

Streaming Multiprocessors



GPU

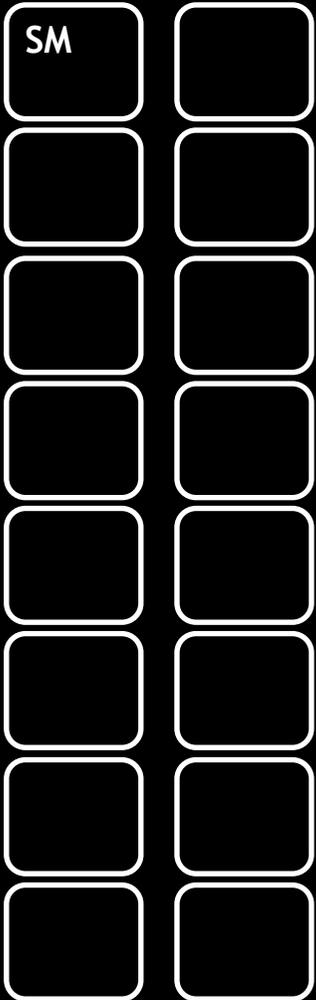
NVIDIA GPUs contain functional units called **Streaming Multiprocessors**, or **SMs**

GPU

SM

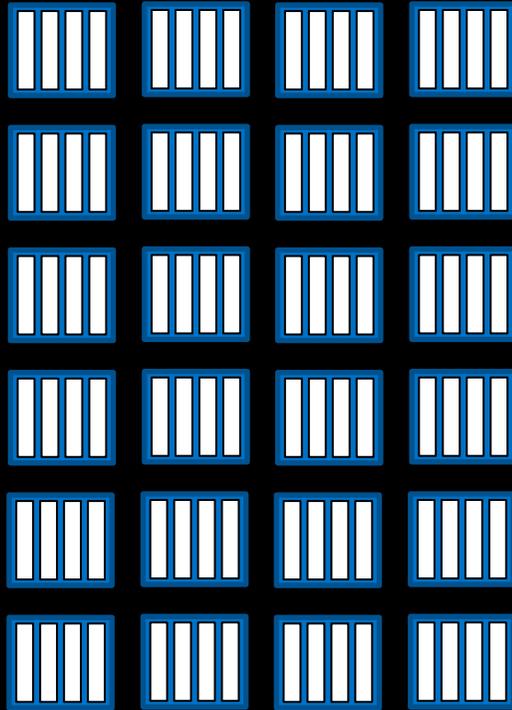
NVIDIA GPUs contain functional units called **Streaming Multiprocessors**, or **SMs**

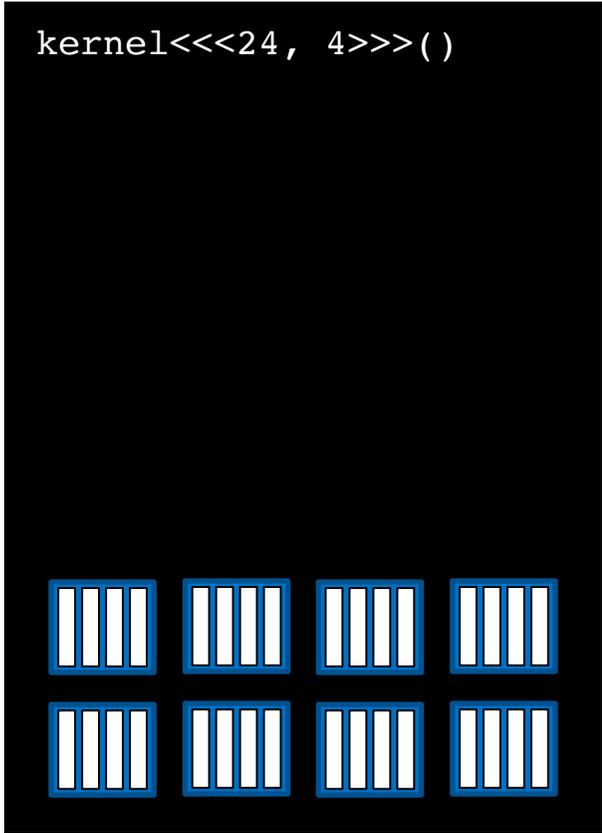
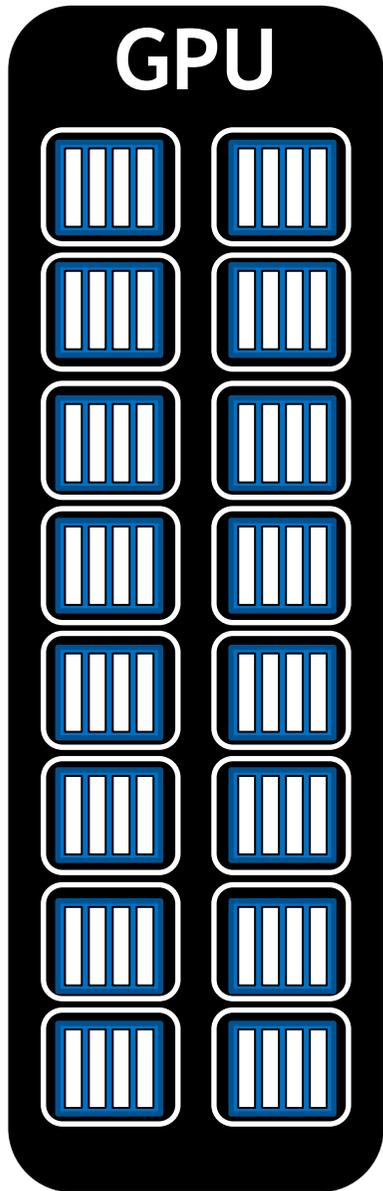
GPU



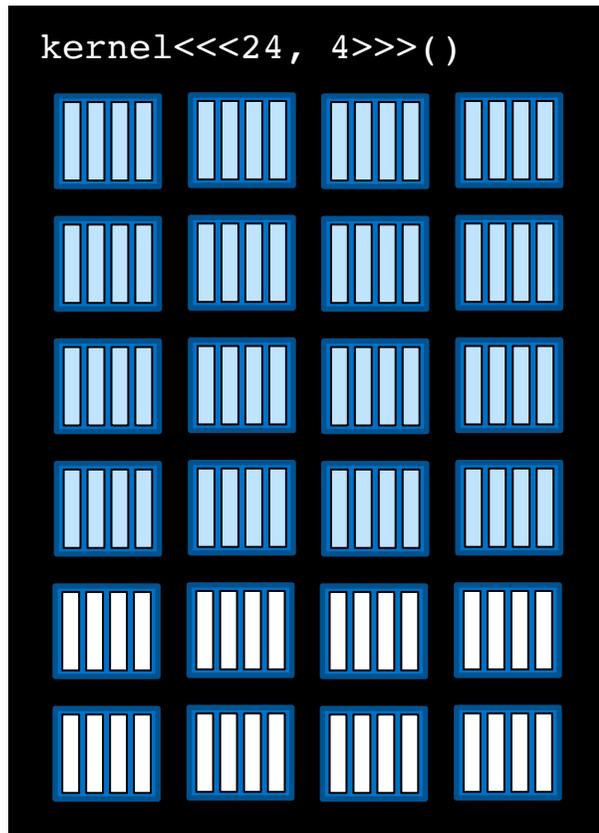
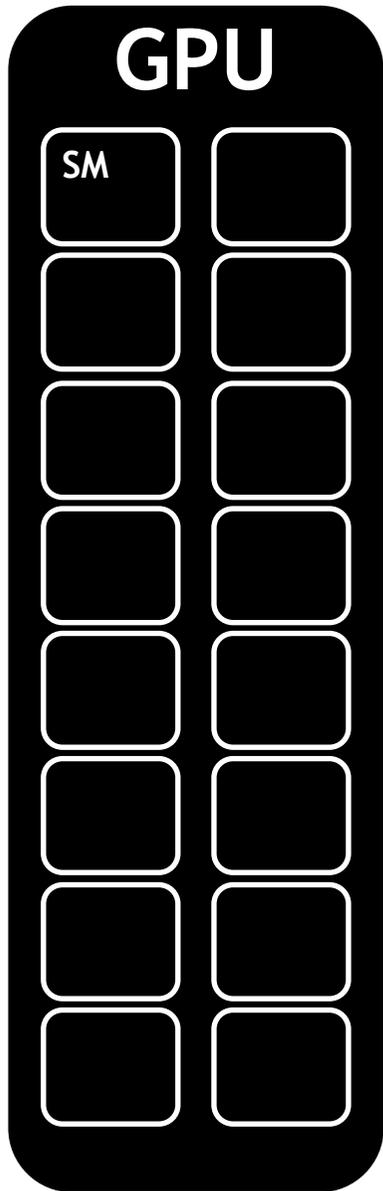
Blocks of threads are scheduled to run on SMs

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

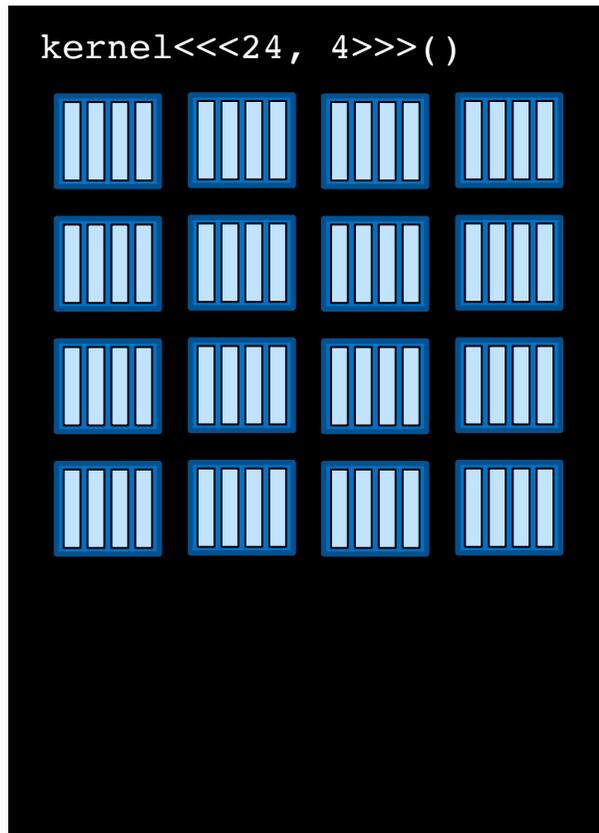
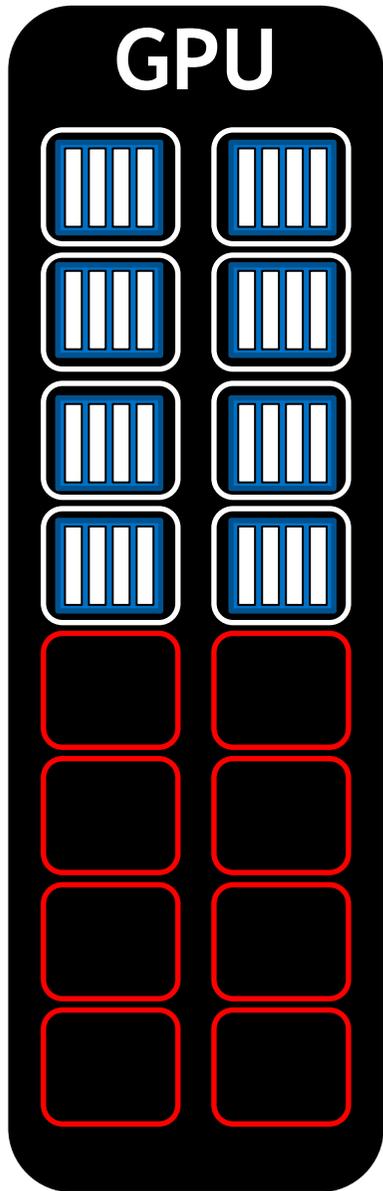




Depending on the number of SMs on a GPU, and the requirements of a block, more than one block can be scheduled on an SM

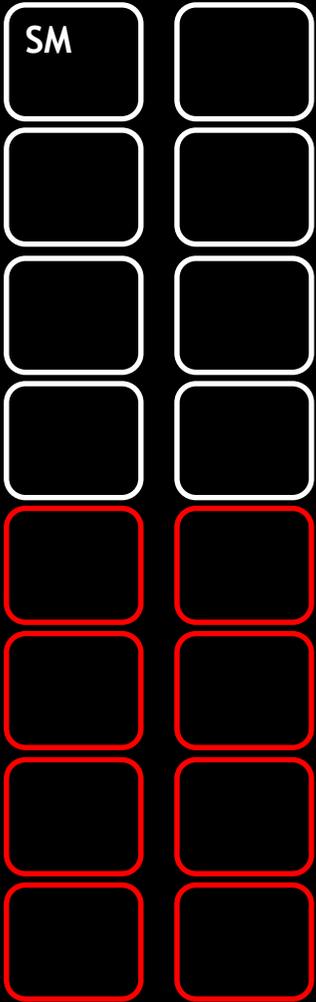


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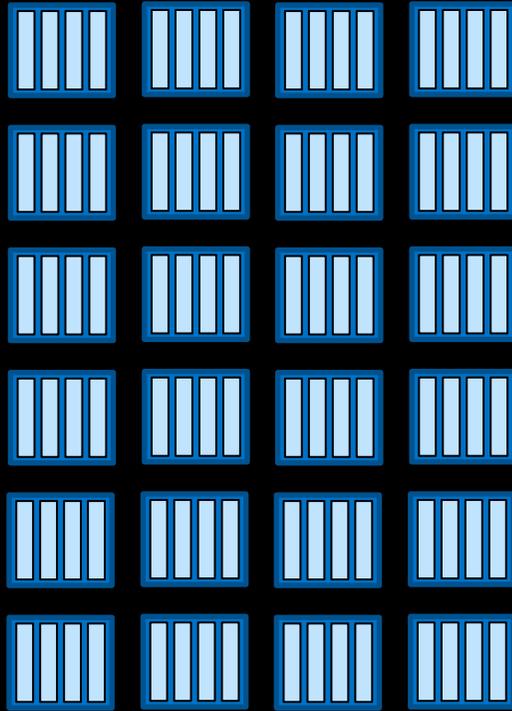
Grid dimensions divisible by the number of SMs on a GPU can promote full SM utilization

GPU

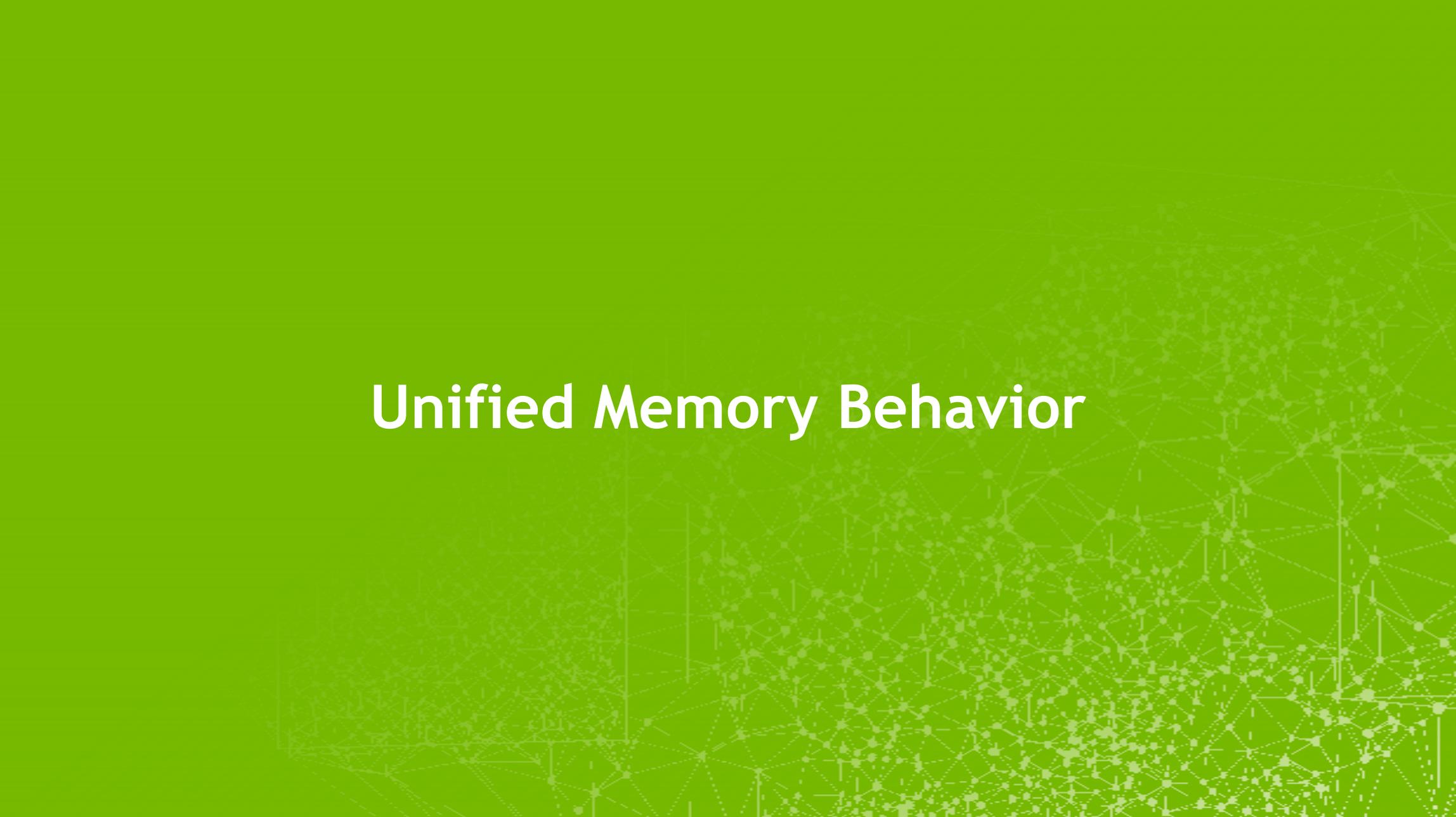


Here there are fallow SMs

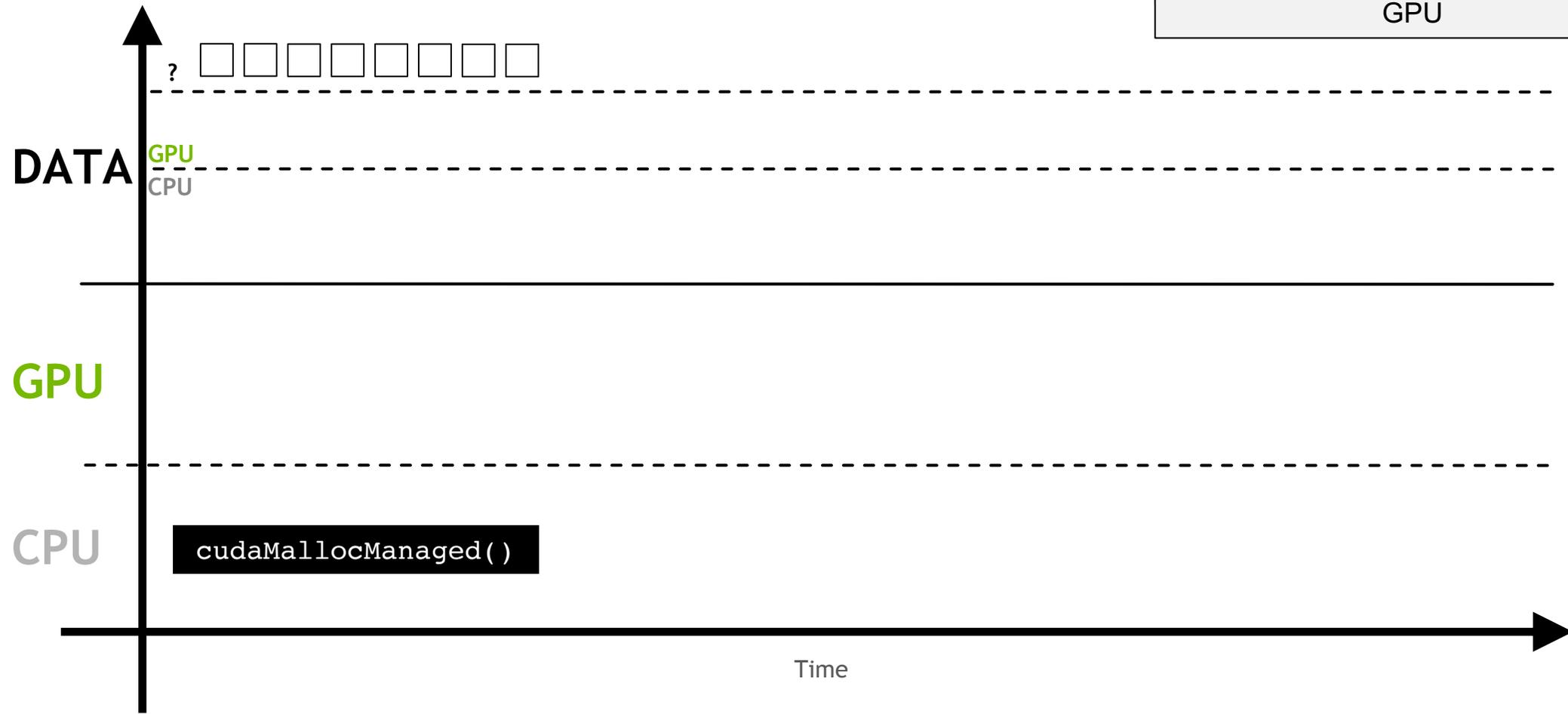
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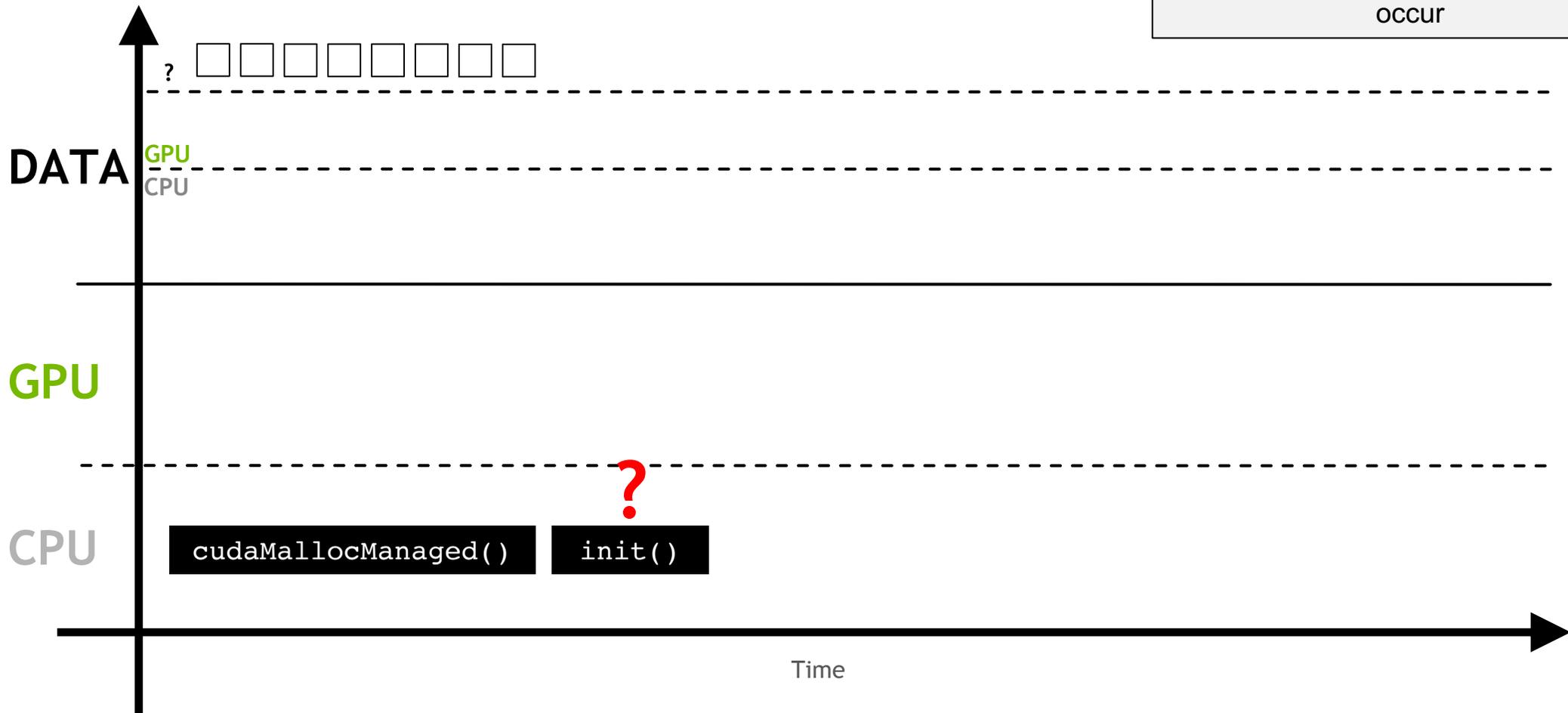
Unified Memory Behavior



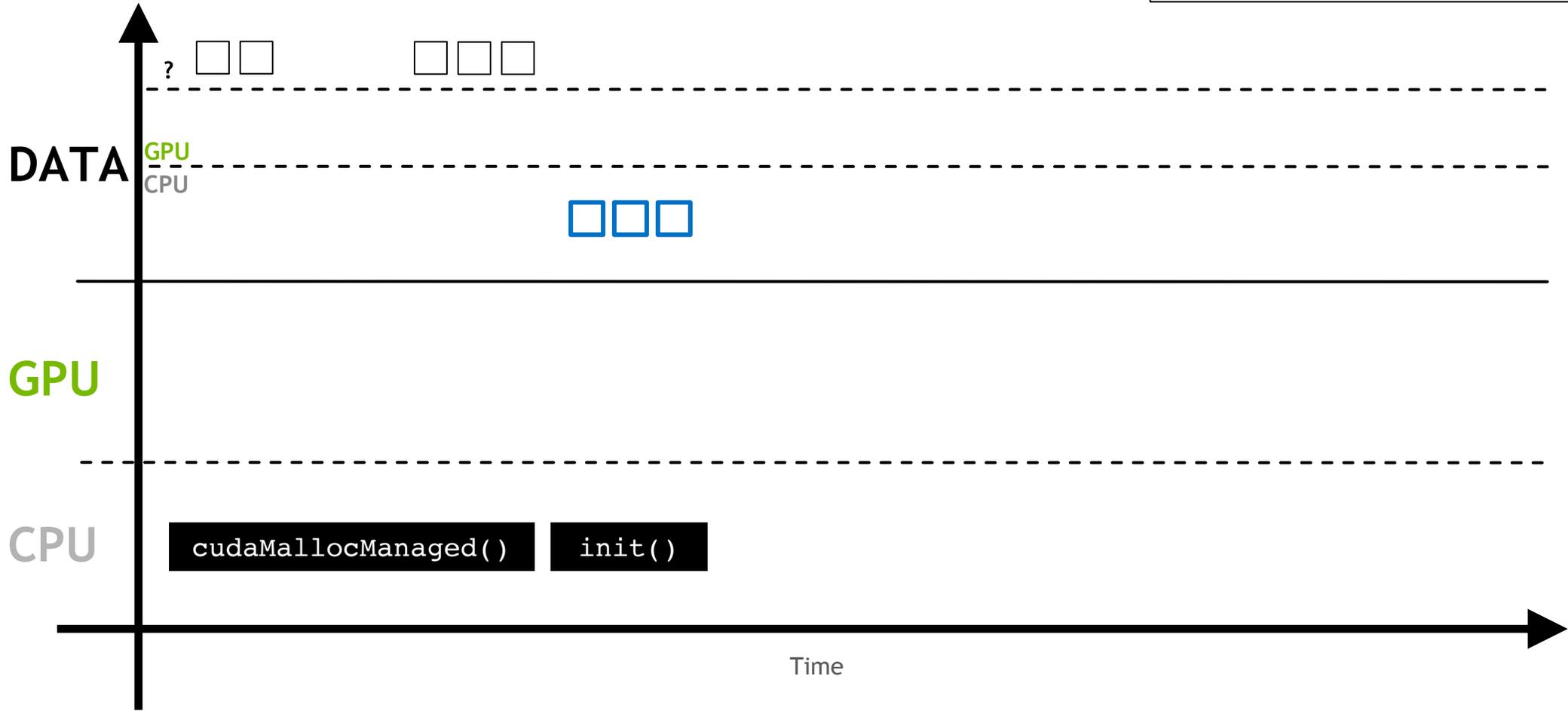
When **UM** is allocated, it may not be resident initially on the CPU or the GPU



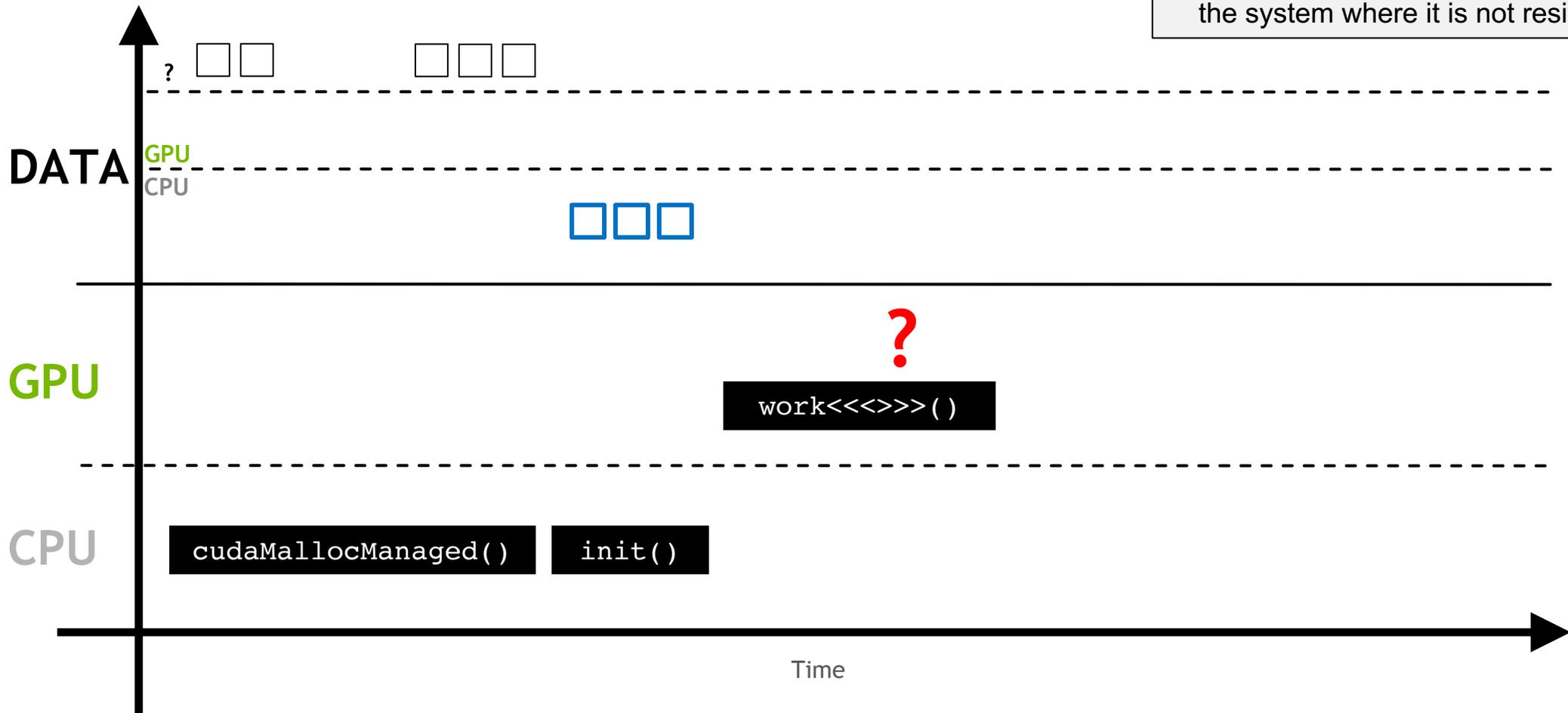
When some work asks for the memory for the first time, a **page fault** will occur



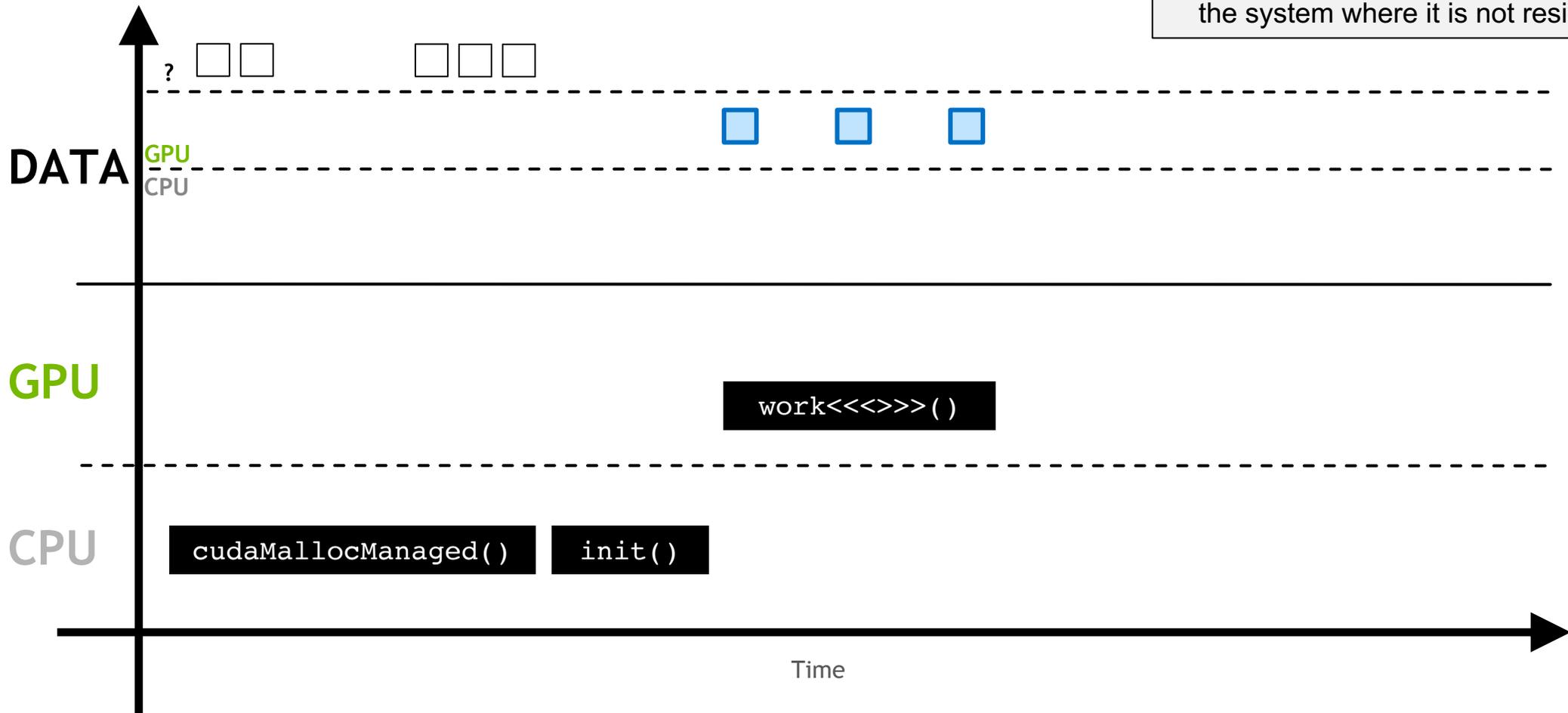
The page fault will trigger the migration of the demanded memory



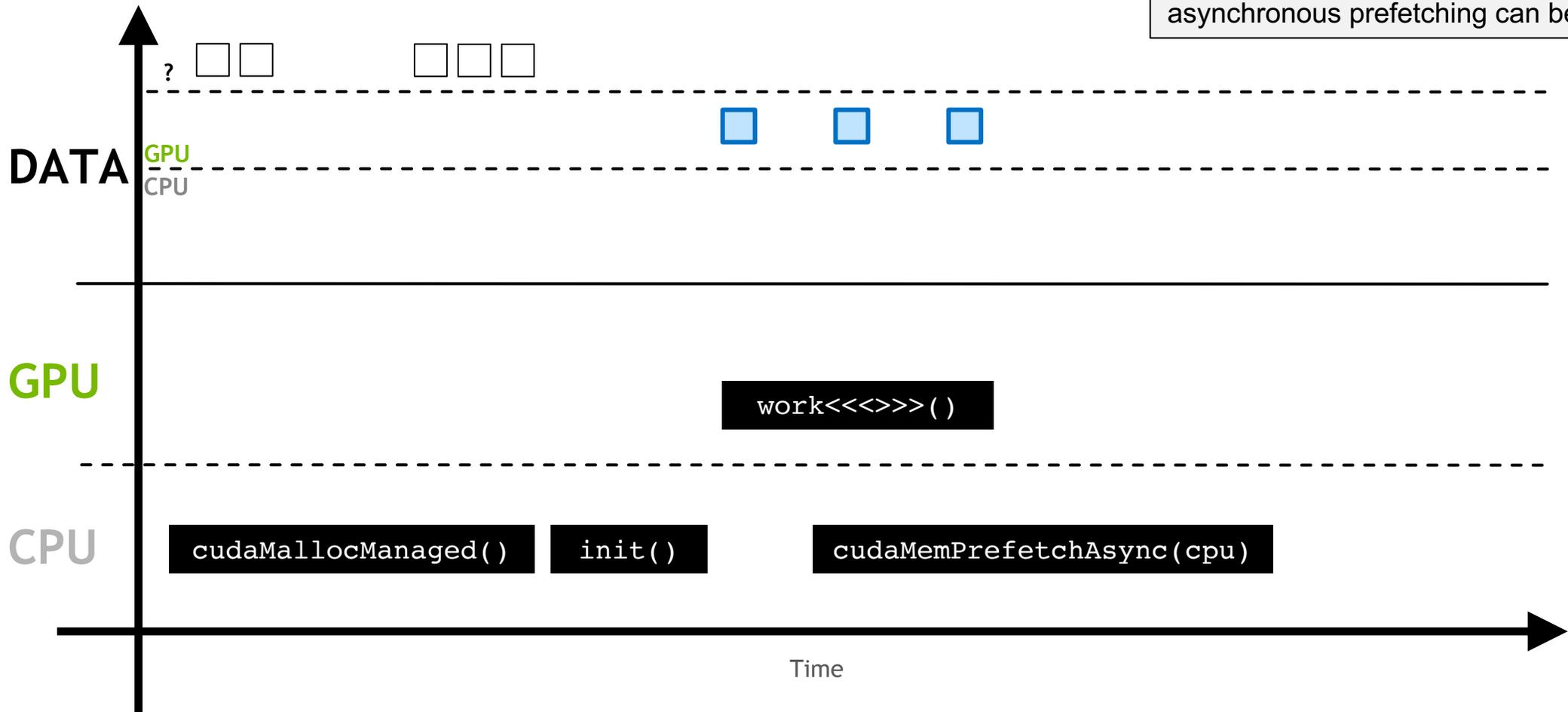
This process repeats anytime the memory is requested somewhere in the system where it is not resident



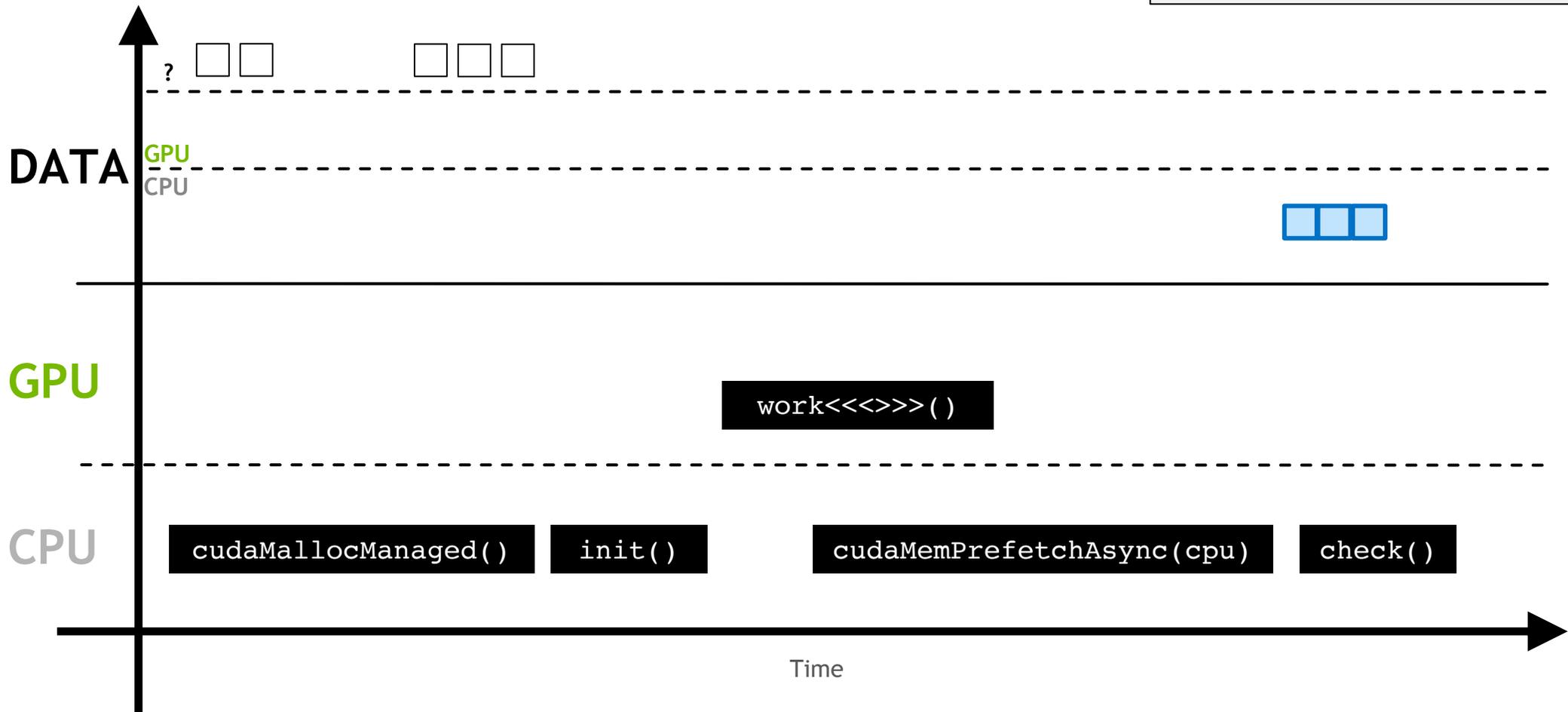
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If it is known that the memory **will be** accessed somewhere it is not resident, asynchronous prefetching can be used



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





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