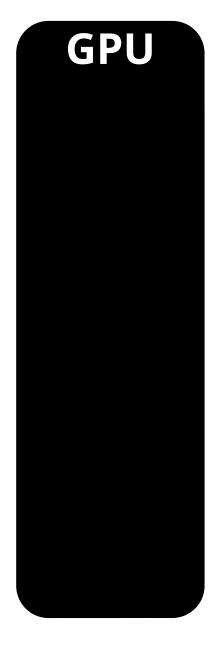
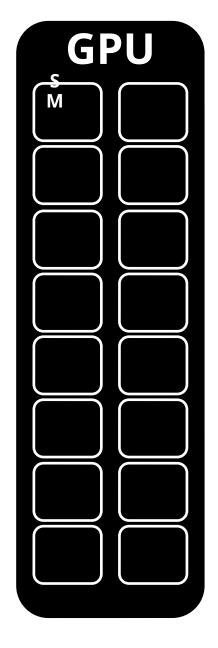
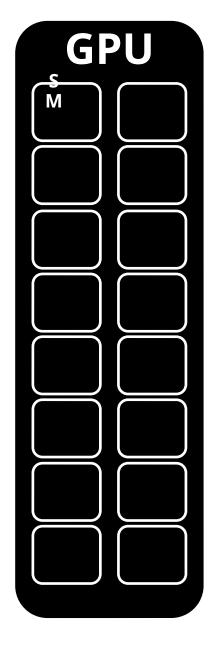
Streaming Multiprocessors

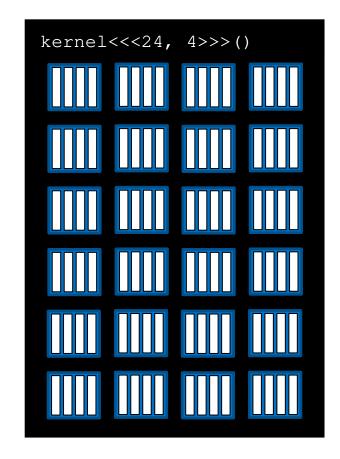


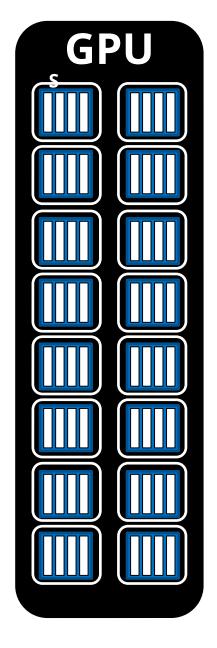
NVIDIA GPUs contain functional units called **Streaming Multiprocessors**, or **SMs**



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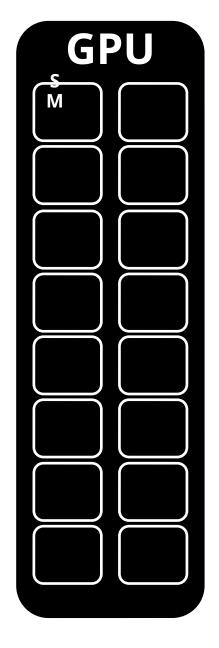


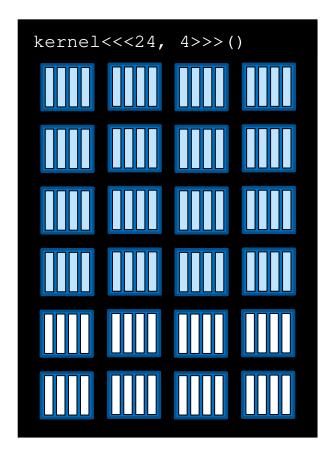




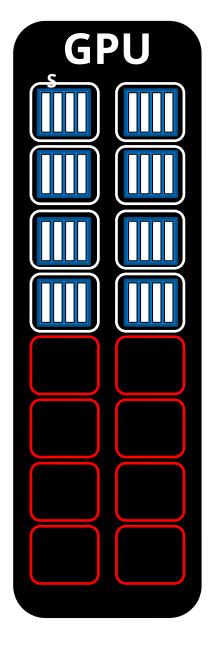
kernel<<<24, 4>>>()

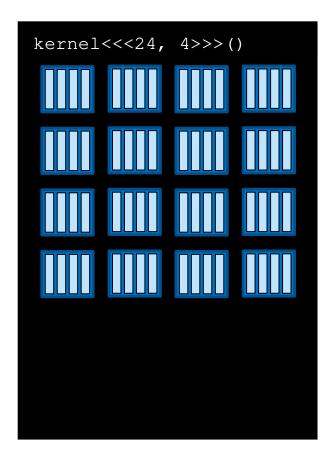
Depending on the number of SMs on a GPU, and the requirements of a block, more than one block can be scheduled on an SM



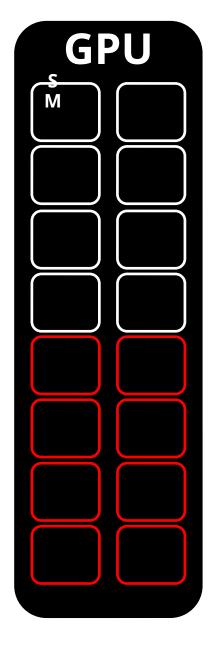


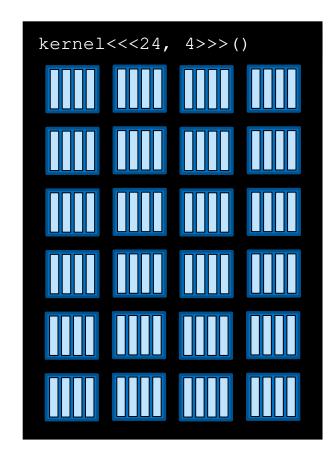
Depending on the number of SMs on a GPU, and the requirements of a block, more than one block can be scheduled on an SM





Grid dimensions divisible by the number of SMs on a GPU can promote full SM utilization





Unified Memory Behavior

resident initially on the CPU or the GPU **DATA GPU** cudaMallocManaged() Time



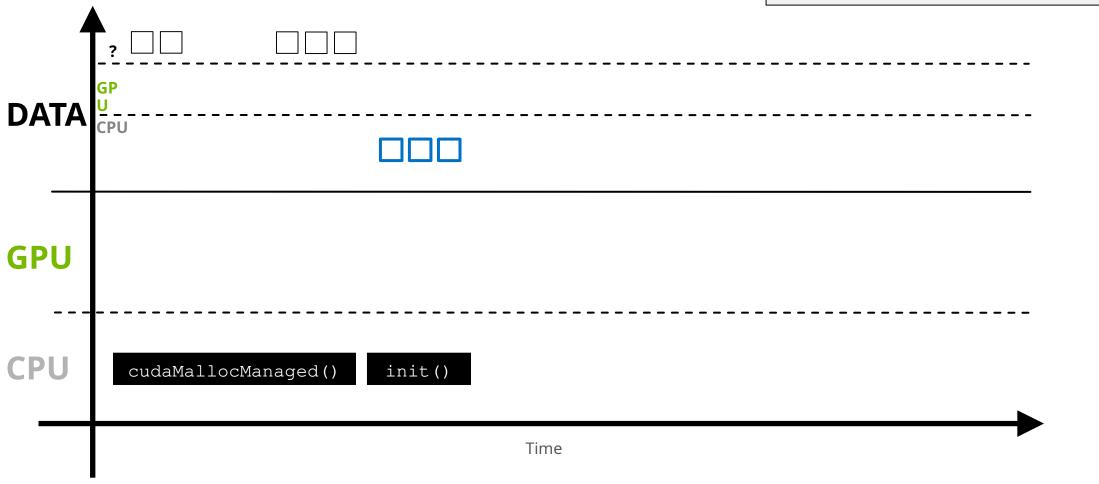
When \mathbf{UM} is allocated, it may not be

for the first time, a page fault will occur **DATA GPU** cudaMallocManaged() init() Time

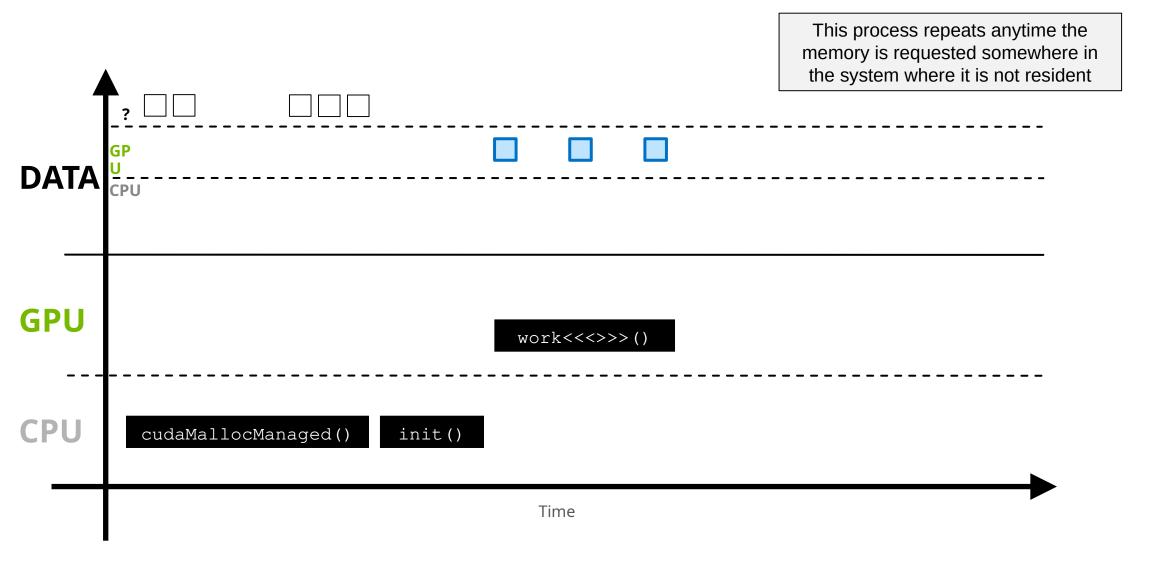


When some work asks for the memory

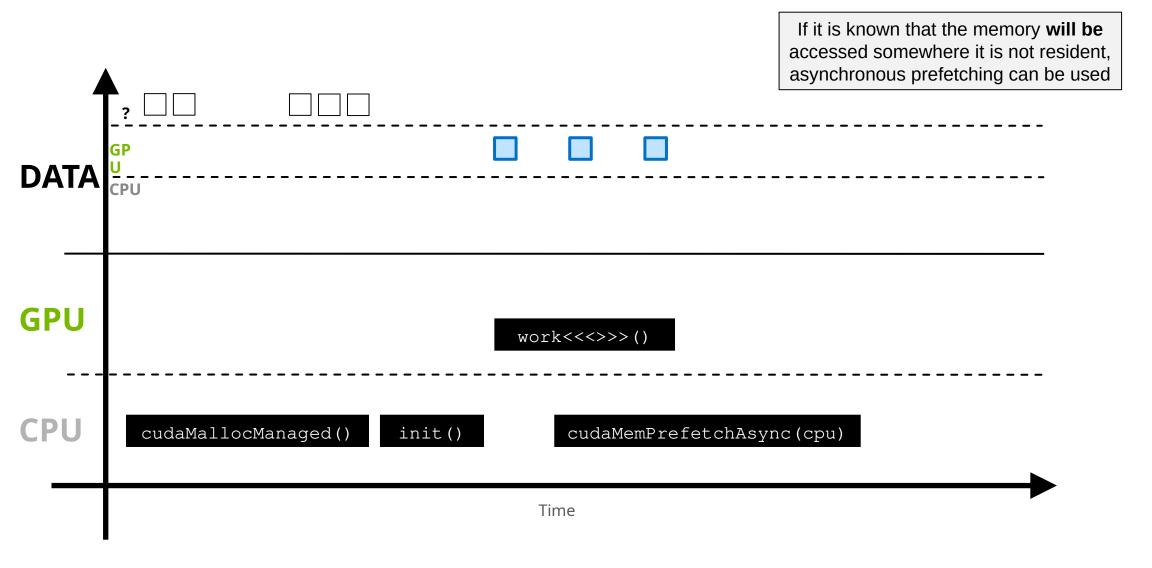
The page fault will trigger the migration of the demanded memory



This process repeats anytime the memory is requested somewhere in the system where it is not resident **DATA GPU** work<<>>>>() cudaMallocManaged() init() Time







This moves the memory in larger batches, and prevents page faulting

