

Grid-enabled PBS: the PBS-Globus Interface

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Abstract

PBS, the Portable Batch System, provides sophisticated scheduling and resource management facilities for a wide range of systems:

- POSIX 1003.2d Batch Environment Standard compliant
- separate, fully tunable, scheduler—production schedulers support priorities, dedicated time, and dynamic backfilling
- production hardened and demonstrated scalability—to thousands of processors
- both serial and parallel jobs are fully supported in a mixed time-shared and space-shared environment
- fault isolation, crash recovery, and support for logging and accounting.

Although fully configurable, the typical PBS installation consists of a few “front-end” nodes running: the PBS client code, a single PBS server, and a single PBS scheduler. The rest of the cluster (the “back-end” nodes) run the PBS MOM daemon, which actually executes the jobs. A job (e.g., “`mpirun -np 4 ./hello`”) is submitted along with a resource specification (e.g., “4 nodes with 256 MB for 10 minutes”) on one of the front-ends, handed to the server, scheduled, run by the MOMs, and has output placed back on the front-end.

The PBS-Globus interface allows a user to take advantage of Globus job facilities, while retaining the well-known PBS interfaces (POSIX-compliance, file staging, job monitoring, and accounting). On job submission, the user simply specifies, “`-Lsite=globus:resourcename`” to indicate a job should be run on a system via Globus. The job gets spooled as a normal PBS job. When the PBS scheduler runs the job, it sends it to a PBS MOM-Globus. The MOM-Globus maps PBS parameters into Globus RSL, submits it to Globus via GRAM, handles staging files via GASS, and waits for the output. While the job is “running”, normal PBS status commands can be used to monitor its progress.

Grid-enabled PBS allows a user to access the vast resources available on the Grid without the costly learning curve of yet another interface—PBS jobs can execute anywhere Globus can run a job. In fact, a PBS job may go from PBS to Globus to Load Leveler, or to LSF. This structure leads to an interesting situation, where a PBS job can get sent to Globus, which sends the job to PBS for execution.

Our initial work with Globus is only the beginning. We are actively enhancing PBS Grid capabilities as well as supporting Grid Forum standardization efforts. Activities include full support for the emerging standard for advance reservations, support for co-allocated jobs, PKI integration, and support for file staging via `gsi-ftp`.

For more information on the Portable Batch System, visit www.pbspro.com.