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 → SC19
AWS is Used to Run Exercises

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

  ssh [USERNAME]@[IP ADDRESS]
Getting Your Credentials for AWS

Password: fptutorial1117

FP Tools Credential Distributor

Here you can request a set of credentials to use with the SC19 Tutorial, “Floating-Point Analysis and Reproducibility Tools for Scientific Software” (see fpanalysistools.org), featuring FLUT, Archer, RetMPI, FPChecker, Precimous, and ADAPT.

Note: this site requires the use of cookies.

Get New Username and Password

FP Tools Credential Distributor

ip address: 18.189.182.165
username: bob
password: sc19fptutorial
Directory Structure

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

http://fpanalysistools.org/ → Tutorial Material → SC19
## Morning Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 - 8:40am</td>
<td>Introduction (housekeeping)</td>
</tr>
<tr>
<td>8:40 - 8:55am</td>
<td>Floating-point background</td>
</tr>
<tr>
<td>8:55 - 9:35am</td>
<td><strong>FPChecker</strong>: floating-point exceptions, GPUs, CUDA</td>
</tr>
<tr>
<td>9:35 - 10:00am</td>
<td><strong>ARCHER</strong>: data races, OpenMP</td>
</tr>
<tr>
<td>10:00 - 10:30am</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>10:30 - 11:30am</td>
<td><strong>FLiT</strong>: floating-point variability, compiler optimizations</td>
</tr>
<tr>
<td>11:30 - 12:00pm</td>
<td><strong>ReMPI</strong>: MPI, floating-point variability</td>
</tr>
<tr>
<td>12:00 - 1:30pm</td>
<td><strong>Lunch Break</strong></td>
</tr>
</tbody>
</table>
# Afternoon Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 - 1:35pm</td>
<td>Afternoon overview</td>
</tr>
<tr>
<td>1:35 - 2:45pm</td>
<td><strong>Precimonious &amp; HiFPTuner</strong>: mixed-precision tuning</td>
</tr>
<tr>
<td>2:45 - 3:00pm</td>
<td><strong>FPBench</strong>: benchmarks for floating-point</td>
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<tr>
<td>3:00 - 3:30pm</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>3:30 - 4:50pm</td>
<td><strong>ADAPT, FloatSmith</strong>: algorithmic differentiation, tuning</td>
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<tr>
<td>4:50 - 5:00pm</td>
<td>Questions &amp; Answers</td>
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