Interactive Visualizations

Standard axis-aligned slices
Rapid reconstruction affords quick injection of more involved visualizations/renderings:
- arbitrary slices (non-axis aligned slices) → 3D slicing
- 3D X-ray views from arbitrary view points
- full 3D volume renderings

All have been shown to run at 20-30 frames/s
- recall, GPUs are meant for graphics
- data is already in texture memory
- simply load another kernel into the shaders
- frames (projections) produced for visualization have similar costs than frames (projections) consumed for reconstruction

Streaming CT
Reconstruct (consume) incoming (produced) projections without buffering
- from 360 $1024^2$ projections to a $512^3$ volume at full floating point precision
- as shown, latest GPUs can achieve 30 projections/s reconstruction speed

Streaming CT With Direct Visualization
Watch the object evolve as it is acquired
Final Remarks

Have shown that:
- GPUs are an excellent and very flexible platform for CT reconstruction
- GPUs are bound to become even more attractive for this purpose
- additional advantages provided by excellent visualization capabilities
- CUDA and CTM will provide even better interfaces for MIC-GPU computing
  - thread management
  - memory management
  - access to more generalized computational resources
  - but with the extra benefit of super-fast interpolation, rasterization, and texture interpolation

Final Remarks: Recap

Introduction
- GPU architecture, programming model, and programming facilities
- GPU programming examples (image processing)

- CT reconstruction pipeline components
- GPU-acceleration of individual components
- Various CT reconstruction pipelines, load balancing and load estimation
- Reconstruction visualization and final remarks
Further Information

Check at http://www.rapidCT.com for latest:

- tutorial updates
- fragment code samples
- executable applications of all routines (soon)
- applications
- publications
- bulletin board
- contacts info
- community news and feedback

Any Questions?