On the Dynamic Composition of Complex Systems - Lessons learned from Component-Oriented Software Engineering

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Abstract—In order to support dynamic and declarative business processes, several challenges have to be addressed: the artefacts used to compose processes must be equipped with rich meta data that can precisely describe their capabilities and requirements. Based on this meta data, contracts can be expressed defining the correctness of compositions. Once a set of correct compositions is known, a fitness function should be used to select the best one.

It appears that these are the same challenges that exist in component based software engineering (CBE). Modern component based systems must support dynamic reconfiguration (re-wiring) of component assemblies. The wiring is based on reasoning about declarative component meta data. In our presentation, we will discuss the state of the art of dynamic component composition. We show some experiments that demonstrate how existing, widely used dynamic component systems such as OSGi and its derivatives violate both the correctness and the fitness criteria. We then sketch an approach to solve this problem through the use of a simple yet expressive ontology based contract language.

Keywords-component-based software engineering, component composition, empirical software engineering