

Identity Tech Overview

Less Pain, More Gain

Tim Bray
Developer Advocate



Please feed back!

- Use the mobile app
- Point your barcode reader at the QR back there
- Later, on video



An Introduction to Integrating Google+ Sign-In

Jonathan Beri, Ridhima Kedia

Google+ Sign-In for Android Developers

Lee Denison, Wesley Tarle

Keys to the Kingdom: Design Patterns for Using OAuth in the Cloud

Benjamin Wiley Sittler, Adam Eijdenberg

Google+ Sign-In for Web Apps

Ade Oshineye

Google+ Sign-In for iOS Developers

Silvano Luciani, Xiangtian Dai

Best Practices for Google+ Sign-In

Gus Class, Joanna Smith

Cross-Platform Auth with Google+ Sign-In

Francis Ma, Chris Cartland

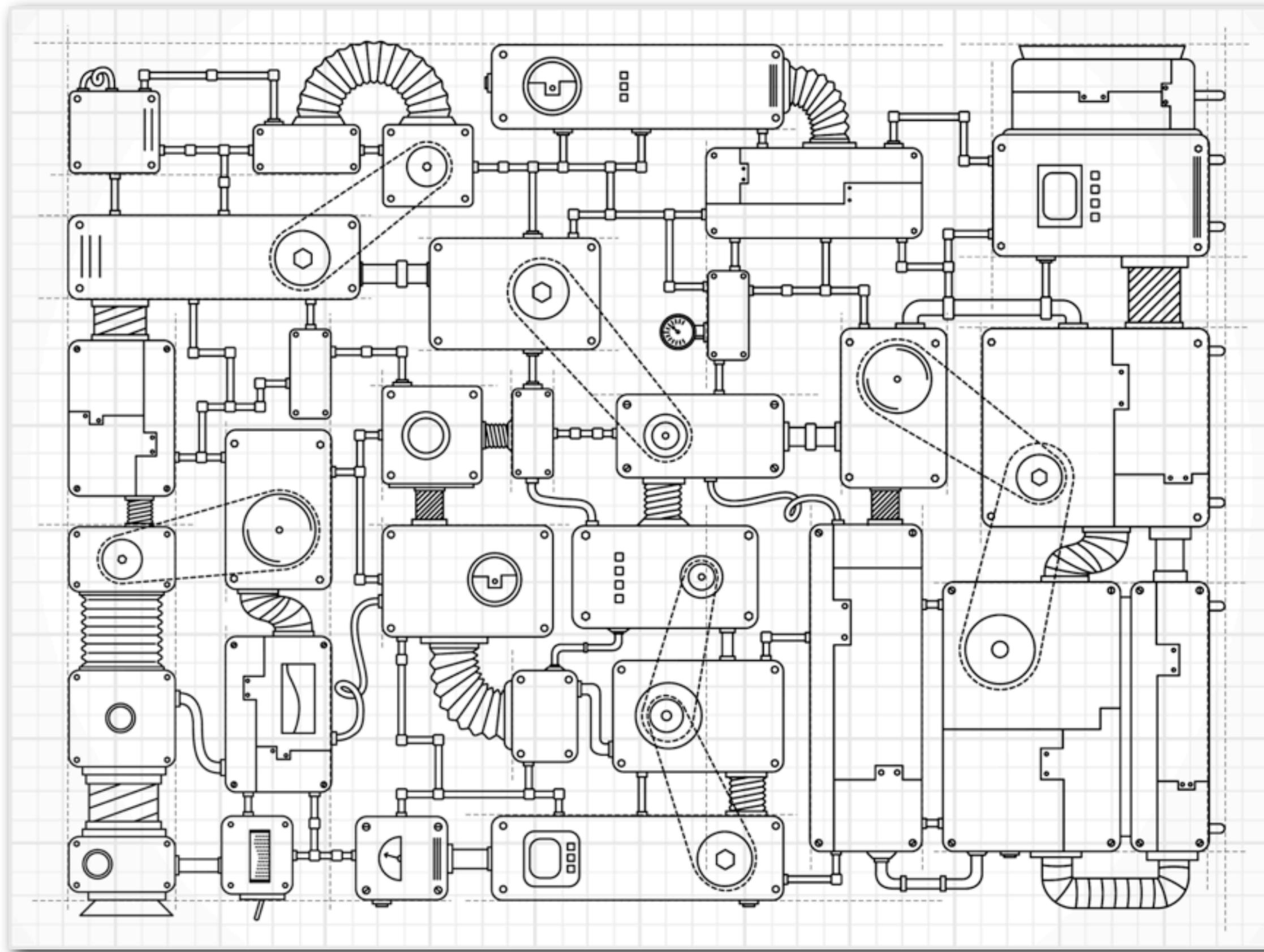
How to Offer Google+ Sign-In Alongside Other Social Sign-In Services

Ian Barber











“ya29.AHES6ZQjFP7Ih-1pKyG9vdUo
F28p4peeieppieob5CPHAWq3FLnm”

An Access Token





```
GET /v1/people/me HTTP/1.1
```

```
...
```

```
Host: www.googleapis.com
```

```
Authorization: Bearer ya29.AHES6ZQjFP7Ih-1pKyG9vdUoF2...
```

How to use an Access Token





How to peek into an Access Token

```
634> curl \
  https://www.googleapis.com/oauth2/v1/tokeninfo?access_token=ya29.AHES6Z...
{
  "issued_to": "407408718192.apps.googleusercontent.com",
  "audience": "407408718192.apps.googleusercontent.com",
  "user_id": "107760670355981561507946",
  "scope": "https://www.googleapis.com/auth/plus.me",
  "expires_in": 3370,
  "access_type": "offline"
}
```



An Access Token

- Is opaque,
- short-lived, and
- signifies the right for a particular Google Account to access a particular scope.
- It is unencrypted, therefore
- it **must be transmitted over TLS (https)**.





eyJhbGciOiJSUzI1NiIsImtpZCI6ImFkMmE1MGNiNzBjNWRhNzg5ZWUyNmQwNWl4ZjYyMW
E5OWU4MTIwMmUifQ.eyJpc3MiOiJhY2NvdW50cy5nb29nbGUuY29tIiwiaWQiOiIxMDc2M
DY3MDM1NTgxNjE1MDc5NDYiLCJzdWIiOiIxMDc2MDY3MDM1NTgxNjE1MDc5NDYiLCJjaWQ
iOiI0MDc0MDg3MTgxOTIuYXBwcy5nb29nbGV1c2VyY29udGVudC5jb20iLCJhenAiOiI0M
Dc0MDg3MTgxOTIuYXBwcy5nb29nbGV1c2VyY29udGVudC5jb20iLCJ0b2t1b19oYXNoIjo
iVzlhVEtEVmF6M1VKdkhHdTUzLWJ5dyIsImF0X2hhc2giOiJXOWFUS0RWYXozVUp2SEd1N
TMtYn13IiwiaWF0IjoiNDA3NDA4NzE4MTkyLmFwcHMuz29vZ2xldXN1cmNvbnRlbnQuY29
tIiwiaWF0IjoiMzY3NTMxODg2LCJleHAiOiJlZjE1MDc2MDY3MDM1NTgxNjE1MDc5NDYiLCJ
ZATjEQaE37jiizY8cWUwBJ8hpXtTkjD9kRs91vncm8BmF_ztT7I3Q64AqYN8kJCyi82ic1
ige06vJ_b0-LgSkJSv657m1agdLPhkB6zqGKkH8qT40xwdYTX0XB0EkNZiGQhYg_TJNDas
Tn9KKxba-DE

An ID Token



header

eyJhbGciOiJSUzI1NiIsImtpZCI6ImFkMmE1MGNiNzBjNWRhNzg5ZWUyNmQwNWl4ZjYyMW
E5OWU4MTIwMmUifQ. (payload) . vtELejHfCCImqR9QTmk-ZATjEQaE37jiizY8cWUw
BJ8hpXtTkjD9kRs91vncm8BmF_ztT7I3Q64AqYN8kJCyi82iclige06vJ_b0-LgSkJSv65
7m1agdLPhkB6zqGKkH8qT40xwdYTX0XB0EkNZiGQhYg_TJNDasTn9KKxba-DE

signature

base64

```
{  
  "alg": "RS256",  
  "kid": "ad2a50cb70c5da789ee26d05b8f621a99e81202e"  
}
```

ID Token header



```
← → ↻ https://www.googleapis.com/oauth2/v1/certs

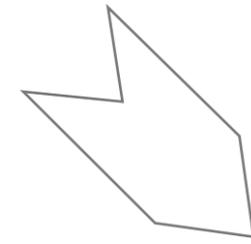
{
  "859c1234d08e008cc261ff11de5f8da1b8c4d490": "-----BEGIN
\nMIICITCCAYqgAwIBAgIIVW52kRi9CMQwDQYJKoZIhvcNAQEFBQAwnjI
nZpY2VhY2NvdW50LmNvbTAe\nFw0xMzA1MDExMzEzMzRaFw0xMzA1MDMx
lzdGVtLmdzZXJ2aWN1YWNjb3VudC5jb20wgZ8wDQYJKoZI\nnhvcNAQEBI
mfc\n9GAV1JgCI2Fpg41JKUCU1E67R9KKlinFX2xVI4dXDhIH8E/nuta
0mZEjoZjai8qeyY1bdHEtG6cmT\n6tivAgMBAAGjODA2MAwGA1UdEwEB
GAQUFBwMCMA0GCSqGSIb3DQEBBQUAA4GBAAsMGM6EQxvQEWVz\nnm3+av
LeQeEL\nbthdgePuUBYqTKG10AYyfm9SFwe8bcEBiL+T3UmUEw0JL/xB
END CERTIFICATE-----\n",
  "ad2a50cb70c5da789ee26d05b8f621a99e81202e": "-----BEGIN
\nMIICITCCAYqgAwIBAgIIAiRtMKqTubQwDQYJKoZIhvcNAQEFBQAwnjI
nZpY2VhY2NvdW50LmNvbTAe\nFw0xMzA1MDIxMjU4MzRaFw0xMzA1MDQx
lzdGVtLmdzZXJ2aWN1YWNjb3VudC5jb20wgZ8wDQYJKoZI\nnhvcNAQEBI
Vnb\nnumqyJYJHz6UKufzUKn2eC3/hMBJb/lvhRwP1Dz7+E1k1YsK5ISh
PGiTV3RUNcCehUDJWiKygKW4Qg\nenLTAgMBAAGjODA2MAwGA1UdEwEB
GAQUFBwMCMA0GCSqGSIb3DQEBBQUAA4GBAJFJiOzmcLHpCLQL\nnA3NMNI
HRkGW1\nM0PKJLw18Axpo4JsnYkq4aRtt7ZaLkfo4zYHWtrBWYR5Qf6d
END CERTIFICATE-----\n"
}
```

www.googleapis.com/oauth2/v1/certs



.eyJpc3MiOiJhY2NvdW50cy5nb29nbGUuY29...

payload

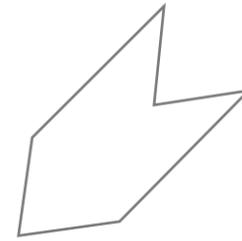


base64



OpenID

```
{  
  "iss": "accounts.google.com",  
  "sub": "107606703558161507946",  
  "azp": "407408718192.apps.googleusercontent.com",  
  "token_hash": "W9aTKDVaz3UJvHGu53-byw",  
  "at_hash": "W9aTKDVaz3UJvHGu53-byw",  
  "aud": "407408718192.apps.googleusercontent.com",  
  "iat": 1367531886,  
  "exp": 1367535786  
}
```



Inside an ID Token payload



An ID Token



- Is cryptographically signed by an issuer (“iss”),
- asserts that the user (“sub”) is authenticated by that issuer,
- is meant for a particular recipient (“aud”), and
- may have been issued to a particular authorized party (“azp”).
- It is unencrypted, therefore
- it **must be transmitted over TLS (https)**.
- They are *incredibly useful!* (see tbray.org/ongoing/When/201x/2013/04/04/ID-Tokens)









Google APIs Client Libraries

The Google APIs Client Libraries are great examples of how to use the Google APIs Discovery Service to build a good quality client library for Google APIs. All libraries are open-sourced and ready for to use as a sample.

In the table below, the first column shows each library's stage of development; note that some are still in early stages. The second column links to the main page for each library.

For libraries that have samples for the Google APIs Discovery Service, the third column in the table below links to them directly. If a library's samples page does not yet include a sample for this API, you can still use that library -- simply adapt one of the existing samples as needed.

Client library	Documentation	All client library samples
Google APIs Client Library for .NET (beta)	google-api-dotnet-client/	.NET samples
Google APIs Client Library for Dart (alpha)	google-api-dart-client/	Dart samples
Google APIs Client Library for Go (alpha)	google-api-go-client/	Go samples
Google API Libraries for Google Web Toolkit (alpha)	gwt-google-apis/	GWT samples
Google APIs Client Library for Java (beta)	google-api-java-client/	Java samples
Google APIs Client Library for JavaScript (beta)	google-api-javascript-client/	JavaScript samples
Google APIs Client Library for Objective-C	google-api-objectivec-client/	Objective-C samples
Google APIs Client Library for PHP (beta)	google-api-php-client/	PHP samples
Google APIs Client Library for Python	Google APIs Client Library for Python	Python samples
Google APIs Client Library for Ruby (alpha)	google-api-ruby-client/	Ruby samples

developers.google.com/discovery/libraries



```
POST /o/oauth2/token HTTP/1.1
```

```
Host: accounts.google.com
```

```
Content-Type: application/x-www-form-urlencoded
```

```
code=4/P7q7W91a-oMsCeLvIaQm6bTrgtp7&
```

```
client_id=8819981768.apps.googleusercontent.com&
```

```
client_secret=meR-4o41afd72rf6n970TtoH&
```

```
redirect_uri=https://oauth2-login-demo.appspot.com/code&
```

```
grant_type=authorization_code
```

```
HTTP/1.1 200 OK
```

```
Content-Type: application/json
```

```
{  
  "access_token": "1/ffAGRNJru1FTz70BzhT3Zg",  
  "expires_in": 3920,  
  "token_type": "Bearer"  
}
```



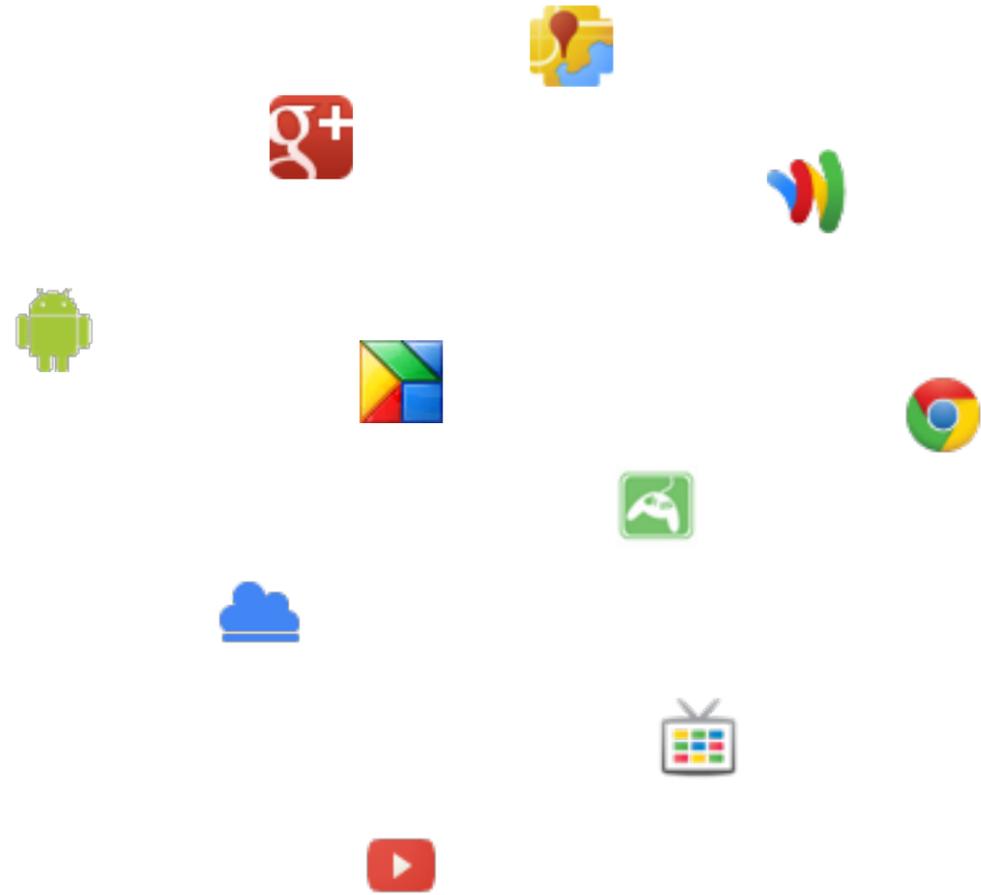
Authorization

Authentication



Authorization

Authentication



Authorization



Authentication



(Authz/authn demo)



```
<body>
  <div id="gConnect">
    <button class="g-signin"
      data-scope="https://www.googleapis.com/auth/plus.login"
      data-requestvisibleactions="http://schemas.google.com/AddActivity"
      data-clientId="{{ CLIENT_ID }}"
      data-accesstype="offline"
      data-callback="onSignInCallback"
      data-theme="dark"
      data-cookiepolicy="single_host_origin">
    </button>
```



```
get '/people' do
  # Check for stored credentials in the current user's session.
  if !session[:token]
    halt 401, 'User not connected.'
  end

  # Authorize the client and construct a Google+ service.
  $client.authorization.update_token!(session[:token].to_hash)
  plus = $client.discovered_api('plus', 'v1')

  # Get the list of people as JSON and return it.
  response = $client.execute!(plus.people.list,
    :collection => 'visible',
    :userId => 'me').body
  content_type :json
  response
end
```



```
<body>
  <div id="gConnect">
    <button class="g-signin"
      data-scope="https://www.googleapis.com/auth/plus.login"
      data-requestvisibleactions="http://schemas.google.com/AddActivity"
      data-clientId="{{ CLIENT_ID }}"
      data-accesstype="offline"
      data-callback="onSignInCallback"
      data-theme="dark"
      data-cookiepolicy="single_host_origin">

    </button>
```

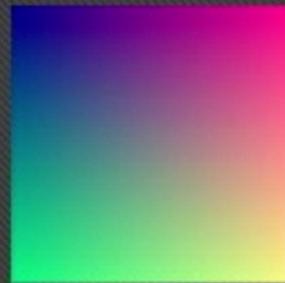


```
<body>
  <div id="gConnect">
    <button class="g-signin"
      data-scope="https://www.googleapis.com/auth/plus.login"
      data-requestvisibleactions="http://schemas.google.com/AddActivity"
      data-clientId="{ { CLIENT_ID } }"
      data-accesstype="offline"
      data-callback="onSignInCallback"
      data-theme="dark"
      data-cookiepolicy="single_host_origin"
      data-apppackagename="com.textuality.favcolor">
    </button>
```



FavColor

Tim Bray



INSTALLED



This app is compatible with all of your devices.

[+]

More from developer

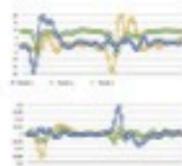


LifeSaver 2

TIM BRAY

★★★★★ (92)

Free



Senspire

TIM BRAY

★★★★★ (10)

Free

OVERVIEW

USER REVIEWS

WHAT'S NEW

PERMISSIONS

Description

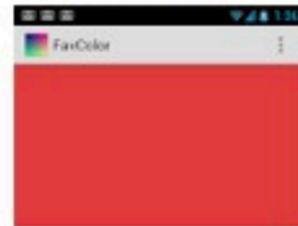
We know your favorite!

This is a demo app for AccountChooser and Android Hybrid auth. Thus, probably not very interesting to the general public.

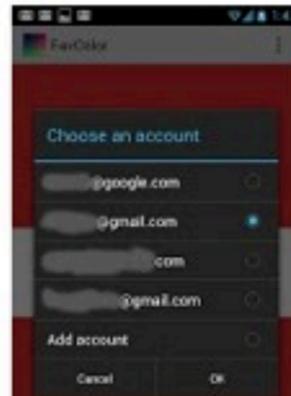
[Visit Developer's Website >](#)

[Email Developer >](#)

App Screenshots



Hello Tim Bray! We know your favorite color! Tap to change it.



+1



Tweet

ABOUT THIS APP

RATING:



UPDATED:

December 20, 2012

CURRENT VERSION:

1.5

REQUIRES ANDROID:

3.2 and up

CATEGORY:

Tools

INSTALLS:

10 - 50

last 30 days

SIZE:



UPDATE: See the [press coverage](#) for the IEEE breach.

UPDATE: [IEEE notifies users, confirming the breach.](#)

[Originally posted on September 25, 2012. A day after I informed IEEE, and they restricted access to the log files]

Data breach at IEEE.org: 100k plaintext passwords.

Using the data to gain insights into the engineering and scientific community



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6 June 2012 Last updated at 23:28 GMT



LinkedIn passwords leaked by hacker

Social networking website LinkedIn has said some of its members' passwords have been "compromised" after reports that more than six million passwords had been leaked onto the internet.

Hackers posted a file containing encrypted passwords onto a Russian web forum.



CNET > News > Security & Privacy

Dropbox confirms it was hacked, offers users help

After a two-week investigation, the online file storage service confirms

52 comments

4.2K

2K

1.3K

283

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Nearly half a million Yahoo passwords leaked following hack

Posted on 12 July 2012.

Some 450,000 email addresses and associated unencrypted passwords have been dumped online by the hacking collective "D33Ds Company" following the compromise of a Yahoo subdomain.

Major U.S. banks still under DDoS attack

Adobe admits breach, will revoke compromised code signing certificate

Mozilla launches its privacy-friendly website login system

The economy behind ransomware attacks

Apple apologises for Maps anger

Syria 'moving chemical weapons'

Kenya doping claims investigated **NEW**

GFI Network Server Monitor Online
Cloud-based server and workstation monitoring
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Spotlight 1 2 3 4 5
Analysis of nearly 1.7 billion shortened URL links
Posted on 27 September 2012. | Web of Trust completed an analysis of nearly 1.7



- The password must be at least 8 characters long.
- The password **must** contain at least:
 - one alpha character [a-zA-Z];
 - one numeric character [0-9];
 - one special character from this set:
` ! @ \$ % ^ & * () - _ = + [] ; : ' " , < . > / ?
- The password **must not**:
 - contain spaces;
 - begin with an exclamation [!] or a question mark [?];
 - contain your login ID.
 - Contain your registered email address
- The password cannot contain repeating character strings of 3 or more identical characters. E.g. “1111” or “aaa”
- The sequence of the first 3 characters cannot be in your login ID.
- The first 8 characters cannot be the same as in your previous password.
- Passwords are treated as case sensitive.

From the top Google match for “password rules”



Наш магазин аккаунтов рад предложить аккаунты различных **почтовых служб** и **бесплатных хостингов** для любых задач. Вы получите аккаунты **СРАЗУ после оплаты** заказа через Webmoney.

Также доступна услуга залива редиректов на **Pochta.ru**, **Cwahi.net** и **0catch.com** что является уникальной услугой - вы получаете готовые редиректы в течение часа после заказа. При покупке аккаунтов менее 1000 штук действует специальный тариф.

www.FreedomScripts.org - разработка софта на заказ

[Мега Софт для дорвеев - Zerber](#)

[Одобрятел друзей - Мой мир](#)

[Twidium](#) - безопасный и профессиональный инструмент для раскрутки твиттера
[накрутить фолловеров в Твиттер](#)

[Заработай на продаже аккаунтов](#)

[Купить аккаунты Одноклассников](#)

[Купить аккаунты Вконтакте](#)

Сейчас в продаже

Служба	Кол-во акков	Цена за 1К аккаунтов
Mail.ru	2928	до 10К: \$5 от 10К до 20К: \$4.5 от 20К: \$4
Mail.ru Mix	260244	до 10К: \$5 от 10К до 20К: \$4.5 от 20К: \$4
Mail.ru Second Hand	55052	до 10К: \$4 от 10К до 20К: \$3.5 от 20К: \$3
Mail.ru Mix S/H	91636	до 10К: \$4 от 10К до 20К: \$3.5 от 20К: \$3
Yandex.ru	3594	до 10К: \$20 от 10К до 20К: \$19 от 20К: \$18
Narod.ru	5106	до 10К: \$50 от 10К до 20К: \$50 от 20К: \$50
Qip.ru (Pochta.ru)	1940	до 10К: \$30 от 10К до 20К: \$30 от 20К: \$30
Hotmail.com	508015	до 10К: \$2 от 10К до 20К: \$2 от 20К: \$2
Hotmail.com Plus	546598	до 10К: \$3 от 10К до 20К: \$3 от 20К: \$3
Outlook.com Plus	165731	до 10К: \$4 от 10К до 20К: \$3.5 от 20К: \$3
Hotmail Second Hand	428316	до 10К: \$4 от 10К до 20К: \$3.5 от 20К: \$3
Gmail.com USA PVA	8	до 10К: \$100 от 10К до 20К: \$95 от 20К: \$90

Новости

03 Мая 2013

Только с **3 по 15 мая** суперцены на аккаунты **Hotmail.com** и **Mail.com**! Также распродаем **Яндекс**, активированный по SMS, по цене **ниже себестоимости!**

29 Апр 2013

Мы снова продаем аккаунты **Mamba.ru**, к тому же - **по старой цене.**

12 Апр 2013

Вновь в продаже аккаунты **Twitter.com!**

15 Мар 2013

Отличная цена на аккаунты **Facebook.com!** Всего **\$80** за **1000 шт.** Дешевле не бывает!

07 Фев 2013

Сенсационная цена на аккаунты **Yahoo.com.** Теперь отличные аккаунты **со всеми регистрационными данными** по цене **от \$7** за **1000 шт!**

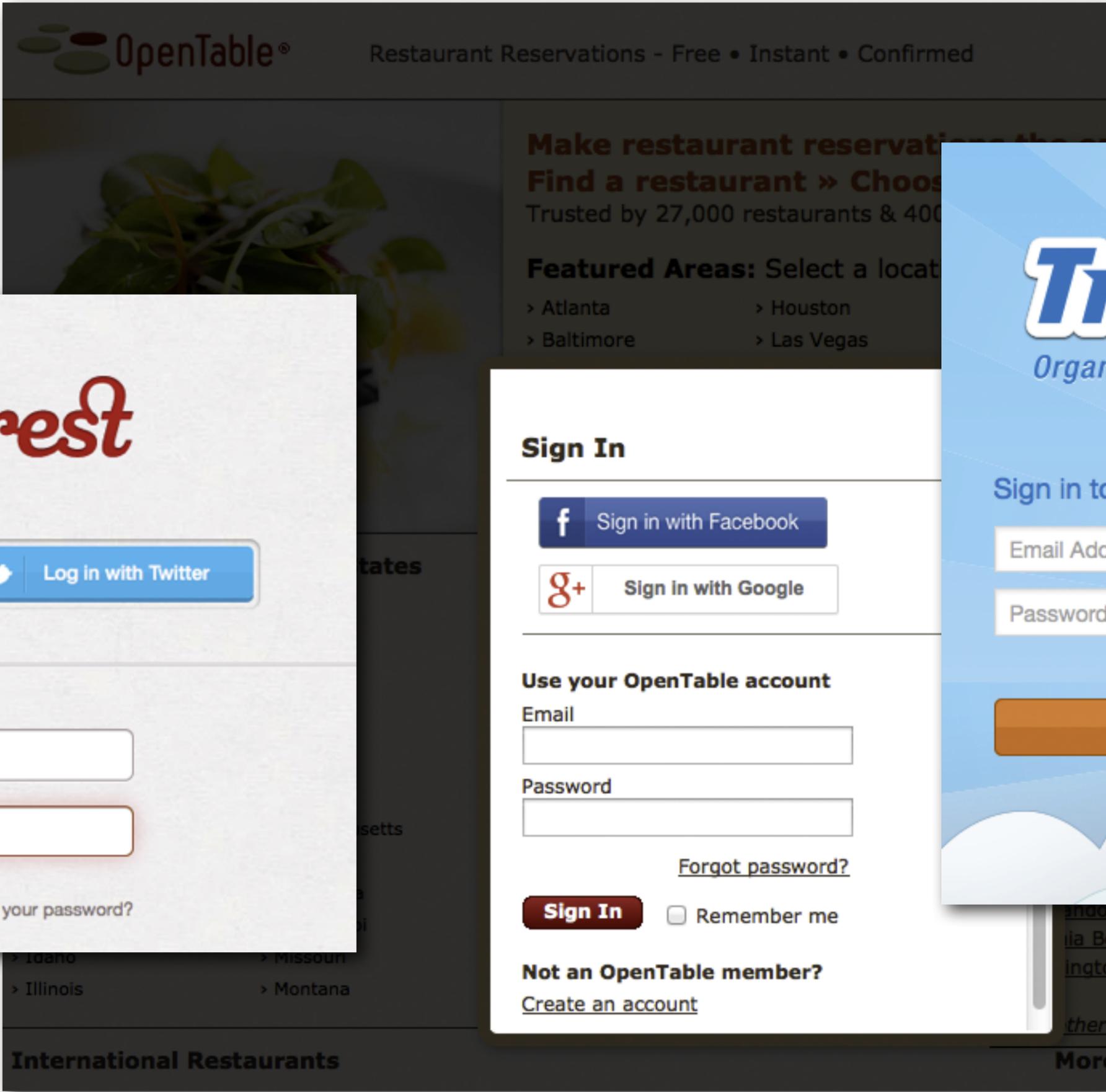
06 Фев 2013

Добавлены аккаунты **Tabor.ru** и **Drugvokrug.ru** по очень интересным ценам

21 Янв 2013

Распродаем аккаунты **Одноклассников!** Теперь всего по **9 руб** за шт!





Pinterest

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Email

Password

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Sign in with Facebook

Sign in with Google

Use your OpenTable account

Email

Password

Remember me

[Forgot password?](#)

Not an OpenTable member?
[Create an account](#)

Triplt

Organize your travel

Sign in to Triplt

Email Address

Password Remember me

Or, sign in with...



(AccountChooser demo)



Platforms

User roles

Functions

Accounts

Resources

This is a guide to using Google Identity [technologies](#) for [authentication](#) and [authorization](#). There are two objectives:

1. Find you links to the libraries, documentation, and sample code that will help you solve your identity problem.
2. Provide background explanations of the technologies and trade-offs that might not appear in the official documentation.

There are many paths through the cookbook, because there are many different ways of thinking about these problems.

- What [platform or programming language](#) do you use? (Web/Mobile/dumb device, Java/Ruby/PHP, ...)
- [Who](#) is your software working on behalf of? (Connected user, offline user, app, ...)
- [What](#) are you trying to do? (Get logged in, authenticate an app, access a service, ...)
- What kind of [accounts](#)? (Just Google, or from other Identity Providers)
- [What](#) are you trying to access? (Google+, another Google API, non-Google resource)



developers.google.com/accounts/cookbook/



Cookbook “Platforms” page

- Android app on a compatible device with Google Play services.
- A native compiled app on a personal computer or mobile device.
- Android app without Google Play services (for example, a Kindle). This is effectively equivalent to the Native-app scenario.
- iOS app.
- Browser-based Web app.
- Hybrid mobile/web, where components need to share identity.
- Chrome app/extension.
- Server-side app.
- Low-capability device (keyboard-challenged).



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Google+ Platform

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- ▶ PhotoHunt Sample
- ▶ API Reference
- ▶ Features
- ▶ Android
- ▶ iOS
- ▶ Websites
- ▶ Hangout Apps
- Downloads
- Best Practices
- Branding Guidelines
- ▶ Community & Support
- Release Notes

Grow your audience across devices

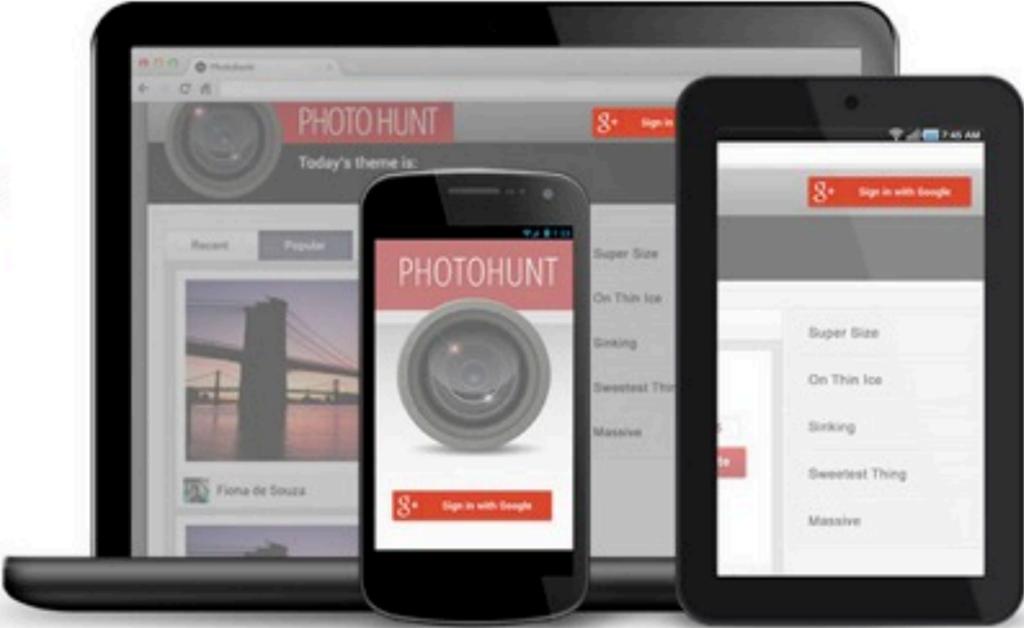
Ten minute quick start
Choose your language:

Google+ Sign-In

Google+ Sign-In is a simple, trusted way to let people sign in with their Google credentials and build even more engaging experiences across desktop and mobile.

[Try our sample app](#)




← → ↻ <https://developers.google.com/+/>

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Grow your audience across devices

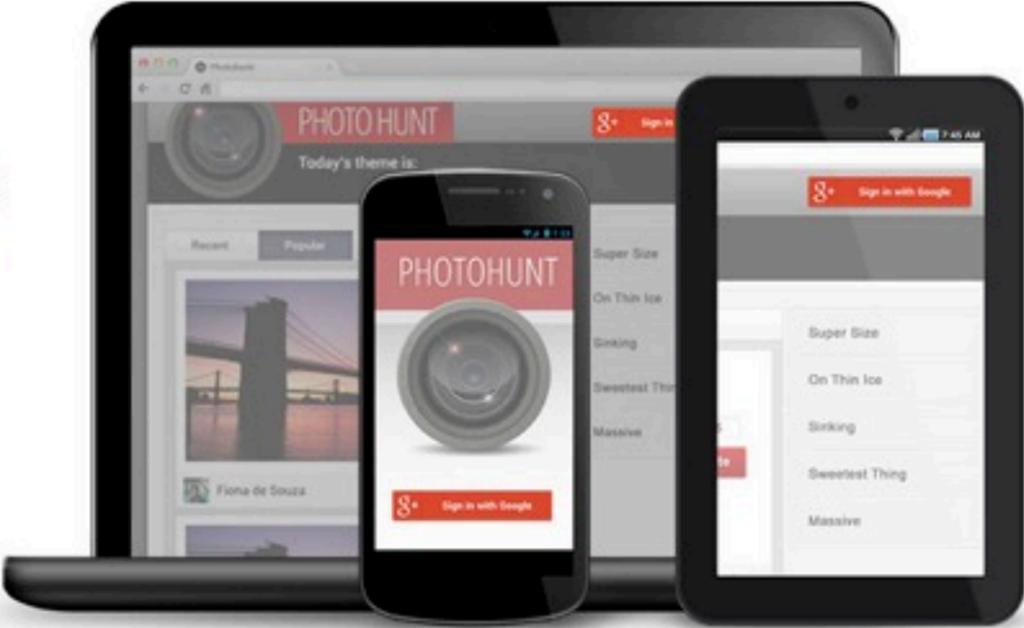
Ten minute quick start
Choose your language:

Google+ Sign-In

Google+ Sign-In is a simple, trusted way to let people sign in with their Google credentials and build even more engaging experiences across desktop and mobile.

[Try our sample app](#)




Cookbook “Roles” page

- You're acting on behalf of a human who is present and can interact with the system. This is the default mode of operation and should Just Work in the vast majority of authentication and authorization scenarios. Google's software attempts to optimize both for security and convenience, which is to say that it will typically not ask a human to reiterate a previously granted authorization, and will not prompt for re-authentication more than is reasonably necessary.
- You need to act on behalf of a human, even when the human is not available to interact via the Internet.
- You're acting on behalf of an app rather than an individual human.



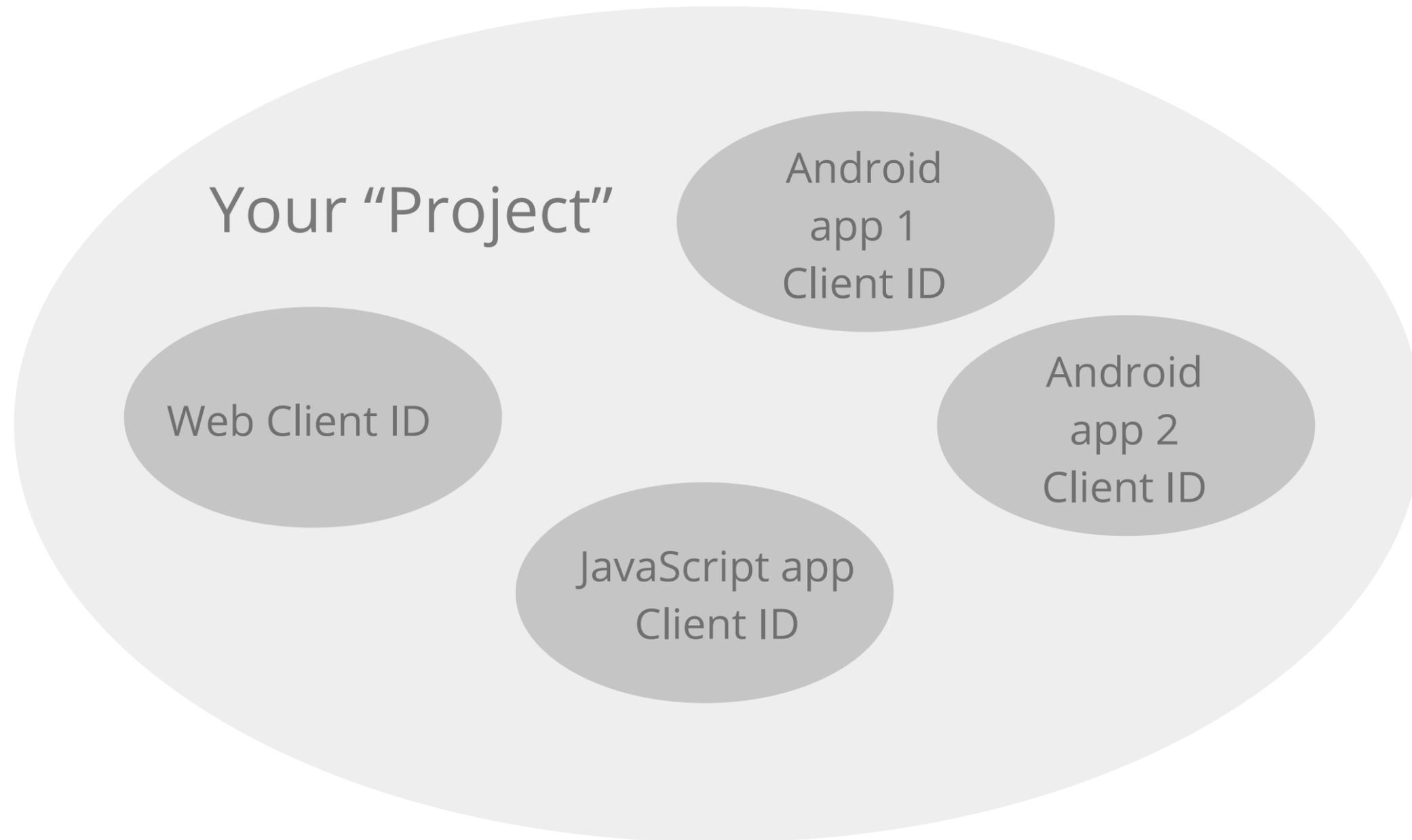
Cross-client Identity



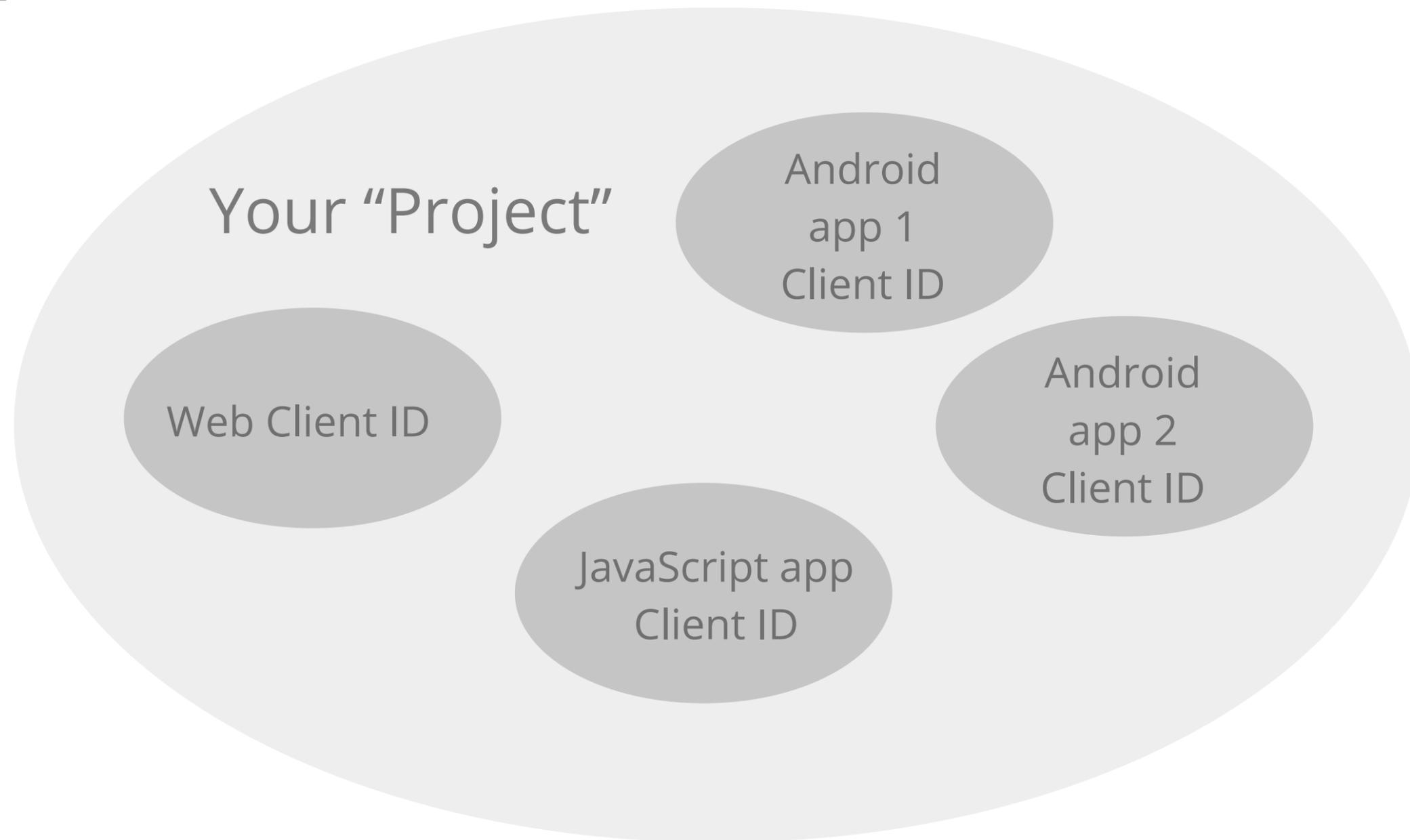
Cross-client Identity



Developer API console



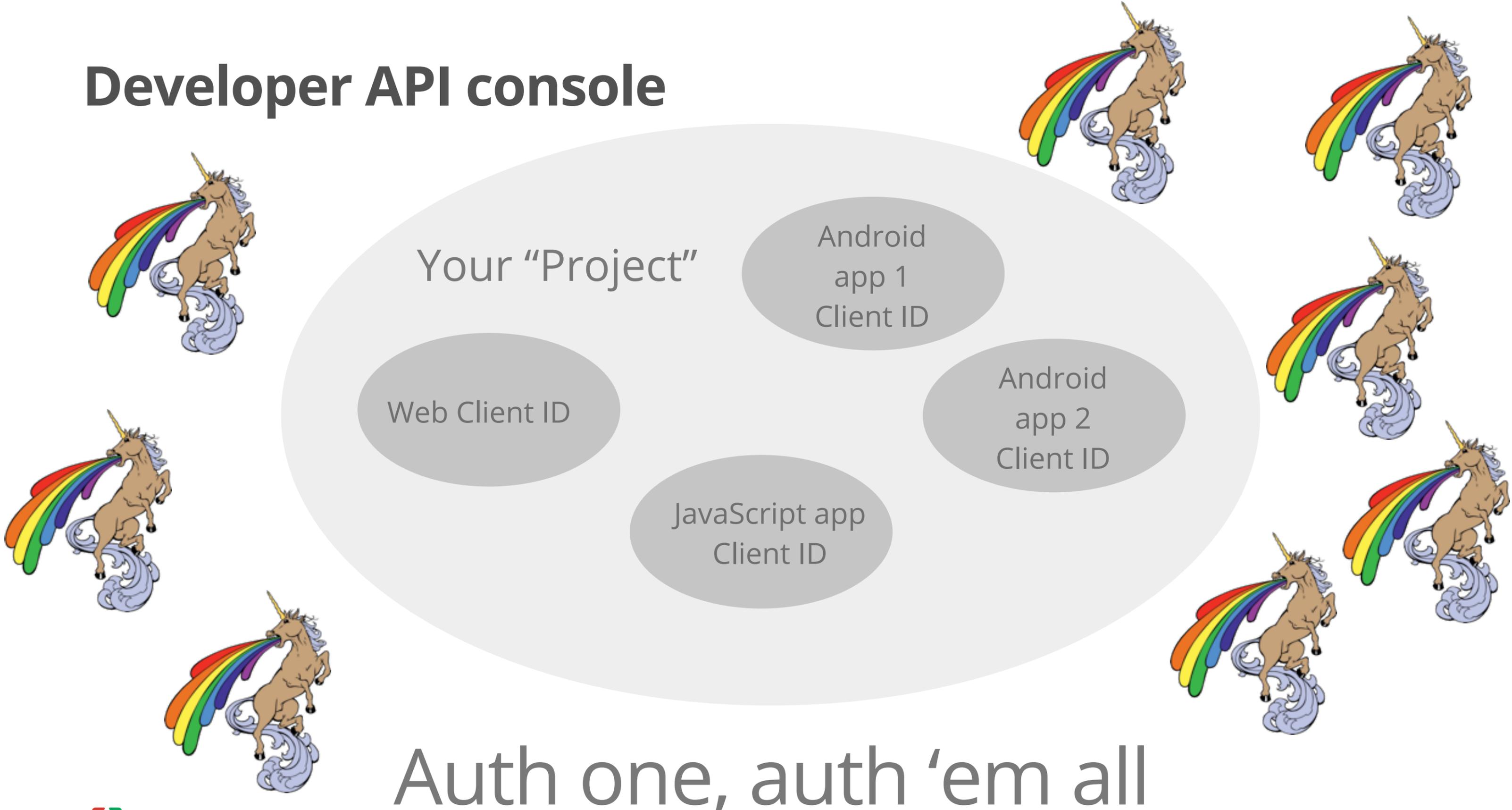
Developer API console



Auth one, auth 'em all



Developer API console



Auth one, auth 'em all





Google Accounts Authentication and Authorization

Choosing an Auth Mechanism

▶ Authentication

▼ API Authorization

▼ OAuth 2.0

Login

Web Server

Client-side

Cross-client Identity

Installed Apps

Devices

Service Accounts

▶ Older Protocols

Cross-client Identity

When developers build software, it routinely includes modules that run on a Web server, other modules that run in the browser, and others that run as native mobile apps. Both developers and the people who use their software typically think of all these modules as part of a single app.

Google's OAuth2 implementation supports this view of the world. To use any of the OAuth2-based services, developers must register their software in the Developer Console. The unit of registration is a "Project", which is meant to correspond to a multi-component app. For each Project, the developer can provide branding information and must specify which APIs the app will access.

In the Developer Console subsystem labeled "API Access", the developer specifies the modules that are logically part of the application: Web-server, native-client, JavaScript, and so on. Each component is identified by a "Client ID", a unique string.

In this document, for brevity we'll use the term "Project" to refer to such a multi-component app.

Cross-client authorization goals

Normally, whenever software requests an OAuth 2 Access Token for access to a resource, identified by one or more scope strings, on some user's behalf, the user will be asked to approve the access.

developers.google.com/accounts/docs/CrossClientAuth



Cross-client Identity

Shared
Access-Token
grant

Shared sign-in
with ID Tokens

Mobile app gets
offline Web-app
access



Cross-client Identity

Shared
Access-Token
grant



Shared sign-in
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Mobile app gets
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Mobile app gets
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Cross-client Identity

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Mobile app gets
offline Web-app
access



Your client app



Your client app



Your server back-end



Your client app



HTTPS



Your server back-end



Your client app



HTTPS



Your server back-end



(FavColor mobile demo)



Mobile app gets
offline Web-app
access



Mobile app gets
offline Web-app
access



Gmail

Experience the ease and simplicity of Gmail, everywhere you go.



Sign in

Google

Username

Password

[Sign In](#)

Stay signed in

[Can't access your account?](#)

About Gmail - email from Google

Video chat with friends, or give someone a ring all from your inbox. [Switch](#) to Gmail to get the latest [features](#), or take Gmail to [work](#).

One Google account for everything

One username and password is all you need to unlock more features from the Google services you use everyday.



 Users

PERSONAL

 Location access

 Security

 Language & input

 Backup & reset

ACCOUNTS

 Dropbox

 Facebook

 Google

 Skype™

+ Add account

SYSTEM

 Date & time

 Accessibility

 2 new messages

 Settings

ACCOUNTS

 Dropbox

 Google

 Kobo

 WhatsApp

 Yahoo!

+ Add account

SYSTEM

 Date & time

 Accessibility

 About phone



An Introduction to Integrating Google+ Sign-In

Jonathan Beri, Ridhima Kedia

Google+ Sign-In for Android Developers

Lee Denison, Wesley Tarle

Keys to the Kingdom: Design Patterns for Using OAuth in the Cloud

Benjamin Wiley Sittler, Adam Eijdenberg

Google+ Sign-In for Web Apps

Ade Oshineye

Google+ Sign-In for iOS Developers

Silvano Luciani, Xiangtian Dai

Best Practices for Google+ Sign-In

Gus Class, Joanna Smith

Cross-Platform Auth with Google+ Sign-In

Francis Ma, Chris Cartland

How to Offer Google+ Sign-In Alongside Other Social Sign-In Services

Ian Barber





<Thank You!>



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