LEAP Next-Generation High Performance Computing Cluster

As evidenced from it's name, the LEAP (Learning, Exploration, Analysis and Processing) next-generation High Performance Computing (HPC) Cluster will represent a significant advancement in Texas State University's computing capabilities as it further enables the varied pursuits of a broad and growing research community. With a node count (123) of roughly 4 times that of it's predecessor, STAR (at 36), and nearly 6 times the number of processors (at 3,516 to STAR's 616), LEAP's theoretical compute capacity is 14 times that of STAR at 135 TFlops (135 trillion floating point operations per second). Combined with LEAP's introduction of a new parallel file system and high-speed interconnect, this compute resource represents a true LEAP in computing capabilities for Texas State University researchers - turning research endeavors into realities.

System Details:

The new LEAP Dell PowerEdge C6320 Cluster will be configured with 120 compute nodes, each with 28 CPU cores via two (14-core) 2.4 GHz E5-2680v4 Intel Xeon (Broadwell) processors. With 128 GBs of memory and 400 GBs of SSD storage per node, the compute nodes will provide an aggregate of 15 TBs of memory and 48 TBs of local storage.

Additionally, LEAP will feature two large memory (1.5TB) nodes with 64 CPU cores via four (16-core) 2.5 GHz E7-8867v3 Intel Xeon (Haswell) processors.

Compute nodes will have access to a 1.5 PB GPFS parallel file system. An FDR InfiniBand high-speed network fabric interconnects the nodes with a point-to-point bandwidth of 40GB/sec (unidirectional).

Furthering Science and Research:

LEAP is designed to provide cyber infrastructure covering a diverse application base with complex workflows. The system is architected to support capacity computing, optimized for quick turnaround on small/modest scale jobs while still providing plenty of resources for jobs that scale.

The local SSDs on each compute node will be beneficial to applications that exhibit random access data patterns or require fast access to significant amounts of compute node local scratch space.

The large memory per node (128 GB) makes LEAP ideal for shared-memory applications or MPI codes with large per-process memory footprints. The AVX2-enabled Intel Broadwell processors should provide excellent performance for applications with vectorizable loops or that make heavy use of optimized math libraries.

Multiple-node jobs and MPI jobs sourcing and/or generating large datasets will benefit significantly from the addition of the FDR Infiniband high-speed interconnect and the GPFS parallel file system.

LEAP Cluster	
Host	leap.txstate.edu
Site	vpit.txstate.edu/rc
Organization	Texas State University
Descriptive Name	TXST Dell PowerEdge C6320 Cluster with Intel Broadwell Processors (Leap)
Manufacturer	Dell
Primary CPU Type	Intel Xeon E5-2680v4
Machine Type	Cluster
Operating System	Linux (CentOS)
Contact	itrcadmins@txstate.edu
Processor Cores	3,516
Nodes	123
Memory	18 TB
Peak Performance	135 TFlops
Disk	48 TB
Primary Storage Shared	DDN 1,500 TB
Storage Network/Node Interconnect	FDR InfiniBand
Batch System	SLURM
Parallel File System	GPFS
Memory Per CPU	4.5 GB (compute) 25 GB (large-mem)
CPU Speed	2.4 GHz (compute) 2.5 GHz (large-mem)
CPU Cores Per Node	28 (compute) 64 (large-mem)