IBM® Systems Director Active Energy Manager V4.2

Demonstration

Drivers for energy management

- ***Understand the exact power / cooling costs in a data center***
  - Breakdown of costs of the components
  - Large margins needed to protect power / cooling allocation failures
- ***Manage the efficiency of the current environment***
  - Get the most out of what is currently installed without having to make large disruptive change
- ***Reduce the power / thermal costs***
  - Save energy costs in periods of low utilization
  - Increase performance without increasing infrastructure (ROI in DC)
- ***Plan a new or retrofit an existing data center***
  - When retrofitting or building a new data center, do it right the first time
  - Trending of current energy consumption on individual or groups of systems show growth patterns in power consumption and cooling needs
  - Power calculators on new system configurations provides better planning information

IBM Systems Director Active Energy Manager V4.2

Monitoring and managing energy usage

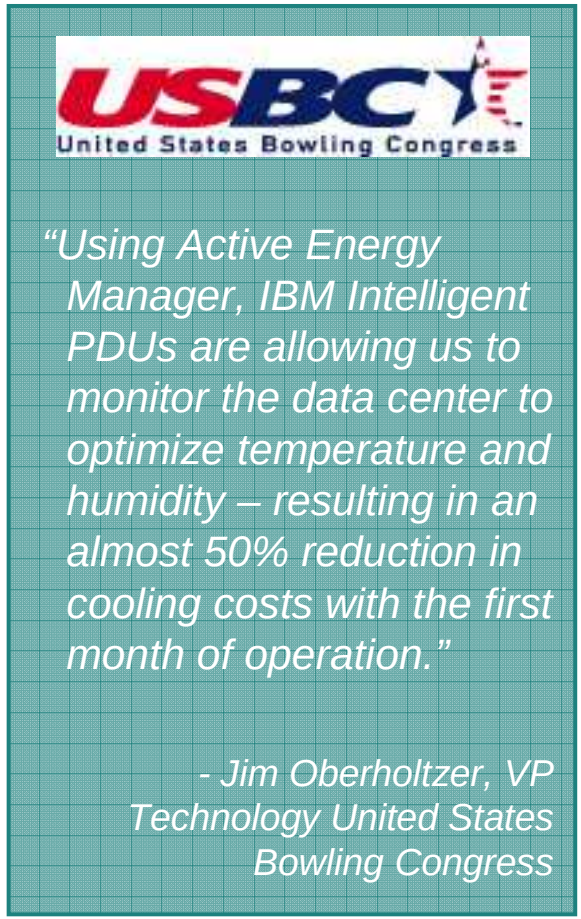
Active Energy Manager

- AEM helps companies monitor, measure and control their energy usage. It provide clients with a single view of the actual power usage across multiple platforms in their infrastructure
- AEM is a unique energy management solution building block that returns true control of energy costs to the customer
- AEM is a the IBM energy management framework. It support monitoring and/or management of System x and BladeCenter servers as well as Power Systems, System z, PDUs and datacenter equipment and sensors
- AEM is a plug-in for Systems Director 6.1.2

IBM® Systems Director Active Energy Manager™

Simplified management across multiple IBM systems and non-IBM servers

- IBM® Systems Director provides a single view of the actual power usage across multiple platforms
- IBM® Systems Director Active Energy Manager™ supports more servers, more PDUs and integrates with more infrastructure providers
- IBM Systems Director Active Energy Manager consists of Monitoring and Management functions
- IBM Systems Director Active Energy Manager Monitoring Functions
  - ✓Power Trending
  - ✓Thermal Trending
  - ✓PDU Support for IBM and non-IBM
  - ✓Support for Facility Providers and sensors
  - ✓Energy Thresholding
  - ✓Altitude Input
- IBM Systems Director Active Energy Management Functions
  - ✓Power Capping
  - ✓Power Savings Mode



Implementing IBM Systems Director Active Energy Manager

How does it work?

- Hardware, firmware, and systems management software in servers and blades can take inventory of components
  - **No agents are required on the endpoint servers**
- Active Energy Manager adds power draw up for each server/blade and tracks that usage over time
- When power is constrained, Active Energy Manager allows power to be allocated on a server by server
  - Care taken that limiting power consumption does not affect performance
  - Sensors and alerts can warn the user if limiting power to this server could affect performance

True Data Center Energy Management

Control energy use on servers

- Set fixed energy usage caps that the servers will not exceed when fully configured, **OR**
- Set a lower “soft cap” for even more energy savings
- Optimize to maximize performance or power savings
- Set a fixed processor energy reduction, or dynamically adjust energy based on utilization
- Input altitude for more efficient fan operation
- Active Energy Manager™ data and energy controls are available on the console and via Command Line Interface

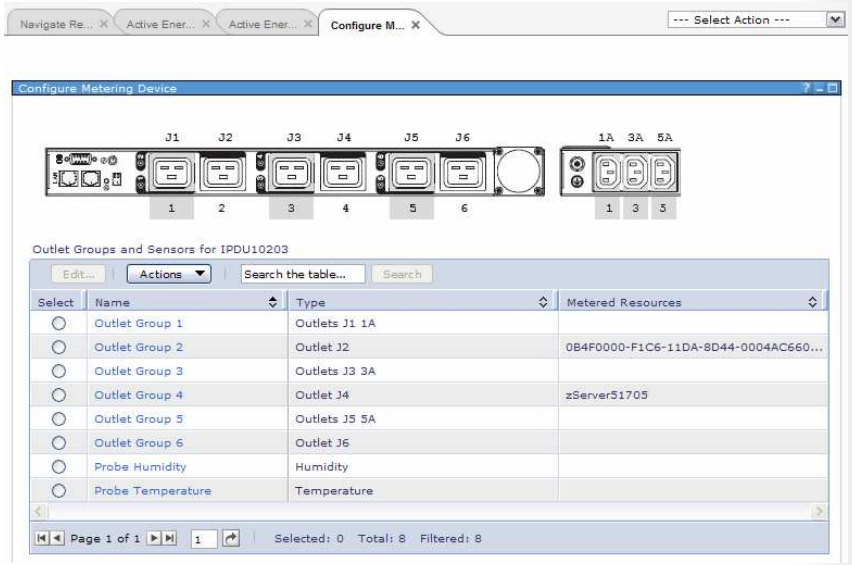
US Energy consumption by servers and data centers is expected to almost double in the next 5 years.

- US Environmental Protection Agency (EPA), August 2007

Note: Active Energy Manager monitoring and control capabilities vary by system.

IBM Systems Director Active Energy Manager V4.2 offering

- Offering consists of “no charge” monitor functions and “priced” management functions
  - Monitoring Functions
    - Power Trending
    - Thermal Trending
    - PDU+ Support
  - Management Functions
    - Power Capping
    - Power Savings Mode
- Management functions are enabled for a 60-day evaluation
- Management functions have a server size specific price structure based upon server being managed
- Application available as a web download (CD with authorization key for priced functions)
- Supports IBM and non-IBM platforms
- Feature of IBM Systems Director



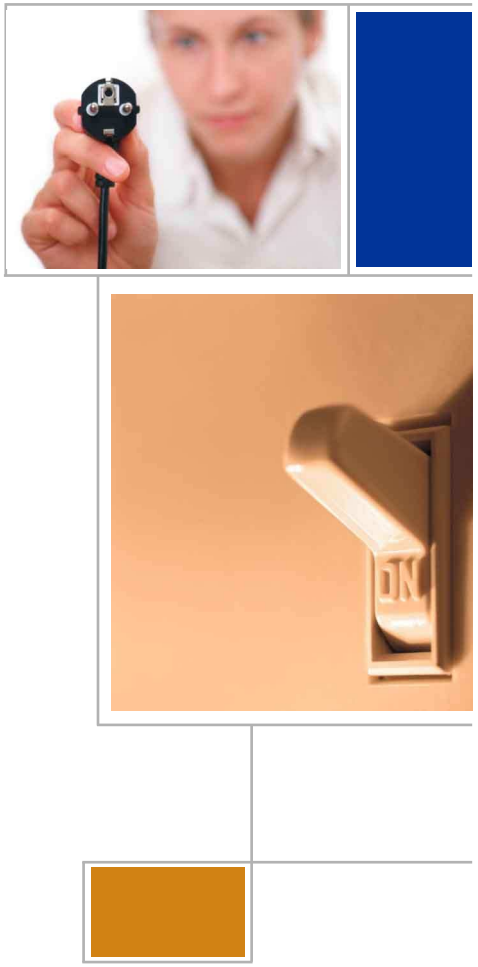
Active Energy Manager Functions

Offering consists of "no charge" functions for monitoring and platform support

- ***Power Trending***
  - Displays power usage for individual systems over time (in a graph or in table format) to understand power usage trends within and across their systems
- ***Thermal Trending***
  - Displays information on the inlet and exhaust temperatures for individual systems one at a time to understand thermal characteristics of systems so that temperature adjustments can be made within the IT shop
- ***PDU+ (intelligent Power Distribution Units)***
  - Enables support for power trending for older systems, low- and mid-range storage devices as well as non-IBM systems. By plugging these systems into an intelligent PDU (a smart power strip) AEM can collect power information from I/O drawers within the iPDU thereby giving a more complete view of power used within a data center
- ***Native Support***
  - Extends power management functions such as power trending, thermal trending, and power capping, originally available on System x, to multiple IBM platforms enabling power management functions on all IBM systems from a single console which reduces complexity

Active Energy Manager Functions

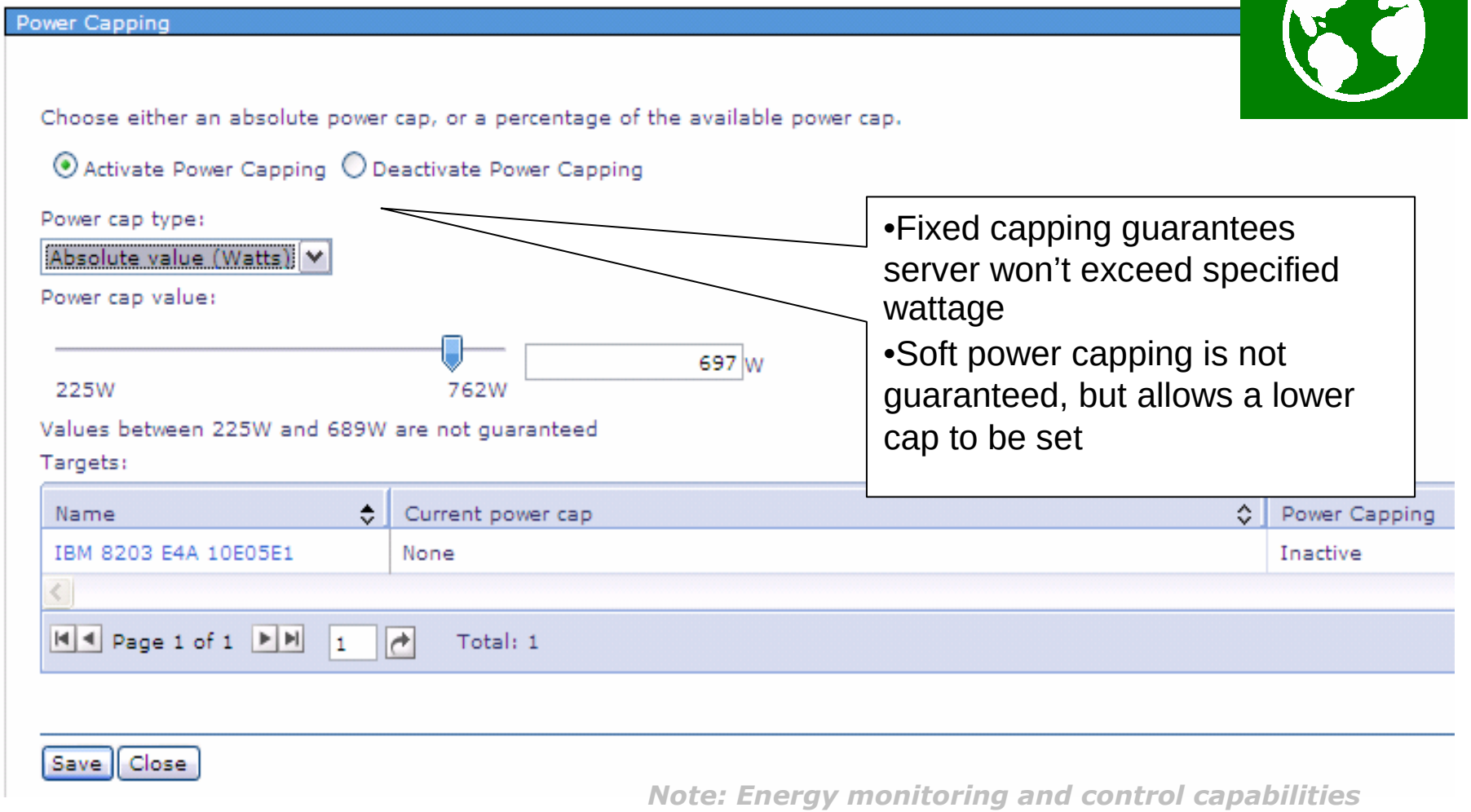
Offering consists of "priced" management functions



- ***Power Capping***
  - Allocates a maximum power level a system can use without having to worry about power usage above the maximum point
  - AEM will throttle the processor to use less power, which slows down the server, if the system starts to consume more than the maximum level set
  - This feature can come into play if it gets too warm in the data center as setting the cap will ensure that the system will not use more than that cap value thus reducing power and thermal usage

- ***Power Savings Mode***
  - Enables a system to save up to 30% of normal CPU power usage
  - Power savings is enabled via an on/off switch which can be scheduled during times of low utilization
  - Occurs automatically based on processor utilization if the function is supported on the system
  - Allows management of power usage as work activity shifts across various demands

Intelligent Energy with power capping

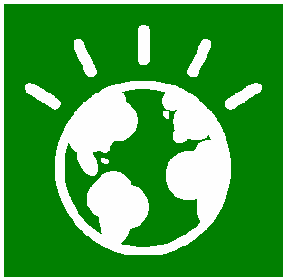


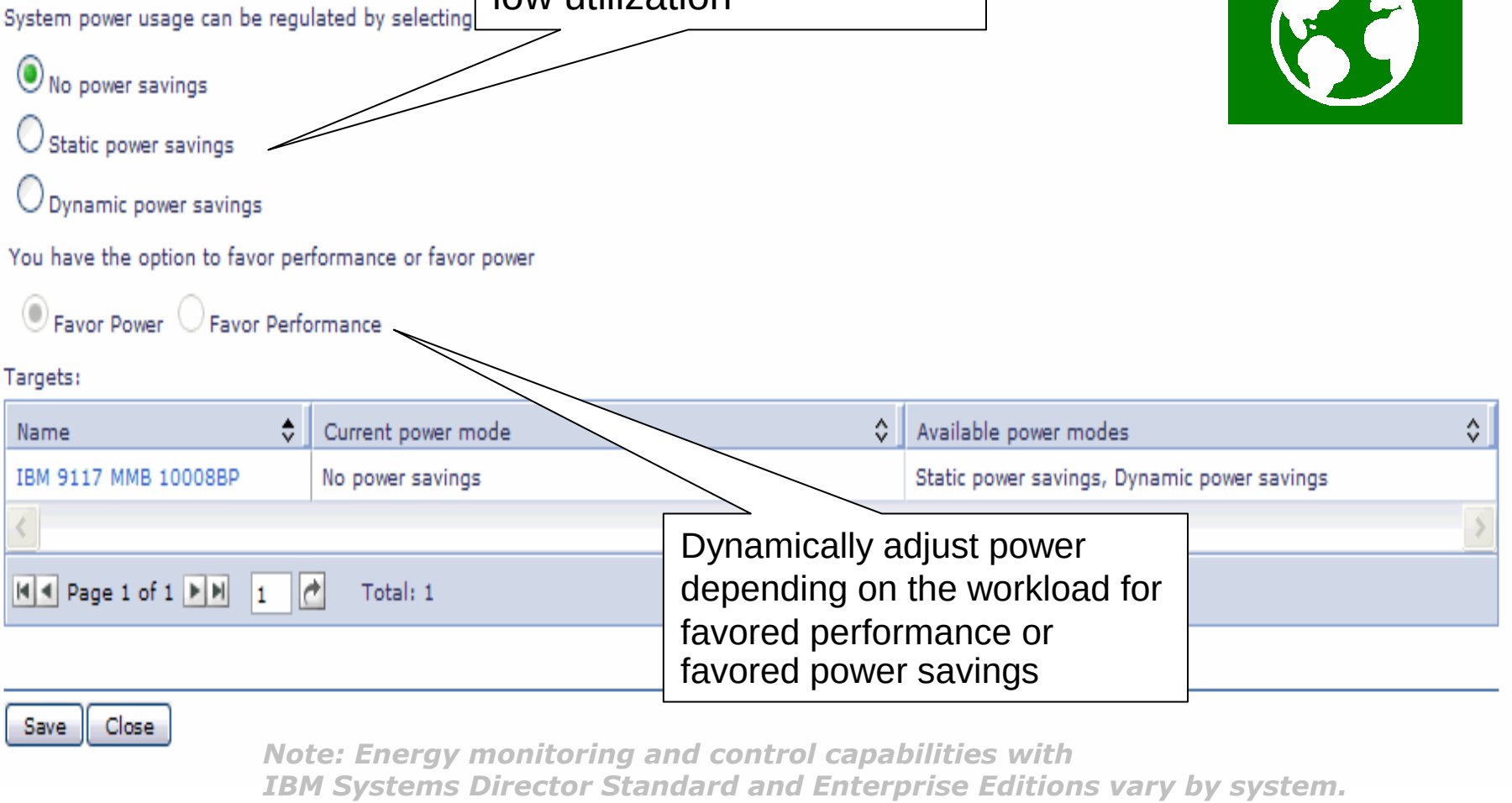
- Fixed capping guarantees server won't exceed specified wattage
- Soft power capping is not guaranteed, but allows a lower cap to be set

Note: Energy monitoring and control capabilities with IBM Systems Director Standard and Enterprise Editions vary by system.

Intelligent Energy with power savings to consume less energy

Lower clock speed and voltage during times of low utilization

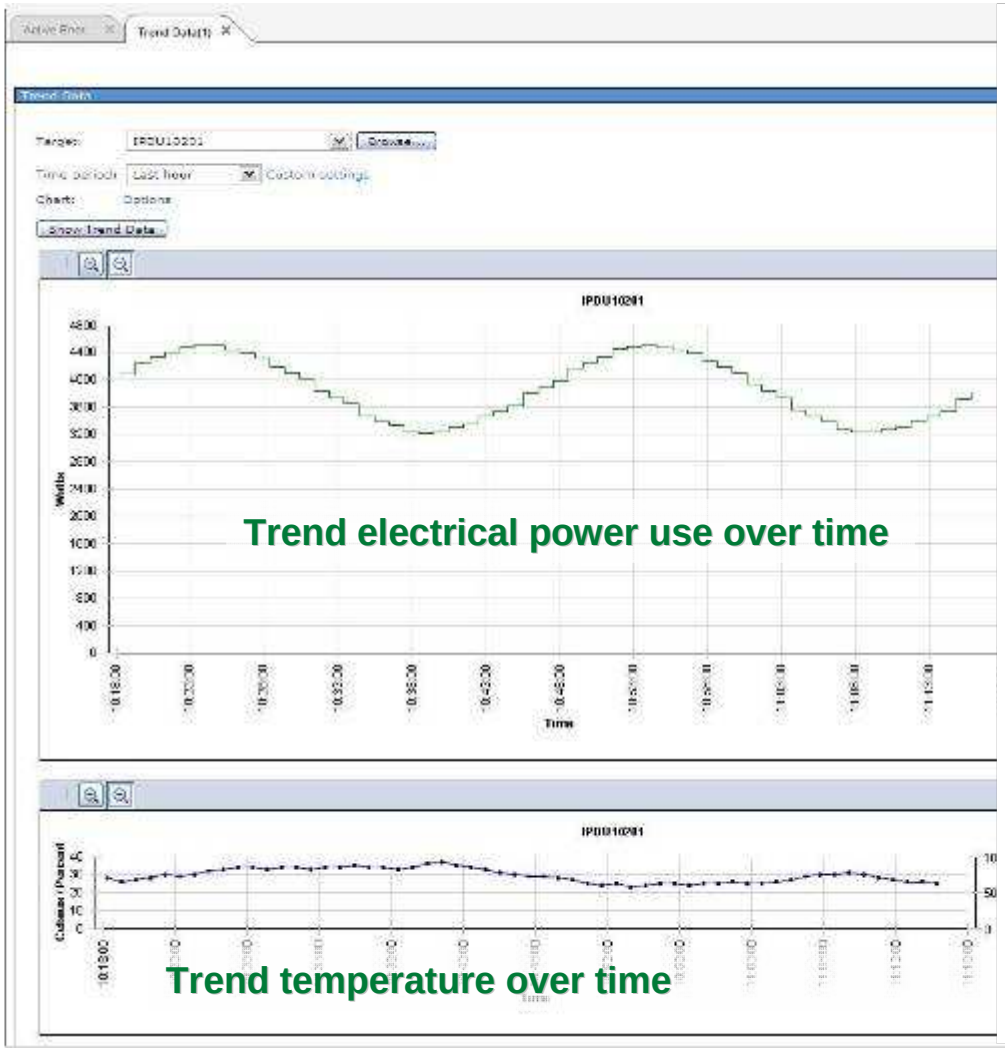




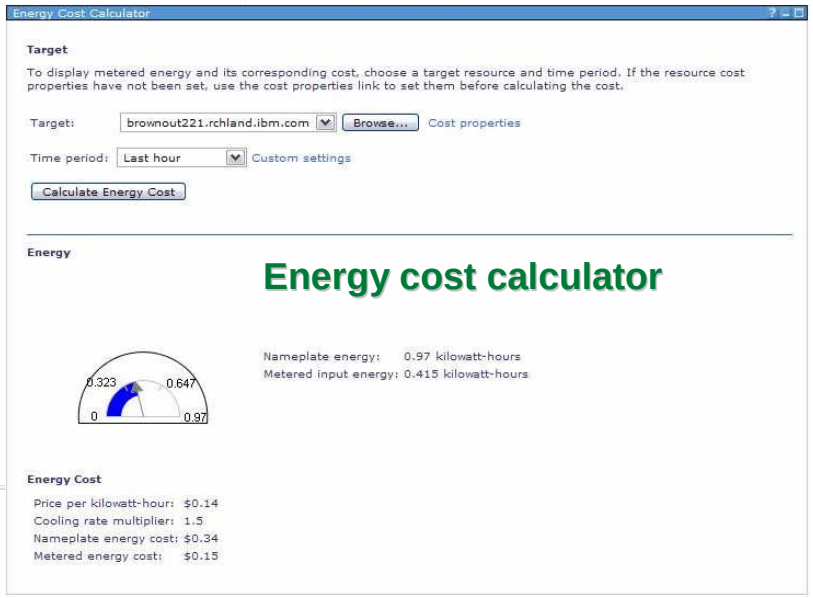
Dynamically adjust power depending on the workload for favored performance or favored power savings

Note: Energy monitoring and control capabilities with IBM Systems Director Standard and Enterprise Editions vary by system.

Electrical energy and thermal trending



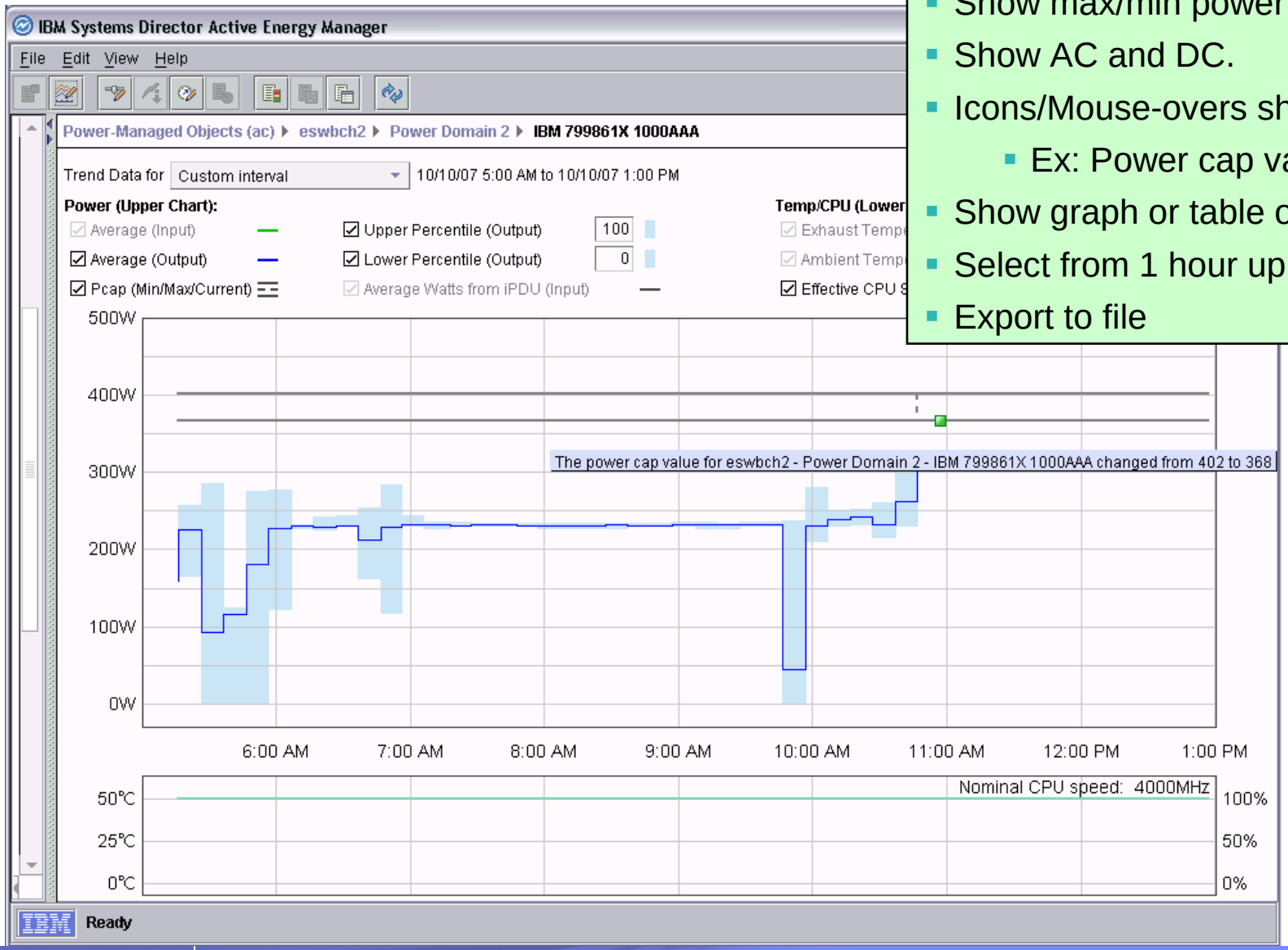
- Report electrical power at the rack and server level
- Manage thermal energy at the rack and server level
- Analyze trends in energy use
- Calculate energy costs for targeted resources



Note: Energy monitoring and control capabilities with IBM Systems Director Editions vary by system.

Power Trending

- Show power usage over time
- Show max/min power during polls
- Show AC and DC.
- Icons/Mouse-overs show events
  - Ex: Power cap value changed
- Show graph or table of data
- Select from 1 hour up to one year
- Export to file



View details of current data

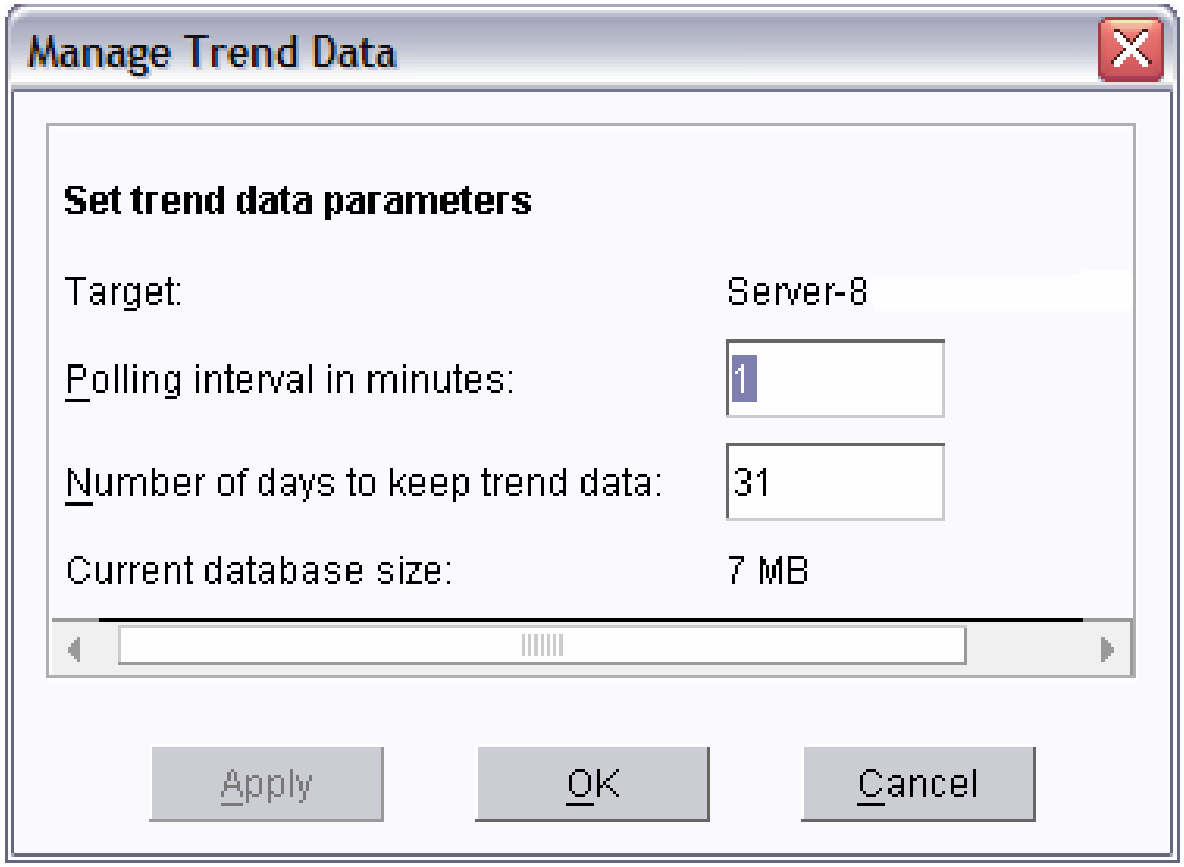
- Additional details shown here that aren't shown in trending graph

Current Data

Field	Value
Time	11/9/07 3:03:25 PM
Name	POWER6Server41301
Power Meter	Version 2.0
Metering Level	Capping
Power Saver	Unsupported
Nameplate Watts (Input)	0
Average Watts (Input)	553
Average Watts (Output)	527
Current Pcap	816
Max Pcap	816
Min Pcap	212
BTUs/hr	1886.8
iPDU Name	
Average Watts from iPDU (Input)	
Current Ambient °C	25.0
Current Exhaust °C	40.0
Effective CPU Speed (%)	100.0
Last Policy	None

Manage trend data

- Select a different polling rate per system
  - Poll critical systems more often than others
  - Default is once per minute
- Select how much data to collect

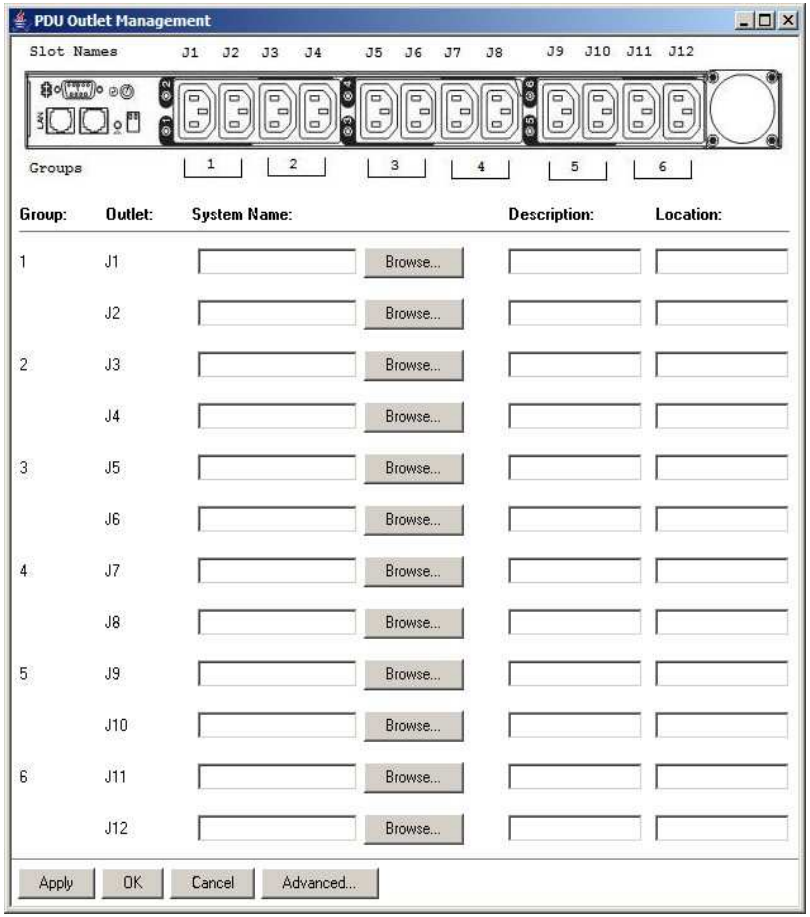


Temperature Trending

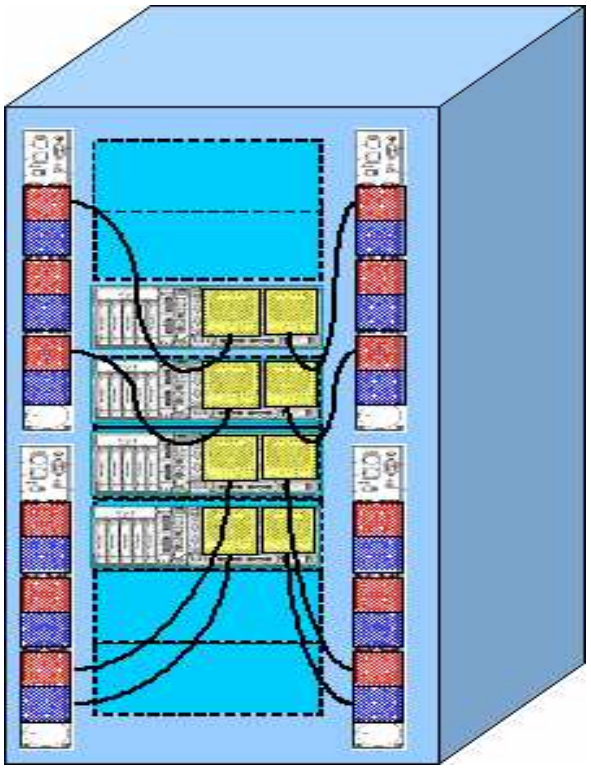
- Show temperature over time
  - Inlet temperature
  - Exhaust temperature
- Show Effective CPU available
  - Show less than 100% when capping or power saving is causing throttling.
- Select from 1 hour up to one year.

iPDU support

- Discover and monitor PDU+ units
- Support the IBM DPI PDU+
- Display trending information per load group
- Allows mgmt of P6 570, legacy, non-IBM, Storage, and other non-server IT equipment (such as I/O Drawers)
- Associate Director Managed Objects with load groups



PDU+ = Intelligent Power Distribution Unit



AEM sums power from both PDUs to show total server power

Energy monitoring and control features vary by Power server model

Systems Director Standard and Enterprise Energy Features

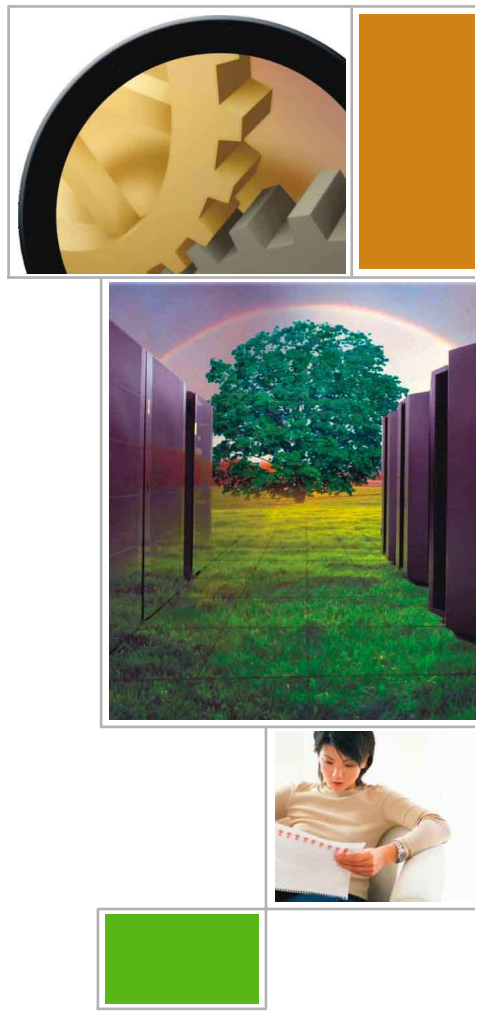
Feature / Model	Power Monitoring	Static Power Saver	Dynamic Power Saver	Optimize for Power savings	Power capping
Any Power 7xx	Yes	Yes	Yes	Yes	Yes
Power 520 and 550	Yes	Yes	Yes	Yes	Yes
BladeCenter JSxx	Yes	Yes	Yes	Yes	Yes
Power 570	(PDU+ only)	Yes			
Power 575* (water)	Yes	Yes			
Power 575* (air)	Yes				
Power 595*	Yes	Yes			
Any POWER5™ processor-based	(PDU+ only)				

* PDU is not an option for this model.

Summary

Active Energy Manager:

- A cornerstone of IBM's Big Green initiative
- Software tool that can provide clients with a single view of the actual power usage across multiple platforms
- Increases energy efficiency by controlling power use across the data center
- Controls energy consumption and improves energy efficiency which results in substantial savings and cost reductions
- Provides out-of-the-box management for single IBM System and BladeCenter while being able to provide a cross-environment view of power and thermal usage within an IT shop
- Cross-platform platform
  - IBM Systems new and legacy



Active Energy Manager demonstration

- **Objective**

This demonstation illustrates how you can monitor the power consumption of your Power Server and how to configure AEM to save energy if your server has less workload.

- **We choosed the following applications**

Swingbench running on Oracle 10g

- **Environment**
  - We used two **p520** managed by the same **HMC** located in the Montpellier PSSC Center
  - We installed a Virtual I/O Server on each p520
  - Oracle is installed on the **ORA** partition on p520

Software Infrastructure

P6 Servers : 2 p520

- Firmware Level EA320_030

VIO Servers

- Version 2.1.

AIX Micro-Partitions

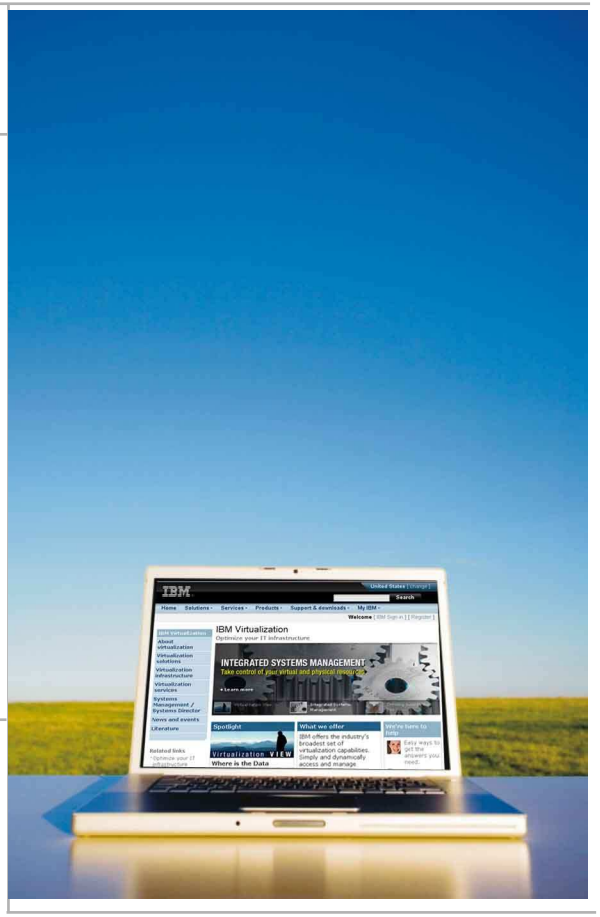
- Swingbench
- AIX Version 6.1 TL4 SP1
- Oracle 10g

IBM Systems Director

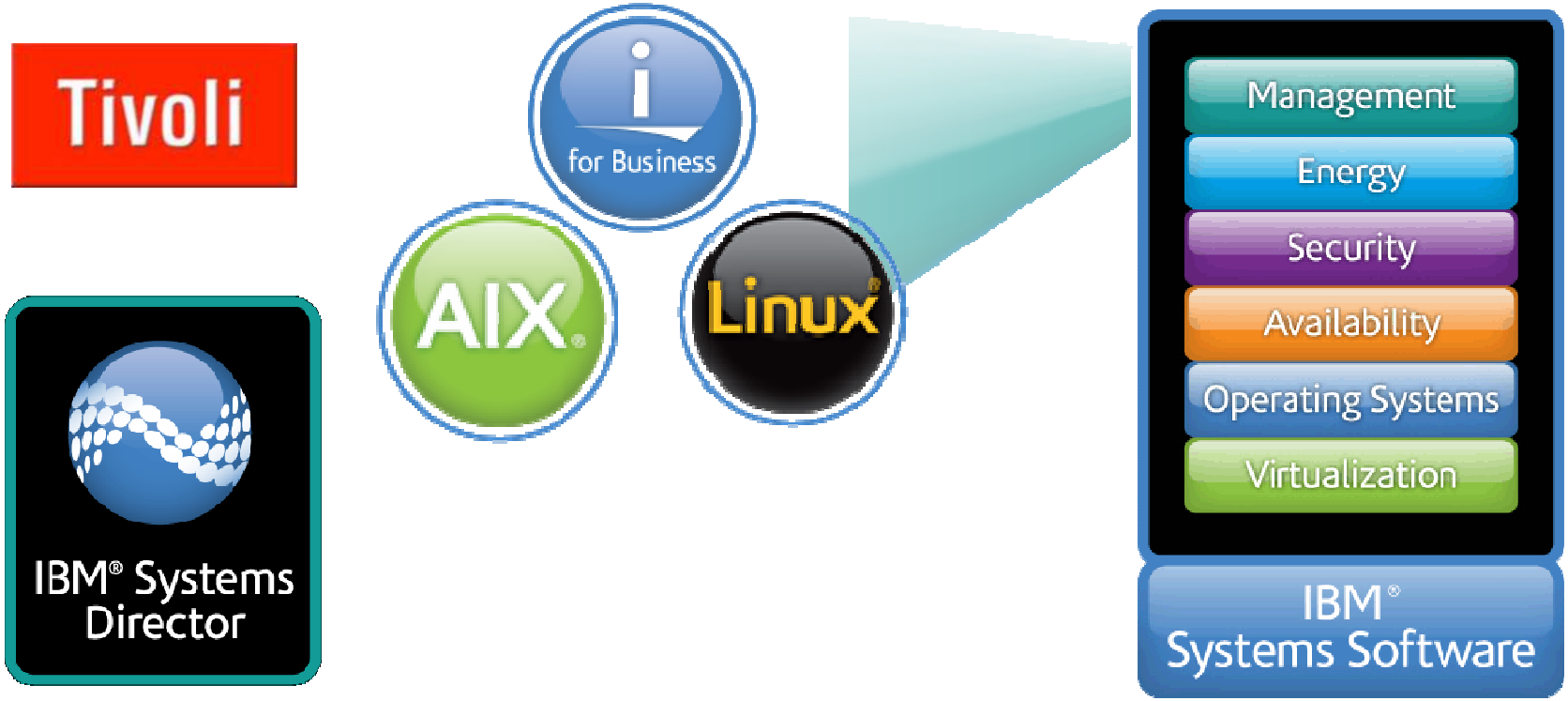
- Version 6.1.2

Additional information

- **ibm.com**/virtualization
- **ibm.com**/virtualization/systemsdirector
- **ibm.com**/systems/optimizeit
- **ibm.com**/systems/management/director/extensions/actengmrg



Integrated Service Management designed to…



Power your planet.

Smarter systems for a Smarter Planet.

Thank You