ADCIRC-HPX

STORM Kickoff Meeting
October 21, 2014
Our Goal

Build a next-generation ADCIRC code

- Sustainable
- Extensible
- Scalable
- Flexible
**Proposed Software Stack**

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<th>Layer</th>
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<tr>
<td>Physics Kernel</td>
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<tr>
<td>LGD Application Code</td>
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<td>LibGeoDecomp</td>
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<td>HPX</td>
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</table>
Proposed Software Stack

- Physics Kernel
- LGD Application Code
- LibGeoDecomp
- HPX

Code that updates physical quantities on each node (timestep.F)
Proposed Software Stack

- Physics Kernel
- LGD Application Code
- LibGeoDecomp
- HPX

Manages interface between physics kernel and LibGeoDecomp library.
Proposed Software Stack

- Physics Kernel
- LGD Application Code
- LibGeoDecomp
- HPX

Auto-parallelizing stencil code library
Proposed Software Stack

- Physics Kernel
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Next-generation parallel runtime system
Current Work

gameoflife_adcisc:
- Toy code using ADCIRC mesh and communication patterns
- \texttt{adcprep} is used to decompose full ADCIRC mesh into subdomains
- Each subdomain is one LGD “Cell”
- fort.80, fort.18 and fort.14 files are used
- Simple “game of life” kernel implemented
Future Challenges

● Internode Communication Patterns
  o gameoflife_ad circ uses PADCIRC’s patterns
  o new algorithms may have new requirements

● Validation and Verification

● Load Balancing

● Incorporating ADCIRC’s physics kernel
  o Semi-automatic code translation?
  o C++/FORTRAN interface?
  o rewrite ADCIRC physics kernel in C or C++?