Arm Debugging and Profiling Tools Training

• Teach how to use Arm Forge
  o DDT: parallel debugging
  o MAP: profiling
  o Performance Reports: performance characterization

• We don’t cover GPU this time - no GPU licenses
Arm Debugging and Profiling Tools Training

- Tutorial team:
  - NERSC: Woo-Sun Yang and Laurie Stephie
  - Arm: Ryan Hulguin (lecturer), Beau Paisley, Srinath Vadlamani, Timothy Duthie

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 am</td>
<td>Welcome and Introduction</td>
<td>Woo-Sun</td>
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<tr>
<td>9:10</td>
<td>Intro to Arm tools; remote client setup</td>
<td>Ryan</td>
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<tr>
<td>9:20</td>
<td>Arm DDT</td>
<td>Ryan</td>
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<tr>
<td>9:55</td>
<td>Memory debugging &amp; hands-on</td>
<td>Ryan</td>
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<tr>
<td>10:15</td>
<td>Break</td>
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<tr>
<td>10:30</td>
<td>Arm Performance Reports &amp; hands-on</td>
<td>Ryan</td>
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<tr>
<td>10:50</td>
<td>Arm MAP &amp; hands-on</td>
<td>Ryan</td>
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<tr>
<td>11:30</td>
<td>Using Forge for Python codes</td>
<td>Ryan and Laurie</td>
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<tr>
<td>12 noon</td>
<td>Break</td>
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<tr>
<td>12:30-2:00 pm</td>
<td>Work on your own codes</td>
<td>Ryan, Beau, Srinath, Timothy, Laurie, Woo-Sun</td>
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Afternoon Session

• Working on user codes with Arm engineers/NERSC staff
  • Five users have signed up
  • Zoom breakout room for a code team

• [Link](https://docs.google.com/spreadsheets/d/1Irwk1oUt7YHnG7qDz5MX1nOk4H2ZO_dMH3WgV4sO1CU/edit?usp=sharing)
If You Are Far Away from NERSC

- Remote X window GUI over network: painfully slow responses due to high latency in X window connections
- Two solutions:
  - NoMachine (formerly NX)
    - Improves X window performance
    - How to install and use: [https://docs.nersc.gov/connection/nx](https://docs.nersc.gov/connection/nx)
  - Arm Forge remote client
    - Configure: [https://docs.nersc.gov/development/performance-debugging-tools/ddt/#reverse-connect-using-remote-client](https://docs.nersc.gov/development/performance-debugging-tools/ddt/#reverse-connect-using-remote-client)
    - Start the client on your laptop/desktop, start a batch job on Cori, and connect them -- see Ryan’s talks/demos
Using NoMachine (NX)
Using Arm Forge Remote Client

(1) Select ‘Configure’ to create a configuration for a NERSC machine

2nd entry in Host Name: for a MOM node - cmom01, ..., cmom06 for Cori

Uncheck for MFA

(2) Create a configuration
Using Arm Forge Remote Client (Cont’d)

(3) Select the configuration

(4) Log into cori (example below: authenticate using password+OTP); if you set SSH to use sshproxy keys instead, you are NOT prompted to type pw+OTP (see the MFA webpage)
Using Arm Forge Remote Client (Cont’d)

(5) Submit a batch job on a NERSC machine and start DDT

```bash
$salloc -N 2 -C knl -t 30:00 -q debug
...
$ module load allinea-forge
$ ddt --connect srun ... ./jacobi_mpiomp
```

(6) Accept the connection request

(7) Set parameter and run

![Image of DDT interface with connection request and commands]

Run: `srun -n 32 -c 16 --cpu-bind=cores ./jacobi_mpiomp`

Command: `srun -n 32 -c 16 --cpu-bind=cores ./jacobi_mpiomp`

Plugins: none

Help  Options  Run  Disconnect
Training materials

- In /global/cfs/cdirs/training/2020/arm-tools on Cori
- Hands-on materials in the `handson` directory
- Python code for demo in the `gpu_specter` directory
  - README.md for info on how to
    - Clone a code repository to your current directory
    - Copy data files
    - Create a conda environment
    - Run with or without Arm Forge
  - `$ cp -r /global/cfs/cdirs/training/2020/arm-tools .`
Job Submission Using Reservation

- **Node reservation**
  - 100 KNL nodes; 9 am-2 pm
  - Name of the reservation: armtools
  - Project account to charge to: nintern
  - Use `debug` or `interactive` qos

```bash
$ salloc -N 1 -C knl -t 30:00 -q interactive \
-A nintern --reservation=armtools
```

- If all the reserved nodes are taken, use your own project account
Thank You!