Tutorial on Floating-Point Analysis and Reproducibility Tools for Scientific Software

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Objective of the Tutorial

Demonstrate tools can be used today

Floating-Point Analysis
- GPUs
- Exceptions
- Compilers
- Optimizations
- Mixed-precision
- Benchmarks

Reproducibility & non-determinism (ND)
- Data races
- Floating-point ND
- MPI & OpenMP
Everything is here:

fpanalysistools.org

Tutorial Material → LANL
AWS is Used to Run Exercises

- You will need:
  - Username, password, IP address
- Accessing the AWS instance via ssh:

  ssh [USERNAME]@[IP ADDRESS]
Directory Structure

/home/user1/
    |---Module-TOOL1
    |   |---exercise-1
    |   |---exercise-2
    |   |---exercise-3
    |---Module-TOOL2
    |   |---exercise-1
    |   |---exercise-2
    |   |---exercise-3
    ...

http://fpanalysisstools.org/ → Tutorial Material → LANL
<table>
<thead>
<tr>
<th>Time</th>
<th>Module</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 - 9:10am</td>
<td>Introduction (housekeeping)</td>
<td>Ignacio</td>
</tr>
<tr>
<td>9:10 - 9:30am</td>
<td>Floating-point background</td>
<td>Ganesh</td>
</tr>
<tr>
<td>9:30 - 10:00am</td>
<td><strong>FPChecker</strong>: floating-point exceptions, GPUs, CUDA</td>
<td>Ignacio</td>
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<tr>
<td>10:00 - 10:15am</td>
<td>Break or Q&amp;A</td>
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<tr>
<td>10:15 - 10:45am</td>
<td><strong>ARCHER</strong>: data races, OpenMP</td>
<td>Ian</td>
</tr>
<tr>
<td>10:45 - 11:30am</td>
<td><strong>FLiT</strong>: floating-point variability, compiler optimizations</td>
<td>Ian</td>
</tr>
<tr>
<td>11:30 - 12:00pm</td>
<td><strong>ReMPI</strong>: MPI, floating-point variability</td>
<td>Ignacio, Ian</td>
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<tr>
<td>12:00 - 12:15pm</td>
<td>Q&amp;A</td>
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