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Blades—An Emerging System Design Model for Economic Delivery of High Performance Computing

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Agenda

Agenda

Introduction / Definitions

Origins of the Blade Server

Limitations of First Generation Designs

Second Generation Design

Future Directions

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Definitions

A Blade is …

An inclusive computing system that includes processor, memory,network connections and associated electronics on a single motherboard.

The server blade typically is associated with an enclosure system that allows multiple blades to be housed in a standard server 'sub-rack' or enclosure that share resources such as power supplies and cooling fans.

Blades …

- are easily accessible
- offer increased computing density
- have modular architecture that ensures flexibility and scalability.

Source: Provisioning the Internet Infrastructure: Server Blades and Dynamic Workload Management IDC Document # 24155

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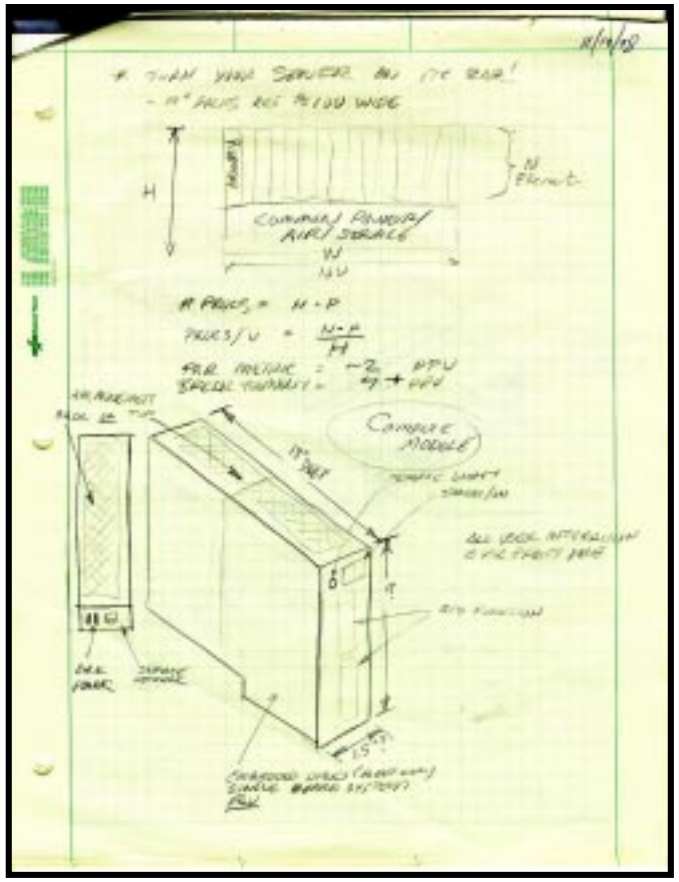
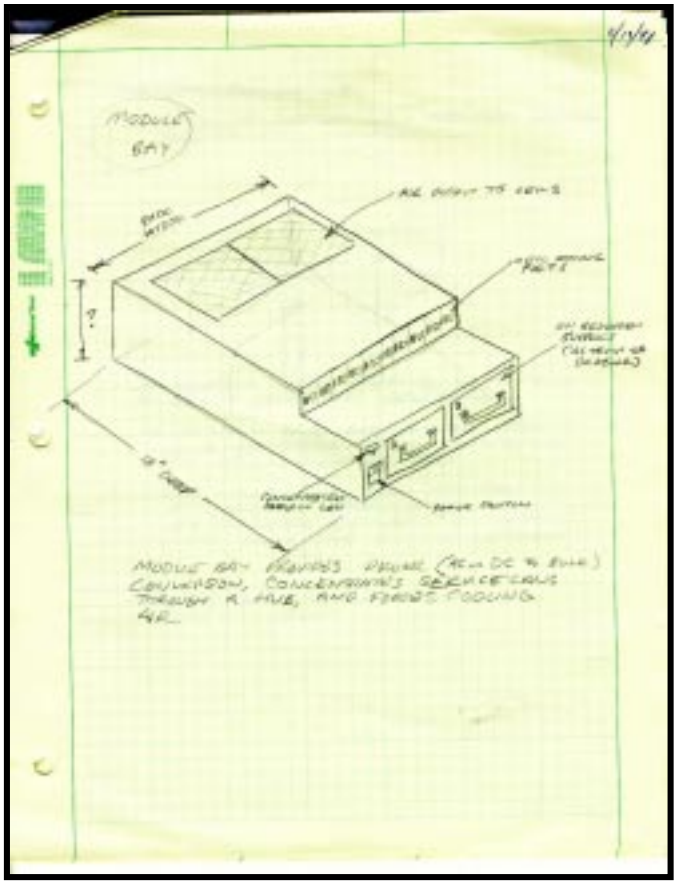
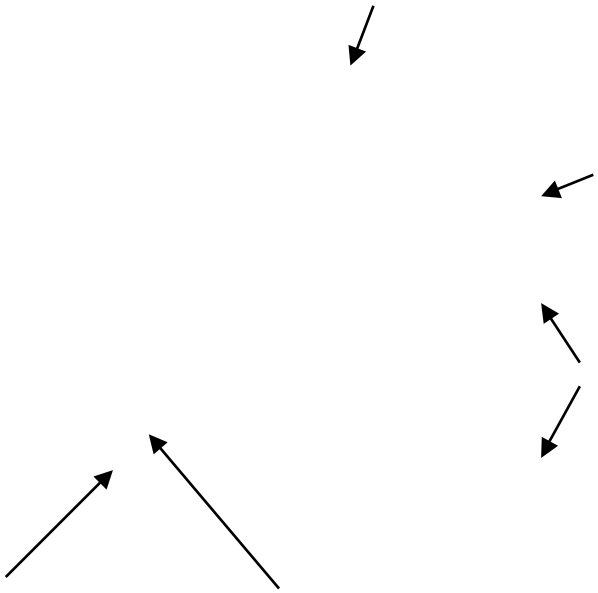
Origins

Initial Blade Sketches







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Dominant xSP Concerns – Circa 1999

Origins

Time-to-Deployment - Competition is cut-throat. How quickly can a new service be deployed in the physical plant?

System Density - The data center incurs costs in $/area and recovers costs in systems/area. How many systems can be burdened on each square foot of data center?

Moving Customers up the price list - Currently shared hosting only sells at the introductory service level. Moving customers up the price list requires dedicated hardware

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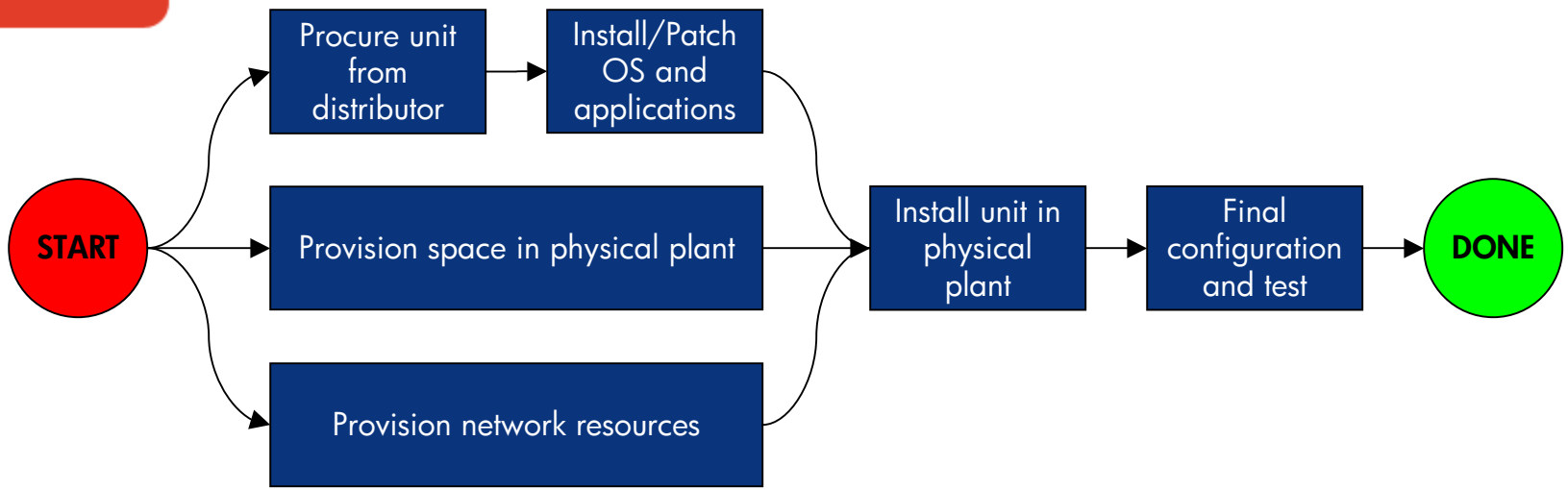
Origins

ASP Deployment Timeline – Circa 1999



Time to Deploy : 5 Days

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Origins

Dominant xSP Concerns – Circa 1999

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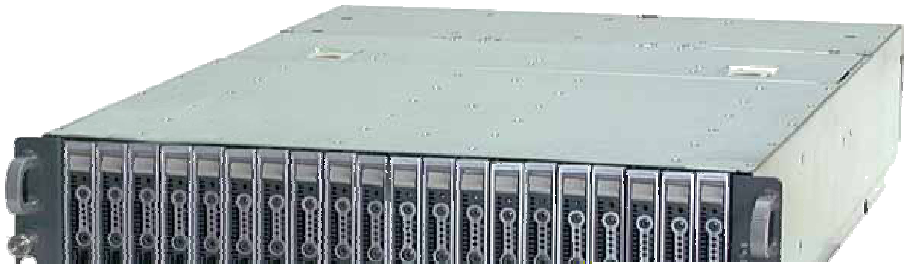
First Generation Blade



Each blade contains:

- 700MHz PIII 512K LV
- 512MB/1GB PC133 SDRAM
- 30GB Mobile IDE Drive
- Dual 10/100 NICs
- Integrated Management

Each 3U chassis contains:

- 20 Server blades
- N+1 Power
- Dual Ethernet Switches

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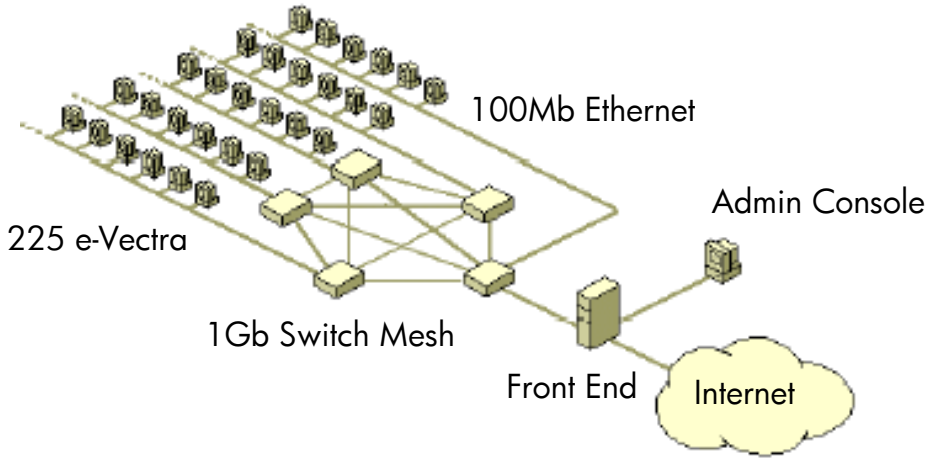
Mainstream Technology Clusters

First Generation



Cluster Topology

Cluster Racking

Mainstream Technology Cluster achieved rank of 385th on TOP500 as of 06/21/2001

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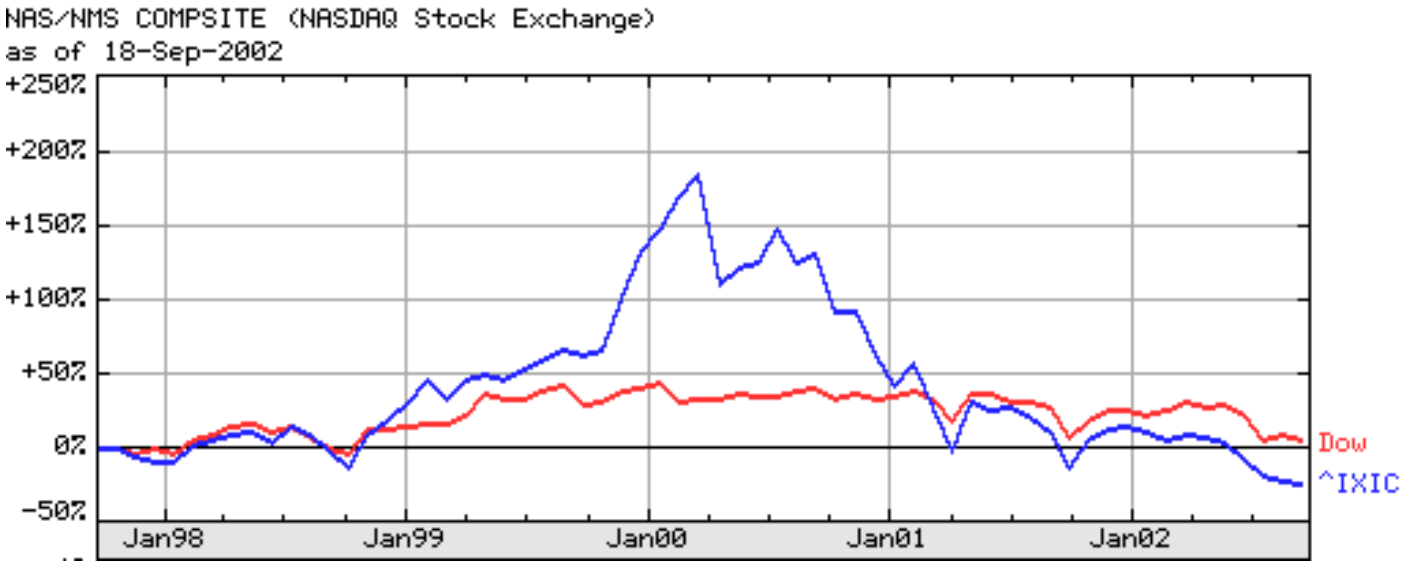
Limitations

What New Economy?



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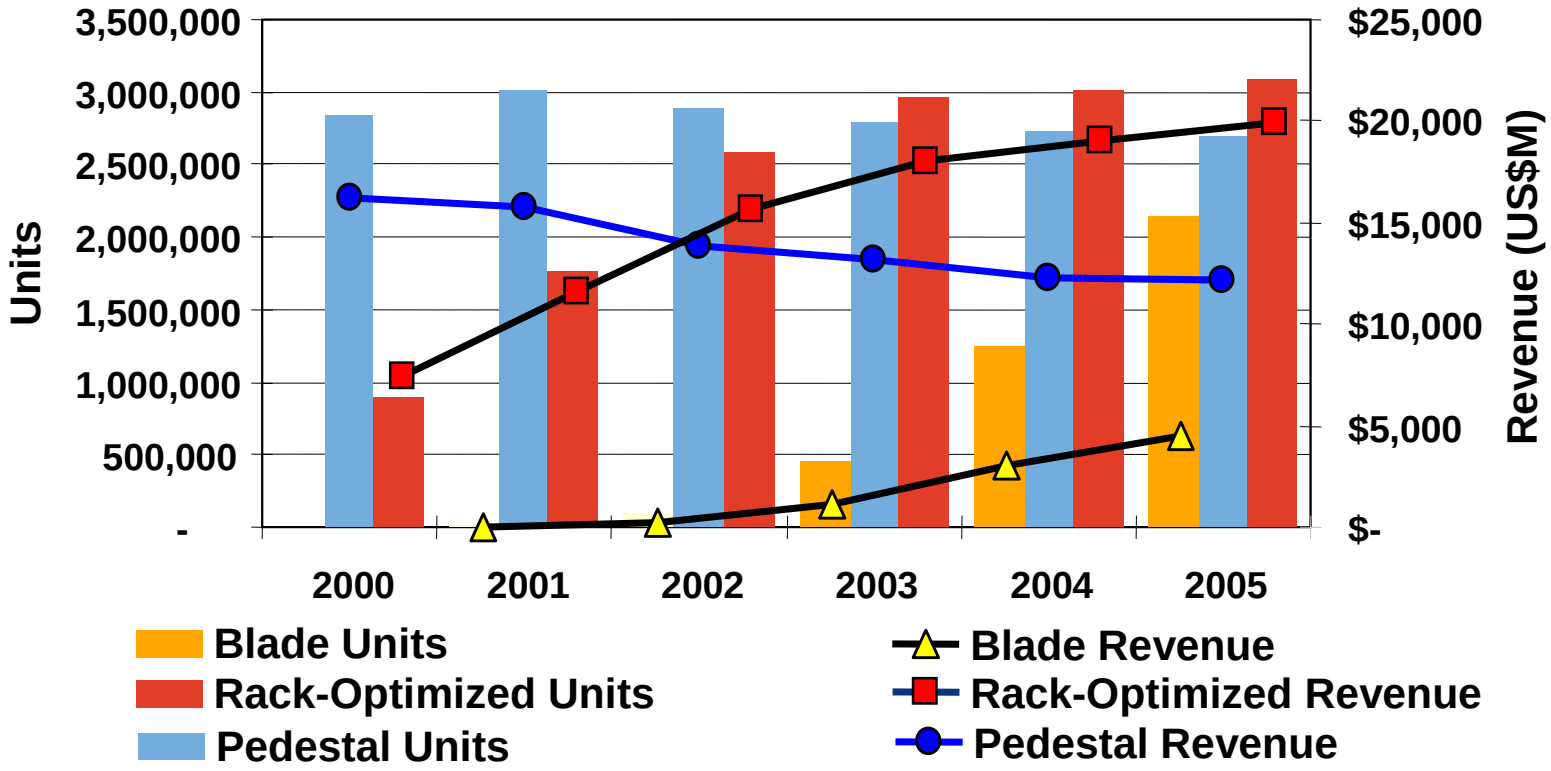
Bladed Architectures: What's the Opportunity?

Second Generation



By 2005, IDC believes the blade form factor will capture approximately 27% of entry server unit sales and 12% of entry server revenue.

Source: IDC August 2001

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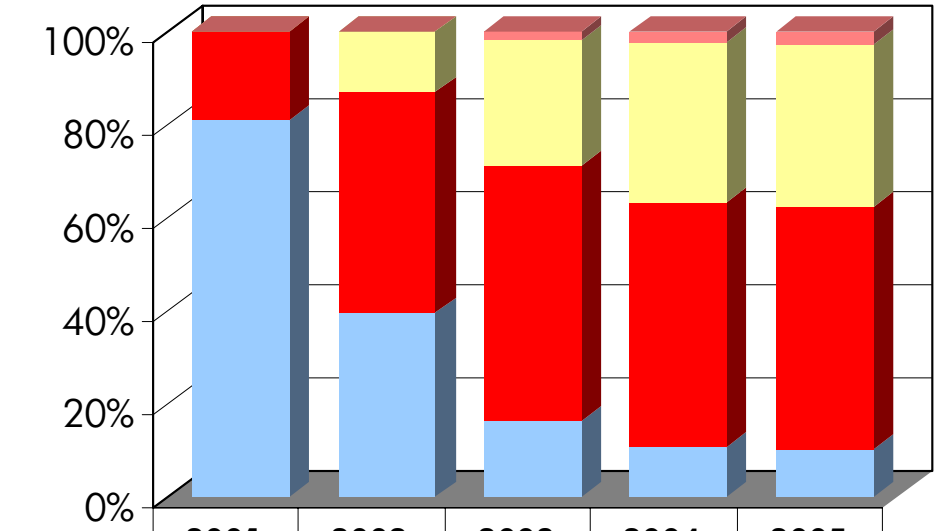
Bladed Architectures: Where Are the Sweet Spots?

Second Generation



	2001	2002	2003	2004	2005
8-way	0%	0%	2%	2%	3%
4-way	0%	13%	27%	35%	35%
2-way	19%	47%	55%	52%	52%
1-way	81%	39%	16%	11%	10%

2005
$4.5 billion

Share of bladed server revenue quickly migrates to the 2 & 4 processor "flavors" as volume ramps and commoditization occurs

Source: IDC August 2001

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Second Generation Blade

- Processors: Mobile/LV/ULV → Mainline server Processors
- SMP: Single → Dual (or more) Processors
- Memory sizes: Sub-1GB per processors → Greater than 1GB per processor
- Ethernet NICs: Dual 10/100 → Multiple 10/100/1000
- Manageability: rack-optimized server leveraged → blade-aware
- Local Storage: low performance mobile → high performance, high reliability server storage
- Remote Storage: Low performance NAS → high performance NAS or SAN
- Chassis form factor: 3U → 6U
- Blades form factor increase in depth, width, and height

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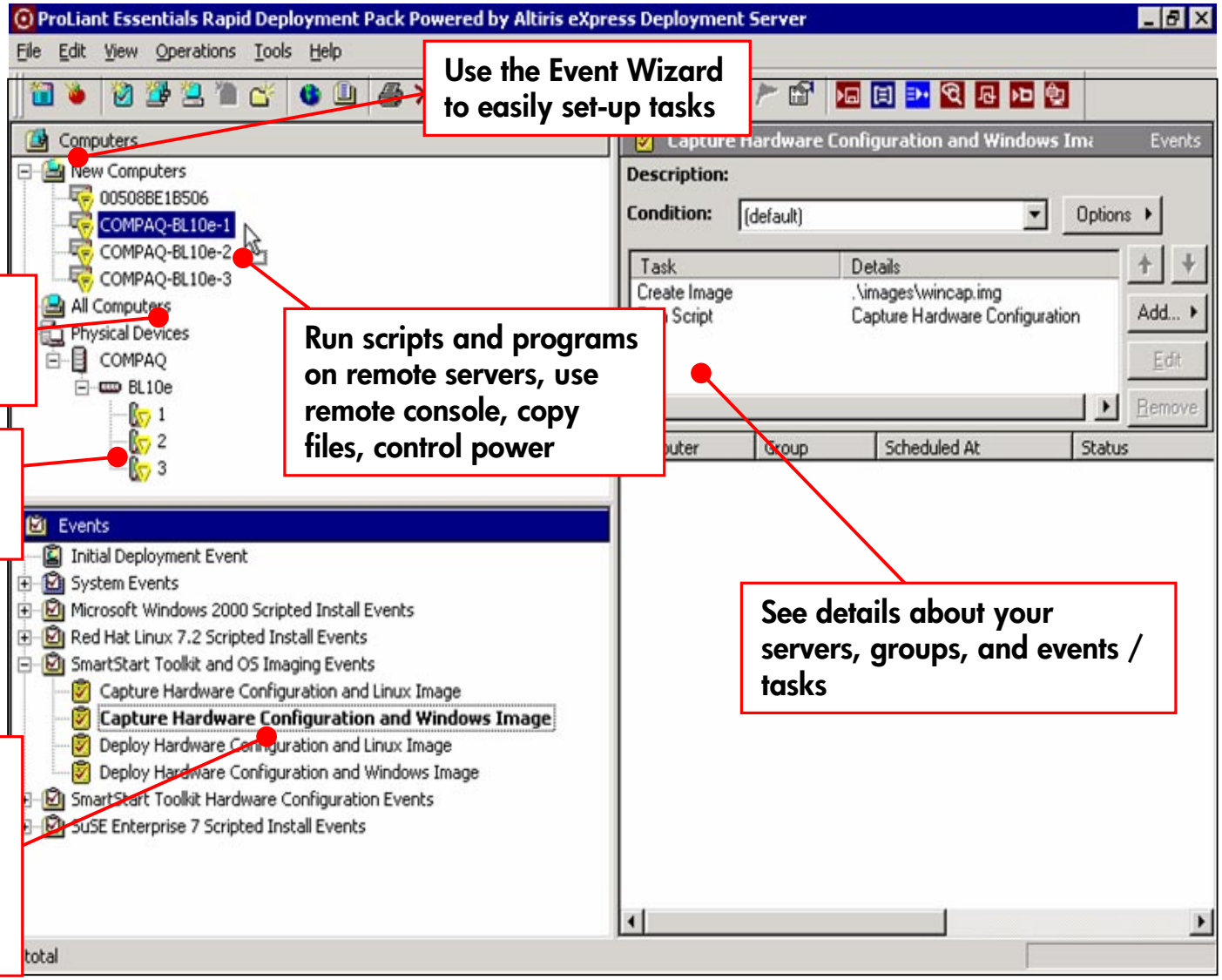
Second Generation

Rapid Deployment Tools



Flexible organization and grouping of all servers

View physical location of blade servers

Run an event by simply dragging it to a server or group (or drag servers or groups to the event)

See details about your servers, groups, and events / tasks

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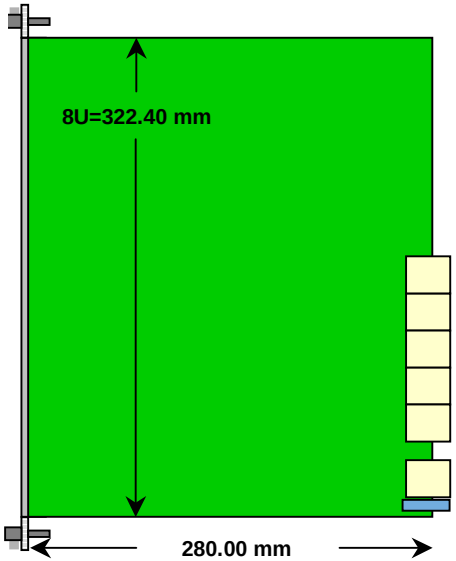
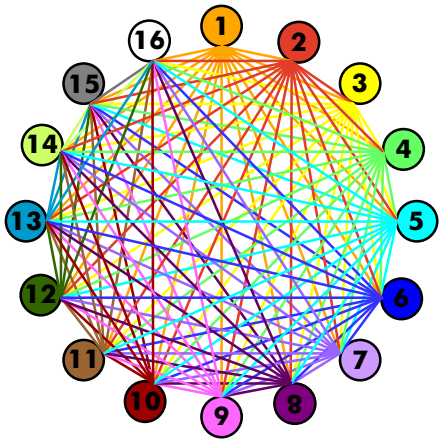
Futures

Advanced Telecom Computing Architecture





Each blade contains:

- A 200W Thermal Envelope (enables Dual slot / DP IPF or QP IA-32)
- Fully connected Mesh Data Transport Protocol Agnostic Fabric. Each Link can support, for example:
  - 1 4X Infiniband link/4 1X Infiniband links
  - 4 1000BX links
  - 1 10GbE XAUI link
  - 4 2Gpbs FC links
- Dedicated Management Dual Star 10/100/1000 Ethernet
- 10 pair Adjacent Slot Update bus
- Redundant blade-centric hardware management bus
- N+1 Redundant Power
- Cost focused module mechanical design

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Futures

ATCA Target Serial I/O Standard Comparisons

Serial Standard	Data rate per Channel (Gbps)	Baud rate per Channel (Gbps)	Ref Clock (MHz)	Pairs/Channel Channel Configs
Infiniband	2.0	2.5	125	2 1X,2X,4X,12X
1Gb Ethernet 1000BASE-CX	1.0	1.25	62.5	2 1X
10Gb Ethernet XAUI	2.5	3.125	156.25	2 4X
Fibre Channel	0.85 / 1.7	1.06 / 2.12	53.125 / 106.25	2 1X
Serial ATA	1.2	1.5	75	2 1X
Serial RapidIO	2.5	3.125	156.25	2 1X,4X
PCI Express	2.0	2.5	125	2 1X-32X


hp
invent