Reconnecting with the Web: An Introduction to the Possibilities Available through Web Service APIs

Jason Paul Michel

Abstract: APIs (Application Programming Interfaces) give developers access to the content and services of most major web sites such as Twitter, Flickr, Instagram, Vimeo, Facebook and more. They offer a way for library sites and their content to maintain relevancy and allow ways for their content to be more easily found via SEO. APIs give developers the ability to both deliver content to and receive content from external web services. For example, uploading images and metadata to Flickr or pulling in images and metadata from Instagram to display on your library’s web site. Using APIs gives you the ability to get your library content into the digital places where people actually go to on the web. This article discusses what APIs are in a technical sense, how they are valuable to libraries and how the Miami University Libraries have utilized APIs to enhance outreach and communication.

Keywords: API, web development, outreach, web programming, Twitter, Flickr, Instagram, Vimeo, SEO

Introduction

Imagine the web as an immensely large city, much like Tokyo. This city is primarily sparsely populated back alleys and warrens, while standing at the center of the city are a few heavily populated monoliths: Google, Wikipedia, Facebook, Twitter, IMDb, Flickr and a few others. These are the places people go to find information.

Most library web sites including our unique digital collections, however, are found in one of those back alleys, 20 blocks from Google (20 pages deep). Unfindable. Dusty. Lonely. All is not lost, however. APIs offer a way for library sites and its content to be more easily found. APIs give developers the ability to both deliver content to and receive content from external services. For example, uploading images and metadata to Flickr or pulling in images and metadata from Instagram to display on your site. Using APIs gives you the ability to get your dusty library content into the places where people actually go to on the web. This article discusses what APIs are in a technical sense, how they are valuable to libraries and how the Miami University Libraries have utilized APIs to enhance outreach and communication.

What is an API?

An API, or Application Programming Interface, is a set of methods to access data in otherwise closed systems. APIs give programmers and developers the tools necessary to build software and services with data and services from external sources.

Extending a metaphor used by David Orenstein in his 2000 Computerworld article, let’s imagine that you are building a deck in your backyard and you realize that you don’t have a hammer. You have three neighbors who you know have a hammer: one neighbor never allows anyone to borrow anything or use any of his property without paying. This neighbor represents a closed or proprietary system. Another neighbor leaves his garage open and allows you to take anything you need without any rules or guidelines. This is your bearded open-source neighbor. The third neighbor represents an API. You can utilize the services of their hammer as long as you ask them in the proper way. Furthermore, they don’t give you the hammer, they just allow you to use it.

A web service API is an API designed for specific web applications. Web Service APIs are one of the hallmarks of the current web ecosystem: an ecosystem based on openness and sharing. Post to Facebook, Tweet This, Tumblr this, etc. The web services we use are no longer closed, autonomous systems. They work together; data flowing freely between them. This is achieved through the use of Web Service APIs.
The Elements of a Typical Web Service API

The two primary elements that are inherent to all web service APIs are data and methods. There is considerable variation amongst the different APIs as to the specifics of these elements but all APIs will involve data and methods. In addition, some APIs require API Keys and/or authentication. Let's first take a look at the data and the formats you will encounter.

API Data

The format of the data that is provided through most APIs is typically XML (REST, SOAP), JSON, RSS, ATOM, and Serialized PHP. Web service APIs also provide more than one format option for greater developer flexibility. Below is an example of XML data returned through the Twitter API:

```
<status type="array">
  <status>
    <created_at>Wed May 04 23:39:19 +0000 2011</created_at>
    <id>65923490921984000</id>
    <text>Lets get Jen to 200 tweets! Yahoo! http://t.co/qUBlS2d</text>
    <source><a href="http://twitter.com/tweetbutton" rel="nofollow">Tweet Button</a></source>
    <truncated>false</truncated>
    <favorited>false</favorited>
    <in_reply_to_status_id/>
    <in_reply_to_user_id/>
    <in_reply_to_screen_name/>
    <retweet_count>0</retweet_count>
    <retweeted>false</retweeted>
    <user>
      <id>292398272</id>
      <name>Brad Klassen</name>
      <screen_name>logo_man</screen_name>
      <location/>
      <description/>
      <profile_image_url>http://a1.twimg.com/profile_images/1337753208/009_normal.JPG</profile_image_url>
      <url/>
      <protected>false</protected>
      <followers_count>1</followers_count>
      <profileBackgroundColor>C0DEED</profileBackgroundColor>
    </user>
  </status>
  <statuses/>
</status>
```

API Methods

How do developers manipulate data via an API? It is done primarily through simple HTTP GET and POST Requests. For example there is a web API for retrieving current weather data in JSON format. Using the following URL endpoint, you can receive current weather data in Tokyo:

http://api.openweathermap.org/data/2.5/weather?q=tokyo

Let's access Open Weather Maps current weather API. Enter the above URL into your browser. You should now see current weather data in JSON format. Now try entering &mode=xml at the end of the URL. The data you see now should look a bit more familiar to you if you are used to subscribing to RSS feeds. Most APIs are flexible enough to give you multiple format options to choose from, so that depending on your project, you can choose the most suitable option.

Each API has several methods to access different types of data. For example, the above method retrieved the current weather of a particular city. Other methods allow you to retrieve other data such as a 3 and 5 day forecast.

Why are APIs important for libraries?

APIs are important for libraries because they allow libraries to connect with the wider web ecosystem and to integrate with prominent web services such as Twitter, Flickr, Facebook and more. As mentioned before, the current social media environment is one of interconnectedness. APIs allows libraries to join in that interconnectedness. In addition to this overarching benefit, APIs have
the ability to change library workflows and enhance already existing services. For example, working with the Twitter API, libraries can automatically tweet to a specific twitter user when a study room becomes available or set up a web-based dashboard that allows users and staff to see if there are any computer or printer problems.

How can Libraries take advantage?
Flickr

Since 2008 there has been much experimentation by academic libraries and special collections with respect to Flickr. It’s not surprising, as Flickr is the go-to place on the web for photos and images. Imagining the web as a vast cityscape, Flickr is one of the large monoliths at the center of the city. The benefit to uploading content to Flickr is two-fold: first it exposes your collections to a very large audience (certainly a much larger audience than your collection enjoys on your library’s website) and secondly and maybe more importantly it drastically improves the findability of your content due to increased SEO.

Below is the Library of Congress’ explanation of its desire to join Flickr:

Like any cultural heritage institution, the Library of Congress is always seeking to broaden the awareness of the resources that it collects, preserves, and makes accessible to the public to inspire, educate, and illuminate. The Library, a pioneer in the digitization of its collections, recognizes the power of the Web to enhance access and expose these resources to the world.

Additionally, the Library of Congress points out that the project was pursued to solve problems inherent to all libraries in the digital age, namely: a limit to institutional resources to provide detailed descriptions, historical context, and transcriptions of the thousands of items in large collections; a need to make the materials in those collections easily retrievable and accessible; competition for the attention of an online community that has ever expanding choices of where to pursue their interests, and a technical infrastructure that does not easily allow users to comment, share, and interact with content in the manner offered by popular social networking sites.

Since the Library of Congress’ Flickr project in 2008, many libraries have followed suit, uploading their massive digital collections. Fortunately, Flickr’s API provides the necessary tools to accomplish this task quickly and efficiently.

Flickr maintains a unique service called “The Commons” for museums, special collections and cultural institutions. By joining this service, your images will be exposed to incredibly large audience. There are currently no Japanese cultural institutions in “The Commons”. That should change. Since uploading some of our digital collections to “The Commons”, our images have received over 6.5 million views! ⁶

Fig. 1 Using the Flickr API, the Miami University Libraries have uploaded over 7,000 images and associated metadata in a quick and efficient manner. This image displays a typical Flickr photo with attached metadata such as tags and subjects.

Twitter

Many libraries now use Twitter to engage with their user base. The success of this endeavor depends on the level of interaction between the library and the users. Ideally, Twitter interactions should be genuine and on a daily basis. Tweeting out a new book feed or event announcements is not enough and doesn’t take advantage of the true nature of Twitter. To engage in a genuine way on a consistent basis can be difficult and time-consuming since staff would need to first follow as many users as possible but then also monitor the Twitter feed looking for opportunities to engage. By utilizing the API, you can produce an application that scours your geographic region for Twitter users who are tweeting about things that relate to the library in some sense. Essentially the API would data mine the Tweets within a specified radius of a
specified longitude and latitude for a list of keywords that in some way relate to the library, i.e. book, research, study, homework, newspapers, library and more and present the Tweets in a unified interface. This application would give staff nothing but relevant Tweets from which engaging discussions can spring.

Fig. 2  A basic interface which captures geolocated tweets containing specified keywords.

**Instagram**

Instagram’s API can be utilized in a similar way to Twitter’s API for mining local user data. The API allows for developers to access Instagram data via a tag search. For example this URL endpoint https://api.instagram.com/v1/tags/snow/media/recent?access_token = ACCESS-TOKEN will produce a result of:

```json
"data": [],
"type": "image",
"users_in_photo": [],
"filter": "Earlybird",
"tags": ["snow"],
"comments": {}
"data": [],
"created_time": "1296703540",
"text": "#snow",
"from": {},
"username": "emohatch",
"username": "Emo Hatch",
"id": "12442965",
"id": "26609649",
"count": 3
```

Utilizing this method, your library could stay on top of all of the Instagram images that may be about your library in some way.

**Vimeo**

Vimeo is a video sharing web service similar to Youtube. If your institution produces video tutorials, Vimeo is an excellent resource to use for hosting. There are wonderful advantages to hosting your videos with web services such as exposing that content to a much wider audience. This is especially useful if that content is valuable to more than just your user base: historical images on an institutional special collections web site would benefit from putting those images on Flickr for example. Another advantage is that developers at your institution do not need to specialize in video
hosting and optimization.

The Miami University Libraries consistently produce videos for outreach and marketing. Using Vimeo’s Simple API\(^5\), we created a number of dynamically generated views for these videos on our own webpage: a thumbnail gallery view, a list view, and an individual video view. Once the scripts were set in place, maintenance of the site was minimal. It was no longer necessary to manually upload all of the videos and descriptions to the site. Once uploaded to Vimeo.com, they are automatically pushed to the library site.

**Fig. 4** Gallery view of tutorial videos uploaded to Vimeo.com. These videos were uploaded to Vimeo.com and then automatically rendered on this page via Instagram’s Simple API.

**Skill Development**

Developing with Web Service APIs will require knowledge of a programming language such as PHP, Python, Ruby, JavaScript and knowledge of HTML and CSS. More advanced programmers may need to understand database systems such as PostgreSQL or MySQL.

There are several ways to learn these technologies. Probably the quickest way would be to utilize web sites such as www.codecademy.com or www.codeschool.com. Codecademy has tutorials for specific APIs, including Twitter. Mozilla Developer Network also offers tutorials as well as exhaustive documentation on most languages. Start here: https://developer.mozilla.org/en-US/docs/Web/Tutorials.

You will most likely get stuck at some point as you develop an application. The web forum http://stackoverflow.com/ is an excellent resource for getting help from professional and amateur programmers.

**References**

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Biography

Jason Paul Michel is the User Experience Librarian at Miami University Libraries in Oxford, Ohio. He received his M.S. in Library and Information Science from Simmons College in Boston, Massachusetts.

Mr. Michel has extensive experience with web development, usability testing, mobile development and API development. He has written and presented on libraries’ use of APIs on a national level. His book Web Service APIs and Libraries was published by ALA Editions in 2013.