# Compositional Security for Interactive Systems

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**Abstract**

To achieve end-to-end security in a system built from parts, it is important to ensure that the composition of secure components is itself secure. This ongoing work investigates the compositionality of three popular conditions of possibilistic noninterference. The first condition, progress-insensitive noninterference (PINI), is the security property enforced by practical tools like JSFlow, Paragon, LIO, Jif, FlowCaml, and SPARK Examiner. We show that this condition is not preserved under parallel composition: composing a PINI system with another PINI system can yield an insecure system. We explore constraints that allow recovering compositionality for PINI. Further, we develop a theory of compositional reasoning and enforcement for the other two conditions (and their combinations with PINI): progress-sensitive noninterference (PSNI) and timing-sensitive noninterference (TSNI). Our work is performed within a general framework for nondeterministic interactive systems.