

## Edges in scope graph

$$\frac{S_1 \xrightarrow{l} S_2}{\mathbb{I} \vdash \mathbf{E}(l, S_2) : S_1 \longrightarrow S_2} \quad (E)$$

$$\frac{S_1 \xrightarrow{l} y_i^{\mathbf{R}} \quad y_i^{\mathbf{R}} \notin \mathbb{I} \quad \mathbb{I} \vdash p : y_i^{\mathbf{R}} \mapsto y_j^{\mathbf{D}} \quad y_j^{\mathbf{D}} \xrightarrow{} S_2}{\mathbb{I} \vdash \mathbf{N}(l, y_i^{\mathbf{R}}, S_2) : S_1 \longrightarrow S_2} \quad (N)$$

## Transitive closure

$$\overline{\mathbb{I}, \mathbb{S} \vdash [] : A \twoheadrightarrow A} \quad (I)$$

$$\frac{B \notin \mathbb{S} \quad \mathbb{I} \vdash s : A \longrightarrow B \quad \mathbb{I}, \{B\} \cup \mathbb{S} \vdash p : B \twoheadrightarrow C}{\mathbb{I}, \mathbb{S} \vdash s \cdot p : A \twoheadrightarrow C} \quad (T)$$

## Reachable declarations

$$\frac{\mathbb{I}, \{S\} \vdash p : S \twoheadrightarrow S' \quad \text{WF}(p) \quad S' \xrightarrow{} x_i^{\mathbf{D}}}{\mathbb{I} \vdash p \cdot \mathbf{D}(x_i^{\mathbf{D}}) : S \twoheadrightarrow x_i^{\mathbf{D}}} \quad (R)$$

## Visible declarations

$$\frac{\mathbb{I} \vdash p : S \twoheadrightarrow x_i^{\mathbf{D}} \quad \forall j, p' (\mathbb{I} \vdash p' : S \twoheadrightarrow x_j^{\mathbf{D}} \Rightarrow \neg(p' < p))}{\mathbb{I} \vdash p : S \mapsto x_i^{\mathbf{D}}} \quad (V)$$

## Reference resolution

$$\frac{x_i^{\mathbf{R}} \xrightarrow{} S \quad \{x_i^{\mathbf{R}}\} \cup \mathbb{I} \vdash p : S \mapsto x_j^{\mathbf{D}}}{\mathbb{I} \vdash p : x_i^{\mathbf{R}} \mapsto x_j^{\mathbf{D}}} \quad (X)$$