarrow \mathrm{T}}{A \vdash_N \exists x \cdot \Gamma[x] \Downarrow \mathrm{T}}$
equality	$o = o'$	$A \vdash_N o = o \Downarrow \mathrm{T}$ $\qquad \dfrac{o \neq o'}{A \vdash_N o = o' \Downarrow \mathrm{F}}$
nesting	$\Psi \prec o.f$	$\dfrac{N(o, f) = \Psi + \Psi'}{A \vdash_N \Psi \prec o.f \Downarrow \mathrm{T}}$
predicate call	$p(\overline{X})$	$\dfrac{A \cup \{p(\overline{X})\} \vdash_N P(p)[\overline{X}] \Downarrow \mathrm{T}}{A \vdash_N p(\overline{X}) \Downarrow \mathrm{T}}$ $\qquad \dfrac{p(\overline{X}) \in A}{A \vdash_N p(\overline{X}) \Downarrow \mathrm{T}}$

Please cite as

John Boyland. *Semantics of Fractional Permissions with Nesting.* ACM TOPLAS Volume 32, Number 6, Article 22, August 2010