IBM Parallel Environment for Linux extends parallel application development to Linux

Overview

If your business has clusters of IBM systems running Linux™, Parallel Environment for Linux, V4.2 can offer you a way to improve resource utilization and reduce time to solution in a cluster environment. Parallel Environment can offer high-performance and fast job turn-around time for numerically intensive and demanding scientific, technical, and strategic business applications.

Based on the Parallel Environment for AIX 5L™ product offering, Parallel Environment for Linux delivers support for parallel application development and execution on xSeries® (Intel®-based), and IBM AMD-based (e325, e326) processors running Linux.

Parallel Environment for Linux can be used on a single server to develop parallel applications for use on a Linux cluster. These parallel applications can then be moved to a networked cluster of servers delivering substantial performance gains. Parallel Environment and Message Passing Interface (MPI) are also useful for applying a parallel solution to problems which are utilizing too much data to be managed on a single workstation.

Parallel Environment is designed to offer a user-friendly, run-time environment for the execution of parallel applications. The components of Parallel Environment are:

• The Parallel Operating Environment (POE) for submitting and managing jobs
• An MPI library for communication among the tasks that make up a parallel program
• Parallel utilities for easing file manipulation
• Integration with the Low-level Application Programming Interface (LAPI) used as a common communications protocol transport layer

Key prerequisites

• Select IBM eServer® systems running Linux
• SUSE Linux Enterprise Server 9, Service Pack 3 or
• Red Hat Enterprise Linux 4, Update 3

Planned availability dates

• April 28, 2006, electronic download
• June 2, 2006, CD media

At a glance

Parallel Environment for Linux is a high-function execution environment for parallel applications running on Linux:

• Offers a fully-threaded Message Passing Interface (MPI) library with full MPI 1.2 function and much of MPI 2 function, including MPI-I/O and MPI one-sided operations
• Offers MPI-I/O which, with GPFS, supports the kind of high-volume and high-speed file I/O required by many parallel applications
• Gives the software developer a parallel API in a controlled, user-friendly environment for the execution and monitoring of parallel applications
• Offers the ability to compile and run applications using the LAPI communications library, shipped with Parallel Environment for Linux
• Supports the GNU open software foundation compiler as well as IBM compilers
• Supports the use of many ISV products that apply parallel computation to specific problems

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Description

Parallel Environment for Linux delivers a full, highly tuned implementation of the MPI-1.1 and 2.0 standard for message passing (refer to the Limitations section). The implementation of MPI-IO is optimized for use with IBM General Parallel File System (GPFS). The full MPI library is thread safe.

The Parallel Environment offering for Linux includes an implementation of LAPI, an IBM proprietary API for efficient one-sided communication. The MPI implementation in Parallel Environment uses LAPI as a message transport layer. Your applications can be written to use MPI or LAPI or both.

With Parallel Environment, MPI and LAPI use UDP/IP communication between compute nodes and shared memory between tasks on the same node. An application simply does MPI (or LAPI) communication calls which function the same whether tasks are on the same node or distinct nodes.

Parallel Environment for Linux includes parallel utilities (copy, gather, and scatter) to ease file manipulation across IBM distributed memory systems. Shared library support improves flexibility and maintenance for applications that utilize Parallel Environment for Linux.

User productivity is maintained by adhering to existing standards, reducing a users’ learning time. The resulting ease-of-use can increase productivity. Some of the standards that Parallel Environment uses are:

- Parallel application development follows the same methodology used during serial application development.
- Informative messages and familiar commands are used to aid in the execution analysis of parallel applications.
- The MPI Standard supported by Parallel Environment for Linux, delivers straightforward message-passing facilities by application developers familiar with distributed memory machines. This can also protect your software investment by allowing portability of applications. The goal of this interface is to deliver a standard for writing message passing programs for practicality, portability, efficiency, and flexibility.

A parallel profiling capability, developed to be compatible with GPROF profiling commands, can generate important statistical data about the parallel application that can be used for identifying potential performance problems such as code cycles, inefficient subroutines, and other code latencies and bottlenecks. While developers may be the main users of profiling information, any user can collect and examine profiling data.

Parallel Environment for Linux supports up to 256 tasks per Parallel Operating Environment (POE) job. POE delivers support for compiling and running applications using the LAPI communications library. The LAPI and MPI libraries can both be used in a single program.

The POE is used to set up the environment for the users parallel program and to control and monitor job execution. The POE API allows an application to retrieve the process IDs of all POE master processes running on the same node. This information can be used for accounting, or to get more detailed information about the tasks spawned by these POE processes.

Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on the products accessibility compliance can be requested by visiting the IBM Web site


Product positioning

Parallel Environment for Linux can be beneficial to those users who:

- Require high performance and fast job turn-around time for numerically intensive and demanding scientific, technical, and strategic business applications running Linux
- Want to exploit parallel computing as a means of obtaining greater performance in a production environment
- Seek ways to improve resource utilization and reduce the time to a solution or solve larger problems by exploiting parallel processing in a cluster environment

Statement of direction

IBM intends to make Parallel Environment for Linux available for the IBM System p® family of servers and IBM BladeCenter® JS20 and JS21 blades by third quarter 2006.

All statements regarding IBM’s plans, directions, and intent are subject to change or withdrawal without notice.

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Product information is available via the Offering Information Web site

http://www.ibm.com/common/ssi

Also, visit the Passport Advantage® Web site

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Publications

No publications are shipped with this program.

The following publications are available from the Web:

- IBM Parallel Environment: Introduction (SA23-2218)
- IBM Parallel Environment: Installation (SC23-5208)
- IBM Parallel Environment: Operation and Use (SA23-2217)
- IBM Parallel Environment: MPI Programming Guide (SA23-2219)
- IBM Parallel Environment: Messages (SA38-0648)
- IBM Parallel Environment: MPI Subroutine Reference (SA23-2220)

To access all, and the most recent Parallel Environment documentation in PDF and HTML formats, visit the IBM eServer® Cluster Information Center Web site

http://publib.boulder.ibm.com/infocenter/clresctr/index.jsp

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Technical information

Hardware requirements

Parallel Environment for Linux™, V4.2 is supported on the following IBM servers running Linux

- IBM eServer 325, 326 Opteron/AMD-based
- IBM xSeries®

Note: IP is supported over Gb Ethernet and 10Gb Ethernet in all supported Linux environments.

Software requirements

Either of the following Linux distributions

- SUSE Linux Enterprise Server 9, Service Pack 3
- Red Hat Enterprise Linux 4, Update 3

For development, any one of these compilers

- IBM C/C++, V7.0.0-1
- IBM XL Fortran, V9.1.0-1
- GNU —Open Software Foundation

Limitations

- Parallel Environment for Linux, V4.2 does not interoperate between different node types or different Linux distributions. All of the nodes used in a parallel job must be of the same type (AMD or Intel®) running the same level of operating system (including maintenance levels), same Linux distribution, and same level for all portions of the Parallel Environment package.

- The MPI-IO data representations, external32 and internal, are not supported. The native data representation as well as user-defined data representations are supported on all platforms.

- Parallel Environment for Linux offers a fully-threaded MPI library supporting all of MPI 1.1, 1.2 and 2.0, except the functions specified in the “MPI-2: Extensions to the Message Passing Interface” chapter on “Process Creation and Management” found at the MPI Web site

http://www.mpi-forum.org/docs/docs.html

Performance considerations: Parallel Environment and the MPI library are intended for use in High Performance Computing (HPC) applications that can exploit multiple processors to achieve parallelism, using message passing to pass data among the processors where necessary. In such environments, performance of the interconnecting network may be important.

In this release, MPI and LAPI use UDP/IP communication between compute nodes. Parallel Environment’s use of UDP is effective in getting the best bandwidth, latency, and scalability available in the underlying network. The best performance is achieved with a dedicated,
high-performance network within the cluster to be used for MPI communication.

Planning information

Customers wishing to expand their Parallel Environment jobs beyond 256 tasks may submit a special bid. Special bids of up to 1000 compute nodes and 8192 tasks will be considered.

Customer responsibilities: Ensure all of the nodes to be used in a parallel job are of the same type (AMD or Intel) running the same level of operating system, same Linux distribution and same level for all portions of the Parallel Environment package.

Packaging: This program is distributed as a single package available via CD-ROM media or electronic software distribution (ESD). A product README file and license information is shipped with the product. Publications are available online.

This program when downloaded from a Web site, contains the applicable IBM license agreement, and License Information (LI), if appropriate, and will be presented for acceptance at the time of installation of the program. The license and LI will be stored in a directory such as LICENSE.TXT for future reference.

Security, auditability, and control

Parallel Environment for Linux uses the security and auditability features of the Linux operating system.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

Ordering information

This product is only available via Passport Advantage. It is not available as shrinkwrap.

Product Group: Other Software
Product Identifier Description (PID)
Parallel Environment for Linux (5724-N05)

Product Category: Parallel Environment

Charge metric

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