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Software Engineering

http://proglang.informatik.uni-freiburg.de/teaching/swt/2009/

Exercise Sheet 3

Exercise 1: Properties of linksets (6 Points)

1. Which of the following linksets are well-formed, which are intra-checked, and which are inter-checked? Justify your answer.
   - $L_1 \equiv \emptyset \mid (x \approx \emptyset \vdash 1 : \texttt{int}), (b \approx y : \texttt{int} \vdash y > 0 : \texttt{bool})$
   - $L_2 \equiv \emptyset \mid (x \approx \emptyset \vdash 1 : \texttt{int}), (b \approx \emptyset \vdash y > 0 : \texttt{bool})$
   - $L_3 \equiv y : \texttt{bool} \mid (x \approx \emptyset \vdash 1 : \texttt{int}), (b \approx x : \texttt{int} \vdash y > 0 : \texttt{bool})$
2. Define a linkset L_4 that is well-formed, intra-checked, but not inter-checked.

Exercise 2: Merging linksets (2 Points)

Given the two linksets

$$L_1 \equiv x : \texttt{int} \mid (b \approx y : \texttt{int} \vdash x > y : \texttt{bool}), (y \approx \emptyset \vdash 5 : \texttt{int})$$
$$L_2 \equiv b : \texttt{bool}, z : \texttt{int} \mid (x \approx \emptyset \vdash \texttt{if}\ b\ \texttt{then}\ z\ \texttt{else}\ 0 : \texttt{int})$$

Merge L_1 and L_2; that is, compute $L_1 + L_2$.

Exercise 3: Linking (6 Points)

1. Link the following linkset L; that is, execute link steps $\rightsquigarrow$ as long as possible.

$$\begin{aligned} L \equiv z : \texttt{int} \mid\ & (b \approx y : \texttt{bool}, x : \texttt{int} \vdash \texttt{if}\ y\ \texttt{then}\ x\ \texttt{else}\ z : \texttt{int}) \\ & (y \approx x : \texttt{int} \vdash x > 5 : \texttt{bool}) \\ & (x \approx \emptyset \vdash 6 : \texttt{int}) \end{aligned}$$

2. Show that the link step relation $\rightsquigarrow$ does not preserve the intra-checked property. That is, find a linkset L with *intra-checked*(L), $L \rightsquigarrow L'$, but not *intra-checked*(L').

Exercise 4: Easy Modules (6 Points)

Consider the following Module, given in simple notation:

```
Module M
{
  import { x: int}
  export { y: int, z: bool}

  y: int = x + 23;
  z: bool = y < 42;
}
```

1. Give a binding judgement for the module `M`.
2. Compile the binding judgement into a linkset.