CS 475/575

Chih Hsuan Huang

ID: 934554197

[huanchih@oregonstate.edu](mailto:huanchih@oregonstate.edu)

Project #6

OpenCL Linear Regression

1. What machine you ran this on

rabbit

1. the correct M and B values

DATASIZE is 4194304, LOCALSIZE is 256=> \*\* m = 5.01 b = 7.00 \*\*

1. Show the table and graphs





Figure1

Figure2

1. What patterns are you seeing in the performance curves? What difference does the size of data make? What difference does the size of each work-group make?

In Figure 1, no matter what kind of LOCALSIZE, as DATASIZE increases, the performance shows an obvious upward trend. When LOCALSIZE is 8, performance increases the slowest. Performance increases faster with LOCALSIZE of 32, 64, 128, and 256, and in some cases, LOCALSIZE of 64 gives the best performance.

In Figure 2, DATASIZE 4194304 and 1048576 performance peaks when LOCALSIZE is 32, and then decreases slightly as LOCALSIZE increases. And it levels off after LOCALSIZE128. The remaining data sizes (4096, 16384, 65536, 262144) have small performance changes under different LOCALSIZE, and the performance is relatively low.

As data size increases, performance usually increases significantly. This suggests that larger datasets make better use of computing resources, primarily due to better parallelization and more efficient use of memory and computing resources. For example: when the data size increases from 4096 to 4194304, the performance increases from 46.91 to 3572.09. When the data size is small (such as 4096), the performance is relatively low, which may be because the data set is small and the computing resources cannot be fully utilized.

Increasing the workgroup size initially can significantly improve performance. This may be since a larger number of workers allows for more parallel processing. However, above a certain workgroup size, performance gains are reduced or even slightly degraded.

1. Why do you think the patterns look this way?

As data size increases, more computing tasks can be divided and processed in parallel, resulting in better utilization of computing resources. For example, computations running on GPUs can process more blocks of data simultaneously, improving overall computing efficiency. When the matrix size is smaller, the performance is lower because the processing power of the GPU is not fully utilized. As the matrix size increases, the GPU is used more efficiently due to reduced computational idle time, resulting in better performance.