A unifying framework for deciding synchronizability

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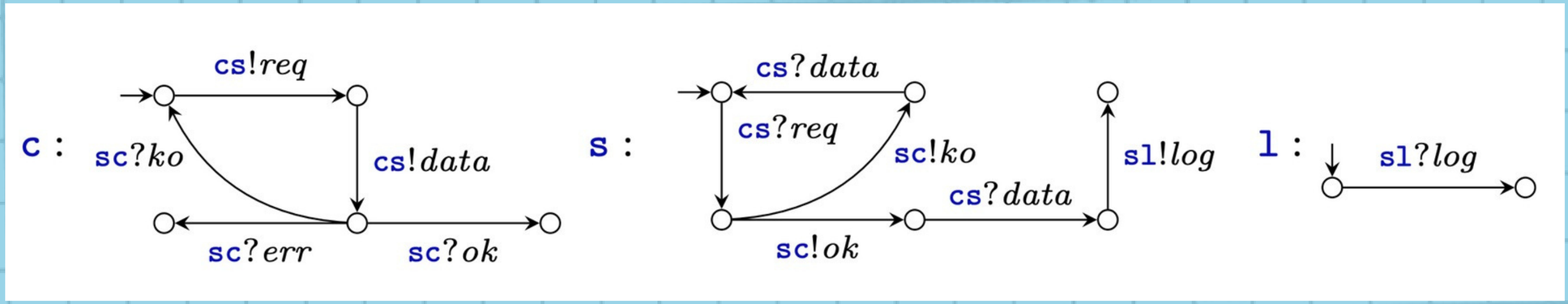
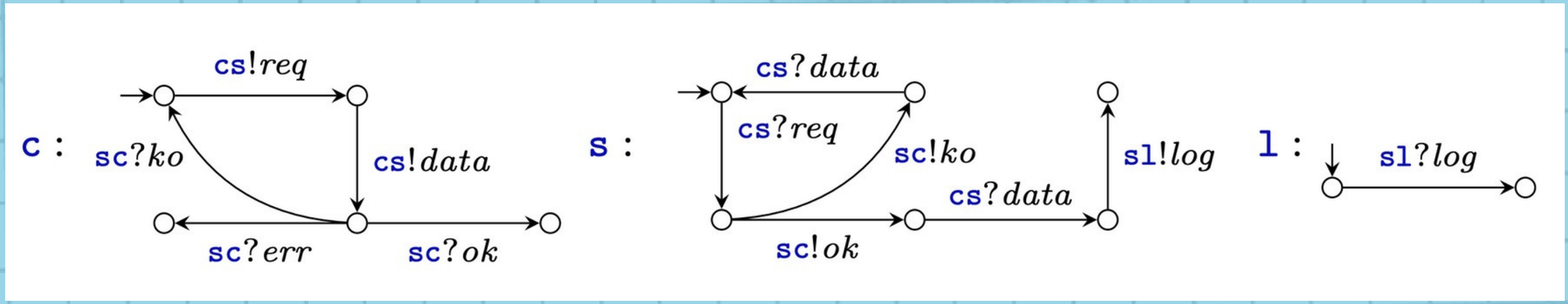
FIFO SYSTEMS



Client-Server-Logger example

From Lange and Yoshida, CAV'19

FIFO SYSTEMS



Client-Server-Logger example

From Lange and Yoshida, CAV'19

TESTING IF THERE IS A BOUND ON THE SIZE OF A QUEUE IS UNDECIDABLE !

Brand and Zafiropulo, JACM'83

SYNCHRONIZABILITY

~ if every execution can be rescheduled so that it meets certain criteria

a channel bound

DEFINITIONS

all accepting executions re-ordered
to a k-bounded execution.

Lohrey and Muscholl, Inf. Comp. '04

DEFINITIONS

all accepting executions re-ordered to a k-bounded execution.

send projection equivalent to that of rendezvous.

Basu and Bultan, WWW'11

DEFINITIONS

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send projection equivalent to that of rendezvous.

if every MSC admits a linearization that can be divided into "blocks"

Bouajjani et al., CAV'18

DEFINITIONS

Inclusion into these classes?

if every MSC admits a linearization
that can be divided into "blocks"

THE FRAMEWORK

CONDITION 1

The class of MSCs are MSO-definable.

CONDITION 2

The class of MSCs have bounded special tree-width.

THE FRAMEWORK

CONDITION 1

Decidable inclusion!

…es have bounded special tree-width.

SUMMARY

Class of MSCs	Peer-to-Peer	Mailbox
Weakly synchronous	Undecidable	EXPTIME
Weakly k-synchronous	Decidable	
Strongly k-synchronous	—	Decidable
Existentially k-p2p-bounded	Decidable	
Existentially k-mailbox-bounded	—	Decidable