AMD **Accelerated** Parallel Processing TECHNOLOGY

SAMPLE

Simple Multi GPU

1 Overview

1.1 Location

`$(AMDAPPSDKSAMPLESROOT)\samples\C++Amp\examples`

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 `$(AMDAPPSDKSAMPLESROOT)\samples\C++Amp\bin\x86\` for 32-bit builds, and `$(AMDAPPSDKSAMPLESROOT)\samples\C++Amp\bin\x86_64\` for 64-bit builds.

Type the following command(s).

1. `SimpleMultiGPU`

   This runs the program with the default options: s = (1600 * 1200 * 3).

2. `SimpleMultiGPU -h`

   This prints the help file.

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-related statistics.
`-v`	`--version`	AMD APP SDK version string.
`-x`	`--samples`	Number of example input values (multiples of three).

2 Introduction

An accelerator represents a “target” on which C++ AMP code is meant execute thread-parallel and data-parallel operations assisting the host application running on CPU. In most scenarios, an accelerator is a GPU device. Accelerators are represented in C++ AMP as objects of the accelerator class. The C++ AMP runtime supports the notion of a default accelerator to run C++ AMP code on a target that can be the best accelerator in the system. However C++ AMP also supports choosing a specific accelerator available in the system. This becomes necessary in a scenario where the C++ AMP code must be executed on at least two accelerators.

C++ AMP supports the following predefined accelerators.

- `accelerator::default_accelerator` represents the default accelerator that the C++ AMP runtime has chosen.
- `accelerator::direct3d_ref` represents an extremely slow reference rasterizer emulator that simulates a direct3d device on the CPU (useful for debugging).
- `accelerator::cpu_accelerator` represents the CPU.
- `accelerator::direct3d_warp` is an accelerator that uses multi-core and SSE2, SSE3, and SSE 4.1, depending on the CPU capabilities. This is the current CPU fallback.

C++ AMP also enumerates hardware accelerators that can be chosen as targets by user programs.

3 Implementation Details

This example shows how data can be initialized, processed, and synchronized between multiple GPUs using C++ AMP. At minimum, there must be two hardware accelerators. This example identifies two hardware accelerators (GPUs), splits the input data evenly across them, and executes an RGB-to-YUV 4:4:4 color conversion algorithm on both in parallel. Checking that the dedicated memory is not 0 kB, and ensuring that the is_emulated flag of the accelerator is false, helps identify hardware accelerators. The input RGB data then is split into two AMP `array_view`s, which then become inputs to the two selected accelerators. By using the overload of `parallel_for_each()`, which allows specifying of the target `accelerator_view`, the same lambda is run on both the accelerators with the first half of the input given to the first `accelerator_view`, and the second half of the input given to the second accelerator_view. The outputs of both accelerators are then verified.

Although this example is targeted at multiple GPUs, it easily can be modified to execute in parallel on a CPU and GPU accelerators, instead of two GPUs. This is left as an exercise for the user.

4 Recommended Input Option Settings

For best performance, enter the following on the command line: `-x 5760000 -q -t -e`

5 References

1. http://www.danielmoth.com/Blog/concurrencyaccelerator.aspx
2. http://en.wikipedia.org/wiki/YUV

Contact

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