



IBM Parallel ESSL for AIX , V4.1 offers scientific subroutines for outstanding performance

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At a glance

IBM® Parallel Engineering and Scientific Subroutine Library (Parallel ESSL) for AIX® is tuned for outstanding performance on select clusters of IBM Power Systems™ servers based on IBM POWER7® technology.

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: RE001).

Overview

Parallel ESSL is a scalable mathematical subroutine library that supports parallel processing applications. Parallel ESSL for AIX, V4.1 supports IBM Power 775 clusters using the Host Fabric Interface (HFI) and select stand-alone POWER7 clusters or POWER7 clusters connected with a LAN supporting IP running AIX 7.1.

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 subroutines.

The Parallel ESSL SMP libraries are provided for use with the IBM Parallel Environment MPI threads library. You can run single or multithreaded user space or IP applications on all types of nodes. However, you cannot simultaneously call Parallel ESSL from multiple threads.

The Parallel ESSL for AIX libraries support both 32-bit and 64-bit environment applications. The subroutines can be called from applications written in Fortran, C, and C++.

Release 4.1 includes:

- New ScaLAPACK subroutines: PDTRTRI and PZTRTRI - Triangular Matrix Inverse
- New Fast Fourier Transform subroutines:
 - PSCFTD and PDCFTD - Multidimensional Complex Fourier Transform
 - PSRCFTD and PDRCFTD - Multidimensional Real-to-Complex Fourier Transform
 - PSCRFTD and PDCRFTD - Multidimensional Complex-to-Real Fourier Transform

Key prerequisites

- IBM AIX 7.1 with Service Pack 3, or later
- IBM Power 775 Supercomputer (9125-F2C) or select stand-alone POWER7 clusters or POWER7 clusters connected with a LAN

Planned availability date

August 26, 2011

Description

Parallel ESSL is a scalable mathematical subroutine library that supports parallel processing applications running on the following clusters under AIX 7.1:

- Power 775 clusters (based on POWER7 technology) using the HFI.
- Select stand-alone POWER7 clusters or POWER7 clusters connected with a LAN supporting IP.

Note: Refer to the [Technical information](#) and [Limitations](#) sections for additional details.

Parallel ESSL for AIX, V4.1 is a functional enhancement and complete replacement of Parallel ESSL for AIX, V3.3.

Parallel ESSL supports the Single Program Multiple Data (SPMD) programming model.

Parallel ESSL for AIX provides over 130 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

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Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Section 508 of the US Rehabilitation Act

Parallel ESSL for AIX is capable as of August 26, 2011, 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. A US Section 508 Voluntary Product Accessibility Template (VPAT) can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Product positioning

Use Parallel ESSL for AIX when you need outstanding performance through simple subroutine calls from floating-point engineering and scientific MPI applications.

Reference information

Refer to Software Announcement [210-152](#), dated June 08, 2010.

Program number

Program number	VRM	Program name
5765-ESX	4.1.0	Parallel ESSL for AIX

Product identification number

Program PID number	Maintenance 1-year PID number	Maintenance 3-year PID number
5765-ESX	5660-PES 5661-PES	5663-PES 5664-PES 5662-PES

Electronic Software Update Orders

Entitled Software Update (ESU) is a way for customers to self order their Power software release upgrades via the Entitled Software Support (ESS) website without the need to go to their seller to place the upgrade order. Entitled Software Update (ESU) orders for Electronic Software Delivery (ESD) is now available in all countries.

ESU orders for software will be placed on the Entitled Software Support (ESS) website

<http://www.ibm.com/servers/eserver/ess>

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Countries requiring physical delivery of License Information documentation will have these documents shipped separately. This physical shipment will not delay the immediate availability of the ESD images for customer download.

ESD customers placing ESD software orders will receive an email with the software order information. The ESU customer will be able to immediately proceed to the Downloads website for program access, instead of waiting for delivery of a physical package shipped from IBM.

Customers choosing physical delivery will also have the electronic images available for ESD download.

- ESD help (instructions on how to use)
http://www.ibm.com/systems/support/software/delivery/en_US/downloadinfo.html
- ESD sign-in (must have Customer number and Product software entitlements to get in)
<https://www.ibm.com/servers/eserver/ess/OpenServlet.wss>
- List of Power software products that are available for electronic download
http://www.ibm.com/systems/support/software/delivery/en_US/supportedproducts.html

Offering Information

Product information is available via the Offering Information website

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

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If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld ID and password are required (use IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=211-091>

Publications

No publications are shipped with this program.

The following publications are available on the web:

- IBM Parallel ESSL: Guide and Reference
- IBM Parallel ESSL for AIX: Installation Guide

To access ESSL and Parallel ESSL documentation, refer to the IBM Cluster information center website. It contains the most recent Parallel ESSL documentation in PDF and HTML formats and is located at

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

The IBM Publications Center

<http://www.ibm.com/shop/publications/order>

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. Payment options for orders are via credit card (in the US) or customer number for 50 countries. A large number of publications are available online in various file formats, and they can all be downloaded by all countries, free of charge.

Specified operating environment

Hardware requirements

IBM Power 775 clusters using the Host Fabric Interface (HFI) or Power 730 or Power 740 clusters running stand-alone or connected with a LAN supporting IP running AIX 7.1.

Software requirements

AIX 7.1 operating system with Service Pack 3, or later

Software products

- For compiling (one of these):
 - IBM XL Fortran Enterprise Edition V13.1 for AIX
 - IBM XL C/C++ Enterprise Edition V11.1 for AIX
- For linking, loading, or running:
 - ESSL for AIX, V5.1
 - Parallel Environment Runtime Edition for AIX, V1.1
 - IBM XL Fortran Run-Time Environment V13.1 for AIX provided with the IBM XL Fortran Enterprise Edition for AIX or downloadable from <http://www.ibm.com/support/docview.wss?uid=swg24026634>
 - IBM XL C libraries (included in the AIX Application Development Toolkit)

The program's specifications and specified operating environment information may be found in documentation accompanying the program, if available, such as a readme file, or other information published by IBM, such as an announcement letter. Documentation and other program content may be supplied only in the English language.

Companion products

- IBM Tivoli® Workload Scheduler LoadLeveler® can be used for submission of batch parallel jobs. It can help assist with node allocation for job management.
- IBM General Parallel File System™ (GPFS™) is a high-performance cluster file system for AIX, Linux®, and mixed clusters that provides users with shared access to files spanning multiple disk drives. GPFS delivers multicluster support, superior scalability and performance, support for extremely large files, failure recovery, and ease of administration.
- GPFS APAR IV00760 is required in support of the Power 775 cluster solution.

Limitations

Parallel ESSL is not thread-safe. However, the Parallel ESSL SMP libraries are thread-tolerant and can therefore be called from a single thread of a multithreaded application. Customers should not make multiple simultaneous calls to Parallel ESSL from different threads of a single process as this causes unpredictable results.

Support is not provided with Parallel ESSL for AIX, V4.1 for:

- AIX 5.3 or AIX 6.1 operating system
- POWER4™, POWER5™, and POWER6® processor types, including IBM BladeCenter®
- Power 755 servers
- Qlogic 9000 Series DDR InfiniBand switches
- High Performance Switch

- Myrinet-2000 switch with Myrinet/PCI-X adapters
- Parallel ESSL GM libraries

Technical description

Usability

Parallel ESSL for AIX is designed for usability with:

- An easy-to-use call interface
- Informative error-handling capabilities
- Support in a 64-bit environment. Note that 64-bit applications can be created on any system, but can only run on 64-bit hardware. The data model used for the 64-bit environment is referred to as LP64. This data model supports 32-bit integers and 64-bit pointers. In accordance with the LP64 data model, all Parallel ESSL for AIX integer arguments remain 32-bit.
- The data types operated on by the short-precision, long-precision, and integer versions of the subroutines are ANSI/IEEE 32-bit and 64-bit binary floating-point format, and 32-bit integer.

Areas of application

Parallel ESSL provides a variety of mathematical functions for many different types of scientific and engineering applications. Some of the industries using these applications are: Aerospace, Automotive, Electronics, Petroleum, Finance, Utilities, and Research. Examples of applications in these industries are:

- Structural Analysis Time Series Analysis
- Computational Chemistry Computational Techniques
- Fluid Dynamics Analysis Mathematical Analysis
- Seismic Analysis Dynamic Systems Simulation
- Reservoir Modeling Nuclear Engineering
- Quantitative Analysis Electronic Circuit Design

The subroutines provided in Parallel ESSL for AIX fall into the following groups:

- Six major areas of mathematical computation, providing the computations commonly used by the industry applications listed above
- Utilities, performing general-purpose functions

High-performance algorithms

The Parallel ESSL subroutines have been designed to provide high performance for numerically intensive computing jobs. To achieve this performance, the subroutines use advanced algorithms tailored to specific operational characteristics of the hardware, such as cache size, Translation Lookaside Buffer (TLB) size, and page size.

The FORTRAN Language Interface to the Subroutines

- The Parallel ESSL for AIX subroutines follow standard FORTRAN calling conventions and must run in the FORTRAN runtime environment.
- When Parallel ESSL for AIX subroutines are called from a program in a language other than FORTRAN, such as C or C++, the FORTRAN conventions must be used. This applies to all aspects of the interface, such as the linkage conventions and the data conventions. For example, array ordering must be consistent with FORTRAN array ordering techniques.

Planning information

Packaging

Parallel ESSL for AIX is distributed as a single package available via DVD media with the following:

- IBM International Program License Agreement in multilanguage booklet (LC23-5101-00) and its License Information (L-RHAN-8CCLST) in multiple languages
- Proof of Entitlement (POE)
- Product readme file that describes the program's specified operating environment and program specifications
- Program filesets:
 - pessl.loc.license.4.1.0.0.I
 - pessl.man.en_US.4.1.0.0.I
 - pessl.msg.En_US.4.1.0.0.I
 - pessl.msg.en_US.4.1.0.0.I
 - pessl.rte.4.1.0.0.I
 - pessl.rte.mp.4.1.0.0.I
 - pessl.rte.up.4.1.0.0.I

Security, auditability, and control

Parallel ESSL uses the security and auditability features of the AIX 7 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.

Software Services

IBM Software Services has the breadth, depth, and reach to manage your services needs. You can leverage the deep technical skills of our lab-based, software services team and the business consulting, project management, and infrastructure expertise of our IBM Global Services team. Also, we extend our IBM Software Services reach through IBM Business Partners to provide an extensive portfolio of capabilities. Together, we provide the global reach, intellectual capital, industry insight, and technology leadership to support a wide range of critical business needs.

To learn more about IBM Software Services or to contact a Software Services sales specialist, visit

<http://www.ibm.com/software/sw-services/>

Ordering information

Charge metric

Program name	Part number or PID number	Charge metric
Parallel ESSL for AIX	5765-ESX	Per processor with 1 year SWMA
1-year SWMA: Registration and Renewal	5660-PES	Per processor
1-year SWMA:	5661-PES	Per processor

After-license

3-year SWMA: Registration	5662-PES	Per processor
3-year SWMA: Renewal	5663-PES	Per processor
3-year SWMA: After-license	5664-PES	Per processor

Processor

A processor is the unit of measure by which this program is licensed. A *processor* (commonly called a *CPU* or *core*) is a functional unit within a computing device that interprets and executes instructions. A processor consists of at least an instruction control unit and one or more arithmetic or logic units. With multicore technology, each core is considered a processor.

5765-ESX - Parallel ESSL for AIX, v4

Basic license one-time charge

Feature description	Feature number
Per processor with 1-year software maintenance	0001

Notes:

- When configuring the 9125-F2C (775), the number of active processors is 256. Since some fulfillment systems have an ordering limitation quantity of 250, the initial order will default to the maximum 250 quantity and a second order will need to be placed for a quantity of 6.
- The following information is updated for Version 3 of Parallel ESSL for AIX.

5765-F84 - Parallel ESSL for AIX, v3

Basic license one-time charge

Feature description	Feature number
Per processor with 1-year software maintenance	0017

This software license includes 1-year Software Maintenance.

Extending coverage for a total of three years from the 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 for Parallel ESSL for AIX - 5765-ESX

Feature description	Feature number
5660-PES Maintenance no-charge 1-year registration Per processor	1690
5660-PES Maintenance 1-year 24 x 7 support Per processor	1691
5662-PES Maintenance 3-year registration Per processor	0904
5662-PES Maintenance 3-year 24 x 7 support Per processor	0905
5661-PES 1-year Software Maintenance after-license	

Per processor	0625
5661-PES After-license 1-year 24 x 7 support	
Per processor	0626
5664-PES 3-year Software Maintenance after-license	
Per processor	0016
5664-PES After-license 3-year 24 x 7 support	
Per processor	0017

System Program Order (SPO): An order for SPO 5692-A6P is mandatory for shipments of program distribution. The individual licensed program orders are for registration and billing purposes only. No shipment occurs under these orders.

To receive shipment of machine-readable materials, the order needs to include SPO 5692-A6P for Parallel ESSL for AIX. The individual licensed program order (for example, 5765-ESX) must still be ordered but will be for registration and billing purposes only and will not result in shipment of materials.

Program number	Program/Function name	Feature number
5692-A6P	Parallel ESSL for AIX, v4.1	2286

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License Information form number

L-RHAN-8CCLST

The program's License Information will be available for review on the IBM Software License Agreement website

<http://www.ibm.com/software/sla/sladb.nsf>

Limited warranty applies

Yes

Limited warranty

IBM warrants that when the program is used in the specified operating environment, it will conform to its specifications. The warranty applies only to the unmodified portion of the program. IBM does not warrant uninterrupted or error-free operation of the program or that IBM will correct all program defects. You are responsible for the results obtained from the use of the program.

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If for any reason you are dissatisfied with the program and you are the original licensee, you may obtain a refund of the amount you paid for it, if within 30 days of your invoice date you return the program and its PoE to the party from whom you obtained it. If you downloaded the program, you may contact the party from whom you acquired it for instructions on how to obtain the refund.

For clarification, note that for programs acquired under any of IBM's On/Off Capacity on Demand (On/Off CoD) software offerings, this term does not apply since these offerings apply to programs already acquired and in use by you.

Volume orders (IVO)

Yes. Contact your IBM representative.

Passport Advantage applies

No

Software Subscription and Support applies

Yes. All distributed software licenses include Software Subscription and 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 Subscription and Support 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 offers optional Severity 1 assistance 24 hours a day, every day of the year.

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No

Other support

Power Systems SWMA

System i Software Maintenance applies

No

Variable charges apply

No

Educational allowance available

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Prices

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Choose the option entitled Purchase/upgrade tools.

Program name: Parallel ESSL for AIX

Order type	Type-model number	One-time charge feature number	One-time charge
Per processor with 1 year SWMA	5765-ESX	0001	\$
Per processor with 1 year SWMA	5765-F84	0017	\$

Program name: Software Maintenance for Parallel ESSL for AIX

Order type	Type-model number	One-time charge feature number	One-time charge
Maintenance no-charge 1-yr registration	5660-PES	1690	\$
Maintenance 1-year 24 x 7 support	5660-PES	1691	
Maintenance 3-year registration	5662-PES	0904	
Maintenance 3-year 24 x 7 support	5662-PES	0905	
1-yr Software Maintenance after-license	5661-PES	0625	\$
After-license 1-year 24 x 7 support	5661-PES	0626	
3-yr Software Maintenance after-license	5664-PES	0016	
After-license 3-year 24 x 7 support	5664-PES	0017	

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[ENUS-211-091-List_prices_2011_07_12.PDF](#)

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