

A Command Interpreter for a Public Computing Utility

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We present GShell, a powerful command interpreter that can be used in the context of a quality of service aware public computing utility system. It is a component of a bigger project called Galaxy that provides a complete set of tools to securely find, allocate, and exploit resources in a public resource pool. In addition to the regular functions that commonly known shells such as sh, bash, and csh provide, GShell supplies hooks into the peer-to-peer and grid based utility computing substrate to examine and manipulate the overall system.

The different components of the Galaxy system are connected in a layered manner that ensures extensibility in the future. The current GShell design has primitives for resource discovery and initial data placement. Several extensions are necessary to provide a richer set of features such as exceptions and procedures.

Given the current trend of outsourcing computing and data processing activities, computing utilities have tremendous scope to be a major part of future computing infrastructures. GShell attempts to provide all the functions needed to exploit efficiently such infrastructures:

Resource Discovery: Allows on-demand discovery of resources based on certain criteria such as proximity and type. All nodes using GShell are interconnected in a giant P2P overlay network called resource addressable network (RAN). Through RAN one could at any moment, from GShell, ask for a certain number of peers to perform an experiment.

Security & Trust: Provides mechanisms to build credentials and to quantify trust between peers. Whereas in fixed environments trust between different hosts can be established in an offline manner, it is generally not the case in dynamic systems such as P2P networks. The requests launched by GShell are passed to the resource management layer that monitors peer history to form reputations. From GShell, one can advertise for a job, and then pick the contender it judges is the most trustworthy.

Command Execution: In GShell, discovered resources are arranged into virtual clusters through which not only one can run jobs, but also pipe results from one job to another program on another peer. Also, GShell takes care of authenticating remote nodes when connecting to them, based on the peer trust information.