



Data Visualization

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SpinSpire: Enterprise Drupal!

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[Jacksonville, FL](#)

Brave New World of Data Visualization

Old paradigm:

- Send data to server
- Server returns raster image to browser
- Embed returned image in ``



HTML5:

- Canvas vs Scalable Vector Graphics (SVG)
- Canvas: HTML element used for drawing graphics using scripting. Raster-based.
- SVG: Vector-based. XML-based syntax. Therefore, DOM can be manipulated dynamically. Interactivity through event handlers

Our Data Visualization Needs

- Charting to support wind measurements for the wind energy industry
- Wind speed, direction and other data is generated daily and sent by email
- Daily data is inserted into DB
- Huge amount of data
- Owners want to visualize data:
 - Aggregations of data
 - Correlations between data series
 - Other relationships

Which Data Visualization Tool?

- Did not want "dead" images, wanted "live" charts
- Wanted ability to create custom charts
- Wanted scalable solution
 - Did not want limitations on size of image
 - Did not want to make multiple trips to server
- Vector graphics was the logical choice
- Google Chart Tools is free, provides good documentation, stable

Google Chart Tools

- SVG-based charting
- Javascript API for Web data visualization package
- The data is processed and rendered by the browser and is not submitted to any server
- Good selection of chart types
- Render data along with chart
- Multiple charts on the same page
- Interactive charts



Pie



Radar



Column



Line

Demonstration

DataWizard.me

- Line Chart
- Polar Chart
- Frequency Chart
- Table of data
- SVG code for chart

Google Chart Tools JS API

1. The Google JSAPI API: <https://www.google.com/jsapi>
2. The Google Visualization library
 - a. `google.load('visualization' '1.0', {'packages':['corechart']});`
3. The package(s) for the chart itself
 - a. `google.load('visualization', '1.0',
{'packages':['corechart', 'table']});`
1. After libraries have finished loading, callback is used to call function `drawChart`.
 - a. `google.setOnLoadCallback(drawChart);`
2. function `drawChart()` contains code to create `dataTable` and draw chart

DrawChart function

```
function drawChart() {  
  var data = new google.visualization.DataTable();  
  data.addColumn('string', 'x-axis-data');  
  data.addColumn('number', 'y-axis-data');  
  data.addRows([row]);  
  var options = { ... };  
  var chart = new google.visualization.LineChart  
              (document.getElementById('chart_div'));  
  chart.draw(data, options);  
}
```


google_chart_tools module

- Review of module
- Review of js file

Data Import

- Daily email processing on Windows
 - VBScript: Process email, extract attachment
 - Copy file to Linux server
 - Move file to archive directory in Windows
 - Run a process on linux to import data into DB
- On Linux
 - Shell script to process data file
 - Tricky because top of file is metadata
 - Import data into MySQL

Data Visualization for Wind data

- Create separate database for our data
- Created custom module winddata
 - Used Forms API for users to change settings of chart
 - Used Database Abstraction layer to extract data from DB, aggregate data
 - Other manipulations of data
- Added interactivity: Tooltip
- Added table at the bottom of chart

Demonstration

- Form elements
- Options for charts
 - Chart title, size
 - Legends
 - X-axis/Y-axis label, min, max, grid
- Tool tip

Custom Chart

- Created a custom chart: LineChartXY
 - x-axis data numeric
 - Two datasets are plotted, each dataset had different x-values
 - Background SVG elements: circles, lines and text
 - In custom module, added `svg_element` to `settings[]`
 - `array('element' => 'circle', 'attributes' => array('cx' => $size / 2, 'cy' => $size / 2, 'r' => $i * $svgScale, 'stroke' => '#aaaaaa', 'stroke-width' => 1, 'fill' => 'none',)`
- To create custom SVG added listener
 - `google.visualization.events.addListener`
 - 'ready' event
 - SVG element is assembled and `appendChild` is used to add to existing SVG chart

What else is possible?

- Combo, Geo, CandleStick, Bubble
- Event Handling:
 - select
- Transition Animation
 - Change value
 - Add/remove rows
 - Add/remove columns
- Add toolbar:
 - Export the underlying data into a CSV file or an HTML table

Q&A

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