LIMULUS™ HPC APPLIANCE

PERSONAL CLUSTER WORKSTATION

An HPC Cluster When You Need One,
an Efficient Workstation When You Don't

The Limulus Personal HPC workstation from Basement Supercomputing™ provides industry leading price-to-performance with a personal low power/noise appliance. The Limulus Model 100 can deliver up to half a TFLOPS of CPU performance (as measured by HPL Benchmark, Model 200 with memory upgrade) in a quiet and cool desk-side workstation package. Each Limulus packs four standard Micro-ATX motherboards into a standard PC case supported by a single high efficient power supply (one wall plug).

Power to the three worker nodes is controlled by the master using a simple software interface. Each of the additional nodes can be powered-on when needed by the user or by the resource scheduler. At idle, with nodes off, a Limulus consumes a mere 60 watts of power.

Expansion options include 10 Gigabit Ethernet, GPU (head node), and multi-unit connection for large cluster of machines.

"DAY ONE, READY TO RUN" TURN-KEY POWERHOUSE WITH SUPPORT

Each Limulus appliance comes with a fully installed Linux HPC cluster software stack. The system is ready for use on first "power-up." No other configuration is needed other than user/site customization. All Linux software is fully open source (SRPMS available), integrated, and upgradable (via YUM/RPM). Each system comes with on-board basic documentation, which is supplemented by an on-line manual. Each system includes:

- Node management with pdsh and whatsup
- Simple node power control commands
- Node log management and replication using rsyslog
- Automatic ssh key generation and propagation of users accounts
- NAT configured nodes for full LAN/Internet access
- Environment Modules that are automatic across node logins
- Email from nodes, used by scheduler
- Complete Open Grid Scheduler (SGE) ready to run configuration

SUPPORT OPTIONS

The basic support package includes 90 days of private access to the Basement Supercomputing Question and Answer page (http://basement-supercomputing.com/qa). In addition, one live phone call/incident is included as part of the 90-day support package. Hardware issues and deeper problems are handled via phone and email support. Additional 9-month and 12-month support packages are also available. Contact Basement Supercomputing for more comprehensive support options.

MORE INFORMATION: http://basement-supercomputing.com

BASEMENT SUPERCOMPUTING

Scientific Linux

Ganglia

MPICH 2

julia

Open MPI

WAREWULF

BASEMENT SUPERCOMPUTING LIMULUS HPC MODELS		
HPC Models	**MODEL 100**	**MODEL 200**
Total Nodes	4 (1 head node; 3 worker nodes)	4 (1 head node; 3 worker nodes)
Total Cores	16	16
Total Memory	64 GB DDR4 (upgradable to 192 GB)	128 GB DDR4 (upgradable to 256 GB)
Node CPU Configuration	Intel Skylake i5-6600; 3.3 GHz; 6 MB cache; 65 watts	Intel Skylake i7-6700; 3.4 GHz; 8 MB cache; 65 watts
Node Memory Configuration	16 GB RAM (upgradable to 48)	32 GB RAM (upgradable to 64)
Head Node Raw Storage Capacity	6.3 TB Total; SATA 6.0 256 GB SSD; 2x3TB HDD	8.3 TB Total; SATA 6.0 512 GB SSD; 2x4TB HDD
Network Connectivity	1x GbE external, internal 8-port GbE switch (10 GbE available)	1x GbE external, internal 8-port GbE switch (10 GbE available)
Worker Node Disk Configuration	diskless	diskless
HPL Performance	480.2 CPU GFLOPS	592.5 CPU GFLOPS
Power/Performance	0.83 watts/GFLOPS	0.72 watts/GFLOPS

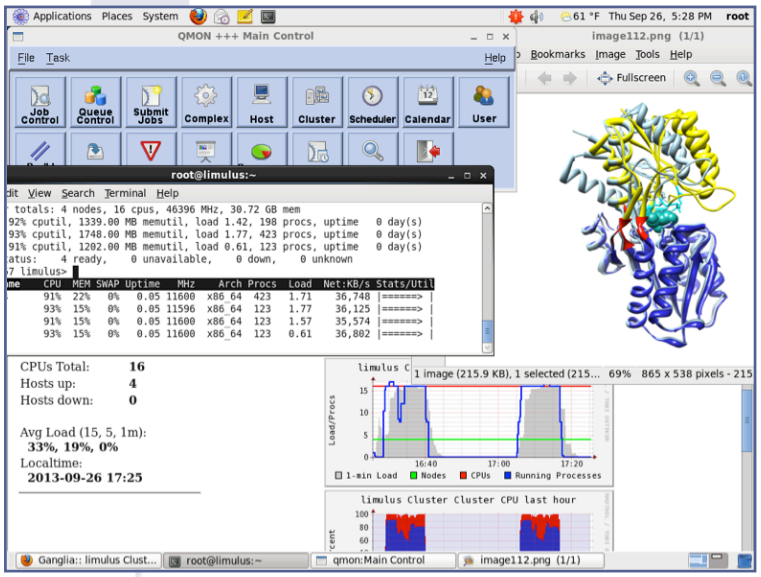
COMMON SYSTEM SPECIFICATIONS:

- Number of Motherboards: 4 Micro ATX, one has full access, three are embedded with front panel access
- Embedded Motherboard Front Panel Access: USB, video, power switch
- Video: Intel HD Graphics 530
- SATA 6.0 Storage
- Interconnect: Gigabit Ethernet (10 GbE option)
- External Ports: GbE, DVI-D, RGB, HDMI, 1xUSB-C, 4xUSB-3/2, 2xUSB-2/1.1, eSATA, 7.1 Audio, PS2 Kbd Mse
- Power Supply: 850 watts
- Power Cord: Single
- Idle Power Main: 60 watts
- Idle Power with All Nodes : 102 watts
- Full Load Power with All Nodes: 320 watts (running HPL benchmark)
- Operating System: Scientific Linux 6.x
- Dimensions: 9x23.25x24.25 (inches); 22.9x59x61.6 (cm)
- Weight: 50 pounds; 22.7 kg

INSTALLED CLUSTER SOFTWARE

Basic cluster RPMs that are included in the Basement Supercomputing software stack are listed below. All software is open source (SRPMS available). The base distribution is built on Scientific Linux 6.x. All files are available through the Basement Supercomputing repository. The entire suite of libraries, tools, and utilities has been integrated using the Modules package.

- Warewulf Cluster Toolkit – Cluster provisioning and administration
- PDSH – Parallel Distributed Shell for collective administration
- Whatsup – A cluster node up/down detection utility
- Open Grid Scheduler – Previously Sun Grid Engine
- Ganglia – Cluster Monitoring System
- GNU Compilers (gcc, g++, g77, gdb)
- Modules – Manages User Environments
- MPICH2 – MPI Library
- OPEN-MPI – MPI Library
- Open-MX – Myrinet Express over Ethernet
- ATLAS – Host tuned BLAS library
- OpenBLAS – Optimized BLAS library
- FFTW – Optimized FFT library
- FFTPACK – FFT library
- LAPACK and BLAS – Linear Algebra library
- ScaLAPACK – Scalable Linear Algebra Package
- PetSc – Scalable PDE solvers
- GNU GSL – GNU Scientific Library (over 1,000 functions)
- PADB – Parallel Application Debugger
- Julia – High Performance Parallel Scientific Language
- Userstat – Job queue/node monitoring application
- Beowulf Performance Suite – Benchmark and testing suite
- relayset – Power relay control utility
- ssmtp – Mail forwarder for nodes



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