A Method for DEVS Simulation of E-Commerce Processes for Integrated Business and Technology Evaluation

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Performance evaluation of electronic commerce processes requires an integrated vision of the capacities offered by computational resources, website functionalities, and resulting financial outcomes. This requires a method that articulates business and technological resources in a model construction and then its simulation allows trying out alternative business configurations before implementation.

The object of this work is to present a discrete event modelization and simulation method for evaluating performance of electronic commerce transactions at business and computational resources levels in order to predict behaviors and changes in system configuration to optimize investment.

An important feature of these models is the interaction among different study units as a result of the integration of business strategies and implemented technologies. For this purpose, representation techniques capable of modeling complex systems are required.

DEVS (Discrete Events System Specification) is a formalization framework that enables interoperability, reusability, and flexibility. Its hierarchical and modular modeling allows complexities representation by depicting individual system components and couplings among them.

The modelization method for simulation consists on defined business model and strategy. Interacting partners and business transactions are considered. A global network is built with partners and roles to show interactions among business operations, such as e-commerce integration with supplier for inventory control or outsourced electronic charging service. Commercial transactions and customer sessions are represented by CBMG (Customer Behavior Model Graphs) model. Computing and communication resources of the technological platform and their metrics are proposed.

E-business DEVS model is built and implemented in DEVSJAVA simulation. After model verification it is validated with actual data. Thus, the various experimentation scenarios are proposed to carry out simulation.

This method is proved by developing a B2C real case study involving a retail company of electronic items, information technology, and household goods. A workload model is specified by GBMG, which represents customer sessions on a website with transactions being executed by a technological platform. All these components are included in DEVSJAVA simulation tool for predicting resource and business behaviors of B2C real case. Simulation results of experimental design allow selecting improvements from an integrated perspective of technological results and financial benefits.

Response time is obtained for scenarios with different configuration of informatics platform. This metric is used to search optimized configuration and to calculate investment cost and sold products profits. Thus it is obtained equilibrium point equation and necessary time for investment return.