Use of Google APIs for Biodiversity Informatics

Kathryn Hurley, Rebecca Shapley
Google Fusion Tables Team
Current Usage - Google Maps

**Protected Planet***

*in progress

**Mountain Biodiversity Portal**

**BioGeomancer**

**GBIF**

*in progress
Current Usage - App Engine

Map of Life / GeoPhylo Engine

VertNet*

*in progress
Many, many Google APIs

<table>
<thead>
<tr>
<th>HTTP (REST)</th>
<th>HTML/JS</th>
<th>Extension/App</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage</td>
<td>Visualization</td>
<td>Google Earth</td>
</tr>
<tr>
<td>BigQuery</td>
<td>Maps</td>
<td>Picasa</td>
</tr>
<tr>
<td>Prediction</td>
<td>Language</td>
<td>GWT</td>
</tr>
<tr>
<td>Fusion Tables</td>
<td></td>
<td>App Engine</td>
</tr>
<tr>
<td>Latitude</td>
<td></td>
<td>Android</td>
</tr>
<tr>
<td>Buzz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

77 APIs!!

http://imagine-it.org/google/apistimeline.html
Many, many Google APIs

HTTP (REST)
- Storage
- BigQuery
- Prediction
- Fusion Tables
- Latitude
- Buzz

HTML/JS
- Visualization
- Maps
- Language

Extension/App
- Google Earth
- Picasa
- GWT
- App Engine
- Android

77 APIs!!
http://imagine-it.org/google/apistimeline.html
### Problem - Sharing Data

Nice data! Can I have a copy?

Happy to share, but I'm still making the data better...

I've got data about that, too!

<table>
<thead>
<tr>
<th>e</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a datatable*
Solution - Virtual data join in Fusion Tables

- A list of entities:
  - a datatable
- Each column has permissions as set by its owner:
  - a fusion table

- The same list of entities:
  - a different datatable
- Column D isn't shared
Solution - Virtual data union in Fusion Tables
Problem - Mapping data

John has data on several species of butterflies in North America. He would like to create several maps using the data.
Solution - Fusion Tables

Why Use it

- Upload data to Fusion Tables.
- Select a subset of the data to display on a map
- Place the map on an HTML page!

Find out more

http://code.google.com/apis/fusiontables/
More mapping with Fusion Tables
Problem - Sharing apps, but not data

John created an App Engine app to collect his butterfly data. Pete and Sharon really like this app and would love to use it for collecting their own data.
Solution - App Engine Multi-tenancy

Why use it
● Set up multiple clients using a unique namespace
● All clients have the same database schema
● Each client is served the same application
● Data is kept separate

Find out more
http://bit.ly/9UvNz0
Problem - Image serving

John and his team have several pictures of butterflies from his trips to the field. He wants to easily upload these pictures to a Web service and be able to access these images quickly.

Photos courtesy of docentjoyce, aussiegall, and HaPe_Geraon on flickr
Solutions - Picasa and App Engine

**Why use it**
- Picasa button for upload
- App Engine for High Performance Image Serving

**Find out more**
Picasa -
http://code.google.com/apis/picasa/docs/web_uploader.html

App Engine -
http://bit.ly/9UvNz0
A few more...

- Google Maps API
Next few APIs...

... are the cutting edge of Google APIs! Some invite only, some coming soon, all will hopefully be helpful!
Store Lots of Data

Solution - Google Storage for Developers

- Data replicated to multiple U.S. data centers
- Up to 100 gigabytes of binary data storage for free
  - "pay as you go" plan
- RESTful interface, almost identical to Amazon's Simple Storage Service

Find out more
http://code.google.com/apis/storage/
Query Your Data

Solution - BigQuery

- SQL-like query language
- Very fast - Analyze billions of rows in seconds
- Scalable - Terabytes of data
- Powerful group- and user-based permissions
- REST API, JSON RPC, Google Apps Script

Find out more
http://code.google.com/apis/bigquery/

SELECT location FROM data
WHERE species='s1' or species='s2';
Solution - Prediction API

- Simple to use
  - Upload data to Google Storage
  - Build the model from the data
  - Use the model to classify new data
- RESTful interface

Find out more
http://code.google.com/apis/predict/

If monarchs can thrive in Monterey, would the be able to survive in Japan?

Given the text "C'est la vie", what is the language?

**September 28 - Tokyo, Japan**
**October 29 - Sao Paulo, Brazil**
**November 9 - Munich, Germany**

**November 12 - Moscow, Russia**
**November 16 - Prague, Czech Republic**
Links

- **All APIs** - [http://code.google.com/apis/](http://code.google.com/apis/)

- **Fusion Tables**
  - online app: [http://www.google.com/fusiontables](http://www.google.com/fusiontables)


- **Google Maps API**

- **Storage** - [http://code.google.com/apis/storage/](http://code.google.com/apis/storage/)

- **BigQuery** - [http://code.google.com/apis/bigquery/](http://code.google.com/apis/bigquery/)