

Module 3.1 Homework Exercises

Problem 1: Describe the difference between a GPU and a CPU. Include a discussion of vector instructions in the CPU's instruction set and how the CPU and GPU are different in this case.

SOLUTION: A GPU is a SIMD device while a CPU is a SISD device. GPUs are good for problems where the same operation can be performed on multiple (numerous) data items. CPUs are good for problems where there are many branches (conditionals) and limited amounts of data parallelism.

Vector instructions provide some SIMD features of the GPU to the CPU, but these are on a much smaller scale, often 4-8 parallel data can be processed using these instructions. GPUs are a good choice for problems with significant data parallelism.

Problem 2: Investigate the cache and memory system for one CPU and one GPU of your choice. Compare the memory architectures of these two platforms.

SOLUTION: Solutions vary, but the key is for the students to see that memory hierarchy and structure will differ between types of processing elements.