Description Logics for *e*-Service Composition

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e-Services represent a new model in the utilization of the network, in which self-contained, modular applications can be described, published, located and dynamically invoked, in a programming language independent way.

Research on *e*-Services spans over many interesting issues, including description, discovery, composition. Our research focuses on automatic composition synthesis.[1] More specifically, we have devised techniques that, given *(i)* a client specification (*target e-Service*) expressed as a transition system and *(ii)* a set of available *e*-Services, also described as transition systems, synthesizes a composite *e*-Service that *(i)* uses only the available *e*-Services and *(ii)* interacts with the client "in accordance" with the input specification. First, we have considered the situation where the target *e*-Service is completely specified, and then we have extended the framework to deal with a target *e*-Service which is underspecified and presents non-determinism, in the form of don't care condition on the next transitions.

Our techniques are based on reducing the problem of checking the existence of a composition into concept satisfiability in a knowledge base expressed in a Description Logic (DL) –or equivalently satisfiability of a formula in a theory expressed in a variant of Propositional Dynamic Logic. With this reduction, reasoning tools for DLs can be directly used for composition synthesis, in particular by extracting a composite *e*-Service from a model of the DL knowledge base. We have developed (and currently continue to extend) an open source prototype system[2], that realizes our techniques, which is, at the best of our knowledge, the first effective tool for automatic composition synthesis of *e*-Services that export their behavior.

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[1]Relevant publications can be found at: `http://www.dis.uniroma1.it/~berardi/publications`.

[2]cfr. the PARIDE (Process-based frAmewoRk for composItion and orchestration of Dinamyc *E*-Services) Open Source Project: `http://sourceforge.net/projects/paride/`