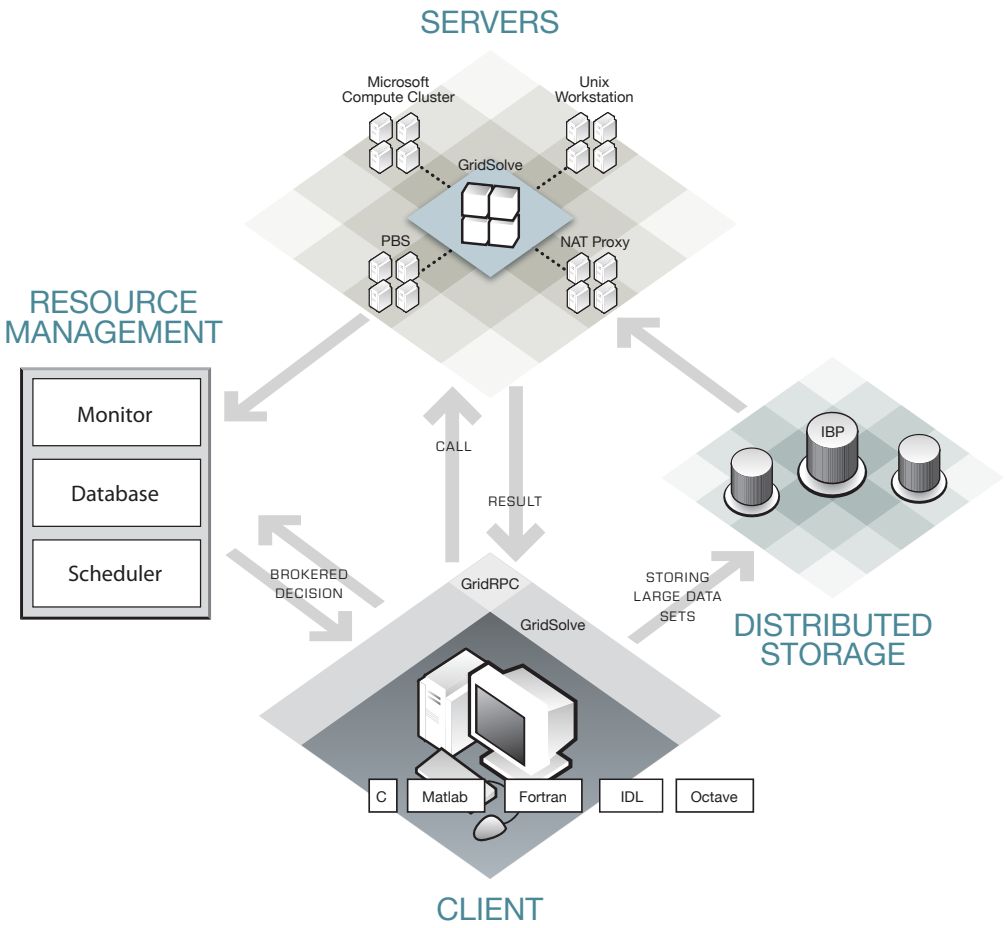
GridSolve

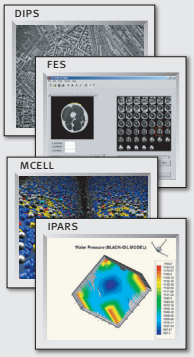
http://icl.cs.utk.edu/gridsolve/

GridSolve investigates the use of distributed computational resources connected by computer networks to solve complex scientific problems. It is a remote procedure call (RPC)-based client/agent/server system that allows users to discover, access, and utilize remote software modules and hardware resources. GridSolve is the next generation of NetSolve. The main improvements are in three general areas: ease of use, interoperability, and scalability.



GridSolve is a GridRPC-compliant brokered remote procedure call system that enables users to solve complex scientific problems remotely using distributed resources on a computational grid. The system consists of an agent, one or more computational servers, and one or more clients. When a user (client) submits a problem to the GridSolve system, the agent searches the network of computational resources (servers) that has registered with it, chooses the best one available, solves the problem on that resource, and then returns the solution to the user. Load balancing for good performance and retry for fault-tolerance are handled automatically by the system.

POWERED BY GridSolve



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GridSolve

http://icl.cs.utk.edu/gridsolve/

GridSolve – the next generation of NetSolve – is a project that investigates the usage of distributed computational resources connected by computer networks to solve complex scientific problems efficiently. It is a remote procedure call (RPC)-based client/agent/server system that allows users to discover, access, and utilize remotely housed software modules, as well as the computational hardware needed to run these modules. The resources to be leveraged can be distributed by geographic location and/or ownership, and heterogeneous operating environments are supported.

The overall goal of GridSolve is to address three general problems: ease of use, interoperability, and scalability. To improve the ease of use, we have streamlined the process of integrating user code into a GridSolve server. Interoperability encompasses several facets, including better handling of different network topologies including NATs and firewalls, better support for parallel libraries and parallel architectures, and better interaction with other Grid computing systems such as Globus and Ninf. Scalability in this context means ensuring that system performance does not degrade as a result of adding components to the GridSolve system.

The motivation for GridSolve is to create a grid-based software computing environment used routinely by a large user base to enhance scientific computing capabilities. In addition to the basic RPC system that supports transparent, fault tolerant, service based access to remote resources, GridSolve provides:

- NAT-tolerant communication framework
- Disconnect/reconnect protocol
- Ease of problem integration using simplified IDLs
- Dynamic service configuration
- Enhanced scheduling heurisitics

Although other research groups and organizations are investigating distributed and grid computing concepts, GridSolve's niche is providing easy access via scientific computing environments (SCEs) to complex collections of high-performance software that run on clusters of commodity components or supercomputers. Such access reduces the effort scientists normally exert to use these resources.

GridSolve provides access to otherwise unavailable software and, in cases where the software is readily available, it can make the power of supercomputers accessible from the convenience of the scientists desktop machine. GridSolve is also designed to increase the accessibility of larger software systems like simulators and modeling software. GridSolve can also be used to extend the capabilities of scientific computing environments (SCEs), such as Matlab, by increasing the number and types of implemented algorithms available. The system also provides these SCE environments with the ability to distribute computational tasks among multiple processors.

Current research in progress has focussed on providing GridSolve with the ability to analyze sequences of requests to detect data dependencies and infer a workflow DAG. The internal service handling mechanisms will be modified to execute the workflow on the appropriate resources, moving the data between the resources via a data handle abstraction.

GridSolve/NetSolve have been employed by users in a variety of scientific domains ranging from image processing to nuclear engineering, microbiology, and sub-surface fluid modeling. The GridSolve project has also been part of larger collaborations with research groups from universities, government laboratories, and private research organizations.