Advanced Architecture "Playgrounds“ Past Lessons and Future Accesses of Testbeds

Rogues Gallery – Georgia Institute of Technology

Organizers: Jens Domke, Oscar Hernandez, Filippo Spiga, **Jeffrey Young**

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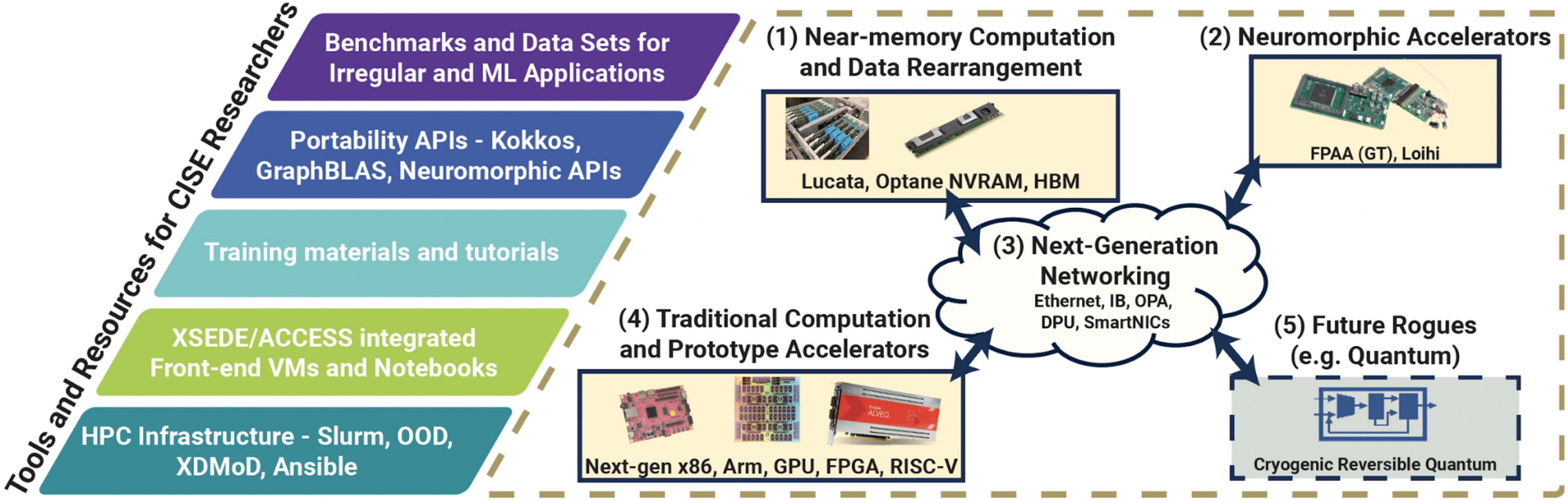
Georgia Tech Rogues Gallery (NSF #2016701)

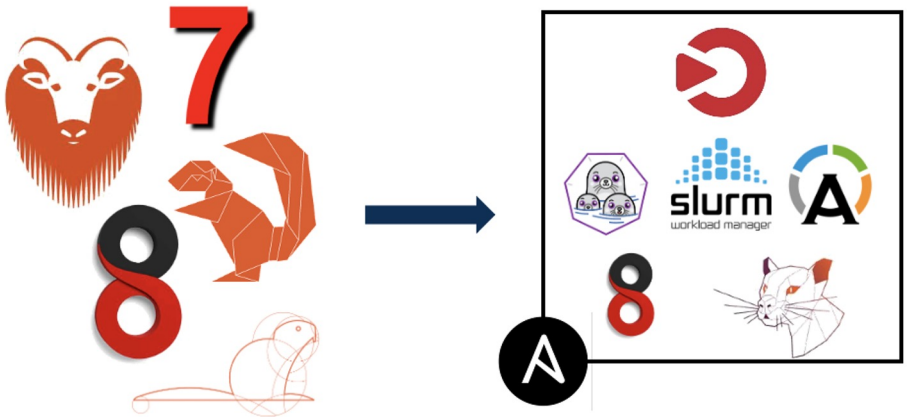


- Intel (ICX, SPR, SPR-Max) and AMD (Milan) x86
- Nvidia (A40, A100, H100) and AMD (MI210) GPUs
- Xilinx (Alveo and Zynq) and Intel (Arria and Stratix) FPGAs
- Lucata Pathfinder Near-memory system
- Fujitsu (A64FX), Ampere (Neoverse), Nvidia (Grace) Arm
- InfiniBand, OmniPath, and Ethernet fabrics
- Nvidia DPUs (BF2 and BF3) and Xilinx SmartNICs

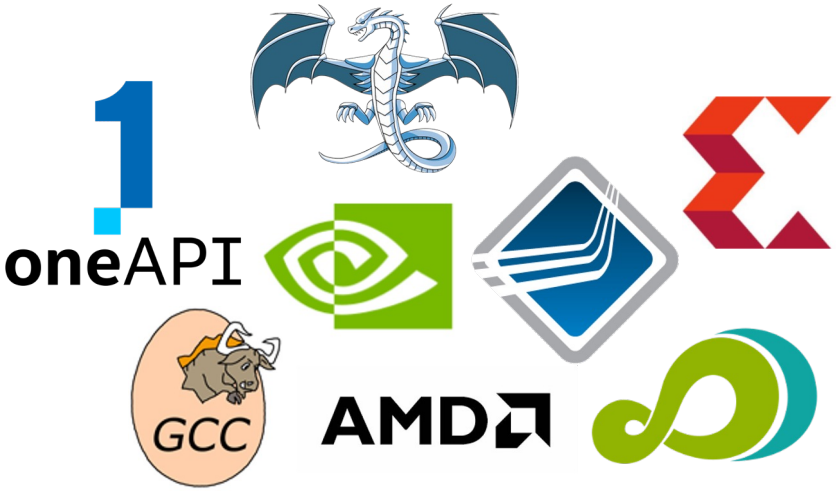
Georgia Tech College of Computing
Center for Research into Novel Computing Hierarchies

Keys to Growth and Success

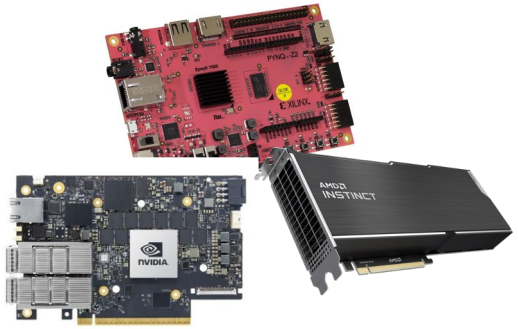
1 Adopting Enterprise Infrastructure/Best-practices



2 Focusing on Essential Software



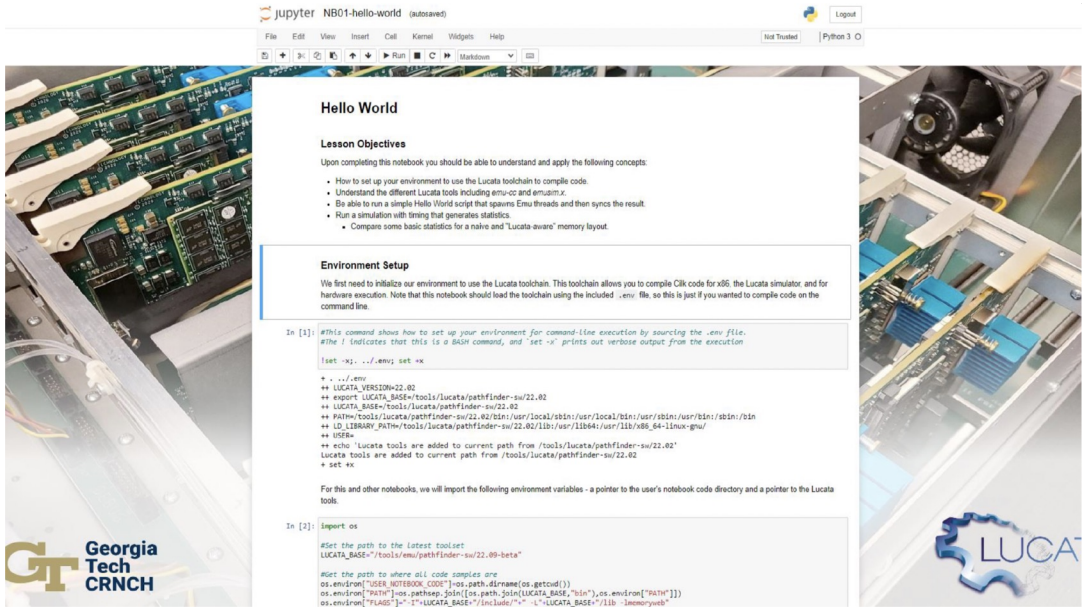
3 Target Specific Needs or Applications

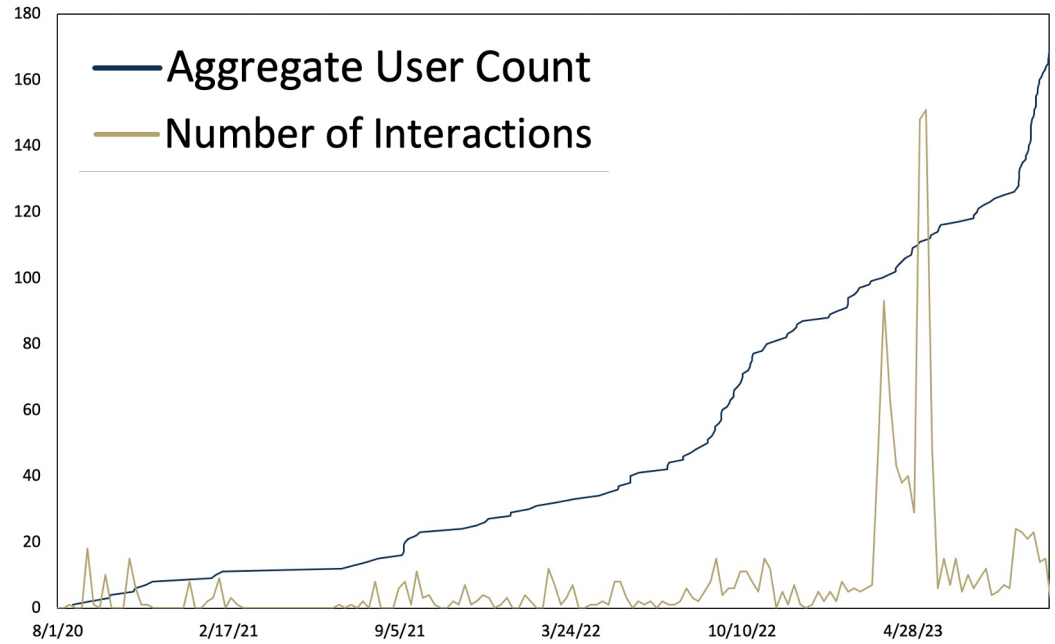


Impact of the Rogues Gallery: Research

Tutorials to Empower Users

- ASPLOS, PEARC, HPEC, MICRO, HI, SC
- Broad (RG overview) to narrow
  - E.g. Pathfinder or SmartNICs
- Also support faculty-driven efforts
  - CSE tutorial for Vortex, an open-source RISC-V GPGPU





Supporting the Research Community Beyond GT

- 168 total users, of those 45 are guests
  - National labs, vendors, other academics
- User-driven documentation
- Roughly 20+ publications
  - Novel algorithms/workflows leveraging the architecture and/or administering heterogeneity

BoF Questions for Panelists

1. What are the goals of your testbed program?
2. How are your testbeds being prepared for exascale and post-exascale evaluations?
    - (optional) If you could change one architectural component of your test bed to make it better, what would this component be and why?
3. How are you envisioning using your testbeds to embrace co-design?
4. What strategies are you using to evaluate AI workloads, especially with the influx of new AI accelerators?
5. Lessons learned: Can you share the key successes and challenges experienced during your testbed programs?

Rogues Gallery - Answers

1. What are the goals of your testbed program?
    - The Rogues Gallery aims to bring tools, training, and community to a small set of post-Moore computing technologies
2. How are your testbeds being prepared for exascale and post-exascale evaluations?
    - Ideally we would like to target tools and techniques that are 5 or more years out (neuromorphic, quantum, reversible, etc.)
3. How are you envisioning using your testbeds to embrace co-design?
    - We support the usage and execution of many simulation tools (SST, gem5, FireSim/Chipyard, Lava, Nengo) that can be used to co-design hardware/software.
4. What strategies are you using to evaluate AI workloads, especially with the influx of new AI accelerators?
    - Mostly standard AI workloads with a focus on small-scale distributed training/inference and neuromorphic variants
5. Lessons learned: Can you share the key successes and challenges experienced during your testbed programs?
    - Successes: New users and modes of use with notebooks, Open OnDemand, targeted tutorials
    - Challenges: Diversity can pose an extreme challenge for both usage and maintenance! It's tough to predict what might be useful to researchers, especially for novel architectures.

Questions/Follow-up

Learn more and sign up: https://crnch-rg.cc.gatech.edu/

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