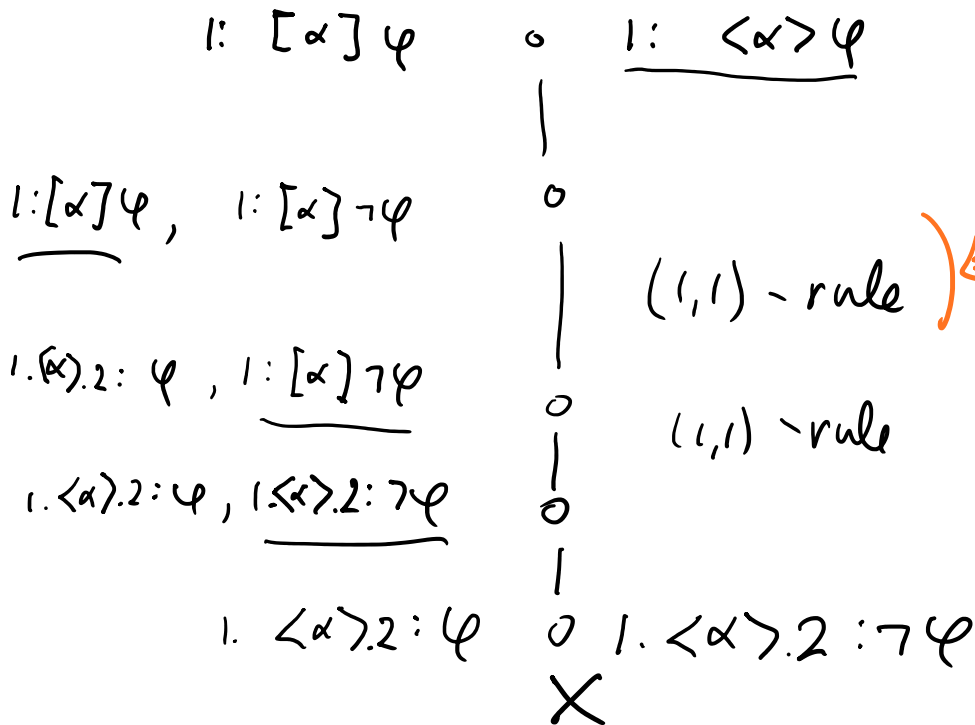


$$\neg \langle \alpha \rangle \neg \varphi =: [\alpha] \varphi$$

$\langle \alpha \rangle \varphi$: exists a way to execute α , such that φ is true

$[\alpha] \varphi$: for all executions of α , φ is true.

Can we derive $[\alpha]\varphi \models \langle \alpha \rangle \varphi$?



$(1,1)$ -rule

$(1,1)$ -rule

WRONG!
The preamble $1.\langle \alpha \rangle.2$
does not exist yet!

$$\begin{array}{lcl}
 1: \underline{\langle \alpha \rangle \psi}, 1: [\alpha] \psi & \circ & 1: \langle \alpha \rangle \psi \quad \text{rule (1,2)} \\
 \hline
 1. \langle \alpha \rangle. 2: \psi, 1: [\alpha] \psi & \circ & 1: \langle \alpha \rangle \psi \quad \text{rule (1,1)} \\
 \hline
 1. \langle \alpha \rangle. 2: \psi, 1. \langle \alpha \rangle. 2: \psi & \circ & 1: \underline{\langle \alpha \rangle \psi} \quad \text{rule (1,4)} \\
 \hline
 1. \langle \alpha \rangle. 2: \psi, 1. \langle \alpha \rangle. 2: \psi, 1: [\alpha] \neg \psi & \circ & \text{rule (1,1)} \\
 \hline
 \quad \text{"} \quad , \quad \text{"} \quad , 1. \langle \alpha \rangle. 2: \neg \psi & \circ & \\
 \hline
 1. \langle \alpha \rangle. 2: \psi, 1. \underline{\langle \alpha \rangle. 2: \psi} & \circ & 1. \underline{\langle \alpha \rangle. 2: \psi} \\
 & & \times
 \end{array}$$

$$\langle \alpha \rangle (p \rightarrow q) \models \langle \alpha \rangle q \vee \langle \alpha \rangle \neg p$$

$$1: \langle \alpha \rangle (p \rightarrow q) \circ \quad 1: \langle \alpha \rangle q \vee \langle \alpha \rangle \neg p$$

$$\frac{1: \langle \alpha \rangle (p \rightarrow q) \circ \quad 1: \langle \alpha \rangle q, \quad 1: \langle \alpha \rangle \neg p}{\text{rule 1,2}}$$

$$1. \langle \alpha \rangle.2: p \rightarrow q \circ \quad \frac{}{} \quad \frac{}{} \quad \text{rule 1,3} \quad \text{Twice}$$

$$1. \langle \alpha \rangle.2: p \rightarrow q, \quad 1: [\alpha] \neg q, \quad 1: [\alpha] \neg p \circ \quad \text{rule (1,1)} \quad \text{Twice}$$

$$1. \langle \alpha \rangle.2: p \rightarrow q, \quad 1. \langle \alpha \rangle.2: \neg q, \quad 1. \langle \alpha \rangle.2: \neg p \circ$$

$$\frac{}{} \quad \times \quad \frac{}{} \quad \circ \quad 1. \langle \alpha \rangle.2: q$$

$$\frac{}{} \quad \times \quad \times \quad \circ \quad \text{''} \quad , \quad 1. \langle \alpha \rangle.2: \neg p$$

$$1. \langle \alpha \rangle.2: p \rightarrow q, \quad 1. \langle \alpha \rangle.2: p \circ \quad 1. \langle \alpha \rangle.2: q$$

$$1. \langle \alpha \rangle.2: p, \quad 1. \langle \alpha \rangle.2: q \circ \quad 1. \langle \alpha \rangle.2: q \quad | \quad 1. \langle \alpha \rangle.2: p \circ \quad 1. \langle \alpha \rangle.2: p, \quad 1. \langle \alpha \rangle.2: q$$

X

Tableau closed, inference valid.

Dangerous, not recommended