

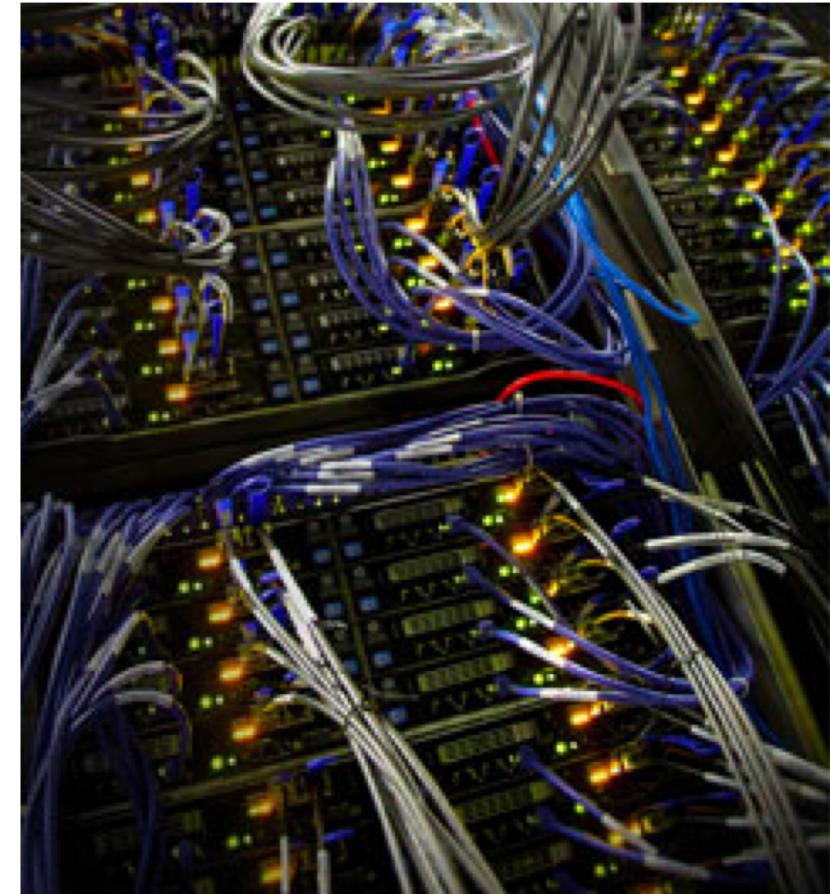
UC San Diego Research Computing Triton Shared Computing Cluster



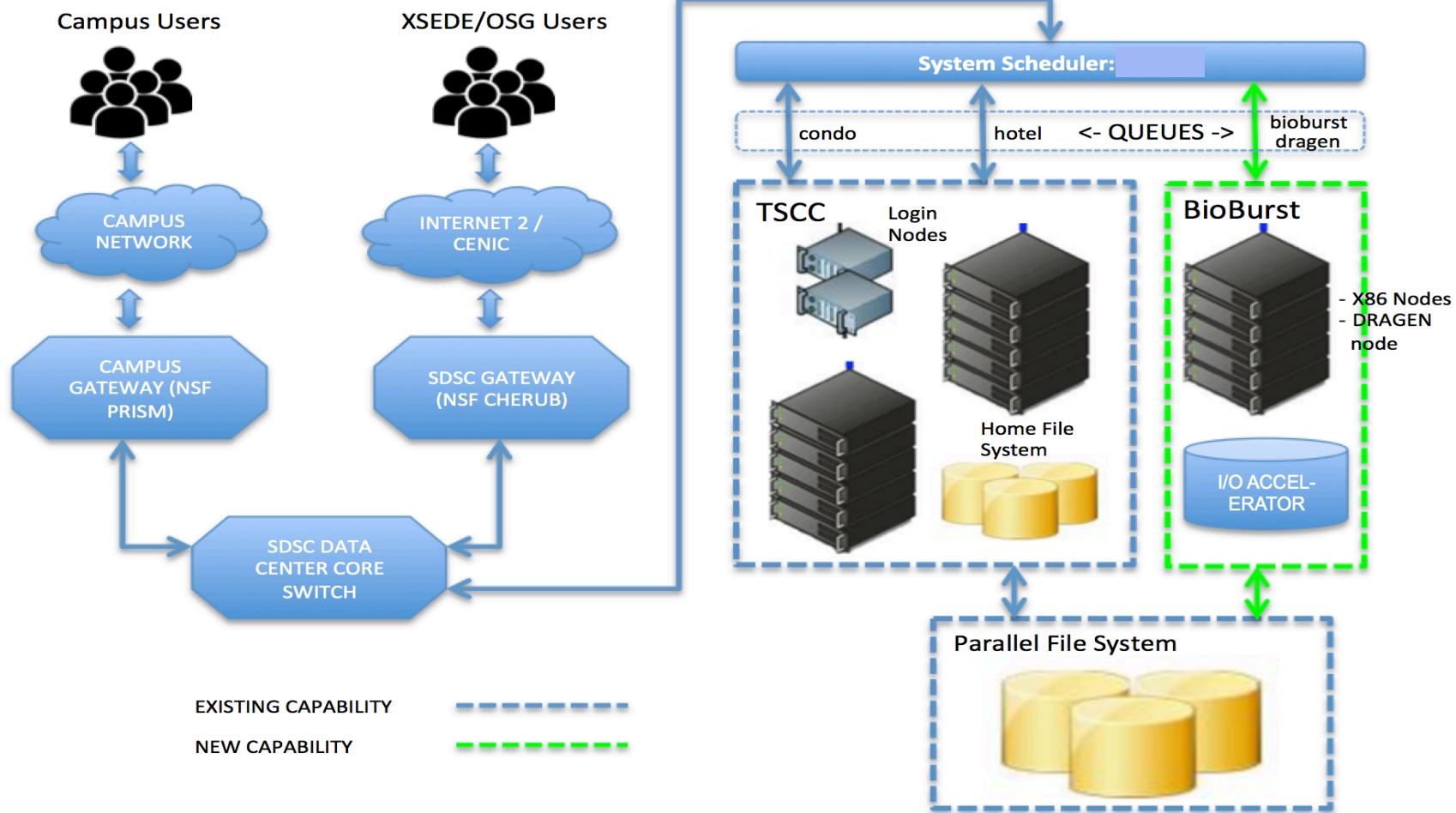
Triton Shared Computing Cluster (TSCC)

High Performance Computing for UC Researchers

- Medium-scale campus research cluster
- Launched 2013
- Hybrid business model: “condo” (buy in) and “hotel” (pay-as-you-go) options
- Mixed architecture:
 - ~375 nodes (>7,000 cores, not incl. GPU cores) + 50 GPU nodes (~300 GPUs with mix of NVIDIA 980/1080/TitanX GPUs)
 - 250-300 TF not incl. GPUs
 - 850 TB parallel file system, home file system, add'l storage services
 - Ethernet + optional InfiniBand
 - High bandwidth external networks
- Provide full Linux software stack (also container support)
- 30 participating labs/groups



Overall Architecture

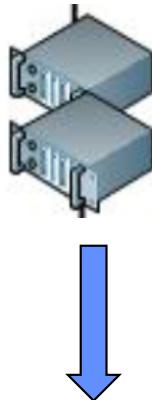


Condo Model Mechanics

**Group 1's
Purchased Nodes**

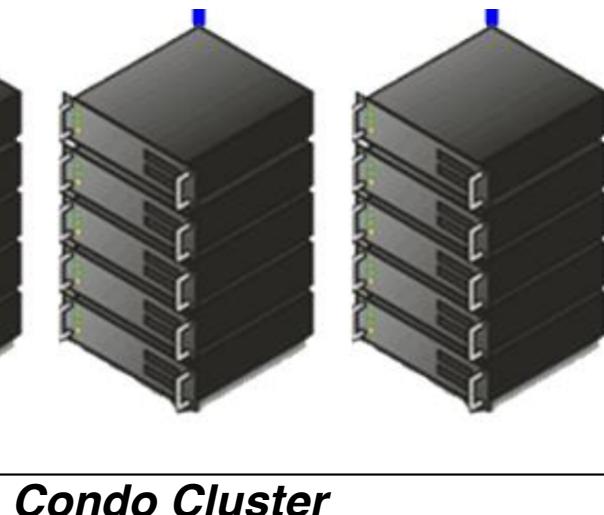


**Group 2's
Purchased Nodes**



Nodes are purchased directly and are property of the lab/group or funding agency

- Once purchased nodes are in place, group may run on purchased nodes or entire cluster according to usage rules
- Labs/groups are assessed an annual per-node operations fee



Common equipment is purchased via assessment of a one-time, per-node "infrastructure fee"



**TSCC Group Purchases
Common Infrastructure**

TSCC Operations

Condo Users



- Purchase Nodes
- Pay annual operations fee (\$495 per node – subsidized rate)
- Can run on purchased nodes or entire cluster (surge capacity for times of high computing need)
- “Glean” queue allows free use of spare capacity for short-running or re-startable jobs



Hotel Users



- Purchase Time (2.5 c per core-hour e.g. \$250 for 10,000 core-hours)
- Run only on hotel nodes

Current Price List

ITEM	COST	NOTES
HOTEL		
Hotel (pay-as-you-go) computing time	\$0.025	Cost per service unit (core-hour); paid via recharge (min. purchase 10,000 service units for \$250)
CONDO		
Standard Compute Node	\$8,000.00	Dual-socket, Intel Skylake 6132 (14-core) processors, 192GB RAM, 10GbE interconnect, 3-year warranty
GPU Compute Node	\$18,700.00 (TBD)	Dual-socket Intel Skylake 4114 (8-core) CPUs, 96GB memory, 8 x NVIDIA 2080Ti GPUs
Per-node Infrastructure Charge	\$939.00	One-time charge covers common infrastructure (home file system, network switches & cables)
Per-node Infrastructure Charge, InfiniBand	\$200.00	Additional one-time charge for IB covers switches and cables
Annual Admin/Maint. Fee	\$495.00	Covers sys admin, software licenses, utilities, etc.

4-year Budget Example for Condo

ITEM	COST	NOTES
One-Time Costs		
Standard Compute Node	\$8,000	1 standard compute node
Infrastructure Charge	\$939	Per-node (Ethernet only)
Tax	\$305	3.8125% tax on research equipment
Total One-Time Costs	\$9,244	
Annual Recurring Charges		
Admin/Maint. Fee (per node)	\$495	
Total Recurring Charges (4 years)	\$1,980	
Total Costs (4 years)	\$11,224	One-time & recurring
Amortized Cost Per Year	\$2,806	
Annual Service Units Per Year	237,922	Annual allocation can be used anywhere on cluster (e.g., purchase 1 node & run 8-node jobs)
Effective Cost per SU	\$0.012	Average cost over 4 years assuming full annual allocation is used each year

Getting Started

- **Trial accounts granted upon request**
 - 250 service units good for 90 days (can accommodate larger trials on a case-by-case basis)
 - Need your name, group, contact information, UCSD AD username
- **For Hotel usage, simply need an index number to recharge**
- **User accounts include remote login and home directory with 50GB quota**
- **Condo Process**
 - Discuss your needs with us
 - We provide an initial budget estimate for review
 - Obtain firm pricing from vendor
 - Work with your fund manager to place order
 - Receive nodes, install and test
 - ~6 weeks for entire process

Future Plans

- GPU node upgrade for Hotel cluster
- Compute node upgrade for Hotel cluster (slowly)
- OS & kernel upgrades
- Network fabric upgrade (consolidate InfiniBand)
- Proposal for JupyterHub and Rstudio server support

**We need your
support &
advocacy!!**

For More Information Contact:

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 - http://www.sdsc.edu/services/hpc/hpc_systems.html