MIC-GPU: High-Performance Computing for Medical Imaging on Programmable Graphics Hardware (GPUs)

SPIE Medical Imaging

Demo: Forward/Back projection with CUDA

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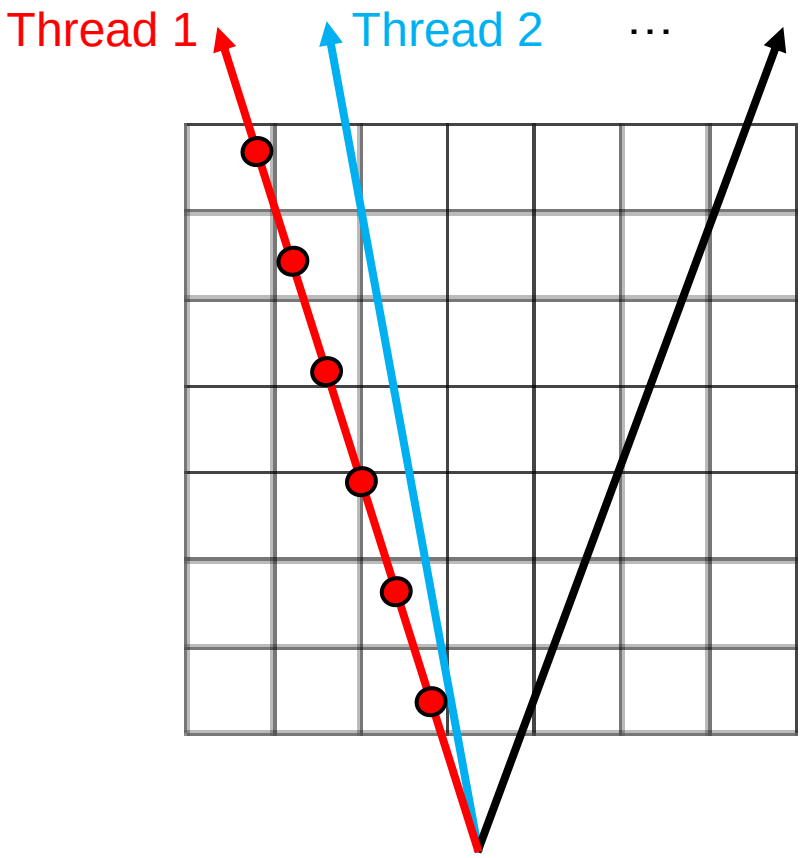
Forward/Back projection in CUDA

Forward/Back projection

- Volume: 512 x 512 x 512
- Detector: 1024 x 329

- Forward projection
  - Ray-driven approach
  - Parallelize over rays
  - (tri-)linear interpolation
  - Serial computation in each ray

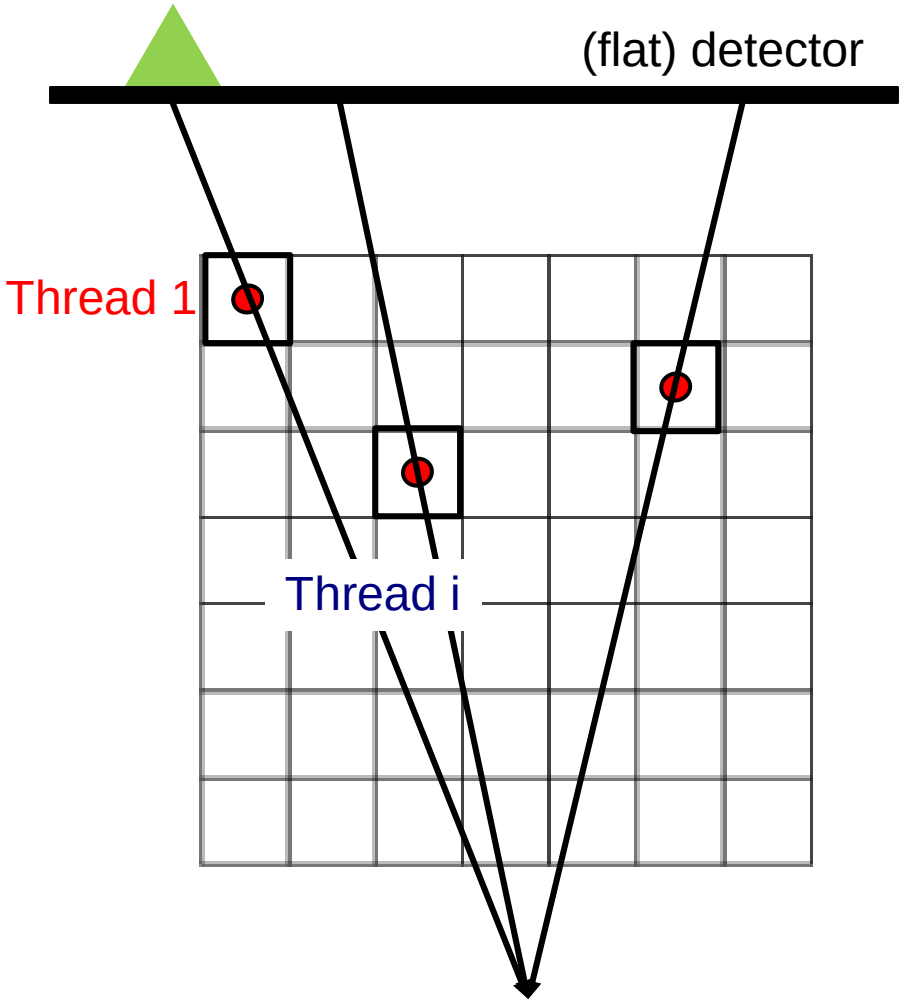


Forward/Back projection in CUDA

Forward/Back projection

- Volume: 512 x 512 x 512
- Detector: 1024 x 329

- Back projection
  - Voxel-driven approach
  - Parallelize over voxels
  - (bi-)linear interpolation
  - Usually more parallelism

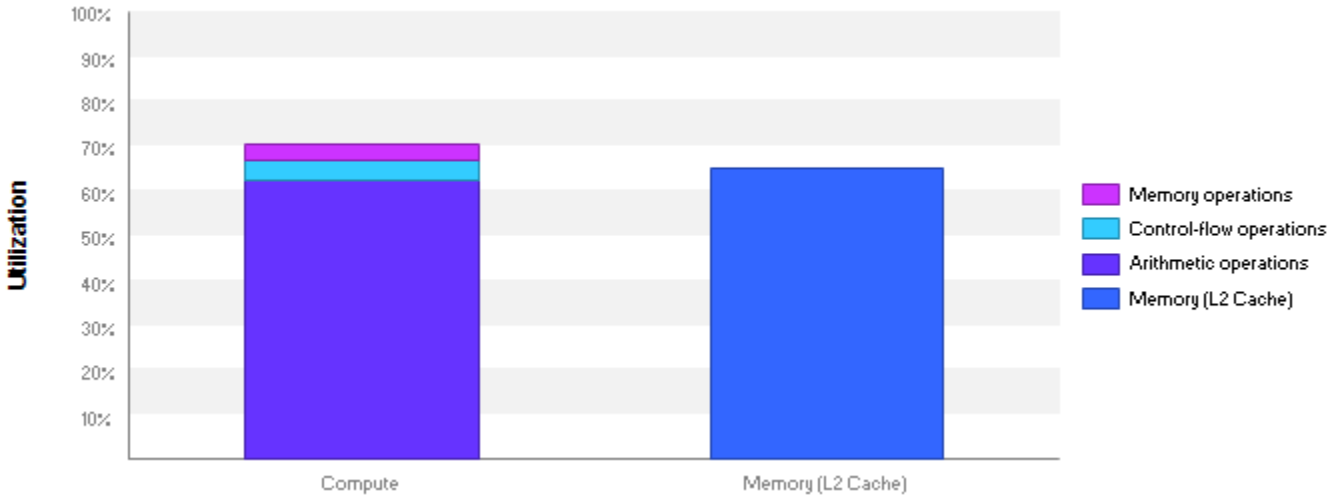


Demo

SPIE Medical Imaging

See code

Ray-driven


Utilization
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
Compute
Memory (L2 Cache)
Memory operations
Control-flow operations
Arithmetic operations
Memory (L2 Cache)

Voxel-driven