

# IBM ESSL for Linux on Power, V6.1 provides new subroutines and function running IBM Power Systems POWER9 servers

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## At a glance

IBM<sup>(R)</sup> Engineering and Scientific Subroutine Library (ESSL) for Linux<sup>(R)</sup> on Power<sup>(R)</sup>, V6.1 provides new function and new subroutines to its math library, providing additional value to your IBM POWER9<sup>TM</sup> processor-based clusters.

## Overview

ESSL for Linux on POWER<sup>(R)</sup>, V6.1 offers a collection of mathematical subroutines that are tuned for performance on IBM POWER8<sup>(R)</sup> and POWER9 processor-based servers.

The following subroutines, providing new functionality, have been added to ESSL for Linux on Power, V6.1:

### New BLAS and CBLAS subroutines:

- SAXPBY and DAXPBY (Scales Vector X and Vector Y by two Scalars, Adds them to one another, and Stores in the Vector Y)

### New LAPACK and LAPACKE subroutines:

- CLANSY and ZLANSY (Complex Symmetric Matrix Norm)
- SSYEVR, DSYEVR, CHEEVR, and ZHEEVR (Eigenvalues, and optionally, the Eigenvectors of a Real Symmetric or Complex Hermitian Matrix)
- SSYGVD, DSYGVD, CHEGVD, and ZHEGVD (Eigenvalues, and optionally, the Eigenvectors of a Positive Definite Real Symmetric or Complex Hermitian Generalized Eigenproblem using a Divide-and-Conquer Algorithm)
- SSYGV, DSYGV, CHEGV, and ZHEGV (Eigenvalues, and optionally, the Eigenvectors of a Positive Definite Real Symmetric or Complex Hermitian Generalized Eigenproblem)
- SLAMCH and DLAMCH (Determines machine parameters for floating-point arithmetic)

Additionally, graphics processing unit (GPU) support, providing improved performance, has been added for the following subroutines:

### LAPACK:

- SGESV, DGESV, CGESV, and ZGESV (General Matrix Factorization and Multiple Right-Hand Side Solve)
- SGETRF, DGETRF, CGETRF, and ZGETRF (General Matrix Factorization)
- SGETRS, DGETRS, CGETRS, and ZGETRS (General Matrix Multiple Right-Hand Side Solve)
- SPOSV, DPOSV, CPOSV, and ZPOSV (Positive Definite Real Symmetric or Complex Hermitian Matrix Factorization and Multiple Right-Hand Side Solve)
- SPOTRF, DPOTRF, CPOTRF, and ZPOTRF (Positive Definite Real Symmetric or Complex Hermitian Matrix Factorization)
- SPOTRS, DPOTRS, CPOTRS, and ZPOTRS (Positive Definite Real Symmetric or Complex Hermitian Matrix Multiple Right-Hand Side Solve)
- SPPSV, DPPSV, CPPSV, and ZPPSV (Positive Definite Real Symmetric or Complex Hermitian Matrix Factorization and Multiple Right-Hand Side Solve)
- SPPTRF, DPPTRF, CPPTRF, and ZPPTRF (Positive Definite Real Symmetric or Complex Hermitian Matrix Factorization)
- SPPTRS, DPPTRS, CPPTRS, and ZPPTRS (Positive Definite Real Symmetric or Complex Hermitian Matrix Multiple Right-Hand Side Solve)
- SGEQRF, DGEQRF, CGEQRF, and ZGEQRF (General Matrix QR Factorization)
- SGELS, DGEELS, CGELS, and ZGELS (Linear Least Squares Solution for a General Matrix)

#### **Fourier Transforms:**

- SCFTD and DCFTD (Multidimensional Complex Fourier Transform)
- SRCFTD and DRCFTD (Multidimensional Real-to-Complex Fourier Transform)
- SCRFTD and DCRFTD (Multidimensional Complex-to-Real Fourier Transform)

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### **Key prerequisites**

- Select IBM Power Systems™ HPC servers
- Red Hat Enterprise Linux 7.5

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### **Planned availability date**

August 31, 2018

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### **Product positioning**

Use ESSL when you need outstanding performance through simple subroutine calls from floating-point engineering and scientific applications running on Power Systems servers.

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### **Reference information**

For information on other product announcements that are part of this high-performance computing solution, see:

- Software Announcement [ZP18-0121](#), dated August 28, 2018, for IBM Parallel Performance Toolkit for POWER, V2.4 and IBM Parallel ESSL for Linux on Power, V5.4
- Software Announcement [ZP18-0119](#), dated August 28, 2018, for IBM Spectrum™ MPI V10.2
- Selected Support Announcement [ZP18-0118](#), dated April 24, 2018, for Cluster Administration and Storage Tools

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## Program number

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Program number	VRM	Program name
5765-L61	6.1.0	IBM Engineering and Scientific Subroutine Library (ESSL) for Linux on Power

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### Product identification number

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Program number	Maintenance 1-year PID number	Maintenance 3-year PID number
5765-L61	5660-ELL	5662-ELL
	5661-ELL	5663-ELL
		5664-ELL

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## Offering Information

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Product information is available on the [IBM Offering Information](#) website.

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## Publications

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No publications are shipped with this program. The following publications are available from [IBM Knowledge Center](#):

*IBM Engineering and Scientific Subroutine Library:*

- *Guide and Reference*
- *Linux on Power Installation Guide*

IBM Knowledge Center is a worldwide central repository of IBM technical publications hosted in a single application. You can find and navigate technical content more efficiently and easily with improved search, filtering, and user experience. Create your own collections of IBM documents with PDF output on demand.

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## Services

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### Global Technology Services

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Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings for the efficient installation, implementation, or integration of this product.

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## Technical information

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### Specified operating environment

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#### Hardware requirements

ESSL for Linux on Power, V6.1 is supported on IBM POWER9 and IBM POWER8 processor-based servers.

**Note:** The ESSL SMP CUDA Library is supported only on:

- IBM Power System AC922 (8335-GTG, 8335-GTC and 8335-GTW) servers that include Tesla V100 with NVLink GPUs
- IBM Power System S822LC (8335-GTB) servers with NVIDIA P100 GPUs.

## **Software requirements**

### **ESSL for Linux on Power, V6.1:**

Supported operating system:

- Red Hat Enterprise Linux 7.5 for Power Little Endian (POWER9 only)
- Red Hat Enterprise Linux 7.5 (little endian mode)(POWER8 only)

For compiling, one of these:

- IBM XL Fortran for Linux, V15.1.6, or V16.1.0, with the latest service level.
- IBM XL C/C++ for Linux, V13.1.6, or V16.1.0, with the latest service level.
- gcc and g++: Use the GCC compiler and libraries provided with your Linux distribution.

For linking, loading, or running:

- IBM XL Fortran Runtime Environment for Linux, 15.1.6, or V16.1.0, with the latest service level.
- gcc 64-bit libraries, provided with the Linux distribution.
- CUDA Toolkit 9.2 (if the ESSL SMP CUDA library is used).

**Note:** The ESSL SMP libraries require the XL OpenMP runtime. The gcc OpenMP runtime is not compatible with the XL OpenMP runtime. Therefore, the ESSL SMP libraries can only be used with other compilers if the program calling ESSL is a serial program (does not use OpenMP) because in this case only the XL OpenMP runtime is used.

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 this announcement. Documentation and other product content may be supplied only in the English language.

## **Compatibility**

The calling sequences for the subroutines in ESSL for Linux on Power, V5.5 and ESSL for Linux on Power, V6.1 are identical; therefore, no changes to your application programs are required.

## **IBM Electronic Support**

The IBM Support Portal is your gateway to technical support. This includes IBM Electronic Support tools and resources, for software and hardware, to help save time and simplify support. The Electronic Support tools can help you find answers to questions, download fixes, troubleshoot, automate data collection, submit and track problems through the Service Request online tool, and build skills. All these tools are made available through your IBM support agreement. Read about the Electronic Support portfolio of tools on the [IBM Electronic Support](#) website.

You can also access the [IBM Support Portal](#) page and the online [Service requests and PMRs](#) tool for more support.

## **Planning information**

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### **Packaging**

This program is distributed as a single DVD media or available for electronic download. Included are:

- IBM International Program License Agreement in multiple languages
- Proof of entitlement (PoE)

- Required installation files

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

### Security, auditability, and control

This program uses the security and auditability features of the system on which the program is installed.

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

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## Ordering information

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Consult your IBM representative.

Program: IBM Engineering and Scientific Subroutine Library for Linux on Power (5765-L61)

Program number	Feature description	OTC feature number
5765-L61	IBM ESSL for Linux on Power Use-Based License w/1 Year SW Maintenance Per Small Processor Qty 1	U8H4C1
5765-L61	IBM ESSL for Linux on Power Use-Based License w/1 Year SW Maintenance Per Medium Processor Qty 1	U8H5C1
5765-L61	IBM ESSL for Linux on Power Use-Based License w/1 Year SW Maintenance Per Large Processor Qty 1	U8H6C1

This software license includes Software Maintenance, previously referred to as Software Subscription and Technical Support. Extending coverage for a total of three years from the date of acquisition may be elected.

Feature numbers associated with this program's Software Maintenance PIDs 5660-ELL, 5661-ELL, 5662-ELL, 5663-ELL, and 5664-ELL are not changed.

### Maintenance PID description

Maintenance PID number	Description
5660-ELL	Software Maintenance no charge 1-year registration
5661-ELL	Software Maintenance 1-year After License
5662-ELL	Software Maintenance 3-year registration (2 year uplift)
5663-ELL	Software Maintenance 3-year renewal
5664-ELL	Software Maintenance 3-year After License

### Charge metric

Program name	PID number	Charge metric	License Information document number
IBM ESSL for Linux on Power	5765-L61	Per processor core on a small,	<a href="#">L-RHAN-AVHSFA</a>

Program name	PID number	Charge metric	License Information document number
		medium, or large server	

### Processor Core

*Processor Core* (or *Processor*) is a functional unit within a computing device that interprets and executes instructions. A Processor Core consists of at least an instruction control unit and one or more arithmetic or logic unit. With multicore technology, each core is considered a Processor Core. Entitlements must be acquired for all activated Processor Cores available for use on the server.

### System Program Order (SPO)

An order for SPO 5692-A6P is mandatory for shipments of program distribution, electronic and on media. The individual licensed program orders are for registration and billing purposes only. No shipment occurs under those orders.

To receive shipment of machine-readable materials, the order needs to include SPO 5692-A6P and program feature:

Program number	Program/Function name	Supply feature number
5692-A6P	IBM ESSL for Linux on Power, V6.1	2341

## Terms and conditions

The information provided in this announcement letter is for reference and convenience purposes only. The terms and conditions that govern any transaction with IBM are contained in the applicable contract documents such as the IBM International Program License Agreement, IBM International Passport Advantage<sup>(R)</sup> Agreement, and the IBM Agreement for Acquisition of Software Maintenance.

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This software license includes Software Subscription and Support (also referred to as Software Maintenance).

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## License Information number

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The following License Information document applies to the offering in this announcement:

Program identifier	License Information document title	License Information document number
5765-L61	IBM Engineering and Scientific Subroutine Library for Linux on Power, V6.1	<a href="#">L-RHAN-AVHSFA</a>

Select your language of choice and scroll down to the Charge Metrics section. Follow-on releases, if any, may have updated terms. See the [License Information documents](#) website for more information.

## Limited warranty applies

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Yes

## Limited warranty

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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.

IBM provides you with access to IBM databases containing information on known program defects, defect corrections, restrictions, and bypasses at no additional charge. For further information, see the [IBM Software Support Handbook](#).

IBM will maintain this information for at least one year after the original licensee acquires the program (warranty period).

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Technical support of a program product version or release will be available for a minimum of three years from the general availability date, as long as your Software Subscription and Support (also referred to as Software Maintenance) is in effect.

This technical support allows you to obtain assistance (by telephone or electronic means) from IBM for product-specific, task-oriented questions regarding the installation and operation of the program product. Software Subscription and Support also provides you with access to updates (modifications or fixes), releases, and versions of the program. You will be notified, through an announcement letter, of discontinuance of support with 12 months' notice. If you require additional technical support from IBM, including an extension of support beyond the discontinuance date, contact your IBM representative or IBM Business Partner. This extension may be available for a fee.

For additional information on the IBM Software Support Lifecycle Policy, see the [IBM Software Support Lifecycle Policy](#) website.

## Money-back guarantee

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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.

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**Volume orders (IVO)**

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Yes. Contact your IBM representative.

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**Passport Advantage applies**

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No

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**Software Subscription and Support applies**

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Yes. All distributed software licenses include Software Subscription and Support (also referred to as Software Maintenance) 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 by 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, go to the [IBM Support Handbooks](#) page.

Software Subscription and Support 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.

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**IBM Operational Support Services - Support Line**

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No

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**Variable charges apply**

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No

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**Educational allowance available**

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Yes. When ordering through the program number process, a 15% education allowance applies to qualified education institution clients.

Education Software Allowance Program applies when ordering through the program number process.

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**ESAP available**

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Yes, to qualified clients.

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**Statement of good security practices**

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IT system security involves protecting systems and information through intrusion prevention, detection, and response to improper access from within and outside your enterprise. Improper access can result in information being altered, destroyed,



or misappropriated or can result in misuse of your systems to attack others. Without a comprehensive approach to security, no IT system or product should be considered completely secure and no single product or security measure can be completely effective in preventing improper access. IBM systems and products are designed to be part of a regulatory compliant, comprehensive security approach, which will necessarily involve additional operational procedures, and may require other systems, products, or services to be most effective.

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Now integrated into the base operating system of AIX<sup>(R)</sup> V5.3, AIX V6.1, and AIX V7.1, Electronic Service Agent is designed to automatically and electronically report system failures and utilization issues to IBM, which can result in faster problem resolution and increased availability. System configuration and inventory information collected by the Electronic Service Agent tool also can be viewed on the secure Electronic Support web portal, and used to improve problem determination and resolution by you and the IBM support team. To access the tool main menu, simply type `smitty esa_main`, and select Configure Electronic Service Agent. In addition, ESA now includes a powerful web user interface, giving the administrator easy access to status, tool settings, problem information, and filters. For more information and documentation on how to configure and use Electronic Service Agent, go to the [IBM Electronic Service Agent](#) website.

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### Benefits

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**Increased uptime:** The Electronic Service Agent™ tool is designed to enhance the Warranty or Maintenance Agreement by providing faster hardware error reporting and uploading system information to IBM Support. This can translate to less wasted time monitoring the symptoms, diagnosing the error, and manually calling IBM Support to open a problem record. Its 24 x 7 monitoring and reporting mean human intervention is not required to report errors.

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For additional information, go to the [IBM Electronic Service Agent](#) website.

**More accurate reporting:** Because system information and error logs are automatically uploaded to the IBM Support Center in conjunction with the service

request, you are not required to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM, problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

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For more information on how to utilize the power of IBM Electronic Services, contact your IBM Systems Services Representative, or go to the [IBM Electronic Support](#) website.

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## Prices

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For all local charges, contact your IBM representative.

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## Announcement countries

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All European, Middle Eastern, and African countries, except Islamic Republic of Iran, Sudan, and Syrian Arab Republic.

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