

A Timed and Colored Petri Nets for Modeling and Verify Cloud System Elasticity

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Abstract : Elasticity is the essential property of cloud computing. As the name suggests, it constitutes the ability of a cloud system to adjust resource provisioning in relation to fluctuating workload. There are two types of elasticity operations, vertical and horizontal. In this work, we are interested in horizontal scaling, which is ensured by two mechanisms; scaling in and scaling out. Following the sizing of the system, we can adopt scaling in in the event of over-supply and scaling out in the event of under-supply. In this paper, we propose a formal model, based on colored and temporized Petri nets, for the modeling of the duplication and the removal of a virtual machine from a server. This model is based on formal Petri Nets modeling language. The proposed models are edited, verified, and simulated with two examples implemented in CPNtools, which is a modeling tool for colored and timed Petri nets.

Keywords : cloud computing, elasticity, elasticity controller, petri nets, scaling in, scaling out

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