

Matrix Multiplication Using Image

1 Overview

1.1 Location \$(AMDAPPSDKSAMPLESROOT)\samples\opencl\cl\app

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 default executables are placed in \$(AMDAPPSDKSAMPLESROOT)\samples\opencl\bin\x86 for 32-bit builds and \$(AMDAPPSDKSAMPLESROOT)\samples\opencl\bin\x86_64\ for 64-bit builds.

Type the following command(s).

1. MatrixMulImage
Implements MatrixMultiplication using images.
2. MatrixMulImage -h
This prints the help message.

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	Shows all command options and their respective meaning.
	--device	Devices on which the program is to be run. Acceptable values are <code>cpu</code> or <code>gpu</code> .
-q	--quiet	Quiet mode. Suppresses all text output.
-e	--verify	Verify results against reference implementation.
-t	--timing	Print timing.
	--dump	Dump binary image for all devices.
	--load	Load binary image and execute on device.
	--flags	Specify compiler flags to build the kernel.
-p	--platformId	Select platformId to be used (0 to N-1, where N is the number of available platforms).
-d	--deviceId	Select deviceId to be used (0 to N-1, where N is the number of available devices).
-v	--version	AMD APP SDK version string.
-x	--height0	Height of matrix A.
-y	--width0	Width of matrix A and height of matrix B.
-z	--width1	Width of matrix B.
-i	--iterations	Number of iterations for kernel execution.

2 Implementation Details

This sample computes the following relation among matrices:

$$\mathbf{C} = \mathbf{AB}$$

Dimensions of matrix A = (y, x) {width0, height0}.

Dimensions of matrix B = (z, y) {width1, width0}.

This results in a matrix C, with dimension = {z, x}.

Matrices A, B, and C are allocated using image buffers.

For (width A / 4) iterations of the loop: Each thread reads four float4s from matrix A, then the corresponding four float4s from matrix B. Each thread then calculates the partial matrix multiplication and updates the partial sum. Thus, each thread computes four float4s (16 floating values of matrix C). See Figure 1.

The number of global threads = {widthC / 4, heightC / 4}.



Figure 1 Matrix Multiplication

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