Creating Library Web Services
Course Overview

- Who we are
- Demos
- Key Terms & Background
- Code Samples
- Questions
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What about You?

- Name
- Organization and Job Title
- HTML and CSS proficiency?
- Javascript or PHP (server-side) programming proficiency?
- Why interested in web services?
Pinboard.in #tag

pinboard.in/u:jasonclark/t:lita-class-api-intro
Why Should You Care?

• Web Services are the backbone of mashups
• Web Services enable you to access and recombine data
• Move and share data across systems in real time
Web Services for Interoperability

• Lots of different ways in which people can access information
• Different devices
  • Mobile devices, computers, special purpose devices
• Machine access to data
What Is A Mashup?

• a Web application that uses and/or combines data from multiple sources within a single tool
Why Create A Mashup

• Want to bring together disparate data sources
• Want to enhance a existing source of data
• Want to improve usability and user interfaces
• Want to make a web page more dynamic and engaging
Top Mashup Types

Top Mashup Tags

- mapping (34%)
- photo (10%)
- shopping (9%)
- video (8%)
- search (8%)
- social (7%)
- travel (6%)
- music (5%)
- news (4%)
- messaging (4%)

Click on a slice or label to see details || Or see the whole Mashup Tag Cloud

ProgrammableWeb.com 10/23/10

http://www.programmableweb.com/mashups
Some Library Mashups

- Repository 66
- Terrapod Project
- Texas A&M Geologic Atlas of the US
- VuFind
Now Playing:

Frog, Chemical, Water, You

17:14mins | 2008-10-28 | Produced by: Grace, Jennifer

Amphibians are indicator species. Because of their sensitive permeable skin, scientists use amphibians to gauge the overall health of the worldwide ecosystem that we all share. So with nearly half of the world's amphibian populations in decline, we're all potentially in big trouble. But there are simple things you can start doing today to help.

Learn More

(0) comments
Into the wilderness, February 6, 2009

The book opens with the delicacy of a Jane Austen. A young woman, alone in a Sydney drawing-room on a quiet Sunday morning around 1845, reluctantly receives a visitor from abroad. "That strange, foreign men should come on a Sunday when she herself had ventured on a headache was quite exasperating." The headache on which Laura Trevelyan, the heroine, has so deliciously ventured is a cover for her recent loss of faith in conventional Christianity, yet the vast novel that follows will soon plunge into mysticism and madness, a magnificent wrestling match between man and God.

For the foreign visitor is Johann Ulrich Voss, a German explorer who is to lead an expedition to traverse the unexplored Australian interior. Awkward and antisocial, he is nonetheless a secular messiah with an almost divine sense of his own destiny. Funded by Laura's uncle, he gathers together a motley collection of misfits and visionaries: a secret poet, a sensitive ornithologist, a simple-minded boy, a rich dilettante, and a former convict whose practical know-how rivals Voss's own. [White's fondness for visionary loners will get even greater play in his next book, RIDERS IN THE CHARIOT.] Accompanied by two aborigines, Voss leads the party into the bush and through the desert, encountering both beauty and hardship, but ultimately tested less by the physical world than by the terrible discovery of their own inner natures.
Voss / Patrick White

Bib ID: 4315510
Format: Book
Author: White, Patrick, 1912-1990
Description: 445 p. ; 18 cm.
ISBN: 0380002515

Holdings

<table>
<thead>
<tr>
<th>Details</th>
<th>Collect From</th>
</tr>
</thead>
<tbody>
<tr>
<td>N A 823.3 W587vo</td>
<td>Main Reading Room (Australian Collection)</td>
</tr>
</tbody>
</table>

Explore

411 entries, 4 reviews at LibraryThing ★★★★★
Add to delicious
Patrick White

Patrick Victor Martindale White (1912 – 1990) was an Australian author who was widely regarded as a major English-language novelist of the 20th century. From 1935 until his death, he published 12 novels, two short-story collections and eight plays. His fiction freely employs shifting narrative vantage points and a stream of consciousness technique. In 1973, he was awarded the Nobel Prize in Literature.

Provided by Wikipedia

Showing 1 - 20 of 34 Library items by Patrick White:

- **Big toys**
  - by White, Patrick 1912-
  - **Call Number:** PR9619.3 W55 B5 (LC)
  - **Located:** LSF - click "Place Requests" for delivery to any Yale library
  - © Not Checked Out
  - Book

- **The Twyborn affair**
  - by White, Patrick 1912-
  - **Call Number:** PR9619.3 W55 T8
  - **Located:** LSF - click "Place Requests" for delivery to any Yale library
  - © Not Checked Out
  - Book

- **A fringe of leaves**
  - by White, Patrick 1912-
  - **Call Number:** PR9619.3 W55 F7
  - **Located:** LSF - click "Place Requests" for delivery to any Yale library
  - © Not Checked Out
  - Book
Mashup Examples

• HousingMaps.com
• McMaster University Mashup of Air Photos
• go2collegeMT
Select any date from the dropdown menu to see an index of McMaster's air photo holdings for that year.

Click on any marker on the map to see information about that photo.

Each marker represents the approximate centre of one air photo. Air photos often overlap, so a site may appear on 2 or 3 adjacent photos.

Click here for information about viewing the airphotos at McMaster University Library.

 circa 1919

Taken at an oblique angle
9 black & white air photos, 21x26 cm.

Source: Archives of Ontario,
McCarthy Air Photos Collection,
Accession Number ACC 2455
Select any date from the dropdown menu to see an index of McMaster's air photo holdings for that year.

Click on any marker on the map to see information about that photo.

Each marker represents the approximate centre of one air photo. Air photos often overlap, so a site may appear on 2 or 3 adjacent photos.

Click here for information about viewing the airphotos at McMaster University Library.
Montana Education Maps

Map for colleges-all

Find a Montana College
- Public Universities & Colleges
  + more
- Tribal Colleges
  + more
- Community Colleges
  + more
- Private Colleges
  + more
- Two Year Colleges
  + more

Online & Distance Learning Campuses
- Distance Learning Programs
  + more

College Fairs
- MPSEOC 2010 Tribal College Fairs
  + more
- MPSEOC 2009 Fall College Fairs
  + more

Map data ©2010 Esri, Technology, Google
How Do Mashups Work?

- Retrieve data from another source(s) typically via a web service
- Mix these datasets together and integrate them into your website
BASIC CONCEPTS

- API
- Web Service
- Structured Data
**Terms: API**

- An application programming interface (or API) is a way for developers to access parts of a remote web site and integrate it with their own site.

[MSU Libraries "lofiAPI" Example](#)
Terms: Web Service

- Provides access to data and/or procedures (API)
- On a remote/external system (usually)
- Use structured data for data exchange (often XML)
- Come in 3 flavors: RPC, SOAP, REST
Terms: Structured Data

- Structured data = XML and JSON
- Extensible Mark-up Language and Javascript Object Notation
- Flexible mark-up languages
- Lightweight and easy to parse
- Allow communication between disparate systems
Putting it all together

- Data access = Web Services (REST, SOAP, XML-RPC)
- Data typically formatted in XML or JSON
- Data display = 1 or more scripting languages (javascript, PHP, python, etc)
What is XML-RPC

- XML Remote Procedure Call
- Provides a means to call methods/procedures on a remote server and make changes and/or retrieve data
- Most common implementation of XML-RPC used today is that of blogging services: Technorati, Flickr, FeedBurner, others
What is SOAP?

- “Simple Object Access Protocol”
- Specification maintained at w3.org
- XML based
- There's nothing simple about SOAP!
SOAP Example

- EBAY wsdl
  http://api.google.com/GoogleSearch.wsdl
  
  <?xml version="1.0" encoding="UTF-8"?>
  xmlns:ns1="urn:ebay:apis:eBLBaseComponents">
  <SOAP-ENV:Header>
    ...
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <ns1:GetSearchResultsRequest>
      <ns1:Version>425</ns1:Version>
      <ns1:Query>*</ns1:Query>
      <ns1:TotalOnly>true</ns1:TotalOnly>
      </ns1:GetSearchResultsRequest>
    </SOAP-ENV:Body>
  </SOAP-ENV:Envelope>
What is REST?

- The greatest thing since sliced...
- Representational State Transfer
- Unique data resources with addresses
Theory of REST

• Focus on diversity of resources (nouns), not actions (verbs)
• Every resource is uniquely addressable
• All resources share the same constrained interface for transfer of state (actions)
• Must be stateless, cacheable, and layered
REST = Web Protocol

- Web As Prime Example
  - URLs uniquely address resources
  - HTTP methods (GET, POST, HEAD, etc.) and content types provide a constrained interface
- All transactions are atomic
- HTTP provides cache control
REST Verbs

• Create, Read, Update Delete
• POST, GET, PUT, DELETE
REST in Practice

• REST
• Google APIs
  • Google Calendar
  • Google Spreadsheet
• RESTful
• Flickr
REST: Final Thoughts

- Similarity to web - easy to understand
- URL is the method
- Most popular type of web service
Formats for Data from Web Services

-XML
  - Can use a particular standard, such as: MARC XML, Dublin Core, RSS, Atom
  - May be a proprietary format

-JSON (Javascript Object Notation)
  - very popular
  - easy to use with Javascript
  - can be simpler to work with

-HTML
What is JSON?

• Javascript Object Notation
• Text file used to pass information from one system to another
• Javascript treats it as an object
  • which makes it easily navigated and specific pieces cherry-picked
Cross Server Scripting

Issues

• AJAX doesn’t allow you to access “scripts” across servers
  • XML, PHP or other scripting languages
• Can access JSON across servers
  • Reason why JSON popular
• Workaround
Cross Server Scripting

Workarounds

- Proxy the script via the webserver
  - Apache mod_proxy
- Use an intermediary to transform content into JSON
  - Use PHP to convert XML to JSON
Some Skills you’ll Need

- XML
- XPath
- Basic understanding of namespaces
- JSON
- Javascript, preferably a library like JQuery
- Some server side scripting language
- PHP, Ruby on Rails, Python, Perl, etc
Some Tools For Development

- Bitnami
- Text editor or some other IDE (Eclipse)
- oXygen XML Editor
- JSONLint
- Firefox Extensions
  - Firebug, JSONovich, Web Developer’s Toolbar
MAMPStack

BitNami MAMPStack greatly simplifies the development and deployment of PHP applications. It includes ready-to-run versions of Apache, MySQL, PHP and phpMyAdmin and required dependencies. It can be deployed using a native installer. BitNami MAMPStack is distributed for free under the Apache 2.0 license.

PHP is an HTML-embedded scripting language. Much of its syntax is borrowed from C, Java and Perl with a couple of unique PHP-specific features thrown in. The goal of the language is to allow web developers to write dynamically generated pages quickly.

The MySQL software delivers a very fast, multi-threaded, multi-user, and robust SQL (Structured Query Language) database server. MySQL Server is intended for mission-critical, heavy-load production systems as well as for embedding into mass-deployed software. MySQL is registered trademark of Sun Microsystems, Inc.

The BitNami MAMPStack native installers were packaged using BitRock’s cross platform installer tool.
```json
{
    "version": "1.0",
    "encoding": "UTF-8",
    "feed": {
        "xmlns": "http://www.w3.org/2005/Atom",
        "xmlns$openSearch": "http://a9.com/-/spec/opensearchrss/1.0/",
        "xmlns$gax": "http://schemas.google.com/spreadsheets/2006/extended",
        "id": {
            "$t": "https://spreadsheets.google.com/feeds/list/0Aitqc3TBbtGmdHJJE2T20:19:37.169z/od",
        },
        "updated": {
            "$t": "2010-10-22T20:19:37.169z"
        },
        "category": [
            {
                "term": "http://schemas.google.com/spreadsheets/2006#list"
            }
        ]
    }
}
```
```json
{
    "version": "1.0",
    "encoding": "UTF-8",
    "feed": {
        "xmlns": "http://www.w3.org/2005/Atom",
        "xmlnsSopenSearch": "http://a9.com/-/spec/opensearchrss/1.0/",
        "id": {
            "$t": "https://spreadsheets.google.com/feeds/list/0Aitqc3TBbtCmdHJJZTBXVkk5UzVnaVh1ekRJN3E3WE6/od6/public/values"
        },
        "updated": {
            "$t": "2010-10-22T19:37:16Z"
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            }
        ],
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        },
        "link": [
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            },
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                "href": "https://spreadsheets.google.com/feeds/list/0Aitqc3TBbtCmdHJJZTBXVkk5UzVnaVh1ekRJN3E3WE6/od6/public/values"
            },
            {
                "rel": "self",
                "type": "application/atom+xml",
                "href": "https://spreadsheets.google.com/feeds/list/0Aitqc3TBbtCmdHJJZTBXVkk5UzVnaVh1ekRJN3E3WE6/od6/public/values"
            }
        ],
        "author": {
```
Demo Files

• Developer Network Subversion repository
  http://www.worldcat.org/devnet/code/devnetDemos/

• Jason Clark Demos
  http://www.lib.montana.edu/~jason/files.php
<?php

// Set the server address that you are loading the demos on
$server_address = '';

// Set WorldCat API WSKey
$WorldCatAPIKey = ''; // replace with your WorldCat Search API Key

// Set your WorldCat Affiliate ID
$worldcat_affiliate_id = ''; // replace with your WorldCat affiliate ID

// Set your Serial Solutions ID
$serial_solutions_id = ':

// replace with your LibraryThing Key

// Set New York Times API Key
$NYT_API = ''; // replace with your New York Times Search API Key

// Set New York Times Movie Reviews API Key
$NYT_Movies_API = ''; // replace with your New York Times Movie API Key

// Set your Last.fm API Key
$lastfm_developer_key = ''; // replace with your Last.fm API Key

$isbndb_key = '';
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