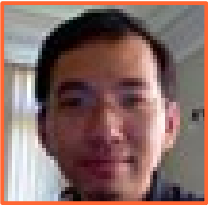# Sun Blade Systems: Open Versatility

Agenda

Mike McNerney

Director, Blade Server Product Line

Francis Lam

Product Line Manager, Systems Group

David Campbell

Technology Directory, Systems Management

Marcos Peixoto

Product Line Manager, Blade Servers

Rakesh Bhatia

Mechanical Engineering Systems Group

Sun microsystems

Sun Blade Modular System

NEW!

The Most Open and Versatile Enterprise Blade Platform

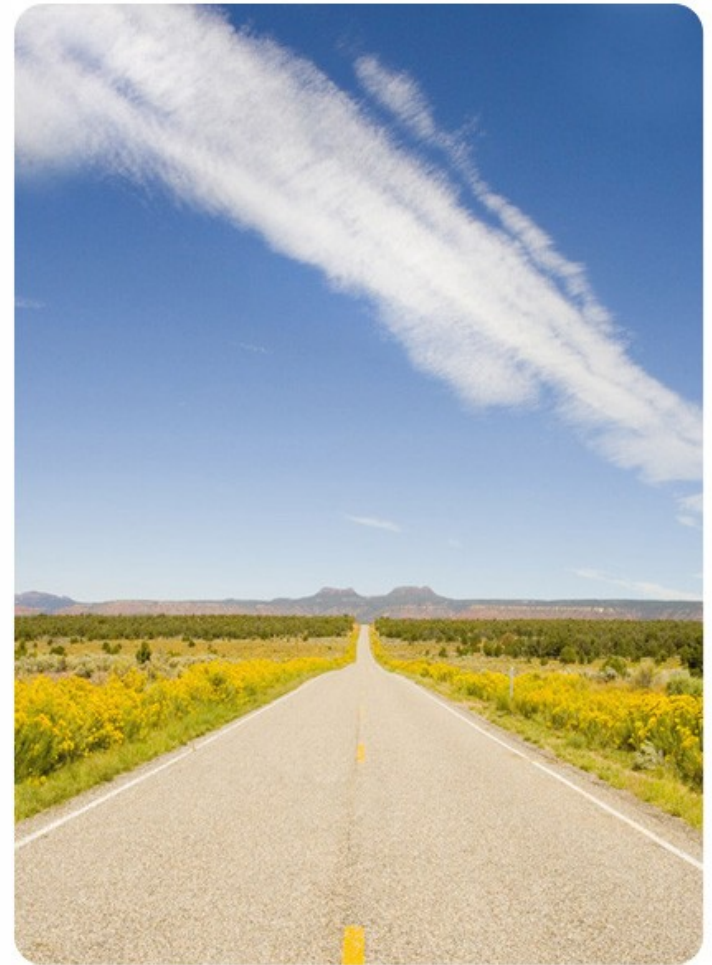ULTRASPARC · intel inside XEON · AMD 64 Opteron · solaris · Microsoft Windows · vmware ·
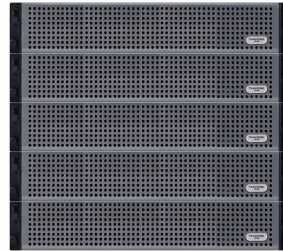
Industry's Most Open Blade Platform

Easy Integration into Existing Data
Centers, Avoid Vendor Lock-In

- Open architecture – Sun UltraSPARC, AMD Opteron and Intel Xeon

- Solaris, Linux and Windows

- Industry-standard, open I/O

- Open, industry-standard management tools
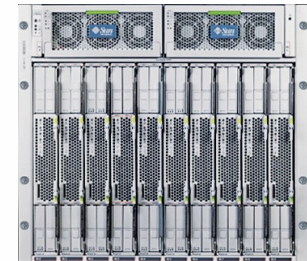
Industry's Most Versatile Enterprise Blades

	Rack Server	Traditional Blade	Sun Blade 6000
Top Performance Sun UltraSPARC, AMD Opteron and Intel Xeon CPUs	✕	✕	●
Large Memory Footprint	✕	✕	●
Extreme I/O Performance and Flexibility	●	✕	●
High Energy Efficiency	✕	●	●
Ease of Integration with Existing Management Infrastructure	●	✕	●
Easy to Upgrade and Service	✕	●	●

More Capacity, More Throughput

More Memory

Memory DIMM/CPU

Value
8
7
6
5
4
3
2
1
0

More I/O

I/O Gbps per Blade

Value
150
125
100
75
50
25
0

More Threads

ULTRASPARC

Threads per CPU

Value
35
30
25
20
15
10
5
0
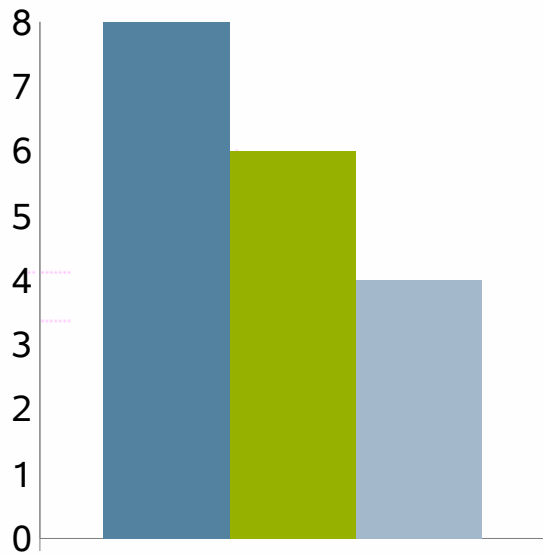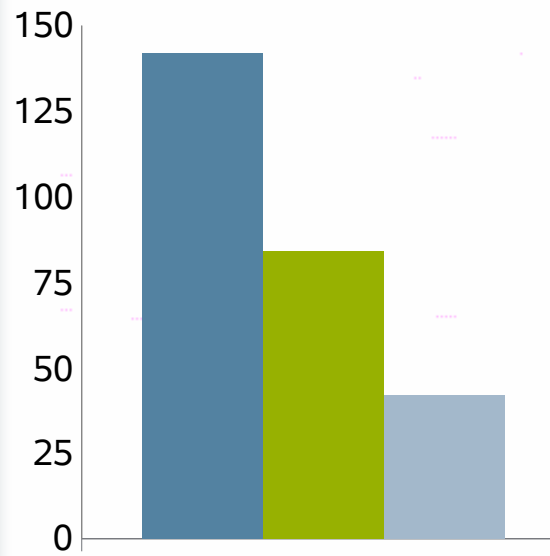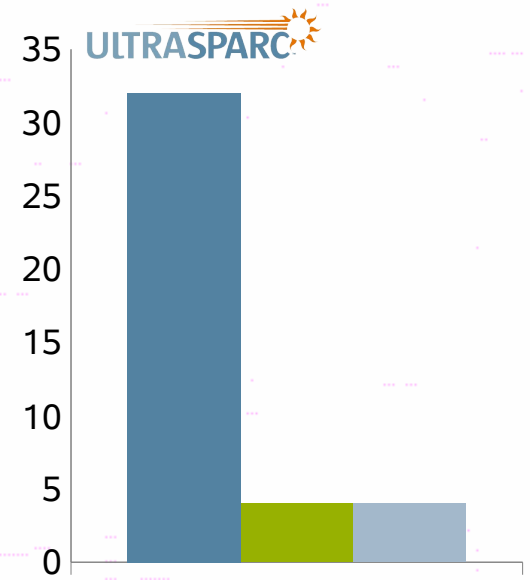
■ **Sun Blade 6000**   ■ **HP BladeSystem c-Clas**   ■ **IBM BladeCenter H**

More, More, More...

Total I/O for blades: IBM – 2 I/O adapters = 1X PCIe x8 @ 32Gbps and 1X PCI-X @ 8Gbps + 2 GbE = 42 Gbps. HP – 3 I/O adapters = 2X PCIe x8 @ 32 Gbps + 1 PCIe x4 @ 16 Gbps
+ 4 GbE = 84 Gbps. Source: HP.com and IBM.com. June 1, 2007.

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Sun Blades Run Any Application ...

Enterprise/ Business Applications

- CRM
- ERP
- BIDW
- Database

VIRTUALIZATION

CONSOLIDATION

eco friendly

HPC

- Mainstream
- Finance
- Manufacturing
- Oil and gas
- Life sciences
- Government

Sun Blade

solaris

Internet Infrastructure

- Web 2.0
- Storage
- Service Providers

Sun microsystems

Sun's Starting Point – Your Datacenter

- Not (usually) an empty room!!
- Has existing management practices
  - > People, tools, procedures
- Systems must to fit into your existing environment, **not the other way around**

What is Sun Transparent Management?

- Sun's unique approach to managing systems in your environment
  - > Managing in the ways you already know
- Principles
  - > **Directly** manage your systems
    - >No intervening, proprietary chassis tools
  - > **Simplify** the management problem
    - >Engineer out complexity
  - > **Open, familiar** management interfaces everywhere
    - >Reusing protocols, information, implementations
    - >Enables reuse; tools, procedures, skills

Transparent Management enables choice

N1 System Manager

- Powerful lifecycle management
  - > Discovery
  - > Provisioning
  - > Patching
  - > Monitoring
  - > Manage 1 to 1,000s of systems
- Manage SPARC & x64 together
  - > Manage blades & rackmount together
- Media & no-cost license bundled with blade chassis

3rd Party Integration

- Fast integration into your choice of management tools from leading vendors including

altiris

bmcsoftware

ca

hp invent

Microsoft

Tivoli software

Sun microsystems

Enabler - Sun ILOM

- Sun's advanced **Service Processor**
  - > Dedicated hardware and software that allows server to be managed independently of operating system state
- **Integrated** into every system at no additional cost
- Enables remote **Lights Out Management** (LOM)
  - > As if using a locally attached keyboard, monitor, mouse
- Exports **industry standard management interfaces**
  - > Easily integrate with customers management tools & processes

ILOM inside!!

Sun ILOM – Open Interfaces ('R' US)
Integration though Industry Standards

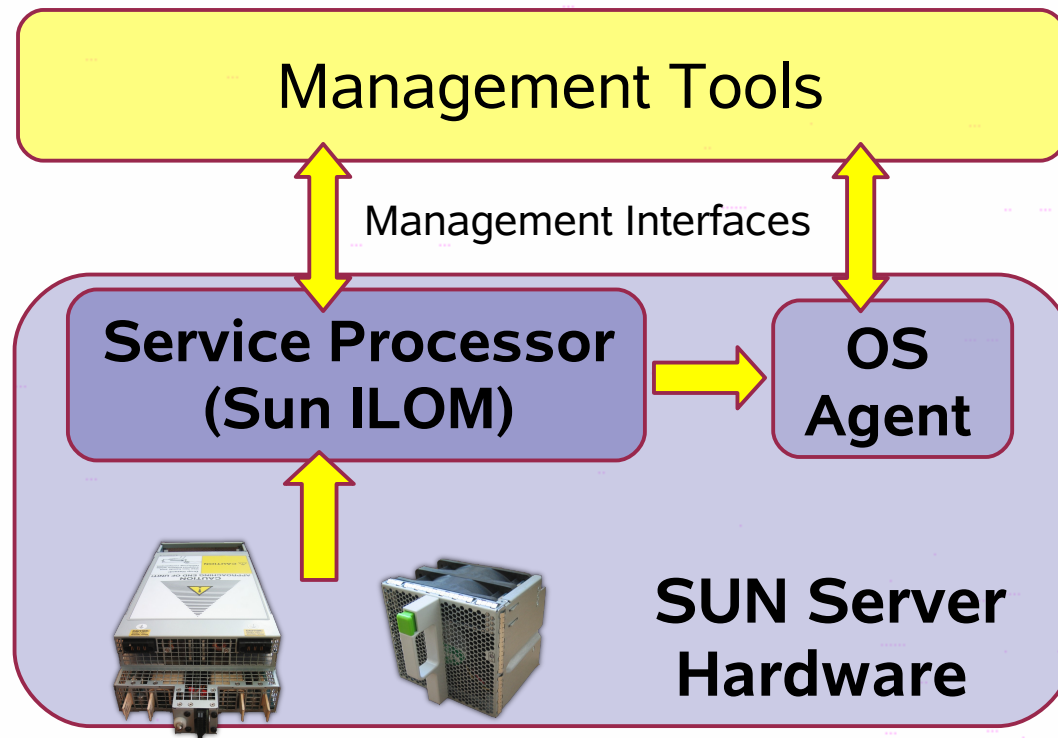- **Administrator focus**
    - > Browser User Interface
    - > DMTF style CLI
    - > Remote KVM (x64 systems)
    - > Remote Media (x64 systems)

- **Tool focus**
    - > IPMI 2.0
    - > SSH 2.0
    - > SNMP V1, V2c, V3
    - > LDAP, RADIUS & MS Active Directory authentication
    - > Email/SMTP alerts & remote syslog

Sun
microsystems

Sun Transparent Management
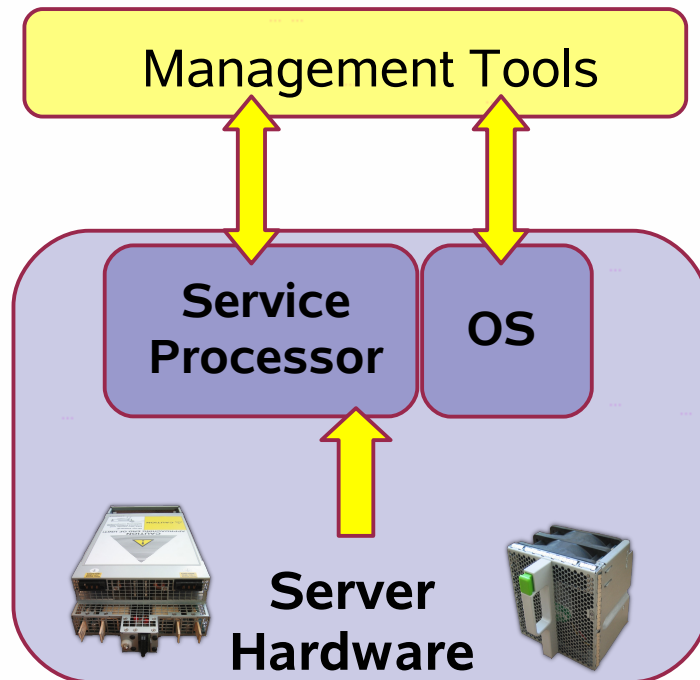## Monitoring a Server today

Transparent Management with Blades

- Every **blade** provides **open** industry standard **interfaces**
  - > Built-in **service processor** e.g. **Sun ILOM**
  - > Standard **OS** resident management agents
- Every **blade** supplies **all** needed management information
  - > From the blade (memory, cpu, temperature, voltages)
  - > From shared chassis hardware (fans, LEDs, PSU)
- **Optional** SB6000 Chassis Monitoring Module (CMM)
  - > Overall status of the chassis components (fans, LED's, PSU)
  - > Presence of server modules and Network Express Modules
  - > Remove - all blades continue to provide service

Sun microsystems

Sun Transparent Management
Sun Blade Modular Server – Monitored like a server !!

Management Tools

Management Tools

Service Processor

OS

Server Hardware

Service Processor

OS

Blade Hardware

CMM

Shared Components

Sun Server

Sun Blade Server

Sun microsystems
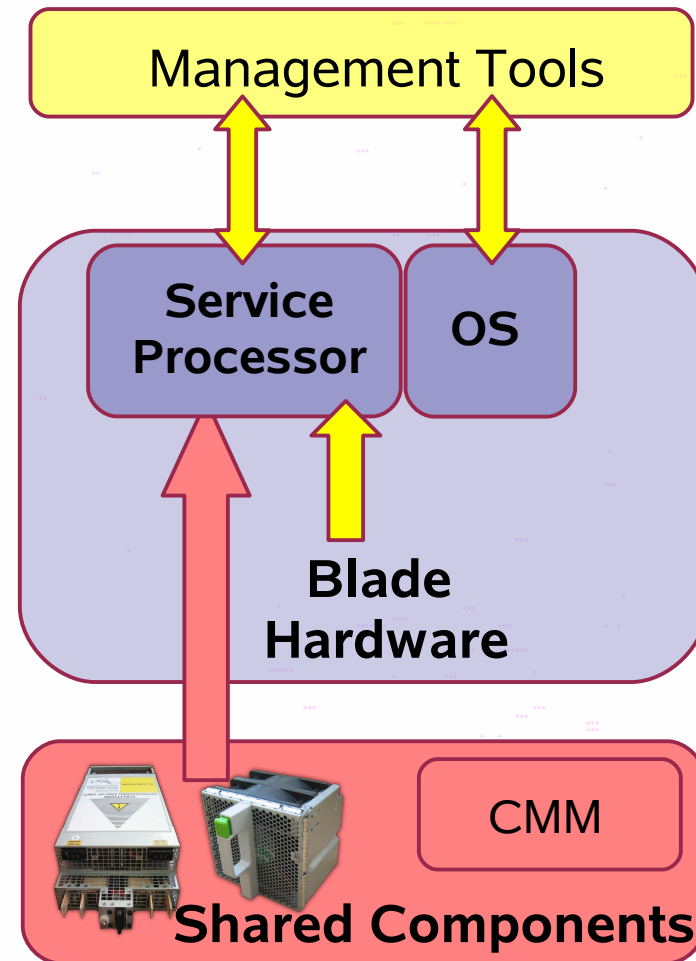
X6220 Sun ILOM - Low Level Data
Transparently sourced from blade or chassis

Temperature (Blade)

PSU Voltage Status (Chassis)

Disk Status (Blade)

FAN Speeds (Chassis)

Processor (Blade)

```
bash-3.00$ ipmitool -H 10.6.163.73 sdr

mb.t_amb0          | 34 degrees C
mb.t_amb1          | 34 degrees C
mb.t_amb2          | 34 degrees C
...
ps0.prsnt          | 0x02
ps0.vinok0         | 0x01
ps0.vinok1         | 0x01
...
hdd0.state         | 0x00
hdd1.state         | 0x00
...
fm0.f0.speed       | 5200 RPM
fm0.f1.speed       | 5300 RPM
...
p0.prsnt           | 0x02
p1.prsnt           | 0x02
```
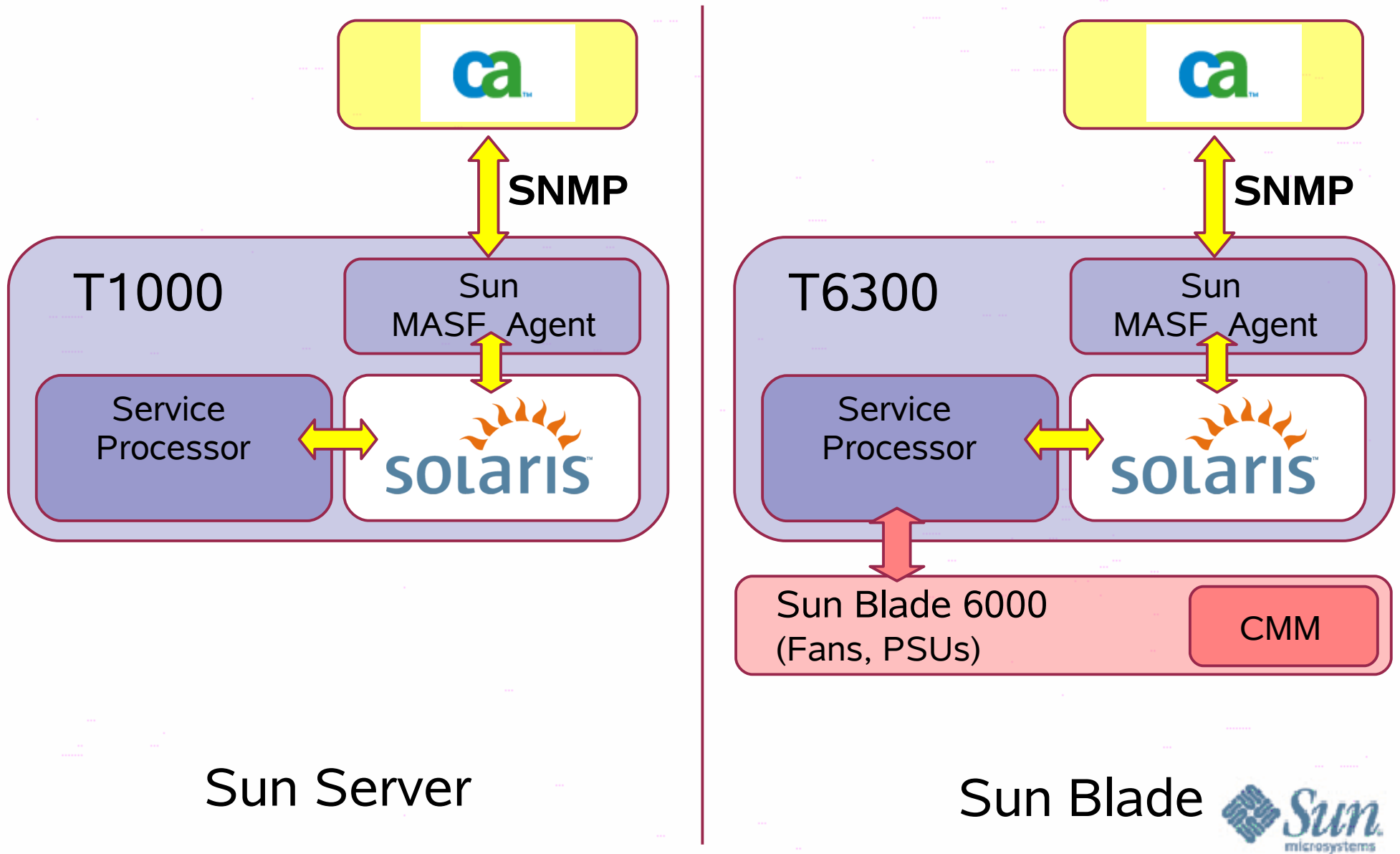
CA Unicenter NSM Integration Example
Rackmount or blade - Same Integration

SNMP

SNMP

T1000

Sun MASF Agent

Service Processor

solaris

T6300

Sun MASF Agent

Service Processor

solaris

Sun Blade 6000 (Fans, PSUs)
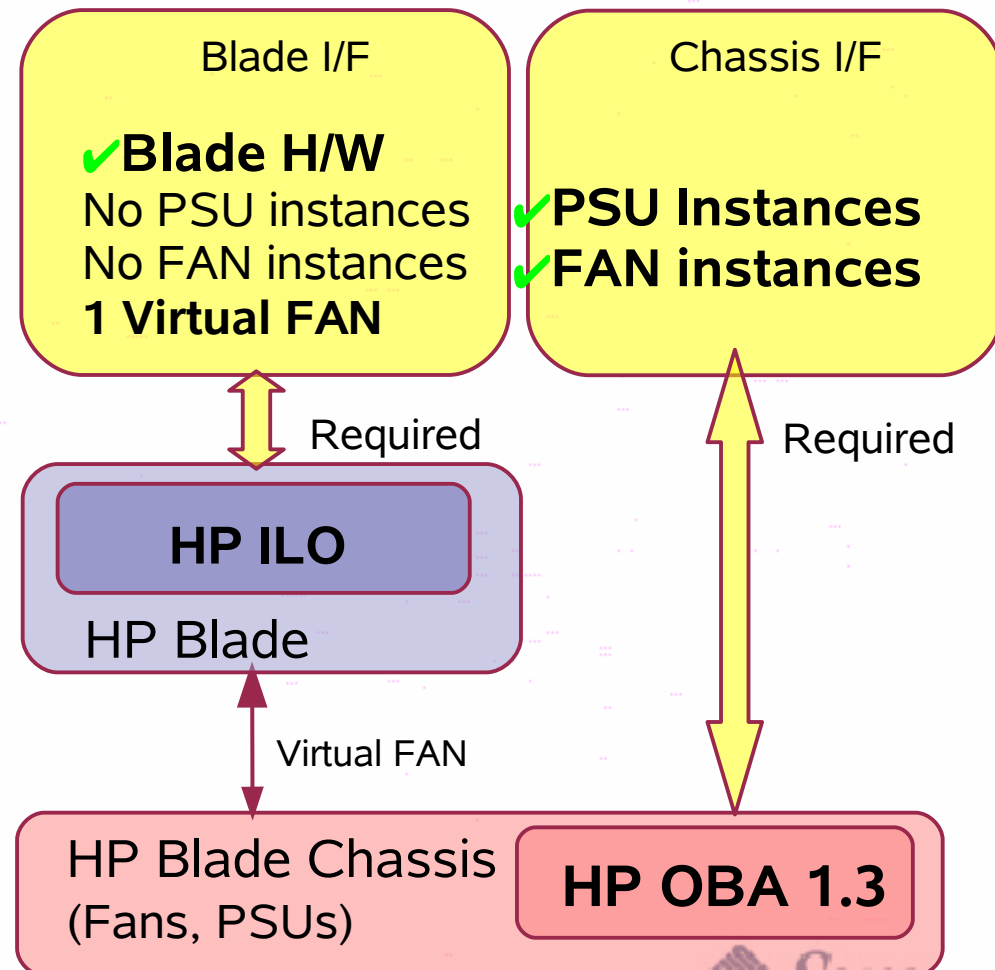
CMM

Sun Server

Sun Blade

Sun microsystems

Server Monitoring Comparison

Sun Blade 6000
Only Blade Interface Needed
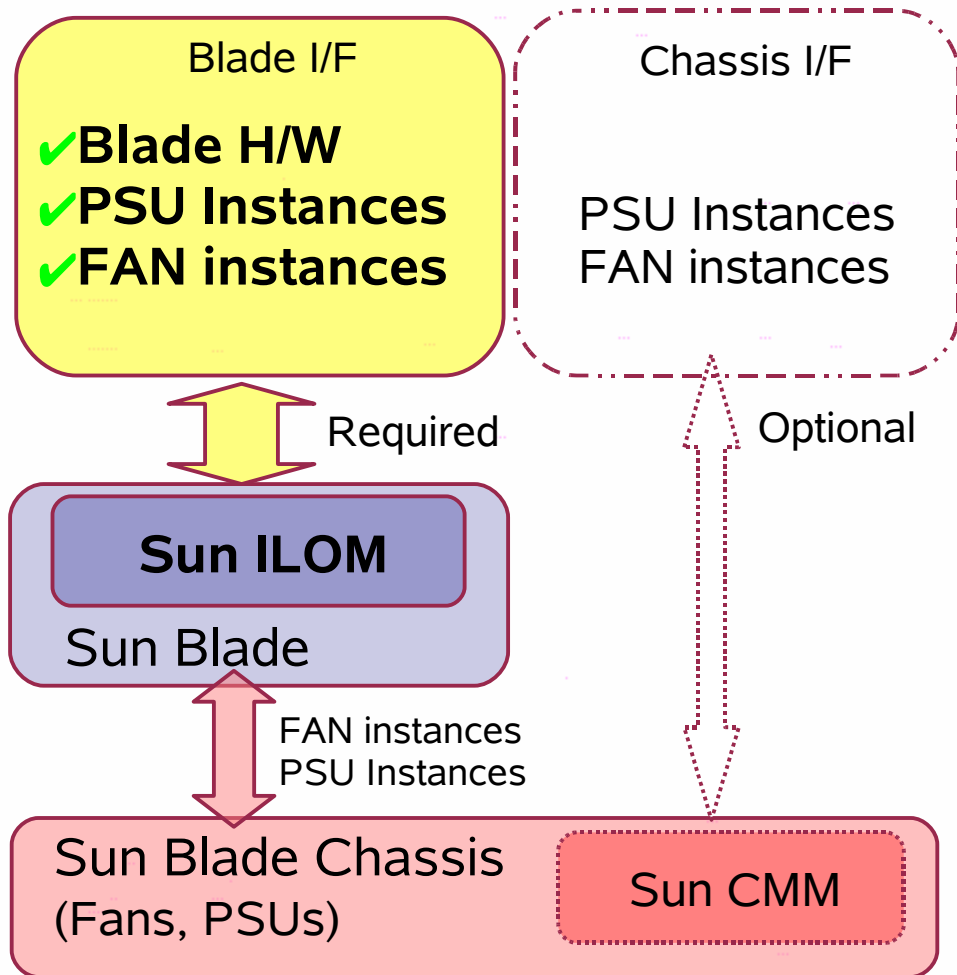
HP C-Class
Blade + Chassis Interfaces Needed

Sun Blade 6000

Blade I/F

✔**Blade H/W**
✔**PSU Instances**
✔**FAN instances**

Chassis I/F

PSU Instances
FAN instances

↕ Required

Sun ILOM

Sun Blade

↕ FAN instances
PSU Instances

↕ Optional

Sun Blade Chassis
(Fans, PSUs)

Sun CMM

HP C-Class

Blade I/F

✔**Blade H/W**
No PSU instances
No FAN instances
1 Virtual FAN

Chassis I/F

✔**PSU Instances**
✔**FAN instances**

↕ Required

HP ILO

HP Blade

↕ Virtual FAN

↕ Required

HP Blade Chassis
(Fans, PSUs)

HP OBA 1.3

Transparent Management Advantages

- Systems are managed the way **you choose**

- **Common** management approach across systems
    - > No proprietary tools or interfaces required
    - > No new management processes or procedures
    - > No need to retrain staff

- **Integration** into your existing management environment
    - > Sun or Non-Sun
    - > Enabled by industry standards interfaces
    - > No vendor lock-in

Sun microsystems

Independent Industry-standard I/O

- Based on open, industry-standard PCI-Express technology

- Forward-compatible with PCIe 2.0 and IOV

- Mix I/O types in chassis

- Hot-pluggable, easily accessible

- High-bandwidth, accommodate multiple interconnect fabrics

Passive midplane

x8 PCIe
x8 PCIe

x8 PCIe
x8 PCIe
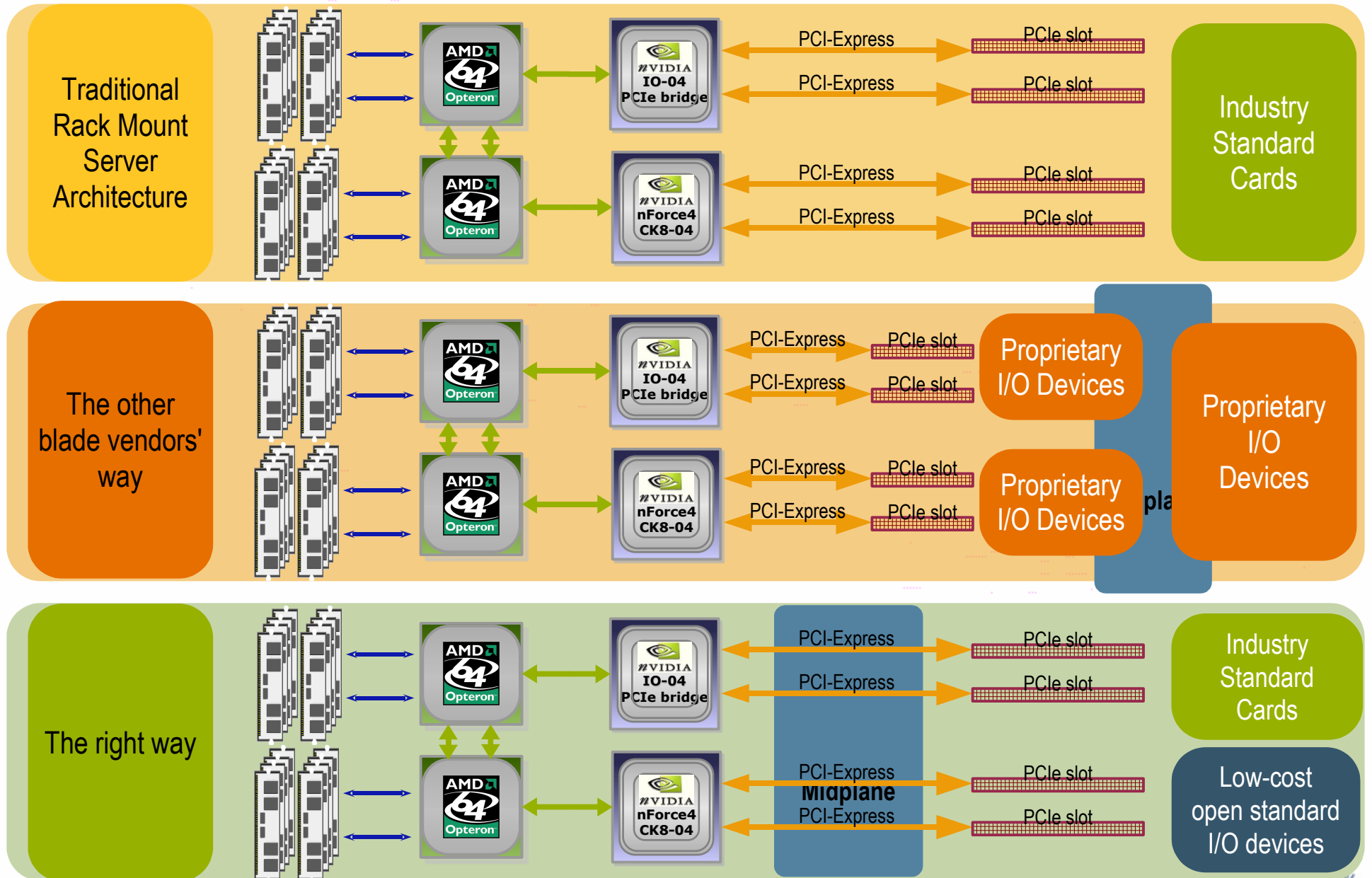
Sun Blade Modular System chassis
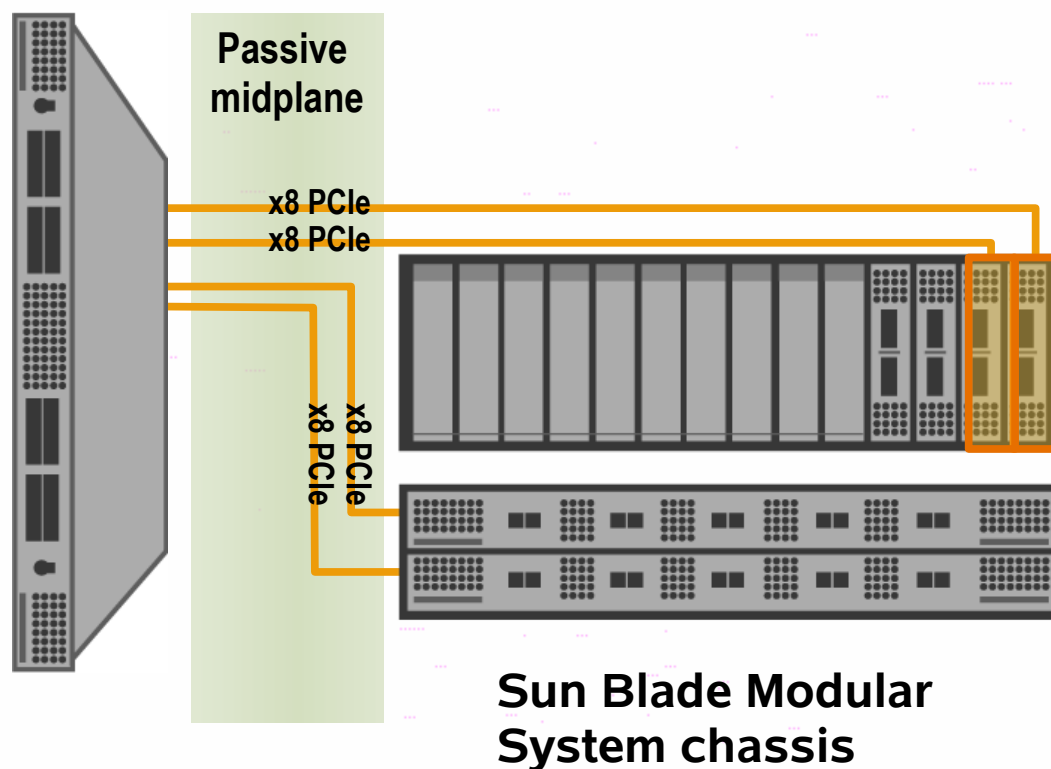
Industry Standard I/O

- PCI-SIG (PCI Special Interest Group)
  - > Formed in 1992, PCI-SIG is an industry consortium that develops and maintains all PCI technologies, such as PCI, PCI-X and PCI-Express.
  - > Member companies include AMD, Dell HP, IBM and Intel
- PCI is the dominant standard for rackmount servers due to its cost-effectiveness, backward compatibility, scalability and innovative design.

Blades: The architectural difference

Traditional Rack Mount Server Architecture — AMD64 Opteron processors connected to nVIDIA IO-04 PCIe bridge and nForce4 CK8-04 via PCI-Express to PCIe slots, leading to Industry Standard Cards.

The other blade vendors' way — AMD64 Opteron processors connected to nVIDIA IO-04 PCIe bridge and nForce4 CK8-04 via PCI-Express to PCIe slots, leading to Proprietary I/O Devices across the midplane to Proprietary I/O Devices.

The right way — AMD64 Opteron processors connected to nVIDIA IO-04 PCIe bridge and nForce4 CK8-04 via PCI-Express through the Midplane to PCIe slots, leading to Industry Standard Cards and Low-cost open standard I/O devices.

I/O Done Right
Simple by design

- Simple versus complex
- Improved serviceability
- Improved I/O latency and performance
- Enhanced flexibility

Passive midplane

x8 PCIe
x8 PCIe

x8 PCIe
x8 PCIe

**Sun Blade Modular System chassis**
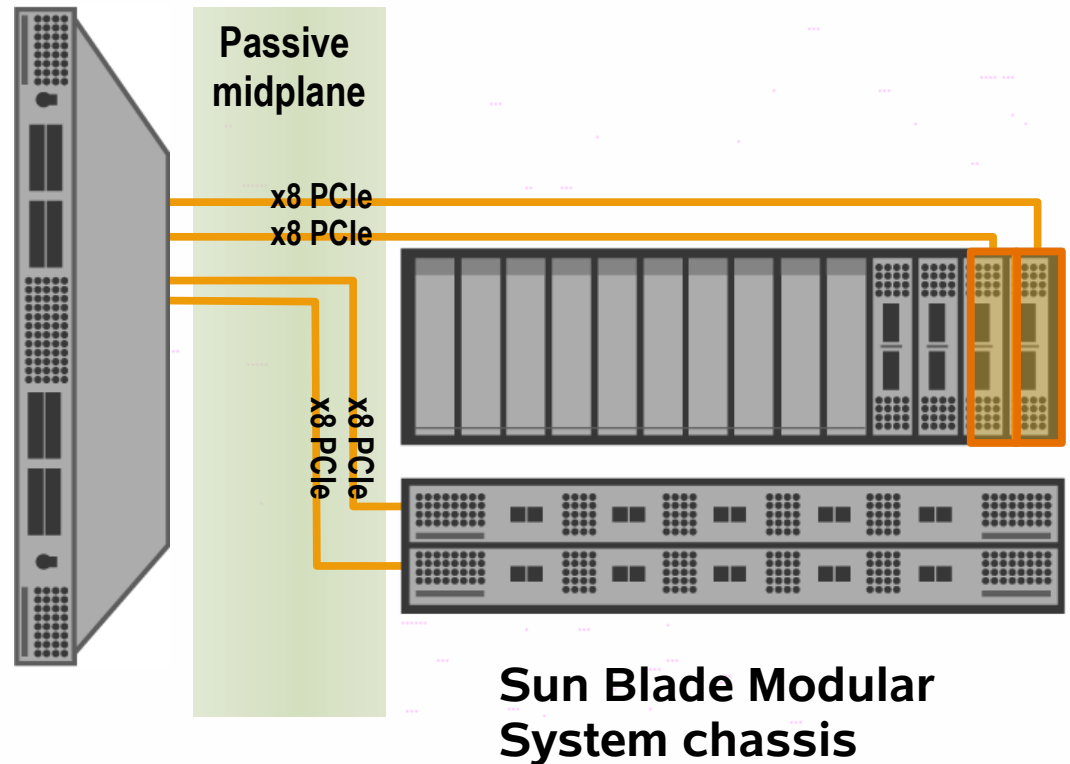
Industry Standard I/O
PCI-Express ExpressModule and Network Express Module

- Sun's products are based on industry standards
  - > PCI-Express ExpressModule
    - > Industry standard PCI-SIG Form Factor
    - > Simple packaging of PCIe cards
  - > Network Express Module
    - > Using industry standard technology
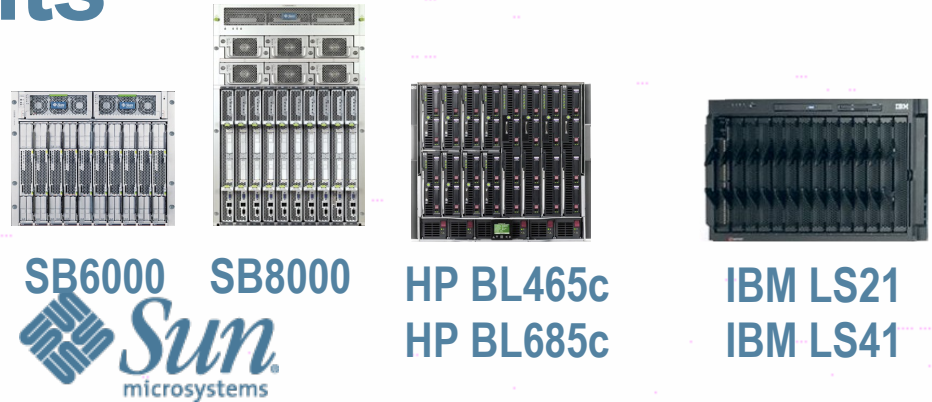   - > Follow PCI-SIG IOV standard in next generation

PCI-Express ExpressModule
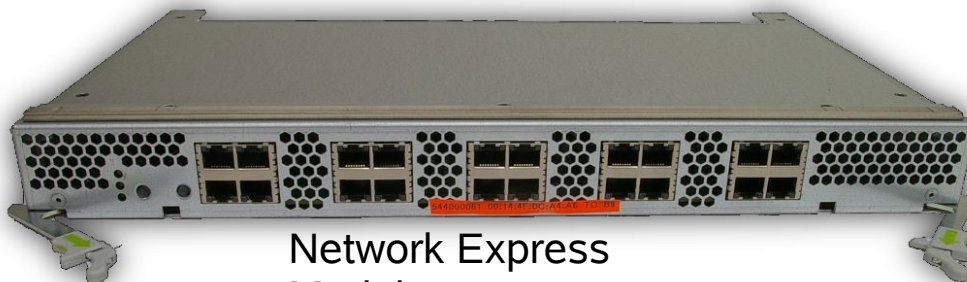
Network Express Module

Sun Blade I/O Benefits

PCIe NonPproprietary I/O
Most I/O capacity

	SB6000 SB8000	HP BL465c HP BL685c	IBM LS21 IBM LS41
Maximum theoretical I/O throughput	6.4-9.6 Tbps	5.12 Tbps	5.6 Tbps
Maximum I/O throughput with today's technology	1.28-1.92 Tbps	0.672 Tbps	0.56 Tbps
Maximum SerDes lanes per chassis	320-480	128-256	280
Maximum SerDes lanes per blade	32-48	Eight-16	20
Maximum I/O adapters per blade	four-six	Three	Two
Hot-plug I/O option adapters	four-six	✗	✗
Unique I/O per blade	✓	✗	✗
Industry-standard I/O	✓	✗	✗

Solaris Ready for PCIe ExpressModules

- Industry Standard I/O Ecosystem

- Foster Momentum of Industry Standard

- Certification, Testing, Open Labs for Development

- Availability and Factory Integration for 3rd Party Solaris Ready Components

- Solaris Ready Logo Program

For more informationhttp://www.sun.com/solarisready/

Sun Blade I/O Value Proposition

- Get To Production Faster
  - > Modular I/O design
  - > Independent of server modules
- Reduce Operating Costs
  - > Reduced downtime due to modularity and hot-plug capability
  - > No penalty for buying complete I/O infrastructure – pay as you go.
- Increase Solution Lifespan
  - > Leading I/O capacity allows data center expansion and upgrades overtime
  - > Open ecosystem, industry-standard PCI-SIG I/O provides flexibility in I/O type and vendor choice

# Sun Blade Power and Cooling

Design Features

- All cooling components are hot-swappable and N+1 redundant
  - > Easily accessible from either front or rear of the chassis
  - > No fans on blades
- Sun 6000 chassis ships with 2x 90% efficient 5,600 W DC Output PSUs, N+N grid redundant, 200-240 V AC Input

Power

- The chassis power depends upon type/configuration of HW (blades and I/O), SW (OS/application), and environmental conditions
- Similar configuration will result in similar total power – from Sun or any other vendor

Sun Blade Cooling:
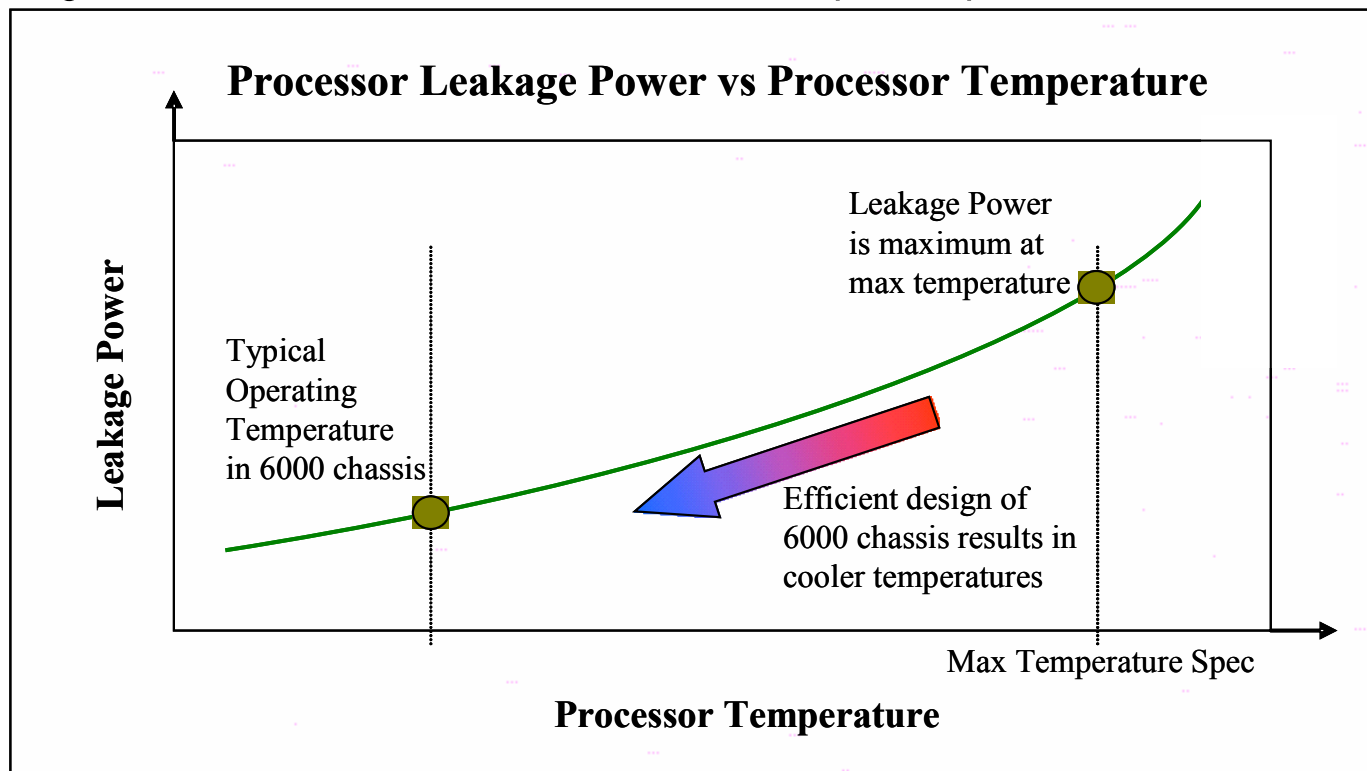## *Simple & Robust Design*

- Highly efficient straight airflow design: no airflow bends, turns, mixing, recirculation

- Lower Airflow Cools Server Modules
  - > Supports the highest performing CPUs and memory density

- Upper Airflow Cools PSUs and I/O
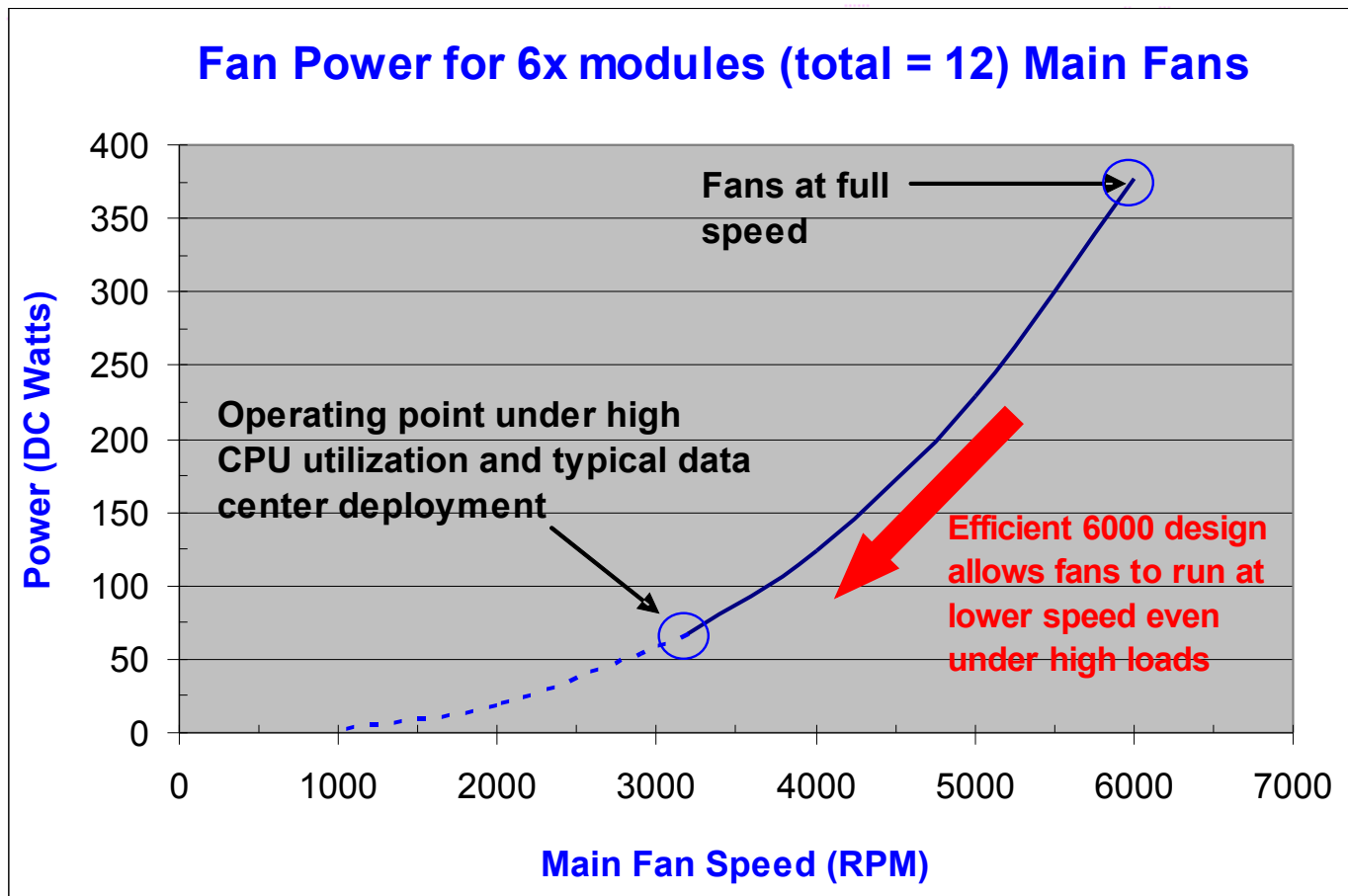 - > Upper airflow stream is effectively sealed from lower airflow stream
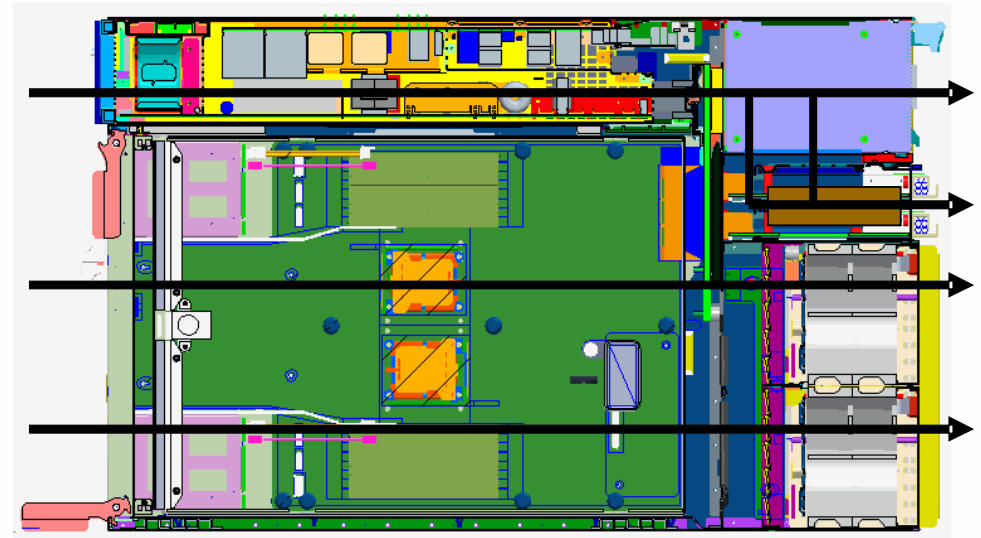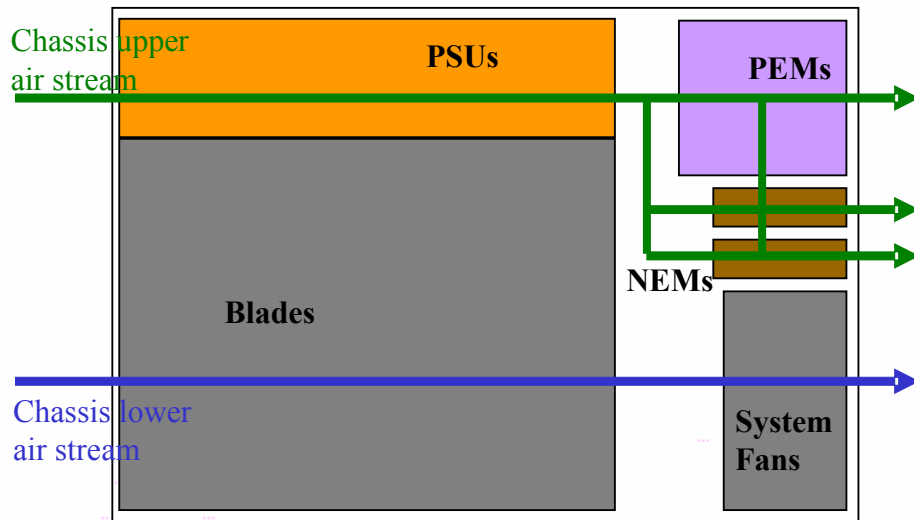
Sun Blade:
Lower Power from Better Design

- Server blades support power minimizing features like PowerNow (AMD) and Speedstep (Intel)

- Lowers component temperatures – minimizes "leakage" power and increases reliability
  - > No design compromises – maximizes performance to full environmental conditions even for the highest Wattage parts
  - > Intel CPUs are designed to "Thermal Profile A" - minimizes CPU power and CPU throttling

- Efficient design of 6000 chassis results in lower total power per CPU socket

Processor Leakage Power vs Processor Temperature

Leakage Power is maximum at max temperature

Typical Operating Temperature in 6000 chassis

Efficient design of 6000 chassis results in cooler temperatures

Leakage Power

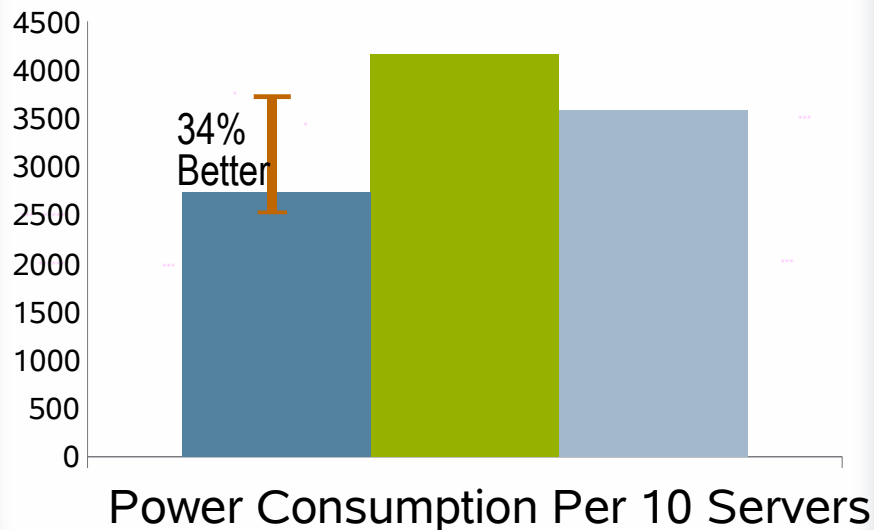Max Temperature Spec

Processor Temperature

Sun Blade: Power and Cooling: Main Fans

- The main fans are temperature-based speed controlled - minimizes power

- In a fan-failure, rest of the fans do not go to max speed - minimizes power

- Designed for no "fan-rpm-hunting" even under max stress for typical data center deployments – better reliability

Fan Power for 6x modules (total = 12) Main Fans

Fans at full speed

Operating point under high CPU utilization and typical data center deployment

Efficient 6000 design allows fans to run at lower speed even under high loads

Power (DC Watts): 0, 50, 100, 150, 200, 250, 300, 350, 400

Main Fan Speed (RPM): 0, 1000, 2000, 3000, 4000, 5000, 6000, 7000

Sun microsystems

Sun Blade Power: Comparison to 1U Rackmount Servers (AMD Processors)

Power Consumption Using 95W CPU

34% Better

Power Consumption Per 10 Servers

Power Consumption Using 120W CPU

21% Better

Not Available On HP

Power Consumption Per 10 Servers
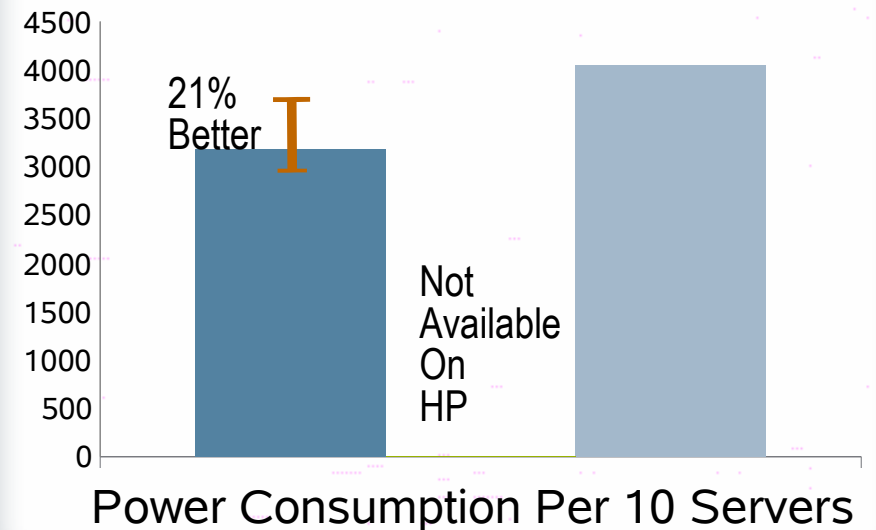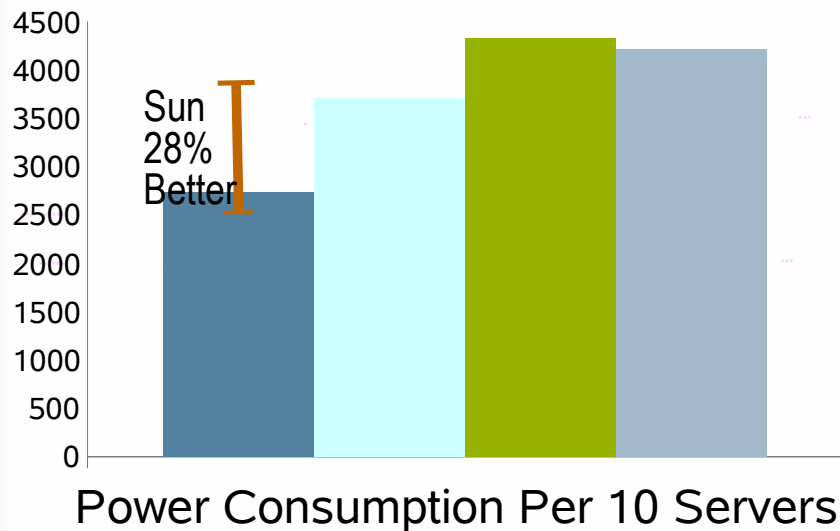
Sun Blade X6220 **HP BL365** **IBM X3455**

Sun Blade Up To 34% More Efficient

All systems have 2S, 4x 2 GB DIMMs/socket, no HDDs (except noted), 2 PSUs (except IBM with 1 PSU only), 0 PCI, 208 V AC Input.
All data is obtained from vendor's respective online Power Calculators at full load on 6/08/2007
Sun 6000 data is measured/estimated

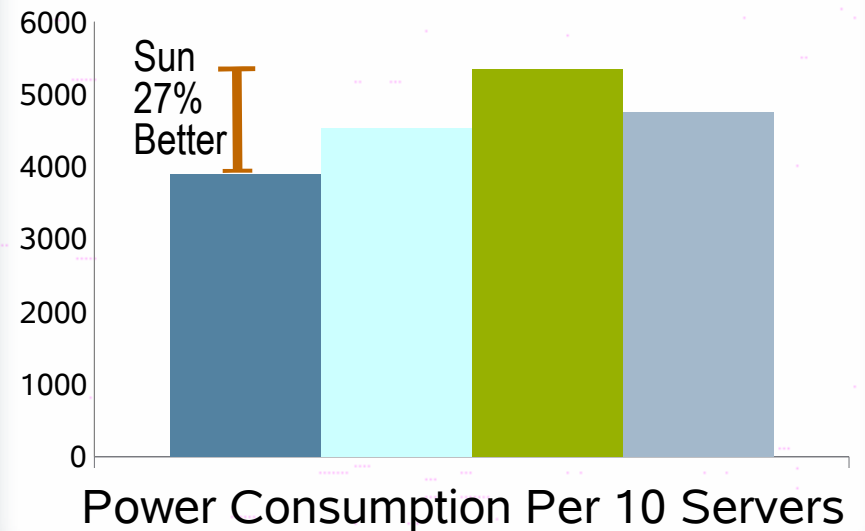# Sun Blade Power: Comparison to 1U Rackmount Servers (Intel Processors)

Power Consumption Using 80W CPU

Sun 28% Better

4500
4000
3500
3000
2500
2000
1500
1000
500
0

Power Consumption Per 10 Servers

Power Consumption Using 120W CPU

Sun 27% Better

6000
5000
4000
3000
2000
1000
0

Power Consumption Per 10 Servers

Sun Blade X6250   **DELL PE1950**   **HP BL360 G5**   **IBM X3550**

Sun Blade Up To 28% More Efficient

All systems have 2S, 4x 2 GB DIMMs/socket, no HDDs (except the 80W Dell server with 1 HDD), 2 PSUs (except IBM with 1 PSU only), 0 PCI, 208 V AC Input.
All data is obtained from vendor's respective online Power Calculators at full load on 6/08/2007
Sun 6000 data is measured/estimated

Sun microsystems

Sun Blade Systems: Open Versatility