

$$\begin{array}{l} M \\ M \\ M \\ M = \\ (S, \cdot, \mathcal{P}) \\ S \\ \subseteq \\ S^\times \\ S \in \\ S' \in \\ S^{s'} \\ \mathcal{P} \\ \mathcal{P} \in \\ \mathcal{P} \\ P \in \\ S^n \in \\ S \in \\ S \\ S = \\ \{s' \mid \\ ss'\} \\ s_0, \dots, s_n \\ s_0, s_1, \dots \\ s_i \\ s_{i+1} \in \\ s_i \\ T \\ T \\ S \\ M \\ (M) \\ M = \\ (S, \cdot, \mathcal{P})(M) \end{array}$$

$$\phi := \left\{ \begin{array}{l} \top \mid \bot \mid P(t_1, ..., t_n) \mid \neg P(t_1, ..., t_n) \mid \phi \wedge \phi \mid \phi \vee \phi \mid \\ AX_x(\phi)(t) \mid EX_x(\phi)(t) \mid AF_x(\phi)(t) \mid EG_x(\phi)(t) \mid \\ AR_{x,y}(\phi_1, \phi_2)(t) \mid EU_{x,y}(\phi_1, \phi_2)(t) \end{array} \right.$$

$$\begin{array}{l} x \\ y \\ S \\ t_1, \ldots, t_n \\ S \\ \mathbf{?} \\ AXEX \\ AF \\ EG \\ \phi \\ x \\ AR \\ EU \\ \phi_1 \\ \phi_2 \\ y \\ (t/x)\phi \\ \phi \\ x \\ t \\ \phi_1\phi_2 \equiv \\ \neg\phi_1\vee \\ \phi_2 \\ EF_x(\phi)(t) \equiv \\ EU_{z,x}(\top,\phi)(t) \\ ER_{x,y}(\phi_1,\phi_2)(t) \equiv \\ EU_{y,z}(\phi_2,((z/x)\phi_1\wedge \\ (z/y)\phi_2))(t)\vee \\ EG_y(\phi_2)(t) \\ z \\ \phi_1 \\ \phi_2 \\ AG_x(\phi)(t) \equiv \\ \neg(EF_x(\neg\phi)(t)) \\ AU_{x,y}(\phi_1,\phi_2)(t) \equiv \\ \neg(ER_{x,y}(\neg\phi_1,\neg\phi_2)(t)) \\ FEF \\ AU \\ EU \\ ARERAG \\ EG \\ MM \\ M\models \\ P(s_1,...,s_n)\langle s_1,...,s_n\rangle\in \\ PPMn \\ M\models \\ \neg P(s_1,...,s_n)\langle s_1,...,s_n\rangle\notin \\ PPMn \\ M\models \\ \top \\ M\models \\ \bot \\ \overline{M}\models \end{array}$$

$$EG_x(\phi_1)(s)M$$

$$s_0, s_1, \ldots$$

$$\overline{s}$$

$$\iota$$

$$M\models$$

$$(s_i/x)\phi_1$$

$$M\models$$

$$AR_{x,y}(\phi_1,\phi_2)(s)$$

$$\overline{TT}$$

$$\overline{s}$$

$$s'\in$$

$$\overline{T}$$

$$\mathcal{M}\models$$

$$(s'/y)\phi_2$$

$$s''\in$$

$$\overline{T}$$

$$\mathcal{M}\models$$

$$(s''/x)\phi_1$$

$$M\models$$

$$EU_{x,y}(\phi_1,\phi_2)(s)$$

$$s_0, s_1, \ldots$$

$$\overline{s}$$

$$j\mathcal{M}\models$$

$$(s_j/y)\phi_2$$

$$\iota<$$

$$j$$

$$\mathcal{M}\models$$

$$(s_i/x)\phi_1$$

$$?$$

$$?$$

$$?$$

$$?$$

$$s'$$

$$s'$$

$$s'$$

$$\sigma$$

$$AG_x(AF_y(D_\sigma(x,y))(x))(s_0)$$

$$s_0$$

$$D_\sigma(x,y)$$

$$x$$

$$\sigma$$

$$??$$

$$(M)$$

$$\overline{M}$$

$$AF_x(P(x))(s)$$

$$\overline{M}$$

$$\overline{TT}$$

$$\overline{T}$$

$$\overline{P}$$

$$\overline{T}$$

$$AF_x(P(x))(s)$$

$$(M)$$

$$AF_x(AF_y(P(x,y))(x))(s)$$

$$\overline{M}$$

$$\overline{T}$$

$$\overline{T}$$

$$aAF_y(P(a,y))(a)$$

$$AF_y(P(a,y))(a)$$

$$\overline{T'}$$

$$\overline{T'}$$

$$\overline{a'}$$

$$\overline{T'}$$

$$\overline{b}$$

$$P(a,b)$$

$$[\mathbf{AFR}_1]\vdash AF_x(\phi)(s)\vdash (s/x)\phi$$

$$[\mathbf{AFR}_2_{\{s_1,\ldots s_n\}=\mathbf{Next}(s)}]\vdash AF_x(\phi)(s)\vdash AF_x(\phi)(s_1)\ldots\vdash AF_x(\phi)(s_n)$$

$$\overline{a}$$

$$\overline{b}$$

$$\overline{c}$$

$$\overline{P}=$$

$$\{b,c\}$$

$$AF_x(P(x))(a)$$

$$[\mathbf{AFR}_2]\vdash AF_x(P(x))(a)[\mathbf{AFR}_1]\vdash AF_x(P(x))(b)[\mathbf{R}]\vdash P(b)[\mathbf{AFR}_1]\vdash AF_x(P(x))(c)[\mathbf{R}]\vdash P(c)$$

$$\mathbf{AFR}_1$$

$$\mathbf{AFR}_2$$

$$[\mathbf{R}_{\langle s_1,\ldots,s_n\rangle\in P}]\vdash P(s_1,\ldots,s_n)$$

$$??$$

$$Q=$$

$$\{(b,d),(c,d)\}$$

$$AF_x(AF_y(Q(x,y))(x))(a)$$

$$[\mathbf{AFR}_2]\vdash AF_x(AF_y(Q(x,y))(x))(a)[\mathbf{AFR}_1]\vdash AF_x(AF_y(Q(x,y))(x))(b)[\mathbf{AFR}_2]\vdash AF_y(Q(b,y))(b)[\mathbf{AFR}_1]\vdash AF_y(Q(b,y))(d)[$$

$$\forall^{\mathbf{R}}_P$$