The Switch to Blades

Systems Overview –
IBM BladeCenter Chassis and Servers
Agenda

> *The IBM BladeCenter Concept*
  ▪ Defining a BladeCenter
  ▪ BladeCenter Components

> A Overview of the BladeCenter family
  ▪ BladeCenter S
  ▪ BladeCenter E
  ▪ BladeCenter H
  ▪ BladeCenter T
  ▪ BladeCenter HT

> The Blade Server
  ▪ Blade Server Overview
  ▪ Blade Server Models

> BladeCenter I/O Modules
  ▪ Ethernet
  ▪ Fibre Channel
  ▪ InfiniBand
Did you know that...

The citrus soda 7-UP was created in 1929; "7" was selected because the original containers were 7 ounces. "UP" indicated the direction of the bubbles.

American car horns beep in the tone of F.

No piece of paper can be folded more than 7 times.

You burn more calories sleeping than you do watching television.

The first product to have a bar code was Wrigley's gum.
What is an IBM BladeCenter?

**IBM BladeCenter chassis**

- >7 to 11U (model dependent)
  mechanical housing to hold multiple blades
- >Hot swappable modules and integrated switching
- >Lightpath diagnostics
- >Redundant components and paths

**IBM Blade Servers**

- >Vertical mounting hot swap servers
Components of the IBM BladeCenter

There are several components that make up an IBM BladeCenter. These components include:

- Blade Servers
- Media Tray
- Power Supply modules
- Blowers
- Hot-swapp able Fan Packs
- Ethernet Components
- Fibre Channel Components
- Pass-thru components
- High-speed Components (BC-H & BC-HT Only)
- Integrated Disk Storage Module (BC-S Only)
- Management Module (BC-T Only)
- Advanced Management Module
Topic 8 - Course Agenda

> The IBM BladeCenter Concept
  ▪ Defining a BladeCenter
  ▪ BladeCenter Components

> *A Overview of the BladeCenter family*
  ▪ BladeCenter S
  ▪ BladeCenter E
  ▪ BladeCenter H
  ▪ BladeCenter T
  ▪ BladeCenter HT

> The Blade Server
  ▪ Blade Server Overview
  ▪ Blade Server Models

> BladeCenter I/O Modules
  ▪ Ethernet
  ▪ Fibre Channel
  ▪ InfiniBand
# IBM BladeCenter Family

## One family, many applications, many environments, long term investment

<table>
<thead>
<tr>
<th>BladeCenter S</th>
<th>BladeCenter E</th>
<th>BladeCenter H</th>
<th>BladeCenter T</th>
<th>BladeCenter HT</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Extending the benefits of BladeCenter outside the datacenter</em></td>
<td><em>Highest density, super power efficient</em></td>
<td><em>Ultra high performance, and I/O flexibility</em></td>
<td><em>Highly rugged, Telco, AC/DC, NEBS, Air Filtration</em></td>
<td><em>Highly rugged, Telco, AC/DC, NEBS, Air Filtration</em></td>
</tr>
</tbody>
</table>

### BladeCenter S
- 7U design
- Integrated storage
- Lowest cost
- Lowest Power
- Support 10GB Uplinks

### BladeCenter E
- 7U design
- Best blade density
- Low cost
- Low Power
- Support 10GB Uplinks
- Support 4GB FC

### BladeCenter H
- 9U design
- Support 30mm blades w/ up to 8 ports
- Support 10GB Ethernet
- Support 4x InfiniBand

### BladeCenter T
- 8U design
- AC or DC models
- NEBS Compliant
- Rugged
- Telco, military, dirty floor

### BladeCenter HT
- 12U design
- AC or DC models
- NEBS Compliant
- Rugged
- Support 10GB Ethernet
- Support 4x InfiniBand
- Telco, military, dirty floor
### IBM BladeCenter S Chassis - At A Glance

#### BladeCenter S Features and Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max number of Blade Servers</td>
<td>6</td>
</tr>
<tr>
<td>Max number of I/O Modules (switch and bridge)</td>
<td>3</td>
</tr>
<tr>
<td>Power Supply size (standard)</td>
<td>950W/1450W AC Auto-sensing</td>
</tr>
<tr>
<td>Number of Power Supplies (standard/max)</td>
<td>2/4</td>
</tr>
<tr>
<td>Number of Blowers (standard/max)</td>
<td>4/4</td>
</tr>
<tr>
<td>Diskette Drives (standard)</td>
<td>None</td>
</tr>
<tr>
<td>DVD/CD Drives standard</td>
<td>1x DVD-Rom in media tray</td>
</tr>
</tbody>
</table>
Meet the BladeCenter S – Front View

- Service label cards slot enable quick and easy reference to BladeCenter S
- SAS and SATA disks can be mixed
- SAS disks recommended for IBM i production
- RAID 0, 1, 5, 0+1 supported with RAID SAS Switch Module (RSSM)
- Separate RAID arrays for IBM i recommended
- Supports up to 6 BladeServers
- Battery Backup Units for use only with RAID SAS Switch Module

Shared USB ports and CD-RW / DVD-ROM Combo

The New Power Equation
Meet the BladeCenter S – Rear View

Hot-swap Power Supplies 3 & 4 are optional, Auto-sensing b/w 950W / 1450W

Hot-swap Power Supplies 1 & 2 are standard, Auto-sensing b/w 950W / 1450W

Power supplies 3 and 4 required if using > 1 blade

Top(SW1) & Bottom(SW2) left: Ethernet
Top(SW3) & Bottom(SW4) right: SAS
Both CIOv (#8246) and CFFv (#8250) adapters supported

Four Blower modules standard

7U

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# IBM BladeCenter E Chassis - At A Glance

<table>
<thead>
<tr>
<th><strong>BladeCenter E Features and Specifications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max number of Blade Servers</strong></td>
</tr>
<tr>
<td><strong>Max number of I/O Modules (switch and bridge)</strong></td>
</tr>
<tr>
<td><strong>Power Supply size (standard)</strong></td>
</tr>
<tr>
<td><strong>Number of Power Supplies (standard/max)</strong></td>
</tr>
<tr>
<td><strong>Number of Blowers (standard/max)</strong></td>
</tr>
<tr>
<td><strong>Diskette Drives (standard)</strong></td>
</tr>
<tr>
<td><strong>DVD/CD Drives standard</strong></td>
</tr>
</tbody>
</table>
BladeCenter E - Front View

- Front Panel LEDs
- Over-Temp Information
- System Error
- Power
- USB port
- Blade Server Location
- Over-Temp Information
- Diskette drive
- CD-ROM drive
- Blade Server Filler
- Recess for chassis service label
- 7U
# IBM BladeCenter Chassis Comparison

<table>
<thead>
<tr>
<th></th>
<th>BladeCenter S</th>
<th>BladeCenter E</th>
<th>BladeCenter T</th>
<th>BladeCenter H</th>
<th>BladeCenter HT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chassis height</strong></td>
<td>7U / 12.0” (306.3mm)</td>
<td>7U / 12.0” (305mm)</td>
<td>8U / 13.75&quot; (349mm)</td>
<td>9U / 15.75” (400mm)</td>
<td>12U / 21.0” (528mm)</td>
</tr>
<tr>
<td><strong>Chassis depth</strong></td>
<td>28.9” (733.4mm)</td>
<td>28 “ (711mm)</td>
<td>20.0” (508mm)</td>
<td>28.0” (711mm)</td>
<td>27.8” (706.0 mm)</td>
</tr>
<tr>
<td><strong>Max number of blade servers</strong></td>
<td>6</td>
<td>14</td>
<td>8</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td><strong>Max number of I/O Modules (Switch, and bridge)</strong></td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>10 (4 x high speed, 4 x standard, 2 x bridge)</td>
<td>8 (4 x high speed, 4 x standard or 2 x bridge)</td>
</tr>
<tr>
<td><strong>Power supply size (standard)</strong></td>
<td>950W/1450W AC auto-sensing</td>
<td>2000 Watts AC</td>
<td>1300W DC, 1300W AC</td>
<td>2900 Watts AC</td>
<td>2535W DC (60A) 3160 DC (75A) 2800 Watts AC</td>
</tr>
<tr>
<td><strong>Number of Power Supplies (standard/maximum)</strong></td>
<td>2/4</td>
<td>2/4</td>
<td>2/4</td>
<td>2/4</td>
<td>2/4</td>
</tr>
<tr>
<td><strong>Number of Blowers (standard/maximum)</strong></td>
<td>4/4</td>
<td>2/2</td>
<td>4/4</td>
<td>2/2</td>
<td>4/4</td>
</tr>
<tr>
<td><strong>Diskette Drives (standard)</strong></td>
<td>None</td>
<td>1x 1.44 MB diskette drive (in Media Tray)</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>DVD/CD drives standard</strong></td>
<td>1x DVD-ROM (in Media Tray)</td>
<td>1x DVD-ROM (in Media Tray)</td>
<td>1x DVD-ROM (in Media Tray)</td>
<td>1x DVD-ROM (in Media Tray)</td>
<td>None</td>
</tr>
</tbody>
</table>
Did you know that...

The king of hearts is the only king without a mustache.

A Boeing 747's wingspan is longer than the Wright brother's first flight.

Venus is the only planet that rotates clockwise.

The first CD pressed in the US was Bruce Springsteen's "Born in the USA."

The 57 on the Heinz ketchup bottle represents the number of varieties of pickles the company once had.
Topic 8 - Course Agenda

> The IBM BladeCenter Concept
  ▪ Defining a BladeCenter
  ▪ BladeCenter Components

> A Overview of the BladeCenter family
  ▪ BladeCenter S
  ▪ BladeCenter E
  ▪ BladeCenter H
  ▪ BladeCenter T
  ▪ BladeCenter HT

> *The Blade Server*
  ▪ Blade Server Overview
  ▪ Blade Server Models

> BladeCenter I/O Modules
  ▪ Ethernet
  ▪ Fibre Channel
  ▪ InfiniBand
What is a Blade?

A Blade contains the core components of a server. Each blade has:

> Processors
> Memory
> Internal storage (optional)
> Network Interface Cards (NIC)
> Optional plug-in components

The Blade server plugs into the midplane of a chassis that provides common functions as:

> Management console Access (KVM)
> Power supplies
> Cooling Fans
> Network Connectivity (LAN, SAN, NAS, HPC)
> Shared media devices (CD/DVD-ROM and diskette or USB drives)
> Optional Modules to support additional functions
# Blade Server Models - Tailored to Customer Need

<table>
<thead>
<tr>
<th>Customer Need</th>
<th>IBM Blades</th>
<th>Processor Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;General Purpose</td>
<td>HS12</td>
<td></td>
</tr>
<tr>
<td>&gt;Extended Memory</td>
<td>HS21</td>
<td>Intel</td>
</tr>
<tr>
<td>&gt;Uni-processor</td>
<td>HS21 XM</td>
<td></td>
</tr>
<tr>
<td>&gt;Workstation</td>
<td>HC10</td>
<td></td>
</tr>
<tr>
<td>&gt;High Performance</td>
<td>LS21</td>
<td>AMD</td>
</tr>
<tr>
<td>&gt;Scalable Enterprise</td>
<td>LS22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LS41</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LS42</td>
<td></td>
</tr>
<tr>
<td>&gt;Performance with in Virtualization</td>
<td>JS12 Express</td>
<td></td>
</tr>
<tr>
<td>&gt;UNIX and Linux Support</td>
<td>JS21 Express</td>
<td></td>
</tr>
<tr>
<td>&gt;More Memory and more Hard disk</td>
<td>JS22 Express</td>
<td></td>
</tr>
<tr>
<td>&gt;Specialized High Performance</td>
<td>QS21</td>
<td></td>
</tr>
<tr>
<td>&gt;Faster with more fidelity</td>
<td>QS22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PN41</td>
<td></td>
</tr>
</tbody>
</table>
IBM JS12 Express Blade Server Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Two 64-bit 3.8 GHz POWER6 processor</td>
</tr>
<tr>
<td>L2 Cache</td>
<td>4 MB per processor core</td>
</tr>
<tr>
<td>Memory (533 MHz DDRAM)</td>
<td>2 or 4GB, up to 64GB DDR2</td>
</tr>
<tr>
<td>Internal HDD</td>
<td>SAS</td>
</tr>
<tr>
<td>Internal Capacity</td>
<td>Up to 292GB with 2 SAS HDDs</td>
</tr>
<tr>
<td>Integrated Ethernet Controller</td>
<td>Integrated Virtual Ethernet adapter (IVE) Dual Gigabit</td>
</tr>
</tbody>
</table>
# IBM JS21 Express Blade Server Features

<table>
<thead>
<tr>
<th>JS21 Features and Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Processor</strong></td>
</tr>
<tr>
<td><strong>L2 Cache</strong></td>
</tr>
<tr>
<td><strong>Memory (533 MHz DDRAM)</strong></td>
</tr>
<tr>
<td><strong>Internal HDD</strong></td>
</tr>
<tr>
<td><strong>Internal Capacity</strong></td>
</tr>
<tr>
<td><strong>Integrated Ethernet Controller</strong></td>
</tr>
</tbody>
</table>
IBM JS21 Express Blade Server - Component View

- Two 2.5" SAS HDDs
- IBM PowerPC 970MP Processor 1
- IBM PowerPC 970MP Processor 2
- DIMM sockets 1 to 4
- High-speed PCI-Express Controller
- Integrated RAID controller
- Optional I/O connector
- PCI-Express controller
- Midplane connections
<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Processor</strong></td>
<td>Up to Four-core 64-bit 4.0 GHz POWER6</td>
</tr>
<tr>
<td><strong>L2 Cache</strong></td>
<td>4 MB per processor core; 4-way set associative</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>2 or 4GB, up to 32GB DDR2</td>
</tr>
<tr>
<td><strong>Internal HDD</strong></td>
<td>73 or 146 GB</td>
</tr>
<tr>
<td><strong>Internal Capacity</strong></td>
<td>Up to 292GB</td>
</tr>
<tr>
<td><strong>Integrated Ethernet Controller</strong></td>
<td>Integrated Virtual Ethernet adapter (IVE) Dual Gigabit</td>
</tr>
</tbody>
</table>
IBM JS22 Express Blade Server Component View

- IBM Power6 Processor 1
- IBM Power6 Processor 2
- DIMM socket 1
- DIMM socket 2
- DIMM socket 3
- DIMM socket 4
- Memory Buffers (Nova)
- I/O Hub
- Svc Proc
- High-Speed PCI-X Connector
- SAS Module (Obsidian)
- Turnin Card
- BladeCenter Chassis connections
- Optional I/O Connections
- 4 DIMM slots for up to 32GB
- SAS Drive
IBM BladeCenter JS23 Express

- 2 sockets, 4 POWER6 cores @ 4.2 GHz
- Enhanced 65-nm lithography
- 32 MB L3 cache per socket
- 4 MB L2 cache per core
- 8 VLP DIMM slots, up to 64 GB memory
- FSP-1 service processor
- 2 x 1Gb embedded Ethernet ports (HEA)
- 2 PCIe connectors (CIOv and CFFh)
- 1 x onboard SAS controller
- Up to 1 SSD or SAS onboard disk
- EnergyScale™ power management
- PowerVM Hypervisor virtualization
IBM BladeCenter JS23 Express

8 DDR2 DIMMs 64 GB max
SMP SAS Controller
SAS or SSD
DIMM FILLER
DIMM
Service Processor
P5IOP2 I/O Hub
CIOv Adapter
CFFh Adapter
Memory Interface Modules
Anchor Card
Socket 0
Socket 1
2-core POWER6 4.2 GHz 32 MB L3 cache
The New Power Equation
IBM BladeCenter JS43 Express

- 4 sockets, 8 POWER6 cores @ 4.2 GHz
- Enhanced 65-nm lithography
- 32 MB L3 cache per socket
- 4 MB L2 cache per core
- 16 VLP DIMM slots, up to 128 GB memory
- FSP-1 service processor
- 4 x 1Gb embedded Ethernet ports (HEA)
- 4 PCIe connectors (CIOv and CFFh)
- 1 x onboard SAS controller
- Up to 2 SSD or SAS onboard disks
- EnergyScale™ power management
- PowerVM Hypervisor virtualization

The New Power Equation
IBM BladeCenter JS43 Express SMP Unit Only

Socket 0

2-core POWER6
4.2 GHz
32 MB L3 cache

Socket 1

8 DDR2 DIMMs
64 GB max

Memory Interface Modules

Service I/O Unit

CIOv Adapter

P5IOC2 I/O Hub

SAS or SSD

CFFh Adapter

THE NEW POWER EQUATION
Did you know that...

The plastic things on the end of shoelaces are called aglets.

Most dust particles in your house are made from dead skin.

The first owner of the Marlboro company died of lung cancer.

Betsy Ross is the only real person to ever have been the head on a Pez dispenser.

Michael Jordan made more money from Nike annually than all of the Nike factory workers in Malaysia combined.
Topic 8 - Course Agenda

> **The IBM BladeCenter Concept**
  - Defining a BladeCenter
  - BladeCenter Components

> **A Overview of the BladeCenter family**
  - BladeCenter S
  - BladeCenter E
  - BladeCenter H
  - BladeCenter T
  - BladeCenter HT

> **The Blade Server**
  - Blade Server Overview
  - Blade Server Models

> **BladeCenter I/O Modules**
  - Ethernet
  - Fibre Channel
  - InfiniBand
IBM BladeCenter I/O Expansion Card Options

- **Ethernet**
  - Dual-Port Ethernet Adapters, iSCSI

- **Fibre Channel**
  - Dual-Port 2Gb FC Host Adapters

- **Myricom or InfiniBand Options**
  (Supported in BC-H and BC-HT only)
# IBM BladeCenter - Redundant Connections

## BladeCenter expansion card form factors

<table>
<thead>
<tr>
<th>Form factor</th>
<th>Description</th>
<th>Protocol/connector used</th>
</tr>
</thead>
<tbody>
<tr>
<td>StFF</td>
<td>Standard Form Factor</td>
<td>PCI-X</td>
</tr>
<tr>
<td>SFF</td>
<td>Small Form Factor</td>
<td>PCI-X</td>
</tr>
<tr>
<td>CFFv</td>
<td>Combination Form Factor (vertical)</td>
<td>PCI-X</td>
</tr>
<tr>
<td>CFFh</td>
<td>Combination Form Factor (horizontal) (BC-H only)</td>
<td>PCI-Express</td>
</tr>
<tr>
<td>HSFF</td>
<td>High Speed Form Factor (BC-H and BC-HT only)</td>
<td>PCI Express</td>
</tr>
</tbody>
</table>
# IBM BladeCenter I/O Portfolio

<table>
<thead>
<tr>
<th>Ethernet</th>
<th>Fibre Channel</th>
<th>InfiniBand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IBM</strong></td>
<td><strong>CISCO</strong></td>
<td><strong>CISCO</strong></td>
</tr>
<tr>
<td>Server Connectivity Module</td>
<td>4Gb SAN Switch Module 10 and 20 port models</td>
<td>Cisco InfiniBand Switch</td>
</tr>
<tr>
<td><strong>Nortel</strong></td>
<td><strong>CISCO</strong></td>
<td><strong>CISCO</strong></td>
</tr>
<tr>
<td>Gigabit Ethernet Switch Module Fiber &amp; Copper Models</td>
<td>4Gb Intelligent Pass-Thru Module</td>
<td>InfiniBand Ethernet Bridge</td>
</tr>
<tr>
<td><strong>Nortel</strong></td>
<td><strong>CISCO</strong></td>
<td><strong>CISCO</strong></td>
</tr>
<tr>
<td>L2/3 Gb Ethernet Switch Module Fiber &amp; Copper Models</td>
<td>4Gb SAN Switch Module 10 and 20 port models</td>
<td>InfiniBand Fibre Channel Bridge</td>
</tr>
<tr>
<td><strong>Nortel</strong></td>
<td><strong>CISCO</strong></td>
<td><strong>CISCO</strong></td>
</tr>
<tr>
<td>Layer 2/3 10Gb Uplink Switch Module</td>
<td>4Gb Fibre Channel Switch Module 10 and 20 port models</td>
<td><strong>CISCO</strong></td>
</tr>
<tr>
<td>SAS</td>
<td><strong>CISCO</strong></td>
<td><strong>CISCO</strong></td>
</tr>
<tr>
<td><strong>IBM</strong></td>
<td>4Gb Fibre Channel Switch Module 10 and 20 port models</td>
<td>Copper Pass-Thru Module</td>
</tr>
<tr>
<td><strong>IBM</strong></td>
<td>SAS Connectivity Module</td>
<td><strong>IBM</strong></td>
</tr>
<tr>
<td><strong>IBM</strong></td>
<td>Fibre Channel Pass-Thru Module</td>
<td><strong>IBM</strong></td>
</tr>
</tbody>
</table>

*Updated 01/27/08*
Glossary of Terms

> Advanced Management Module (AMM)
> Disk Storage Module (DSM)
> IBM BladeCenter E (Enterprise)
> IBM BladeCenter H (High Performance)
> IBM BladeCenter HT (High Performance Telco)
> IBM BladeCenter S (Simplification)
> IBM BladeCenter T (Telco)
> Serial-attached SCSI (SAS)
> Serial Advanced Technology Attachment (SATA)
> Storage Area Network (SAN)
> I/O Expansion Unit
> Network Equipment Building System (NEBS)
> Network Interface Card (NIC)
> PCI Expansion Unit II (PEU)
> Remote Deployment Manager (RDM)
> Ethernet
Additional Resources

IBM STG SMART Zone for more education:
>http://lt.be.ibm.com/smartzone

IBM BladeCenter Support

IBM ServerProven
>http://www-03.ibm.com/servers/eserver/serverproven/compat/us/

IBM BladeCenter Solutions
>http://www-03.ibm.com/systems/bladecenter/solutions/