BUILDING RELIABLE AND ROBUST SERVICE-BASED SYSTEMS FOR AUTOMATED BUSINESS PROCESSES

Julian Jang-Jaccard

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Abstract

An exciting trend in enterprise computing lies in the integration of applications across an organisation and even between organisations. This allows the provision of services by automated business processes that coordinate business activity among several collaborating organisations. The best successes in this type of integrated distributed system come through use of Web Services and Service-based Architecture, which allow interoperation between applications through open standards based on XML and SOAP. But still, there are unresolved issues when developers seek to build a reliable and robust system.

An important goal for the designers of a loosely coupled distributed system is to maintain consistency for each long running business process in the presence of failures and concurrent activities. Our approach to assist the developers in this domain is to guide the developers with the key principles they must consider, and to provide programming models and protocols, which make it easier to detect and avoid consistency faults in service-based system.

We start by defining a realistic e-procurement scenario to illustrate the common problems faced by the developers which prevent them from building a reliable and robust system. These problems make it hard to maintain the consistency of the data and state during the execution of a business process in the occurrence of failures and interference from concurrent activities. Through the analysis of the common problems, we identify key principles the developers must consider to avoid producing the common problems.

Then based on the key principles, we provide a framework called GAT in the orchestration infrastructure. GAT allows developers to express all the necessary processing to handle deviations including those due to failures and concurrent activities. We discuss the GAT framework in detail with its structure and key features. Using an example taken from part of the e-procurement case study, we illustrate how developers can use the framework to design their business requirements. We also discuss how key features of the new framework help the developers to avoid producing consistency faults. We illustrate how systems based on our framework can be built using today's proven technology.

Finally, we provide a unified isolation mechanism called Promises that is not only applicable to our GAT framework, but also to any applications that run in the service-based world. We discuss the concept, how it works, and how it defines a protocol. We also provide a list of potential implementation techniques. Using some of the implementation techniques we mention, we provide a proof-of-concept prototype system.

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