HW6 Report

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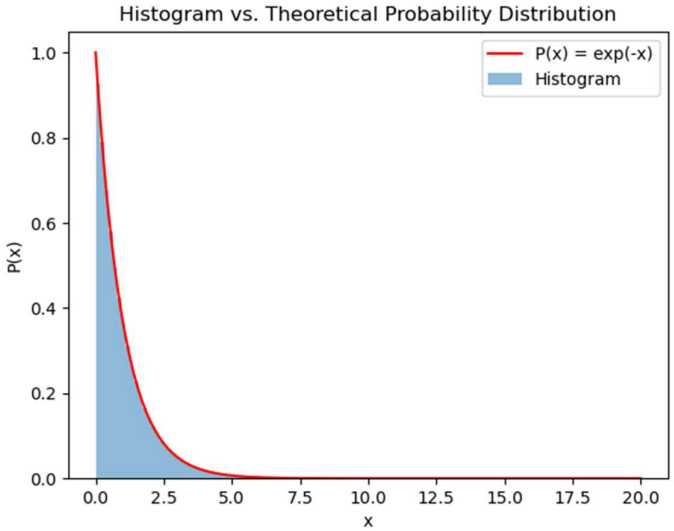
1. Description

Under the ”b10505047_HW6” directory, my source code is in “exp_hist_1gpu_gmem.cu” and “exp_hist_1gpu_shmem.cu”, and the results that I tested are put under the “results” directory. To run the code, run “make” first and then run “condor_submit cmd” to submit the job. Go to the “cmd” file, then you can change “Initialdir” into your working directory and “Arguments” into different executable files and input/output files’ names.

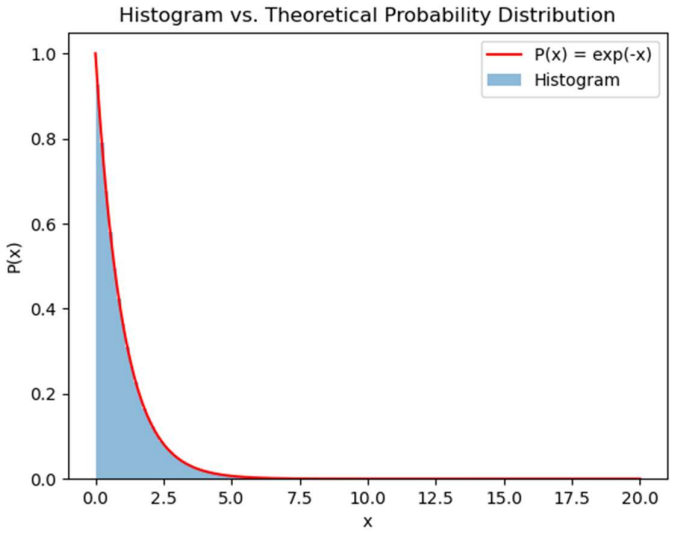
2. Results

The histograms and the curves of the theoretical probability distribution are shown below. I used number of bins of histogram = 128, number of threads per block = 128, number of blocks per grid = 1024 for example. The speed up for GPU with global memory is 1.734286, and the speedup for GPU with shared memory is 2.877772.

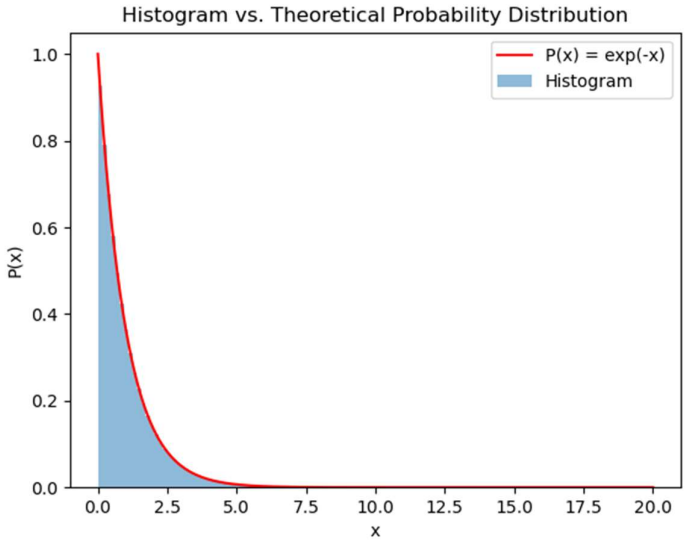
computed by CPU:



computed by GPU with global memory:



computed by GPU with shared memory:



As for determining the optimal block sizes, I tested GPU with global memory case with block size = 64, 128, 256, 512, each with several grid sizes. The result(speed up of GPU) is shown in the block below. Determined by the performance of “processing time for GPU” and

"speedup", the optimal block size and grid size that I tested is block size = 128, with grid size = 65536. I tested each input case for several times for a more reliable result.

block size→ grid size	64	128	256	512
1024	1.723759	1.735183	1.650945	1.588650
4096	1.726089	1.752234	1.684056	1.602757
65536	1.721095	1.764915	1.662492	1.597561
(N+blocksize-1)/blocksize	1.729773	1.734984	1.640694	1.612602

3. Discussion

According to the results that I tested, the histograms computed by CPU, GPU with global memory, and GPU with shared memory are quite similar, and they both follow the theoretical probability distribution. The comparison of speed is GPU with shared memory > GPU with global memory > CPU. At last, block size = 64, 128 perform much better than block size = 256, 512. On the other hand, different grid sizes have small difference in the result.