ITACA: Integrated Toolbox for the Automatic Adaptation of Web Services

J. Cámara, J. A. Martín, G. Salaún, J. Cubo, M. Ouederni, C. Canal, E. Pimentel
{jcamara,jamartin,salaun,cubo,meriem,canal,ernesto}@lcc.uma.es
Dpto. de Lenguajes y Ciencias de la Computación, Universidad de Málaga, Málaga, Spain

1. Objectives
- Automatic Web Service orchestration and choreography through contract-based adaptation.
- Both signature and behavioral incompatibilities are solved avoiding erroneous executions derived from the order of the messages and parameters exchanged.

2. Adaptation Contracts
- Web Service interfaces are extracted from WSDL, whereas their protocols are obtained from (A)BPEL or WF code.
- Web Services are modeled as Symbolic Transition Systems (STS).
- Transitions and arguments are mapped across services using an adaptation contract which can either be designed in an interactive environment or automatically generated using similarity metrics.
- Contracts can be validated through interactive simulation and different kinds of trace checks on the choreography/orchestration.

3. Adaptor and Wrapper Generation
- Protocols and contracts are encoded in LOTOS where, using CADP and state-of-the-art algorithms, an adaptor protocol is generated.
- The adaptor protocol can be used as monolithic adaptor or be automatically distributed into service wrappers.
- Unfeasible interleavings are pruned in the protocol and the adaptor/wrappers are finally implemented in BPEL.

4. Final Remarks
- ITACA is a toolbox that fully supports generative adaptation from beginning to end.
- About 5,000 lines of Python and Java code.
- We plan to extend it with goal-oriented adaptation, system monitoring and self-reconfiguration.

5. A1. Services in (A)BPEL

6. A2. Services in Microsoft-WF

B. Abstract Model in STS

C1. Automatic Contract

C2. Interactive Contract

D. Adaptor Protocol

E. Adaptor Implementation