

# Hazel Assistant Calculus WIP

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## Abstract

The hazelnut assistant calculus provides an extensible framework for type- and value-directed completion and refactoring support in a structured editing context.

**CCS Concepts:** • Software and its engineering → General programming languages.

**Keywords:** live programming, code completion, refactoring, GUIs

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wazzzzzaaaaaaaaaaaaaaaaaaaaaa

## 1 Assistant Calculus

blah blah blah types

TODOs:

- get cursor icons from hazelnut paper
- get right arrow for bidi
- basic zipper cases
- remaining zipper cases
- var + varapp
- proj
- base case for hole
- base cases for non-empty holes, incld:
- delete + act for general hexps
- wrap for non-empty-holes

## References

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$\boxed{\Gamma \vdash \hat{e} \Rightarrow \tau \curvearrowright A}$   $e$  synthesizes  $\tau$ , suggesting actions  $A$

$\boxed{\Gamma \vdash \hat{e} \Leftarrow \tau \curvearrowright A}$   $e$  analyzes against  $\tau$ , suggesting actions  $A$

$$\frac{\Gamma \vdash e \Leftarrow \tau_2 \quad \Gamma \vdash \hat{e} \Leftarrow \tau_1 \curvearrowright A}{\Gamma \vdash (\hat{e}, e) \Rightarrow \tau_1 \times \tau_2 \curvearrowright A}$$

$$\frac{\Gamma \vdash \hat{e} \Rightarrow \tau_1 \curvearrowright A \quad \tau_1 \blacktriangleright \tau_2 \rightarrow \tau \quad \Gamma \vdash e \Leftarrow \tau_2}{\Gamma \vdash \hat{e}(e) \Rightarrow \tau \curvearrowright A}$$

$$\frac{\tau \blacktriangleright \tau_1 \rightarrow \tau_2 \quad \Gamma \vdash \hat{e} \Leftarrow \tau \curvearrowright A}{\Gamma \vdash \lambda x. \hat{e} \Leftarrow \tau \curvearrowright A}$$

**Figure 1.** Suggestion Zipper Cases

Suggest Hole Analytic

$$\frac{\text{Intros}(\tau) \curvearrowright A_{\text{intros}} \quad \text{Elims}(\Gamma, \tau) \curvearrowright A_{\text{elims}}}{\Gamma \vdash \langle \rangle \Leftarrow \tau \curvearrowright A_{\text{intros}} \cup A_{\text{elims}}}$$

**Figure 2.** Suggestion base cases

$$\frac{\text{IntrosTriv}}{\text{Intros}(1) \curvearrowright \{\text{construct triv}\}}$$

$$\frac{\text{IntrosProd}}{\text{Intros}(\tau_1 \times \tau_2) \curvearrowright \{\text{construct pair}\}}$$

$$\frac{\text{IntrosArrow}}{\text{Intros}(\tau_1 \rightarrow \tau_2) \curvearrowright \{\text{construct lam } x\}}$$

$$\frac{\text{IntrosSum}}{\text{Intros}(\tau_1 + \tau_2) \curvearrowright \{\text{construct inj L, construct inj R}\}}$$

**Figure 3.** Introduction suggestions

$$\begin{array}{c}
\text{Suggest Elims} \\
\frac{\text{ElimCase} \rightsquigarrow A_{case} \quad \text{Var}(\Gamma, \tau) \rightsquigarrow A_{var} \quad \text{VarApp}(\Gamma, \tau) \rightsquigarrow A_{varapp} \quad \text{Proj}(\Gamma, \tau) \rightsquigarrow A_{proj}}{\text{Elims}(\Gamma, \tau) \rightsquigarrow A_{case} \cup A_{var} \cup A_{varapp} \cup A_{proj}} \\
\\
\frac{\text{ElimCase}}{\text{ElimCase} \rightsquigarrow \{\text{construct case } x \ y\}} \\
\\
\begin{array}{cc}
\text{Var} & \text{VarApp} \\
\frac{TODO}{\text{Var}(\Gamma, \tau) \rightsquigarrow TODO} & \frac{TODO}{\text{VarApp}(\Gamma, \tau) \rightsquigarrow TODO} \\
\\
\text{Proj} & \\
\frac{TODO}{\text{Proj}(\Gamma, \tau) \rightsquigarrow TODO}
\end{array}
\end{array}$$

**Figure 4.** Elimination suggestions