DEFESA DE PROPOSTA DE TESE

Programa de Pós-Graduação em Ciência da Computação

TOWARDS EFFICIENT AND HIGH-LEVEL PARALLELISM ABSTRACTIONS FOR STREAM PROCESSING WITH SELF-ADAPTIVITY

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RESUMO:
Stream processing is a representative paradigm present in several applications that compute data flowing in the form of streams (e.g., video feeds, image, and data analytics). However, processing data and producing results periodically is a technological challenge. As a consequence, the majority of these applications demand parallelism for accelerating their executions. Although high-level and structured parallel programming aims at facilitating parallelism exploitation, there are still issues to be addressed for improving existing parallel programming abstractions. The complexity increases when application developers must set non-intuitive and error-prone parallelism parameters. Employing self-adaptivity in stream processing applications can provide a higher level of programming abstractions and autonomic resource management. However, providing highly abstracted solutions that are efficient and performatic can be challenging. Relevant and novel opportunities for selfadaptive parallelism are concerned to support adjustments in complex application compositions, which are representative for real-world applications. There is also a demand for new methodologies and benchmarking metrics for comprehensively measuring the impact of self-adaptivity in application performance and resource usage. Moreover, a further opportunity for increasing flexibility and performance is dynamically changing the application graph´s topology. The preliminary results have shown that self-adaptation can achieve additional parallelism

abstractions for running stream processing applications. Also, the preliminary results from proposed strategies have shown a competitive performance and a low overhead.

Keywords: Self-adaptive Systems, Stream Processing Applications, Parallel Programming, Stream Parallelism, Parallelism Abstractions.