

# Priority Downward Closures

Ashwani Anand<sup>(A)</sup>      Georg Zetsche<sup>(B)</sup>

<sup>(A)</sup>MPI-SWS, Kaiserslautern

ashwani@mpi-sws.org

<sup>(B)</sup>MPI-SWS, Kaiserslautern

georg@mpi-sws.org

When a system sends messages through a lossy channel, then the language encoding all sequences of messages can be abstracted by its downward closure, i.e. the set of all (not necessarily contiguous) subwords. This is useful because even if the system has infinitely many states, its downward closure is a regular language. However, if the channel has congestion control based on priorities assigned to the messages, then we need a finer abstraction: The downward closure with respect to the priority embedding. As for subword-based downward closures, one can also show that these priority downward closures are always regular.

While computing finite automata for the subword-based downward closure is well understood, nothing is known in the case of priorities. In this talk, we discuss the priority order and provide algorithms to compute priority downward closures for regular languages, one-counter languages, and context-free languages.

This work has been accepted for publication at CONCUR'23.