

Web Developer's Bootcamp: Tips, Code Samples, Explanations, and Downloads

Jason A. Clark
Head of Digital Access and Web Services
Montana State University Libraries
jaclark@montana.edu
twitter.com/jaclark

Amanda Hollister
Web Consultant for LISHost.net
libdevel@gmail.com

Tips – Getting Started with Web Services

- Play in the sandbox – pick a service, study it
- Yahoo Query Language: <http://developer.yahoo.com/yql/>
- Yahoo Developer Central: <http://developer.yahoo.com/>
- Amazon Web Services Developer Connection: <http://developer.amazonwebservices.com/connect/>
- Google Code: <http://code.google.com/>

Tips – Consuming Web Services

- Pick a language or parsing tool
- Find a few data sources (APIs) worth learning about
- Make some requests and look at code in your browser
- Think about added value, more efficient workflows
- Browse around – many language libraries are already written

Tips – Building Web Services

- URIs are your friends – that's your interface
- Use simple CRUD (Create, Read, Update, Delete) functions over HTTP (Get, Delete, Put, Post)
- Keep verbs in API protocol intuitive and memorable
- Start small – simple, read-only requests
- Roll it out, beta version – once it's public you are restricted

Tips – Web Services Data Sources

- AllCDCovers.com <http://www.allcdcovers.com/api>
- ISBNdb.com <http://isbndb.com/docs/api/index.html>
- OpenDOAR <http://www.opendoar.org/tools/api.html>
- arXiv.org http://export.arxiv.org/api_help/
- Google Book Search APIs <http://code.google.com/apis/books/>
- LibraryThing APIs <http://www.librarything.com/services/>
- WorldCat Search API <http://worldcat.org/devnet/wiki/SearchAPIDetails>
- iTunes and App Store API: <http://www.apple.com/itunes/affiliates/resources/documentation/itunes-store-web-service-search-api.html>

* See programmableweb for more: <http://www.programmableweb.com/apis/directory>

Resources and Tools

- New York Times API Tool <http://prototype.nytimes.com/gst/apitool/index.html>
- YouTube Data API scratchpad <http://stage.gdata.youtube.com/demo/index.html>
- Google Code Playground <http://code.google.com/apis/ajax/playground/>
- Yahoo Pipes <http://pipes.yahoo.com/pipes/>
- Google Chart Wizard http://code.google.com/apis/chart/docs/chart_wizard.html
- Yahoo Query Language Console <http://developer.yahoo.com/yql/console/>

Web Services – Sample Applications

- Google Ajax Search API - Federate search of Google Data
- Flickr API - Display Photos (JSON)
- Google Maps API - Local Libraries (XML)
- Yahoo Pipes
- WorldCat Basic API

View samples and download code at <http://www.lib.montana.edu/~jason/files.php> and at <http://librarydev.com/mashups>

Web Services – Building Blocks

1. REQUEST – learn the protocol, ask for the data
2. RESPONSE – receive the data
3. PARSE – pick the pieces you need
4. DISPLAY – format those pieces for display

Code Sample #1: Google Ajax Search API – Javascript and CSS

xHTML source:

```
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<link href="http://www.google.com/uds/css/gsearch.css" type="text/css"
rel="stylesheet"/>
<style type="text/css">
body {background-color:white;color:black;font-family:Arial,sans-
serif;font-size:small;margin:15px;}
.gsc-control {width:400px;}
</style>
<script src="http://www.google.com/uds/api?file=uds.js&v=1.0"
type="text/javascript"></script>
...
```

Javascript source:

(<http://www.google.com/uds/api?file=uds.js&v=1.0>)

...

```

if (window['google'] != undefined && window['google']['loader'] !=
undefined) {
if (!window['google']['search']) {
window['google']['search'] = {};
google.search.CurrentLocale = 'en';
google.search.ShortDatePattern = 'MDY';
google.search.Version = '1.0';
google.search.NoOldNames = false;
google.search.JSHash = 'b2cf21b87d5348acb0a314b08588b757';
google.loader.ApiKey = 'notsupplied';
google.loader.KeyVerified = true;
google.loader.LoadFailure = false;
}
google.loader.writeLoadTag("script", google.loader.ServiceBase + "/
api/search/1.0/en/b2cf21b87d5348acb0a314b08588b757/default.I.js",
false);

```

xHTML and Javascript Explanation:

- Javascript written by Google – heavy lifting: <http://www.google.com/uds/api?file=uds.js&v=1.0>
- “google.loader.writeLoadTag” – tells API to run, sets possibilities for search API
- CSS written by Google – formatting and display: <http://www.google.com/uds/css/gsearch.css>
- Understand these files, but you probably want to leave them as is – code library

Web page for user interface and display

```

...
<script type="text/javascript">
//
function OnLoad() {
// Create a search control
var searchControl = new GSearchControl();
// Add in a full set of searchers
var localSearch = new GlocalSearch();
searchControl.addSearcher(localSearch);
searchControl.addSearcher(new GwebSearch());
searchControl.addSearcher(new GvideoSearch());
searchControl.addSearcher(new GblogSearch());
searchControl.addSearcher(new GnewsSearch());
searchControl.addSearcher(new GimageSearch());
searchControl.addSearcher(new GbookSearch());
// Set the Local Search center point
localSearch.setCenterPoint("Bozeman, MT");
// tell the searcher to draw itself and tell it where to attach
searchControl.draw(document.getElementById("searchcontrol"));
// execute an initial search
searchControl.execute("library books");
}
GSearch.setOnLoadCallback(OnLoad);
</pre>
</div>
```

```
//]]
</script>
<div id="searchcontrol">Loading</div>
```

Web page for user interface and display explanation

- xHTML and javascript that gives action to our script
- Create the interface (GUI) controls with “var searchControl = new GSearchControl();”
- Set the local search parameter with “localSearch.setCenterPoint”
- Set the initial query with “searchControl.execute”
- Decide which pieces of Google data to federate with “searchControl.addSearcher”
- <div id="searchcontrol"> will be populated with script messages OR generated xHTML tags received via our Ajax requests
- Any customization begins with these parsing and display functions

Code Sample #2: Flickr API - Display Photos (JSON)

The URL Request

http://api.flickr.com/services/feeds/photos_public.gne?tags=cil2008&format=json

URL Request: Explanation

- HTTP Request to Flickr API: <http://www.flickr.com/services/api/>
- API provides data as XML feeds (RSS, ATOM)
- Requesting “/feeds/” with a “format” of JSON (Javascript Object Notation)
- Querying API for all public photos tagged “cil2008” with the “tags” parameter

The URL Request in Javascript

```
<!-- use script tag to make request to flickr api, specify json format
and tag to search -->
<script type="text/javascript" src="http://api.flickr.com/services/
feeds/photos_public.gne?tags=cil2008&format=json">
</script>
```

The URL Request in Javascript - Explanation

- JSON is actually javascript and to make JSON output available we must call it on the page via the <script> tag
- After <script> tag is run, JSON output exists as javascript object ready to be parsed

JSON Response

```
jsonFlickrFeed({
  "title": "Photos from everyone tagged cil2008",
  "link": "http://www.flickr.com/photos/tags/cil2008/",
  "description": "",
  "modified": "2008-04-07T18:43:16Z",
  "generator": "http://www.flickr.com/",
```

```

"items":
[
{
"title": "So many floors",
"link": "http://www.flickr.com/photos/nengard/2395908509/",
"media": {"m": "http://farm4.static.flickr.com/3182/2395908509_d6452e2d56_m.jpg"},
"date_taken": "2008-04-07T13:07:53-08:00",
"description": "So many floors",
"published": "2008-04-07T18:43:16Z",
"author": "nobody@flickr.com (nengard)",
"author_id": "10137764@N00",
"tags": "hyatt cil2008 cil08"
},
...
]
})

```

JSON Response - Explanation

- More structured data ready to be parsed
- We'll extract the values and format for display using the second javascript

Parse and display with Javascript

```

<script type="text/javascript">
//run function to parse json response, grab title, link, and media
values - place in html tags
function jsonFlickrFeed(fr) {
for (var i = 0; i < fr.items.length;i++) {
document.write('<a title="' + fr.items[i].title + '" href="' +
fr.items[i].link + '"></a>');
}
}
</script>

```

Parse and display with Javascript - Explanation

- Create javascript function “jsonFlickrFeed” to parse JSON response returned from first javascript
- Loop statement: “for (var i = 0; i < fr.items.length;i++)” runs through all JSON data nodes
- “document.write” – native javascript function prints out values from JSON in xHTML markup

Code Sample #3: Google Maps API

Local Libraries (XML) - HTML Markup

```
<div id="map" style="width:75%; height:500px"></div>
```

HTML Explanation:

- Create HTML container where Javascript will load dynamic content
- Add some inline CSS styles to control size of map object

XML File

```
<markers>
  <marker name="St. Johns Co Public Library" address="1960 North
Ponce de Leon Blvd. St. Augustine, Florida 32084" url="http://
www.sjcpls.org/" lat="29.1869" lng="-82.1372" />
  <marker name="Branford Public Library" address="703 Suwannee Ave
NW, Branford, FL 32008-3279" url="http://www.neflin.org/srml/"
lat="29.963245" lng="-82.93090" />
  ...
</markers>
```

XML Explanation

- Create XML file with metadata and geographic coordinates; file is named "markers.xml".
- Javascript will use this XML file as instructions for mapping locations

Javascript

```
<script type="text/javascript" src="http://maps.google.com/maps/api/
js?sensor=false"></script>
<script type="text/javascript">
//
function load() {
  var map = new google.maps.Map(document.getElementById("map"), {
center: new google.maps.LatLng(29.1869, -82.1372),
zoom: 7,
mapTypeId: google.maps.MapTypeId.TERRAIN,
mapTypeControl: true,
mapTypeControlOptions: {style:
google.maps.MapTypeControlStyle.DROPDOWN_MENU},
navigationControl: true,
navigationControlOptions: {style:
google.maps.NavigationControlStyle.SMALL}
});
  var infoWindow = new google.maps.InfoWindow;
  // Change this depending on the name of your xml file
  downloadUrl("markers.xml", function(data) {
var xml = data.responseXML;
var markers = xml.documentElement.getElementsByTagName("marker");
for (var i = 0; i &lt; markers.length; i++) {
  var name = markers[i].getAttribute("name");
  var address = markers[i].getAttribute("address");
  var url = markers[i].getAttribute("url");
  var point = new google.maps.LatLng(</pre></div>
```

```

    parseFloat(markers[i].getAttribute("lat")),
    parseFloat(markers[i].getAttribute("lng"))));
    var html = '<p style="height:50px;"><strong><a
href="" +url+" ">' +name+'</a></strong><br/>' +address+'</p>';
    var marker = new google.maps.Marker({
map: map,
position: point,
    });
    bindInfoWindow(marker, map, infoWindow, html);
}
});
}
function bindInfoWindow(marker, map, infoWindow, html) {
    google.maps.event.addListener(marker, 'click', function() {
infoWindow.setContent(html);
infoWindow.open(map, marker);
    });
}
function downloadUrl(url, callback) {
    var request = window.ActiveXObject ?
    new ActiveXObject('Microsoft.XMLHTTP') :
    new XMLHttpRequest;
    request.onreadystatechange = function() {
if (request.readyState == 4) {
    request.onreadystatechange = doNothing;
    callback(request, request.status);
}
    };
    request.open('GET', url, true);
    request.send(null);
}
function doNothing() {}
//]]>
</script>

```

Javascript Explanation

- Bring in Google Maps API
- Create Google Maps Object
- Download XML file ("markers.xml"); Parse values to create markers
- Create information windows for data from XML file - These are the Google Maps "pop-up" windows

Code Sample #4: WorldCat Search API + LibraryThing Reviews + Google Book Preview

HTML Form:

```
<h2>Search for:</h2>
```

```
<form action="worldcat_basicsearch_mashup.php" method="get">
<p>
  <label for="AddWorldCatSearch-SearchString">Search </label>
  <input type="text" id="AddWorldCatSearch-SearchString"
name="AddWorldCatSearch-SearchString" value="" />
</p>
<input type="submit" value="Search"/>
</form>
```

Explanation:

- Provides a search box
- Form passes search string as a variable

URL Request:

<http://worldcat.org/webservices/catalog/search/openserach?format=rss&q=javascript&maximumRecords=10&wskey=yourAPIkey>

Explanation:

- Sends request to the WorldCat Basic API service
- Sets the request protocol as Opensearch (<http://www.opensearch.org>)
- Sets the response format to RSS

PHP used to build the URL request:

```
if ( strlen($_REQUEST['AddWorldCatSearch-SearchString']) > 0) {

$searchURL = 'http://worldcat.org/webservices/catalog/search/
opensearch?format=rss&q=' . urlencode($_REQUEST['AddWorldCatSearch-
SearchString']) . ' ';

$searchURL = $searchURL . '&maximumRecords=10';
$searchURL .= '&wskey=' . $WorldCatAPIKey;

$xml = simplexml_load_file($searchURL);
```

Explanation:

- Checks to see if a search string was passed as a variable
- Adds the search query, the number of records, and your API key
- Sends request, loads the XML results as an object

PHP used to fetch the ISBNs

```
$lt_ids = "";
$isbn = $xml->xpath("//dc:identifier");

foreach ((array)$isbn as $isbn) {
```



```

        if (strlen($isbn) > 1) {
            if (strpos($isbn[0], " ") > 0) {
                $lt_ids = $lt_ids . substr($isbn, 0, strpos($isbn, " "))
            };
            } else {
                $lt_ids = $lt_ids = $lt_ids .
ltrim($isbn[0], "urn:ISBN:" );
            }
            if ($isbn != end($isbns)) {
                $lt_ids = $lt_ids . ',';
            }
        }
    }
}

```

Explanation:

- Specifies what element in the XML object contains the ISBN
- Sets up an array of the ISBNs from the records
- Trims the extra characters “urn:ISBN:” from each ISBN

Parse and display with PHP

```

foreach($xml->xpath('//item') as $book ) {
    $book['xmlns:dc'] = 'http://purl.org/dc/elements/1.1/';
    $book['xmlns:oclcterms'] = 'http://purl.org/oclc/terms/';
    $field = simplexml_load_string($book->asXML());
    $title = $field->xpath("title");
    $isbn = $field->xpath("dc:identifier");
    $isbn_1 = ltrim($isbn[0], "urn:ISBN:" );
    $author = $field->author->name;
    $oclcnumber = $field->xpath("oclcterms:recordIdentifier");

    echo '<div class="record">';
    if (strlen($isbn_1) > 0) {

// check Open Library for a cover
        $image_url = 'http://covers.openlibrary.org/b/isbn/' .
$isbn_1 . '-S.jpg';
        $image_size = getimagesize($image_url);
        if ($image_size[0] > 1 and $image_size[1] > 1) {
            echo '';
        } else {

// check LibraryThing for a cover
            $image_url = 'http://covers.librarything.com/
devkey/' . $librarything_key . '/small/isbn/' . $isbn_1;
            $image_size = getimagesize($image_url);
            if ($image_size[0] > 1 and $image_size[1] > 1) {
                echo '';
            }
        }
    }
}

```

Explanation:

- Specifies which XML element holds the records
- Loops through the results and extracts the title, author, ISBN, and OCLC number for each item
- Checks OpenLibrary and LibraryThing for a cover; if available, displays it

Create the HTML for record display:

```
    echo '<p><a href="http://www.worldcat.org/oclc/' . $oclcnumber[0]
. '"><span>' . $title[0] . '</span></a></p>';
    if ( strlen($isbn_1) > 1 ) {
        echo '<br/>';
        echo '<span id="LT_' . $isbn_1 . '"></span><br/>';
        echo '<noscript><a href="http://www.librarything.com/
isbn/' . $isbn_1 . '">View Book Information at LibraryThing</a></
noscript>';
        echo '<br/>';
        echo '<script type="text/javascript">';
        echo 'GBS_insertPreviewButtonPopup("ISBN:' . $isbn_1 . '")';
        echo '</script>';
        echo '<noscript><a href="http://books.google.com/books?
vid=ISBN' . $isbn_1 . '">Book Info at Google Books</a></noscript>';

    }
    echo '</p>';
    echo '<br clear="all"/>';
    echo '</div>';
}
```

Explanation:

- Uses the OCLC number to create a link to the WorldCat record
- Creates a placeholder for the LibraryThing rating
- Adds the link to the Google Books preview of available
- Creates <noscript></noscript> messages in case the user has javascript turned off

Javascript to fetch the ratings from LibraryThing:

```
<script type="text/javascript">
function LTpop(booksInfo) {
    for (i in booksInfo) {
        var book = booksInfo[i];
        if (book.link) {
            var desc = '';
            var rating = '';
            if (book.reviews && (book.reviews != '0')) {
                desc = book.reviews + ' reviews';
            }
            if (book.rating) {
```

```

        rating = ' <img src="" +
book.rating_img + '"/>' ;
        $('#LT_' + book.id).append('<a href="'
+ book.link + '">' + desc + '@ LibraryThing</a>' + rating );
    }
}
}
}
</script>

<script type="text/javascript" src='http://www.librarything.com/
api/json/workinfo.js?ids=<?php echo $lt_ids ?
>&callback=LTpop'></script>

```

Explanation:

- The first part is the function that checks the retrieved records and displays the rating
- The second part is the URL query sent to LibraryThing to retrieve the book records as JSON
- If the item has a rating, the rating is displayed in the html placeholder

Final Thoughts

- Start with simpler data formats – RSS and ATOM are well-supported
 - Keep experimenting and learning with a single web service, become a seasoned veteran
 - Remember the primary actions for using web services: request, response, parse, display
- * Translate these actions into your favorite tool or scripting language