



Technische  
Universität  
Braunschweig

Institut für Programmierung  
und Reaktive Systeme

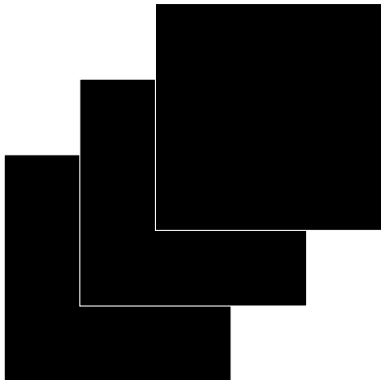


# An I/O Conformance Testing Theory for Software Product Lines based on Modal Interface Automata

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FOSD Meeting, May 14, 2015

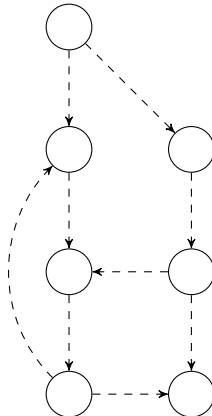
# Motivation

implementation variants



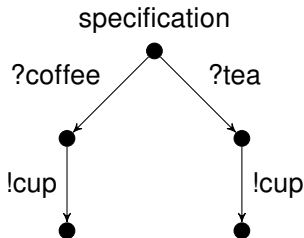
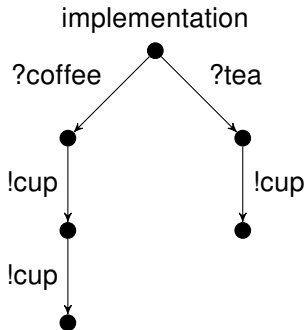
specification

Inputs  
←  
→  
Outputs



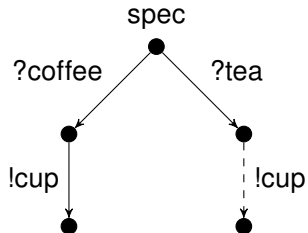
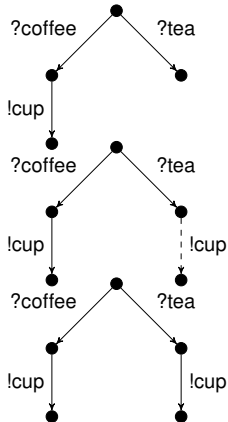
# Input/Output Conformance (ioco)

- Specifies allowed output behavior
- No mandatory behavior



# Modal Interface Automata (MIA)

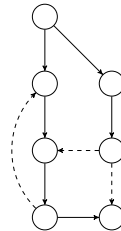
- Distinguish between optional and mandatory behavior



# Modal Input/Output Conformance

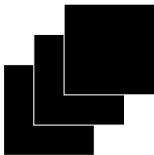


**mioco**<sub>MIA</sub>

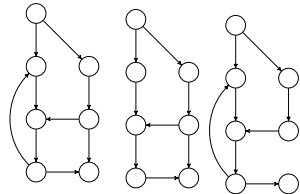


$\sqsubseteq_{\text{MIA}}$

$\sqsubseteq_{\text{MIA}}$

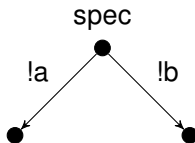
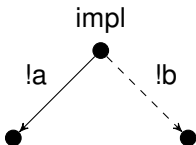


**ioco**



# Modal Input/Output Conformance

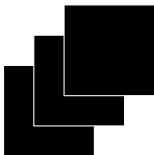
- May-transitions are allowed
- Must-transitions are required



# Soundness



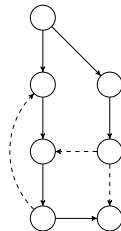
$\sqsubseteq_{\text{var}}$



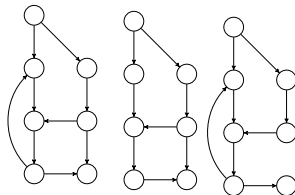
**mioco**<sub>MIA</sub>

$\Downarrow$   $\Uparrow$

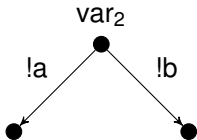
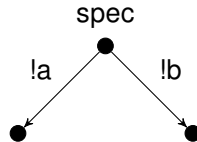
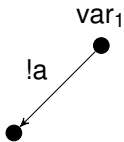
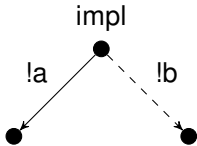
**ioco**



$\sqsubseteq_{\text{var}}$



# Soundness

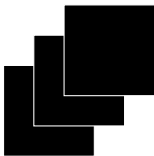




# Completeness



$\sqsubseteq_{\text{var}}$

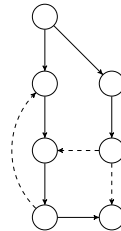


**mioco**<sub>MIA</sub>

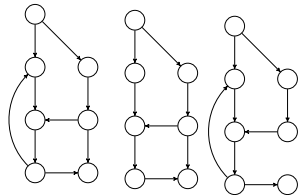
$\sqsubseteq_{\text{MIA}}$

$\uparrow$

**ioco**



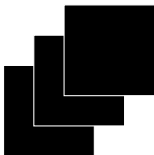
$\sqsubseteq_{\text{var}}$



# Completeness



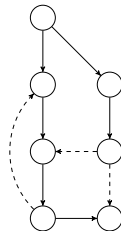
$\sqsubseteq_{\text{var}}$



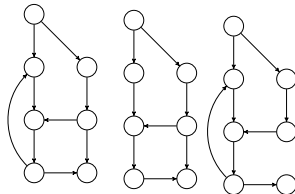
~~mioco~~<sub>MIA</sub>

$\uparrow$

~~ioco~~



$\sqsubseteq_{\text{var}}$



# Future Work

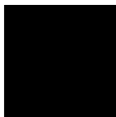
- Reintroduce  $\tau$ -steps (internal behavior)

- Characteristics of composition:

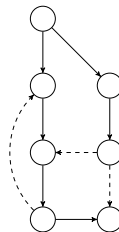
$$\frac{i_1 \mathbf{mioco}_{MIA} S_1 \quad i_2 \mathbf{mioco}_{MIA} S_2}{i_1 \otimes i_2 \mathbf{mioco}_{MIA} S_1 \otimes S_2}$$

- Tool for mioco-testing
- mioco-testing against blackboxes
- Approaches for restricting variants

# Summary

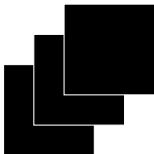


**mioco**<sub>MIA</sub>



$\sqsubseteq_{\text{MIA}}$

$\sqsubseteq_{\text{MIA}}$



**ioco**

