

Checking System Substitutability: An Application to Interactive Systems

Yamine Ait Ameer¹ and Abdelkrim Chebieb²

¹ IRIT/ENSEEIH
2 Rue Charles Camichel
31071 Toulouse Cedex 7
yamine@enseeiht.fr

² ESI
BP 68M OUED SMAR,
16270, EL HARRACH ALGER
k_chebieb@esi.dz

Abstract. The capability to substitute a given system by another one is a property useful for dealing with adaptation, maintenance, interoperability, reliability, etc. This talk proposes a formally based approach for checking the substitutability of a system by another one. It exploits the weak bi-simulation relationship.

In this talk a system is seen as a state-transition system. Two systems are observed to check if one may be substituted by the other preserving their behaviour. The weak bi-simulation relationship is revisited to handle systems that have different sets of labels by defining a relation on labels. A transformation of the systems to be compared is defined according to the relation defined on labels. Classical weak bi-simulation is then used to model check the substitutability property.

The approach is illustrated on the case of plastic interactive systems. We show how an interactive system supporting a set of interactive tasks can be replaced by another interactive system that performs the same tasks with different interaction devices. Relations on labels are borrowed from an ontology of interaction and of interaction devices. A case study will be used along the talk to illustrate how the proposed approach practically works.