STG – Systems Group Infrastructure
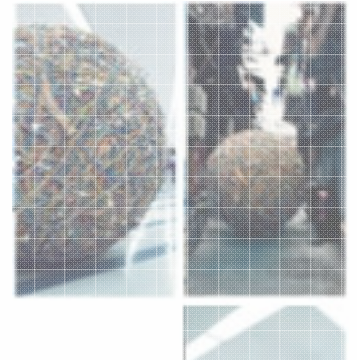
Clive Morris –
System X & BladeCenter FTSS

OUT WITH COMPLEXITY. OUT WITH INEFFICIENCY. OUT WITH CABLES.
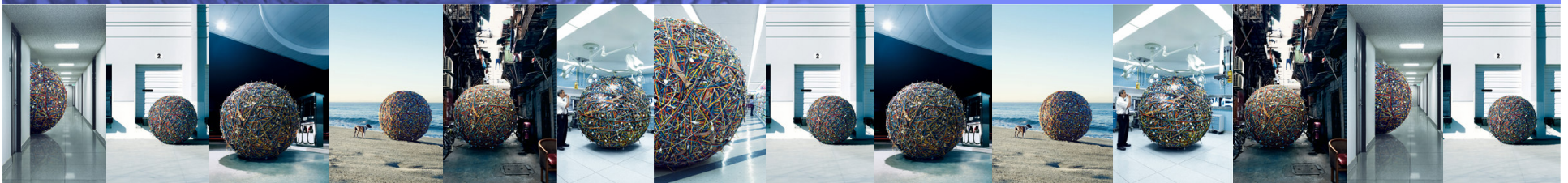
Agenda

- **STG System Portfolio**

- **IBM and Virtualisation**

- **IBM System X & BladeCenter**

- **IBM System Storage**

- **Cooling in the Datacenter**

STG System Portfolio

The market place is changing – with open, pervasive technologies as a driving force

Examples driving change:

Resources without limits

- **Computing power for everyone**
- **Energy demands growing**
- **Information explosion**
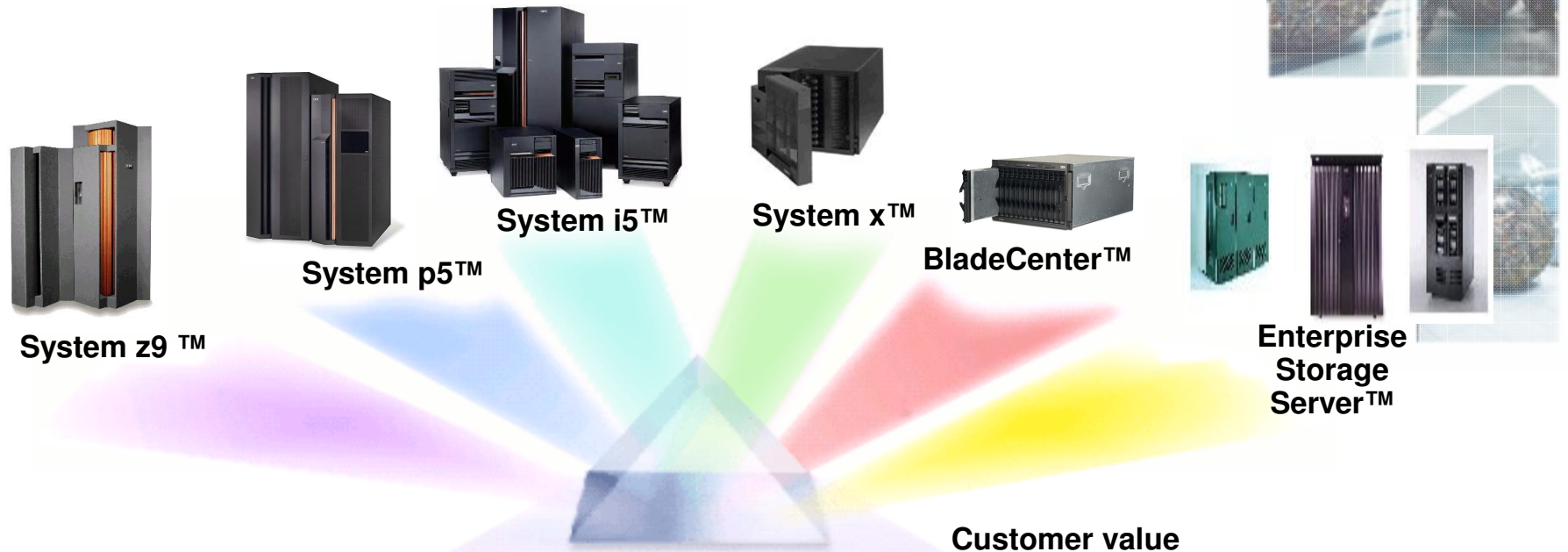
Computing power is everywhere

- **Pervasive network capabilities**
- **Web-centric workloads**
- **Structured & unstructured data**

Connectivity of everything

- **Open standards**
- **Virtualization**
- **Service-Oriented Architecture**

Innovation and Technical Leadership
- The Server Portfolio

System z9 ™

System p5™

System i5™

System x™

BladeCenter™

Enterprise Storage Server™

|	
Autonomic Computing	**WorkLoad Mgr, Virtualization, Partitioning, Security, Systems Mgmt**
Series Unique Technologies	**z/OS, AIX 5L™, OS/400, Windows Operating System, FICON Express**
Shared Components	**BladeCenter, Linux, Processors, I/O Power, Hardware Console, Adapters, Switches, Power/Mechanical frames**

Customer value

- IBM's best technology
- Shared innovation
- Faster servers
- Improved availability
- Faster to market
- Investment leverage

Comprehensive portfolio of industry-leading energy efficient solutions – across the data center – help optimize costs

Diagnose · Manage & Measure · Build · Green Data Center · Virtualize · Cool
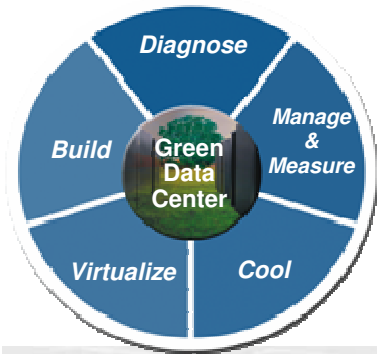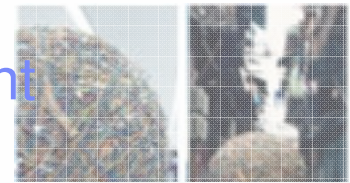
## Data centers at a tipping point

"The cost to power and cool servers projected to increase 54%." [1]

"The values that drove environmental stewardship as a foundation for corporate wide initiatives are also deeply embedded in the way that IBM views product stewardship"

John Davies, AMR Research, April 2007 [2]

Energy Services

- Server and Storage Power/Cooling Trends and Data Center Best Practices
- Data Center Thermal Analysis and Optimization Facilities Integration
- Data Center Health Audit for IT
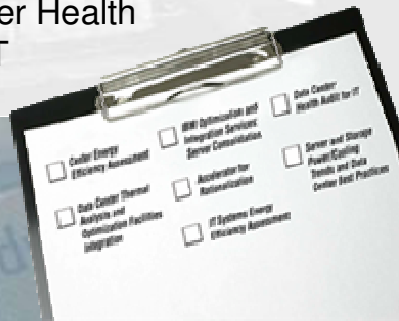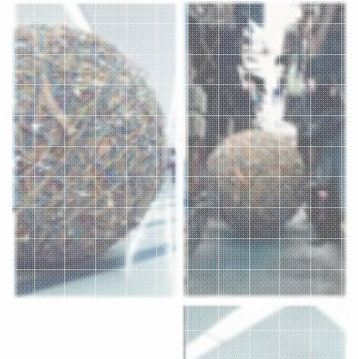
Energy Technology

- IBM BladeCenter®
- IBM System z™ lean and green leadership
- Processor efficiency management for System i™ and System p™
- IBM Blue Gene®
- IBM Rear Door Heat Exchanger

Energy Management

- Active Energy Management
- Storage and server virtualization leadership
- IBM PowerExecutive™
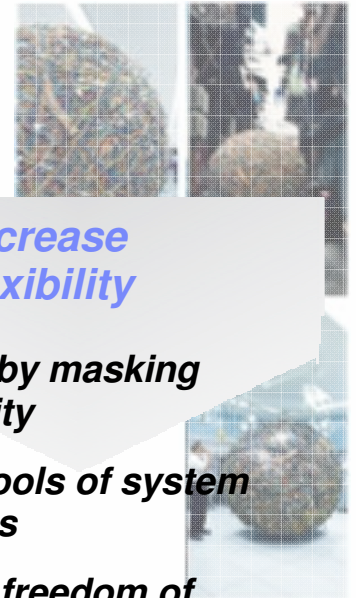- IBM Tivoli® Usage and Accounting, Monitoring and Provisioning

IBM and Virtualisation

IBM Virtualization Platform – comprehensive offerings – and a key part of IBM's Energy Efficiency Initiative

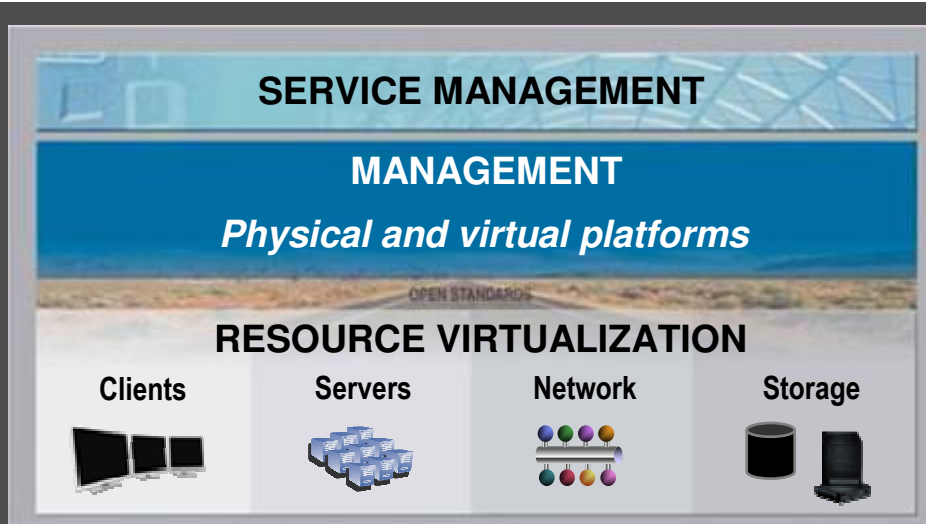### Improve Total Cost of Ownership (TCO)

- **Decrease management costs**

- **Increase asset utilization**

- **Manage consolidated systems to drive down energy requirements**

Access through shared infrastructure

- **Leverage common tools across many systems**

- **Improve business resilience and security**

- **Establish foundation for Service-Oriented Architecture (SOA)**

Increase flexibility

- **Simplify by masking complexity**

- **Create pools of system resources**

- **Maintain freedom of choice with open standards**

SERVICE MANAGEMENT

MANAGEMENT

Physical and virtual platforms

OPEN STANDARDS

RESOURCE VIRTUALIZATION

| Clients | Servers | Network | Storage |

A recent virtualization study by ITG cited up to a 72% overall savings by fully leveraging consolidation and virtualization technologies and IBM System p 570 servers. Cost savings ranged across maintenance, software support, personnel & facilities costs. [1]

(1) Source: ITG, 'Impact of IBM System p Virtualization': May 2007

IBM Virtualization Platform technologies on IBM Systems – *Drive up utilization and drive down overall costs*

- Large-scale, multi-image virtualization technologies significantly improve resource utilization
- Support and management of single and multiple server and storage heterogeneous environments
- Dynamic logical partitioning can adapt to changes without downtime – with certified secure partitions
- Improvements in overall availability with Live Partition & Live Application Mobility
- SAN Volume Controller improves storage utilization and systems management – with support for both IBM and non-IBM storage
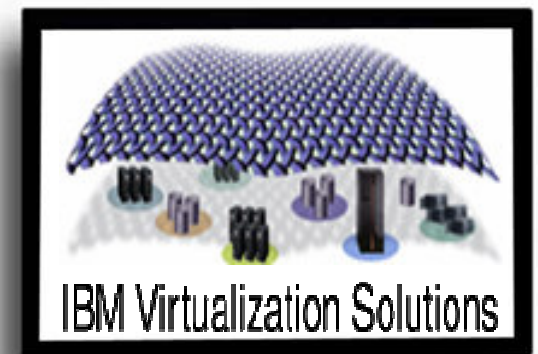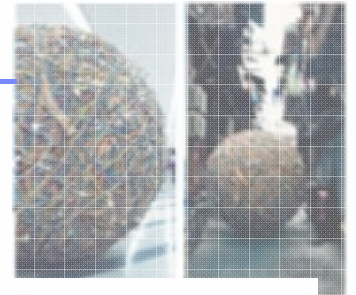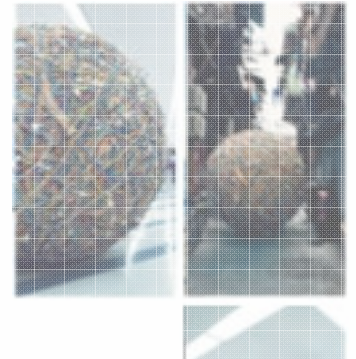
IBM System X & BladeCenter

System x Portfolio – Volume Servers
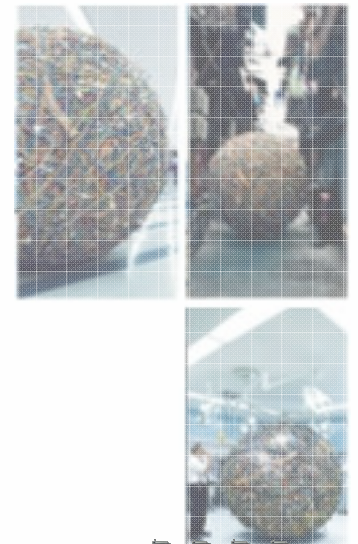
'The System x Portfolio is better suited to meet the demands of business performance computing'

Scale up / SMP computing

Enterprise X-Architecture™

x3950

x3850

x3800

x3755

x3655

LS41

BladeCenter

x3650

LS21

x3550

x3455

x3500

x3200   x3400

x3250

HS21
BladeCenter T
BladeCenter H

Scale out / distributed computing

Xtended Design Architecture™

Extend blade benefits to your entire business

Chassis tailored to your specific needs…

IBM BladeCenter E
Enterprise, best energy, best density
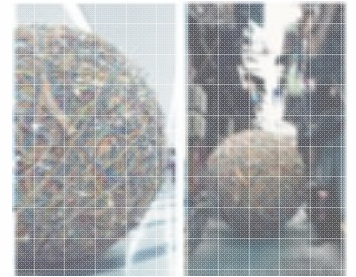
IBM BladeCenter S
Distributed, small office, easy to configure

IBM BladeCenter T
Ruggedized

IBM BladeCenter H
High performance

IBM BladeCenter HT
Ruggedized, high performance

- ✓ **A common set of blades**
- ✓ **A common set of industry-standard switches and I/O fabrics**
- ✓ **A common management infrastructure**

Extend blade benefits to all your applications

Blades tailored to your specific needs…

HS21 XM
Extended-memory
(intel)

LS21
High-performance
AMD

HS21
*General-purpose
enterprise*
(intel)

LS41
*Scalable, enterprise
performance*
AMD

HC10
Workstation
(intel)

QS20
High-performance
IBM

JS21
*High-performance
w/ native
virtualization*
PowerPC

- **A common set of blades**

- **A common set of industry-standard switches and I/O fabrics**

- **A common management infrastructure**

BladeCenter protects your critical business operations

- **Engineered for reliability**
  - Dual power connections
  - Thermal/cooling redundancy
  - Dual blade connections for all I/O
  - Dual switch modules
  - Dual paths through backplane
  - Dual Management Modules
  - Dual N+N power topologies
  - True N+N thermal solutions

- **Engineered for availability**
  - Automated failover capability via Management Module
  - Management Module monitors health of chassis components
  - Comprehensive Predictive Failure Analysis® proactively identifies many potential issues before they cause failures
  - First Failure Data Capture helps provide integrity of error reporting
  - Light Path Diagnostics for easy trouble shooting

No single point of failure

XDA… Innovation Now Comes Standard!

- **Predictive Failure Analysis®** — Helps alert IT to potential failures before they happen – on additional components beyond Dell and HP

- **Simple-swap SATA interfaces** — Makes it easier to add or replace than fixed drives and at a lower cost than hot-swap drives

- **PowerExecutive**™ — Measure, Track and Control server power consumption, helping you manage your power and cooling "budget" (extension to IBM Director)
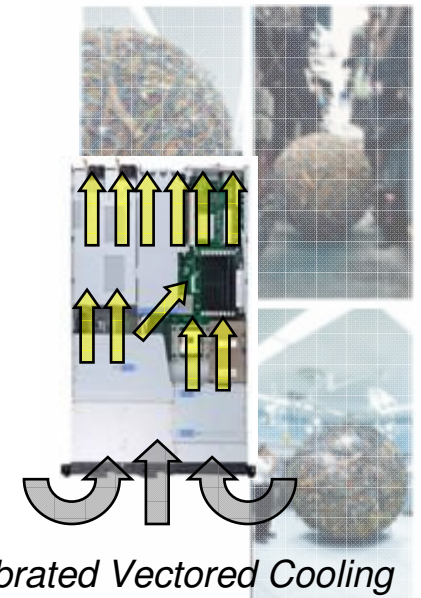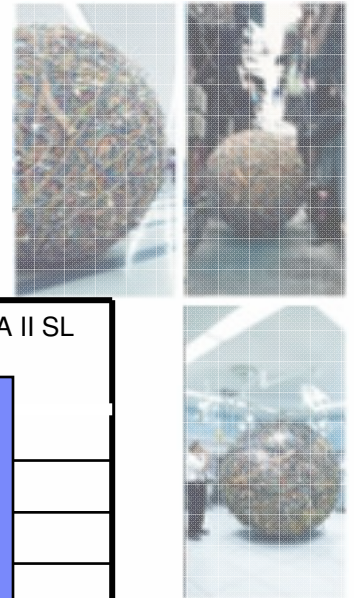
Calibrated Vectored Cooling

Xtended Design Architecture

- **Calibrated Vectored Cooling** — Provides more efficient cooling, which allows for more internal components

- **Light path diagnostics** allows easier identification of failed parts, even without power to the server

Light path diagnostics

Server Management (BMC)

|	mini-BMC	BMC	RSA II, RSA II SL
IPMI 1.5 Compliant			
Environmental monitors			
Drive System LED's (No LightPath)			
Power Control			
Serial over LAN (SOL)			
IPMI 2.0 Compliant			
Proxy-based command line interface			
PFA support			
Drives LightPath			
Web Interface			
Embedded command line interface			
Remote Presence Keyboard, Mouse, Video, and Disks			
Directory Integration (LDAP)			
Advanced Security (e.g. SSL, encryption)			

Fourth Generation Scalable Chip Set !
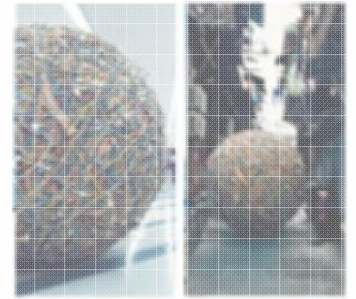
- Next generation of IBM System x scalable servers

  – More mainframe inspired reliability / availability features

  – Increased performance thru enhanced bandwidth / reduced latencies

  – Greater flexibility

  – Greener design

  – Enterprise workload optimized
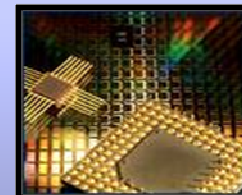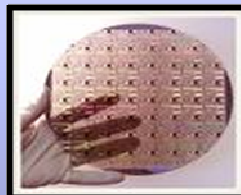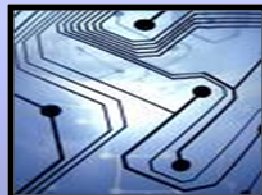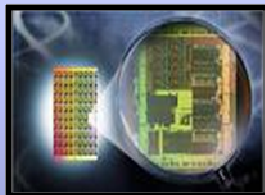
High Performance Portfolio Positioning 2007-2009
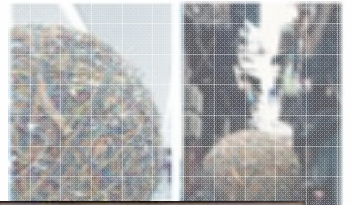
x3755: 4-Socket Rack

Target: Mid-Market, Large Enterprise HPC/BPC

Apps: Scientific Computing, Financial Analysis, Weather Simulations, CAE, Crash Analysis, Transactional DB

AMD Opteron: 64-bit computing with leadership in 4-socket HPC cluster node configuration
Maximum Price Performance
Dual core capable (QC 1Q08)
4U Rack Optimized

x3800: 4-Socket Tower

Target: SMB, Remote/ Branch Office

Apps: SMB, Collaboration, Departmental database

eServer X3: 3rd Gen EXA
64-bit Intel Xeon MP
Competitive Price-perf
Latest technology
   SAS, PCI-X2, DDR2
High Availability
7U Tower or Rack
Maximum Int. Storage
Tape Backup Support
Dual-core Capable

x3850: 4-Socket Rack

Target: Enterprise & Mid-market

Apps: Collaboration, Database, ERP, SCON

eServer X3: 3rd Gen EXA
64-bit Intel Xeon MP
Leadership 4-way perf
Latest technology
   SAS, PCI-X2, DDR2
High Availability
3U Rack-optimized
Maximum Int. Storage
Dual-core enabled

x3950: 4+ Socket Rack

Target: Enterprise & Mid-market

Apps: Database, ERP, CRM, SCM, SCON

eServer X3: 3rd Gen EXA
64-bit Intel Xeon MP
Leadership 8-way perf
Leadership 16-way+ perf
Latest technology
   SAS, PCI-X2, DDR2
High Availability
XpandOnDemand to 32way
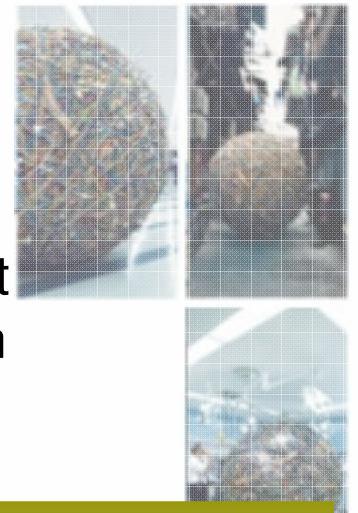Dual-core enabled
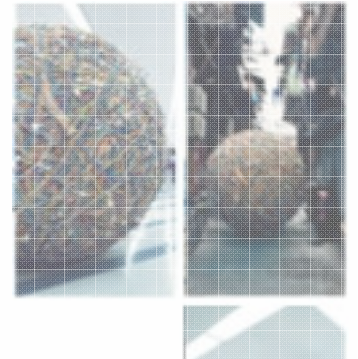
IBM System Storage

The right disk storage system to meet your needs

IBM System Storage™ — one of the industry's broadest storage portfolios — supports multiple technologies with BladeCenter such as Fibre Channel, iSCSI and SAS

Easy and affordable systems for entry-level storage environments	Attractively priced systems for heterogeneous UNIX® and Windows environments	Enterprise-class, affordable, highly scalable and upgradeable storage	Enterprise-class storage for open systems and mainframes in a small, modular package	Enterprise-class disk systems that set new standards in functionality and performance
DS3000	DS4000	N Series	DS6000	DS8000

A DS3000 or DS4000 for every System x
The right match at the right price for your business. . .

DS3200/DS3300/DS3400 DS4200/DS4700 Mod 70

Most affordable

IBM System x3550s

IBM System x3650/x3655

IBM BladeCenter BCS/BCE

DS4700 Mod 72 DS4800 Mod 80

Most price/ performance

Multiple IBM System x3650s/x3655s

IBM System x3755

IBM System x3850/x3950

IBM BladeCenter BCE/BCH

DS4800 Mod 82-88

Most performance

High Performance Computing

Multiple IBM System x3850s/x3950s

Multiple Boot From SAN Blade Center BCE/BCH
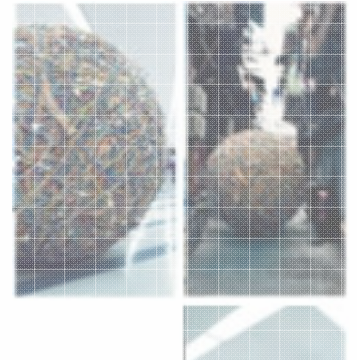
Cooling in the Datacenter

Innovation for greener IT with IBM Cool Blue portfolio

Cool Blue Portfolio

Energy Management

- **Power Configurator to plan power usage**
- **Systems Director Active Energy Manager**

- **Leadership virtualization capabilities**
- **Tivoli Enterprise Management**

Energy Technology
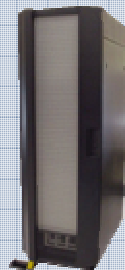
System designs
Leadership compute power per kilowatt

IBM power supplies
Measurement built in

Calibrated Vector Cooling™
Reduces wasteful air movement

Acoustic Door
Stop noise pollution

BladeCenter
Energy efficiency from the ground up

Rear Door Heat Exchanger
Thermal management innovation

Energy Services

- **Energy-efficiency assessments**
- **Data center thermal analysis and optimization facilities integration**

- **Data Center stored cooling solution**
- **How-to guide for energy rebates**

Go green and potentially add to your bottom line

Take control of your power now

IBM BladeCenter power efficiency:

- **Leadership performance/watt**

- **Right-sized for any business**

IBM BladeCenter power tools help:
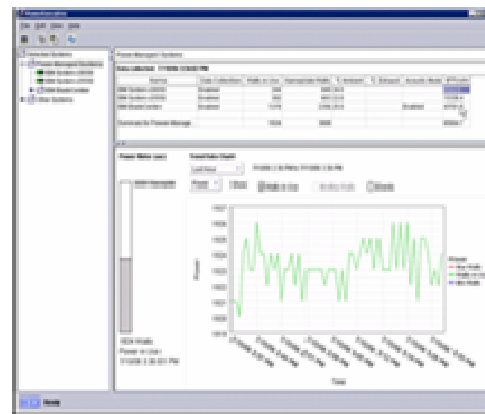
- **Plan, monitor and control power usage**

- **Provide "cruise control" for power consumption of servers**

IBM leadership in virtualization helps:

- **Increase utilization rates**

- **Reduce number of server, storage, network devices**

- **Create shared, easily scalable infrastructure**
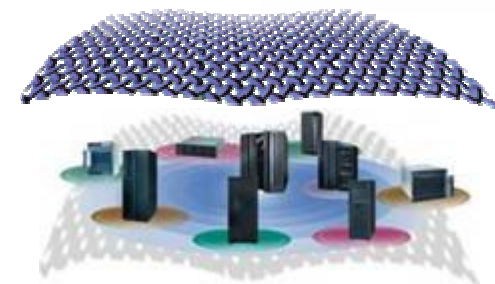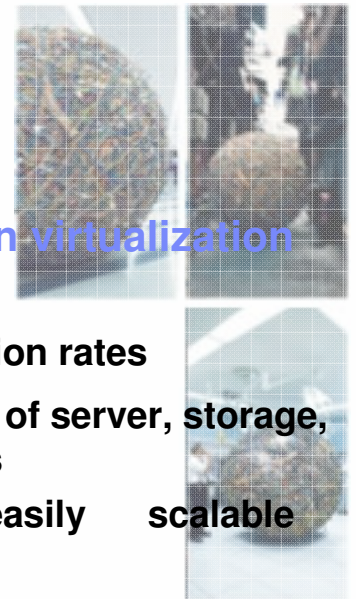
IBM Virtualization Solutions

Save on infrastructure with IBM power tools

IBM Power Configurator

- Get better information for up-front planning by sizing the power needs of your unique configurations

- Select systems and IT infrastructure that best fit your data center infrastructure before you commit to buying the first server

IBM Systems Director Active Energy Manager

- Monitor and track power over time

- Make choices based on accurate information

- Take command with power virtualization

Included at no additional charge with IBM servers
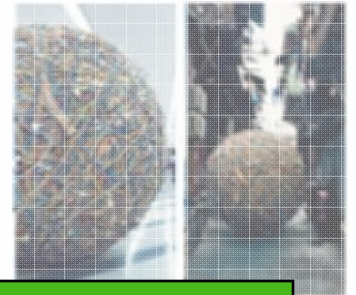
Take control with Systems Director Active Energy Manager
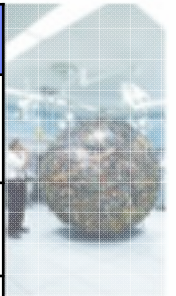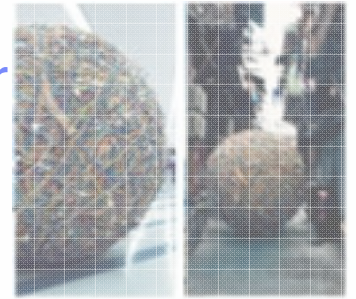
Features	Benefits
Report and collect actual power draw	No more data center budgeting assumptions
Power trending	System-level power analysis for better decision making
Intelligent power virtualization	Automated or user defined power control to help optimize performance/watt
CPU control with Intel DBS/ AMD PowerNOW	Reduces power draw during low utilization via OS
OS independent	Works on all blades and all compatible OS
Cost per system	Included with virtually all blades

Simple and easy power management
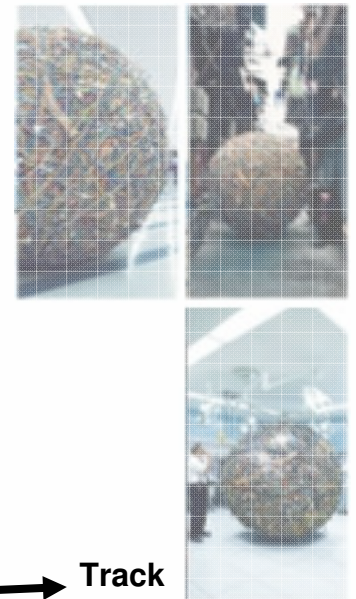
Compare actual vs. name plate power at system level

View inlet and exhaust temperature
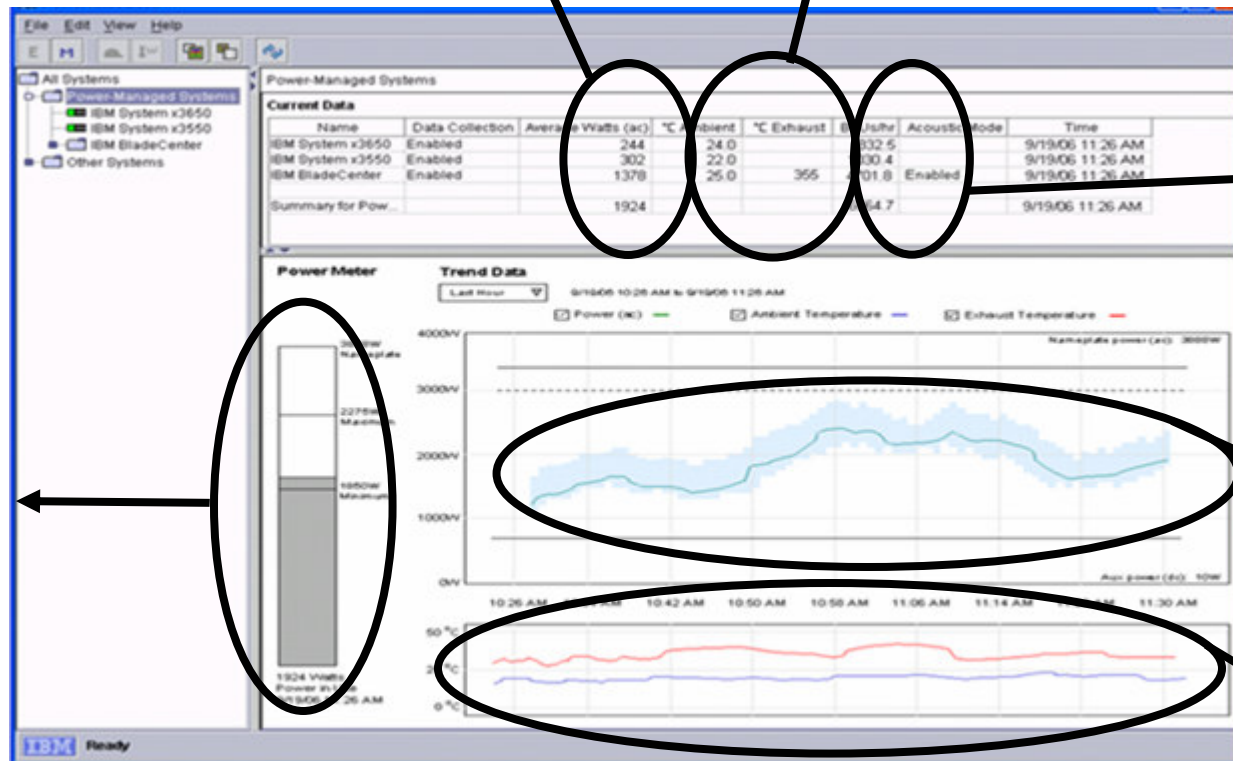
Track heat emitted

Compare rack actual power vs. label power

Trend power use over time

Trend temperature over time

Put power where you need it with Active Energy Manager
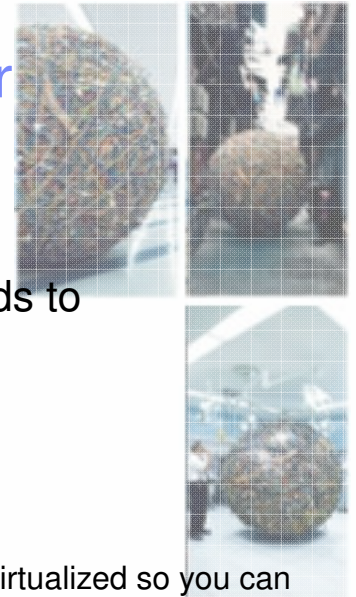
- Rack density is based on power consumption estimates, which typically leads to a 20 percent over allocation of power

- With Active Energy Manager exact power usage is possible

- The power virtualization feature allows you to turn that wasted power into real productivity

Result is multiple servers, each with wasted overhead power

Power is virtualized so you can add more servers

Allocation before Active Energy Manager

| Server 7 |
| Server 6 |
| Server 5 |
| Server 4 |
| Server 3 |
| Server 2 |
| Server 1 |

Allocation after Active Energy Manager

+2 additional servers

| Server 9 |
| Server 8 |
| Server 7 |
| Server 6 |
| Server 5 |
| Server 4 |
| Server 3 |
| Server 2 |
| Server 1 |
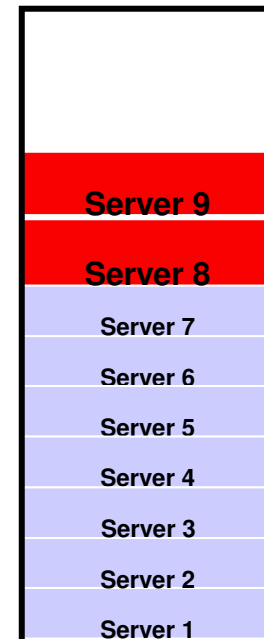
Increase your density with BladeCenter efficiency
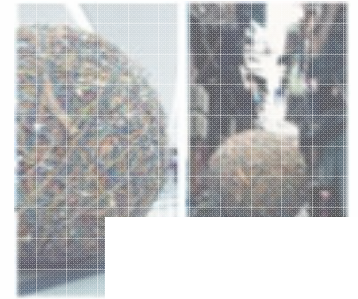
**10KW rack holds
23 Dell 1Us (427W)**

**10KW rack holds
37 blades (270W)**

**10KW rack holds
44 blades (270W)**

**Improve
performance/watt
by up to 90%**

**Inefficient Dell 1U
servers**

**Power-efficient
BladeCenter servers**
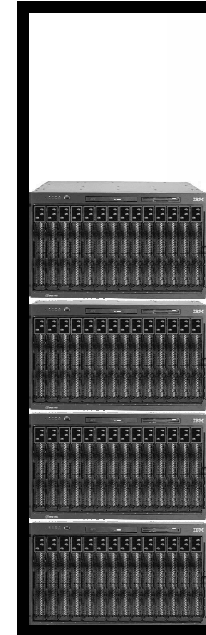
**Power-efficient BladeCenter
with Active Energy Manager
power virtualization**

GREEN
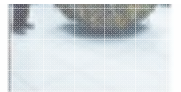
IBM Virtualization Manager

- Simplifies virtualization for IBM hardware clients

- Provides a single point of management for both physical and virtual systems

- Provides consistent management across multiple virtualization environments

- Provide common IBM Director-based management tool for hypervisors running on BladeCenter, System x™ and System p™
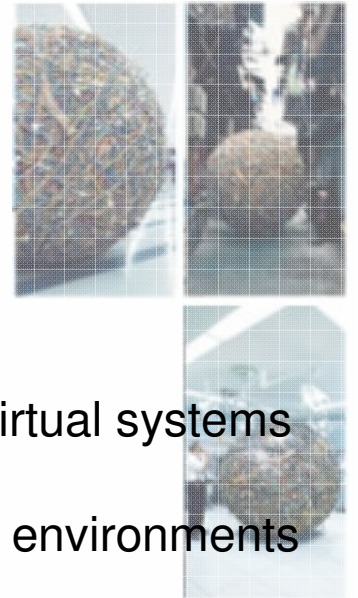
Available at no additional charge with IBM servers

How to see the real picture of your virtual IT resources with the IBM Virtualization Manager.

Virtualization VIEW

Cut heat up to 50 percent with Rear Door Heat eXchanger technology from IBM*
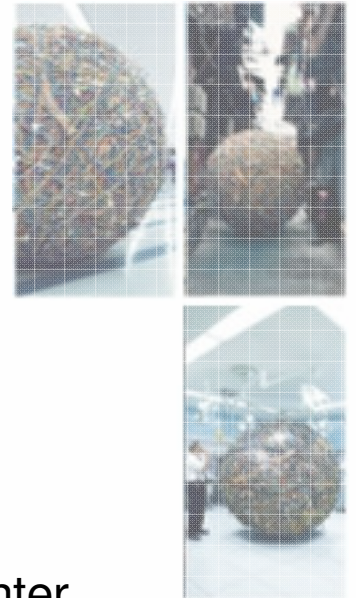
This can help:

- Increase density easily
- Solve hot spots in the data center
- Avoid cost of purchasing another air-conditioning unit
- Potentially postpone spend on major renovations in the data center

IBM used water in the mainframe 35 years ago …

Solving today's data center issues with mainframe thinking

The model 900

Water cooling is more energy efficient than air

Smart then; smart now

"That's all folks!"

Questions?

Footnotes

Information in this presentation concerning non-IBM products was obtained from the suppliers of these products, published announcement material or other publicly available sources. IBM has not tested these products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Prices do not include tax or shipping and are subject to change without notice. [Price includes applicable discounts.] Reseller prices may vary. Unless otherwise specified, pricing informationis current as of original publication of this document.

MB, GB, and TB = 1,000,000, 1,000,000,000 and 1,000,000,000,000 bytes, respectively, when referring to storage capacity. Accessible capacity is less.; up to 3GB is used in service partition. Actual storage capacity will vary based upon many factors and may be less than stated. Some numbers given for storage capacities give capacity in native mode followed by capacity using data compression technology.

Maximum internal hard disk and memory capacities may require the replacement of any standard hard drives and/or memory and the population of all hard disk bays and memory slots with the largest currently supported drives available.

Telephone support may be subject to additional charges. For onsite labor, IBM will attempt to diagnose and resolve the problem remotely before sending a technician.

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Notes: