

Advanced Parallel Programming on GPU
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3 days/approximately 6 hours per day

DAY 1:

1. Effective Use of Memory and Optimization (3h)
 - Global Memory
 - Shared Memory
 - Asynchronous access
 - Warps and Occupancy Considerations
2. Control Flow (3h)
 - Branch divergence overhead
 - Floating point operations
 - Parallel Reduction
 - Atomic Operations

DAY 2:

3. Optimization and Performance Metrics (2h)
 - Execution resource utilization
 - Other optimization issues
 - Performance Metrics
 - Identifying Performance Limiters
4. CUDA Profiler/Parallel Nsight (2h)
 - Performance evaluation
 - Debugging
 - Parallel Nsight Metrics and Experiments
5. Case Studies (2h)
 - Case Study I – Background Subtraction
 - Implementation of background subtraction algorithm on GPU
 - Memory optimization (coalesced access, asynchronous copying)
 - Case Study II – Cross Correlation
 - Implementation of cross correlation on GPU
 - Memory optimization (shared memory, avoiding bank conflicts)

DAY 3:

6. Thrust Library (2h)
7. NPP library (1h)
8. Advanced Concepts (2h)
 - Using Multiple GPUs
 - Dynamic Parallelism
 - HyperQ