

CSCI-GA.3033-004
Graphics Processing Units (GPUs): Architecture and Programming
Homework Assignment 1

1. [5] Make a small web search and form a table as follows (columns from left to right):
- GPU model (to reduce the search time, concentrate on Nvidia GeForce GTX GPUs)
 - The amount of memory in GB. If there are several versions of the same model, pick the bigger memory.
 - Total number of cores (aka SP or unified shader) on all SMs (newer versions called SMX)
 - Memory bandwidth (from the GPU to the graphics DRAM) in GB/s. Again, if there are several versions of the same model, pick the highest bandwidth you can find for that model.
 - The launch year

To get full credit for this question, make sure that you satisfy the following:

- The table **must cite 5 GPUs**
- Spanning years **2015 and 2016**

2. [2] Based on the information you gathered in question 1:
- What do you think is the bottleneck of performance now (computational power, memory size, or memory bandwidth)?
 - Given the trend shown, which bottleneck is expected to continue in the near future?

3. [5] Provide a bulleted list of of 5 applications that GPUs can be used in (e.g. computational finance, etc) and specify why.

4. [2 points] Let's assume an application has a lot of independent and similar operations to performed on data. Does **the amount of data** has anything to do with the expected performance of the GPU?

5. [6 points] For each of the following applications state whether it is beneficial to implement them on a GPU, and justify your answer.

- a) Finding whether a number exist in an array of 10M integers
- b) Calculating the first 1M Fibonacci numbers
- c) Multiplying two 1000x1000 matrices