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Title: ASC L2 Milestone Review CTS-2 Production Readiness

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ASC L2 Milestone Review

CTS-2 Production Readiness

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September 11th 2023

LA-UR-23-XXXXX



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Agenda

- Milestone Overview
- Facility Preparation
- System Delivery
- Integration & Production Availability
- Summary

CTS-2 Production Readiness Milestone

- **Description**

- Open and secure CTS-2 are ready for production capability to include accessibility for users and integration with existing storage and network environment. Hardware testing, early user testing is accomplished, and the systems are generally available for ASC production users.

- **Completion Criteria**

- Open and secure CTS-2 are running production user jobs.

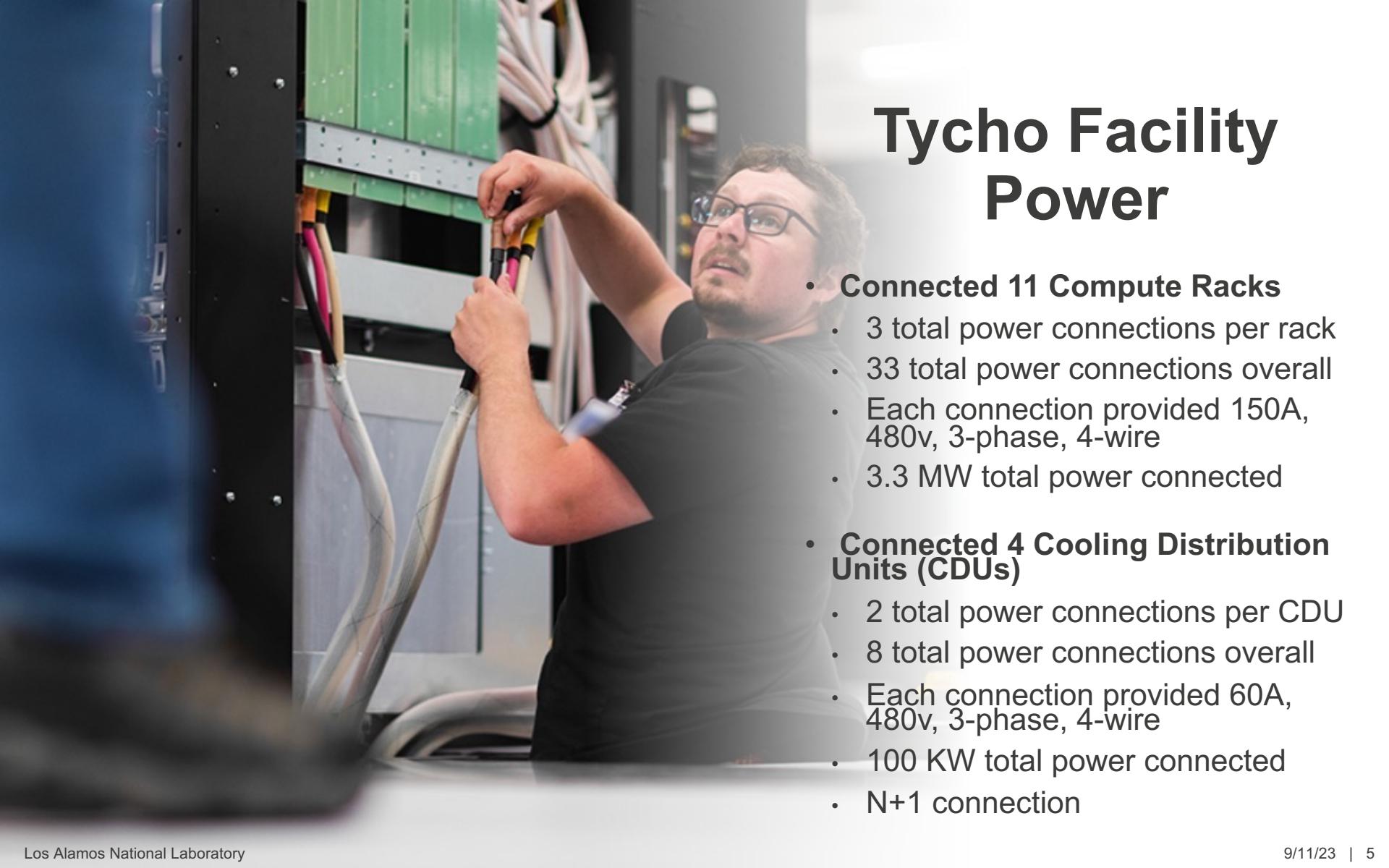
CTS-2 – Facility Preparation



**Reggie Page,
CIP Project Manager**



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A photograph of a man with glasses and a beard, wearing a black t-shirt, working in a server room. He is reaching up to connect a bundle of power cables to a rack. The rack is filled with green server modules. The background is dark, typical of a server room environment.

Tycho Facility Power

- **Connected 11 Compute Racks**
 - 3 total power connections per rack
 - 33 total power connections overall
 - Each connection provided 150A, 480v, 3-phase, 4-wire
 - 3.3 MW total power connected
- **Connected 4 Cooling Distribution Units (CDUs)**
 - 2 total power connections per CDU
 - 8 total power connections overall
 - Each connection provided 60A, 480v, 3-phase, 4-wire
 - 100 KW total power connected
 - N+1 connection

A photograph of a man with a beard and glasses, wearing a black t-shirt, working on a server rack in a data center. He is holding a power cord and connecting it to a rack-mounted power distribution unit. The rack is filled with green server modules and various cables. The background is a blurred view of the data center's interior.

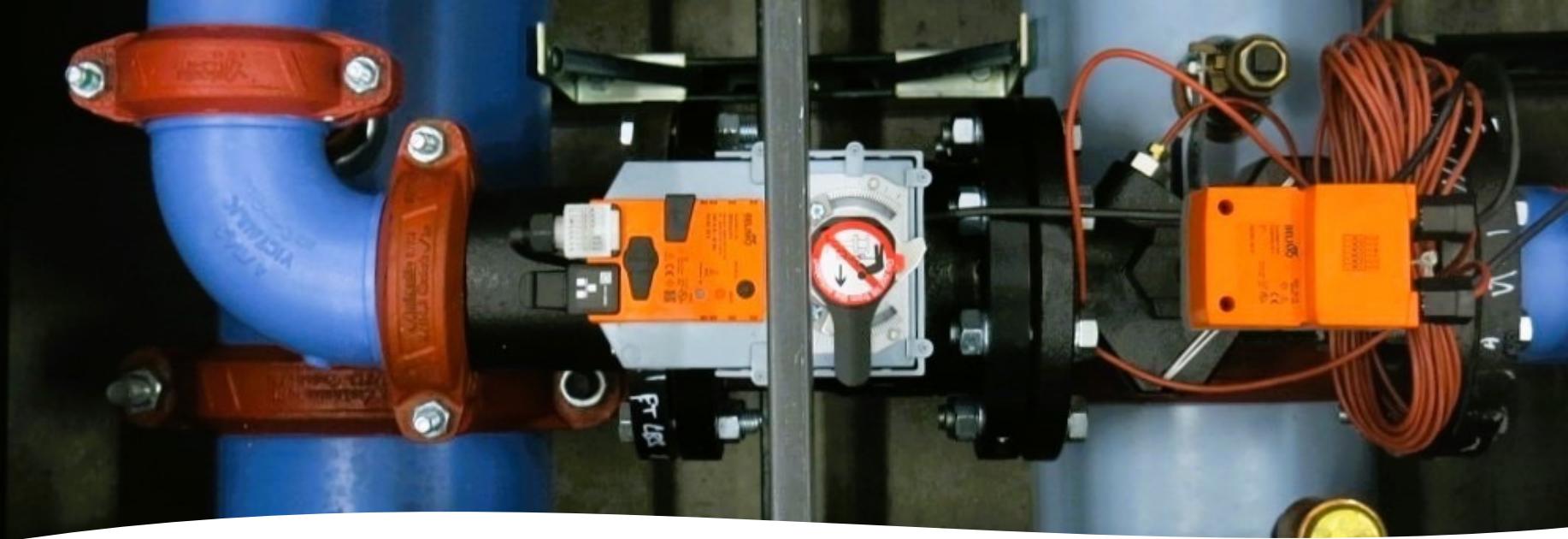
Tycho Facility Power continued

- **Connected 3 Management and Storage Racks**
 - 2 total power connections per rack
 - 6 total power connections overall
 - Each connection provided 60A, 208v, 3-phase, 4-wire
 - 130 KW total power distributed
 - N+1 connection

Tycho Facility Cooling

- **Connected 4 Cooling Distribution Units (CDUs)**
 - 75-degree supply water temperature
 - 258 gpm total flow to each CDU
 - Each CDU connected using 1 – 4in supply line and 1 – 4in return line
 - Adjusted flows across the loops to optimize efficiency
 - Verified and validated flow across all measuring devices in the system
 - 3.3 MW of total cooling capacity distributed





Positive Outcomes

- Addition of Belimo Energy valves provides ability to adjust valves with precise demand to match load via the BAS. The valves also eliminated the need for manual Test and Balance work during platform installation therefore, reducing time and effort during installation.
- Designing additional length on power cables allowed for immediate relocation of storage and management racks

Summary

11 - Compute Racks, 3 - Storage and Management Racks, and 4 – CDUs were successfully connected to facility power and cooling.

All distributed power and cooling calculations confirmed by the HPC Data Center Operations Group; systems powered on and ready for integration

CTS-2 – System Hardware



**Amanda Bonnie,
CTS2 Project Lead**



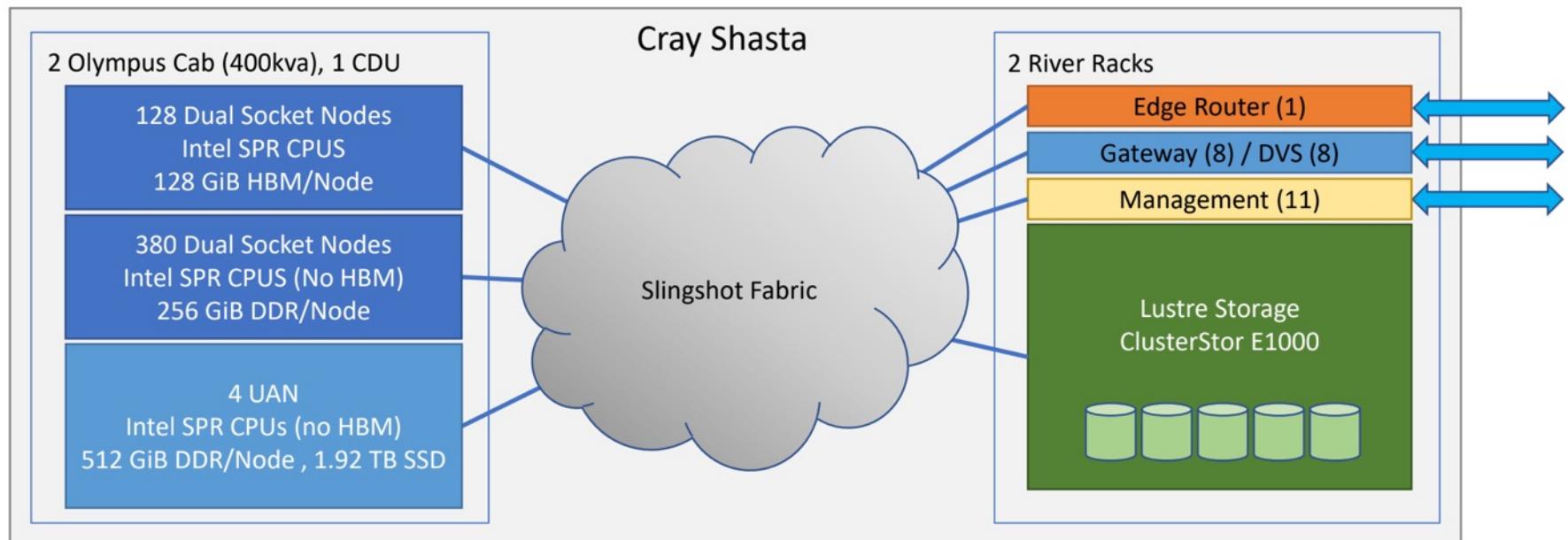
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CTS-2 Open System Hardware

- Open system arrived Nov. 29, 2022.
- Initially delivered with 380 SPR+DDR nodes – 128 SPR+HBM nodes arrived later (technology was not ready during initial installation).
- System was powered on and cooling balanced with the facilities loop.



CTS-2 – Open System Hardware

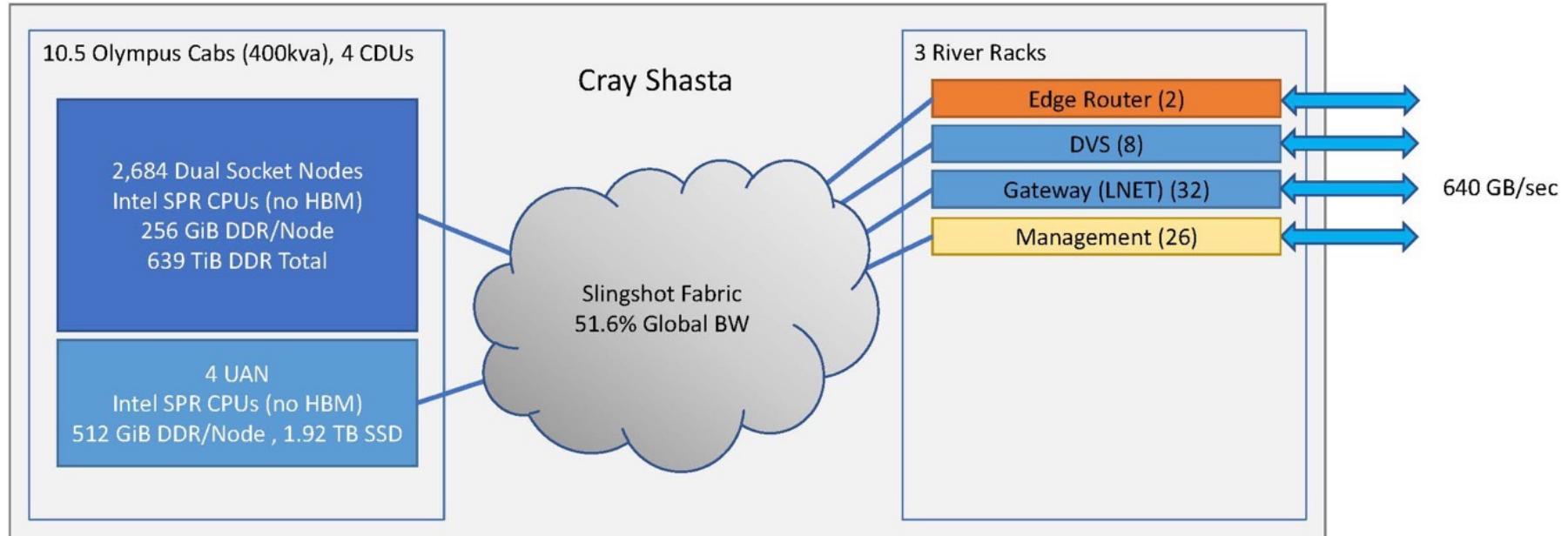




CTS-2 – Secure System Hardware

- Secure system arrived Oct. 3, 2022.
 - 11 Eight Ton Cabinets of Compute
 - 3 River Management Racks
 - 5 Semi-trailers
 - 6 days of installation
- On day 7 admins were bringing the system online!

CTS-2 – Secure System Hardware



CTS-2 – Secure System Hardware



Summary and Recommendation

Completion Criteria

- The ASC Level 2 milestone criteria for Advanced Technology Systems:
 - **hardware deliveries from vendor to site are complete**
 - **including the basic hardware to integrate “the system” as contractually defined**
 - All the supporting interconnect, storage, and sufficient spares along with a hardware testing infrastructure (hot spares cabinet) were delivered and tested.
 - **installation of the system by the vendor onsite to the extent that is contractually required is substantially complete;**

Results from Open and Secure System Hardware were installed and demonstrate a system ready for configuration & testing.

CTS2 – Integration & Production Availability



Amanda Bonnie
CTS2 Project Manager

CTS2 – Open System Software/Integration

- Software Installation
 - CSM 1.2.1
 - SS 2.0.1 (pre-release)
 - 95% of hardware online/available
- Pre-Team Testing (Mini-Acceptance)
 - Large Scale jobs able to launch and run to competition
 - Proven Stability with long running job sequences across the system overnight and over weekends
 - Passed post-DST checkout



CTS2 – Open System General Availability

- Open system was released to General Availability for ASC Production Users on June 6th 2023



CTS2 – Secure System Software/Integration

- Software Installation (in the OPEN)
 - CSM 1.2.1
 - SS 2.0.1 (pre-release)
 - 95% of hardware online/available
- Pre-Team Testing (Mini-Acceptance)
 - Large Scale jobs able to launch and run to competition
 - Proven Stability with long running job sequences across the system overnight and over weekends
 - Passed post-DST checkout
- READY TO SWING SECURE



CTS2 – Secure System Software/Integration

- Transition Challenges
 - Upgraded to CSM 1.3
 - Untested upgraded – needed for security compliance
 - First of its “kind” to be deployed in our secure environment
 - DVS projection of filesystems had not been fully tested
 - Due to tight timelines and limited resources
 - UDSL allowed users to scale their jobs
- Testing (Mini-Acceptance)
 - Pre-Team was able to prove scale and stability while also being able to complete a post-DST checkout
 - A short Early User period helped validate *real* codes worked



CTS2 – Secure System General Availability

- Secure system was released to General Availability for ASC Production Users on June 19th 2023



Summary and Recommendation

Completion Criteria

- The ASC Level 2 milestone criteria for Advanced Technology Systems:
 - Open and secure CTS-2 are ready for production capability to include accessibility for users and integration with existing storage and network environment.
 - Hardware testing, early user testing is accomplished, and the systems are generally available for ASC production users.

Results – Open and Secure systems have been installed, tested, and released GA to ASC Production Users

Questions