What eBay really wants to buy.

Charles Kalko
Operations Strategist, eBay Technical Operations
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In 2006 we realized that our exponential growth of our site was unsustainable:
- We were going to have to start building multiple data centers/year.
- That cost of running our site was going to affect our business.

We also realized that technology was now limiting the growth rate of our business:
- The business was literally waiting for operations to build out new capacity.

We needed to change our mind set from always build new to a more mature managed approach.

2006 is the year that eBay needed Green Metrics.
eBay – Some Interesting Numbers

- 241+ million registered users
- 160+ million plus Items
- 8 million plus new items per day
- 58.5 billion SQL transactions per day
- 800+ production database instances (inc replicas)
- 100+ clusters
- ~4PB production data
- ~8PB data warehouse
Our definition of Parallel Efficiency is: A even distribution of workload across a parallel processing environment.

- An Example: Evenly distributing a workload across application servers in many disparate locations.

- We generate the metric by sampling the max average and min average of pool members at peak load.

- A pools capacity is based on its worst members.
  - Since pools might have three or four generations of hardware in them

- We had a homogenous work load on heterogonous hardware.

- For example:
  - If the Max average CPU of the pool = 90% (old servers)
  - and the Min average CPU of the pool = 60% (new servers)
  - then Pool Utilization is said to be 90% (old servers dominate)
Our main metric Transactions/Watt

- We have seen significant growth in CPU capabilities
- Nearly 12:1 improvement for some of our workloads
- Cost of servers are largely flat
- Multi-core is paying off in Transactions/Watt
- Cost of operating a server far outweighs the initial outlay

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Managing Transaction/Watt with Tech Refresh

• We stopped purchasing servers and started leasing them.

• Using PE in conjunction with hardware upgrades gave us a finer level of control over our IT load.
  – We could now manage pool workload horizontally and vertically

• We could now leverage our IT load by tuning our pools based on seasonal demand.

• We are staying inside of Moore’s Law
  – We can double our site capacity every 18 months and still stay in the same footprint.
The results of our efforts

Volume Trend

The Data Center we don't have to build
What we expect from our OEM’s today.

• Our primary metrics are Transaction/Watt and $/Watt
  – We benchmark all new platforms to determine performance to cost
  – How do we optimize our power consumption?
  – Right sized power supplies
  – Lower power CPU’s
  – Smarter power management (larger and smarter fans)
  – Flexible leasing return options.

• We are also asking for other things
  – A SKU to order less wasteful packaging and filler.
  – Shipping a fully built out and burned in rack of systems.
What we are expecting from our OEM’s tomorrow.

• We are starting to track our Green House Gas emissions.
  • What is the embedded cost of energy in manufacturing and disposal.
• A more generic performance to cost metric, than our workloads.
• More efficient power supplies at lower utilization
  • With on board battery backup similar to the Google model.
• Higher inlet temperatures (28C ~ 30C)
• Higher exhaust temperatures (for better $\Delta T$)
• Liquid cooling
• Reduced components on the system.
  • Delete USB and LED’s
  • Stripped down video cards
  • SSD vs. Spindles?