



BRA2Cloud – A Brand new Resilient Agent-based Architecture to Cloud Computing

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Abstract:

Cloud data centers, realizing that the amount of unused resources is significant, have started offering them as transient resources with unpredictable, irreversible revocation. The use of transient resources indicates many relevant issues still pose critical challenges, including security, strong and reliable connectivity and fault-tolerance approaches. To effectively use transient cloud servers to fulfill user requests, it is necessary to define an appropriate fault-tolerant mechanism and its respective parameters to avoid data loss if an unexpected failure occurs. We present an agent-based framework, namely BRA2Cloud, for integrating bag-of-tasks enabled systems using unreliable transient resources. To guarantee application execution and better use of idle resources, it is necessary to create an execution plan through fault tolerance definitions to increase reliability. To do this, BRA2Cloud agents combine features to predict failures in a multi-agent architecture that dynamically creates fault-tolerant multi-strategies, considering the current availability scenario and providing a resilient environment according to users' application needs. Our approach was validated using real data retrieved between 2017 and 2019 from Amazon Spot Instances. Exhaustive experiments achieved high accuracy levels, reaching a 91% survival prediction success rate, which indicates the model is effective under realistic working conditions. We consider the results promising, decreasing up to 74.48% in total execution time when compared to other approaches in the literature. As the main requirements of our proposal, we have defined a series of features that BRA2Cloud should have in order to address the impact of these definitions on resiliency provision, application execution time reduction, and monetary cost reduction.



Biography:

José Pergentino de Araujo Neto holds a bachelor's degree in Information Systems from the Faculdades Integradas de Patos (2005) and a Master's degree in Software Engineering from the Center for Advanced Studies and Systems in Recife, Brazil (2009). He is currently a PhD student in the Informatics Graduate Program at the Department of Computer Science, University of Brasília, Brazil. He is a lecturer at the Institute of Higher Education of Brasília. He has experience in computer science with emphasis on information systems, software architecture, distributed systems, artificial intelligence and multiagent systems.

Publication of speakers:

1. Neto, José & Pianto, Donald M & Ralha, Célia. (2018). A Resilient Agent-Based Architecture for Efficient Usage of Transient Servers in Cloud Computing. 218-225. 10.1109/CloudCom2018.2018.00050.
2. Neto, José & Pianto, Donald M & Ralha, Célia. (2019). MULTS: A Multi-cloud Fault-tolerant Architecture to Manage Transient Servers in Cloud Computing. Journal of Systems Architecture. 101. 101651. 10.1016/j.sysarc.2019.101651.
3. Neto, José & Pianto, Donald M & Ralha, Célia. (2019). Towards increasing reliability of Amazon EC2 spot instances with a fault-tolerant multi-agent architecture. Multiagent and Grid Systems. 15. 259-287. 10.3233/MGS-190312

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