Virginia Tech – Facilities, Equipment and Other Resources

Computing resources will be provided through Advanced Research Computing (ARC) within the Division of Information Technology at Virginia Tech. ARC provides cutting-edge high-performance computing and visualization resources. Currently available high-performance computing (HPC) systems include:

1. **TinkerCliffs**: a general-purpose CPU cluster. This cluster has approximately 40,000 AMD Rome CPU cores, HDR Infiniband offering 100 Gbps throughput, nodes for high-memory applications, an additional 16 Intel Xeon Cascade Lake-AP nodes, four HPE nodes with eight NVIDIA A100-80GB GPUs each, and ten Nvidia DGX-A100 nodes with eight NVIDIA A100-80GB GPUs each and a dense interconnecting network.
2. **Infer**: GPU-based cluster made up of 98 compute nodes with a total of 80 NVIDIA Volta V100 GPUs, 18 NVIDIA Tesla T4 GPUs, and 80 NVIDIA Tesla P100 GPUs; Ethernet interconnect.
3. **CUI:** A protected data system intended for certain types of Controlled Unclassified Information (CUI) such as export-controlled data. This cluster has 12 CPU nodes amounting to 768 AMD Rome cores and 3 dense GPU nodes for a total of 24 NVIDIA A100-80GB GPUs.

Parallel file systems provide over 11 Petabytes of high-performance storage, and a tape archive is provided to support long term data storage.

In the next year, ARC plans to release additional resources supporting:

1. **OWL - AMD CPU Cluster**: A new, 84 node, liquid-cooled CPU cluster with AMD Genoa CPUs running at high clock speed and equipped with DDR5 memory.
2. **GPU resource** addition: TBD FY24 replacement for aging components in the current Infer cluster.

Services
In addition to the computational systems, ARC provides services to accelerate discovery and enhance the use of these systems. ARC has a staff of computational scientists who are available to consult with researchers to provide expert advice on the selection of systems for their workloads, optimizing workflows and code bases, and actively engaging in collaborative research. For extended engagements, they are also able to participate as named personnel on sponsored projects.

Daily office-hours are hosted by a team of graduate assistants who also provide most of the support for system usage via ARC Helpdesk tickets. Various workshops are conducted every term to provide orientation to new users and training to groups.

Visualization
ARC's Visionarium Lab also provides an array of visualization resources, including the VisCube, an immersive 10′ x 10′ three-dimensional visualization environment. In all, the VT Visionarium provides nearly 86 million pixels, 4 billion triangles-per-second and 22 TB/s of GPU memory bandwidth. ARC resources leverage Virginia Tech's excellent network connectivity, and network. Virginia offers access to advanced national networks, including ESnet, Internet2, Mid Atlantic Crossroads, and has an institutional license for Globus which provides capabilities for multi-institution data sharing and transfers.