



Release Note for Arm Performance Libraries

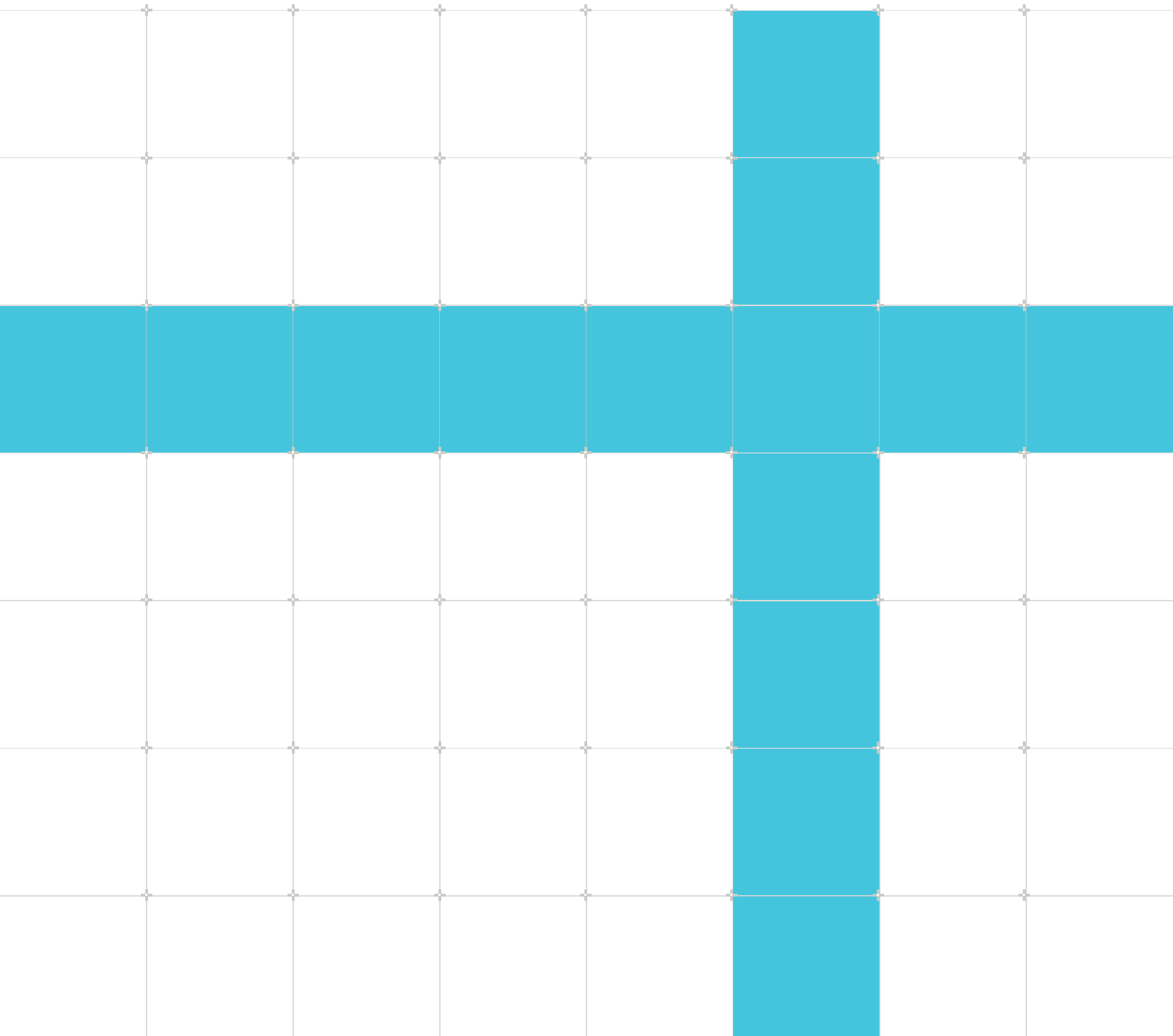
23.10

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Issue 01

109681_2310_01_en



Release Note for Arm Performance Libraries

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Release information

Document history

Issue	Date	Confidentiality	Change
2020-01	7 August 2020	Non-Confidential	20.2 release
2030-01	9 September 2020	Non-Confidential	20.3.0 release
2100-01	30 March 2021	Non-Confidential	21.0.0 release
2110-01	24 August 2021	Non-Confidential	21.1.0 release
2202-01	24 May 2022	Non-Confidential	22.0.2 release
2210-01	23 September 2022	Non-Confidential	22.1.0 release
2304-01	19 May 2023	Non-Confidential	23.04.1 release
2310-01	12 October 2023	Non-Confidential	23.10 release

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PRE-1121-V1.0

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Product Status

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Feedback

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To provide feedback on the document, fill the following survey: <https://developer.arm.com/documentation-feedback-survey>.

Inclusive language commitment

Arm values inclusive communities. Arm recognizes that we and our industry have used language that can be offensive. Arm strives to lead the industry and create change.

We believe that this document contains no offensive language. To report offensive language in this document, email terms@arm.com.

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1. Arm Performance Libraries 23.10 Release Note

Arm Performance Libraries 23.10 covers the following releases:

- Arm Performance Libraries 23.10 - Released 12th October 2023

Arm Performance Libraries 23.10 is available for the following versions of GCC:

- GCC 7.5
- GCC 8.2
- GCC 9.3
- GCC 10.2
- GCC 11.3
- GCC 12.2

1.1 Arm Performance Libraries 23.10 Release Note

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Arm conventions and proprietary notices, including confidentiality status, terminology statement, and product release status, can be found at the end of this document.

1.2 Contents

This release note contains the following sections:

- Release overview
- Release contents
- Get started
- Support
- Release history
- Glossary
- Proprietary notices

1.3 Release overview

Use of the standalone version of Arm Performance Libraries is subject to the terms and conditions of the applicable End User License Agreement (“EULA”). A copy of the EULA can be found in the ‘license_terms’ folder of your product installation.

Product description

The standalone Linux version of Arm Performance Libraries contains optimized math functions, such as linear algebra and Fast Fourier Transforms, for Arm AArch64 implementations, including those with SVE. It is compatible with GCC 12.2.0.

Arm Performance Libraries is optimized for a number of microarchitectures. The latest information is available on the Arm Developer website:

<https://developer.arm.com/documentation/101004/latest>

Release status

This is the 23.10.0 release of Arm Performance Libraries.

These deliverables are being released under the terms of the agreement between Arm and each licensee (the “Agreement”). All planned verification and validation is complete. The release is suitable for volume production under the terms of the Agreement.

1.4 Release contents

The following subsections describe:

- The product parts that are delivered as part of this release.
- Any changes since the previous release.
- Any known issues and limitations that exist at the time of this release.

Deliverables

- Arm Performance Libraries 23.10.0
- Release Notes (this document)
- Documentation

Product documentation is available on the Arm Developer website:

<https://developer.arm.com/Tools%20and%20Software/Arm%20Performance%20Libraries#Resources>

Documentation and release notes might change between product releases. For the latest documentation bundle, check the product download page.

Arm tests PDFs only in Adobe Acrobat and Acrobat Reader. Arm cannot guarantee the quality of its PDFs when used with any other PDF reader. Adobe reader products are available at <https://www.adobe.com>.

Differences from previous release

The following subsections describe differences from the previous release of Arm Performance Libraries.

Additions and changes:

Describes new features or components added, or any technical changes to features or components, in the 23.10.0 release.

- This is the first combined release of Arm Performance Libraries for Linux, macOS and Windows.
- New build of the library compatible with NVIDIA HPC Compilers 23.3.
- The Arm Neoverse V2 and Neoverse N2 cores are added as new microarchitecture targets with specific tunings.
- Increased performance for:
 - Many cases across BLAS routines.
 - Parallel FFT implementations.
- New BLAS extension matrix-copy routines added:
 - Out-of-place routines: ?OMATCOPY.
 - In-place routines: ?IMATCOPY
 - See examples and online documentation for details.

Resolved issues:

Describes any technical issues that are resolved in the 23.10.0 release.

- Arm Performance Libraries now detects software availability of SVE on SVE capable hardware.

Describes any technical issues that are resolved in the 23.04.1 release.

- Integer overflow fixed in `armpl_spmat_export*` functions in lp64 libraries.

Known limitations

The following subsection describes any issues known at the time of this release.

Open technical issues:

There are no open technical issues in 23.10.0 release.

1.5 Get started

This section describes information to help you get started with accessing, setting up, and using Arm Performance Libraries.

For more information, see the Get Started information on the Arm Developer website:

<https://developer.arm.com/downloads/-/arm-performance-libraries>

Licensing information

Use of the standalone version of Arm Performance Libraries is subject to the terms and conditions of the applicable End User License Agreement (“EULA”). A copy of the EULA can be found in the ‘license_terms’ folder of your product installation.

You do not require a license to use this Arm Performance Libraries package.

Prerequisites

If any of the following tools are not already installed by your Linux distribution, you must install them before installing Arm Performance Libraries:

- Python (version 3.6 or later)
- C Libraries:
 - SLES and RHEL: glibc-devel
 - Ubuntu: libc6-dev

Download the product

Arm delivers the files through the Arm Developer website:

<https://developer.arm.com/downloads/-/arm-performance-libraries>

Unpack the product

The following steps describe how to unpack each constituent part delivered in this bundle:

1. Relocate the bundle file. Move the .tar files to the directory you want to install the product in.
2. Extract the tar file contents using a tar utility:

```
tar -xvf <package_name>.tar
```

Directory structure:

Shows the principal directory structure of this release created after unpacking the bundle:

```
license_terms/  
arm-performance-libraries_<version>_*.sh  
RELEASE_NOTES.txt
```

Install the product

To install Arm Performance Libraries, navigate into the extracted package directory (<package_name>) and run the installation script as a privileged user. Pass any options to configure the installation:

```
cd path/to/<package_name>/  
./arm-performance-libraries_<version>_*.sh [option]...
```

Some common installation options are:

- For a headless installation and to automatically accept the EULA, use the `--accept` option.
- To perform a local install, use the `--install-to <dir>` option.

For a full list of supported installation options, see:

<https://developer.arm.com/downloads/-/arm-performance-libraries>

The installer displays the EULA and prompts you to agree to the terms. Type 'yes' at the prompt to continue.

The packages are unpacked to <install_location>/arm-performance-libraries_23.10.0_gcc-12.2, and <install_location>/armp1_23.10.0_gcc-12.2, with environment modulefiles available under <install_location>/modulefiles. The default installation location is /opt/arm/. Local installs have the same directory structure starting from your chosen installation root.

RPMs

The installed packages are shipped as RPMs for RPM based Linux distributions. These RPMs are signed by Arm's High Performance Computing (HPC) GPG key. The public key can be downloaded from:

<https://developer.arm.com/-/media/files/keys/GPG-PUB-KEY-ARM-HPC-SW-TOOLS.PUB>

This key can be imported by running:

```
rpm --import GPG-PUB-KEY-ARM-HPC-SW-TOOLS.PUB
```

More information about Environment Modules can be found at:

<http://modules.sourceforge.net>

Run the product

1. Load the environment module.

Ensure you have access to modules, replace `/opt/arm` with `<install_location>` if necessary, and use:

```
module use /opt/arm/modulefiles
module avail
module load armpl/23.10.0_gcc-12.2
```

2. To generate an executable binary with GCC, compile your program with Arm Performance Libraries. Use:

```
gcc -I<install_dir>/include -L<install_dir>/lib <-larmpl> -lm [options] -o <binary>
<input>
```

or

```
gfortran -I<install_dir>/include -L<install_dir>/lib <-larmpl> -lm [options] -o
<binary> <input>
```

where:

- `<-larmpl>` is one of: `-larmpl`, `-larmpl_lp64`, `-larmpl_ilp64`, `-larmpl_lp64_mp`, or `-larmpl_ilp64_mp`.
- `[options]` denotes any other GCC compiler options
- `<input>` is the source file (or files)
- `<binary>` is the application executable to build

3. Run the generated binary `<binary>`:

```
./<binary>
```

Examples

Example code can be found at:

```
<install_location>/armpl_23.10.0_gcc-12.2/examples*
```

Multiple examples directories are provided in the installation. The suffix of the directory name indicates whether the examples inside link to the 32-bit (`_lp64`) or 64-bit (`_ilp64`) integer variants, and sequential (no suffix indicator) or OpenMP (`_mp`) multi-threaded variants, of Arm Performance Libraries.

The default set of examples in the 'examples' directory link to the sequential, 32-bit integers variant of Arm Performance Libraries.

You need to copy this code to a writeable directory and load Arm Performance Libraries environment module for the examples to build.

For example:

1. Copy the default 'examples' directory somewhere writeable:

```
cp -r <install_location>/armp1_23.10.0_gcc-12.2/examples ./  
cd examples
```

2. Load the correct environment modules:

```
module load armp1/23.10.0_gcc-12.2
```

3. Build the examples:

```
make
```

For more information about the Arm Performance Libraries examples, see:

<https://developer.arm.com/documentation/102620/0100/Compile-and-test-the-examples>

Uninstall

For convenience, this package includes an "uninstall.sh" script at:

```
<install_location>/arm-performance-libraries_23.10.0_gcc-12.2/uninstall.sh
```

This script attempts to uninstall all the components supplied as part of Arm Performance Libraries. However, if other packages outside of this product depend on the GCC component, GCC will not be uninstalled.

1.6 Support

The documentation that is available for Arm Performance Libraries can be found on the product resources page on the Arm Developer website:

<https://developer.arm.com/Tools%20and%20Software/Arm%20Performance%20Libraries#Resources>

Reference documentation for the supported routines in Arm Performance Libraries is available at:

<https://developer.arm.com/documentation/101004/latest>

If you have any issues with the installation, content or use of this release, create a post that describes your issue on the Arm Community HPC forum:

<https://community.arm.com/developer/tools-software/hpc/f/hpc-user-group>

Arm will respond as soon as possible.

These deliverables are being released under the terms of the agreement between Arm and each licensee (the "Agreement"). All planned verification and validation is complete. The release is suitable for volume production under the terms of the Agreement.

OS

These libraries are supported on the following Linux platforms:

- AArch64 RHEL 7, 8 and 9
- AArch64 SLES 15
- AArch64 Ubuntu 20.04 and 22.04
- AArch64 Amazon Linux 2 and 2023

Full information about the platforms supported by Arm Performance Libraries is available on the Arm Developer website:

<https://developer.arm.com/Tools%20and%20Software/Arm%20Compiler%20for%20Linux#Supported-Devices>

1.7 Release history

A full release history (with release notes) for Arm Performance Libraries is available on the Arm Developer website:

<https://developer.arm.com/downloads/-/arm-performance-libraries/release-history>

1.8 Glossary

The Arm Glossary is a list of terms that are used in Arm documentation, together with definitions for those terms. The Arm Glossary does not contain terms that are industry standard unless the Arm meaning differs from the generally accepted meaning.

See the Arm Glossary for more information: <https://developer.arm.com/glossary>.

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