Organizing the world’s information and making it universally accessible and useful
Building a Gadget
South Africa Gadget Competition

David Harper
(harper@google.com)

Special Thanks:
Yotam Aviv
Ran Tavory
Oren Naim
Sascha Häberling
Agenda

- Intro to iGoogle and Gadgets
- Developing a Gadget – The Gadget API (Legacy/Old)
- More on Gadget Development
- IGoogle V2 – OpenSocial & Canvas View
- Development Tools
Introduction to iGoogle & Gadgets

• **iGoogle** is Google’s personalized homepage
  – Users customize the page to fit their needs and interests
  – Can choose from more than 30,000 different gadgets to display
  – Millions of users every day

• **Gadgets** are like small web pages
  – Consisted of HTML, JavaScript, CSS, Flash, etc.
  – Anything possible in a web page is possible in a gadget
  – Write once, run anywhere

- **Try to use iGoogle** and consider:
  - Which gadgets grab your attention?
  - Which gadgets are nice to keep around?
  - Do any truly inspire you?
Gadgets can live in the iGoogle homepage, third party web sites, Google desktop and more…
Examples of Google Gadgets

- Calvin and Hobbes (Unofficial)
  - Calvin and Hobbes for May 24, 2007
  - Calvin and Hobbes for May 23, 2007
  - Calvin and Hobbes for May 22, 2007

- Daily Horoscope for Gemini
  - A subtle shift of energy at work is already underway, but you may not feel the full ramifications of your current actions for a while. It may appear as if everything is moving right along, but new undertones can be set in motion by suppressed feelings. If you have something to say, you better get it out into the open before the ripples of frustration build into larger waves.
  - Thursday, May 24, 2007
  - more from tarot.com

- PacMan v2.4
  - Popout and play in window

- Stock Market
  - GOOG: 473.97 (1.89%)
  - MSFT: 30.58 (-0.11%)
  - Yahoo!
  - Delayed at least 15 minutes unless otherwise indicated.

- Sudoku

- Unicycle Rider
  - Instructions

- Funny Eyes
  - The Advocate's Legal Bible
  - New York Daily, Attorneys, legal secretaries, paralegals, and more.
  - Add by Google

- Quotes of the Day
  - The Constitution gives every American... the inalienable right to make a damn fool of himself. - John Card
  - There is no human problem which could not be solved if people would simply do as I advise. - Gore Vidal
  - Devotees of grammatical studies have not been distinguished for any very remarkable felicities of expression. - Amos Bronson Alcott
So, what exactly are Gadgets?

- **HTML** inside an XML wrapper
- **Mini web pages**: HTML, JavaScript, CSS, Flash, Silverlight, ...
- **Anything** you can do on a web page, you can do inside a gadget
- **Google Gadgets API** – Gives you an interface to easily accomplish many common task (saving state, UI, remote content, etc.)
- Gadgets are easy to develop!
  - Google Gadget Editor
- Write once, runs **everywhere**
- **Free** hosting and bandwidth
- **Hundreds of thousands** of page views each week

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<Module>
  <ModulePrefs
title="hello world example" />
  <Content type="html">
    <![CDATA[
      <b>Hello world!</b>
    ]]>  
  </Content>
</Module>
```

**hello world example**
Hello, world!
Where do Google Gadgets live?

• iGoogle homepage
• Third-party websites (Syndication not Google.)
• Google Desktop (Windows, Mac OS X)
• Mac OS X Dashboard
• Windows Vista Sidebar
• IBM WebSphere Portal
iGoogle homepage...
Third-party websites...

Google Gadget Tryout

I had to do something
So I increased the size of the sidebar to accommodate the Google gadgets.

I have just done something...
I am not employed with, nor am I affiliated in any way with Google (I don't get any of their cash). But, I have managed to do something that none of their thousands of paid (more than me) employees managed to do.

Actually try this out on their software and view the results.

http://gadgetryout.blogspot.com

http://www.puertovallarta.net
Instant Dashboard Capabilities

• Going from this:
Instant Dashboard Capabilities

• to this:
Google Confidential and Proprietary

Full Application (Gadget Interaction)

Why Use Gadget Technology?

• Standard Web technologies
• Scalable
• Cross platform
• Flexible (Syndication)

Extra services…
• Caching
• User Prefs (State)
• Internationalization
• Gadget Ads
• Tabs, Drag n’ Drop, Analytics, Flash, etc…
Step 1: Hello World Example

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<Module>
  <ModulePrefs title="hello world example" />
  <Content type="html">
    <![CDATA[
      Hello, world!
    ]]>  
  </Content>
</Module>
```

**Demo**: Google Gadget Editor & Developer Gadget
http://code.google.com/apis/gadgets/docs/gs.html#GGE
<?xml version="1.0" encoding="UTF-8" ?>
<Module>
  <ModulePrefs title="My First Gadget"
    description="This gadget prints hello world."
    height="50"
    author="Daniel L."
    author_email="my.email@gmail.com"
    author_location="Madrid, Spain"
    category="tools" />
  <UserPref name="Color" datatype="string" default_value="red" />
  <UserPref name="Toggle" datatype="bool" default_value="true" />
  <UserPref name="Locations" datatype="list" />
  <Content type="html"><![CDATA[
    <b style="color: red">hello world!</b>
  ]]></Content>
</Module>
Look at existing gadgets

- You can take a look at the source code of existing gadgets

For webmasters

Place an "Add to Google" button »

Embed this gadget »

View source »
<?xml version="1.0" encoding="UTF-8" ?>

<Module>
    <ModulePrefs title="hello world example" />
    <Content type="url" href="http://mypage.com/mygadget.html" />
</Module>

• Limitation: \_IG_Fetch\_... functions won't work.
Step 2: Your details

<?xml version="1.0" encoding="UTF-8" ?>

<Module>
  <ModulePrefs
    title="Fibonacci take 1"
    author="Yotam Aviv"
    author_email="...@google.com"/>
  <Content type="html">
    <![CDATA[
      Hello, world!
    ]]>  
  </Content>
</Module>

- http://code.google.com/support/bin/answer.py?answer=55128&topic=12391&ctx=sibling
- http://www.google.com/ig/submit
Step 3: Try out some Javascript

```xml
<?xml version="1.0" encoding="UTF-8"?>
<Module>
  <ModulePrefs>
    <title>Fibonacci ...</title>
    <author>Yotam Aviv</author>
    <author_email>aviv@google.com</author_email>
  </ModulePrefs>
  <Content type="html"><![CDATA[
    <script>
      function myFunction() {
        return "Hello World (JavaScript)";
      }

      document.write(myFunction());
    </script>
  ]]></Content>
</Module>
```
Step 4: Implement Fibonacci

...<script>
    function fibs(n) {
        var out = [];
        for(var i = 1; i <= n; i++) {
            out[i - 1] = fib(i);
        }
        return out;
    }
    function fib(i) {
        if (i <= 2) {
            return i;
        } else {
            return fib(i - 1) + fib(i - 2);
        }
    }
    document.write(fibs(9));
</script>
...

Fibonacci take 1
1,2,3,5,8,13,21,34,55
<script>
  ...

  function formatFibs(results) {
    var html = [];
    html.push('<ul>');
    for (var i = 0; i < results.length; i++) {
      html.push('<li>' + results[i] + '</li>');</n
    }
    html.push('</ul>');
    return html.join('');
  }

  document.write(formatFibs(fibs(9)));

  </script>

  ...

  (use scrolling="true" if content is too large to fit)
Step 6: Advanced Formatting - CSS

...<style type="text/css">
ul {
    background-color: silver;
    border: 1px solid gray;
    margin-left: 0pt;
    padding-left: 0pt;
    text-align: center;
}
li {
    background-color: #00BB00;
    border: 1px solid black;
    display: inline;
    list-style-type: none;
    padding: 0.25em 0.5em;
    font-size: 12px;
    margin: 1px;
}
</style>
...

- [http://www.w3schools.com/css/default.asp](http://www.w3schools.com/css/default.asp)
Storing State: Gadget UserPrefs

- Allows users to configure your gadget
- Multiple types:
  - Checkboxes
  - Dropdowns
  - Text input
  - Lists
- Use “hidden” UserPrefs to store data inside your gadget

```
<UserPref name="saved" datatype="hidden" default_value="0" />
```
Storing State...

- Example: **Simple Notes Gadget**
- User creates notes and saves them in iGoogle
- Remember user’s notes whenever coming back to the page.
- Let the user set a different background color for the gadget
Using special Gadget features

- Add `<Require feature="…"/>` tags to use our libraries

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<Module>
  <ModulePrefs ...
    <Require feature="tabs"/>
    <Require feature="flash"/>
    <Require feature="dynamic-height"/>
    <Require feature="minimessage"/>
    <Require feature="analytics"/>
    <Require feature="setprefs"/>
    <Require feature="drag"/>
    <Require feature="grid"/>
    <Require feature="sharedmap"/>
  </ModulePrefs>
  <Content.../>
</Module>
```
Storage Demo

- Using UserPrefs
- Use of datatype="hidden"
- Not stored in local cookie
<?xml version="1.0" encoding="UTF-8"?>

<Module>
  <ModulePrefs
    title="Fibonacci take 4"
    author="Yotam Aviv"
    author_email="aviv@google.com">
    <Require feature="setprefs"/>
  </ModulePrefs>
  <UserPref name="size" default_value="10" />
</Module>

<script>
  document.write(format(fibs(__UP_size__)));}
</script>
Step 8: Document Object Model

```javascript
function myOnload() {
    var html = format(fibs(__UP_size__));
    var domElement = _gel('fib_out');
    domElement.innerHTML = html;
}

_IG_RegisterOnloadHandler(myOnload);
```

...<h3>Fibonacci</h3>
<div id="fib_out">Should go here</div>
Done.
```
<script>

function myOnload() {
    var array = fibs(__UP_size__); 
    var list = document.createElement('ul'); 
    for (var i = 0; i < array.length; i++) {
        var node = document.createElement('li');
        node.innerHTML = array[i];
        list.appendChild(node);
    }
    var dest = _gel('fib_out');
    dest.removeChild(dest.childNodes[0]);
    dest.appendChild(list);
}

_IG_RegisterOnloadHandler(myOnload);

</script>

... 

<h3>Fibonacci</h3> 
<div id="fib_out">Should go here</div>
Done.

]]></Content>
</Module>
<Require feature="setprefs" />

<Require feature="minimessage" />

</ModulePrefs>

...  

function myOnload() {
    if (isNaN(parseInt('__UP_size__'))) {
        var mini = new _IG_MiniMessage(__MODULE_ID__);  
        mini.createDismissibleMessage('Size must be a number, not: ' + '__UP_size__');
        return;
    }
    var array = fibs(__UP_size__);
    ...

    Fibonacci take 7
    Size must be a number, not: xxx

    Fibonacci
    Should go here
    Done.
<Require feature="setprefs" />
<Require feature="analytics" />
</ModulePrefs>

<script>
...
reportEvent('load');
...
function reportEvent(event) {
_IG_Analytics('UA-3738979-1', '/yotamaviv-gadgets/' + event);
}
</script>
...
Provided Analytics

• Weekly pageviews are displayed in the Google Gadgets for Your Page directory.

http://www.google.com/ig/directory?synd=open&url=<gadget_url>
More Stuff

- Internationalize!
- Comments, Formatting, Tips
- Tabs
- RemoteRequests
- Caching
- Gadget-to-Gadget Communication
- IGoogle V2
- Development Tools
Internationalize!

- Support multiple languages in a single gadget
- Increase success in other countries
- Specify supported languages in your gadget

XML and iGoogle automatically loads the right one

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**hello.xml**

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<Module>
  <ModulePrefs title="__MSG_title__">
    <Locale lang="en" messages="en.xml" />
    <Locale lang="ja" messages="ja.xml" />
  </ModulePrefs>
  <Content type="html"><![CDATA[ __MSG_hello__ ]]>></Content>
</Module>
```

---

**en.xml**

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<messagebundle>
  <msg name="title">Title</msg>
  <msg name="hello">Hello, World!</msg>
</messagebundle>
```

---

**ja.xml**

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<messagebundle>
  <msg name="title">題名</msg>
  <msg name="hello">こんにちは世界</msg>
</messagebundle>
```
• Message Fallback
<Locale messages="http://x.com/ALL_ALL.xml"/>
<Locale lang="de" messages="http://x.com/de_ALL.xml"/>
<Locale lang="de" country="DE" messages="http://x.com/de_DE.xml"/>
<Locale lang="de" country="US" messages="http://x.com/de_US.xml"/>

• Bi-Directional Languages
<Locale lang="iw" messages=".../iw_ALL.xml" language_direction="rtl"/>
<Locale lang="ar" messages=".../ar_ALL.xml" language_direction="rtl"/>

...
HTML:

<html>
  <body>
    <h1>Enter your name:</h1>
    <!-- I’ll use id “name” to get this DOM Element later. -->
    <input type="text" id="name" />
  </body>
</html>
Formatting, Comments, and Alerts

// This function computes the Fibonacci
// number of n recursively (by calling
// itself for smaller values.
function fibs(n) {
    var out = [];
    for (var i = 1; i <= n; i++) {
        // TODO: Remove after development.
        alert('i=' + i); // blocks
        console.log('i=' + i); // Firebug
        out[i] = fib(i);
    }
    return out;
}
Fetching remote content is powerful, convenient, and easy!

- Text/HTML, XML, RSS/Atom feeds
- Cached by default to prevent overloading servers
- Built-in RSS/Atom parser outputs in JSON

• http://code.google.com/apis/gadgets/docs/docs/remote-content.html
Fetching Remote Content...

Three methods available:

- **IG_FetchFeedAsJSON**(url, callback, entries, summaries)
  Fetch RSS/Atom feeds. Returns simple JSON object:
  - Useful when you need general data from the feed:
    - per feed: URL, Title, Description, Link, Author
    - per entry: Title, Link, Summary, Date

- **IG_FetchXmlContent**(url, callback)
  Fetch XML content. Returns response as XML object.
  - Useful when fetching XML feeds with no standard format.
  - Extract any data that you need.

- **IG_FetchContent**(url, callback)
  Fetch content. Returns response as text.
  - Useful when fetching and screen-scraping HTML from the response
Fetching Remote Content…

```html
<div id="container"></div>
<script>
    function callback(response) {
        // Iterate through each entry and generate HTML to be inserted
        var html = new Array();
        for (var n = 0; n < response.Entry.length; n++) {
            var entry = response.Entry[n];
            html.push('<a href="' + entry.Link + '">' + entry.Title + '</a>' + '<div>' + entry.Summary + '</div>');
        }
        _gel('container').innerHTML = html.join('<hr>');
    }
    _IG_FetchFeedAsJSON("http://news.google.com/?output=atom", callback, 3, true);
</script>

http://news.google.com/?output=atom

<?xml version="1.0" encoding="UTF-8"?>
<feed version="0.3" xml:lang="en"
     xmlns="http://purl.org/atom/ns#">
  <generator>NFE/1.0</generator>
  <title>Google News</title>
  ...
</feed>
A Useful Gadget?

• Travel Planner Gadget
• Adds value to www.zvv.ch, a travel planning site: allows a user to save favourite trips

• Points to note
  – UI design
  – User Prefs to store favourite trips
  – Gadget **constructs** URL www.zvv.ch?<lots of parameters>
  – Calls the constructed URL and pops up travel results in a separate window
  – Internationalized and localized: German, English
What makes a good gadget?

• Provides **useful** information or actions
• **Extends** functionality or information already provided by web property/site.
• Satisfying **user experience** given gadget constraints
• **Localized** (assumes good internationalization of gadget)
• **Customized** to locality (where appropriate)
Caching External Resources

• Facts:
  – Google caches all gadget XML files
  – Google caches all requests going through _IG_Fetch…() methods.
  – Gadgets receive tons of traffic (ok, opinion;)

• Remaining Problem:
  – Gadgets often embed external resources hosted on third-party servers, e.g. images, Flash
  – Hosting servers melt down because they cannot handle all the requests

• Solution:
  – Use API methods to cache all embedded resources on iGoogle
    • _IG_GetImage(url) - Returns HTML image fetched from the cache
    • _IG_GetImageUrl(url) - Returns URL used to fetch the image via cache
    • _IG_GetCachedUrl(url) - Returns URL used to fetch the resource via cache
Caching External Resources...

Caching images

```html
<img id="goImg" src="" width=100 height=150 />
<script>
  _gel("goImg").src = _IG_GetImageUrl("http://domainA.com/go.gif");
</script>
```

Caching Flash

```html
<div id="container"></div>
<script>
  var cacheUrl = _IG_GetCachedUrl('http://mydomain.com/flashvideo.swf');
  _IG_EmbedFlash(cacheUrl, 'container', { width: 300, height: 250 });
</script>
```
Gadget to Gadget Communication

• Subscribe to agreed upon UserPref variables.
  – “lat”, “long”
  – “rawquery”
  – “finance_symbol”

• Publish changes

• Pub/Sub, Easy, Powerful.

• *Demo: “Google Finance”.*

• http://www.google.com/ig/sandbox (externally)

• Canvas View (Maximized View)
  <Require feature="views"/>
  <Content type="html" view="home"> ... 
  <Content type="html" view="canvas"> ... 

• OpenSocial Sandbox
  http://code.google.com/apis/opensocial/
  – People- and Friends Data API
  – Activities Data API
  – Persistence Data API
Useful Development Tools

Web browsers
- Designed to view the web, not for WebApps
- Errors… Debugging…
- Make sure to test on Firefox, IE, Safari, Opera

In order to develop
- Be mindful of this.
- There are lots of great development tools (different from browsing tools.)

I use and recommend:
- Firefox
- Firebug
- W3CSchools
  [http://www.w3schools.com/](http://www.w3schools.com/)
- Web Developer Toolbar

Demos...
Want to Know More?

- Competition website
  google.co.za/gadgetcomp08
- Email alias for student questions on competition and gadgets (but look at the handout, website and documentation first)
  Zagadgetcomp08@google.com
- Google Gadgets API Docs
  http://www.google.com/apis/gadgets
- Google Gadgets For Your Webpage
  http://www.google.com/ig/directory?synd=open
- Top Gadget Authors
  http://www.google.com/ig/authors
- Discussion Group
  http://groups.google.com/group/Google-Gadgets-API
- FAQ / Knowledge Base
  http://code.google.com/support/bin/topic.py?topic=10027
- Publishing Your Gadget
  http://code.google.com/apis/gadgets/docs/publish.html#Syndication
- Google Distribution Guidelines
  http://www.google.com/webmasters/gadgets/guidelines.html