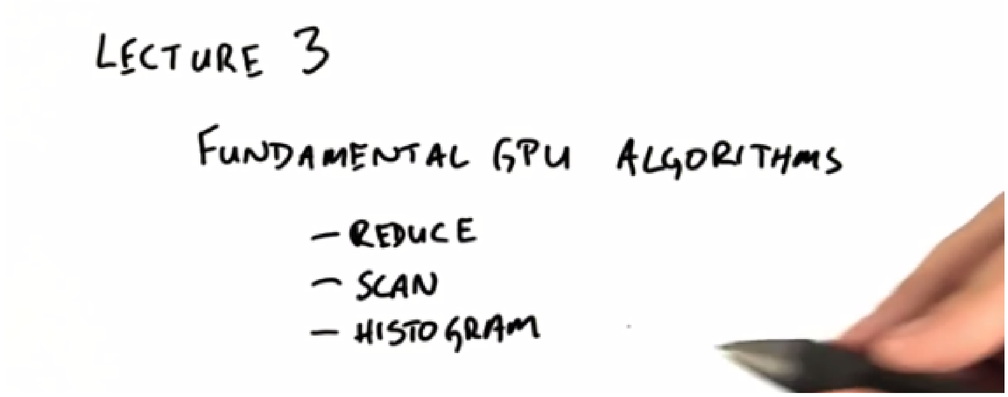
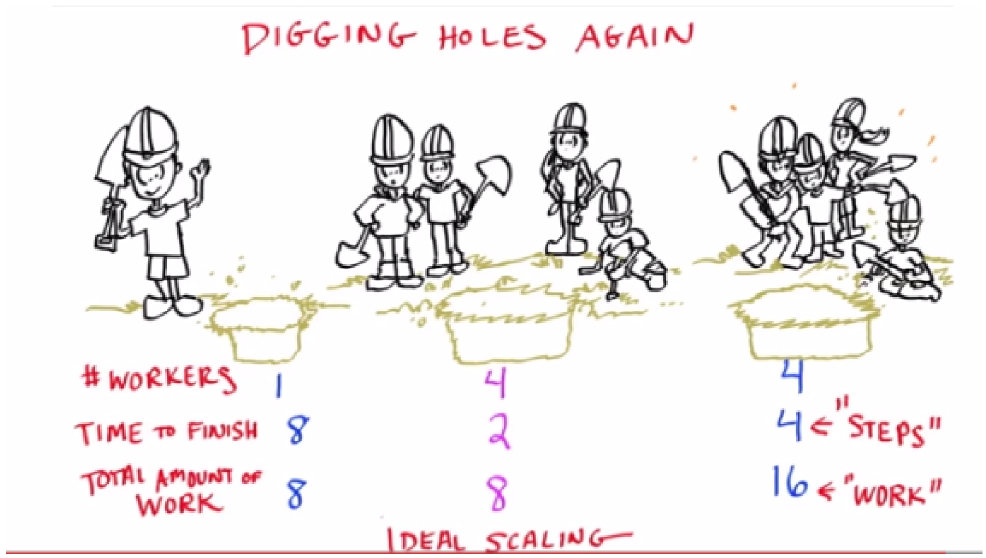
CS344 Introduction to Parallel Programming

Lesson 3:Fundamental GPU Algorithms (Reduce, Scan, Histogram)

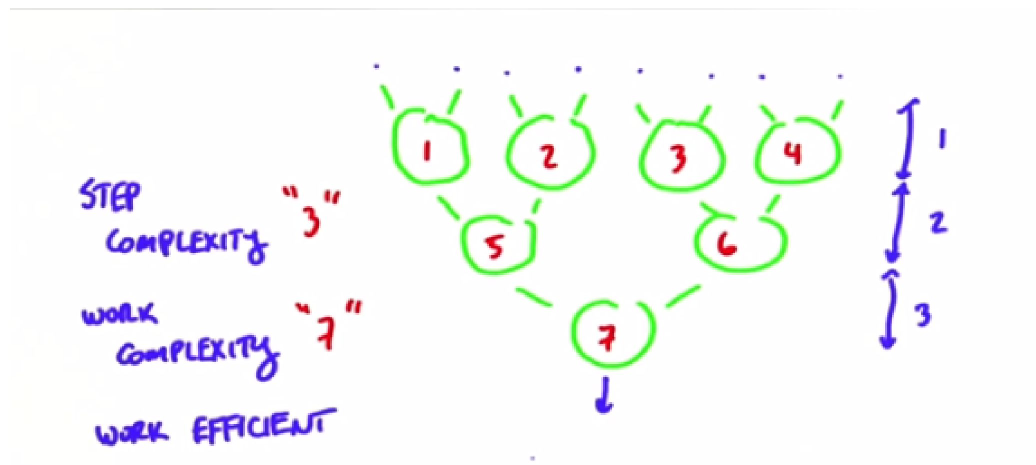
L3-3.2-Fundamental GPU Algorithms



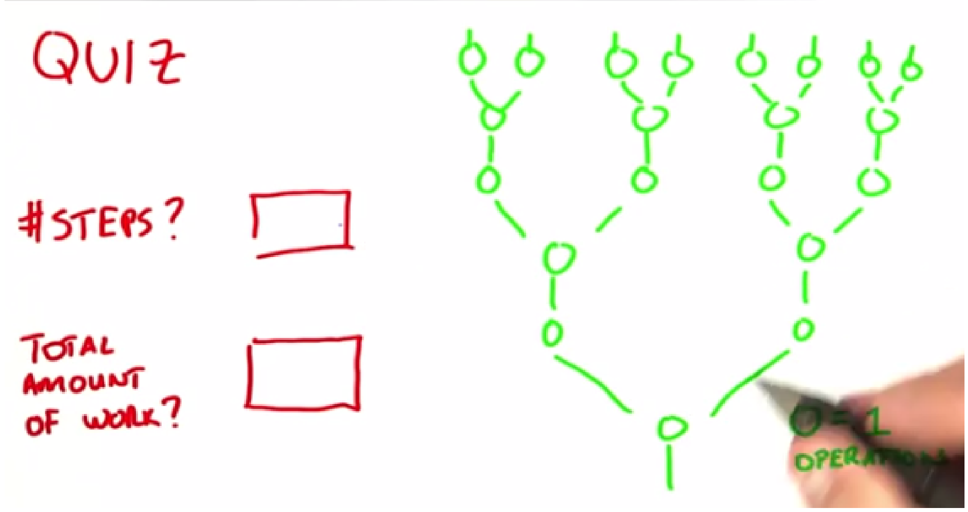
L3-3.3-Digging Holes Again



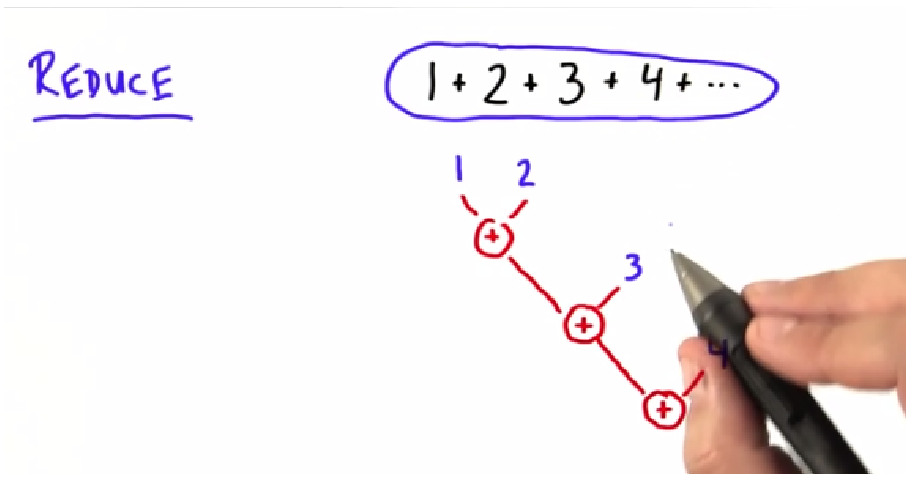
L3-3.4-Steps and Work



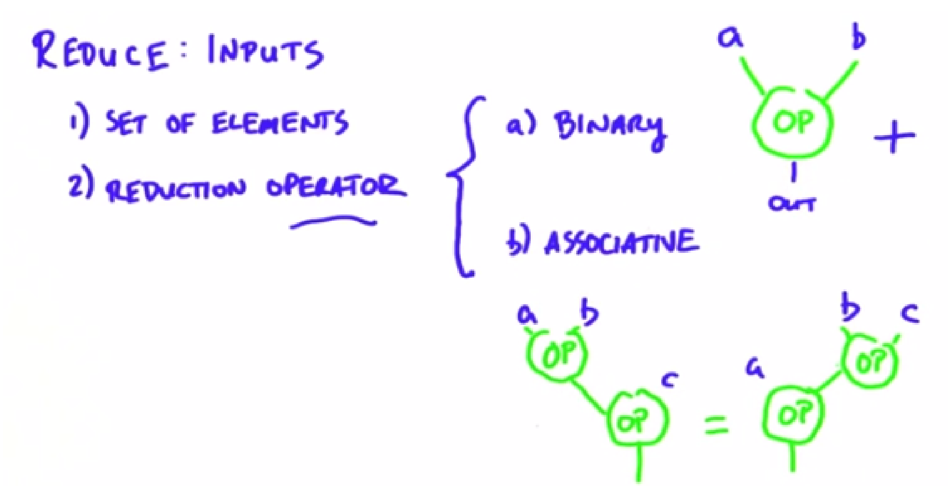
L3-3.5-A Quiz on Step And Work



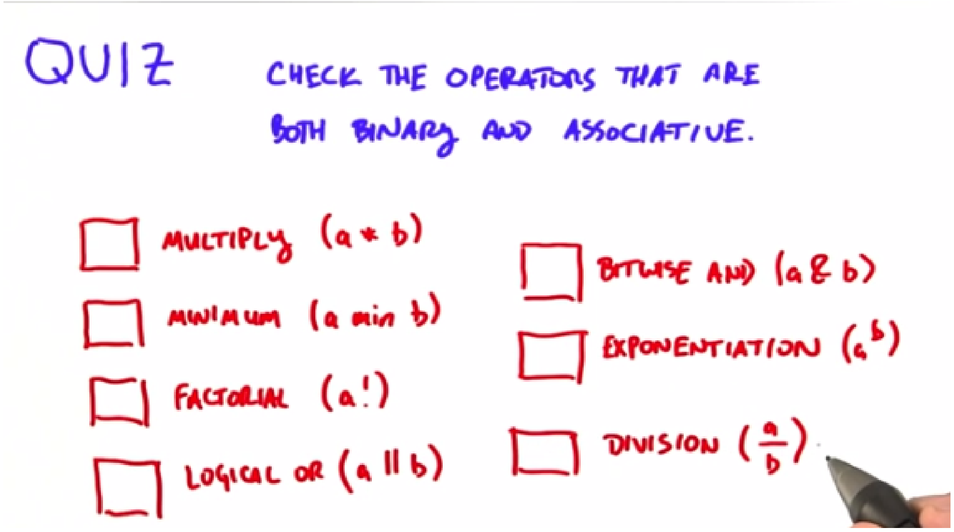
L3-3.6-Reduce Part 1



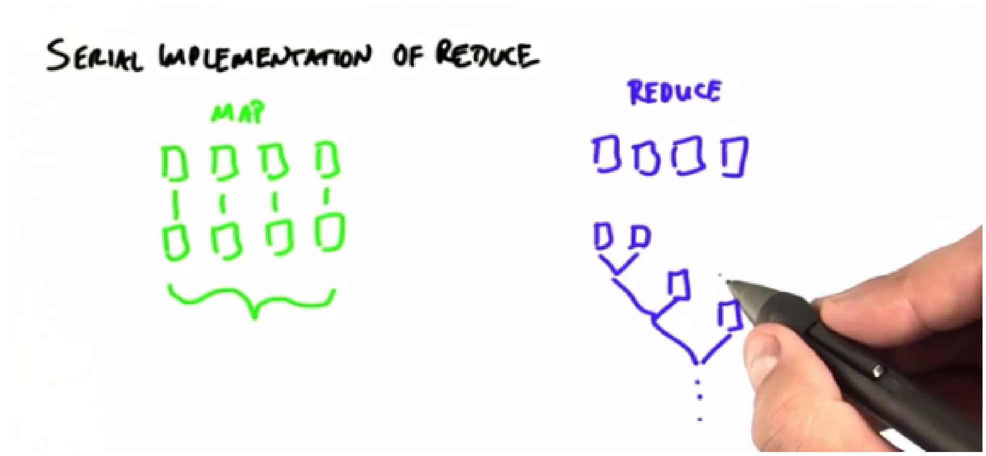
L3-3.7-Reduce Part 2

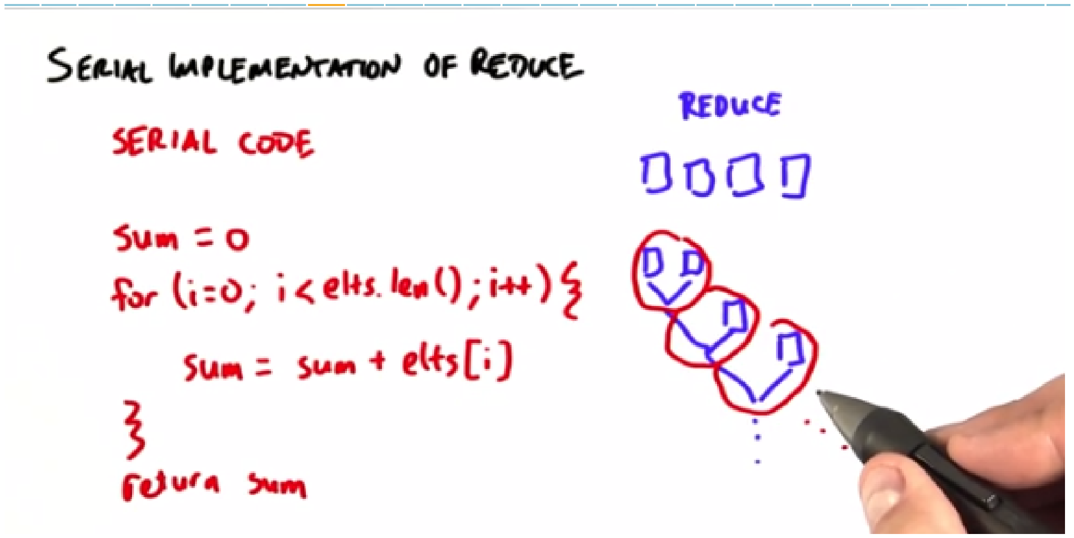


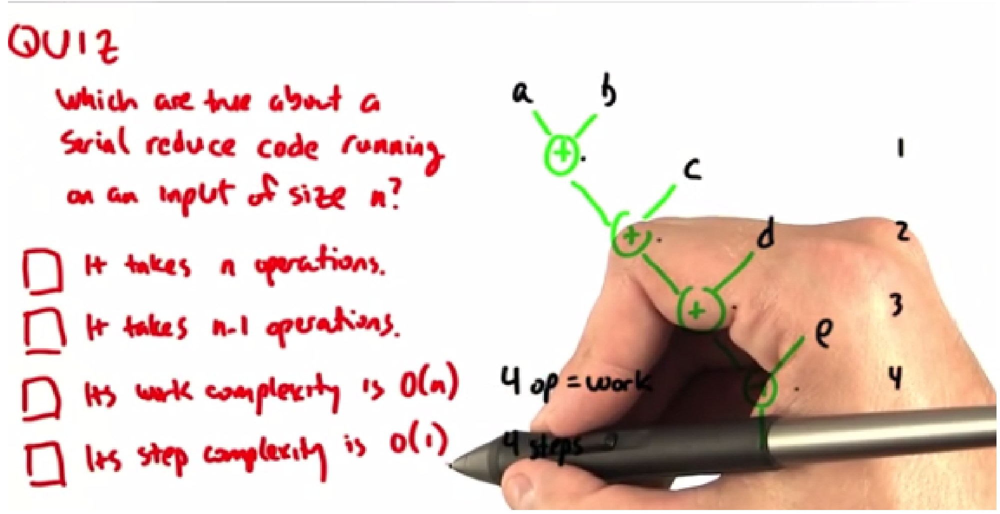
L3-3.8-Binary and Associative Operators



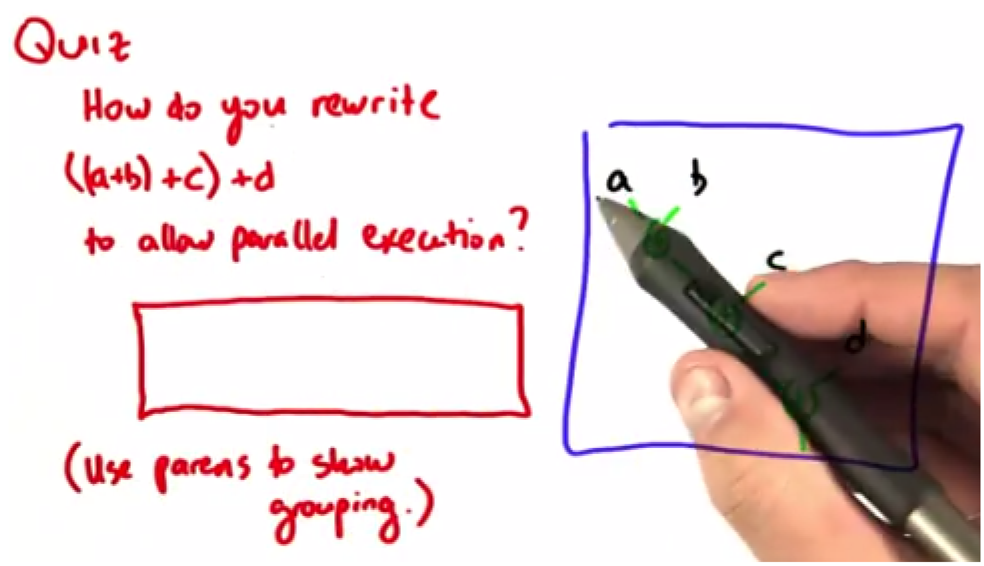
L3-3.9-Serial Implementation of Reduce



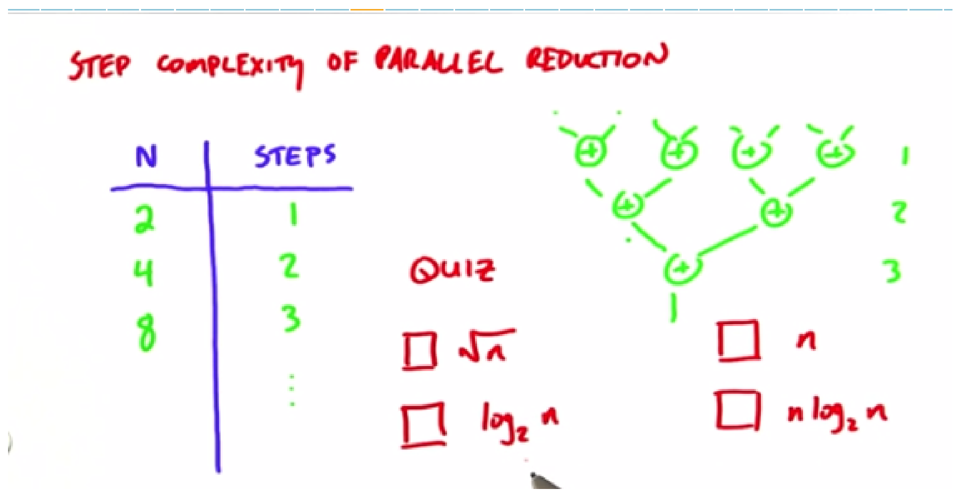




[L3-3.10-Parallel Reduce](#)



[L3-3.11-Step Complexity of Parallel Reduce](#)



[Brent's Theorem](#)

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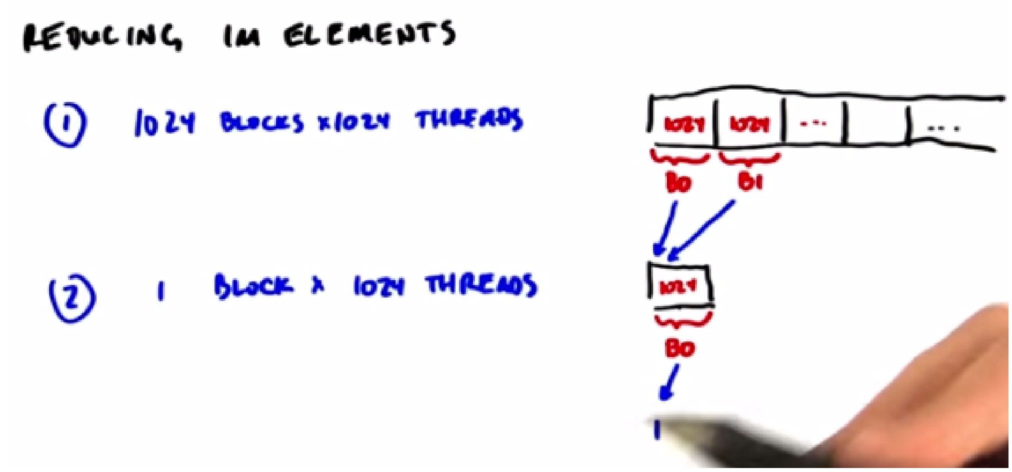
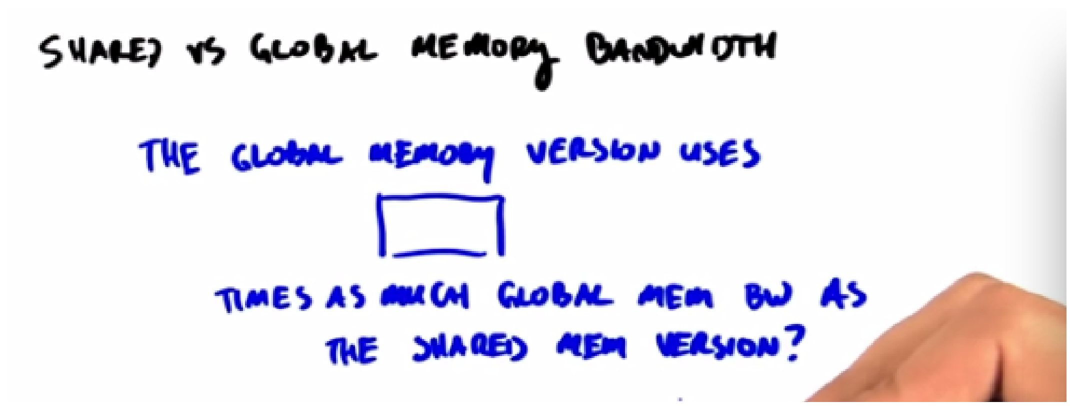
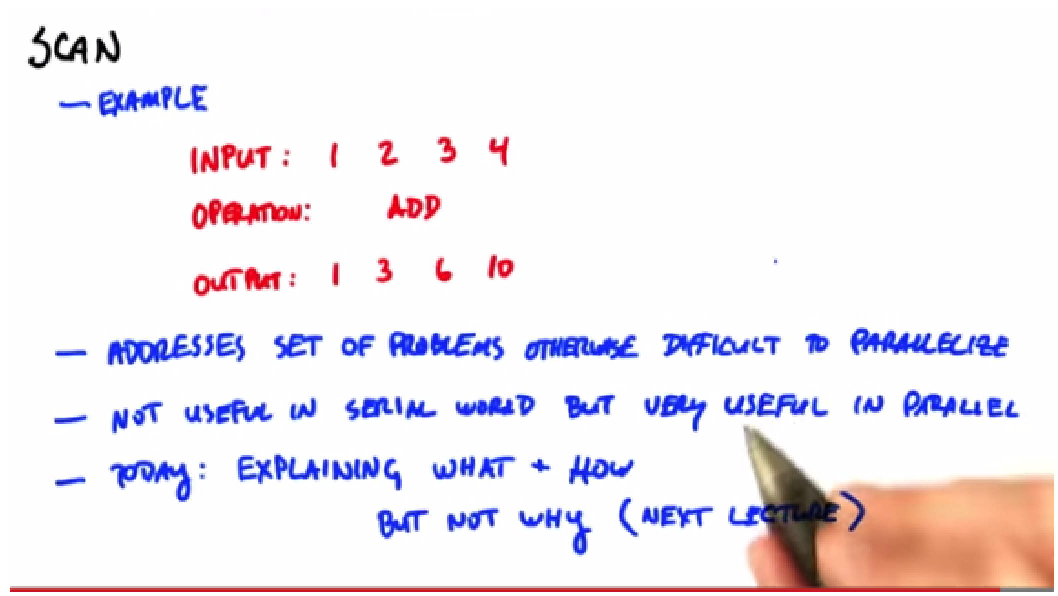
L3-3.12-Reduction Using Global and Shared Memory



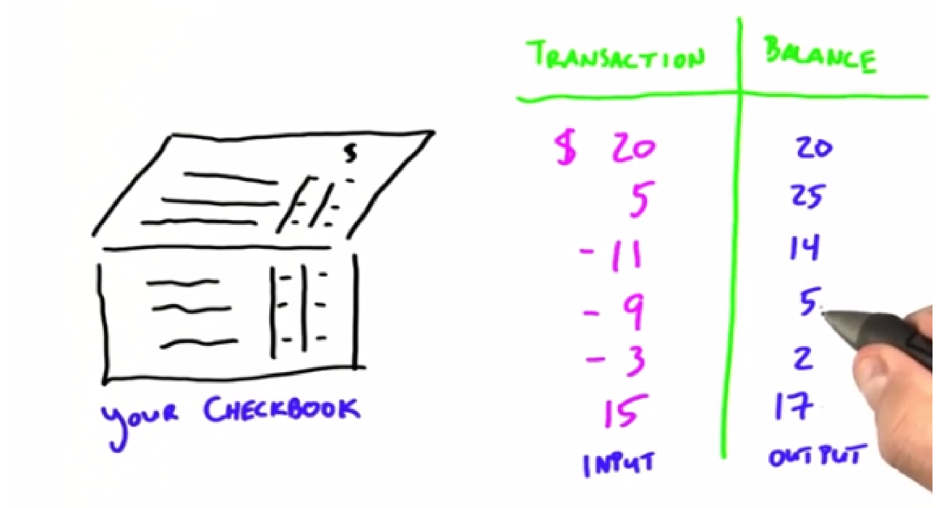
Code available
https://github.com/udacity/cs344/tree/master/Unit3%20Code%20Snippets



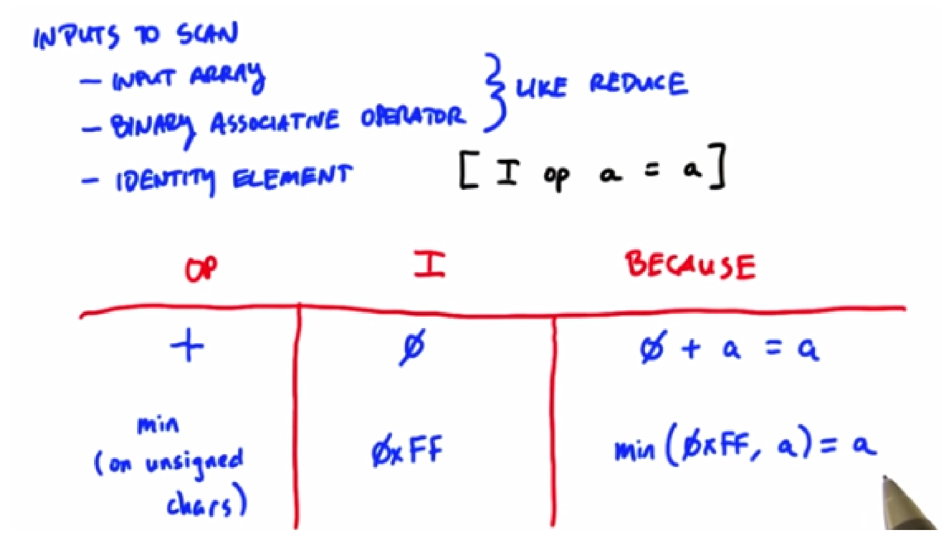
L3-3.13-Scan

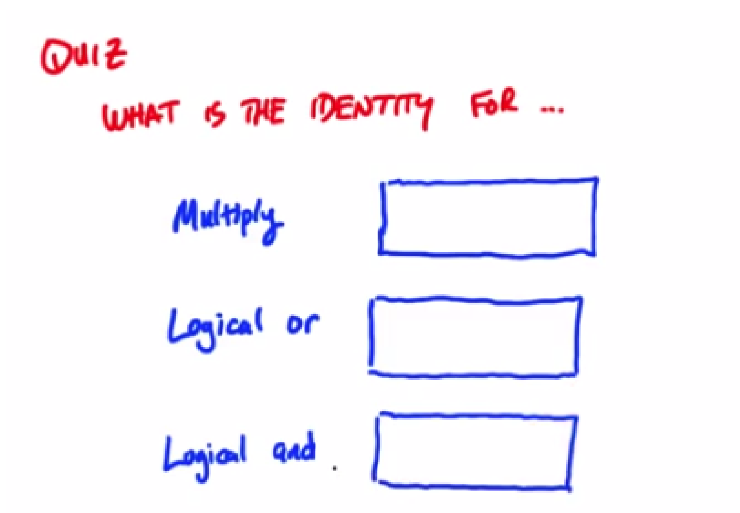


L3-3.14-Balancing Checkbook With Scan

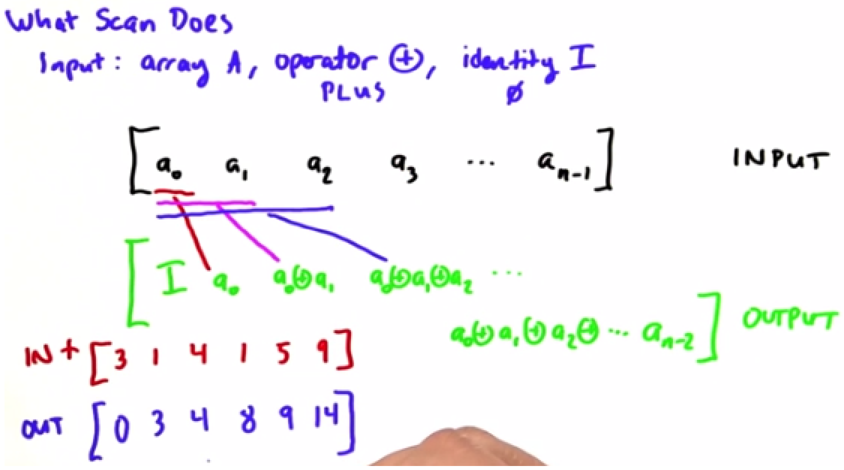


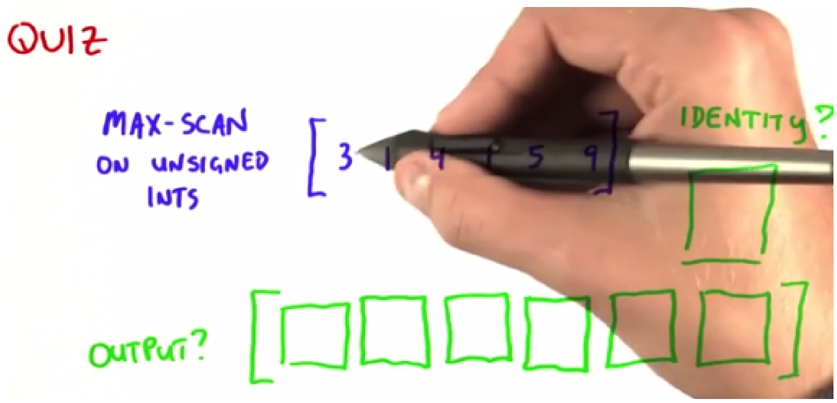
L3-3.15-Inputs to Scan



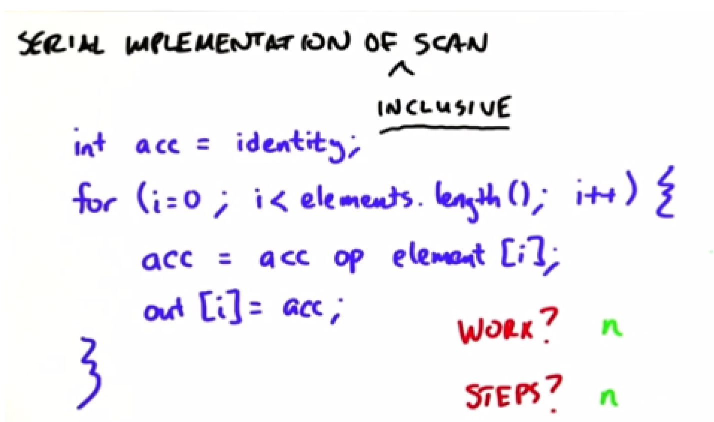


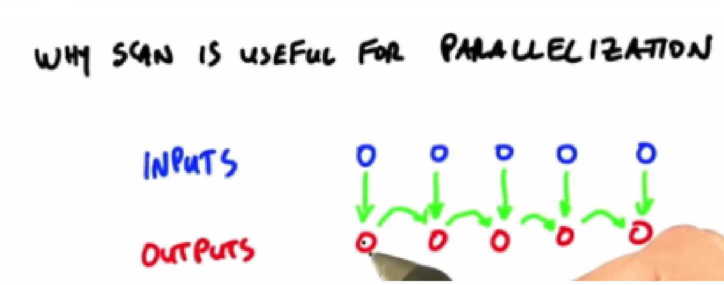
L3-3.16-What Scan Actually Does





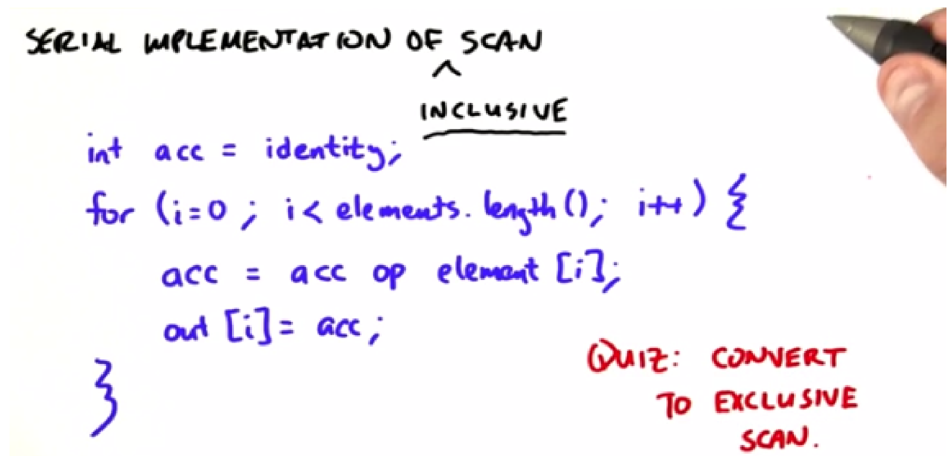
L3-3.17-Why Do We Care About Parallel Scan



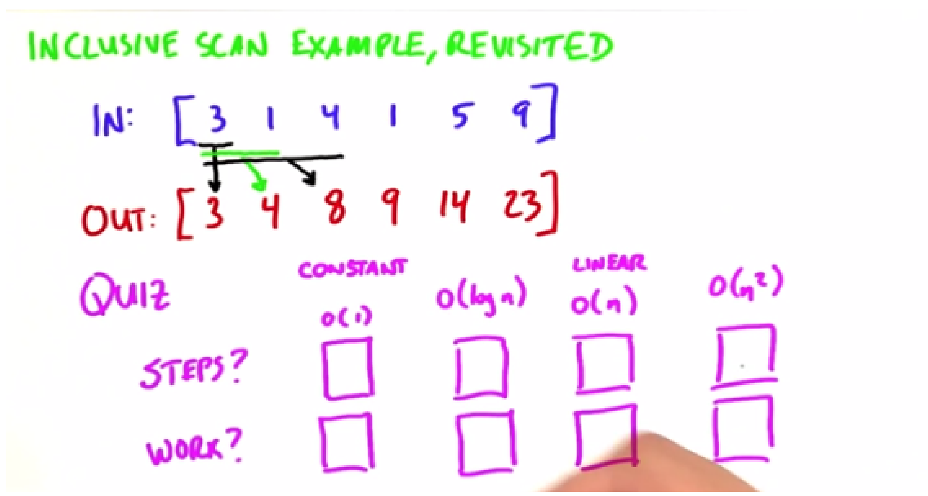


L3-3.18-Inclusive vs. Exclusive Scan

L3-3.19-Serial Implementation of Scan



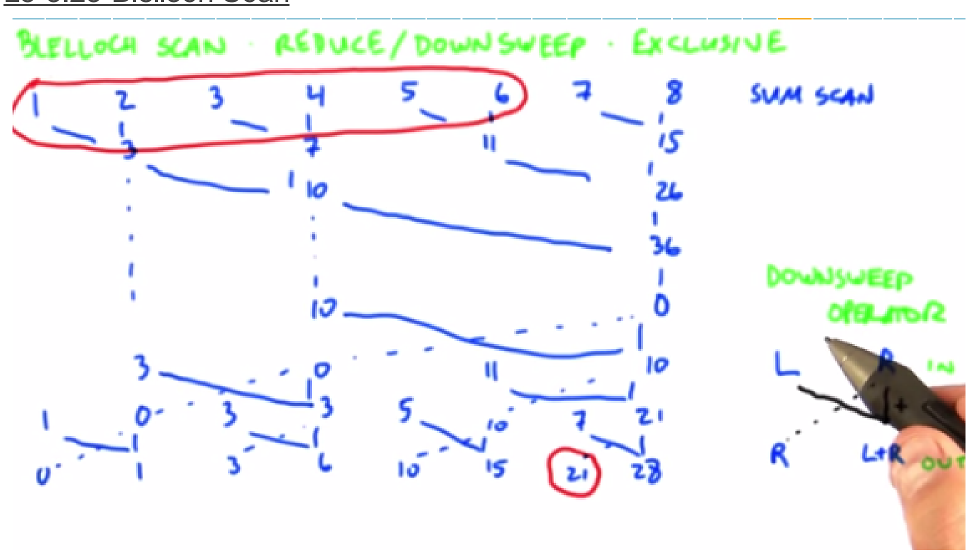
L3-3.20-Inclusive Scan Revisited

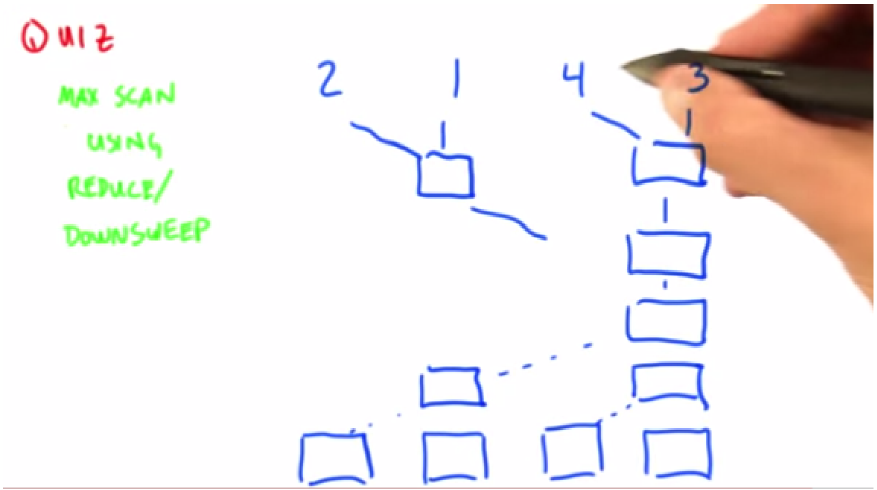


L3-3.21-Hillis Steele vs. Blelloch Scan

L3-3.22-Hillis Steele Scan

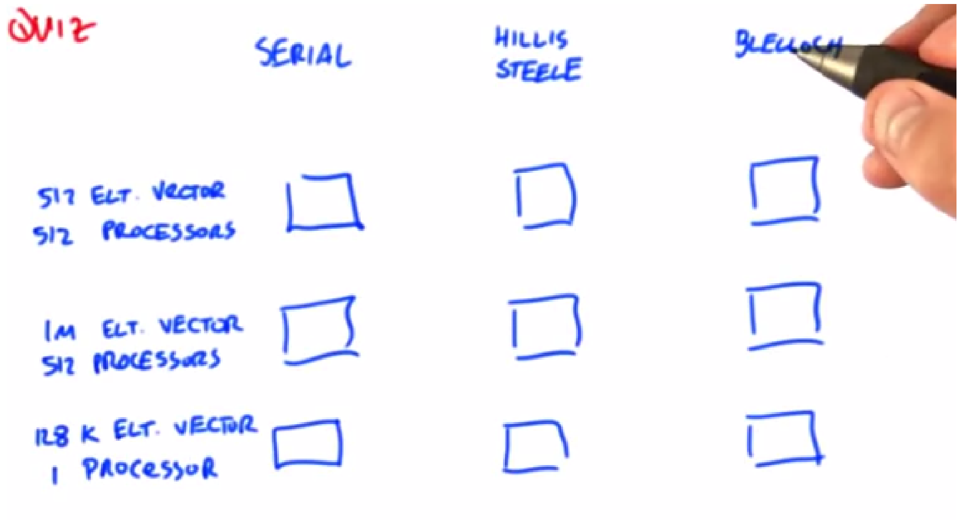
L3-3.23-Blelloch Scan



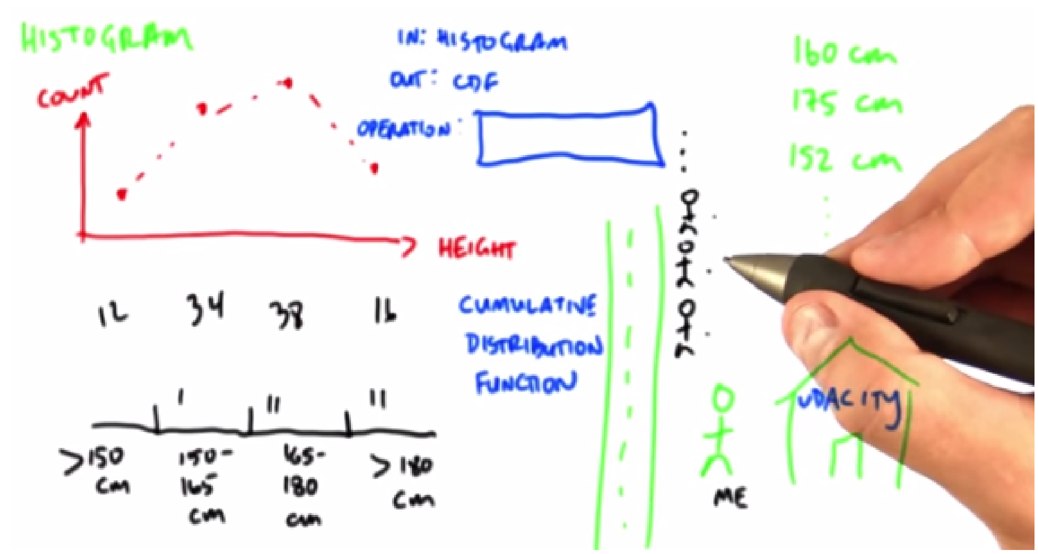


L3-3.24-Analyzing The Blelloch Downsweep

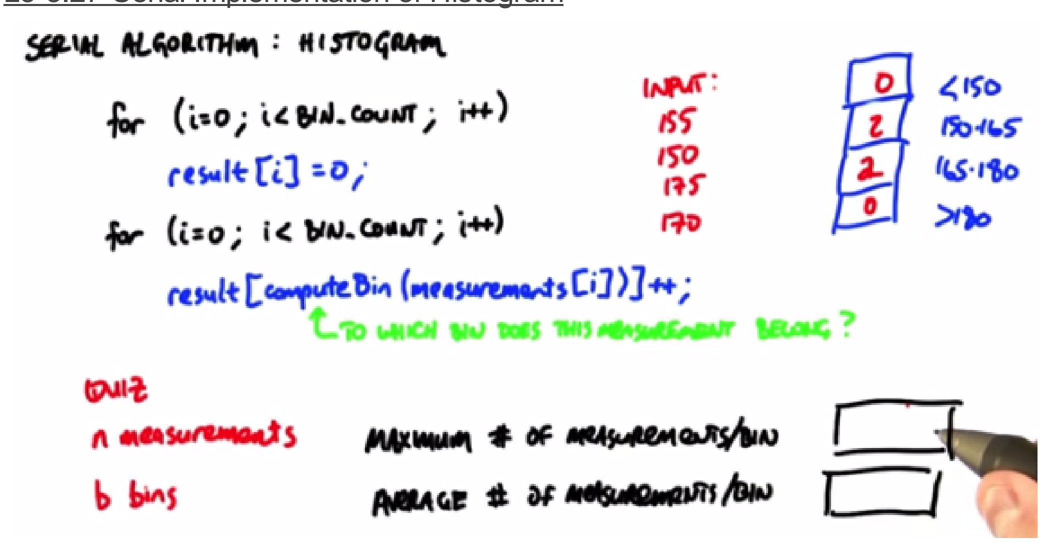
L3-3.25-Which Scan Should You Use



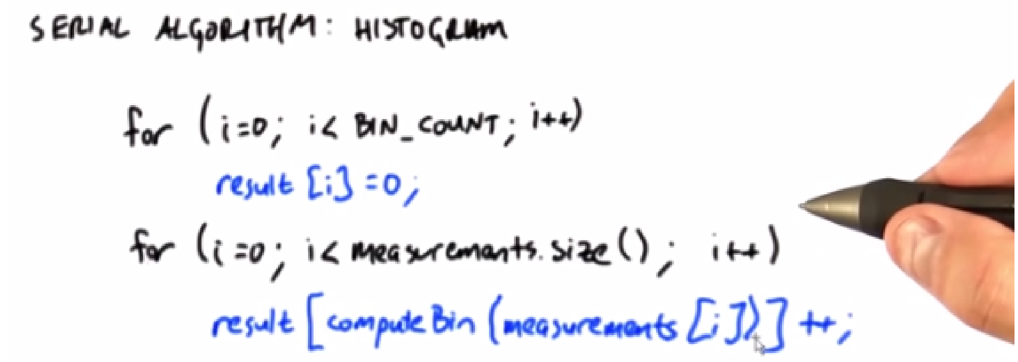
[L3-3.26-Histogram](#)



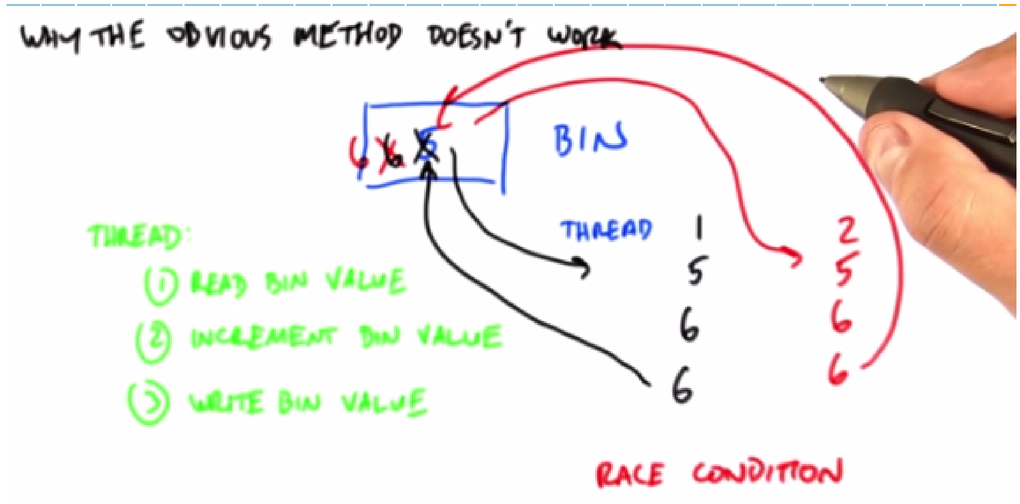
[L3-3.27-Serial Implementation of Histogram](#)



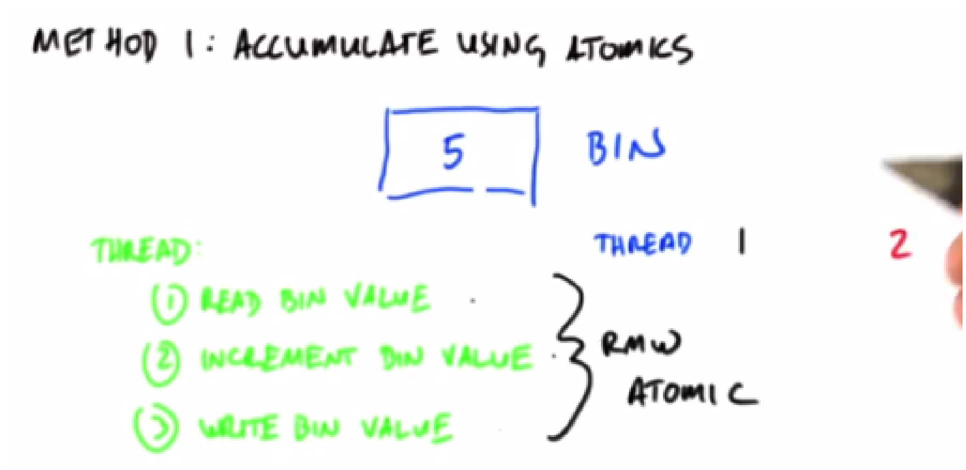
L3-3.28-Parallel Implementation of Histogram



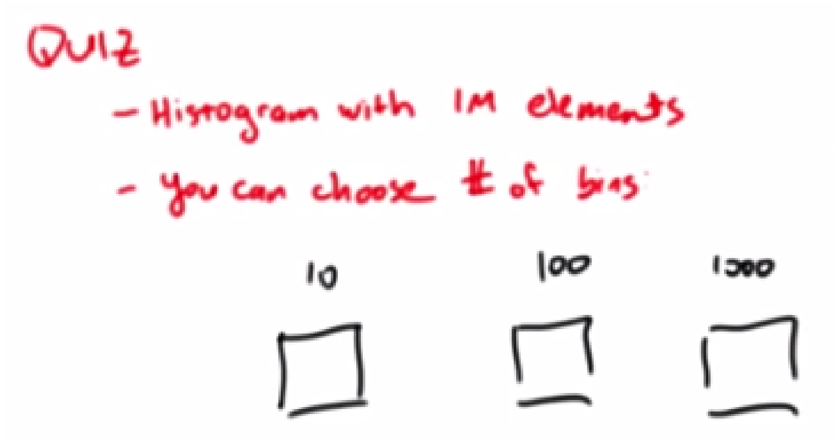
Code Available
https://github.com/udacity/cs344/blob/master/Unit3%20Code%20Snippets/histo.cu



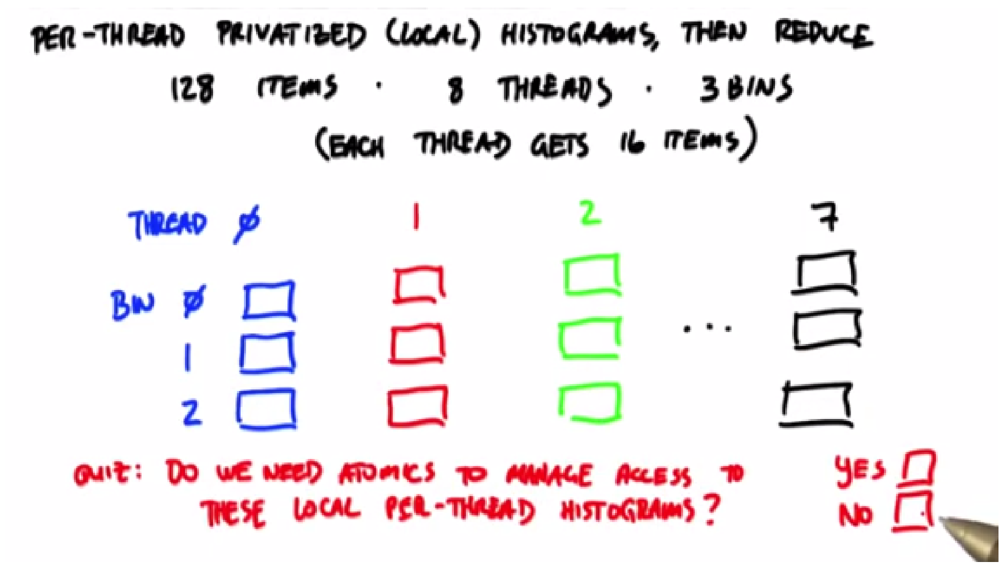
L3-3.29-Implementing Histogram Using Atomics



Code Available
https://github.com/udacity/cs344/blob/master/Unit3%20Code%20Snippets/histo.cu



[L3-3.30-Implementing Histogram Using Local Memory]



[L3-3.31-Calculating Global Histogram Using Reduction]

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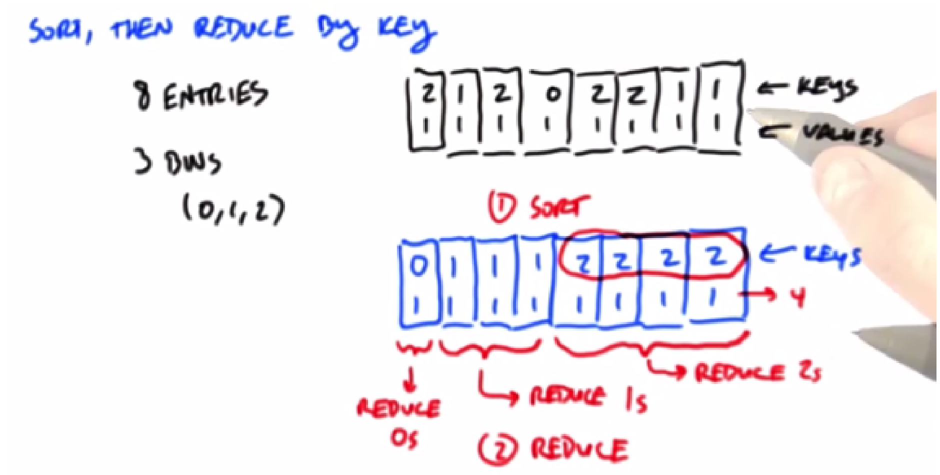
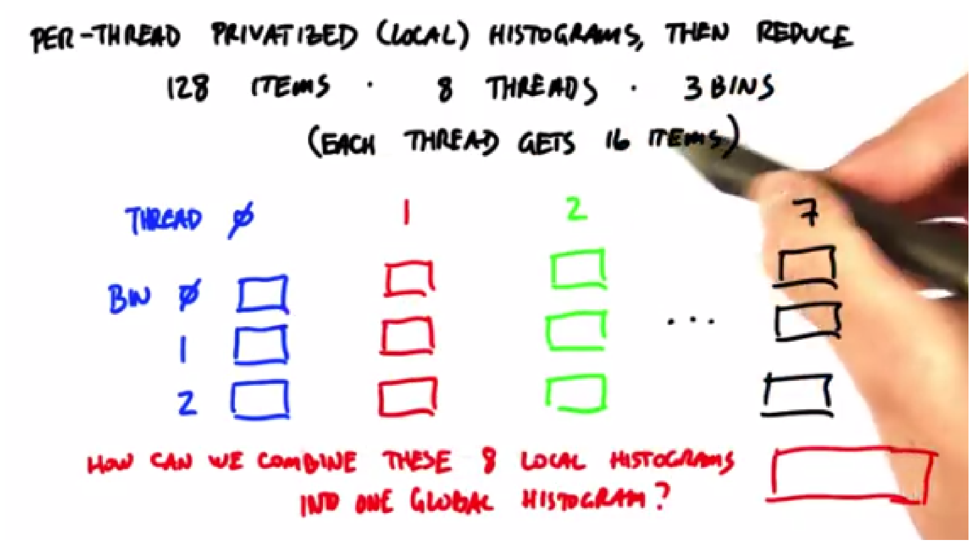
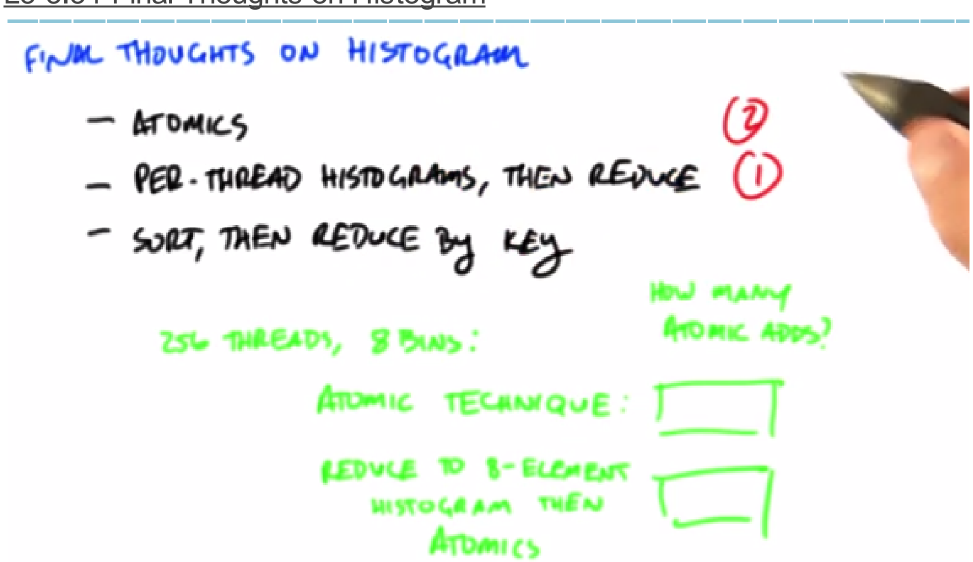
L3-3.32-Sort Then Reduce By Key



L3-3.33-What Operation Should We Use



L3-3.34-Final Thoughts on Histogram



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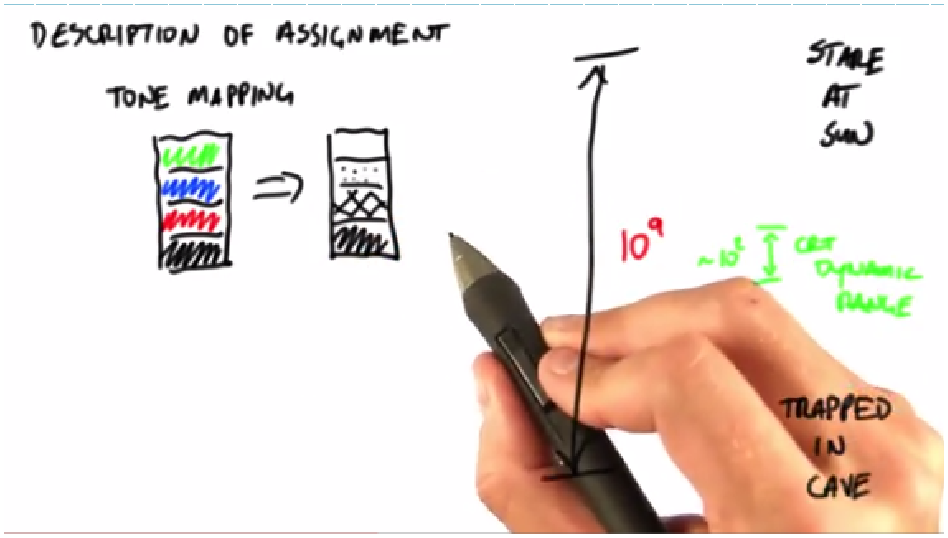
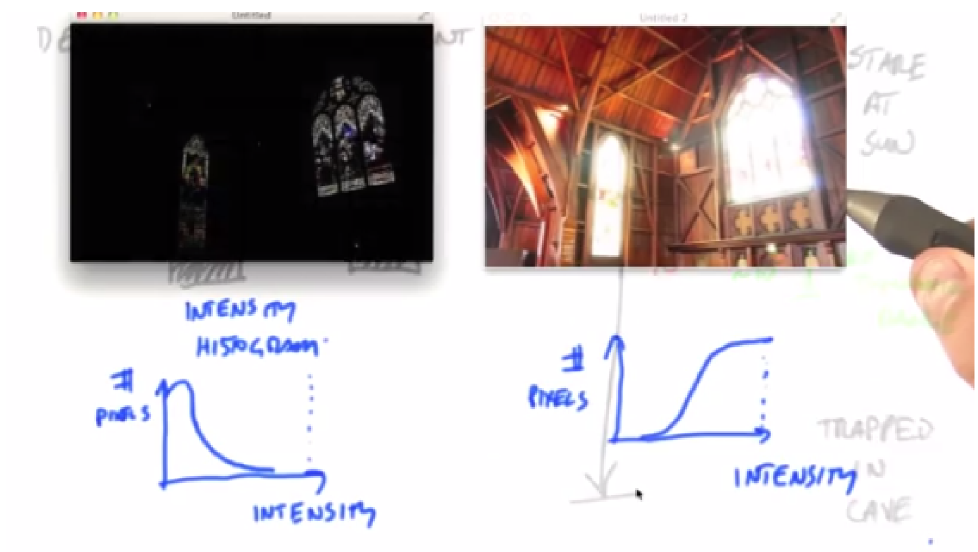
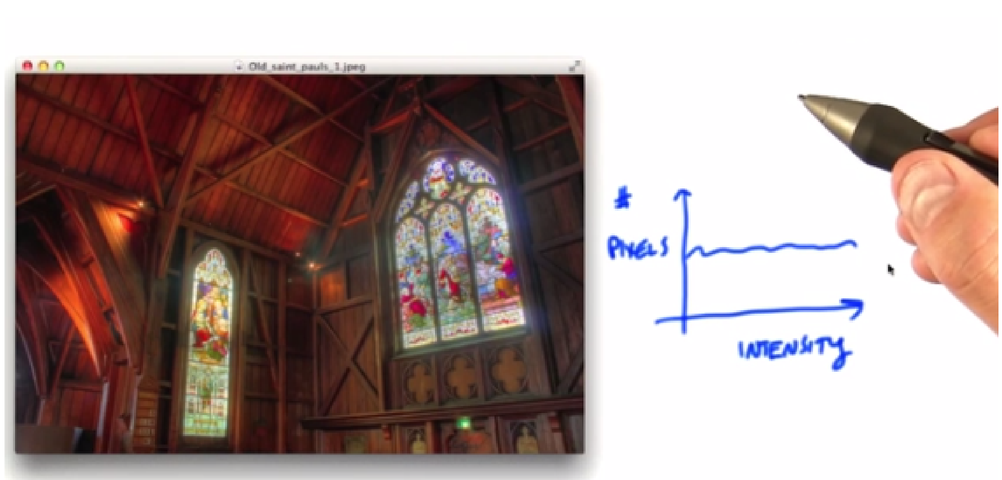
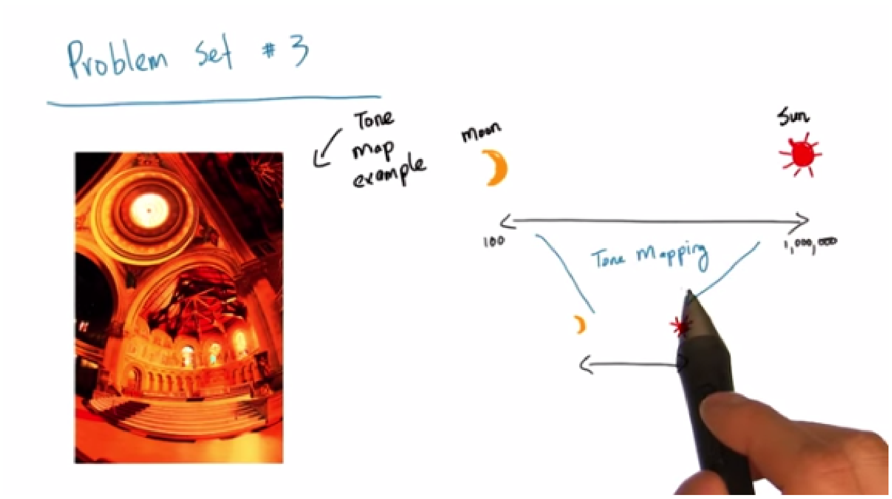
L3-3.35-Description of Problem Set #3

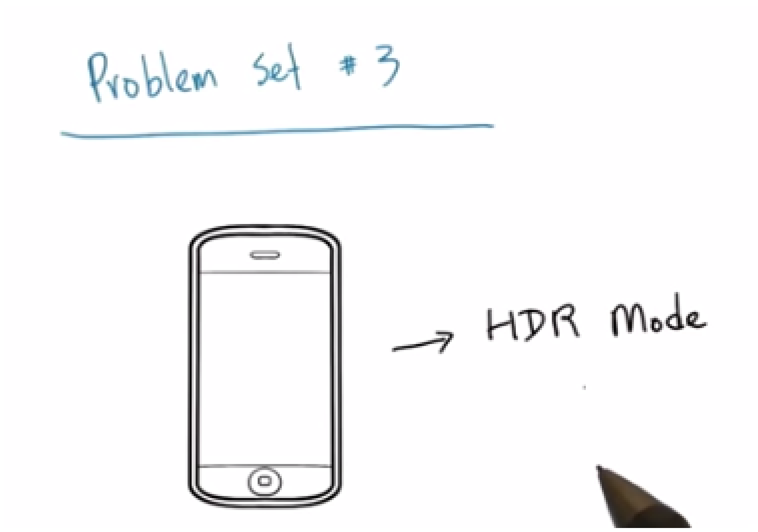


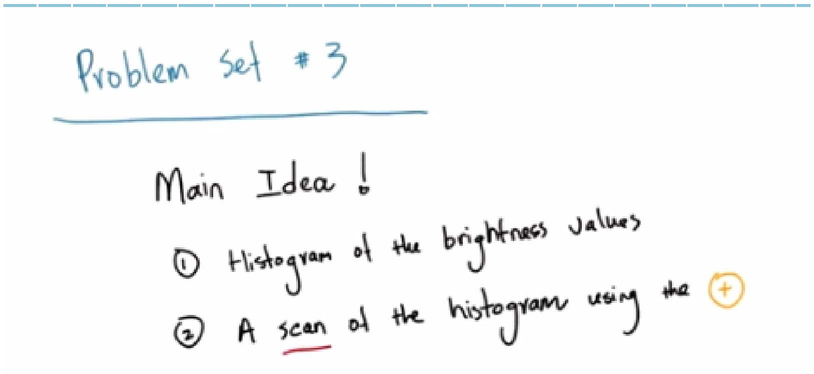


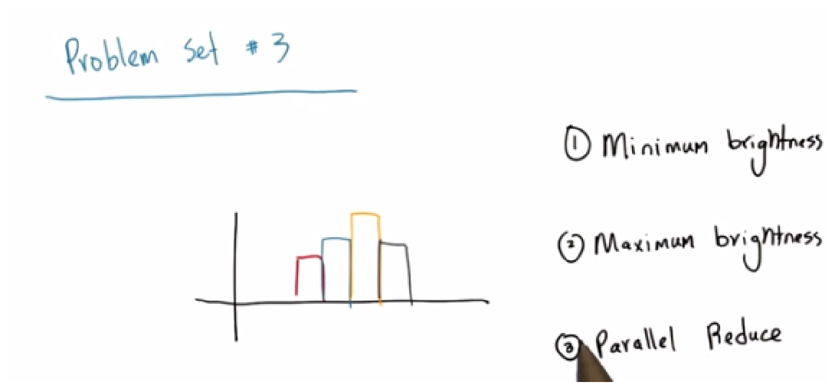


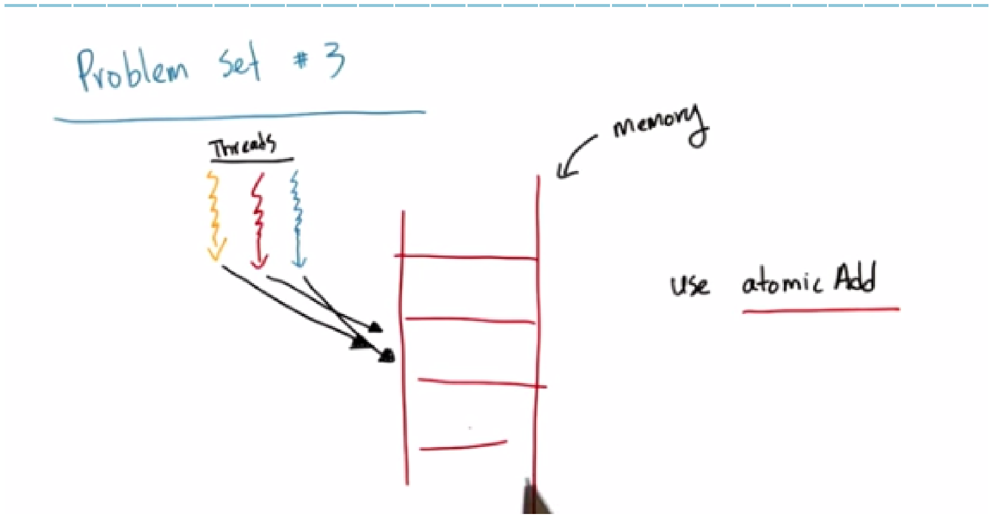
L3-3.37-Problem Set #3






Problem Set #3
Main Idea!
① Histogram of the brightness values
② A scan of the histogram using the +


Problem Set #3
① Minimum brightness
② Maximum brightness
③ Parallel Reduce


Problem Set #3
Threads
memory
use atomicAdd