Ultrasound simulation on a GPGPU - Reducing memory bottleneck using compression

COMP8750 – Computer Systems Project

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Outline

- Background
- Challenges & Bottlenecks
- Approach
- Questions
Background

• Application of Ultrasound Simulation
  • Medical Ultrasonography - System design and development
  • Delivery of Therapeutic Ultrasound

• Westervelt Equation
  • Partial Differential Equation
  • Finite Difference Method
Challenges & Bottlenecks

• Floating point operations
  • Large number of floating point computations

• Memory bandwidth
  • Transfer of data to and from CPU for computation of each grid point
  • Main focus of this project
Approach

• GPGPU
  • Utilize the parallel architecture of GPGPU
  • SIMT model of execution

• Data compression
  • Efficient data compression techniques to reduce memory bandwidth bottleneck
Approach (contd.)

• Data compression techniques
  • Floating point to fixed point conversion
  • Prediction method to compress sequences of values
  • Other approaches
Questions

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