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Visualizing the Power Quality of Websites

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Motivation

- Power consumption of Internet still increasing
- Several approximations exits, e. g. an approximated consumption in 2007 of 208 TWh power
- In Germany the power consumption of Data Processing Centers is estimated with 8.67 TWh power, that means 1.42% of the complete Power Consumption in Germany
- Several Approaches can reduce this consumption
  - Better hardware
  - Virtualization
  - Efficient algorithms and efficient Software

II. The “Power Indicator” Application
### Overall Architecture

- **Database (PostgreSQL)**
- **Application Server (Zope, Python)**
- **Content Management System (Plone)**
- **Firefox (XUL, JavaScript)**
- **Community**

### Order of Events

The database request proceeds as following:
1. Load a Website into Firefox
2. Send the URL to the Application Server via HTTPS
3. Identify the corresponding IP
4. Identify the corresponding provider in the database (if an entry is available)
5. Send information about the Green Power status to the Firefox client
6. Visualize the Green Power status within Firefox

### III. First Usage Results
Test results

A test phase with 10 users over 1 week yields to the following results:

<table>
<thead>
<tr>
<th>Provider</th>
<th>Energy Provider</th>
<th>Hits</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internex GmbH</td>
<td>Greenpeace Energy</td>
<td>150</td>
<td>6,95%</td>
</tr>
<tr>
<td>Gernsache consult</td>
<td>Elektrizitätswerke Schönau</td>
<td>77</td>
<td>2,81%</td>
</tr>
<tr>
<td>Wissenschaftlaiden Dortmund</td>
<td>Elektrizitätswerke Schönau</td>
<td>19</td>
<td>0,59%</td>
</tr>
<tr>
<td>dieDeep GmbH</td>
<td>Greenpeace Energy</td>
<td>11</td>
<td>0,43%</td>
</tr>
<tr>
<td>Flora IT-Dienstleistungen</td>
<td>Greenpeace Energy</td>
<td>4</td>
<td>0,16%</td>
</tr>
<tr>
<td>New Media Markets &amp; Networks GmbH</td>
<td>Greenpeace Energy</td>
<td>2</td>
<td>0,08%</td>
</tr>
<tr>
<td>auto.net</td>
<td>Greenpeace Energy</td>
<td>2</td>
<td>0,08%</td>
</tr>
<tr>
<td>f.a.V.</td>
<td>Unknown</td>
<td>19</td>
<td>0,73%</td>
</tr>
<tr>
<td>Jannsen</td>
<td>Unknown</td>
<td>225</td>
<td>89,06%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>253</td>
<td>100,00%</td>
</tr>
</tbody>
</table>

Advantages of the Application

- Light weighted Software, available as a Firefox extension
- The information about the power quality is independent from the Website
- The connection to our server is encoded (HTTPS)
- "Green Power" has several quality levels => These levels can be maintained and visualized by the user

Limitations

- Up to now, the "Power Indicator" is just prototypical implemented
- Only internet providers (10) and power providers (2) from Germany are available
- The success of the application is strongly related with quality and the amount of the data basis
- Up to now restricted to Firefox
- Analysis of usage is restricted regarding privacy protection
Future Work

- Implement the application on other browser platforms
- Motivate some stakeholders to set up a community to maintain the data
- Up to now, the content is stored in a database. In the future it would be reasonable if the provider provide a certified green power state directly (or use meta data of a Website):

Summary

- The “Power Indicator” visualizes if a Website is hosted with Green Power
- The client application bases on Firefox, in the backend we use Python, Zope, Plone, and PostgreSQL
- The “Power Indicator” is part of our project “Greening Our Web” and part of “Sustainability Informatics”
- To avoid a rebound effect, the transferred data volume is very small
- We plan to fulfill the data base and to set up a community to look for the data quality and for criteria of Green Power

End.

Thank you for your attention.

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