

## **Facilities, Equipment and Other Resources**

### **University of Texas at San Antonio (UTSA)**

**San Pedro I (SP1):** San Pedro I is a 167,000-square-foot facility with 84,000 square feet of flexible classrooms, laboratories, and research space. This space is categorized into four neighborhoods to foster partnerships between students and faculty in data science and related disciplines. In addition, the building has four suites and 16 offices for companies that want to co-locate with UTSA. A two-megawatt generator backs up the site. One megawatt is specifically assigned to the data center, and the second is for the life safety of the building. Below are further specifics of San Pedro I:

#### **Data Center Entries:**

- SP1 302 Data Center Entry 1 - 267.03 square feet
- SP1 300 Data Center Entry 2 and Staging Area- 601.14 square feet - Data Cabinets/Racks - 1 for staging
- SP1 300C Instructional Data Center Entry - 578.44 square feet

#### **Data Center Security Zones:**

- SP1 302A Instructional Data Center Security Zone A - International Partners - 970.68 square feet - Data Cabinets/Racks - 11 and 1 fiber distribution cabinet
  - SP1 302E Instructional Data Center Security Zone A - International Partners Staging Area - 89.60 square feet
- SP1 302B Instructional Data Center Security Zone B - Federal Partners - 437.96 square feet - Data Cabinets/Racks - 14
- SP1 302C Research Data Center Security Zone C - American Partners - 867.12 square feet - Data Cabinets/Racks - 28
- SP1 302D Research Data Center Security Zone D - UTS Space - 397.50 square feet - Data Cabinets/Racks - 12

#### **Other**

SP1 350 Data Center UPS Room - 591.89 square feet

**UTSA John Peace Library (JPL) Data Center:** The Main UTSA Data Center provides a secure and environmentally controlled environment for many of the systems critical to the university's operations and will soon be home to the new HPC cluster named Arc. The data center also provides space for departmental servers. This data center is directly connected to the UTSA backbone network, via a pair of two combined 40Gb/s Ethernet connections for a total of 80Gb/s into the data center. By default, 1Gb/s Ethernet connectivity is delivered to each individual host system, however 10Gb/s is available as requested. All power, data cabling, etc. is ran overhead and the raised floor space is used for air flow to cool the room.

The data center is equipped with four 20 ton Computer Room Air Conditioning units (CRACs), a main UPS unit which supplies 160 kW of conditioned power to the data center, and an emergency power generator. Additional UPS units, and in row cooling units have been purchased and have been scheduled for installation in order to accommodate the new HPC cluster that will be installed in February 2021.

**Data Center for the National Security Collaboration Center (NSCC), Downtown, San Antonio:** UTSA is one of the few universities in the nation to hold four National Center of Excellence designations from the National Security Agency and Department of Homeland Security, further solidifying its dominance as a leader in cybersecurity. Planning is underway to build a new data center at NSCC in Downtown San Antonio.

**Arc Cluster:** This is UTSA's High Performance Computing (HPC) system and includes the following hardware components:

- 169 total compute/GPU nodes and 2 login nodes, majority of these are Intel Cascade Lake CPUs and some are AMD EPYC CPUs
  - 30 GPU nodes - each containing two Intel CPUs with 20 cores each for a total of 40 cores, 384GB RAM, and each including one V100 Nvidia GPU accelerator
  - 5 GPU nodes - each containing two Intel CPUs with 20 cores each for a total of 40 cores, 384GB RAM, and each including two V100 Nvidia GPU accelerators
  - 2 GPU nodes - each containing two Intel CPUs and 4 V100 GPUs, and 384 GB RAM
  - 2 GPU nodes - each having two AMD EPYC CPUs and having one A100 80 GB GPU, and 1 TB RAM

- 2 large-memory nodes, each containing four Intel CPUs with 20 cores each for a total of 80 cores, and each including 1.5TB of RAM
- 1 large-memory node, equipped with two AMD EPYC CPUs and 2 TB of RAM
- 1 node equipped with two AMD EPYC CPUs and having 1 TB of RAM
- 5 nodes - each equipped with two AMD EPYC CPUs and 1 NEC vector engine and 1 TB of RAM
- 100 Gbps Infiniband connectivity
- Two Lustre filesystems: /home and /work, where /home has 110 TBs capacity and /work has 1.1 PB of capacity
- A cumulative total of 250TB of local scratch (approximately 1.5 TB of scratch space on most compute/GPU nodes)
- 3 Nvidia DGX A100 Systems with 8x A100 80Gb GPU in each system and 2TB of memory each

**Dell Isilon Storage System:** In addition to the data center and HPC systems, UTSA has acquired a resilient Isilon storage array. This storage array has a total of 2PB of raw storage that will be divided between the research, academic, and administrative, areas at UTSA. This system will be utilized for active data storage, as well as long-term data archival. General researcher, server workload information is listed below:

- SAISILON01 (and replicated to a similar array at the Arlington Research Data Center) – General use file storage of a mix of Isilon H500 and A2000 nodes.
- Researchers get 1TB personal capacity upon request at no cost. Lab folders are provided up to 25TB with zero cost and are reviewed annually for usage. Any additional capacity is a discussion with our CTO where grant funds may be sought - Total capacity (approx.): 2.4PB.
- SAISILON02 – High-Performance storage of Isilon F600 nodes – still to be made operational. However, it will be exclusively used for research storage for project-specific uses - Total capacity (approx.): 780TB.

**Dell IDPA:** UTSA has recently purchased a robust backup system (a Dell Integrated Protection Appliance) that includes a total of 336TB usable space dedicated to backups of research specific data. The Dell IDPA solution provides a 36:1 to 40:1 deduplication rate, which is more than adequate for current needs, and can be expanded as necessary.

**Dell VxRail System:** UTSA has invested in a new Hyper Converged Infrastructure (HCI) product that will enable multiple areas (**including researchers**) on campus to have quick access to reliable virtual machines to meet their various needs. The following are available for the researcher's general server workload:

- 20 Nodes of Dell VCF P570 in a stretch cluster between JPL and Frio Street for Tier 1 workloads (10 nodes act as replication nodes) – Total cluster capacity: 3.02THz CPU / 14.97TB Memory / 282.72TB Storage. \*\*Note, capacity needs to be halved for usable
- 13 Nodes of Dell VCF P570 nodes in JPL for Tier 2 workloads (general use that backups will suffice for recovery window) – Total Cluster capacity: 1.96THz CPU / 19.48TB Memory / 275.41TB Storage.

**UTSA Advanced Visualization Laboratory (VizLab):** The VizLab that allows researchers from all disciplines of art, science, and engineering to conduct simulation and visualization research to better understand complex phenomena and translate data into images on large-scale and high-resolution visualization walls or other display devices. The Lab is open to all faculty, students and the San Antonio community. VizLab Features:

- Visualization Wall
- 24 high-definition 32" monitors
- 115 million pixels versus 2 million on a 1080P TV
- Powered by:
  - Three tile nodes: Dell Precision workstations with dual 10 core Intel Xeon processors, 32 GB of RAM, and dual NVidia Quadro M2000 graphics cards
  - Head node: Dell Precision workstation with dual 10 core Intel Xeon processors and 32 GB of RAM
  - Storage node: PowerEdge R530 server with dual 8 core Intel Xeon processors, 64GB of RAM, and 8TB of fault tolerant storage
- HTC Vive virtual and Oculus Rift reality headsets, HoloLens AR, Oculus Rift Go, and Lenovo Daydream
- 3D Systems Touch Haptic Device

- 85" 4K television monitor
- Two high performance workstations each configured with:
  - Dual Intel Xeon 8 core processors
  - 64GB RAM
  - Nvidia Quadro M4000 CAD video cards
  - 500GB Solid State Disk (SSD) drives
  - Mac Pro Workstation
  - Visual Mobile Cart with MS Surface Studio, Oculus Rift, and more

**Internet2 (I2) Connectivity and Usage:** UTSA is currently a full standing member of Internet2 and maintains a shared 10Gb/s link to other research institutions and universities connected to I2.

**University of Texas System Research Cyberinfrastructure (UTRC):** Through the University of Texas Research Cyberinfrastructure (UTRC) initiative, which was implemented in collaboration with the Texas Advanced Computing Center (TACC), researchers from across The University of Texas System are able to leverage a combination of advanced computational systems, large data storage resources, and high bandwidth data access between institutions in the UT system. The Lonestar6 system at TACC is available to the UT community through UTRC.