IBM Parallel Engineering and Scientific Subroutine Library for AIX 5L, V3.1 (Parallel ESSL) offers scientific subroutines for optimum performance for AIX 5L

Overview

IBM Parallel Engineering and Scientific Subroutine Library for AIX® 5L, V3.1 (Parallel ESSL for AIX 5L) is a scalable mathematical subroutine library that supports parallel processing applications on clusters of IBM @server pSeries® servers. Parallel ESSL for AIX 5L supports the Single Program Multiple Data (SPMD) programming model.

Parallel ESSL for AIX 5L provides over 100 subroutines in six major areas of mathematical computations:

- Level 2 Parallel Basic Linear Algebra Subprograms (PBLAS)
- Level 3 PBLAS
- Linear Algebraic Equations
- Eigensystem Analysis and Singular Value Analysis
- Fourier Transforms
- Random Number Generation

For communication, Parallel ESSL includes Basic Linear Algebra Communications Subprograms (BLACS), which use the Message Passing Interface (MPI). For computations, Parallel ESSL uses ESSL for AIX 5L subroutines.

The Parallel ESSL for AIX 5L SMP libraries support both 32-bit environment and 64-bit environment applications. The subroutines can be called from application programs written in FORTRAN, C, and C++.

Parallel ESSL runs under the AIX 5L V5.2 operating system.

Key prerequisites

- Operating systems:
  - AIX 5L V5.2
  - For customers who use SP™ systems and PSSP: PSSP 3.5, or later, with service
- Hardware:
  - Clusters of IBM @server pSeries servers
- Software products:
  - For compiling (one of these):
    -- IBM XL FORTRAN for AIX, V8.1, or later (5765-F70)
    -- IBM VisualAge® C++ Professional for AIX, V6.0, or later (5765-F56)
    -- IBM C for AIX, V6.0, or later (5765-F57)
  - For linking, loading, or running:
    -- IBM XL FORTRAN Run-Time Environment for AIX, V8.1, or later (5765-F71)
    -- IBM Parallel Environment for AIX, V4.1, or later (5765-F83)
    -- IBM Engineering and Scientific Subroutine Library for AIX 5L, V4.1 (5765-F82)
    -- C libraries

At a glance

Parallel ESSL for AIX 5L, V3.1 is tuned for optimum performance on POWER™ and POWER4™ processors and the IBM @server pSeries High Performance Switch (HPS).

- Callable from FORTRAN, C, and C++
- 32-bit and 64-bit application support
- Easy-to-use call interface
- Informative error-handling capabilities

For ordering, contact:
Your IBM representative, an IBM Business Partner, or the Americas Call Centers at 800-IBM-CALL

Planned availability dates

- October 31, 2003, for Parallel ESSL V3.1
- December 19, 2003, for Parallel ESSL V3.1 running with PSSP V3.5 on AIX 5.2

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IBM United States

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All Parallel ESSL for AIX 5L libraries provide high levels of performance for numerically intensive computing jobs on the respective processors. All versions provide mathematically equivalent results.

Parallel ESSL provides manpages of the subroutine descriptions.

Parallel ESSL documentation is not shipped with the product. It can be viewed or downloaded from the following Web sites:

- IBM @server Cluster Resource Center: http://publib.boulder.ibm.com/clresctr
- IBM Publications Center: http://w3.ehone.ibm.com/public/applications/publications/cgi/bin/pbi.cgi

The Parallel ESSL software license agreement is shipped, viewed, and accepted electronically. (See the Parallel ESSL for AIX Installation Guide for details.)

The following is a brief description of the new subroutines in V3.1.

New Dense Linear algebraic equation subroutines:
- PDPOTRI and PZPOTRI — Positive Definite Real Symmetric or Complex Hermitian Matrix Inverse
- PDPOCON and PZPOCON — Estimation of the Reciprocal of the Condition Number of a Positive Definite Real Symmetric or Complex Hermitian Matrix

New Eigensystems Analysis subroutines:
- PZGEBRD — Reduce a General Matrix to Bidiagonal Form
- PDGESVD and PZGESVD — Singular Value Decomposition of a General Matrix

New Utility subroutines:
- DESCINIT — Initialize a Type-1 array descriptor with error checking.
- DESCSET — Initialize a Type-1 array descriptor.
- ICEIL — Compute the ceiling of the division of two integers.
- ILCM — Compute the least common multiple of two positive integers.
- INDXG2L — Compute the local row or column index of a global element of a block-cyclically distributed matrix.
- INDXG2P — Compute the process row or column index of a global element of a block-cyclically distributed matrix.
- INDXL2G — Compute the global row or column index of a local element of a block-cyclically distributed matrix.
- INFOG1L — Compute the starting local row or column index and process row or column index of a global element of a block-cyclically distributed matrix.
- INFOG2L — Compute the starting local row and column indices and the process row and column indices of a global element of a block-cyclically distributed matrix.
- PDLANSY, PZLANSY, and PZLANHE — Real symmetric, complex symmetric, or complex Hermitian matrix Norm.

Accessibility by people with disabilities

The following features support use by people with disabilities:

- Operation by keyboard alone

Section 508 of the U.S. Rehabilitation Act

Parallel Engineering and Scientific Subroutine Library for AIX 5L, V3.1 is capable as of October 31, 2003, when used in accordance with IBM’s associated documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it.

Product positioning

Parallel ESSL for AIX 5L should be used where optimum performance is desired through simple subroutine calls from floating-point engineering and scientific MPI applications running on clusters of IBM @server pSeries servers.

Reference information

Refer to:
- Parallel Environment, V4.1, Software Announcement 203-270, dated October 14, 2003
- ESSL V3.3 and Parallel ESSL V2.3, Software Announcement 201-333, dated November 13, 2001

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Offering Information

Product information is available through the Offering Information Web site at:

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

Publications

Documentation supporting the Parallel Engineering and Scientific Subroutine Library for AIX® 5L, V3.1 licensed program is not available from IBM in hardcopy format.

Available documentation can be viewed, searched, and printed as follows:

- On the Web:
  http://www.ibm.com/servers/eserver/pseries/library
  Click “RS/6000® SP™ Hardware and Software Books.”

- Online via the IBM @server Cluster Resource Center at:
  http://publib.boulder.ibm.com/clresctr

The ESSL licensed product consists of the following publications:

<table>
<thead>
<tr>
<th>Title</th>
<th>Publication number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering and Scientific Subroutine Library Products General Information</td>
<td>GA22-7903</td>
</tr>
<tr>
<td>Parallel Engineering and Scientific Subroutine Library for AIX 5L, Version 3 Release 1 Installation Guide</td>
<td>GA22-7953</td>
</tr>
</tbody>
</table>

Technical information

Hardware requirements: Parallel ESSL V3.1 is supported in the following environments:

- IBM @server pSeries High Performance Switch (HPS)
- Clusters of IBM @server pSeries servers
- Clustered IBM @server pSeries POWER4™ servers attached to a Cluster 1600 interconnected with the SP Switch or SP Switch 2, running the AIX 5.2 64-bit kernel.
- Clustered RS/6000 workstations, POWER3 and/or POWER4 servers, either stand-alone or connected via a LAN supporting IP, running AIX 5.2 32-bit or 64-bit kernel.

Note: Parallel ESSL V3.1 has the same hardware requirements as Parallel Environment V4.1. For details, refer to Parallel Environment, V4.1, Software Announcement 203-270, dated October 14, 2003.

Software requirements

- Operating systems:
  - AIX 5L for POWER V5.2 with the 5200-02 Recommended Maintenance package, or later.
  - PSSP V3.5 (5765-D51), with APAR IY49007 (PSSP 3.5 support for cluster software products running AIX 5.2), or later, when running on an SP system. PSSP is not required when Parallel ESSL is used on a stand-alone or cluster of pSeries or RS/6000 workstations and/or servers.

- Software products:
  - For compiling (one of these):
    - IBM XL FORTRAN for AIX, V8.1, or later (5765-F70)
    - IBM VisualAge® C++ Professional for AIX, V6.0, or later (5765-F56)
    - IBM C for AIX, V6.0, or later (5765-F57)
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    - IBM Engineering and Scientific Subroutine Library for AIX 5L, V4.1 (5765-F82)
    - C libraries

Limitations: Parallel ESSL for AIX 5L is not thread-safe; however, Parallel ESSL for AIX 5L is thread-tolerant and can therefore be called from a single thread of a multi-threaded application.

Multiple simultaneous calls to Parallel ESSL for AIX 5L from different threads of a single process cause unpredictable results.

The 32-bit kernel support is restricted as described in the Parallel Environment 3.1 announcement.

Parallel ESSL for AIX 5L has the same restrictions as Parallel Environment when running on PSSP V3.5.

This announcement is provided for your information only. For additional information, contact your IBM representative, call 800-IBM-4YOU, or visit the IBM home page at: http://www.ibm.com.
Planning information

Direct customer support: Eligible customers can obtain installation and usage assistance from the AIX Support Family line at 800-225-5249.

To obtain customer eligibility and registration procedures, contact the appropriate support center.

Packaging: Parallel ESSL for AIX 5L, V3.1 is distributed on one CD-ROM, LCD4-6649.

Security, auditability, and control

Parallel ESSL for AIX 5L uses the security and auditability features of the AIX 5L 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

Parallel ESSL for AIX 5L, V3.1 (5765-F84) is a product with one charge unit: active processors. The number of processors is the sum of the active number of processors in each of the machines on which Parallel ESSL will be installed or run. A license is required for each machine on which Parallel ESSL will be installed and run, for a quantity as computed above.

Software Maintenance for Parallel ESSL for AIX 5L, V3.1 (5771-PES or 5773-PES) should be ordered in a quantity equal to the sum of the active processors on each of the pSeries systems on which Parallel ESSL for AIX 5L will be installed and run.

Users of Parallel ESSL for AIX 5L, V3.1 should specify type 5765, model F84, media feature number 5809, and the quantity equal to the number of operating system images (OSIs) on the pSeries systems. For example, if ordering Parallel ESSL for AIX 5L, V3.1 for a server that has 12 OSIs, order media feature number 5809 and the one-time charge (OTC) feature number with a quantity of 12.

<table>
<thead>
<tr>
<th>Description</th>
<th>Type/model number</th>
<th>OTC feature number</th>
<th>Medium feature number</th>
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<tr>
<td>Parallel ESSL for AIX, V3.1</td>
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<tr>
<td>Per processor</td>
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<tr>
<td>Per block of 250 processors</td>
<td>0002</td>
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Note: The feature number for a block of 250 processors is provided for convenience with large orders. A quantity of one for feature number 0002 will order 250 processor licenses.

Ordering information for software maintenance

This software license includes Software Maintenance, previously referred to as Software Subscription and Technical Support.

All distributed software licenses include Software Maintenance (Software Subscription and Technical Support) for a period of 12 months from the date of acquisition. Extending coverage for a total of three years from date of acquisition may be elected. Order the program number, feature number, and quantity to extend coverage for your software licenses. If maintenance has expired, specify the after-license feature number.

Software Maintenance replaces Software Subscription for AIX (5692-SSO) for new and expired contracts. Refer to Software Announcement 202-003, dated January 8, 2002.

Customers who want to add software maintenance

To register for future upgrades of this product from Software Maintenance for the program described in this announcement, specify 5771-PES for one-year or 5773-PES for three-year registration, and the applicable Parallel ESSL after-license billing feature with quantity equal to:

- The number of licenses in the base F84 license contract

After-license support is available for Parallel ESSL for AIX 5L, V3.1.

Notes

- The following billing features either:
  - Must have been previously purchased and must currently be on a customer’s record as proof of eligibility to receive this upgrade and future upgrades at no charge or may be purchased to receive future releases of this product for no charge; order the program number, feature number, and quantity to obtain coverage for your software licenses.
  - The appropriate one-year registration feature (no additional charge feature) will transfer automatically to the customer order record when 1-year 5771-PES is selected.
  - Customers should select the “Renewal Billing Feature” for one- or three-year contract renewal.
  - Customers should select the “Maintenance After License” to reenter one of the programs after a contract has lapsed.

Software maintenance 5771-PES one-year offering

<table>
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<tr>
<th>LPP program name</th>
<th>Registration feature number</th>
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Software maintenance 5773-PES three-year offering

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<td>0392 0394 0396</td>
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<td>Per processor</td>
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Note: The registration features for 5773-PES are priced for the second and third years only of the three-year contract. The first-year charge is included in the price of the license.

Customization options for F84

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Terms and conditions

Licensing: IBM International Program License Agreement. Proofs of Entitlement are required for all authorized use.

This software license includes Software Maintenance, previously referred to as Software Subscription and Technical Support.

The following agreements apply for maintenance and do not require customer signatures:

- IBM Agreement for Acquisition of Support (Z125-6011)
- Addendum for Support (Software Maintenance) for Select iSeries™ and pSeries Programs (Z125-6495)

Limited warranty: Yes

Warranty: This program has warranty for a minimum of one year from acquisition from IBM or authorized Business Partner. The warranty provided to the customer, for at least one year from acquisition, is access to databases (read Web sites) for program information, FAQs, including any known fixes to defects, which customers can download or obtain otherwise and install at their leisure.

Money-back guarantee: If for any reason you are dissatisfied with the program, return it within 30 days from the invoice date to the party (either IBM or its reseller) from whom you acquired it for a refund. This applies only to your first acquisition of the program.

Copy and use on home/portable computer: No

Volume orders (IVO): Yes, contact your IBM representative.

Passport Advantage® applies: No

Software maintenance applies: Yes

All distributed software licenses include Software Maintenance (Software Subscription and Technical Support) for a period of 12 months from the date of acquisition, providing a streamlined way to acquire IBM software and assure technical support coverage for all licenses. Extending coverage for a total of three years from date of acquisition may be elected.

While your Software Maintenance is in effect, IBM provides you assistance for your routine, short-duration installation and usage (how-to) questions, and code-related questions. IBM provides assistance via telephone and, if available, electronic access, only to your information systems (IS) technical support personnel during the normal business hours (published prime shift hours) of your IBM support center. (This assistance is not available to your end users.) IBM provides Severity 1 assistance 24 hours a day, every day of the year. For additional details, consult your IBM Software Support Guide at:

http://techsupport.services.ibm.com/guides/handbook.html

Software Maintenance does not include assistance for the design and development of applications, your use of programs in other than their specified operating environment, or failures caused by products for which IBM is not responsible under this agreement.

For additional information, refer to “Changes to Selected Distributed Software Products acquired through IBM or IBM Business Partners who remarket iSeries and pSeries,” Software Announcement 201-201, dated July 10, 2001.

Note: The following term differs from Software Announcement 201-201. Stand-alone upgrades to this product/release and its future versions and releases will be considered only on a special request basis from IBM.


IBM Operational Support Services — Support Line: No

AIX/UNIX® upgrade protection applies: No

Entitled upgrade for current AIX/UNIX upgrade protection licensees: No

iSeries Software Subscription applies: No

Variable charges apply: No

Educational allowance available: Yes, 15% education allowance applies to qualified education institution customers.

Prices

Parallel ESSL for AIX 5L, V3.1

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Software maintenance 1-year offering

OTC 1-year software maintenance program 5771-PES

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<td>charge)</td>
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Software maintenance 3-year offering

OTC 3-year software maintenance program 5773-PES

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<td>18,750</td>
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Mail: The Americas Call Centers
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P.O. Box 2690
Atlanta, GA 30301-2690

Reference: RE001

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