

THEORY *Traces***IMPORT THEORY** *EvtBStruc, Natural***TYPE PARAMETERS** *STATE, EVENT***OPERATORS****IsANextState** *predicate* ($m : \text{Machine}(\text{STATE}, \text{EVENT}), s : \text{STATE}, sp : \text{STATE}$)**direct definition** $\exists e \cdot e \in \text{Progress}(m) \wedge s \in \text{Grd}(m)[\{e\}] \wedge s \mapsto sp \in \text{BAP}(m)[\{e\}]$ **IsATrace** *predicate* ($m : \text{Machine}(\text{STATE}, \text{EVENT}), tr : \mathbb{P}(i\text{NAT} \times \text{STATE})$)**direct definition** $($
 $tr \in i\text{NAT} \rightarrow \text{STATE} \vee$
 $(\exists n \cdot n \in i\text{NAT} \wedge$
 $tr \in \{i \mid \text{mk_int}(i) \in 0..\text{mk_int}(n)\} \rightarrow \text{STATE} \wedge$
 $tr(n) \notin \text{Grd}(m)[\text{Progress}(m)])$
 $) \wedge$ $tr(iZero) \in \text{AP}(m) \wedge$ $(\forall i, j \cdot i \in \text{dom}(tr) \wedge j \in \text{dom}(tr) \wedge j = i\text{Succ}(i) \Rightarrow \text{IsANextState}(m, tr(i), tr(j)))$ **THEOREMS*****tr is a partial fun:*** $\forall m, tr \cdot m \in \text{Machine}(\text{STATE}, \text{EVENT}) \wedge \text{IsATrace}(m, tr) \Rightarrow tr \in i\text{NAT} \rightarrow \text{STATE}$ ***if succ(n) in tr then n in tr:*** $\forall i, j, tr, m \cdot m \in \text{Machine}(\text{STATE}, \text{EVENT}) \wedge \text{IsATrace}(m, tr) \wedge$ $j = i\text{Succ}(i) \wedge j \in \text{dom}(tr)$ $\Rightarrow i \in \text{dom}(tr)$ **PROOF RULES**

type_rules:

Metavariables $m : \text{Machine}(\text{STATE}, \text{EVENT})$ $tr : \mathbb{P}(i\text{NAT} \times \text{STATE})$ $i : i\text{NAT}$ $j : i\text{NAT}$ **Inference Rules** $\text{inf1} : \text{IsATrace}(m, tr) \vdash tr \in i\text{NAT} \rightarrow \text{STATE}$ $\text{inf2} : \text{IsATrace}(m, tr), j \in \text{dom}(tr), j = i\text{Succ}(i) \vdash i \in \text{dom}(tr)$ **END**