

# ACML

## AMD Developer Central

// Code Faster, Faster Code

## OTHER AMD PERFORMANCE LIBRARIES

**APPML:** AMD Accelerated Parallel Processing Math Libraries are software libraries containing FFT and BLAS functions written in OpenCL and designed to run on AMD GPUs.

**AMD LibM:** a software library containing a collection of basic math functions optimized for x86-64 processor-based machines.

**AMD String Library:** standard GNU C Library (glibc) string functions optimized for AMD processors.

**Framework Project:** a collection of popular low-level software routines beginning with simple arithmetic and extending into rich domains, such as image and signal processing.

**SSEPlus Project:** simplifies SIMD development through optimized emulation of SSE instructions, CPUID wrappers, and fast versions of key SIMD algorithms.

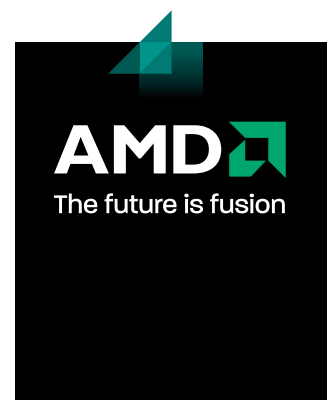
<http://developer.amd.com>

## OVERVIEW

AMD Core Math Library (ACML) provides a no-cost set of math routines for high performance computing (HPC), scientific, engineering, and related compute-intensive applications, thoroughly optimized and threaded for use on AMD processors. ACML is ideal for weather modeling, computational fluid dynamics, financial analysis, oil and gas applications, and more.

## FEATURES

BLAS	<ul style="list-style-type: none"><li>→ 100% compatible BLAS library including all standard Level 1, Level 2, and Level 3 subroutines</li><li>→ Highly optimized kernels for GEMM routines and other Level 3 matrix-matrix operations</li><li>→ Highly optimized for Level 1 BLAS vector operations</li><li>→ Support for AMD-K8™, AMD Family 10h, AMD Family 15h and various Intel processor families</li><li>→ OpenMP support for Level 3 BLAS routines</li></ul>
LAPACK	<ul style="list-style-type: none"><li>→ Derived from Mark 22 NAG Library for SMP and Multicore</li><li>→ Multithreading optimizations in many routines</li></ul>
FFT	<ul style="list-style-type: none"><li>→ Complex, Real-Complex, Complex-Real transforms</li><li>→ 1D, 2D, and 3D transforms</li><li>→ Expert interfaces provide more control over scaling, in-place/out-of-place, array layout</li></ul>
Vector Math Library	<ul style="list-style-type: none"><li>→ Optimized versions of most critical libm functions</li><li>→ Scalar, Vector, and array versions</li></ul>
Random Number Generators	<ul style="list-style-type: none"><li>→ 5 base generators<ul style="list-style-type: none"><li>→ NAG Basic, Wichmann-Hill, L'Ecuyer, Mersenne Twister, Blum-Blum-Shub</li></ul></li><li>→ 26 distribution generators<ul style="list-style-type: none"><li>→ Univariate continuous and discrete</li><li>→ Multivariate</li></ul></li><li>→ Save, copy, and restore state of each generator</li><li>→ Multiple independent sequences</li></ul>



# AMD Core Math Library (ACML)

## BENEFITS

### Simple interface to take advantage of latest hardware innovations

ACML tunes for the latest hardware so you can easily tap into new processor features, including:

- SSE, SSE2, SSE3, AVX and FMA4
- Multi-cores

### Blazing fast development of scientific and high performance computing projects

With tuned implementations of industry standard math libraries and other frequently used scientific subroutines, ACML enables you to accelerate projects such as:

- Weather modeling
- Finite element analysis
- Computational fluid dynamics
- Financial analysis
- Oil and gas applications
- and many more...

### Easy path to multi-threading

ACML's aggressively tuned OpenMP versions mean that you don't have to worry about managing sophisticated threading models or complex debugging. Whether you are using dynamic or static linking, Windows® or Linux® 32- or 64-bit operating systems, multi-threading just works. Multi-threaded routines are available for the Level 3 BLAS, many LAPACK routines, and the 2D and 3D FFTs.

## SUPPORTED COMPILERS

ACML supports a variety of compilers for both Linux and Windows Operating Systems.

### Linux

- Absoft Pro Fortran
- GFORTRAN
- Intel Fortran
- NAG Fortran
- Open64
- PGI Fortran

### Windows (Compatible with Microsoft® Visual Studio)

- Intel Fortran
- PGI Fortran

In addition to supporting these compilers, ACML provides build versions that are single threaded, builds that are OpenMP enabled, and builds for default 32-bit integers or 64-bit integers (REAL\*8).

## RELATED RESOURCES

ACML can be downloaded from AMD Developer Central, which includes a number of helpful resources:

### Documentation

- Release Notes
- User Guide/FFT Documentation

### Articles, Blogs, and Knowledgebase

- How to use ACML with different versions of GCC/GFORTRAN
- When should the ACML int64 versions be used?
- Export Control Classification Number
- ACML Example Programs and the Bonus RNG
- Removing C wrapper functions from the AMD Core Math Library (ACML) to resolve linking issues
- ACML 4.3.0 Performance Data

### Example Programs

ACML library installs include a helpful set of example programs. These demonstrate how to call ACML with various compilers, and how to call a variety of routines. There are also performance examples that can be quickly used to demonstrate how fast certain ACML routines will be on a given system.

### Support

- Community forums
- Helpdesk
- FAQs

<http://developer.amd.com/ACML>

