

## POWERWULF ACTA CLUSTER

### REFERENCE ARCHITECTURE

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The PowerWulf ACTA Cluster Compute Engine is a custom configured high performance computing solution designed specifically to meet the computing needs of ACTA, LLC RRAT .. The PowerWulf ACTA Cluster will be delivered preconfigured with our CBeST Cluster Management Toolkit optimized for maximum performance and be certified compatible with RRAT.

The PowerWulf™ ZXR1+ Cluster Compute Engine contains:

- 1 Head Node & 20 Compute Nodes
  - Detailed Description of Nodes on Following Page
- 504 Total Intel® Xeon® Scalable Processor Cores
  - 480 Total 2.3 GHz Processor Cores on Compute Nodes
  - 24 Total 2.3 GHz Processor Cores on Head Node
- 2016 GB Total High Performance ECC System Memory
  - 4 GB per Compute Node Processor Core
  - 4 GB per Head Node Processor Core
- 28 TB of RAW Storage Space
  - 8 TB Raw Storage Space for Data on Head Node
  - 1 TB Raw Storage Space for Data for each Compute Node
- 10/100/1000/10000 10 GigE High Performance Network Backplane
  - 48 Port 10 GigE Network Switch
- Remote Management & Monitoring Network Included
  - 48 Port 10/100/1000 Gigabit Ethernet Switch
- Rack and Power Infrastructure
  - 1 x 25U Rack Enclosure
  - 5 x APC 20 AMP / 110 V / UPS Unit
  - All Power and Network Cables Included
- Additional Head Node Power Redundancy Included
- Rack & Roll Integration for Truly Turn Key Deployment
- CBeST Cluster Management Toolkit
  - CentOS 64 Bit Operating System
  - CBeST Feature Details on Following Page
- PSSC Labs Services Bundle see Following Pages for Details
- Three Year Complete Warranty Coverage
  - Warranty Details on Following Page



Image is representative only.

The ability to upgrade all system components including processor cores, memory, network backplane & available storage is built into the PowerWulf ACTA Cluster Compute Engine. The system will grow along with your computing needs.



## SERVICES INCLUDE

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- Installation of CBeST® v. 4.0 Complete Beowulf Software Toolkit including:
  - Setup of and installation of CentOS 7.X x 64-bit
  - Message Passing Libraries (OpenMPI standard, options available)
  - SLURM Scheduling System
  - Ganglia Cluster Monitoring Utility and Custom Scripting
  - Temperature Monitoring & Auto Shutdown Script
  - Clonezilla to facilitate imaging compute nodes
  - PowerScripts for Remote Cluster or Node Reboot, Remote Cluster or Node Shutdown
  - Security Patches (Port Mapper, IP Chains/Tables and Latest Security Updates)
  - Scientific Libraries (LAPAK & BLAS)
  - GNU Compilers (C & Fortran standard, options available)
- CBeST® Operation Manual (35+ page) detailing installation, operation, maintenance and support
- CBeST® Support: PSSC Labs will extend the CBeST® support to 3 years. Our standard warranty includes 1 year CBeST® support. See p.4 for details.
- Hardware Warranty: PSSC Labs will upgrade the standard warranty from 1 year return to depot to 3 year on-site. See p.4 for details.
- Maintenance Kit. An extensive maintenance kit will ship with the cluster. The maintenance kit allows for immediate replacement of critical failed components.
- IPMI Remote Network Management Configuration. Allows remote access to all nodes for system management.
- Complete Recovery (CPR) Toolkit. PSSC Labs will keep a copy of your image at our facility.
- Performance Tuning. PSSC Labs Cluster Technicians have 10+ years experience optimizing system hardware for maximum performance. Performance tuning encompasses every step of the integration process including:
  - Optimizing BIOS settings for specific hardware
  - Installation of latest component drivers
  - Installation of necessary firmware updates
  - Compiling MPI with various flags for maximum performance
- Net Connect Integration Service. Prior to software installation by PSSC Labs Cluster Technicians, end user will provide the necessary network information including (cluster name, IP address, subnet, gateway, etc). Once this information is received, PSSC Labs will verify the information and properly configure the PowerWulf Cluster network. All network settings will be tested prior to shipping. End user will simply need to connect a network cable to begin communicating with the PowerWulf Cluster and run jobs.
- Site Preparation Guide. Gathers information regarding computing environment and network settings to ensure proper connectivity, power and cooling.





## **WARRANTY DETAILS**

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### Hardware Support

Each system includes a THREE year return to depot hardware warranty (unless otherwise noted). The warranty services coverage is limited only to PSSC Labs manufactured systems specified on the quotation or technical specifications document. Under no circumstances will the hardware warranty be extended to peripherals or other components added by anyone other than PSSC Labs. Any negligent or malicious treatment of system hardware including but not limited to improper computing environment, unacceptable operating room temperatures, and/or inappropriate firewall as specified by PSSC Labs is considered grounds for voiding warranty service. Shipping costs to PSSC Labs are the responsibility of the end user. PSSC Labs is responsible for all return shipping cost. In order to reduce system down-time, PSSC Labs strongly recommends purchasing our System Maintenance Kit. This System Maintenance Kit includes system components most likely to fail (hard drive, power supply, items with moving parts). On-Site Hardware Support Services are available for up to three years. On-Site Hardware Support Services can be purchased on an annual or per incident basis. Contact your Sales Representative for annual and per incident pricing.

### CBeST™ Support

PSSC Labs can preinstall and test the CBeST™ Cluster Management Toolkit. PSSC Labs is responsible for the integration of various software packages (commercial and open source) that constitute CBeST. PSSC Labs is not responsible for making changes to the source code, writing custom scripts or debugging any third party software application (commercial and open source). As part of CBeST installation, PSSC Labs Cluster Technicians will need to establish internal system network configuration settings. These settings (including domain name) cannot be changed without prior notice to PSSC Labs. Making internal system network changes without PSSC Labs consent is prohibited and can void the warranty. No custom configuration, customer scripts or other software changes are included. CBeST Support is included for one year. During this time, the end user may contact PSSC Labs an unlimited number of times via email and telephone. A support ticket must be opened on PSSC Labs website. Our Cluster Technicians are available to discuss the cluster network settings and installed CBeST packages. Cluster Technicians may refer to system manual or online information. If necessary, Cluster Technicians can log into system to verify proper CBeST functionality. If CBeST is not functioning properly, Cluster Technicians can ONLY return system to proper factory installed condition. If during the support process, PSSC Labs determines that the system is not functioning due to unauthorized system changes or unacceptable computing environment (as specified in the site preparation guide) the customer will be notified and sent a void of warranty notification. The end user will have 30 days to return system configuration to factory installed settings at which time PSSC Labs can reinstate the warranty. Cluster Technicians can be contracted in order to return system to factory installed conditions.

### Limits of Liability

In no event will PSSC Labs be liable to the customer for lost profits or any form of indirect, special, incidental, or consequential damages of any form from any causes of action of any kind with respect to any order, whether based on breach of contract, tort (including negligence), or otherwise, and whether or not the other party has been advised of the possibility of such damage. Recourse is limited only to the value of the purchase price.