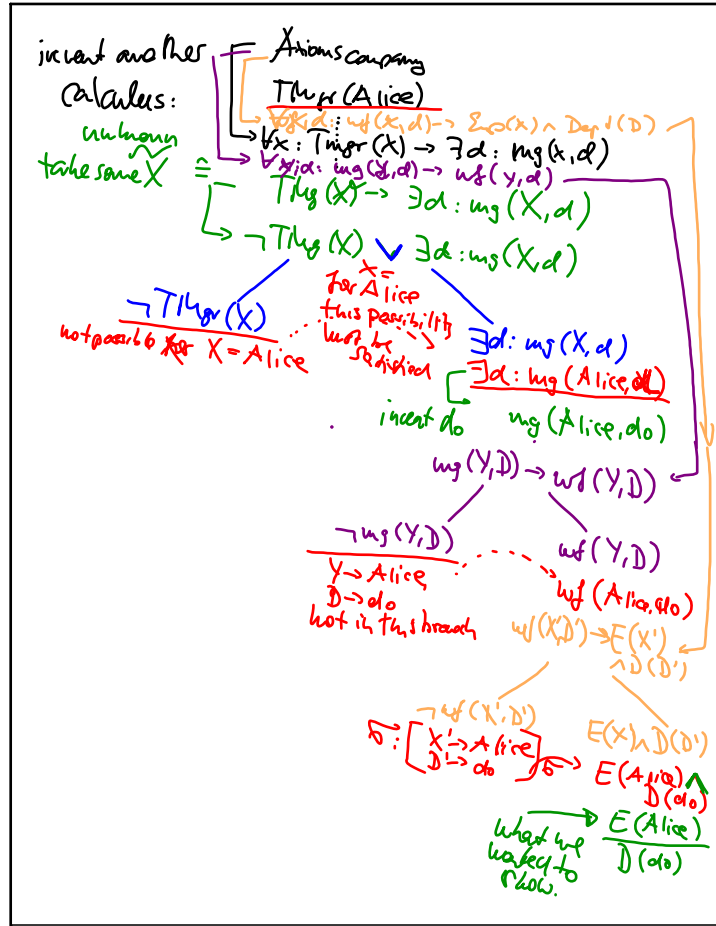$\text{Axioms}_{comp} \wedge Mgr(Alice) \models Exp(Alice)$

$$MP: \quad \frac{\forall x \; Mgr(X) \rightarrow Exp(x) \qquad Mgr(Alice)}{Exp(Alice)}$$

Other proof than before . . . .

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$\text{Axioms}_{comp} \wedge TMgr(Alice) \models \boxed{Exp(Alice)}$

Axiom: $\boxed{\forall x: TMgr(X) \rightarrow \exists d: mg(X,d)}$

$$MP: \quad \frac{\forall x: TMgr(X) \rightarrow \exists d: mg(X,d) \qquad TMgr(Alice)}{\underline{\exists d: mg(Alice, d)}}$$

$\Rightarrow$ MP proof not directly applicable

invent an Inference Rule

$$\frac{\exists X: P(X)}{P(X_0)} \quad \text{invent an } X_0$$

$$\text{Continue proof:} \quad \frac{\exists d: mg(Alice, d)}{mg(Alice, d_0)}$$

Continue as before with d_0 instead of ride.

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invent another calculus:

Axioms company

$TMgr(Alice)$

$\forall x, d: wf(x,d) \to E_p(x) \wedge D_{apf}(D)$

$\forall x: TMgr(x) \to \exists d: mg(x,d)$

$\forall y, d: mg(y,d) \to wf(y,d)$

$TMg(X) \to \exists d: mg(X,d)$

$\neg TMg(X) \vee \exists d: mg(X,d)$

$\neg TMgr(X)$

not possible for $X = Alice$

$X=$ for Alice this possibility must be satisfied

$\exists d: mg(X,d)$

$\exists d: mg(Alice, d)$

invent d_0 $mg(Alice, d_0)$

$mg(Y,D) \to wf(Y,D)$

$\neg mg(Y,D)$ $wf(Y,D)$

$Y \to Alice$ $wf(Alice, d_0)$
$D \to d_0$
not in this branch $wf(X',D') \to E(X') \wedge D(D')$

$\neg wf(X',D')$ $E(X) \wedge D(D')$

$\sigma: \begin{bmatrix} X' \to Alice \\ D' \to d_0 \end{bmatrix} \sigma \Rightarrow$ $E(Alice) \wedge D(d_0)$

what we wanted to know. $\dfrac{E(Alice)}{D(d_0)}$

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Prenex Form example:

$\forall x \; TMgr(x) \to \exists d: mg(x,d)$

$\to \forall x \exists d: TMgr(x) \to mg(x,d)$

epsilon example:

Choose f_{dept} and f_{mg} such that for "any" φ: $\forall x: wf(x, f_{dept}(x))$ holds,

and $\forall x: mg(f_{mgr}(x), x)$ holds.

recall prenex form:

e.g. $\forall x \; \exists y \; (\forall z \; \forall d \; \exists b : G(x,y,z,d,b))$

skolemize it

choose y as a function

$y = f_1(x)$

$\forall x \; \forall z \; \forall d \; \exists b : G(x, f_1(x), z, d, b)$

b is a function of $f_2(x,z,d)$ $\forall x \forall z \forall d (G(x,f_1(x),z,d, f_2(x,z,d))$

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$$\forall x \exists y \, \forall z \forall \alpha \, \exists b \quad G_1(x,y) \wedge G_2(z, \alpha, b)$$