



Using active power management to slash data center energy costs

SVLG Data Center Energy Summit '08
Data Center Demonstration Project

Ken Oestreich

26 June 2008

Use Scenario

The User Environment:

- A F1000 technology provider firm in Silicon Valley, CA
 - Remaining anonymous; their policy does not permit public comments on technology decisions
- Multiple development and test engineering labs across 6 locations (domestic & overseas)
- Over 25,000 devices including servers & other specialized equipment

Case Study Overview & Context

Premise

- Data center assets are not in continuous use
- Equipment idle time is significant
- Idle equipment wastes considerable power
- Eliminating wasted power saves significant \$
- *Traditional data center management solutions do not solve this issue*

Context

- **EPA's report to congress, "state-of-the-art" scenario:** "Enable power management at data center level of applications, servers, and equipment..."



Thesis:

Policy-based power control can reduce power waste

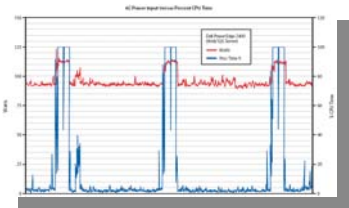
Case Study Overview – Project Requirements

User's Requirements:

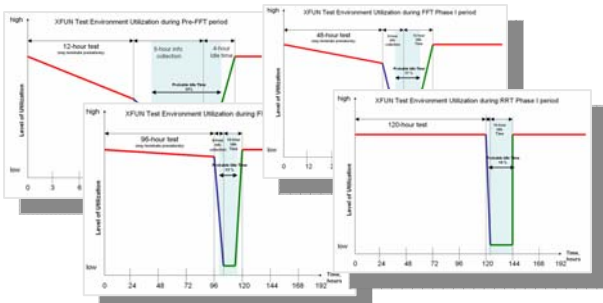
- Method to determine *what* devices are candidates to power up/down
- Method to determine *when* to power them up/down
- Approach to *safely* powering-up/down devices
- Hardware & software independent
- No change to existing architecture

To test thesis, company chose Cassatt Active Response to power-control the engineering lab pilot environments

Project Implementation: Summary



Individual device power consumption
 • *Measured*

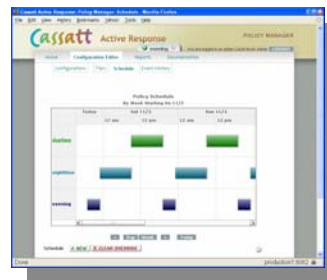
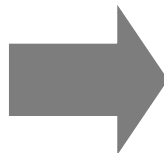


Device use/idle profiles
 • *Measured*
 • *Surveyed*

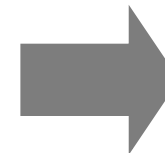
Test Name	Device ID	Location	Power (W)	Utilization (%)	Test Status
Test 1	1001	Lab A	1.5	100	Pass
Test 2	1002	Lab B	2.0	80	Fail
Test 3	1003	Lab C	1.8	90	Pass
Test 4	1004	Lab D	2.2	70	Fail
Test 5	1005	Lab E	1.6	95	Pass

Device counts, locations
 • *Asset DB*

© 2008 Cassatt. All rights reserved.



Implement Cassatt Active Response
 • *Power management policies*



Device ID	Location	Power (W)	Utilization (%)	Test Status
1001	Lab A	1.5	100	Pass
1002	Lab B	2.0	80	Fail
1003	Lab C	1.8	90	Pass
1004	Lab D	2.2	70	Fail
1005	Lab E	1.6	95	Pass

Analysis & business case
 • *Computed*



Findings - Measured

■ Phase I – Proof-of-Concept

- Preliminary use profile interviews = 26% device idle time
- Initial environment = 8 servers, 1 lab group
- Simulated idle time = 750 hrs (~ 6.5 hrs/day/server over 2 week period)
- Tested power cycles = 100 cycles (failure-free)
- Measured power savings = 65 kWh (29% of baseline power)

■ Phase II – Production Pilot

- Initial environment = 89 devices, 4 lab groups
- Simulated idle time = 17,000 hrs (~ 6.3 hrs/day/server over 6 week period)
- Tested power cycles = 3,500 cycles (failure-free)
- Measured power savings 2,400 kWh (26% of baseline power)

■ User Survey

- 53 respondents across 26 lab groups
- **Final use profile yielded 21%-27% device idle time**

Findings - Implications

- **Potential 1-year projection**
 - ~25,000 devices * .200 kW/device avg. * 21% idle * (24*365) =
- **Potential for the company:** (does not include indirect cooling cost savings)
 - **9,198 MWh/year**
 - **2,409 tons CO₂/year** (using California rate)
 - **\$ 1.055 million saved** (using California rate)
 - **\$ 310,000 max PG&E incentive** (@ \$ 0.08/kWh avoided)* for CA only
- **Potential for the Industry:**
 - Development & Test labs are ~ 20% - 50% of data center assets
 - Total US data center energy consumption (2006) = 61 billion kWh
- **Potential for Customers:**
 - Paybacks in < 1 year of implementation

Conclusions

Test Thesis:

Policy-based power control *can* reduce power waste.

Conclusions:

- Server power management software is a viable technology
- Energy & cost savings are real & compelling

“ ...[the best thing to do] is to turn your equipment off and stop it from drawing power”

~ Company Facilities Manager

Project Team

- **Concept Inception:**
Made at an SVLG-sponsored meeting on energy efficiency
- **Champions:**
Company Facilities – made internal engineering introductions
- **Who was Involved:**
 - Cassatt
 - The Company
 - Facilities management
 - Lab Engineering Services
 - Engineering groups
 - Executives
 - PG&E
 - Energy conservation programs
 - Account management

How Others Can Get Started

1. Form a cross-functional team (Facilities + IT)
2. Involve IT users (e.g. engineering groups)
3. Profile power consumption/usage – take data points
4. Characterize use patterns – use surveys, etc.
5. Manage IT equipment power using policy-based controls
6. Contact local utility re: efficiency incentives

Thank You