Center for Computational Physics University of Tsukuba

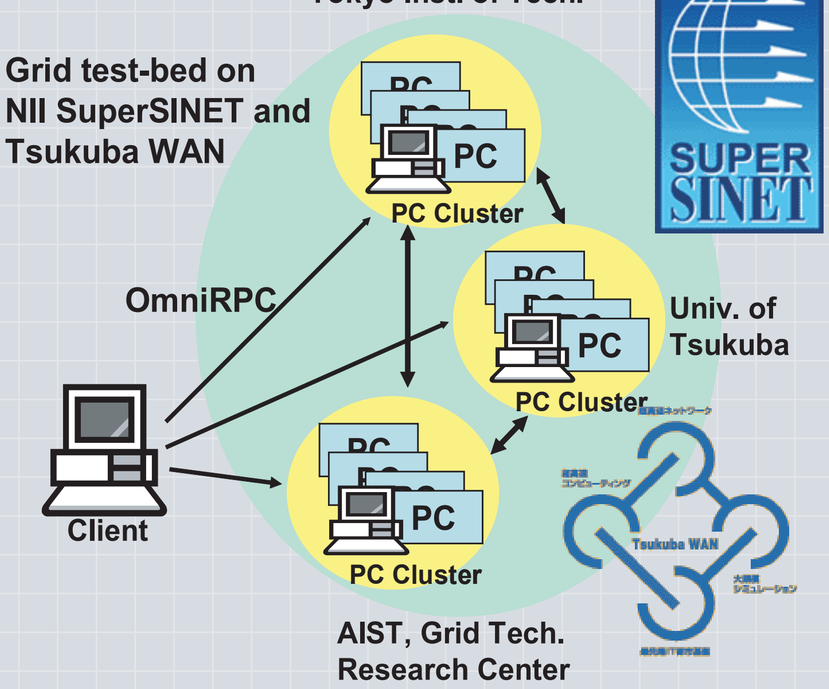
OmniRPC: a Grid RPC for grid parallel programming

Features of OmniRPC

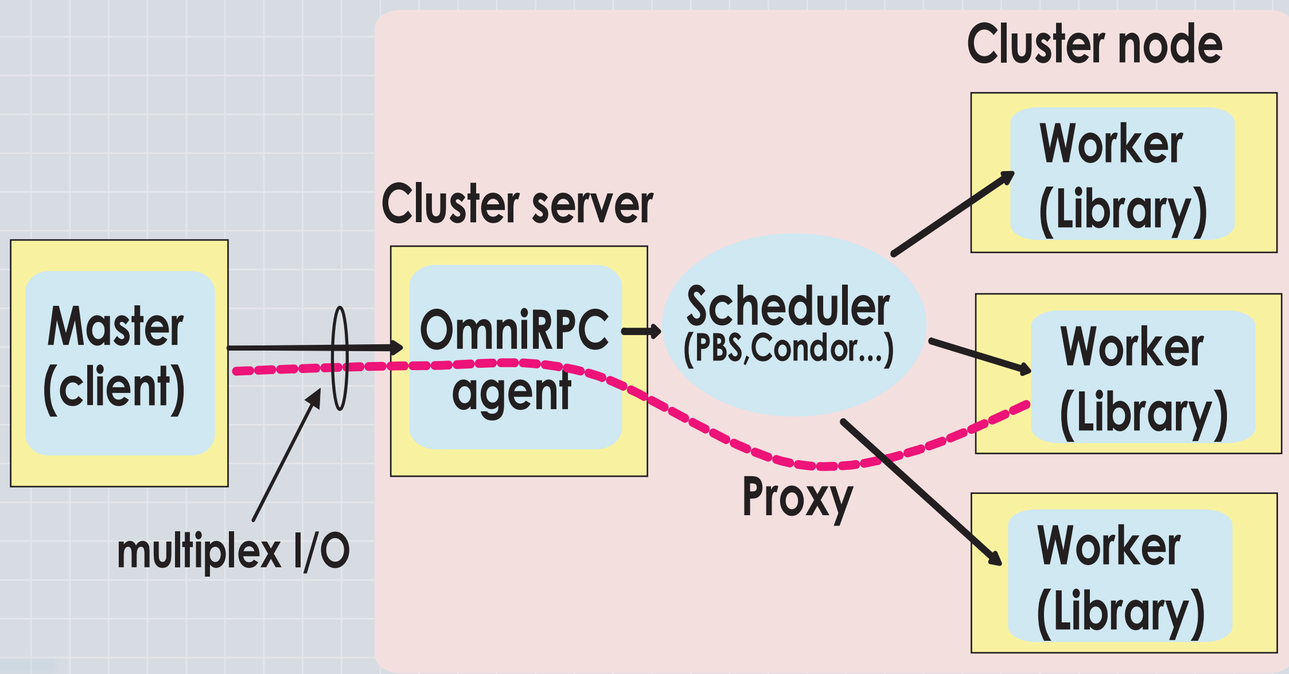
- It supports master-workers programming model for parametric search grid applications.
- A gridRPC API based on Ninf GridRPC.
- The thread-safe RPC design allows the programmer to use OpenMP for easy-to-use parallel programming.
- The persistence model of automatic-initializable RPC remote module enables re-use of the connection to RPC executables for efficient execution.
- Support for clusters with private IP address with scaling up to 1000 hosts. The RPC agent in a remote host works as a proxy between the client and the cluster internal hosts with I/O multiplexing of communications.
- Seamless programming environment from clusters to grid. It can use "rsh" in a cluster, and Globus GRAM or "ssh" in a grid for job invocation.
- Webpage: http://www.omni.hpcc.jp/OmniRPC/

Grid RPC Omni

Tokyo Inst. of Tech.



Overview of OmniRPC



Example

```
main(argc, argv){
  /* Initialize OmniRPC */
  OmniRpcInit(&argc,&argv);
  ...
  #pragma omp parallel for \
          private(t) reduction(+:s)
  for(i = 0; i < N; i++){
    OmniRpcCall("work",i,&t,...);
    s+=... t ...;
  }
  ...
  OmniRpcFinalize();
}
```

Applications

- **HMCS-G (heterogeneous multi-computer system/Remote):**
  A system to access a special-purpose supercomputer GRAPE-6 for gravity calculation over Grid using the OmniRPC interface.
- **CONFLEX-G:**
  An exhaustive molecular conformational search program CONFLEX (developed by Dr. Goto, Toyohashi University of Technology) parallelized using OmniRPC for a grid environment. (supported by JST-ACT program of Japan)
- **Parallel eigenvalue solver using Grid distributed resources:**
  A program to find certain eigenvalues of a generalized eigenvalue problem in a given domain by solving linear equations in parallel using OmniRPC. (developed by Prof. Sakurai, University of Tsukuba)