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Running Bag-of-Tasks Applications in EGEE with MaWo

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MaWo is a distributed computing framework which implements a well-known master-worker pattern. It provides a programming interface as well as easy-to-use tools for running Bag-of-Tasks applications across heterogeneous computing resources. MaWo allows the user to seamlessly utilize all available resources including local workstations, clusters and grids among which EGEE is a primary target. The framework significantly reduces the time and effort needed to port an application to grid.

Detailed analysis

The grid is an ideal platform for Bag-of-Tasks (BoT) applications composed of many independent tasks. The efficiency and run time of such applications in a grid strongly depend on a strategy used for scheduling of tasks. A well-known “master-worker” strategy proved to be efficient for heterogeneous and unreliable distributed resources. It can also improve the run time of an application in a grid by bypassing the central grid scheduler. In order to streamline the porting of BoT applications to grids a generic application framework MaWo was developed. MaWo implements basic parts of a master-worker pattern such as workers allocation, communication with master, task scheduling, failure recovery, etc. Since many users have access to several computing resources and infrastructures MaWo supports the simultaneous use of various types of resources by means of pluggable adaptors. The current implementation supports the EGEE infrastructure as a primary target and was successfully used to run several applications in EGEE.

Conclusions and Future Work

The MaWo framework provides an easy-to-use solution for the development and running of BoT applications across heterogeneous computing resources. The applicability of the framework was demonstrated by successfully running several real applications both on local and EGEE resources. The planned future work includes the optimization of the current implementation, measurement of the total efficiency of computations, support for pluggable schedulers and the implementation of adapters for other grid infrastructures.

Impact

MaWo is a generic framework which can be used to streamline the development of BoT applications. The framework provides a programming interface for the implementation of problem-specific parts of application. MaWo also supports the declarative description of BoT applications which enables the quick porting of applications without using MaWo API. The current implementation supports the simultaneous allocation of workers on the local machine, cluster and EGEE infrastructure. MaWo also provides a built-in Web interface which can be used to monitor the status of running applications. In contrast to existing master-worker frameworks for EGEE, such as DIANE, MaWo requires less effort to develop or port applications because it doesn't require the installation of gLite User Interface and supports simple declarative description of an application in addition to a programming interface. MaWo was used to implement and run several real BoT applications in EGEE including ray tracing and atomic cluster conformation problem.

Keywords

Bag-of-Tasks Applications, Master-Worker Framework, Application Development

URL for further information

<http://dcs.isa.ru/os/mawo/>

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