

S&T Campaign: Computational Sciences Advanced Computing Architectures

Barry Secrest, (410) 306-1313
barry.r.secrest.civ@mail.mil

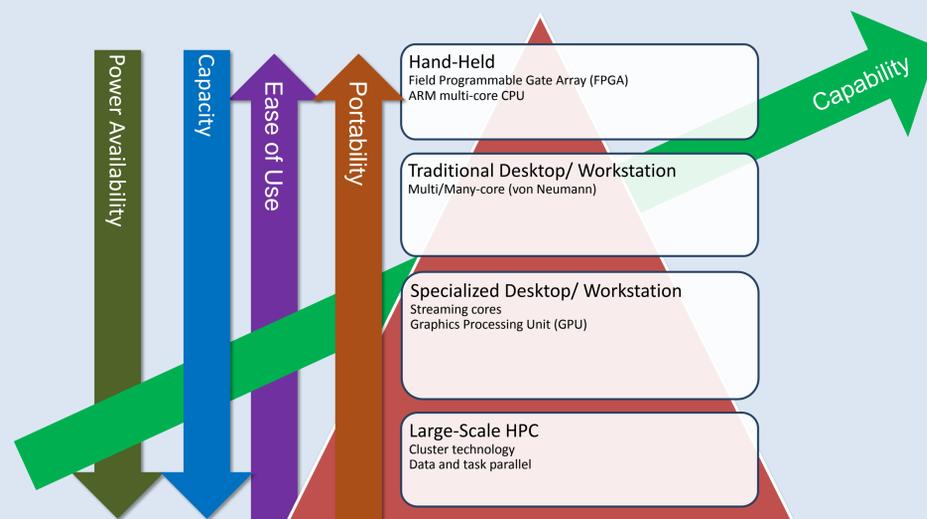
Research Objective

- Exploit HPC capability pushed to the tactical edge
- Increase situational awareness for Army foot Soldiers
- Discover novel real-time decision-making, mission planning, and big data applications using a distributed HPC architecture with advanced sensors



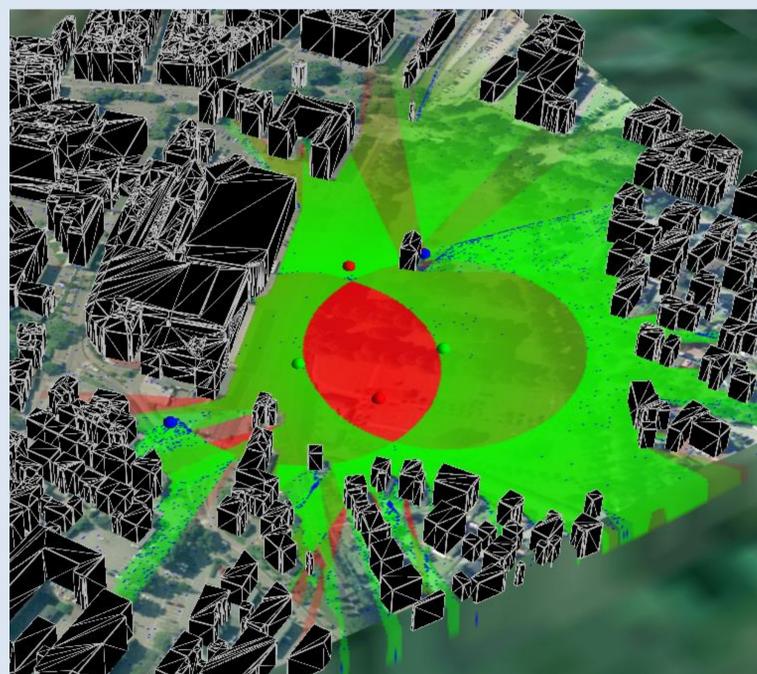
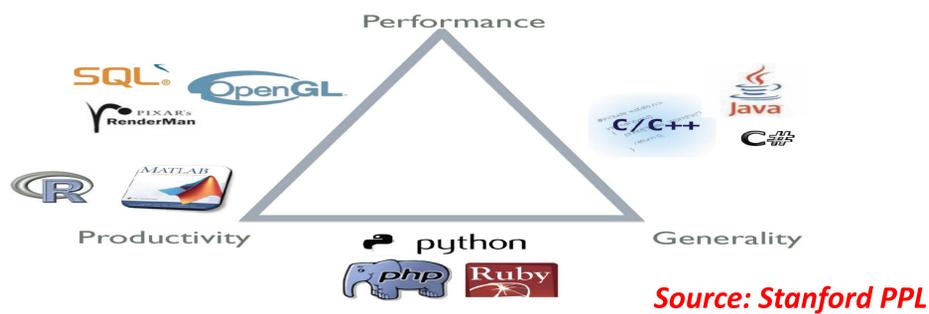
ARL Facilities and Capabilities Available to Support Collaborative Research

- Novel low-power architecture development platforms (Adapteva Epiphany, IBM TrueNorth)
- Large-scale heterogeneous resources including Xeon Phi and GPU clusters
- New architectural features on multi-core CPU clusters
- Altera FPGA development platforms

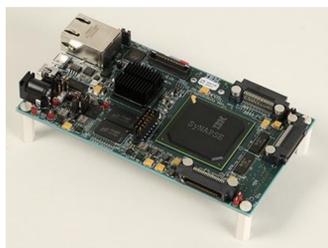


Challenges

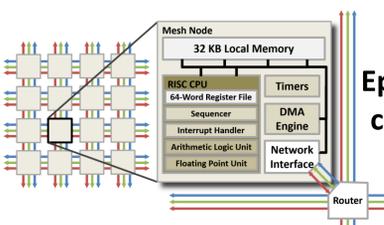
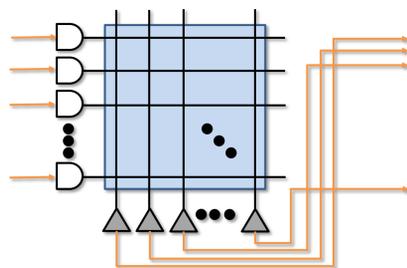
- Power, Performance, Portability
- Distributed heterogeneous computing
- Low-power mobile HPC computing solutions including specialized co-processors
- Achieving scalability to emerging memory-hierarchy dependent processors



Tactical HPC enabled situational awareness in real-time



NS1e low-power neuromorphic development platform



Epiphany many-core processor technology



Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Mobile Computing
- Parallel Operating System Development
- Machine learning expertise for large-scale Army application investigation and transition
- Big Data applications for adversary modelling and prediction