Mode Decoration

What does a mode derivation mean for a raw term?

- *Mode derivations* are just bidirectional typing derivations *with types erased*.

- A raw term t has a mode derivation if and only if it has enough annotations.

- *A term that has no mode derivation cannot be bidirectionally typed.*

- *Mode decoration*: it is decidable to check whether a term has a mode derivation.

$$\frac{x \in V}{V \vdash_{\Sigma,\Omega} x^{\Rightarrow}}\ \textsc{Var}^{\Rightarrow} \qquad \frac{\cdot \vdash_{\Sigma} A \qquad V \vdash_{\Sigma,\Omega} t^{\Leftarrow}}{V \vdash_{\Sigma,\Omega} (t \mathbin{⨾} A)^{\Rightarrow}}\ \textsc{Anno}^{\Rightarrow} \qquad \frac{V \vdash_{\Sigma,\Omega} t^{\Rightarrow}}{V \vdash_{\Sigma,\Omega} t^{\Leftarrow}}\ \textsc{Sub}^{\Leftarrow}$$

$$\frac{V, \vec{x}_1 \vdash_{\Sigma,\Omega} {t_1}^{d_1} \qquad \cdots \qquad V, \vec{x}_n \vdash_{\Sigma,\Omega} {t_n}^{d_n}}{V \vdash_{\Sigma,\Omega} \mathsf{op}_o(\vec{x}_1.\, t_1; \ldots; \vec{x}_n.\, t_n)^{d}}\ \textsc{Op}$$

$$\text{for } o\colon \Xi \rhd [\Delta_1]A_1^{d_1}, \ldots, [\Delta_n]A_n^{d_n} \to A_0^{d}$$

$$\Gamma \vdash_{\Sigma,\Omega} t :^{d} A$$

$$\Gamma \vdash_{\Sigma,\Omega} t : A$$

Completeness

Soundness &

$$|\Gamma| \vdash_{\Sigma,\Omega} t^{d}$$

M

0

d

e

D

e

C

0

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t

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- A raw term

has a mode derivation if and only if it has enough annotations.

t

$$|\Gamma| \vdash_{\Sigma,\Omega} t$$

M

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