NVIDIA DEEP LEARNING INSTITUTE

MULTI-GPU PROGRAMMING FOR CUDA C++

INTRODUCTION

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Main Objectives

Concurrency Strategies

Workshop Structure

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Increase performance for Single-Node CUDA C/C++ applications by exploiting, and then combining, 2 concurrency strategies offered to CUDA programmers.

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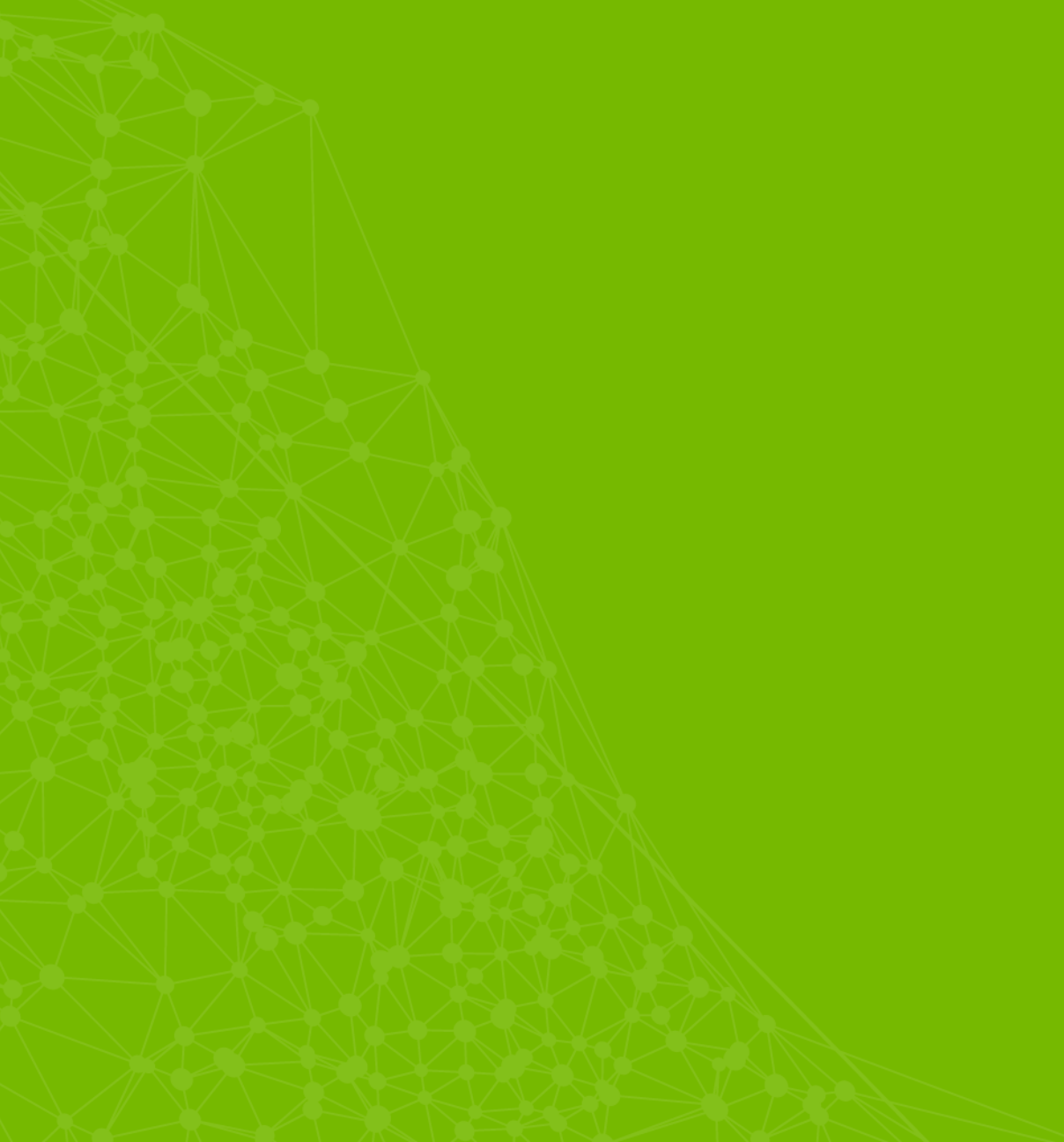
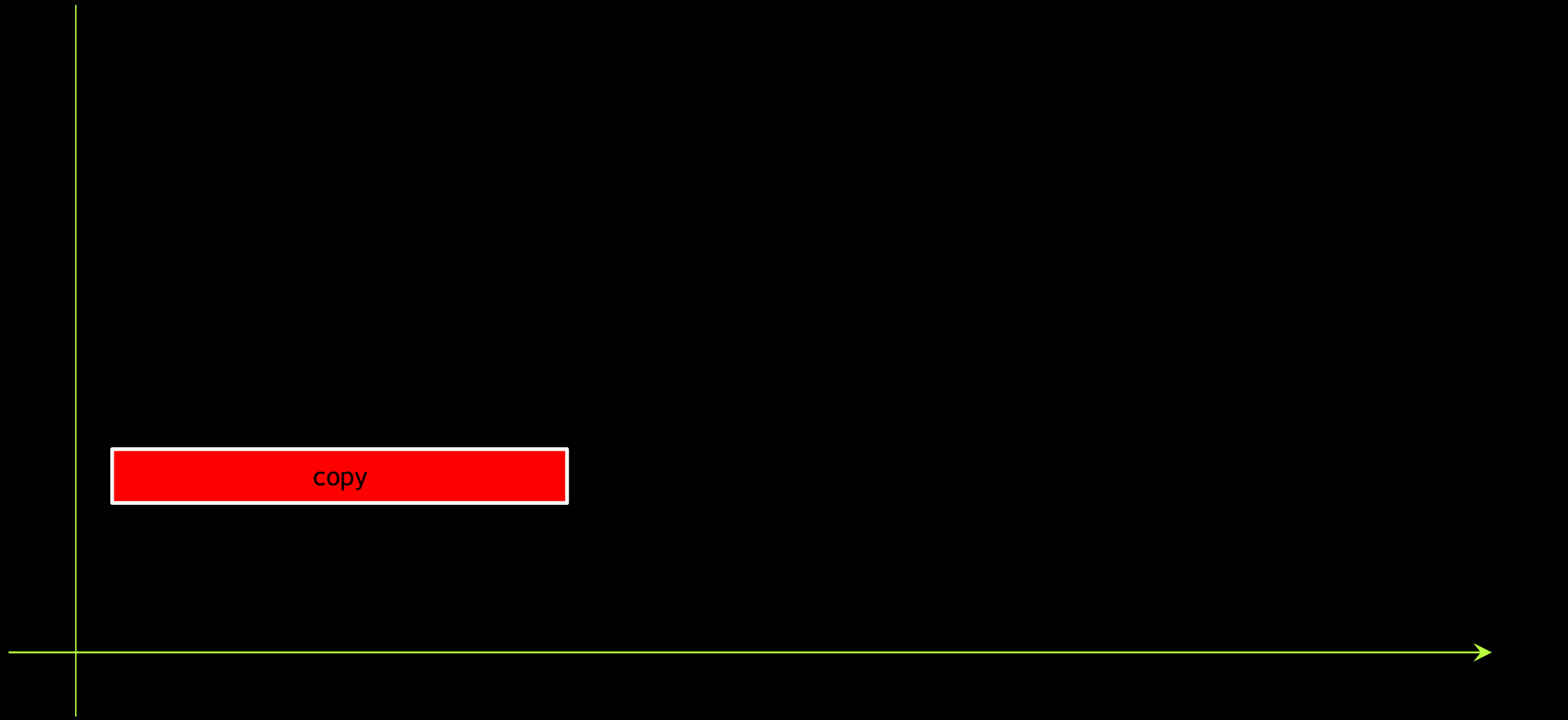
2) Performing computations concurrently on more than one GPU



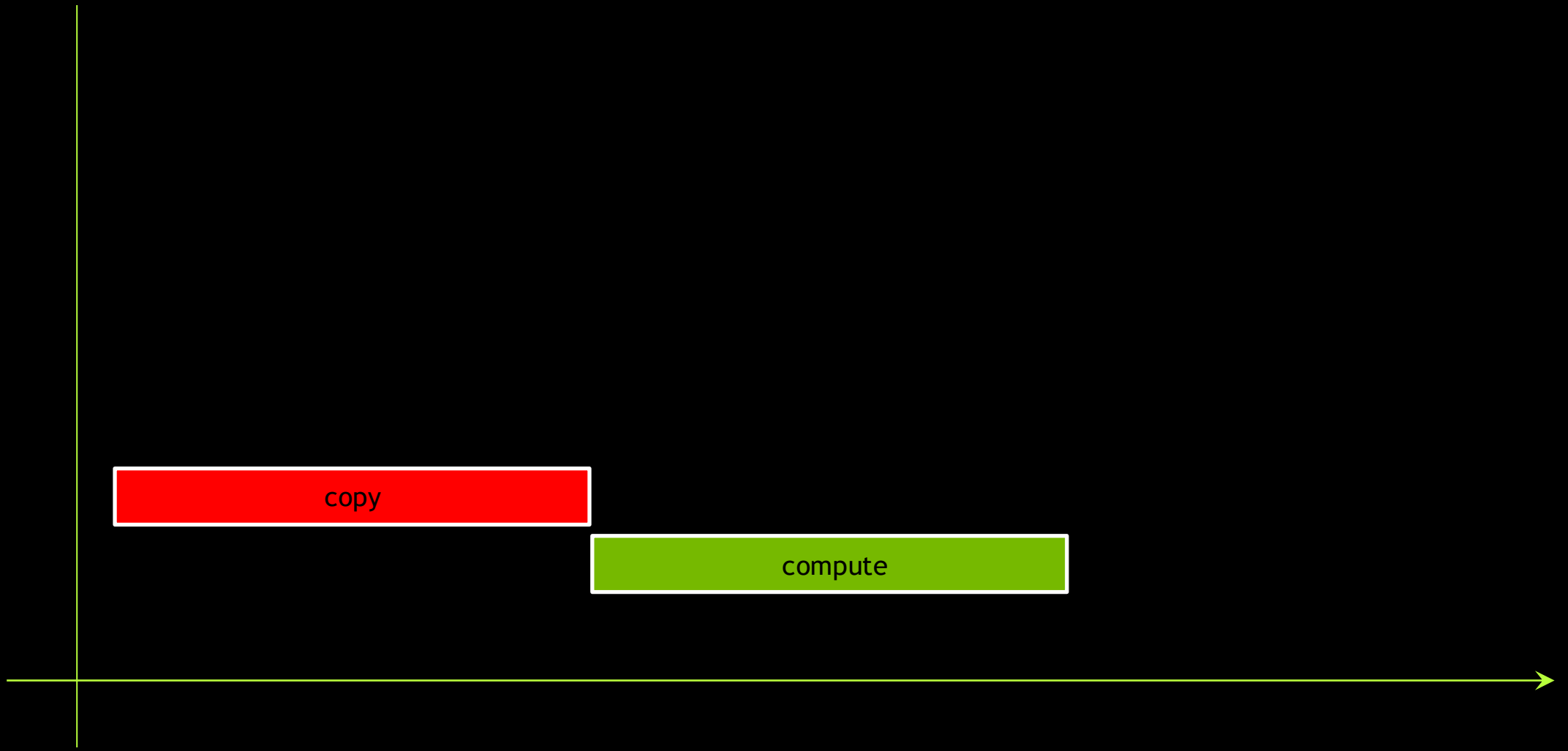
CONCURRENCY STRATEGIES

GPU programming is usually a 3-step process

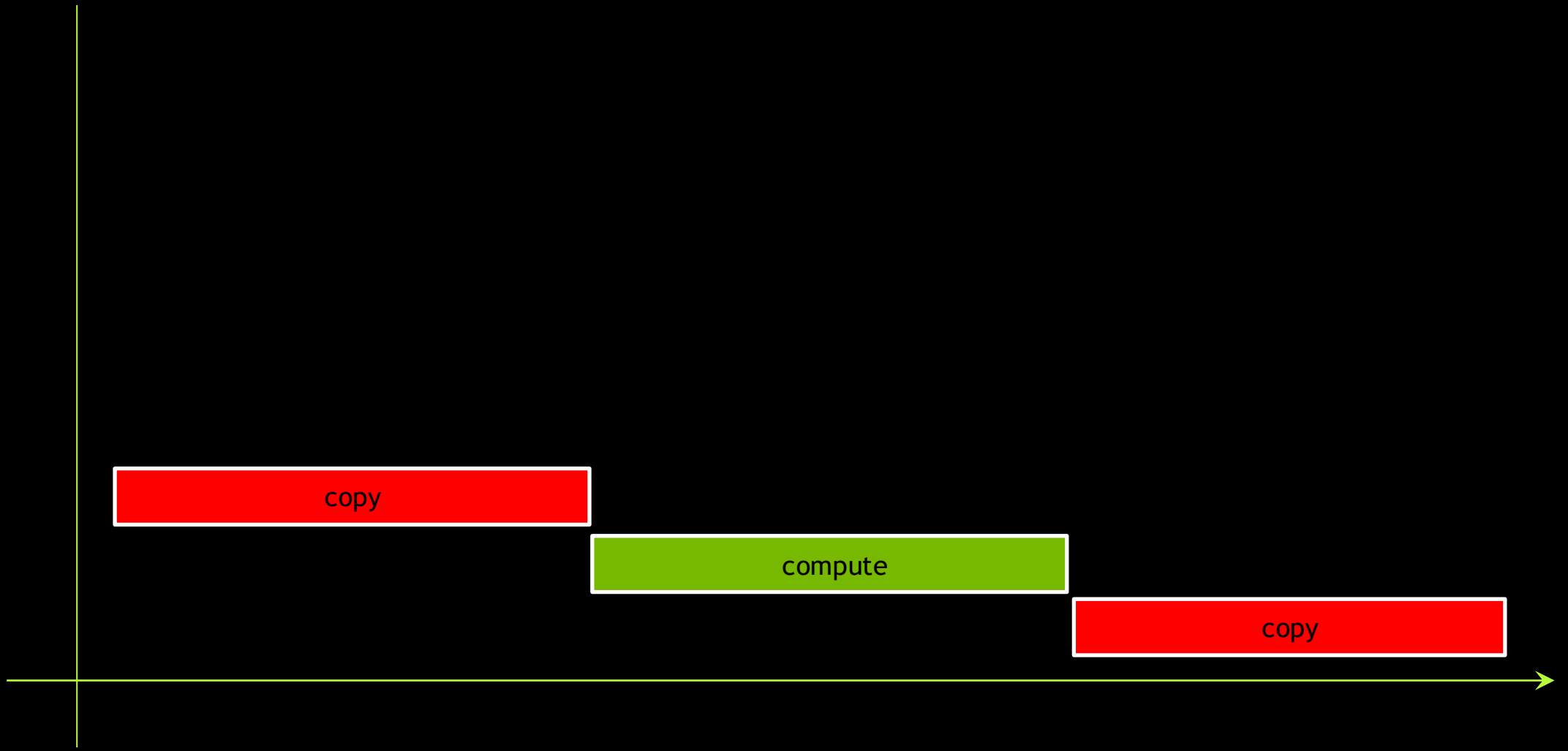
1. Transfer data to GPU device(s)

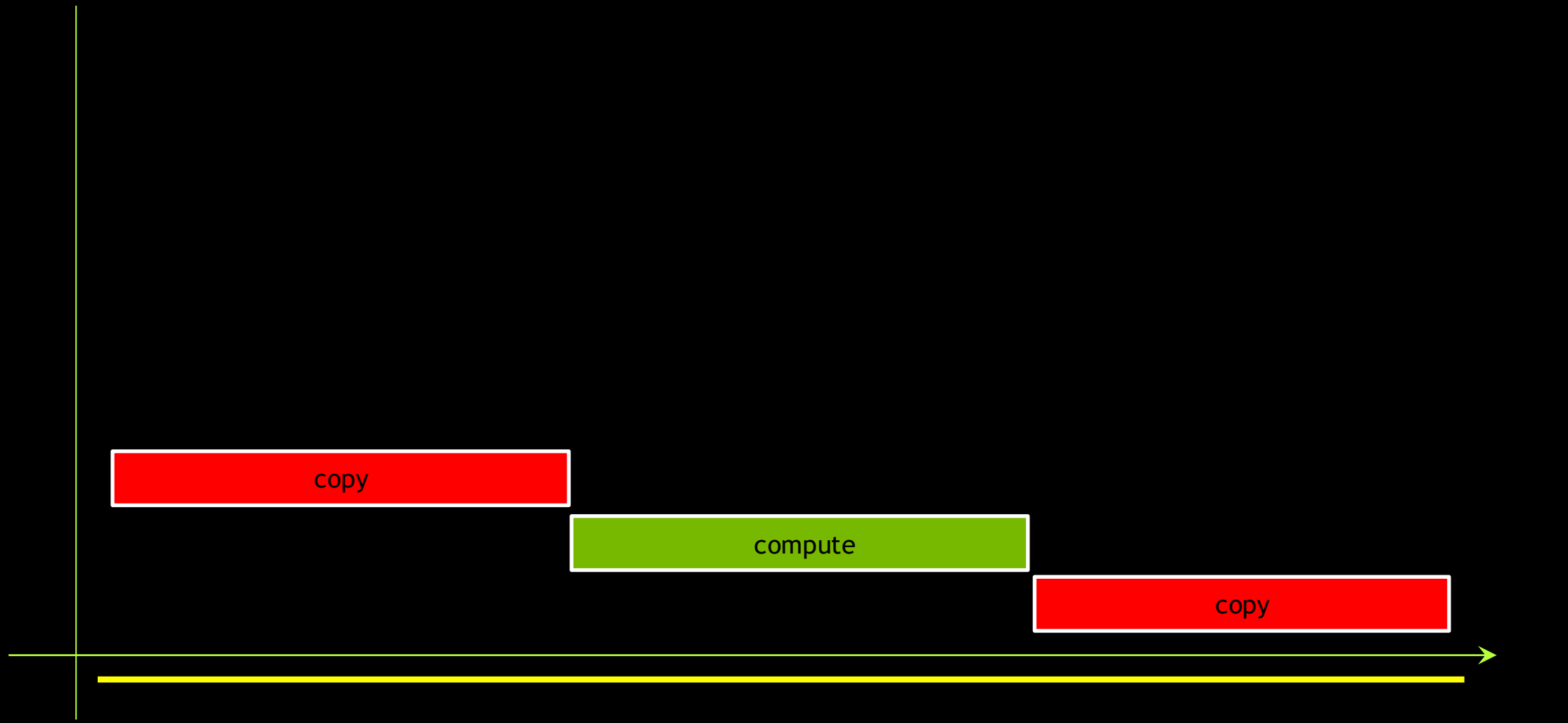


2. Perform computation on GPU device(s)

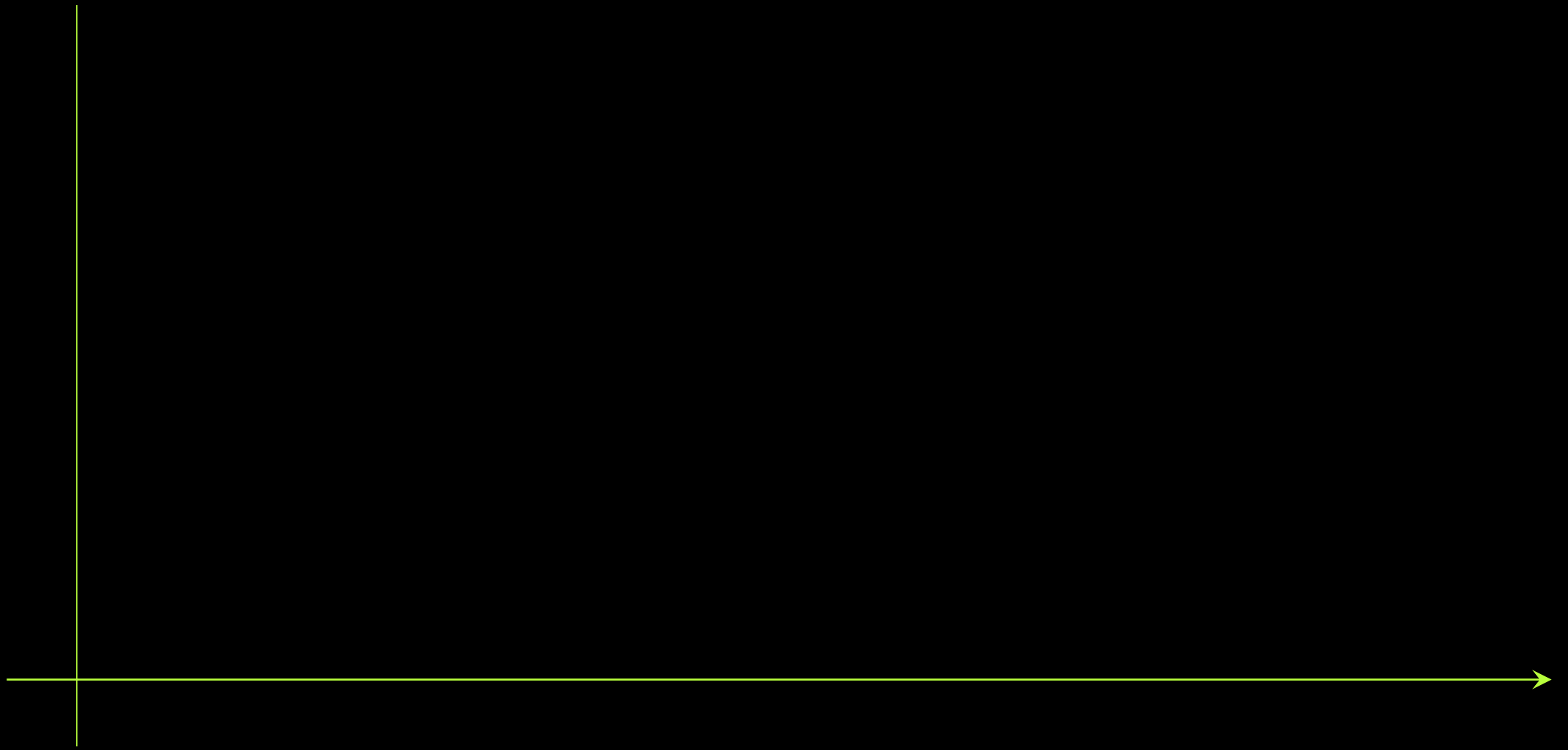


3. Transfer data back to the host




Total runtime is the sum
copy
compute
copy

If we can overlap memory transfer and compute…



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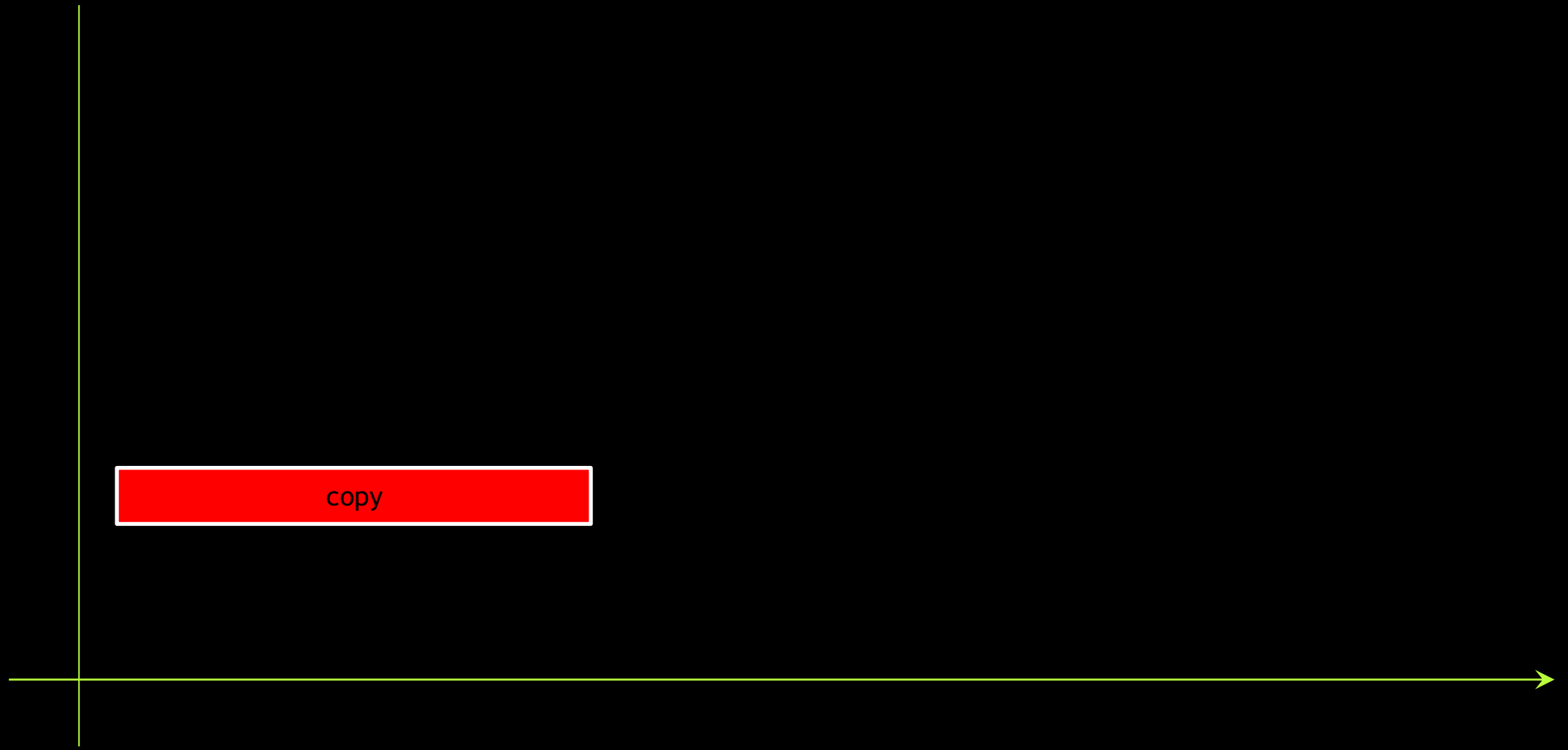

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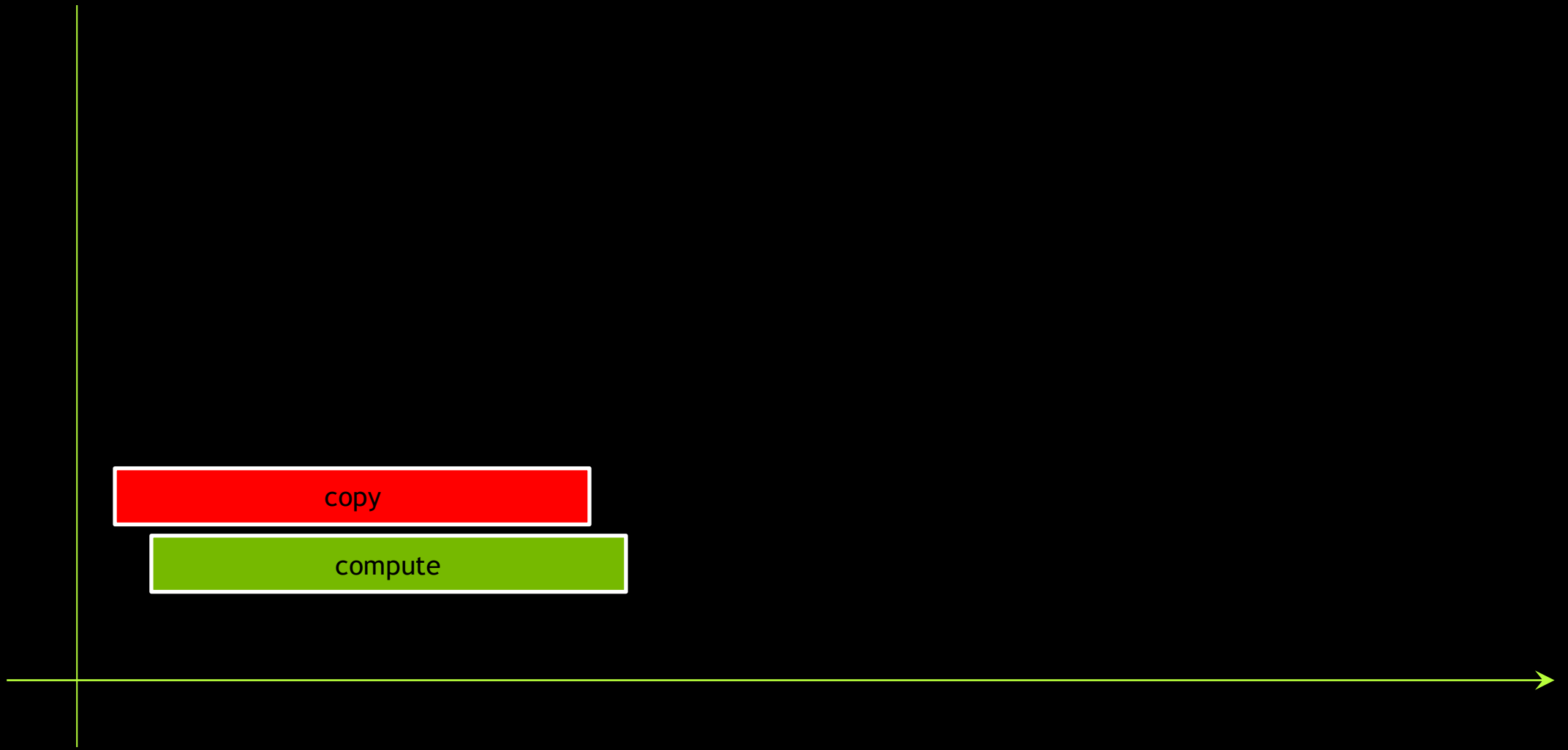

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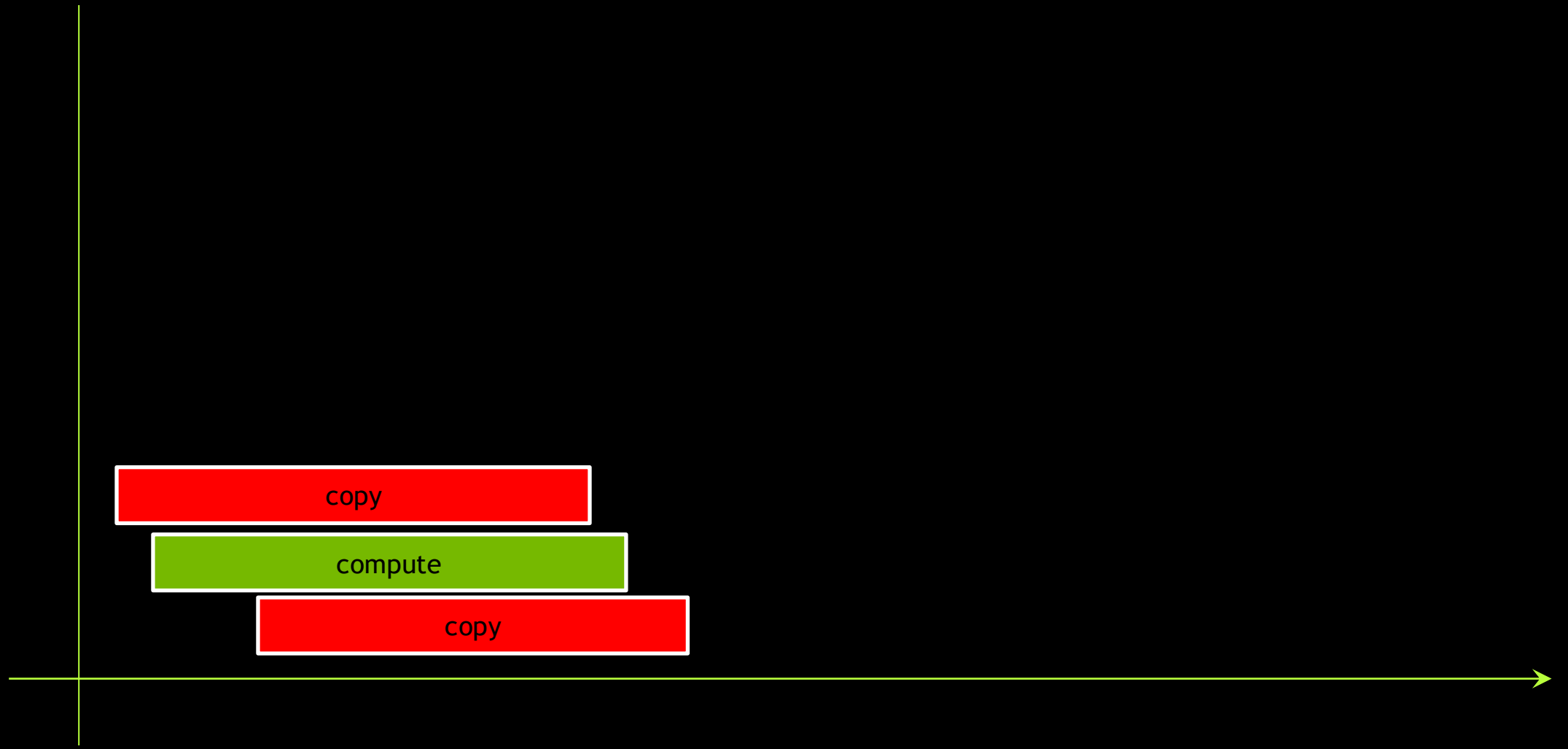
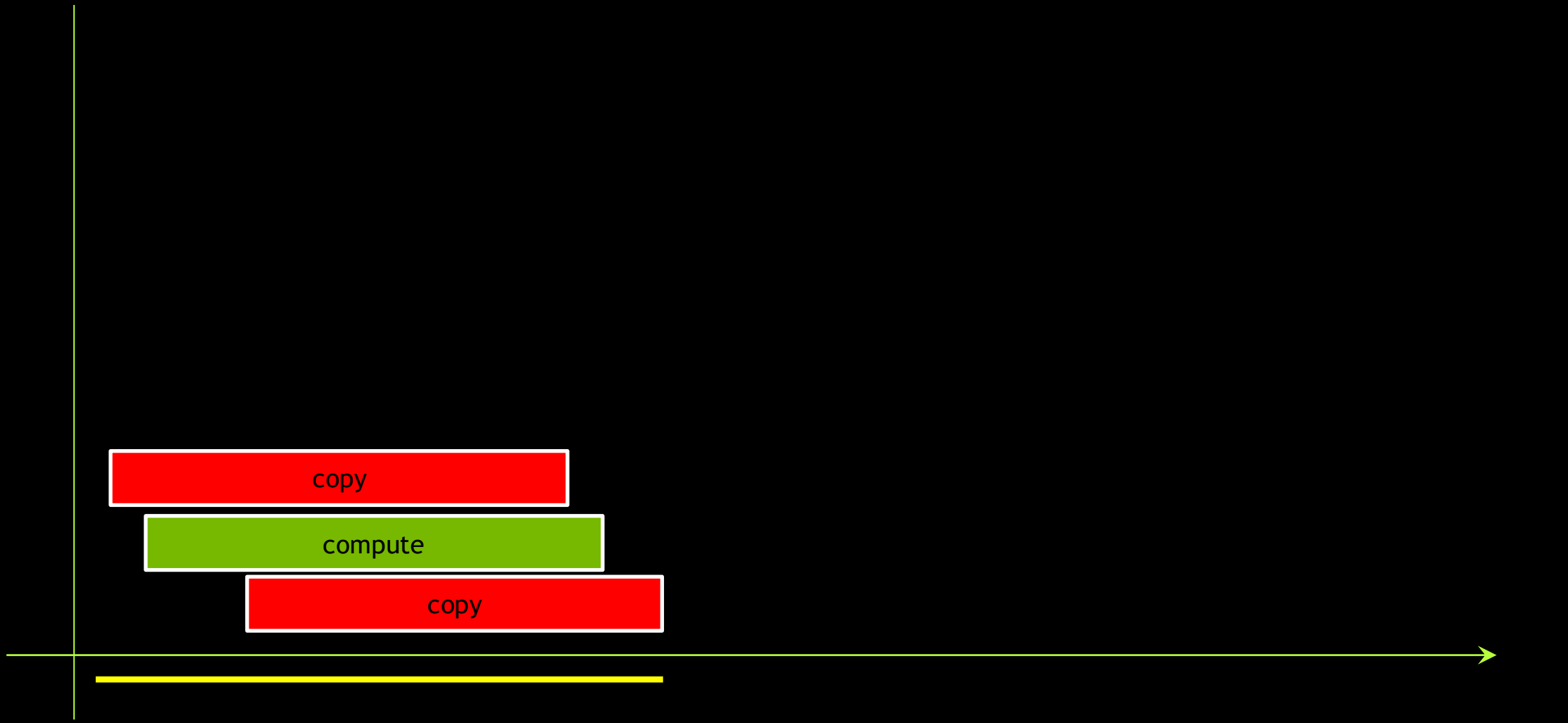
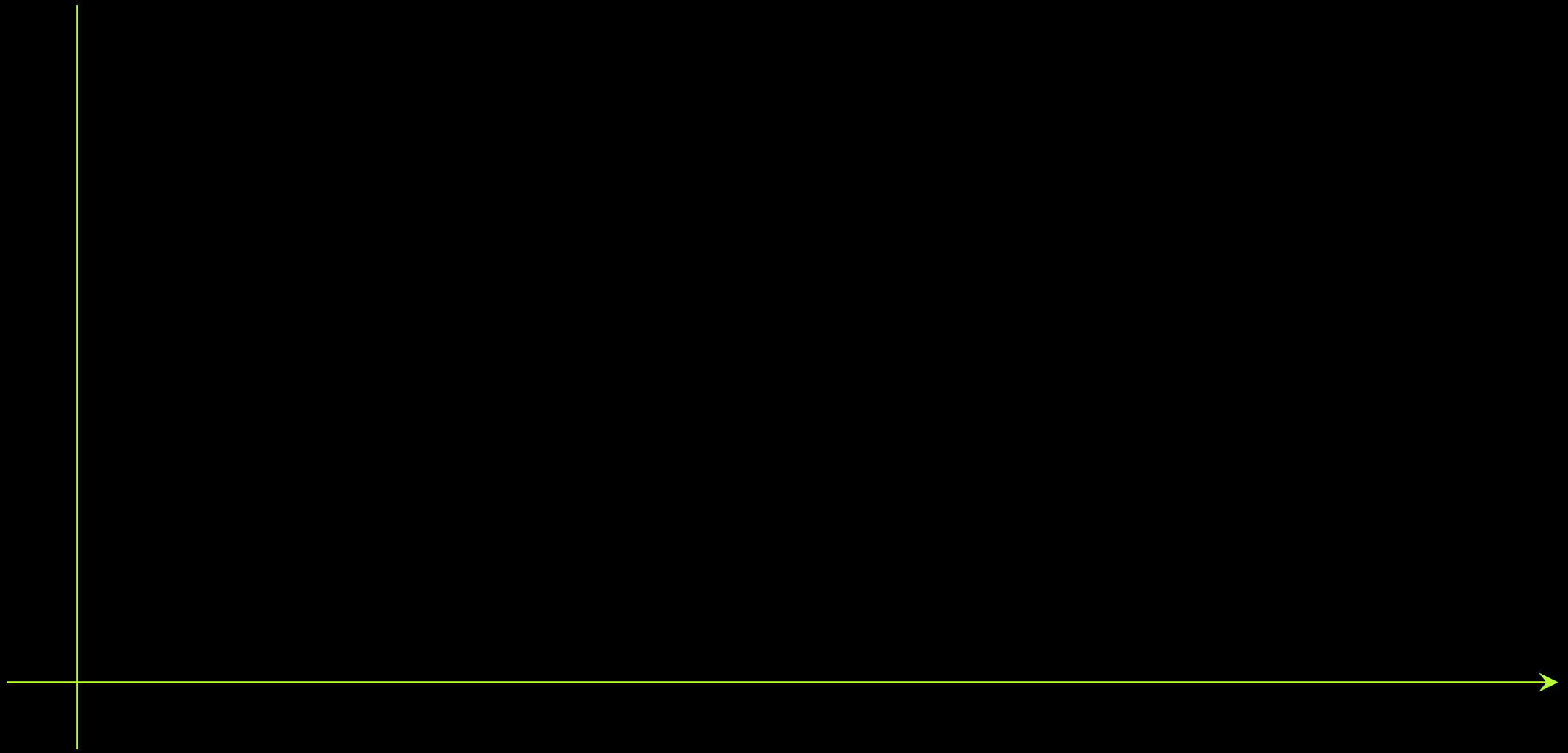


...total application time will be less



If we can overlap computation on multiple devices…



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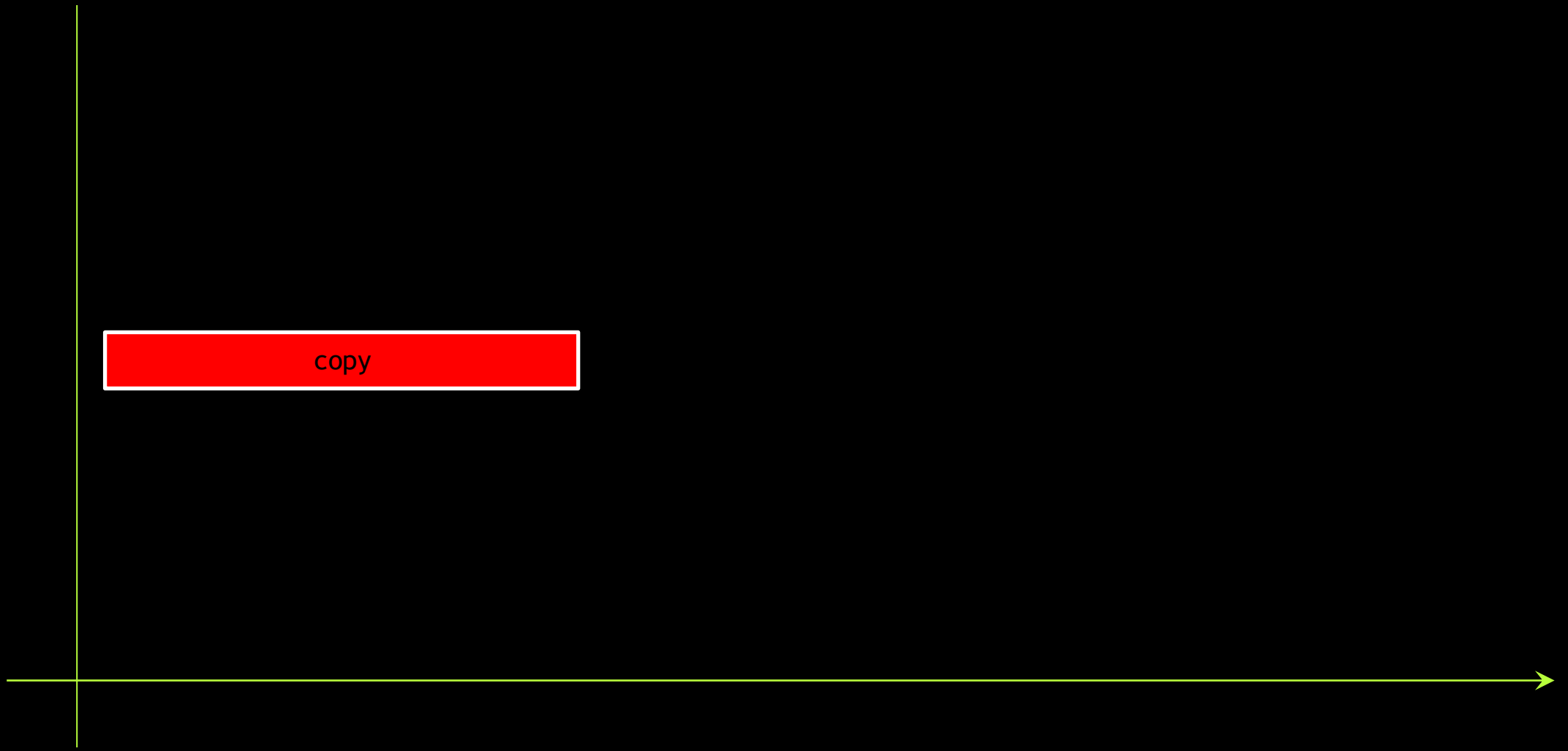

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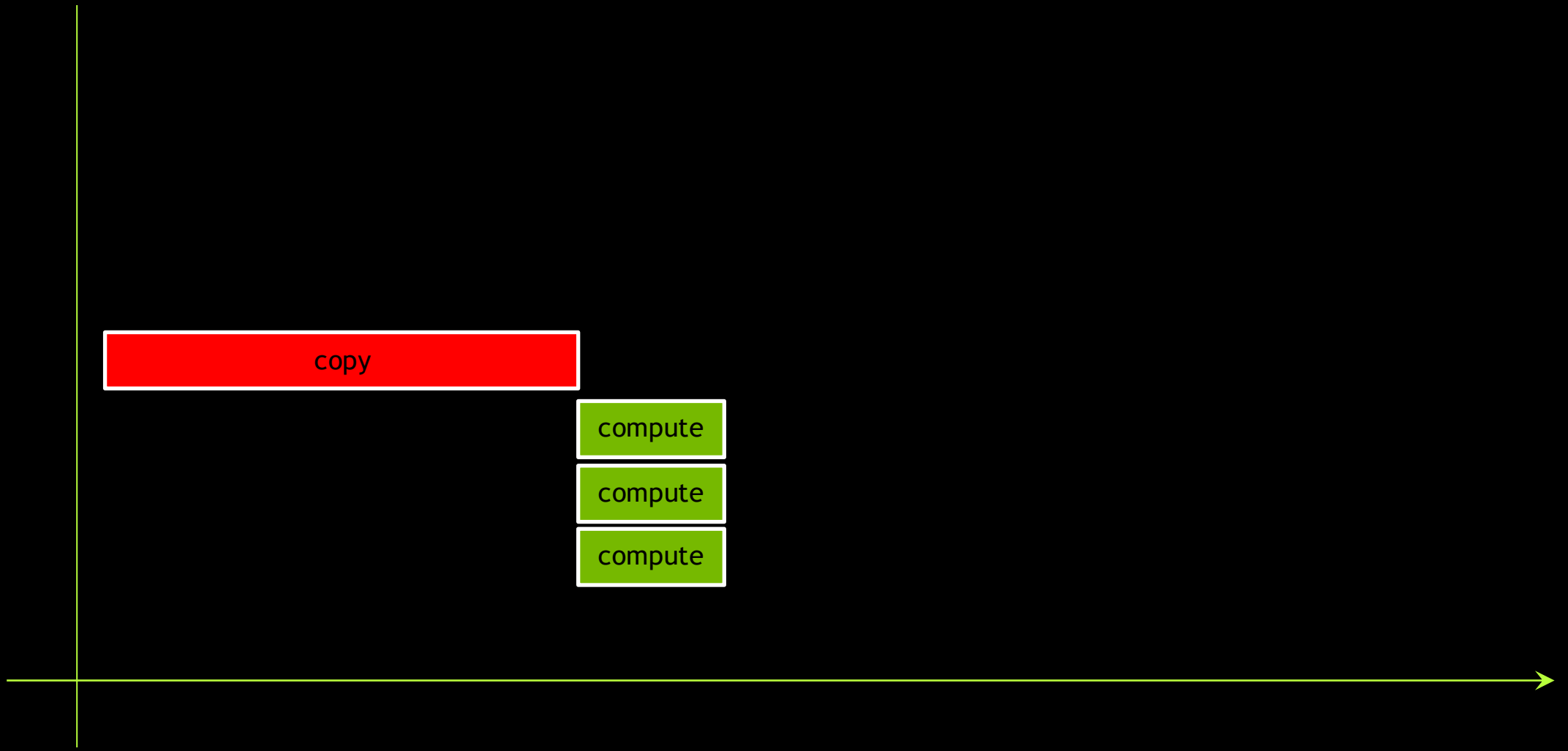

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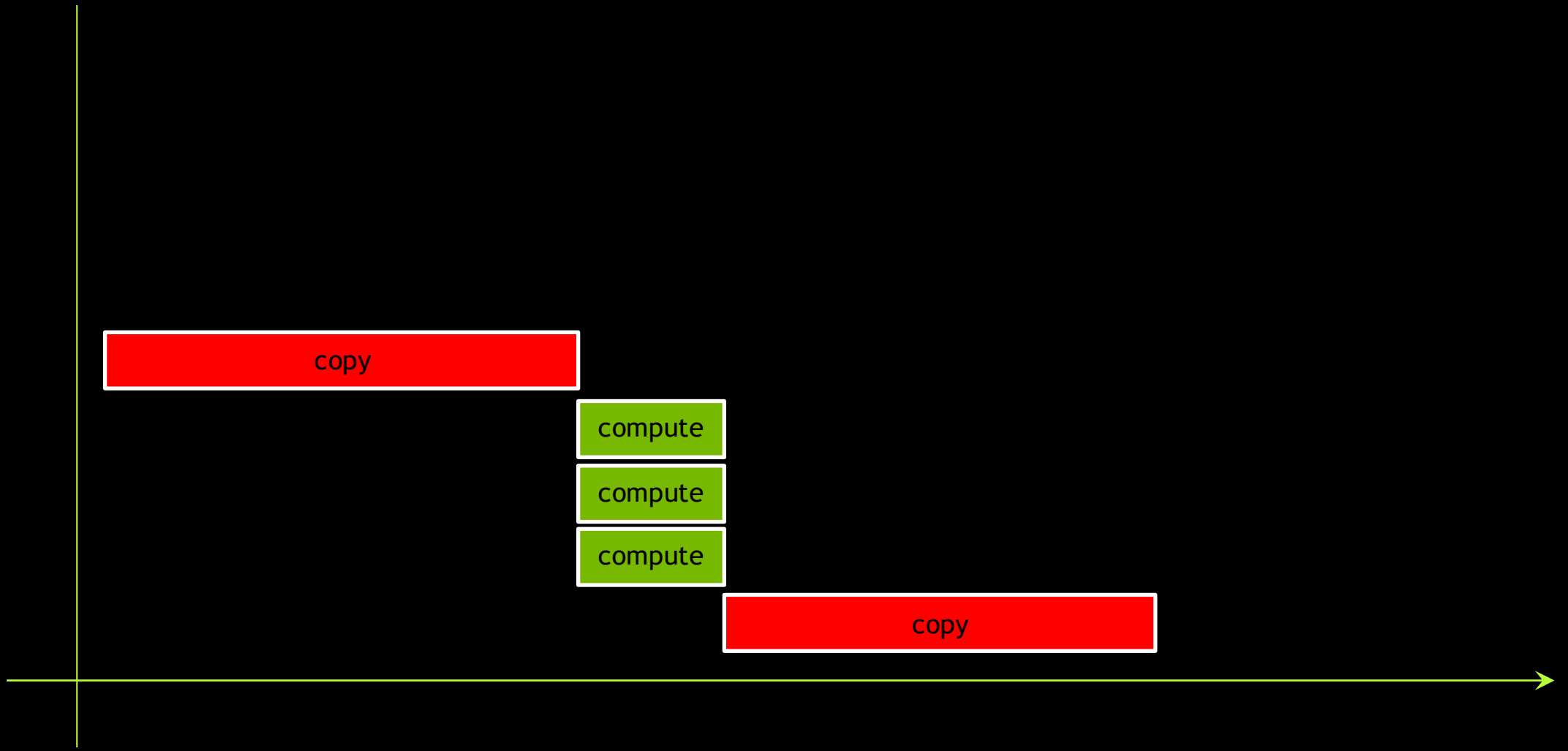
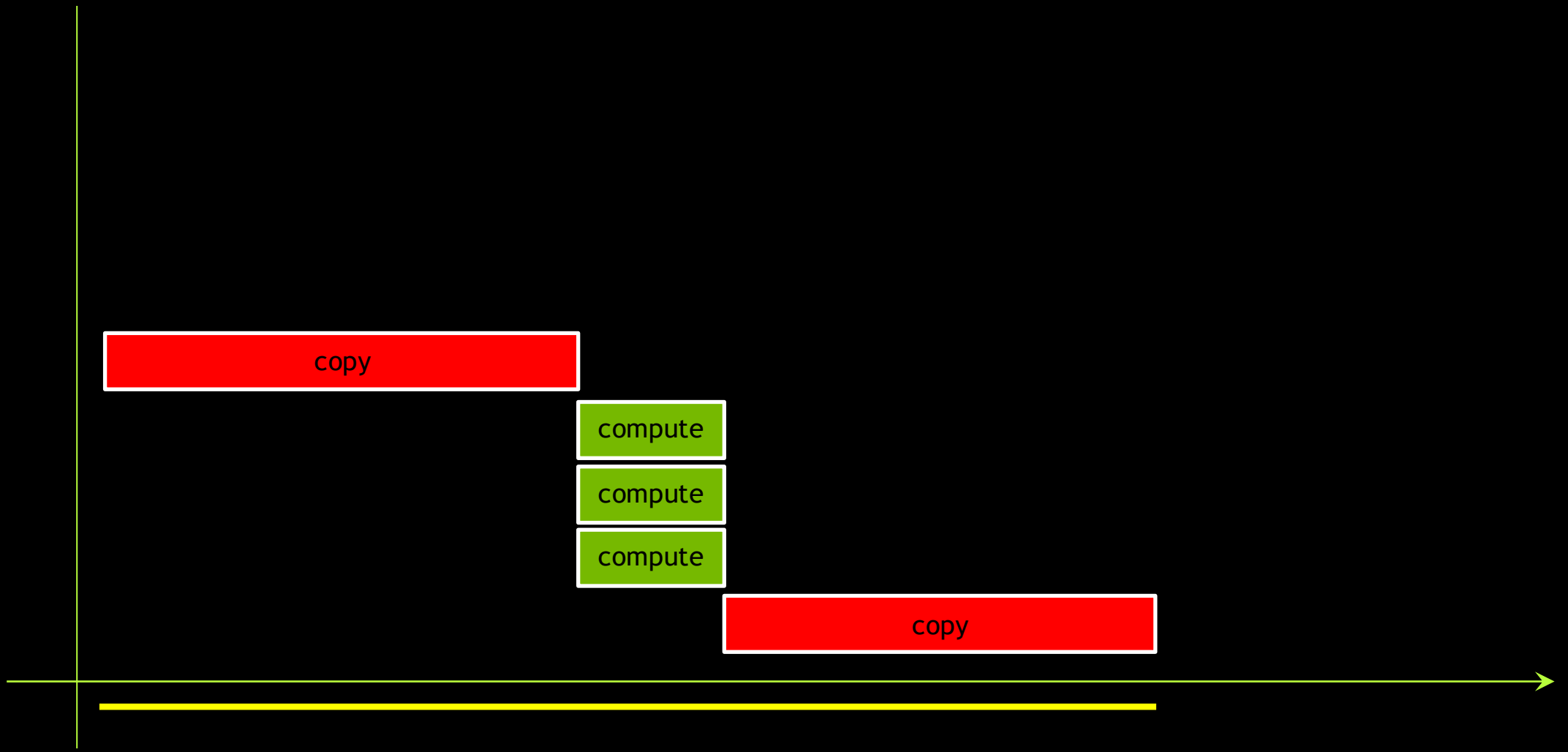
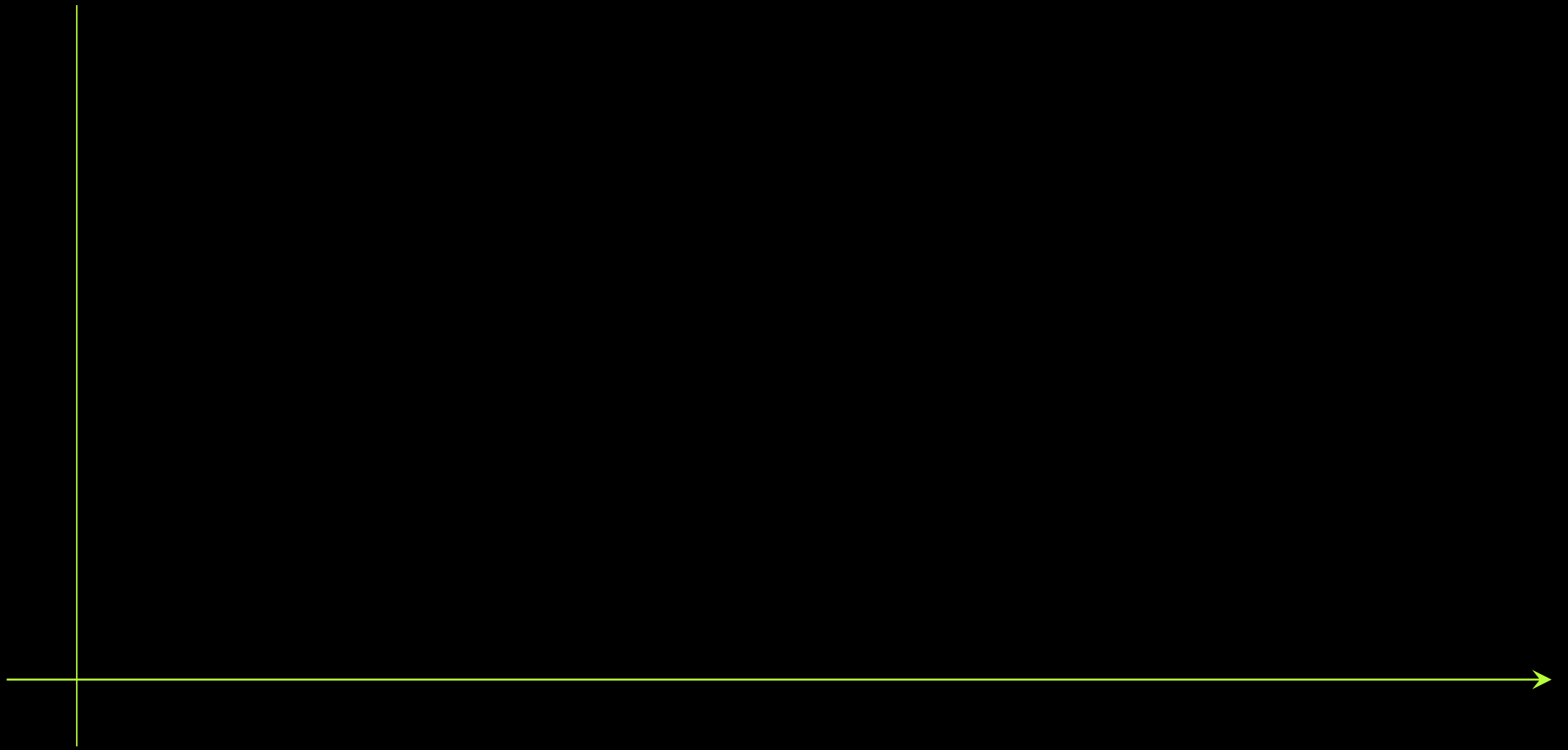


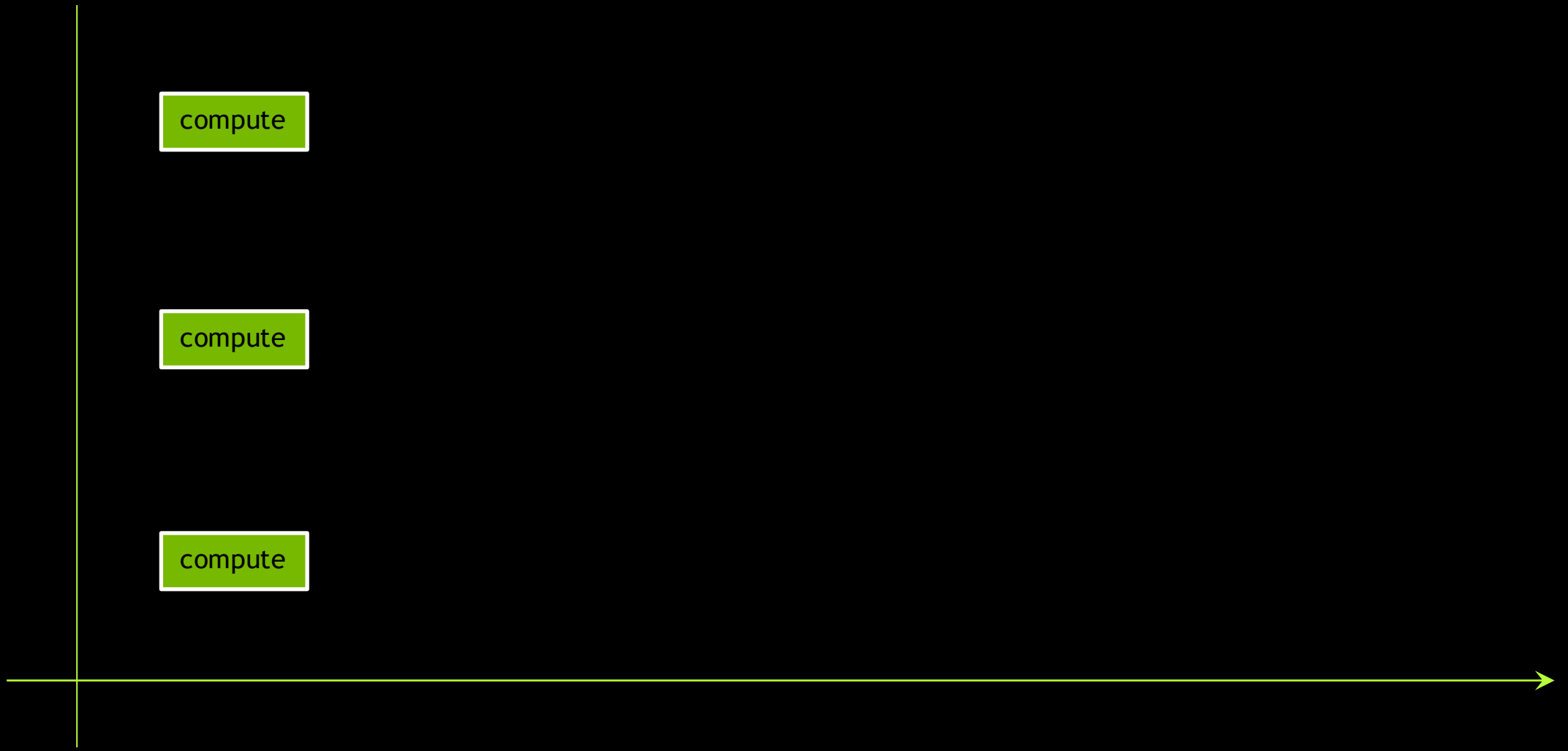
...total application time will also be less



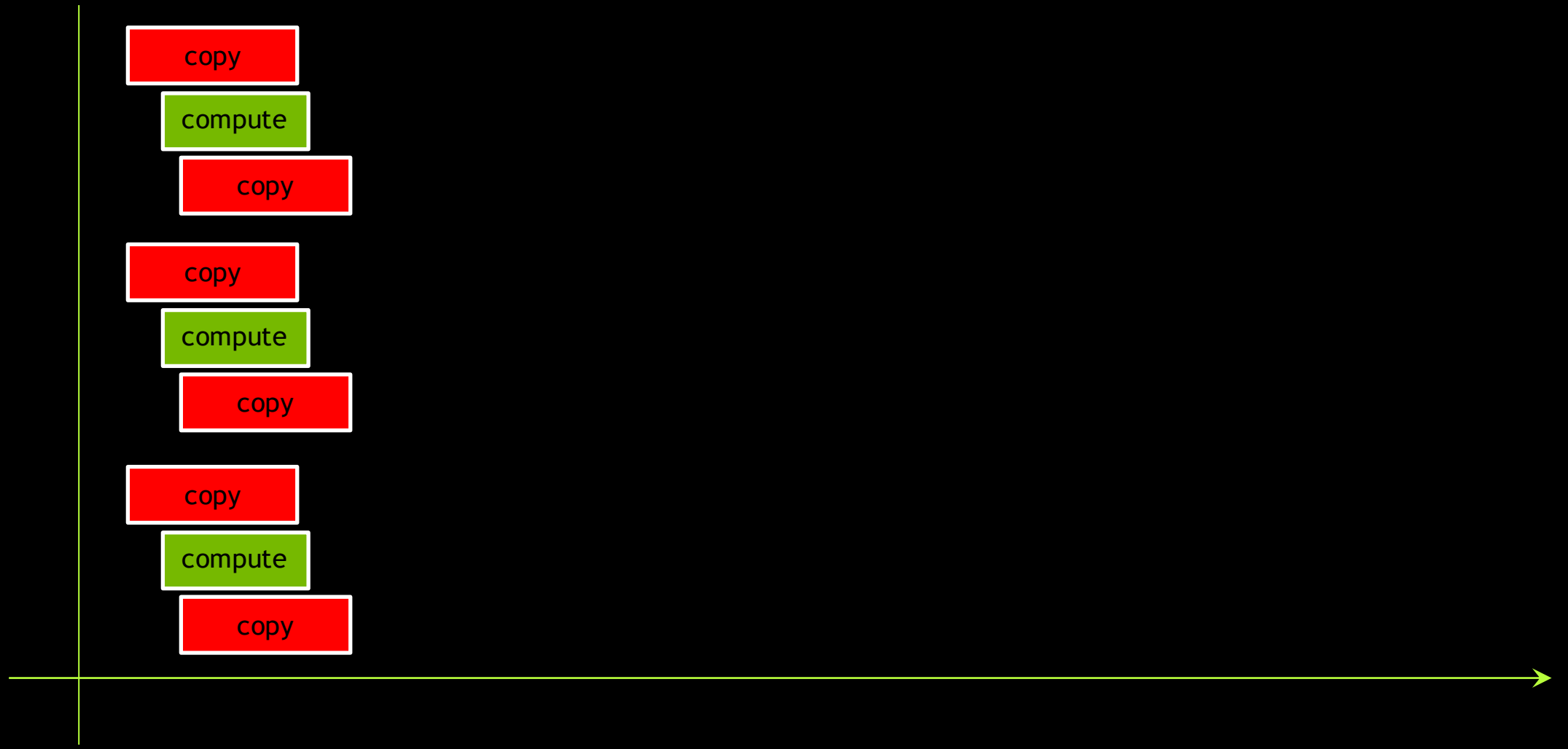
Combining the 2 strategies…



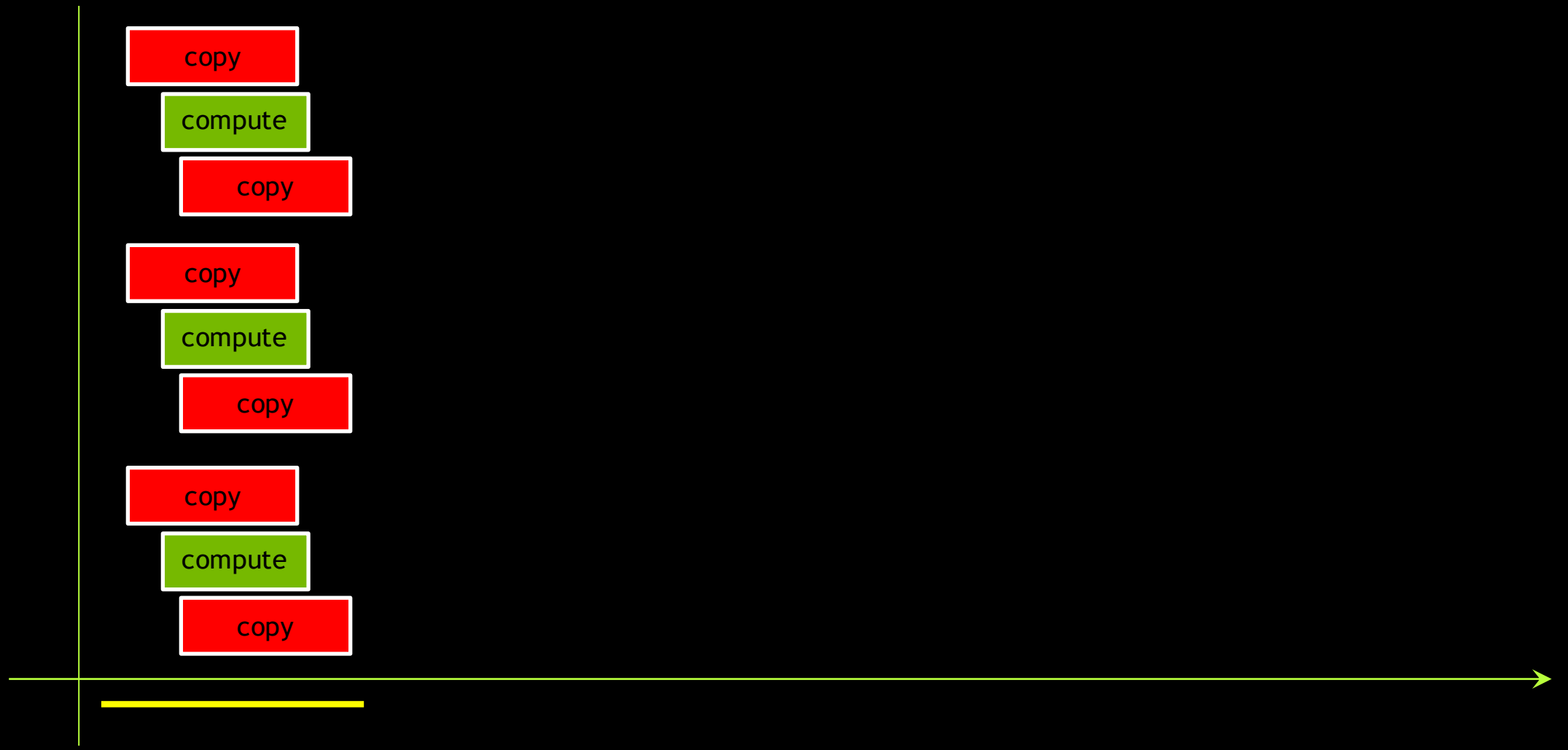
…overlapping compute on multiple devices



…and copy with each device’s compute



...total application time will be even less



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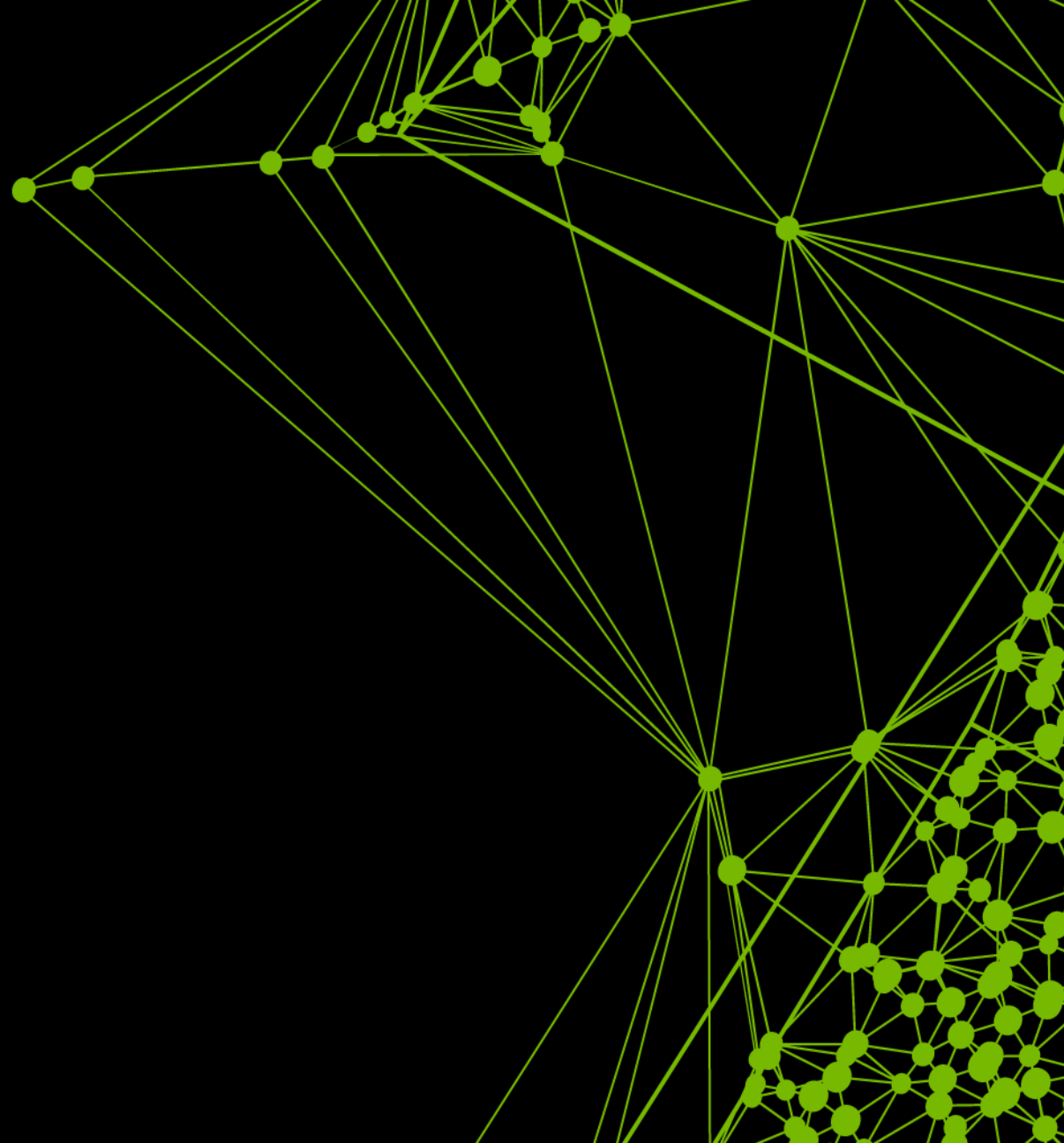
Next Steps



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