Sun in HPC

Update for IDC HPC User Forum
Tucson, AZ, Sept 2008

Bjorn Andersson
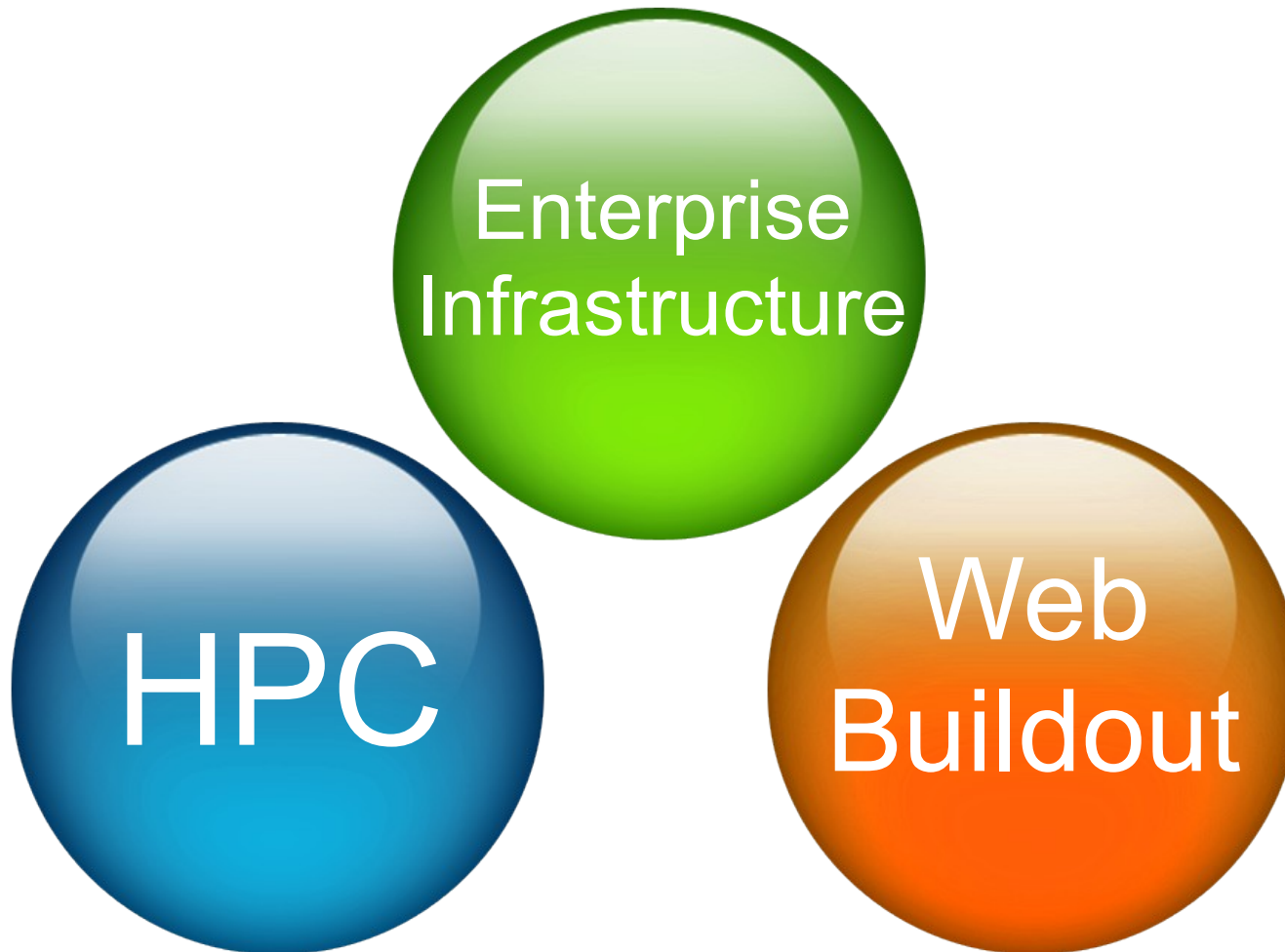Director, HPC Marketing
Makia Minich
Lead Architect, Sun HPC Software, Linux Edition
Sun Microsystems

Core Focus Areas for Sun

Enterprise Infrastructure

HPC

Web Buildout

Our Vision

Open, Seamless and Comprehensive

Clustering Made Easy

Extreme Performance and Scalability

Extreme Efficiency

Choice and Flexibility

LIFE SCIENCES

MANUFACTURING

EDU & RESEARCH

ENERGY

GOVERNMENT

FINANCIAL SERVICES

Any Organizations that Use HPC to Deliver a Competitive Advantage

The Sun HPC Cluster Portfolio
Updates Across the Board

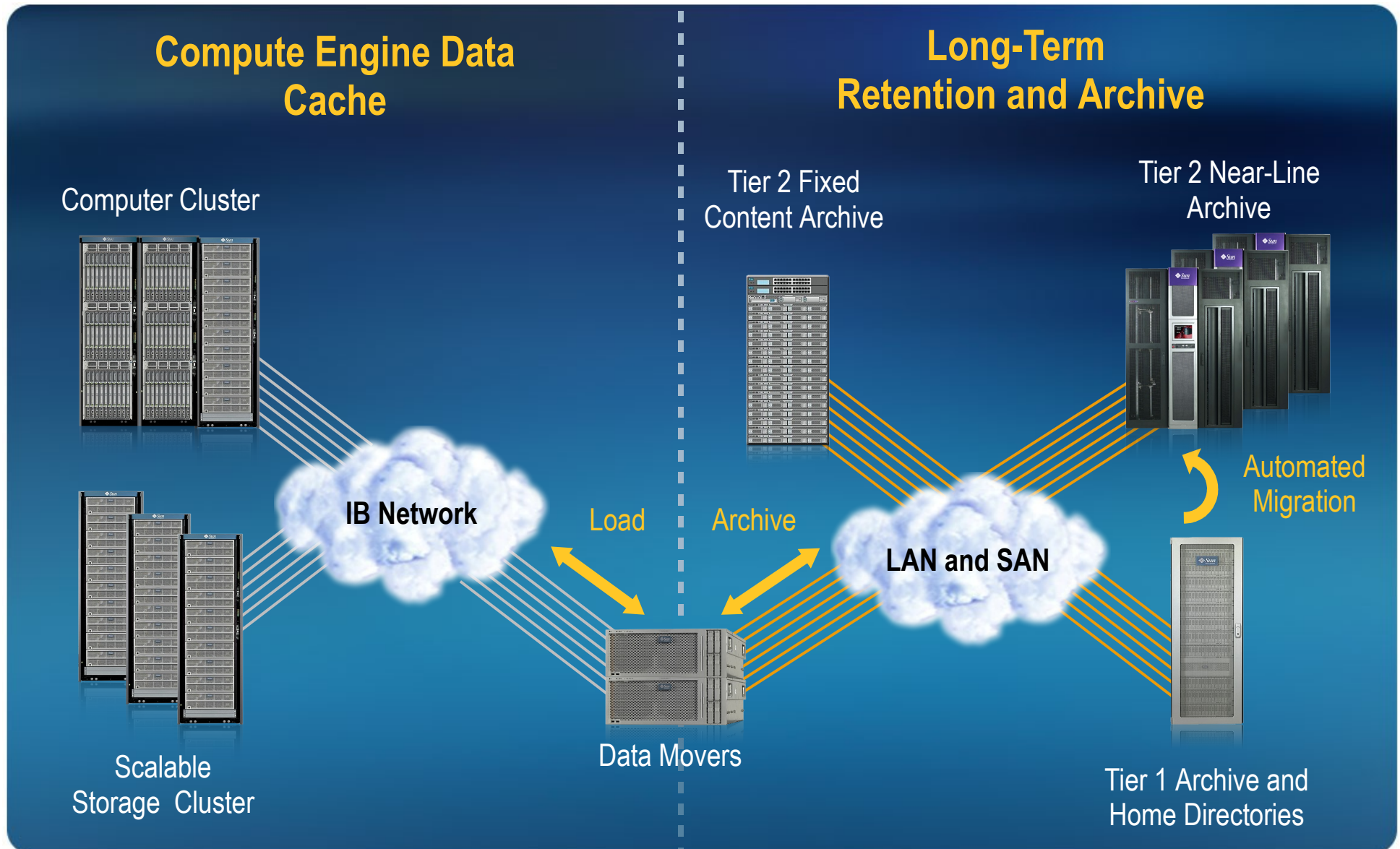| Access	Developer	Management	OS	Interconnect	Storage/Archive	Systems
Visualization Workstation, Thin Clients, Remote Access	Compilers, Debuggers, Optimization Tools, Libraries	Workload, Systems and Cluster Management	Linux, Solaris	InfiniBand or Ethernet	Cluster Storage, Backup, Archive, File Systems, HSM	Racks, Blades or SMP Variety of CPU Architectures
			Sun HPC Software			

Sun Services

Sun Customer Ready

Sun HPC Storage Solutions

Compute Engine Data Cache

Long-Term Retention and Archive

Computer Cluster

Tier 2 Fixed Content Archive

Tier 2 Near-Line Archive

IB Network

Load

Archive

LAN and SAN

Automated Migration

Scalable Storage Cluster

Data Movers

Tier 1 Archive and Home Directories

5

Open Storage for HPC

New **Open Storage** Products and Solutions Help Customers Handle Explosive Data Growth at New Levels of Economics, Scalability, and Performance

Sun Storage and Archive Solution for HPC

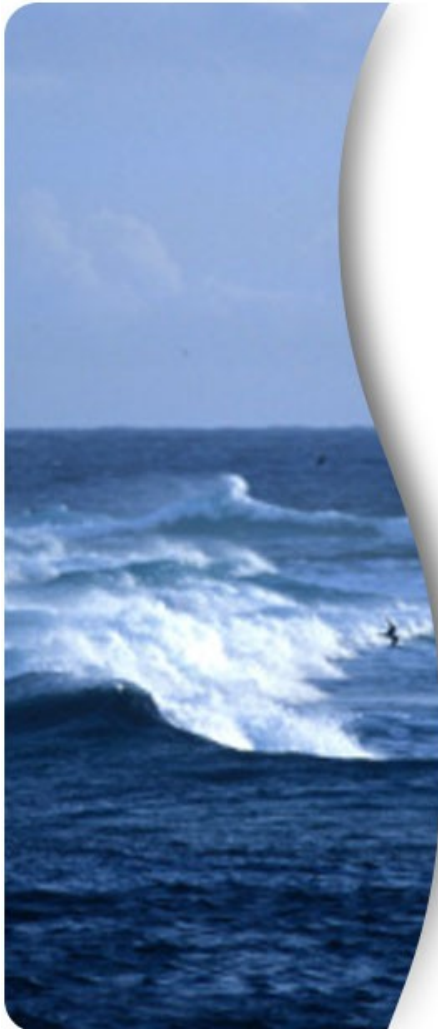- Save up to 40% in TCO, reduce power consumption by 24%

Lustre

- >40% of the top 100 Clusters in the world use Lustre

ZFS

- Simplifying storage & delivering end-to-end data integrity

Open Storage

- Better reliability and scalability at 1/10th the cost of closed proprietary storage
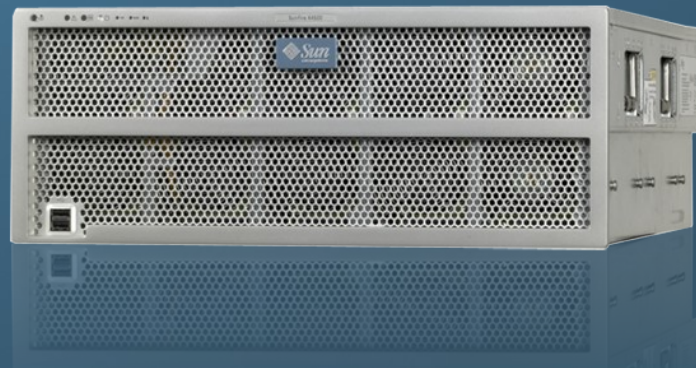
Scalable Clustered Storage

Sun Fire X4500 and Sun Fire X4540 Servers

- Industry's first data servers
- Best server data throughput and storage density
- Runs Lustre parallel file system
- Standard platform and common systems management capabilities

InfoWorld 2008 TECHNOLOGY OF THE YEAR AWARDS

Best Storage Server

Sun Constellation System Enhancements

New, Expanded **Sun Constellation System** Configurations Are Designed to Let Customers Take Advantage of Superscale Technologies Starting at the Departmental Level and Up

Sun Data Center Switch 3x24
- 67% less cabling

New Sun Constellation System Reference Designs
- 50% more blades per rack than competitive systems
- 20% reduction in floor space
- Scalable reference designs starting from 7Tflops
- Intel, AMD or SPARC*
- Fast, simple and easy to deploy
- Integrated with storage, archive and visualization

Sun Blade X6450
- Up to 71% more performance (7.37Tflops in a single rack)
- 50% more memory capacity than competitive systems

*Future

Massive Scaling, Performance and Reduced Complexity

AMD, Intel or SPARC CPU's

Single Blade	Sun Blade 6000	Single Rack 768 Cores 7+ TFLOPS Peak	4 Core Switches 13,824 Servers 2+ PFLOPS Peak
→ 10 x Scaling	→ 4.8 x Scaling	→ 288 x Scaling	

Sun Blade 6048 Modular System

- The first blade platform designed for extreme density and performance
  - > >7 TFLOPS, 768 cores per chassis/42U
    - — 50% more compute power than HP C-Class
    - — 71% more compute power than IBM BladeCenterH
  - > 4 InfiniBand Leaf Switch Network Express Modules
    - — Lowest cost per port with ultra-dense switch solution
- Pay as you grow platform ideal for fast growing businesses
  - > Choose among SPARC, AMD Opteron and Intel Xeon CPU technologies
- Runs general purpose software
  - > Custom compiles and tuning are not required
- Realize economies of scale savings in power and cooling

Massive Horizontal Scale
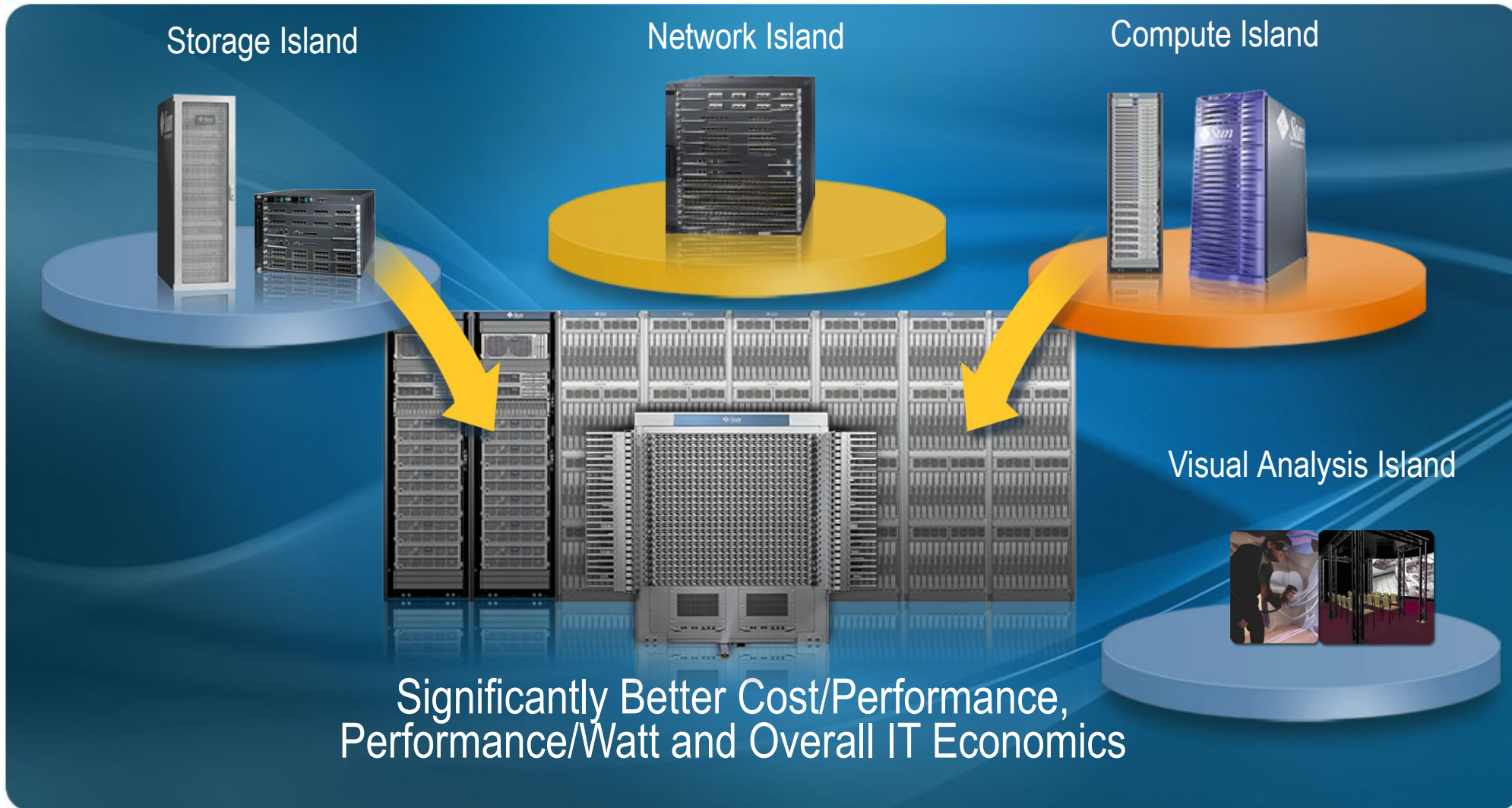
Sun Visualization System

Scalable, Sharable and Secure

- Virtualizing graphics resources
- Massive scale in compute density and Display resolution
- Share across multiple users with different devices
- Data is secured on central server

Sun Constellation System

Integrating the Islands

Storage Island

Network Island

Compute Island

Visual Analysis Island

Significantly Better Cost/Performance, Performance/Watt and Overall IT Economics

New Open Source Software...

New, Powerful **Open Source Software** Enabling Customers to Simplify the Process of Installing, Managing and Developing Software for Their HPC Clusters

Sun™ HPC Software, Linux Edition 1.0
- Integrated SW stack for Linux based solutions on Sun HW

Solaris™ Developer Preview
- Parallel app development and workload software

Sun™ xVM Ops Center 1.1
- Comprehensive, integrated cluster management

Sun™ Grid Engine 6.2 Preview
- World leading Open Source distributed workload management software
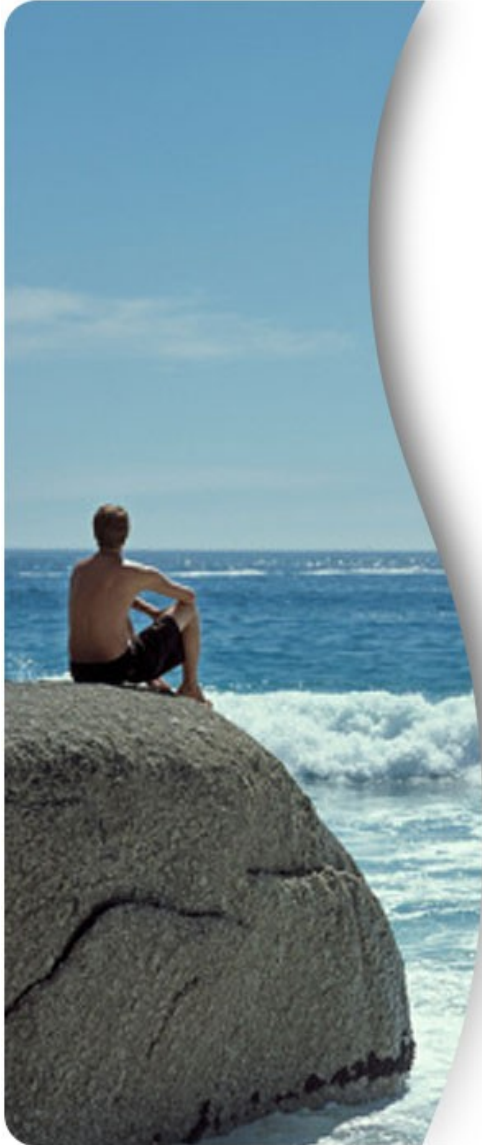- Installed at over 10,000 sites worldwide
- 1,000 downloads per month

Sun™ Shared Visualization 1.1 and Scalable Visualization 1.1 software
- Integrated Linux and Solaris SW stacks for remote and scalable visualization
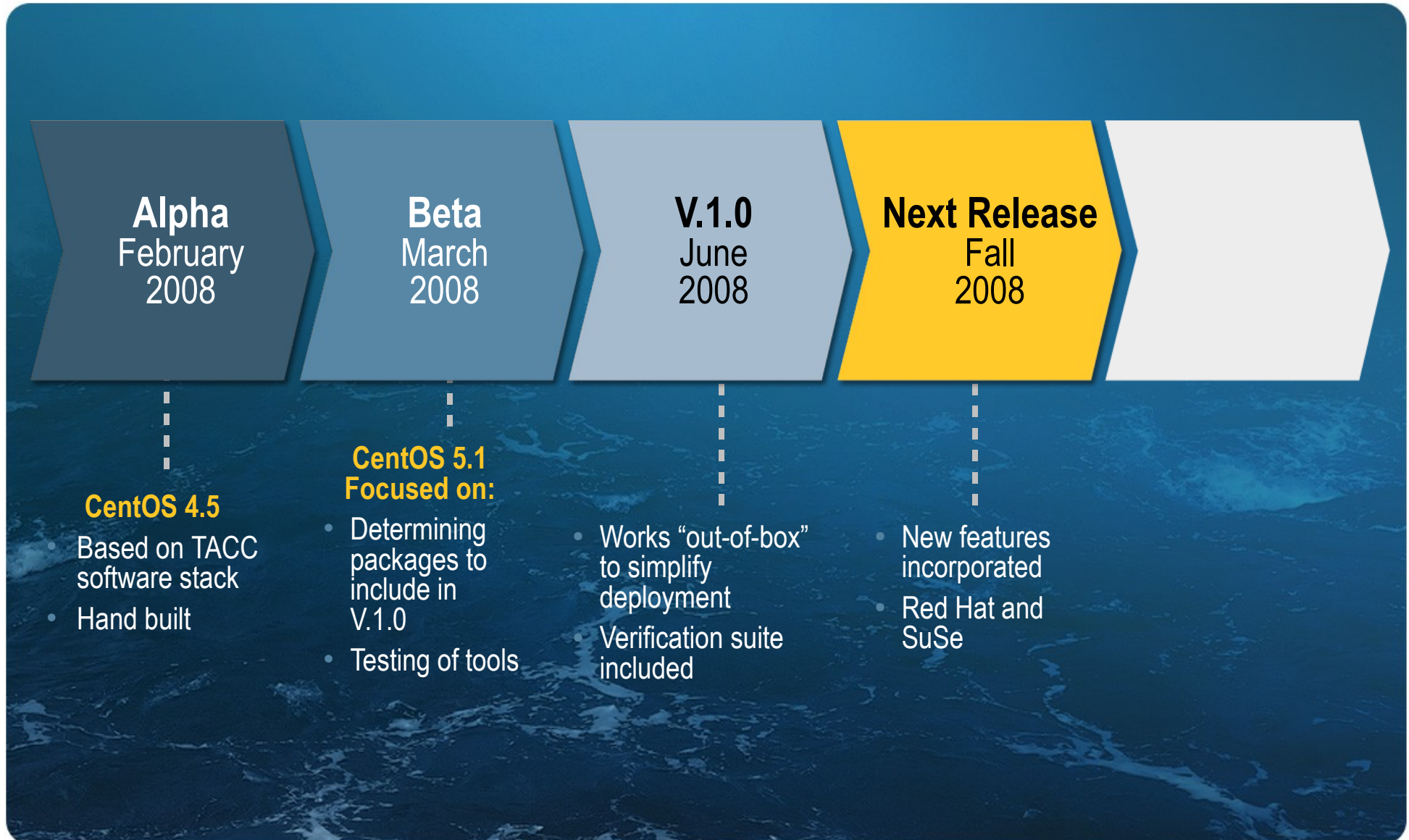
Sun HPC Software
LINUX EDITION

Project Goals

- Deliver an integrated software stack for Linux-based HPC solutions, verified on Sun HPC hardware

- Provide a complete set of tools and well-defined processes for configuring and provisioning an HPC cluster

- Design the stack to be scalable

- Includes tools for verification, management and administration, and monitoring

- Open and community driven project

- Built on existing Linux distributions
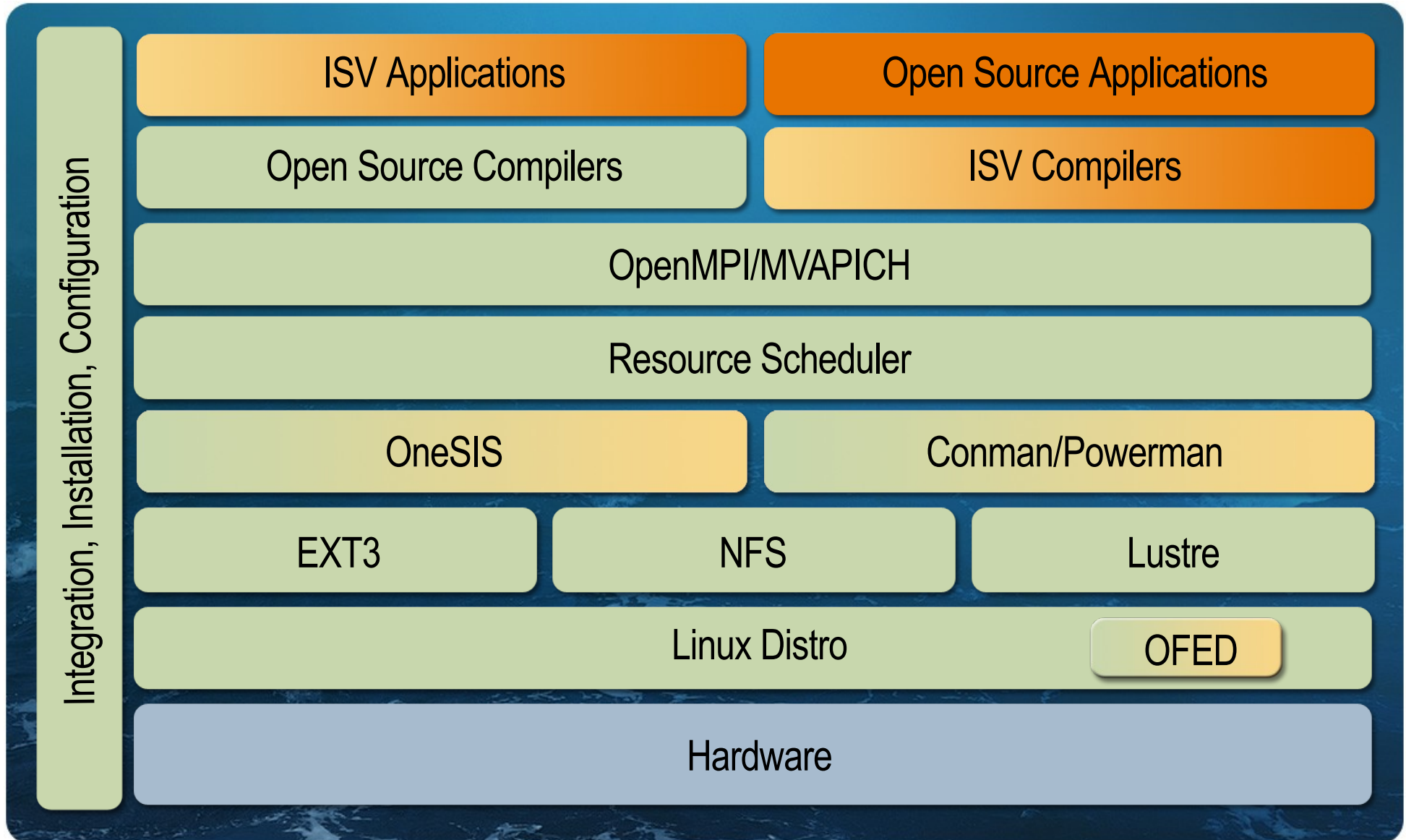
Types of HPC

- Commercial HPC
  - > Fully supported
  - > ISV Requirements
  - > End-to-End Solution

- Supercomputers
  - > Fully supported
  - > Some OS modifications for performance tweaking
  - > Lesser ISV Requirements

- Extreme HPC (xHPC)
  - > Paradigm Shifting

Linux HPC SW Stack Roadmap

Alpha
February
2008

Beta
March
2008

V.1.0
June
2008

Next Release
Fall
2008

CentOS 4.5
- Based on TACC software stack
- Hand built

CentOS 5.1 Focused on:
- Determining packages to include in V.1.0
- Testing of tools

- Works "out-of-box" to simplify deployment
- Verification suite included

- New features incorporated
- Red Hat and SuSe

Sun HPC Software – Linux Edition

Integration, Installation, Configuration		
ISV Applications	Open Source Applications	
Open Source Compilers	ISV Compilers	
OpenMPI/MVAPICH		
Resource Scheduler		
OneSIS	Conman/Powerman	
EXT3	NFS	Lustre
Linux Distro		OFED
Hardware		

1.0 Release (CentOS)

- Released in June 2008
- Build your own ISO
  - > Download build-it tool
  - > Uses standard CentOS repositories to grab core packages
  - > Uses our supplied repository to layer management tools
- Has all core components and documentation to create an HPC cluster.
- Includes optional Sun components of:
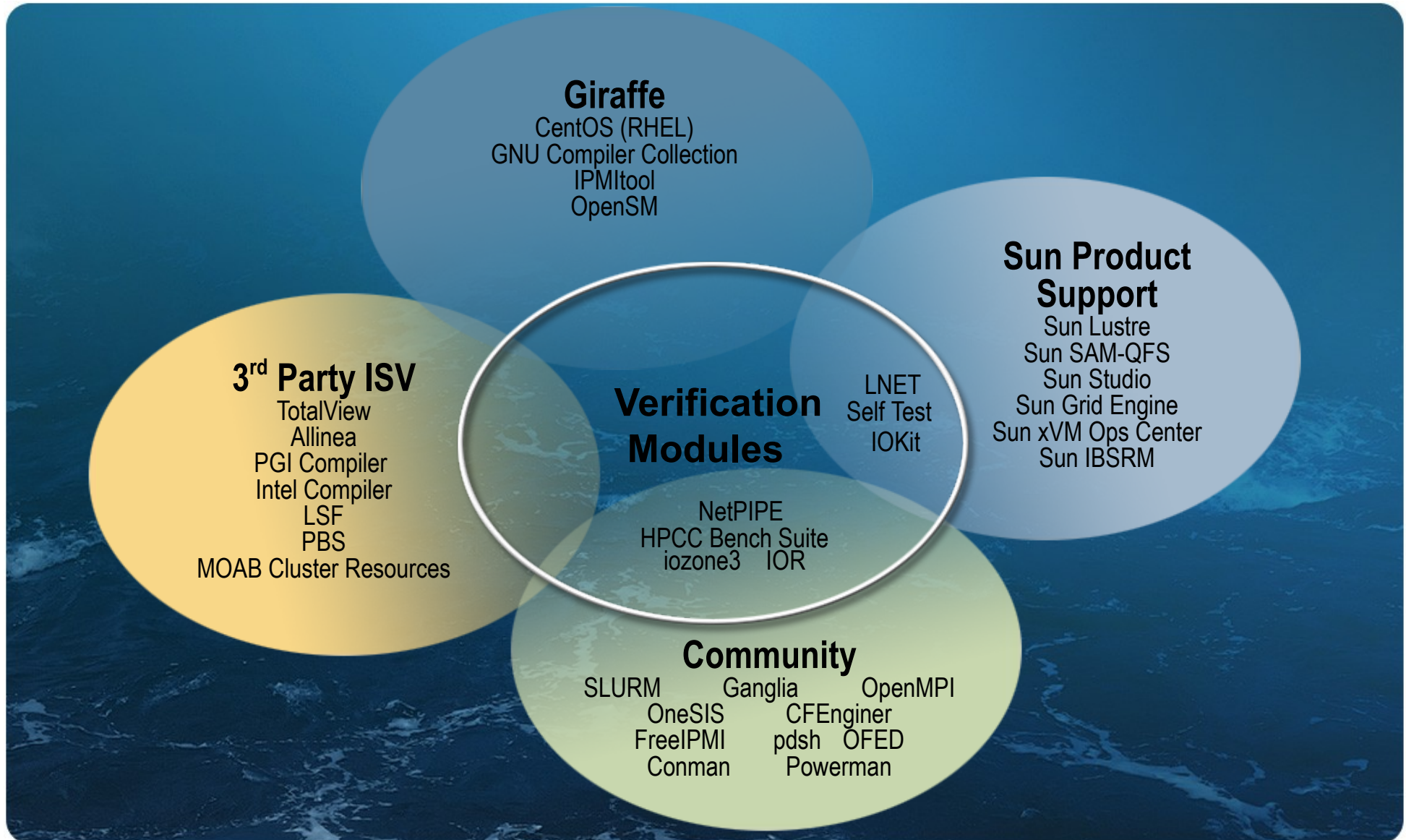 - > Lustre
  - > Sun Grid Engine

Next Releases

- Linux Edition Software housed in a central repository
- Modular on top of base commercial Linux distribution
    - > RedHat Enterprise Linux (Q3)
    - > SuSE Linux Enterprise Server (Q4)
- Provides tools to create an HPC Cluster out of an ordinary RHEL or SLES Linux Installation
- Better integration of stack components

Sun HPC Software, Linux Edition Support

- Current
  - Community based support for Linux Edition from Sun and partners
    - Community wiki site, Mailing lists, Bugzilla
- Future
  - Single Point of Contact is the goal.
    - Sun to support hardware, OS, and middleware
    - Will investigate closer relationships with ISV app vendors
  - Enhanced Community support (Level 1 & 2 of 3 level Support model)
    - Engineers that will triage, troubleshoot, resolve Open Source problems
    - Assist in putting fixes upstream to OS communities
- Sun Professional Services offers consulting services that can help you plan, develop, deploy, and optimize your Sun HPC Software solutions

Component Support

Giraffe
CentOS (RHEL)
GNU Compiler Collection
IPMItool
OpenSM

Sun Product Support
Sun Lustre
Sun SAM-QFS
Sun Studio
Sun Grid Engine
Sun xVM Ops Center
Sun IBSRM

3rd Party ISV
TotalView
Allinea
PGI Compiler
Intel Compiler
LSF
PBS
MOAB Cluster Resources

Verification Modules

LNET
Self Test
IOKit

NetPIPE
HPCC Bench Suite
iozone3   IOR

Community
SLURM   Ganglia   OpenMPI
OneSIS   CFEnginer
FreeIPMI   pdsh   OFED
Conman   Powerman

What's in the Future?

- RAS Solutions
  - > Exposing hardware RAS solutions in Linux (EDAC)
  - > High availability
  - > Centralized DB with a view of the entire cluster

- Light Weight Linux versus Light Weight Kernel
  - > What's the best option for Peta- and Exa-scale
  - > Maximize utilization, minimize jitter, keep usability

- OS Jitter Reduction
  - > What's running, what's required, what can be done better?

- **Virtualization, Infiniband Fabric Diagnosis, System Diagnosis ... etc. ... etc. ...**

Communication Paths

Email

linux_hpc_swstack@lists.lustre.org

Blog

http://blogs.sun.com/giraffe

Website

http://www.sun.com/software/products/hpcsoftware/index.xml

Learn More, Interact, Participate

Download

Download and try out:
• Lustre
• Sun Grid Engine
• Sun HPC Software
  Linux Edition 3.0 TBD
• Sun HPC Developer Preview
• Visualization Software
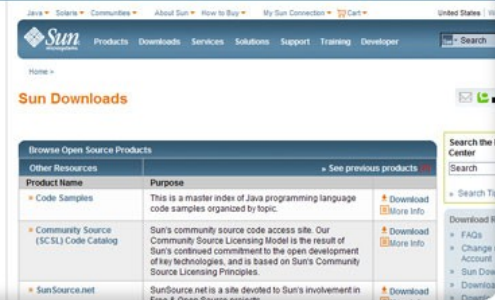
Learn More

Visit: sun.com/hpc
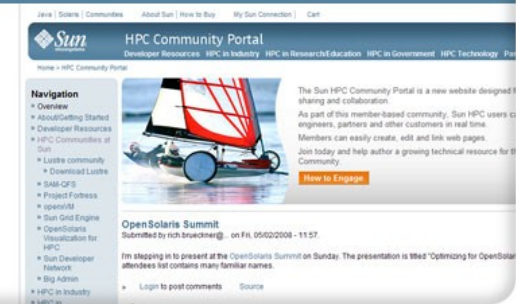Read the latest news, view the latest offers, download the latest white papers and more

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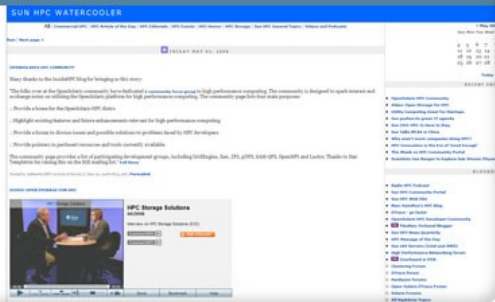
Join

Join the online HPC community at: hpc.sun.com and collaborate with Sun engineers and experts
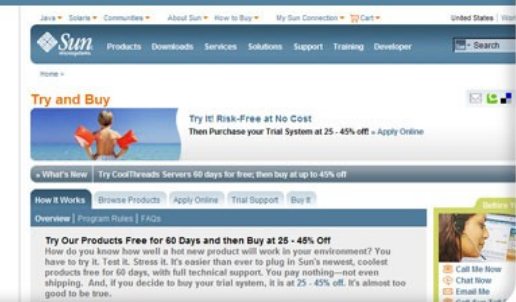
Watercooler

Visit the HPC Watercooler at: blogs.sun.com/hpc and get the latest HPC news from around the globe

Try and Buy

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Thank You!

bjorn@sun.com
makia@sun.com