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Description

The main goal of Rising STARS is to enable a parallel programming framework for the development and execution of advanced large-scale Cyber Physical Systems (CPS) with High Performance Computing (HPC) and real-time requirements. Overall, there is an urgent necessity to develop run-time parallel frameworks, compatible with HPC, capable of guaranteeing that decisions made at run-time maintains the guarantees about system correctness and timing behavior. These new runtime capabilities however, cannot preclude the ability of run-times to dynamically adapt the execution to new working conditions or changing modes of operation of CPS to maximise the utilisation and performance capabilities of parallel heterogeneous architectures. A key element of the Rising STARS framework will be the incorporation of a unified, efficient and highly configurable data acquisition strategy fully integrated in the parallel programming models with the objective of improving productivity in CPS software development. Exposing the data-acquisition to the programmer (by including it into the parallel programming model) is also key to overlap data-transfers with computation. Another objective of the project is to add this capability in existing programming models for HPC and to investigate new parallel programming extensions to allow developers to define the realtime properties of the system in terms of periodicity and timing constraints. Finally, one of our main objectives is to implement several demonstration platforms to promote the main technological developments of this R&I action and their performance under realistic conditions, including Adaptive Optics for giant telescopes and SSA experiments, dataprocessing for SKA, and critical real-time embedded systems.

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