Technology Opportunity

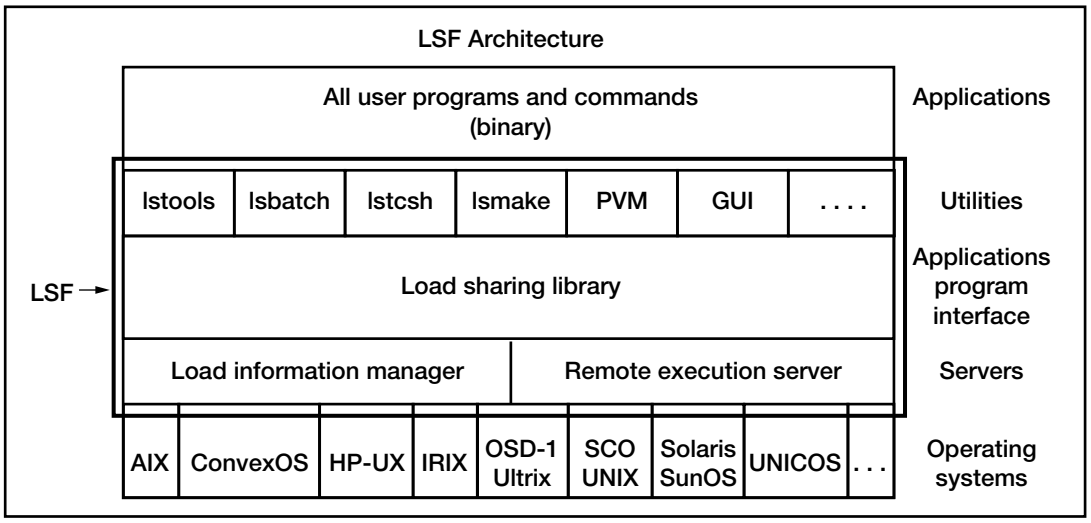
Load Sharing and Distributed Batch Queuing for Networked Computers

The National Aeronautics and Space Administration (NASA) seeks to transfer load sharing and distributed batch queuing software for computer networks. The product, called the Load Sharing Facility, is a fully integrated suite of software that is installed on top of operating systems to turn a heterogeneous computer network into a single, integrated system.

Potential Commercial Uses

- The Load Sharing Facility (LSF) creates a single system image such that a whole network of computers becomes a single, integrated computing environment. Specifically, LSF provides the following:
  - Batch job queuing and scheduling
  - Interactive job distribution across the network
  - Load balancing across a network of computers
  - User-transparent access to heterogeneous resources across a network
  - Enforcement of site resource sharing policies
  - Network-wide load monitoring

- LSF can be applied in these industries:
  - Aerospace
  - Automotive
  - Defense
  - Electronic design automation
  - Energy
  - Manufacturing
  - Pharmaceutical
  - Research and development
  - Telecommunications



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Benefits

- Increased user productivity
- Faster batch, interactive, and parallel job processing
- Increased utilization of existing computing resources
- Simplified use and management of UNIX networks
- Open environment for growth and customized applications

The Technology

The Load Sharing Facility (LSF) is a product of Platform Computing, Incorporated. It is being enhanced as part of the Affordable High Performance Computing Project. Work on the project is being performed under a cooperative research agreement between NASA Lewis and a team of industry and university partners led by Pratt & Whitney United Technologies. LSF is a load sharing and distributed queuing system that integrates a network of UNIX computer systems to reduce interactive response time, increase batch throughput, and improve computing resource accessibility. LSF schedules jobs based on the availability and load of heterogeneous hardware and software resources as well as the resource requirements of the jobs, ensuring that jobs run on the best computers. Fully transparent remote processing of jobs is supported, including remote terminal input/output, signals, and file access. Job accounting data and analysis tools are available. LSF supports parallel applications and packages such as PVM (parallel virtual machine—a message-passing package). LSF is highly fault tolerant, and checks the job at specified points and migrates it as appropriate.

LSF's services are natural extensions to operating system services. LSF sits on top of different operating systems. The services are provided by two network servers, the Load Information Manager and the Remote Execution Server. Distributed applications (such as batch queuing systems) can be built on top of the LSF application program interface (API). A rich set of utilities have been built on top of the LSF API, which, in turn, interfaces to end-user jobs. Therefore, ordinary users need not worry about the API; they need to use only the LSF utilities to get their job done (see fig. on previous page).

Enhancements to LSF will enable intelligent job scheduling to ensure the maximum throughput of multiple parallel and nonparallel jobs in a computer system environment with dynamically changing load conditions. These enhancements will be complete in October 1997.

Options for Commercialization

The LSF is a fully licensed product available from Platform Computing, Inc. If your company is interested in licensing the Load Sharing Facility, please contact us.

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Key Words

Distributed batch queuing
Load sharing and balancing
Job scheduling
Parallel processing
Distributed heterogeneous computer network

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