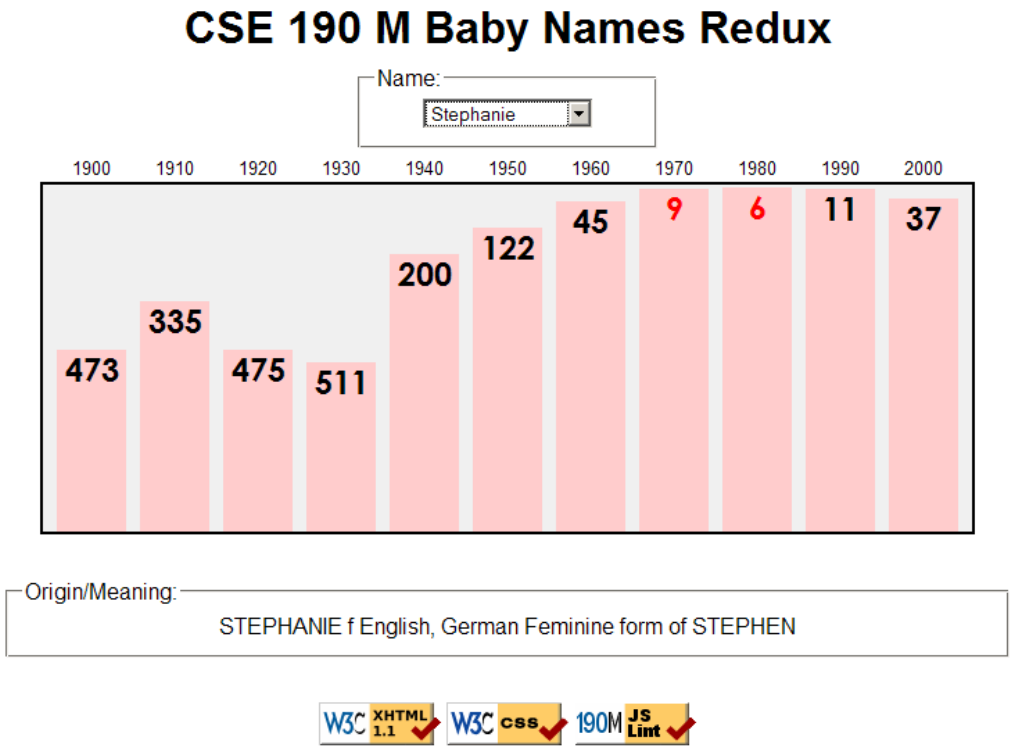
University of Washington, CSE 190 M, Spring 2009
Homework Assignment 7: Baby Names Redux
due Wednesday, May 20, 2009, 11:30pm electronically

Special thanks to Nick Parlante for the original idea of this nifty assignment!
also see: http://www.peggyorenstein.com/articles/2003_baby_names.html

This assignment tests your understanding of fetching data from files and web services using Ajax (Asynchronous JavaScript and XML). You must match in appearance and behavior the following web page:



Every 10 years, the Social Security Administration provides data about the 1000 most popular boy and girl names for children born in the US, at http://www.ssa.gov/OACT/babynames/. Your task for this assignment is to write the JavaScript code for a web page to display the baby names, popularity rankings, and meanings.

You do not need to submit any `.html` or `.css` file. We will provide you with the HTML (`names.html`) and CSS (`names.css`) code to use. Turn in the following file:

- `names.js`, the JavaScript code for your Baby Names web page

This program uses Ajax to fetch data from the Webster server. Please note that Ajax can only connect to a web server from a page located on that same server. This means that **you must upload your page to Webster and test it by viewing it on Webster**. If you try to fetch data from Webster while viewing the page from your local hard drive, the request will fail with an exception.

Data:

Your program will read its data from a web service located at the following URL:

```
https://webster.cs.washington.edu/babynames.php
```

This web service accepts three different types of queries, specified using a query string with a parameter named `type`. Each type of query returns text or XML as its output. (You can test queries by typing in their URLs in your web browser's address bar and seeing the result.) If you submit an invalid query, such as one missing a necessary parameter, your request will return an HTTP error code of 400 rather than the default 200. If you submit a query for an unknown name, your request will return an error code of 404.

1. The first type of query is `list`, which returns plain text containing all baby names on file, with each on its own line. The following query would return the results below (shortened by ...):

   ```
   https://webster.cs.washington.edu/babynames.php?type=list
   ```

   ```
   Aaliyah
   Aaron
   Abagail
   ...
   ```

2. The second type of query is `rank`, which returns an XML document about that baby name's popularity rank in each decade. The `rank` query requires a second parameter named `name`.

   The overall XML document tag is called `<baby>` and has an attribute `name` for the baby's first name. Inside each `<baby>` tag are `<rank>` tags, one for each decade. Each `<rank>` tag contains an attribute `year` representing the year of data. The text in the `<rank>` tag is that name's popularity in that year.

   The data has 11 rankings per name, from 1900 to 2000, from 1 (popular) to 999 (unpopular). A rank of 0 means the name was not in the top 1000. The following query would return the results below:

   ```
   https://webster.cs.washington.edu/babynames.php?type=rank&name=morgan
   ```

   ```
   <baby name="Morgan">
       <rank year="1900">430</rank>
       <rank year="1910">477</rank>
       ...
       <rank year="2000">25</rank>
   </baby>
   ```

   Though the provided web service always returns data starting at 1900 and running until 2000, you should not rely on the starting year being 1900. Your code should examine the XML to determine this.

3. The third type of query is `meaning`, which returns text about that baby name's meaning. The `meaning` query requires a second parameter named `name`. The following query would return the results below:

   ```
   https://webster.cs.washington.edu/babynames.php?type=meaning&name=martin
   ```

   ```
   MARTIN m English, French, German From the Roman name Martinus, which was derived from Martis, the genitive case of the name of Roman god MARS.
   ```

   All names returned by the `list` query have ranking data, but not all will have meaning data. In such a case, do not display any text in the Origin/meaning area (and clear any text that used to be there).

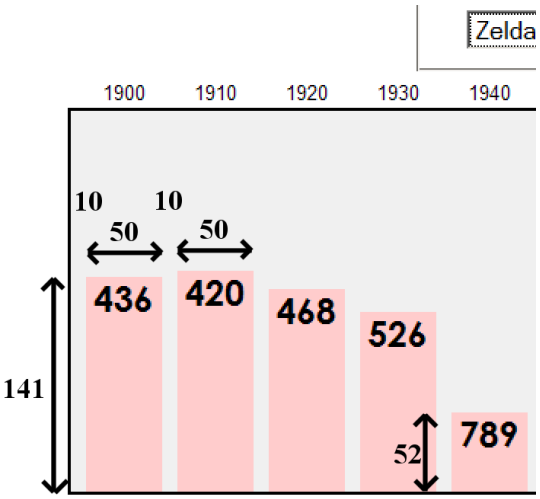
You may assume that all XML and text data sent to your program is valid and does not contain any errors. You may also assume that the web app is reachable at the time your code runs.

Appearance and Behavior:

The HTML page given to you shows a heading followed by a `select` element with `id` of `babyselect`. When the page first loads, the box is empty and disabled. In the background the page should fetch the name data from the web service as described in this document, fill itself with an option for each name, and then enable itself.

There is also a large 670x250px shaded bar graph section in the center of the page that is initially blank. If a name is selected from the selection box, this shaded section is filled with bars representing that name's popularity for each year in the data. Any data from a previous name should be cleared from the graph. Nothing should happen if the user selects the "Select a name..." option in the list.

The bars are positioned absolutely with respect to the overall shaded graph section. Each ranking bar's width is 50px; its height is one fourth as many px as the "inverse ranking" for that decade. The inverse ranking is defined to be 1000 minus the ranking. For example, the ranking of 880 leads to a bar with a height of 30 (one fourth of 1000 - 880, or 120). (Note that division is exact in JavaScript; `13 / 4` is `3.25`. You will want to round down any height values you compute using `Math.floor` or `parseInt`. Their x-coordinates are such that the first bar's left edge is 10px from the left edge of the graph section, and there are 10px horizontal space between bars. The first bar's left corner is at x=10, the second is at x=70, the third at x=130, and so on. All bars' y positions are such that their bottoms touch the bottom of the shaded graph area.



Within each ranking bar appears the ranking number for that name in that decade. The numbers appear in an 18pt sans-serif font, top-aligned and horizontally centered within the bars. If the ranking is very popular (1 through 10 inclusive), it should appear in red. Some less popular rankings (around 900 and up) have numbers that drop below the graph region's black border; this is expected behavior.

The provided CSS file contains a class named `ranking` that contains all necessary properties for these bars, except the x/y positions and height, which differ for each bar. Create a DOM element for each bar and assign this class to it. The element itself is the bar, and its inner text content is the ranking.

Above each ranking bar, at the top of the shaded graph region, are labels representing the corresponding years. These are positioned vertically 1.5em from the top of the shaded region and centered horizontally within the ranking bar's width. The provided CSS file contains a class named `year` that contains all necessary properties for these elements other than their x positions, which differ for each year label.

Underneath the ranking bars appears a paragraph of text explaining the meaning of the name shown. When a new name is chosen, that name's meaning information is loaded asynchronously and appears underneath the graph. Inject the relevant text into the paragraph with `id` of `meaning`.

error messages: If an error or exception occurs during any Ajax request, your program should show a descriptive error message about what went wrong. For full credit, your error message should not be an `alert`; it must be injected into the HTML page. The exact format of the error message is up to you, but it should at least include the HTTP error code and some descriptive error text. It is **not** an error if a name has no meaning data; this is expected for some names. Do not show an error message in such a case.

All other style elements on the page are subject to the preference of the web browser. The screenshots in this document were taken on Windows XP in Firefox 3, which may differ from your system.

Extra Features:

In addition to the previous requirements, you must also complete **at least one of the following additional**

features. If you want to complete more than one, that is fine, but only one is required.

- **better loading feedback**: The page as currently described does not give the user very good feedback while it is loading its data, both initially (loading the list of names) and subsequently (when a name is chosen and that name's XML data must be fetched). Consider adding code to display a "Loading" message, loading styles on the page (such as "graying out" items or putting placeholder text into them), or even an hourglass mouse cursor (achieved by using the CSS `cursor` property).

  To help you test this functionality, the `babynames.php` service can accept an optional query parameter named `delay`, whose value should be an integer representing a number of seconds of delay that the server should wait before sending its response. For example, requesting the following URL would retrieve the rankings for the name "Stefanie" after a delay of 10 seconds:

  ```
  https://webster.cs.washington.edu/babynames.php?type=rank&name=stefanie&delay=10
  ```

- **ability to compare multiple names**: By default the page displays data about one name at a time. Consider adding code so that if a second name is chosen, the previous data remains, with the new data superimposed in a different color. This provides a way to compare the relative popularity of the two names over time. You should add some sort of "Clear" button so that the user can erase previously shown names.

  You'll have to decide some of the details such as what to show in the Origin/Meaning box, and exactly how to show both sets of bars cleanly. There is no exact specification of the appearance, so long as both sets of bars show up and can be seen. You can decide what should happen if the user chooses a third name: Does the first name go away, leaving only the most recent second and third? Do all 3 names show? Etc.

- **auto-complete babies' names**: Use the DOM to remove the select box from the page and replace it with an input text box where the user can type a name. As the user types a partial name, use Scriptaculous *(will be taught on Mon 5/18)* to display any names in the data set that contain or start with the partial text. The program should fetch the rank/meaning data for the name when the user selects a name from the auto-complete list and/or clicks a Search button you inject into the page.

  To help you write this feature, there are three additional optional parameters that our `babynames.php` service can accept when you are performing a `list` query. First is format, which if set to `html`, will output the list of names as a `ul` list. The other two are `prefix` and `substring`, indicating an optional beginning or substring to filter on (case insensitive). For example, the following query:

  ```
  https://webster.cs.washington.edu/babynames.php?type=list&format=html&prefix=mar
  ```

  would output a list of names in HTML that begin with "mar":

  ```
  <ul>
    <li>Mara</li>
    <li>Maranda</li>
    <li>Marc</li>
    <li>Marcel</li>
    <li>Marcelina</li>
        ...
  </ul>
  ```

Near the top of your JS file, put a comment saying which extra feature(s) you have completed. If you implement more than one, comment which one you want us to grade (the others will be ignored). Regardless of how many additions you implement, the main behavior and appearance should still work as specified. You may not modify the XHTML/CSS files; each feature must be done through JavaScript. If you have a different idea for an addition to the program, please ask us and we may approve it.

Grading:

For reference, our `names.js` file has roughly 95 lines of JavaScript (62 without blanks or comments).

Fetch the necessary data for the program using Ajax. We suggest using Prototype's `Ajax.Request` and `Ajax.Updater` objects rather than the raw `XMLHttpRequest` object, but either approach is acceptable if the code is not redundant. Process XML data by examining the request's XML tree using the XML DOM.

Your JavaScript code should follow reasonable stylistic guidelines similar to those you would follow on a CSE 14x programming assignment. In particular, you should pass the JSLint validator, minimize the number of global variables, utilize parameters and return values properly, correctly utilize the XHTML DOM objects, correctly use indentation and spacing, and place a comment header at the top of your JavaScript file and atop every function explaining that function's behavior, and on complex code sections. You should only use material discussed in lecture or found in the textbook, unless given explicit permission from the instructor.

You should minimize redundant code. You should also exercise good procedural decomposition, breaking down lengthy operations into functions, including parameters and returns over global variables when possible.

You should separate content (XHTML), presentation (CSS), and behavior (JS). As much as possible, your JS code should use styles from the CSS rather than manually setting each style property in the JS.

Part of your grade will come from successfully uploading your files to the **Webster** server at the URL:

```
https://webster.cs.washington.edu/your_uw_netid/hw7/names.html
```

Please do not place a solution to this assignment online on a publicly accessible web site.