## **Concurrent CUDA Streams**

A **stream** is a series of instructions, and CUDA has a **default stream** 

## **DEFAULT STREAM**



By default, CUDA kernels run in the default stream

## **DEFAULT STREAM**

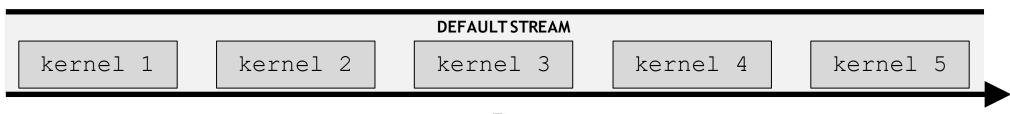
kernel 1



In any stream, including the default, an instruction in it (here a kernel launch) must complete before the next can begin

kernel 1 kernel 2

In any stream, including the default, an instruction in it (here a kernel launch) must complete before the next can begin

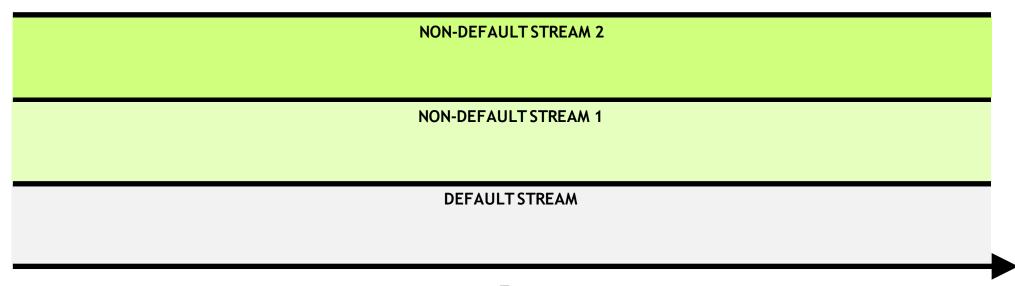


Non-default streams can also be created for kernel execution

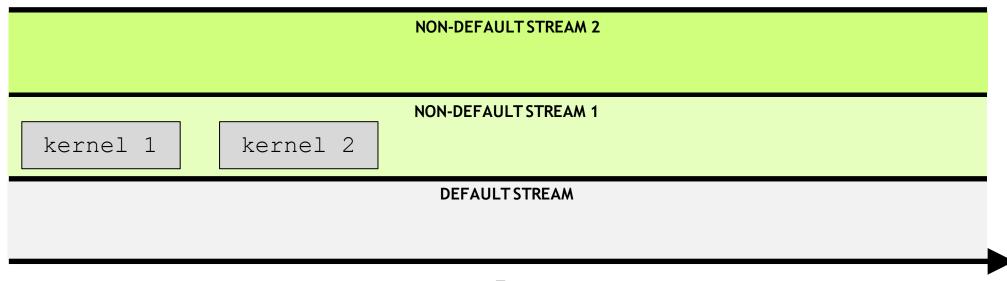
**NON-DEFAULT STREAM 1** 

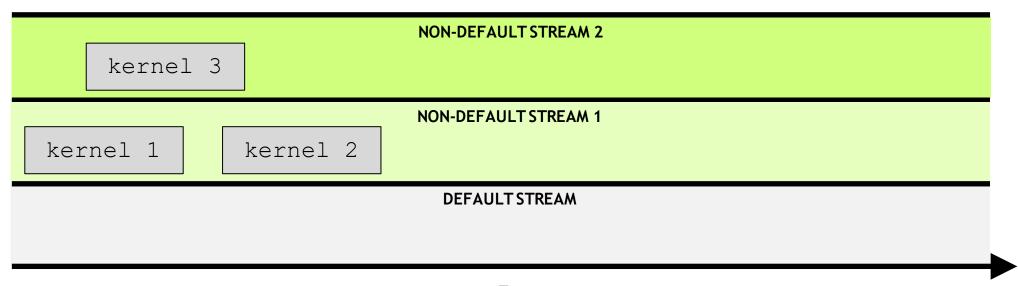
**DEFAULT STREAM** 

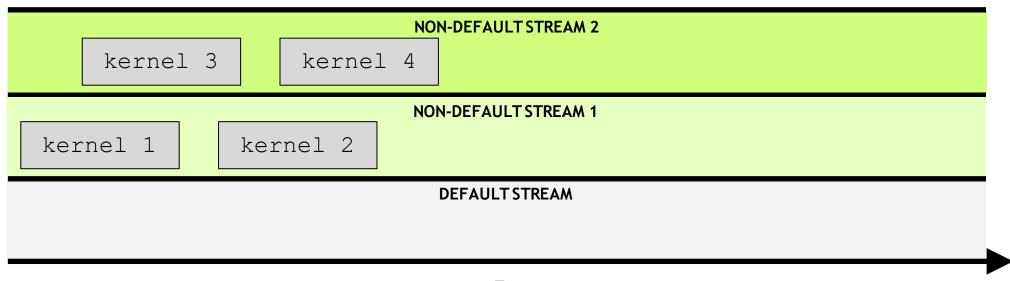
Non-default streams can also be created for kernel execution

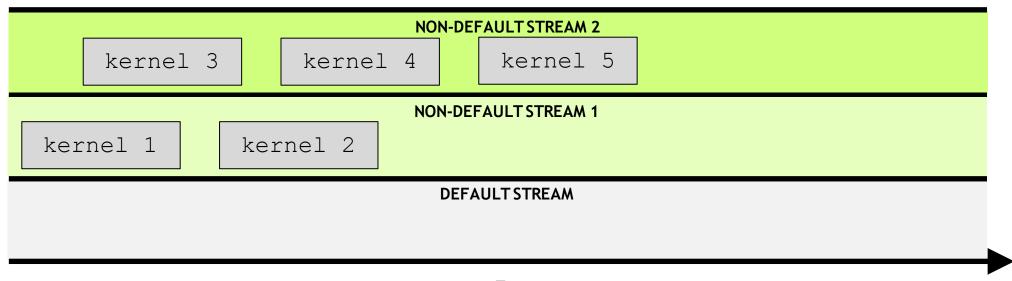


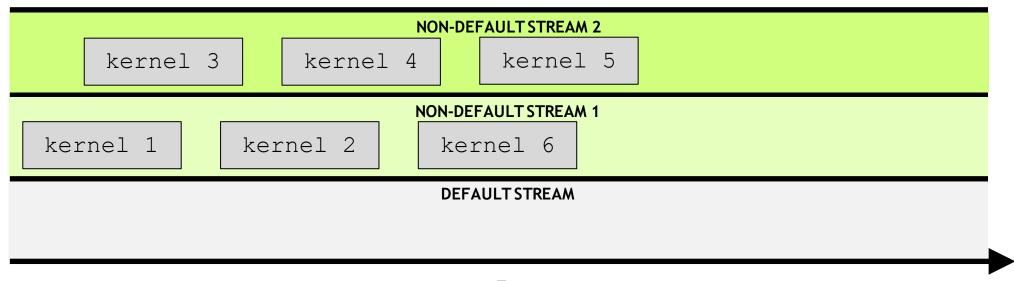
Kernels within any single stream must execute in order

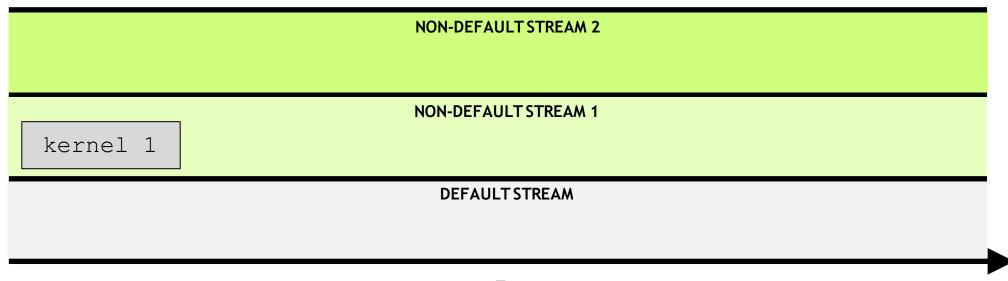


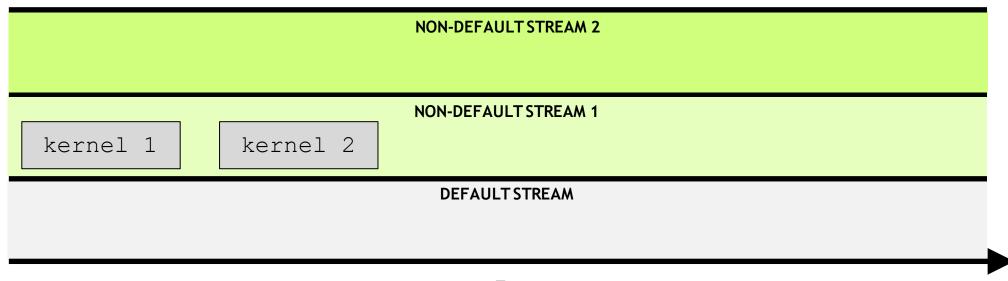


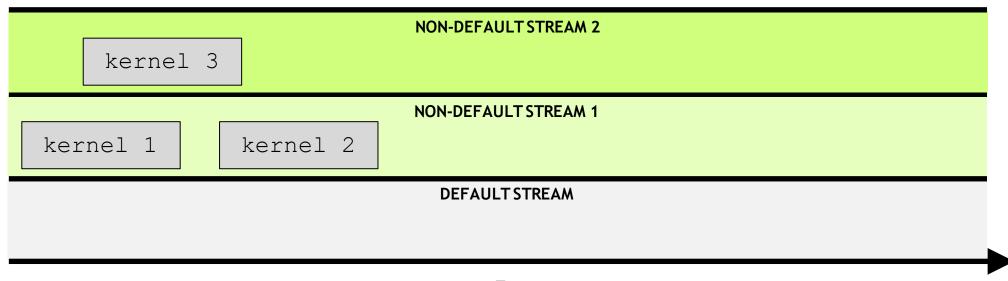


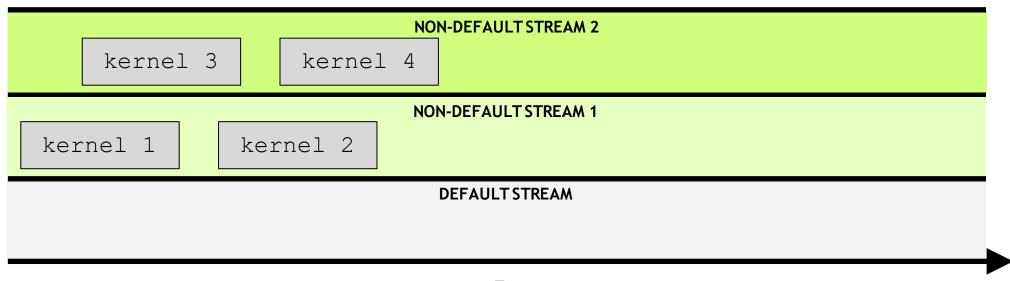


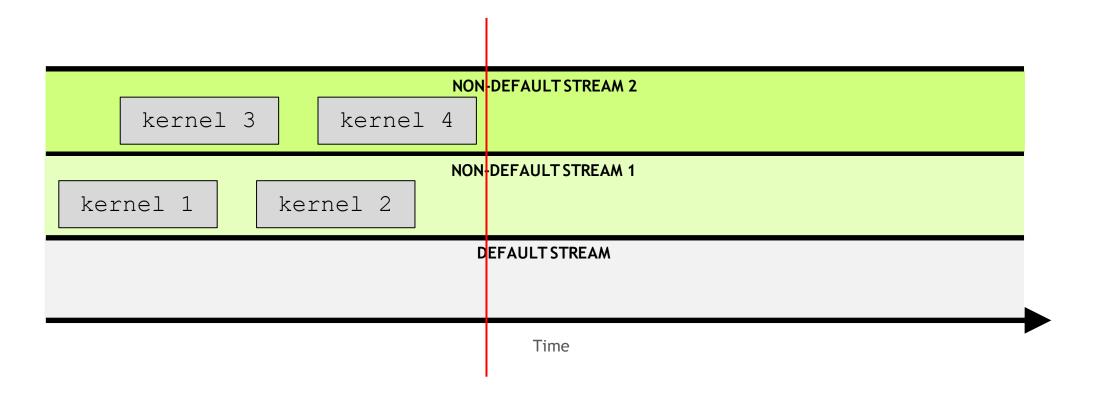


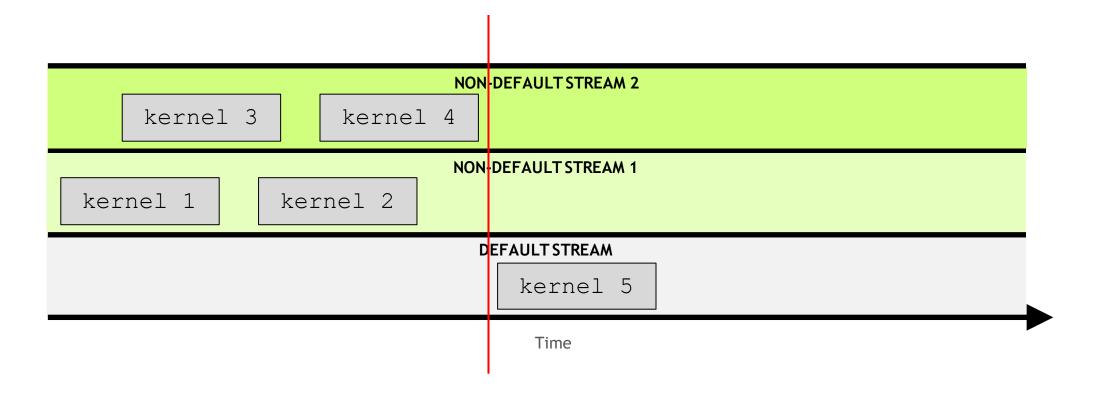


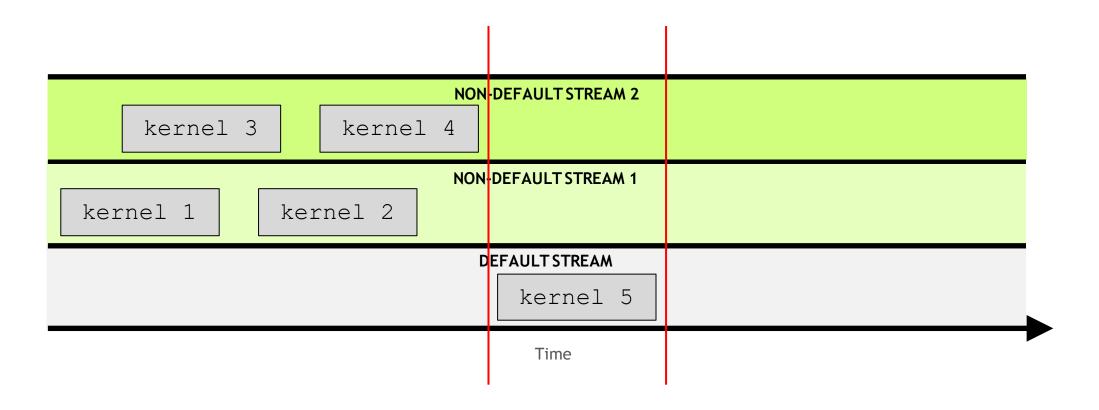


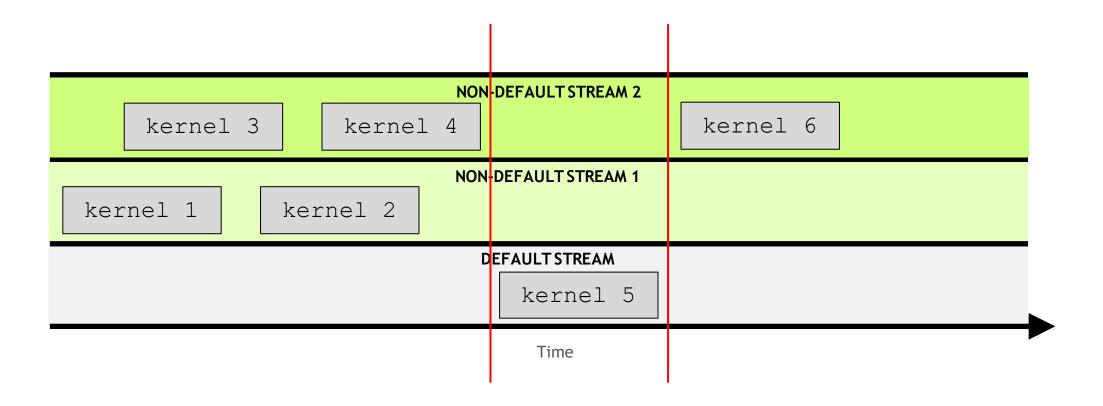


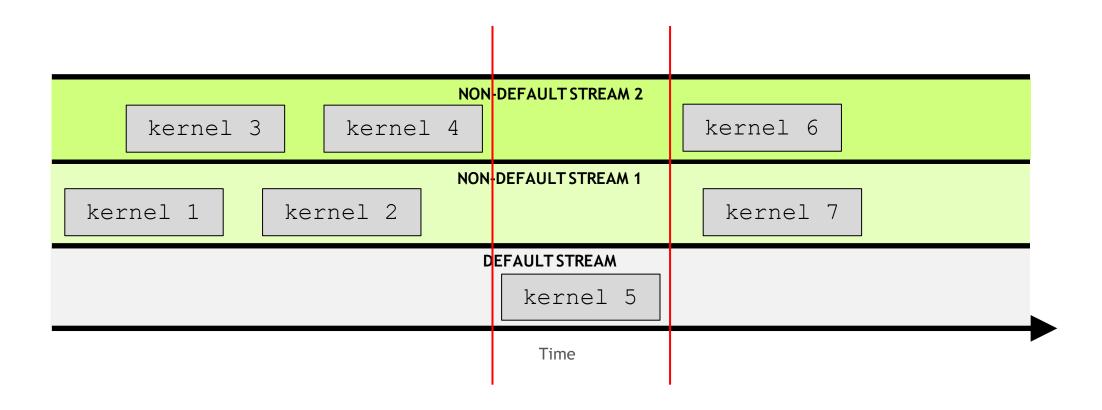


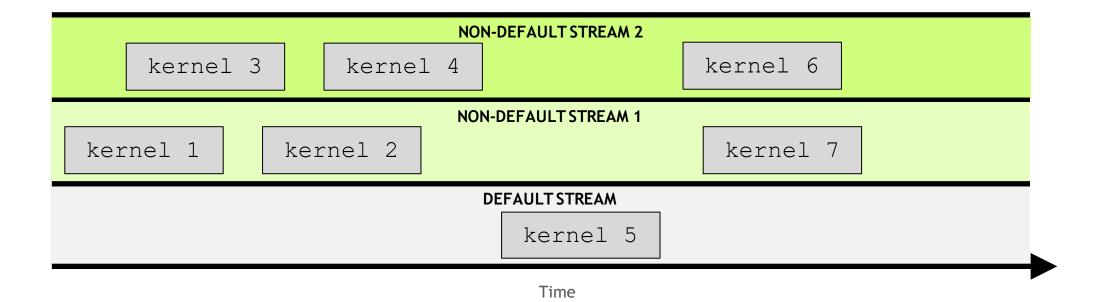










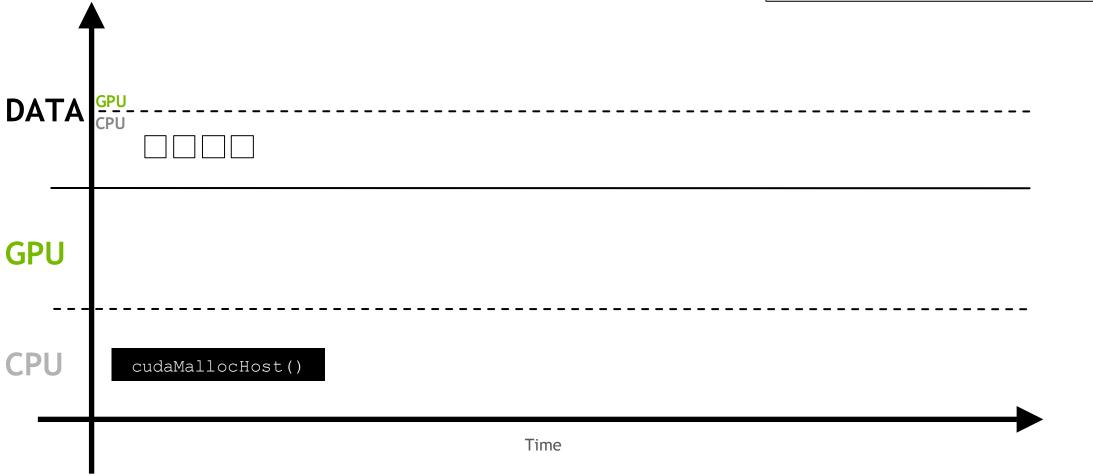


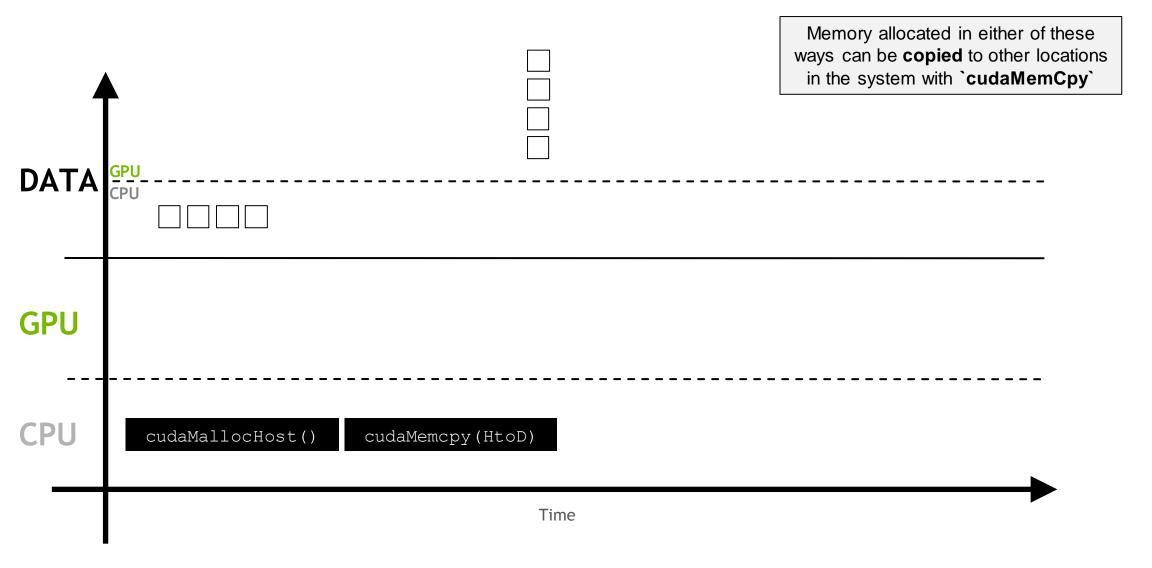
## **Non-Unified Memory**

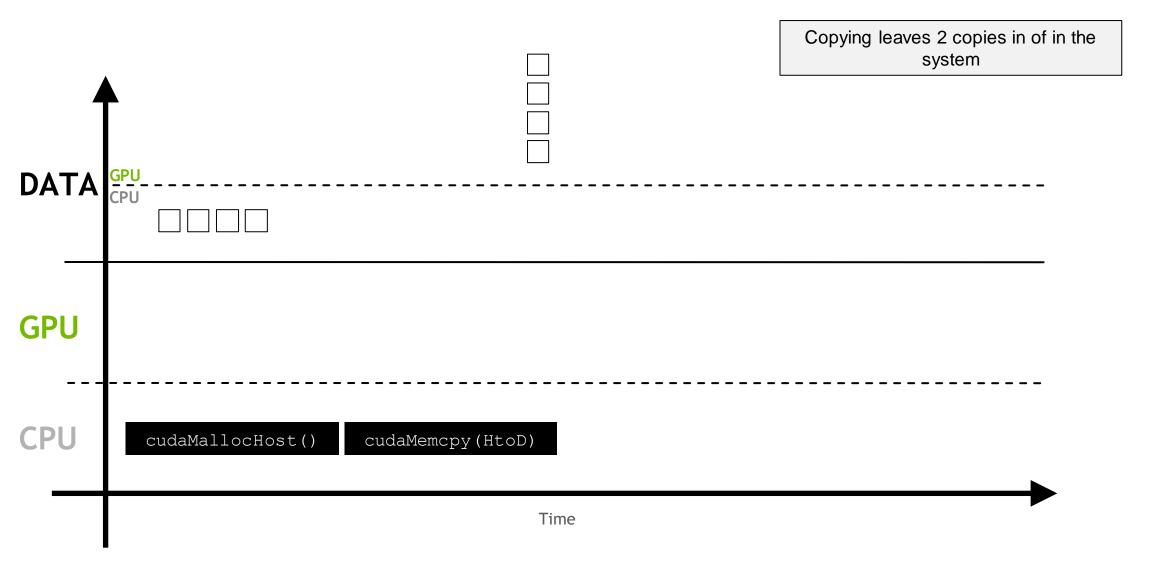
Memory can be allocated directly to the GPU with `cudaMalloc`



Memory can be allocated directly to the host with `cudaMallocHost`









asynchronously transfer memory over a non-default stream **GPU** cudaMallocHost() cudaMemcpyAsync(HtoD) Time



`cudaMemcpyAsync` can





