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Reductions on GPUs

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Example reduction on the GPU

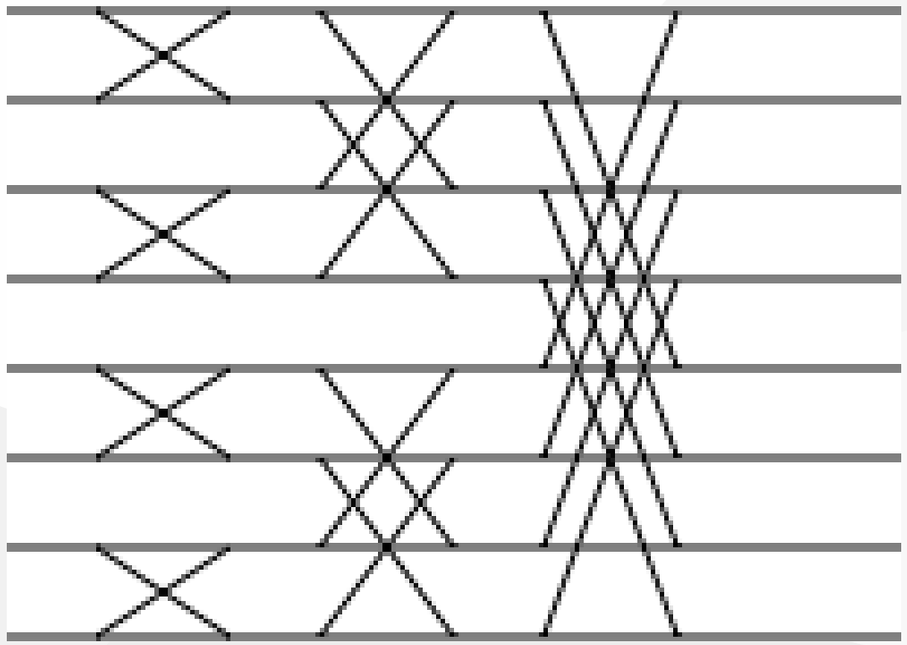
Overview

Reductions

1. Similar to our dot product example.
2. Race condition needs to be avoided.
3. Different levels of parallelism are exploited.

Warp level

- Thread cooperation with shuffle operations. (compute capability 3.x or higher)
  - `__shfl_xor_sync`
  - Butterfly algorithm



Block level

- Thread cooperation with shared memory

Kernel level

- Thread cooperation with atomic operations

Most recent hardware (compute capability 8.x or higher)

- NVIDIA Grace-Hopper cards provide warp reduction operations in hardware

reduction.cu