Parris Khachi
Andrew Manoske
What is Tesla?

• Tool for capturing both the power consumption, carbon footprint of computer systems over time.
  – Power draw changes based off of both how we use computers and what computers we use (i.e.: the components within them)

Tesla is designed to empower individuals and organizations with the information they need to minimize their computing carbon footprint and maximize their computing power efficiency.
So, Why Should I Care?

• [Power] is [money]
  • 10-30% of IT expenses utility costs for electricity (Oliver Wyman / Mercer Consulting) – HVAC, direct power
  • Electricity costs -> Reduced productive output
  • Examples of $ in power cost optimization: NetApp
    – Simple measures saved 41,184 KWh per mo.
    – Result: $58,000 in OPEX savings per mo.

• And soon CO2 is too...
  – Movement to make Carbon Dioxide criteria pollutant under EPA definition.
  • Firms need to care about how much CO2 they produce.
  – Carbon dioxide credits: reality for corporations, speculation opportunities for internatl. finance - Kyoto
Market Dynamics: Welcome to the Wild West.

- **Plenty** of market opportunities in this area.
  - Hardware tools are accurate but expensive.
  - Software:
    - Proprietary: ($$$$$$, hardware specific)
    - ACPI Utils: (free, Linux/Unix only)
  - No Windows consumer level applications out there.
    - None that capture carbon footprint.
Why Tesla is the fastest gun in the west:

- Hardware-agnostic Windows client (later OSX + Linux w/ Mono)
- Captures point-in-time statistics for BOTH CO2 and W/h as a function of usage.
- Creates meaningful web-based statistics, graphical trending analysis, exportable to .csv.
  - Use with Stata/SPSS/SAS for powerful regression analysis (see more later)
Technology: A Tale of Two Components

Client
- C# .NET
- WMI
- SQL
- Win. Services
- HttpRequest

Server
- Silverlight
- C# XAML
- PHP (Cake PHP RC 1.3)
- Croogo 1.3 Beta
- LiquidCanvas + Excanvas
- JQuery
- MySQL
How It Works: The Client

• **Use proxies to determine power consumption**
  – Example: Processors
    • Power consumption = F(Utilization, Thermal Design Power (TDP)).

• **Capture point in time vars to determine wattage.**
  – E.g.: processor - Get processor utilization via WMI
  – Cross-ref. TDP w/ utilization, frequency (overclocking and underclocking)
    • TDP data from vendor, testing in gaming and enthusiast blogs (techreport.com, anandtech.com, even wikipedia). Cooling.

• **Service report findings to server.**
  – Runs in background invisible to user, controlled by GUI
  – Send it off to the server!
    • HttpRequest sent on timer from Windows service.

• **Modularity: everything can be customized or independent**
  • GUI
  • Windows Service or Daemon
  • Win API calls
How It Works: TeslaProject.com

• User accounts, and the ability to track machines via graphs or CSV files
  – With access control features!
• Blogging and community interaction
• Community Awards/Badges offered to leading users
  – To drive users to come back
• A gateway to post data
  – The data is held in a database and will periodically be rearranged in order to simplify charting
  – Old data will be held in CSV files for regression analysis
• Modularity
  – The features of Tesla can be imported into almost any web application (with some tweaking of course).
  – Web Service for TDP
Business Applications of Tesla

• See how a computer contributes to network power consumption, carbon footprint.
• Regression Analysis for cost optimization
  – Integrate Tesla data into economic models
    • Impact of electricity on production factors, optimal levels of output (modify Cobb Douglas Prod. Fcn.)
    • Feature enhancement: Correlation analysis to determine how certain processes affect power util. and production capabilities.
      – Financial impact of optimized vs. non-opt. programs
Biz. Reactions to Tesla’s Value Prop.

• “[Tesla] is a remarkable achievement, as most programs that address this sustainability need operate only for very large organizations and [are] implemented at a very high cost.”
  – Joe Capella, VP of Marketing at Yoh

• “Very cool. The industry needs something like this.”
  – Peter Perrault, Prog. Man. Env. Sustainability at NetApp

• Several smaller companies want to try beta testing Tesla.
From Niche to Product

• Completely free to individual users
• Users with install bases of over 50 need to “go premium”
  – Offers more statistical analysis and tools
  – Host their own copy of Tesla
    • Maximizing their internal security
    • Modularity allows for customizing to their own business needs
  – Hosting or Summaries at teslaproject.com
• Tax Incentives for using Tesla?
Questions?