CUDA GPGPU Workshop 2012

Day-4 (Final Day):
Advanced CUDA/C Programming

Presenter(s):
Abu Asaduzzaman, WSU
Mark Ebersole, NVIDIA

Wichita State University
July 13, 2012
Introduction

- **Workshop Objectives**
  - To become a moderate to advanced level CUDA/C programmer
  - To prepare pedagogy for future CSE courses
  - To develop parallel computing research initiatives

- **Methodologies**
  - Discuss, study (book?), and practice
  - CUDA Educator from Nvidia

- **Workshop Outcomes**
  - Understand the needs and benefits of parallel programming
  - Write program in C, C thread, OpenMP/C, and Open MPI/C
  - Understand NVIDIA GPGPU/CUDA technology
  - Develop programs in CUDA/C for GPGPUs
Workshop Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>9:30 am to 12:00 noon session</th>
<th>1:30 pm to 4:00 pm session</th>
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</thead>
<tbody>
<tr>
<td>July/10/2012</td>
<td>• Introduction to the Workshop&lt;br&gt;• Computing: past, present, and future&lt;br&gt;<strong>GPGPU/CUDA/C and WSU</strong>&lt;br&gt;• Parallel Computing (by Nasrin)</td>
<td>• Practice&lt;br&gt;• C, C threads&lt;br&gt;• Open MP/MPI&lt;br&gt;• Open MPI (SMP, MPI)</td>
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<tr>
<td>Tuesday</td>
<td>(Asaduzzaman/WSU)</td>
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<td>July/11/2012</td>
<td>• Brief history of GPGPU&lt;br&gt;• <strong>Intro to CUDA/C Programming</strong>&lt;br&gt;• CUDA Development Toolkit&lt;br&gt;• CUDA Arch &amp; Prog (by Chok)</td>
<td>• Practice&lt;br&gt;• Hello WSU!&lt;br&gt;• Summing vectors&lt;br&gt;• Fun example!</td>
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<td>Wednesday</td>
<td>(Asaduzzaman/WSU)</td>
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<td>July/12/2012</td>
<td>• <strong>Thread Cooperation in CUDA/C</strong>&lt;br&gt;• Shared memory and synchronization&lt;br&gt;• Texture, Page-Locked Host memory</td>
<td>• Practice&lt;br&gt;• Dot products&lt;br&gt;• Matrix multiplication</td>
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<td>Thursday</td>
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<td>July/13/2012</td>
<td>• <strong>Advanced CUDA/C Programming</strong>&lt;br&gt;• CUDA Threads&lt;br&gt;• CUDA Memory&lt;br&gt;• Performance Considerations</td>
<td>• CUDA/C on multiple GPGPUs&lt;br&gt;• Virtualization on GPGPU&lt;br&gt;• Cloud Computing, MIMD/VLIW, and CUDA&lt;br&gt;• Thank you!</td>
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<tr>
<td>Friday</td>
<td>(Ebersole/NVIDIA)</td>
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Introduction (3)

(Workshop) Presenters

- Abu Asaduzzaman (Dr. Zaman)
  - Ast. Prof., EECS Dept. at WSU
  - Teaching computer systems and architecture courses
  - Research: parallel computing systems

- Mark Ebersole
  - NVIDIA CUDA Educator and parallel programming expert
  - Ten years of low-level systems programming experience
  - Working on device drivers and hardware diagnostic

- Chok Yip, EECS MS Student, WSU
- Nasrin Sultana, EECS MS Student, WSU
Day-4 (Final Day) Presentation

“Advanced CUDA/C Programming”

Presenter:
Mark Ebersole,
NVIDIA CUDA Educator and parallel programming expert
E-mail: mebersole@nvidia.com
Conclusions

Following topics are covered is Day-4 (Final day):

- Advanced CUDA/C Programming
- Performance considerations
- CUDA/C on multiple GPGPUs
- Virtualization on GPGPU
- Cloud computing, MIMD/VLIW, and GPGPU/CUDA/C
Conclusions (2)

Workshop Outcomes:

- Understand the benefits of parallel programming
- Understand NVIDIA GPGPU/CUDA technology
- Write program in C, C thread, OpenMP/C, Open MPI/C
- Write program in CUDA/C for GPGPUs
- Pedagogy for future CSE courses
- Parallel computing research initiatives
Questions?

- Any questions, comments, or suggestions?
CUDA GPGPU Workshop 2012
Day-4: Advanced CUDA/C Programming

Thank you.

Please send your feedback to:
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