## Matrix Multiplication

#include <cuda\_runtime.h>

#include <iostream>

\_\_global\_\_ void matmul(int\* A, int\* B, int\* C, int N) {

int Row = blockIdx.y\*blockDim.y+threadIdx.y;

int Col = blockIdx.x\*blockDim.x+threadIdx.x;

if (Row < N && Col < N) {

int Pvalue = 0;

for (int k = 0; k < N; k++) {

Pvalue += A[Row\*N+k] \* B[k\*N+Col];

}

C[Row\*N+Col] = Pvalue;

}

}

int main() {

int N = 512;

int size = N \* N \* sizeof(int);

int\* A, \* B, \* C;

int\* dev\_A, \* dev\_B, \* dev\_C;

cudaMallocHost(&A, size);

cudaMallocHost(&B, size);

cudaMallocHost(&C, size);

cudaMalloc(&dev\_A, size);

cudaMalloc(&dev\_B, size);

cudaMalloc(&dev\_C, size);

// Initialize matrices A and B

for (int i = 0; i < N; i++) {

for (int j = 0; j < N; j++) {

A[i\*N+j] = i\*N+j;

B[i\*N+j] = j\*N+i;

}

}

cudaMemcpy(dev\_A, A, size,

cudaMemcpyHostToDevice);

cudaMemcpy(dev\_B, B, size,

cudaMemcpyHostToDevice);

dim3 dimBlock(16, 16);

dim3 dimGrid(N/dimBlock.x, N/dimBlock.y);

matmul<<<dimGrid, dimBlock>>>(dev\_A, dev\_B,

dev\_C, N);

cudaMemcpy(C, dev\_C

// Print the result

for (int i = 0; i < 10; i++) {

for (int j = 0; j < 10; j++) {

std::cout << C[i\*N+j] << " ";

}

std::cout << std::endl;

}

// Free memory

cudaFree(dev\_A);

cudaFree(dev\_B);

cudaFree(dev\_C);

cudaFreeHost(A);

cudaFreeHost(B);

cudaFreeHost(C);

return 0;