

# Capability Computing Panel SOS10

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LA-UR-06-1539

# Current LANL HPC Capability Platform: The Q Machine



The ASCI Q machine is currently the largest ASC production platform and is providing significant capability and capacity computing to the ASC Program

- System available since July 2002
- Focus on production operations
- 20.48 TeraOps
- 22 Terabytes memory
- Quadrics Interconnect



# LANL has 59 TFLOPS for Secure Work

System	Manufacturer	Peak TFLOPS	Memory
Q	Hewlett-Packard	20.48	22 TB
CA	Hewlett-Packard	1.28	.51 TB
CB	Hewlett-Packard	1.28	.51 TB
CC	Hewlett-Packard	1.28	.51 TB
CX	Hewlett-Packard	.32	.13 TB
Lightning/Bolt	Linux NetworX	34.3	26 TB

# LANL has 40 TFLOPS for Unclassified Work

System	Manufacturer	TFLOPS	Memory
QSC	Hewlett-Packard	2.56	4.1 TB
Grendels	Linux NetworX	1.23	.26 TB
Coyote	Linux NetworX	15.0	11 TB
Pink	Linux NetworX	9.8	2.0 TB
Flash/Gordon	Linux NetworX	9.21	5.5 TB
TLC	Linux NetworX	1.02	1.0 TB
Mauve	SGI	1.64	.26 TB

# Significant Capability Runs on Q

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- Large memory of Q machine contributed significantly to safety calculations on major weapons system.
- First million atom molecular biology calculation was completed on Q machine.

# Distinction between Capability / Capacity is helpful but ...

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- NRC & Jasons committees observed that the ASC “capacity” workload was preventing “capability” systems from being used as “capability” systems.
- Is there a fundamental difference in cost per unit of performance between two types of systems?
  - With the growth in Linux Cluster solutions for HPC it is not clear that there is a fundamental difference in cost other than scaling costs between capability and capacity systems.
- Today’s capability workload can become tomorrow’s capacity workload
- Definitions are relative to specific set of requirements:
  - My capacity system may be your capability system

# Metrics

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- Capability
  - Time to solution
  - Increased cost per sustained performance
  - Reliability can limit over all system effectiveness
  
- Capacity
  - Lower cost per sustained performance
  - Total cost of ownership
    - System administration
  - Impact on user community
    - If capacity and capability are different, then users need two “validated” sets of each application that runs on both systems.