Artifact for Measuring the Relative Efficacy of Gossip Enabled Distributed Circuit Breaking

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***Abstract*—The circuit breaker resiliency pattern has been popularly used to improve the resiliency of distributed systems. We targetted a scope of improvement in this pattern by bringing in some modifications to the traditional circuit breaker pattern and coupling it with a gossip-based information dissemination protocol. To support our claims of superiority of this Gossip Enabled Distributed Circuit Breaking (GEDCB) scheme over the traditional circuit breaker pattern, we modelled three systems - a system that uses GEDCB, one that uses the traditional circuit breakers (CB) and a baseline system that uses no resiliency pattern. We can get a good idea about the efficacy of our proposals based on the relative performance of the three models. The artifact includes the three UPPAAL models that were used to claim the efficacy.**

***Index Terms*—Circuit Breaker, Formal Modeling and Analysis, Gossip Protocol, Resiliency Patterns, Statistical Model Checking, Timed Automata, UPPAAL**

I. Artifact Summary

In our work [1], we proposed a distributed circuit breaking scheme that is facilitated by a gossip-based information dissemination protocol. We called this circuit breaking scheme as "Gossip Enabled Distributed Circuit Breaking" (GEDCB).

We modelled three systems - a system that uses GEDCB, one that uses the traditional circuit breakers (CB) and a system that uses no resiliency pattern in the UPPAAL [2] model checker. The systems were modelled as networks of timed automata (TA) [3].

UPPAAL also comes with a statistical model checking (SMC) module [4]. The SMC module can monitor several runs of the system, and then use results from statistics to get an overall estimate of the value of certain model variables. The variables of importance in our study are total execution time and the number of timeouts, which are compared to understand the relative efficacy of the three systems under consideration.

Using the SMC queries [4] illustrated in the paper [1], we obtained the data points in support of the efficacy of our proposals. The artifact [5] includes the model files we used to execute SMC queries [4]. The artifact is made publicly available in order to facilitate replication of our study.

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