Performance Tools and Debuggers: Introduction
Outline

• What is your favorite debugger?
  – printf?
  – You can have a better debugger on HPC environments

• How do you measure performance of your application on HPC?
  – Wall time (e.g., $time ./a.out)?
  – Flop-rate, bandwidth?
  – How to identify performance bottlenecks?
  – Leading profiling tools can help you optimize your code on HPC

• Seven powerful HPC tools in this track
  – Hardware vendor tools
    • Intel VTune and Advisor
    • NVIDIA Nsight System & Nsight Compute
    • AMD ROCm tools: ROC profiler & debugger
  – Cross-platform tools
    • ARM Forge: DDT(debugger) & MAP(profiler)
    • Perforce TotalView(debugger)
  – Open source community tools
    • HPCToolkit
    • TAU
Team for Tools Track

JaeHyuk Kwack (Argonne)
Scott Parker (Argonne)
Kevin O’Leary (Intel)
Max Katz (NVIDIA)
Suyash Tandon (AMD)
Ryan Hulguin (ARM)
Nikolay Piskun (PERFORCE)
John Mellor-Crummey (Rice Univ.)
Sameer Shande (Univ. of Oregon / Paratools)
Agenda

9:00  Speaker check-in
9:30  Introduction
   JaeHyuk Kwack, ANL
   Scott Parker, ANL

9:40  Intel Vtune/Advisor
      Kevin O’Leary, Intel

10:15 NVIDIA Nsight
      Max Katz, NVIDIA

10:50 AMD
      Suyash Tandon, AMD

11:25 Parallel Sessions:
   - Break
     All
   - ROOM B: Hands-on: Vtune/Advisor
     Kevin O’Leary, Intel
   - ROOM C: Hands-on: NVIDIA
     Max Katz, NVIDIA
   - ROOM D: Hands-on: AMD
     Suyash Tandon, AMD

12:10 Lunch

Hardware vendor tool sessions

Cross-platform tool sessions

1:10 p.m.  ARM Forge
           Ryan Hulguin, ARM

1:45 TotalView
            Nikolay Piskun, PERFORCE

2:20 Parallel Sessions:
   - Break
   - ROOM B: Hands-on: ARM
      Ryan Hulguin, ARM
   - ROOM C: Hands-on: TotalView
      Nikolay Piskun, PERFORCE

3:05 HPCToolkit
     John Mellor-Crummey, Rice University

3:40 TAU
      Sameer Shende, University of Oregon / Para Tools, Inc.

4:15 Parallel Sessions:
   - ROOM B: Hands-on: HPCToolkit
   - ROOM C: Hands-on: TAU
     John Mellor-Crummey, Rice University
     Sameer Shende, University of Oregon / Para Tools, Inc.

5:00 Adjourn

Open source community tool sessions
ZoomGov sessions

• Main Room
  – All presentations sessions for Intel Vtune/Advisor, NVIDIA Nsight, AMD ROCm, Arm Forge, TotalView, HPCToolkit, and TAU

• Breakout room B
  – Hands-on sessions for Intel Vtune/Advisor, Arm Forge, and HPCToolkit

• Breakout room C
  – Hands-on sessions for NVIDIA Nsight, Perforce TotalView, and TAU

• Breakout room D
  – Hands-on sessions for AMD ROCm tools
Slack channels for hardware vendor tools

- Intel VTune/Advisor (#track-6-breakout-intel)
- NVIDIA Nsight (#track-6-breakout-nvidia)
Slack channels for hardware vendor tools

- AMD ROCm Tools (#track-6-breakout-amd)
Slack channels for cross-platform tools

- Arm Forge (#track-6-breakout-arm)
- TotalView (#track-6-breakout-perforce)
Slack channels for open source community tools

- HPCToolkit (#track-6-breakout-hpctoolkit)
- TAU (#track-6-breakout-tau)
Systems for Hands-on

• System reservation for today
  – Theta: 512 nodes from 9am – 6pm in Central  
    (-q ATPESC2021 -A ATPESC2021)
  – Cooley: 80 nodes from 9am – 6pm in Central  
    (-q training -A ATPESC2021)
  – ThetaGPU: 21 nodes from 9am – 6pm in Central  
    (-q training -A ATPESC2021)

• Intel DevCloud for Intel Gen9 GPUs
  – Instruction: https://devcloud.intel.com/oneapi/get_started/  
    (e.g., $ qsub -l -l nodes=1:gpu:ppn=2 -d . )

• AMD Accelerator Cloud (AAC) for AMD MI-100 GPUs
  – 2 users/GPU, 40 GPUs in total
  – Instruction: https://anl.app.box.com/notes/844862636734

• ASCENT: no reservation, but usable with the default queue (with –P GEN161)
Thanks and Enjoy!
Hardware vendor tools hands-on

- 11:25 am (CDT) – 12:10 am (CDT)
- Breakout room B: Intel Vtune/Advisor hands-on
  - Join and use `#track-6-breakout-intel` slack channel for discussion
- Breakout room C: NVIDIA Nsight hands-on
  - Join and use `#track-6-breakout-nvidia` slack channel for discussion
- Breakout room D: AMD ROCm tools hands-on
  - Join and use `#track-6-breakout-amd` slack channel for discussion
Cross-platform tools hands-on

• 2:20 pm (CDT) – 3:05 am (CDT)

• Breakout room B: ARM Forge hands-on
  – Join and use `#track-6-breakout-arm` slack channel for discussion

• Breakout room C: TotalView hands-on
  – Join and use `#track-6-breakout-perforce` slack channel for discussion
Open source community tools hands-on

- 4:15 pm (CDT) – 5:00 am (CDT)
- Breakout room B: HPCToolkit hands-on
  - Join and use #track-6-breakout-hpctoolkit slack channel for discussion
- Breakout room C: TAU hands-on
  - Join and use #track-6-breakout-tau slack channel for discussion