

ELEC 374
Machine Problem 1
Luka Gobovic
20215231

Code

```
#include <stdio.h>
#include <cuda_runtime.h>
#include "device_launch_parameters.h"

int _ConvertSMVer2Cores(int major, int minor);

int main() {
    int deviceCount;
    cudaGetDeviceCount(&deviceCount);
    printf("Number of CUDA devices: %d\n", deviceCount);

    for (int i = 0; i < deviceCount; ++i) {
        cudaDeviceProp deviceProp;
        cudaGetDeviceProperties(&deviceProp, i);

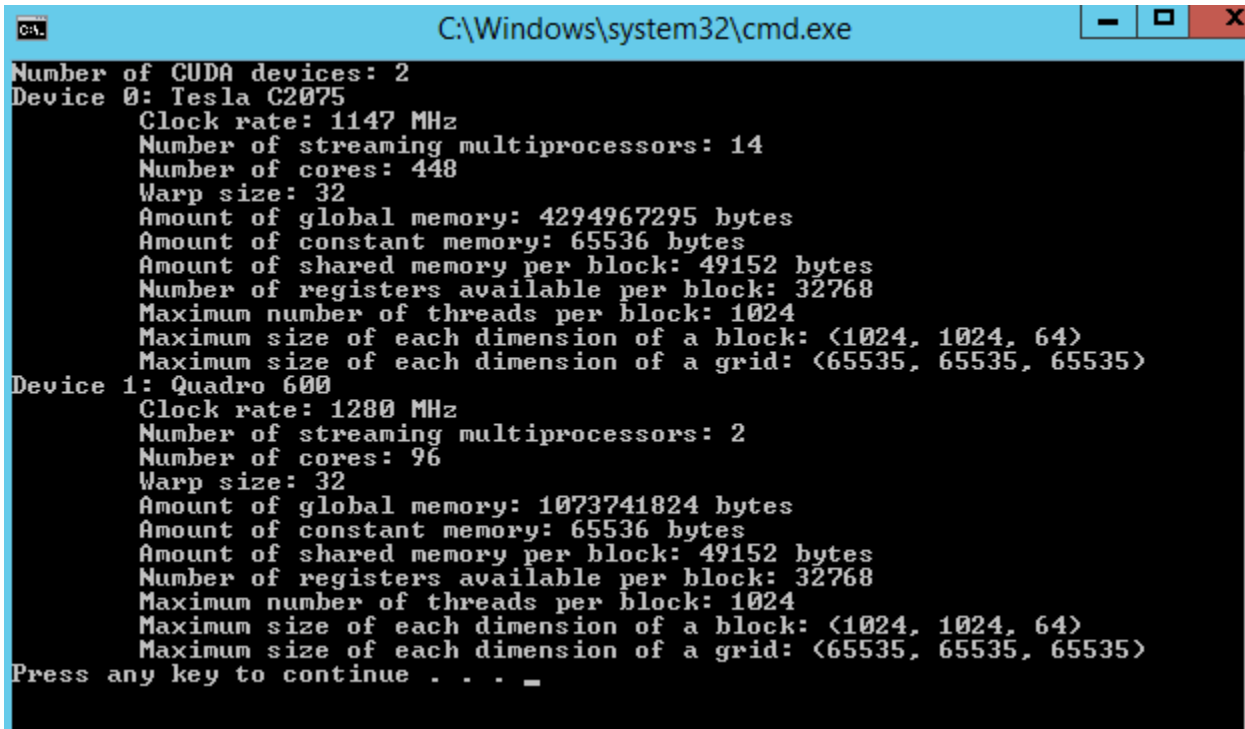
        printf("Device %d: %s\n", i, deviceProp.name);

        printf("\tClock rate: %d MHz\n", deviceProp.clockRate / 1000);
        printf("\tNumber of streaming multiprocessors: %d\n", deviceProp.multiProcessorCount);
        printf("\tNumber of cores: %d\n", deviceProp.multiProcessorCount * _ConvertSMVer2Cores(deviceProp.major, deviceProp.minor));
        printf("\tWarp size: %d\n", deviceProp.warpSize);
        printf("\tAmount of global memory: %lu bytes\n", (unsigned long)deviceProp.totalGlobalMem);
        printf("\tAmount of constant memory: %lu bytes\n", (unsigned long)deviceProp.totalConstMem);
        printf("\tAmount of shared memory per block: %lu bytes\n", (unsigned long)deviceProp.sharedMemPerBlock);
        printf("\tNumber of registers available per block: %d\n", deviceProp.regsPerBlock);
        printf("\tMaximum number of threads per block: %d\n", deviceProp.maxThreadsPerBlock);
        printf("\tMaximum size of each dimension of a block: (%d, %d, %d)\n", deviceProp.maxThreadsDim[0], deviceProp.maxThreadsDim[1], deviceProp.maxThreadsDim[2]);
        printf("\tMaximum size of each dimension of a grid: (%d, %d, %d)\n", deviceProp.maxGridSize[0], deviceProp.maxGridSize[1], deviceProp.maxGridSize[2]);
    }

    return 0;
}

int _ConvertSMVer2Cores(int major, int minor) {
    // Returns the number of CUDA cores per SM for a given architecture version.
    // Refer to the CUDA documentation for the compute capability of each GPU.
    switch (major) {
        case 2:
            return (minor == 0) ? 32 : 48;
        case 3:
            return 192;
        case 5:
            return 128;
        case 6:
            return 64;
        case 7:
            return (minor == 0) ? 64 : 128;
        default:
            return 0;
    }
}
```

Screenshots

A screenshot of a Windows command prompt window. The title bar is blue and shows the path 'C:\Windows\system32\cmd.exe'. The window has standard Windows window controls (minimize, maximize, close) on the right. The command prompt has a black background with white text. It displays the output of a command that queries CUDA devices. The output lists two devices: Device 0 (Tesla C2075) and Device 1 (Quadro 600). For each device, it shows various specifications including clock rate, number of streaming multiprocessors, number of cores, warp size, global and constant memory, shared memory per block, registers available per block, maximum threads per block, and maximum block and grid dimensions. The text ends with 'Press any key to continue . . . _' where the underscore indicates a key has been pressed.

```
C:\Windows\system32\cmd.exe
Number of CUDA devices: 2
Device 0: Tesla C2075
  Clock rate: 1147 MHz
  Number of streaming multiprocessors: 14
  Number of cores: 448
  Warp size: 32
  Amount of global memory: 4294967295 bytes
  Amount of constant memory: 65536 bytes
  Amount of shared memory per block: 49152 bytes
  Number of registers available per block: 32768
  Maximum number of threads per block: 1024
  Maximum size of each dimension of a block: <1024, 1024, 64>
  Maximum size of each dimension of a grid: <65535, 65535, 65535>
Device 1: Quadro 600
  Clock rate: 1280 MHz
  Number of streaming multiprocessors: 2
  Number of cores: 96
  Warp size: 32
  Amount of global memory: 1073741824 bytes
  Amount of constant memory: 65536 bytes
  Amount of shared memory per block: 49152 bytes
  Number of registers available per block: 32768
  Maximum number of threads per block: 1024
  Maximum size of each dimension of a block: <1024, 1024, 64>
  Maximum size of each dimension of a grid: <65535, 65535, 65535>
Press any key to continue . . . _
```

The code queries the system and returns the number of devices information about each of the devices. Based on the output, the computer has 2 devices, a Tesla C2075 and a Quadro 600. The various information includes clock rates, number of streaming multiprocessors, the number of cores and more.