Some properties of the system LF extended with RType[L]

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1. Things to prove on the system

For system rules, see [draft-meta].

**Theorem 1.1. (Equal form of two selection rules)** Consider the following two forms of computational rules on record field selection. Prove that (1) and (2) are equal.

\[
\begin{align*}
\Gamma & \vdash r : (R, l : A) \quad \Gamma \vdash [r].l' : B \quad l \neq l' \\
\Gamma & \vdash r.l' = [r].l' : B
\end{align*}
\]

(1)

\[
\begin{align*}
\Gamma & \vdash \langle r, l = a : A \rangle : \langle R, l : A \rangle \quad \Gamma \vdash r.l' : B \quad l \neq l' \\
\Gamma & \vdash \langle r, l = a : A \rangle.l' = r.l' : B
\end{align*}
\]

(2)

**Proof.** ($\Rightarrow$) Obvious. Apply field selection of $l'$ to both records $\langle r, l = a : A \rangle$ and $r$.

($\Leftarrow$) This can be derived by using the fact that $r \equiv ([r], l = r.l : A) : \langle R, l : A \rangle$ (noted as $(\eta_r)$) up to the weakly extensional equality.

NB.: Because the rule (2) is a reduction rule, it can be used to define reduction $\triangleright : \langle r, l = a : A \rangle.l' \triangleright r.l' \quad (l \neq l')$

**Theorem 1.2. (Well-typeness of field selection to a random record)** Can we prove:

$R : RType[[l]], \quad r : R \vdash r.l : B$ for some $B$?

**Theorem 1.3. (Conj.)** If $\Gamma \vdash R : RType[L]$, then either $R \in FV[\Gamma]$ or $R \equiv \langle R', l : A \rangle$ for $l \in L$ up to syntactic identity.

**Proof.**

**REFERENCES**


