

Publications by the HP Labs Cool Team

Sample Links (2001 to 2006):

HPL-2006-55 2006
Report Title: Energy Flow in the Information Technology Stack: Introducing the Coefficient of the Ensemble at its Impact on Total Cost of Ownership
Report Author(s): Patel, Chandrakant D.; Sharma, Ratnesh K., Bash, Cullen E.; Beitelmal, M
View Full Text: <http://www.hpl.hp.com/techreports/2006/HPL-2006-55.html>

HPL-2005-107(R.1) 2005
Report Title: Cost Model for Planning, Development and Operation of a Data Center
Report Author(s): Patel, Chandrakant D.; Shah, Amip J.
View Full Text: <http://www.hpl.hp.com/techreports/2005/HPL-2005-107R1.html>

Keynote Smart Chip, System and Data Center

Patel, C.D., "Smart Chip, System and Data Center: Dynamic Provisioning of Power and Cooling from Chip Core to the Cooling Tower", Temperature Aware Computing Workshop, International Symposium on Computer Architecture ISCA-2005, Madison, WI
<http://www.cs.virginia.edu/~skadron/tacs05/>

HPL-2004-146(R.1) 2004
Report Title: Thermo-Fluids Provisioning of a High Performance High Density Data Center
Report Author(s): Beitelmal, Monem H.; Patel, Chandrakant D.
View Full Text: <http://www.hpl.hp.com/techreports/2004/HPL-2004-146R1.html>

HPL-2003-5 2003
Report Title: Balance of Power: Dynamic Thermal Management for Internet Data Centers
Report Author(s): Sharma, Ratnesh K.; Bash, Cullen E.; Patel, Chandrakant D.; Friedrich, Richard J.; Chase, Jeffrey S.
View Full Text: <http://www.hpl.hp.com/techreports/2003/HPL-2003-5.html>

Keynote Energy Aware Computing

Patel, C.D, Dec 2003, "A Vision of Energy Aware Computing from Chips to Data Centers", International Symposium on Micro-mechanical Engineering, ISMME, Hitachi Mechanical Engineering Research Laboratory, Tsuchiura, Japan
http://www.hpl.hp.com/news/2003/oct_dec/energy_talk.html

HPL-2002-329 2002
Report Title: Energy Aware Grid: Global Workload Placement based on Energy Efficiency
Report Author(s): Patel, Chandrakant; Sharma, Ratnesh; Bash, Cullen; Graupner, Sven
View Full Text: <http://www.hpl.hp.com/techreports/2002/HPL-2002-329.html>

Planetary Computing: Creating a Worldwide Computing Utility
<http://www.hpl.hp.com/news/2001/oct-dec/planetary.html>

2001

Patel, C.D., Bash, C.E, Belady, C., Stahl, L and Sullivan, D Beitelmal,A.H., Saad, M.A., and Patel, C.D., 2001, "*Computational Fluid Dynamics Modeling of High Compute Density Data Centers to Assure System Inlet Air Specifications*", ASME/JSME IPACK2001, Kauai
<http://www.hpl.hp.com/research/papers/power.pdf>

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Publications in Conferences and HP Labs External Technical Reports

1. Patel, C.D., Sharma, R.K., Bash, C.E., Beitelmal, M, “Energy Flow in the Information Technology Stack: Coefficient of Performance of the Ensemble and its Impact on the Total Cost of Ownership”, HP Labs Technical Report, HPL-2006-55
2. Beitelmal, M, Patel, C.D., “Model-Based Approach for Optimizing a Data Center Centralized Cooling System”, HP Labs Technical Report, HPL-2006-67
3. Bash, C.E., Patel, C.D., Sharma, R.K., “Dynamic Thermal Management of Air Cooled Data Centers”, IEEE Itherm, 2006
4. Chen, Keke; Auslander, David M.; Bash, Cullen E.; Patel, Chandrakant D, Local Temperature Control in Data Center Cooling: Part I, Correlation Matrix, HPL-2006-42
5. Chen, Keke; Bash, Cullen E.; Auslander, David M.; Patel, Chandrakant D., Local Temperature Control in Data Center Cooling: Part II, Statistical Analysis, HPL-2006-43
6. Chen, Keke; Auslander, David M.; Bash, Cullen E.; Patel, Chandrakant D., Local Temperature Control in Data Center Cooling: Part III, Application HPL-2006-46
7. Chen, Keke; Federspiel, Clifford C.; Auslander, David M.; Bash, Cullen E.; Patel, Chandrakant D. Control Strategies for Plenum Optimization in Raised Floor Data Centers HPL-2006-47
8. HPL-2006-11 Dynamic Thermal Management of Air Cooled Data Centers - Bash, Cullen E.; Patel, Chandrakant D.; Sharma, Ratnesh K.
9. HPL-2006-12 Viability of Dynamic Cooling Control in a Data Center Environment - Boucher, Timothy D.; Auslander, David M.; Bash, Cullen E.; Federspiel, Clifford C.; Patel, Chandrakant D.
10. Patel, C.D., Shah, A., “Burdened Cost of Power – A Key Market Driver of the Future Information Technology Industry”., 2005, IMAPS Advanced Technology Workshop on Thermal Management, Palo Alto, California
11. Bash, C.E., Patel, C.D., Sharma, R.K., “Dynamic Thermal Management of Air Cooled Data Centers”, 2005, IMAPS Advanced Technology Workshop on Thermal Management, Palo Alto, California
12. Patel, C.D., Shah, A., “Cost Model for Planning, Development and Operation of a Data Center”, 2005 HP Labs External Technical Report, HPL-2005-107R1
13. Patel, C.D., Bash, C.E, Sharma, R.K., Beitelmal, A., Malone, C. G., “Smart Chip, System and Data Center enabled by Flexible Cooling Resources”, 2005, IEEE Semitherm, 2005, San Jose, California
14. Moore, Chase, Ranganathan, Sharma, “Making Scheduling "Cool": Temperature-Aware Workload Placement in Data Centers”, USENIX-05, Anaheim, CA, April 2005
15. Sharma, R.K., Bash, C.E. and Patel, C.D., “Inkjet Assisted Micro-scale cooling of Electronics
16. Enabling device compaction by efficient thermal management”, 2005 NSTI Nanotechnology Conference, Anaheim CA, May 8-12, 2005
17. HPL-2005-65 Experimental investigation of data centers performance - SHI-based thermal management and provisioning impact of multiple CRAC unit fan flows - Sharma, R.; Bash, C.; Patel, C.

18. Shah, A., Carey, V.P., Bash, C.E., Patel, C.D. "Impact of Chip Power Dissipation Profiles on Thermodynamic Efficiency", 2005, IEEE Semitherm, 2005, San Jose, California
19. Shah, A., Carey, V.P., Bash, C.E., Patel, C.D. "Exergy Based Optimization for Multi-Component Data Center Thermal Management: Part 1, Analysis", 2005 ASME InterPACK2005, San Francisco, California
20. Shah, A., Carey, V.P., Bash, C.E., Patel, C.D. "Exergy Based Optimization for Multi-Component Data Center Thermal Management: Part 2, Validation", 2005 ASME InterPACK2005, San Francisco, California
21. Vargas, S., Fabris, D., Gonzalez, J. E., Sharma, R., Bash, C., Ortiz, L., Cartagena, J., "Fast Transient Micro-Boiling Characterization", Submitted to Proceedings of HT2005, 2005 ASME Summer Heat Transfer Conference, San Francisco, CA, July 2005
22. Beitelmal, A., Patel, C.D., "Thermo-fluids Provisioning of a High Density Data Center", 2004, HP Labs External Technical Report, HPL-2004-146R1
23. Patel, C.D., "Sustainability – A Key Market Driver of the Future Information Technology Industry"., 2004, IMAPS Advanced Technology Workshop on Thermal Management, Palo Alto, California
24. Shah, A., Carey, V.P., Bash, C.E., Patel, C.D., "An Open-System, Exergy-Based Analysis of Data Center Thermal Management Components", 2004, IMAPS Advanced Technology Workshop on Thermal Management, Palo Alto, California
25. Shah, A., Carey, V.P., Bash, C.E., Patel, C.D., "An Exergy Based Control Strategy for Computer Room Air-Conditioning Units in Data Centers", ASME, IMECE 2004-61384, ASME International Mechanical Engineering Conference and Exposition, Anaheim, CA, USA
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31. Patel, C.D, Dec 2003, "A Vision of Energy Aware Computing from Chips to Data Centers", International Symposium on Micro-mechanical Engineering, ISMME, Hitachi Mechanical Engineering Research Laboratory, Tsuchiura, Japan [KEYNOTE]
32. Patel, C.D, Sharma, R, Bash, C.E, Graupner, S, June 2003, "Energy Aware GRID: Global Service Placement based on Energy Efficiency of the Cooling Infrastructure, 2003, ASME International Mechanical Engineering Conference and Exposition, Washington D.C., USA

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