

## ***Toward 10x Improvement in Data Center Efficiency***

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## ***Do We Really Need 10x Improvement?***

- ❖ **Most data center growth is from Web2.0 based cloud computing applications**
- ❖ **Compared to traditional desktop apps, these programs are a big step backwards**
  - ◆ **Imagine if your desktop were as fragile as the net**
  - ◆ **Big brother isn't snooping your data, he owns it**
  - ◆ **All upgrades are now mandatory**
  - ◆ **When you provider goes under, so does your data**
- ❖ **But value does exist (e.g., community, ubiquity)... so please step up the application innovation!**

## How To Get 10x Efficiency Improvement

### ❖ **Proposal #1: Rethink the Economics of Operation**

- ◆ Efficiency reduces operating costs
- ◆ Efficiency protects the earth

### ❖ **Solution: Seek out more economical and greener energy and cooling...for instance:**



Nuclear power  
in Antarctica



Geothermal power  
in Mariana Trench



Solar power  
in space

## How To Get 10x Efficiency Improvement

### ❖ **Proposal #2: Re-purpose data centers**

- ◆ Most center components have high thermal efficiency
- ◆ A 17,500 node center with 300W blades and 4.75 CoP A/C has 80% thermal efficiency, higher with more solid state
- ◆ According to Sun, this is 80,000x greater efficiency than a center purposed for computing (at 0.001% efficiency)

### ❖ **Solution: utilize co-generation...**



Central Heating  
And Cooling



Food Production  
And Preparation



Power  
generation

## ***How To Get 10x Efficiency Improvement***

- ❖ **Proposal #3: Communal Computing**
  - ◆ Use idle cycles on the user's computers
  - ◆ Data center is composed of a massive number of widely dispersed machines
  - ◆ Has great potential to address many performance, availability, and privacy issues
  
- ❖ **Solution: data centers @ home...**

