

## 1 Overview

**1.1 Location** `$<APPSDKSamplesInstallPath>\samples\C++Amp\`

**1.2 How to Run** See the *Getting Started* guide for how to build samples. You first must compile the sample.

Use the command line to change to the directory where the executable is located. The sample executable is in `$<APPSDKSamplesInstallPath>\samples\C++Amp\bin\x86\` for 32-bit builds, and `$<APPSDKSamplesInstallPath>\samples\C++Amp\bin\x86_64\` for 64-bit builds.

Type the following command(s).

1. `GEMM`

This runs the program with the default options: `-i 10 -s 2048`

2. `GEMM -h`

This prints the help file.

Ensure you have installed Microsoft® Visual Studio® 2012 or higher.

**1.3 Command Line Options** Table 1 lists, and briefly describes, the command line options.

**Table 1 Command Line Options**

Short Form	Long Form	Description
-h	--help	Show all command options and their respective meaning.
-q	--quiet	Quiet mode. Suppresses text output.
-e	--verify	Verify results against reference implementation.
-t	--timing	Print timing.
-d	--deviceId	Select deviceId to be used (0 to N-1, where N is the ID of the device to be used).
-v	--version	AMD APP SDK version string.
-2	--size	Edge length of square matrices A, B, and C.
-i	--iterations	Number of times to repeat each algorithm.
-V	--arrayview	Use <code>array_view</code> instead of <code>array</code> .

## 2 Introduction

The General Matrix Multiply (GEMM) is a subroutine in the Basic Linear Algebra Subprograms (BLAS). It performs matrix multiplication: the multiplication of two matrices. GEMM is often tuned by high-performance computing (HPC) vendors to run as fast as possible.

The GEMM routine calculates the new value of matrix C based on the matrix-product of matrices A and B, as well as the old value of matrix C.

$$.C = aAB + \beta C$$

where  $a$  and  $\beta$  values are scalar coefficients.

According to the data type, GEMM has four versions: SGEMM, DGEMM, CGEMM, and ZGEMM for handling float, double, complex, and complex-double data types, respectively. This sample implements SGEMM NN/TN and DGEMM NN/TN. N means normal; T means transpose.

## 3 References

1. Dongarra, Jack J.; Croz, Jeremy Du; Hammarling, Sven; Duff, Iain S. (1990), "A set of level 3 basic linear algebra subprograms", [ACM Transactions on Mathematical Software](#) 16 (1): 1–17, doi:10.1145/77626.79170, ISSN 0098-3500.
2. Golub, Gene H.; Van Loan, Charles F. (1996), Matrix Computations (3rd ed.), Johns Hopkins, ISBN 978-0-8018-5414-9.
3. GSL Team (2007), "[§12.1.3 Level 3 GSL BLAS Interface](#)", GNU Scientific Library. Reference Manual, [http://www.gnu.org/software/gsl/manual/html\\_node/Level-3-GSL-BLAS-Interface.html](http://www.gnu.org/software/gsl/manual/html_node/Level-3-GSL-BLAS-Interface.html).
4. Goto, Kazushige; van de Geijn, Robert A. (2008), "Anatomy of High-Performance Matrix Multiplication", [ACM Transactions on Mathematical Software](#) 34 (3): Article 12, 25 pages, doi:10.1145/1356052.1356053.

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