Data Centers: Energy Efficient, Cost effective, Fast to build

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Yahoo!, Inc.
Yahoo! Data Center, Lockport NY Phase 1 YCC cooling system
Yahoo! Concept, patent pending

Partners:
• Structuretone Inc. (builder)
• HP Mission Critical Facilities, EYP (Mechanical Engineering)
• PKJB LLC (Architect)
• Wendel Companies (Civil Design and Commissioning support)
• Cupertino Electric Inc. (Electrical Engineering)

Project conceived in June 2009 and commissioned July 2010

This project represents Yahoo!’s goals to build high efficiency Data Centers at lower cost utilizing a unique approach to cooling systems (Yahoo! Computing Coop, Y!CC) AKA “Chicken Coop”
The Objective and reasoning behind it

Keeping in alignment with Yahoo! goals to find more efficient means of cooling servers, the key objective is the removal of waste.
Project Background (Why)

- Energy to Cool (% of overall facilities consumption) data center facilities ranged from a best of 35% to a high of 55%.

- Avg ~3% loss through multiple voltage transformations (Util→MV, 480V→208V.)

- Additional UPS losses ranged from ~20% to 8%.

- Additional 30% losses in computer power supplies very common.

- Avg PUE (power utilization efficiency) = ~2.0 (2.46 if you count server power supplies)
Approach, Results, Deliverables

- Choosing locations with suitable climate to enable use of evaporative cooling for short periods of time during the hottest hours of the year
- More hours of free cooling
- Validation of the Yahoo Computing Coop (Y!CC) design
- Implementation of design into construction under 12 months.
Game changing

- Reduced total cooling energy consumption by 90% over legacy data centers
- Free air cooling 99% of the time, using evaporative cooling to make up the remaining hours
- Drastic reduction in water consumption over water cooled chiller plant (millions of gallons/yr.)
- Industrialization of the data center
- Faster to build, lower cost and environmentally friendly
Energy Savings

PUE = Total Facility Energy

IT Equipment Energy

- Legacy data centers measure of efficiency in PUE (Power Utilization Efficiency) between 1.5 and 2.0
- Y!CC Design PUE = 1.08
- Y!CC Constitutes approximately 42-92% cooling energy savings
- Sustainable in climate zones similar to Lockport, NY
Jobs/Employment

• The Lockport, NY construction project employed over 300 trade workers
• Yahoo! Committed to employing 125 full time employees to work at the Lockport location
• The Y!CC Design is repeatable on a national and international level
• Y!CC Design currently under construction in Central Washington State and Switzerland
Project Status

- The Lockport, NY project – Phase 1 and Phase 2 are complete and functional

Lockport, NY
Project Status

• Additional Y!CC Projects are currently under construction and more to come

Central WA

Switzerland
What’s left?

Starting in April we will begin a 12 month test study comparing our previous generation efficient data center to the Y!CC Project in Lockport. This will help validate the overall energy efficiency gains for this design.

We will be measuring monthly PUE average to determine ultimate PUE based on an actual load.
After ITP Sponsorship

• Yahoo! will continue to develop energy efficient systems and work towards our goal of being the industry leader in data center development

• The next area of focus is the electrical systems and removing losses in transformation and inefficient power supplies

• Continue to develop utility computing solutions to reduce the reliance on inefficient UPS Systems
Value proposition for end user

- Yahoo! has filed application for patent for the Y!CC Technology
- Once patent has been issued, Yahoo! will consider licensing agreements
- Many articles have already been published on the Y!CC Technology, by using your Yahoo! Search page, you can find many reference links on the subject and more...Just type in “Yahoo Datacenters”