

Y!

yet another  
conference

# Open Mapping on iOS

Justin Miller • MapBox



YaC 2013 • Moscow • October 2013

# Overview

- What is iOS mapping like out of the box?
- What is geodata? How can you use it?
- What software exists for custom mapping?

# About Me

- I live and work in Portland, USA
- I've been building with Cocoa for ~10 years
- I lead iOS & OS X engineering at MapBox

# About MapBox

- We are pushing the space around open data & open source for maps
- Why? I will show you by way of iOS
- With open tech, we also leave options open
  - No inherent lock-in
  - Mix vendors, software, and data

# What Apple Gives You

- `MapKit.framework`
- Available since iOS 3 (2009)
- Incrementally improved in each iOS release
- Apple vends their own maps
  - Pre-iOS 6, famously, they vended Google's



# Inherent Limitations

- No custom styling
- No formal offline capabilities
- Weak interactivity
  - Not fine-grained
  - Not offline-capable
  - Not at the pixel level

# What Do We Need?

1. Custom maps

2. Software to integrate them

3. Apple's blessing

- Alternate frameworks are ok!
- I'll explain more about this later

# Custom Maps

- MapBox is building a cloud platform on OpenStreetMap
  - OSM is like Wikipedia for maps
  - Over one million contributors
  - But the open tools also let you self-host
    - Start small, grow large

# Custom Maps

- We make (and use) TileMill for styling geodata
- TileMill works with both:
  - Large (OSM extracts or full)
  - Small (`vacation.geojson`)

# Can Be Combined!

- Use OSM for the base layer
  - Custom (or not) worldwide map
- Use alpha-transparent overlays for details
  - Brought in locally (bundled) or via the cloud (MapBox or other)

# But I'm Not a Map Maker!



# But I'm Not a Map Maker!

- MapBox provides easy, slider-based styling of OSM in a web UI
- The point of TileMill is to make everyone a map maker!
- Analogy: think about design assets in your application



# Geodata

- Many formats:
  - GeoJSON, KML, Shapefile, YMapsML, PostGIS & SQLite databases, even CSV (+ more)
- You can layer data together to style a map

# TileMill Concepts

**Geodata**

`russia.geojson`

**Import**

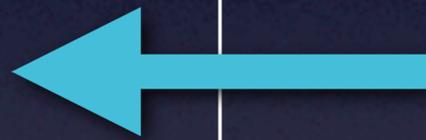
`#russia layer`

**Export**

Russia map image

**Code/Style**

`#russia { ... }`

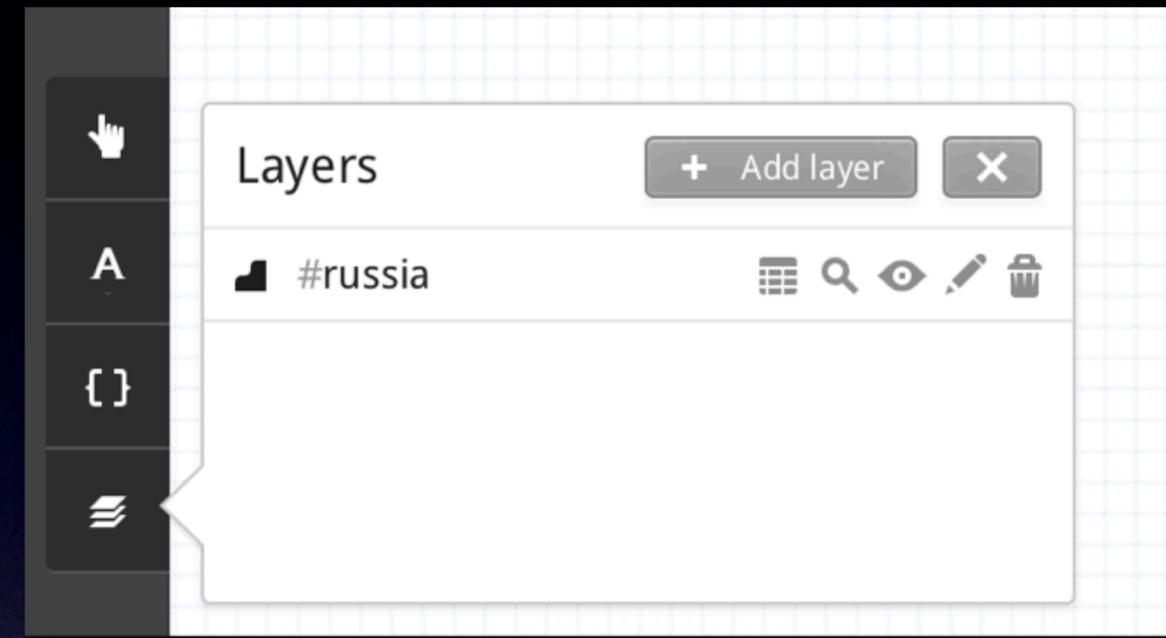


# Geodata

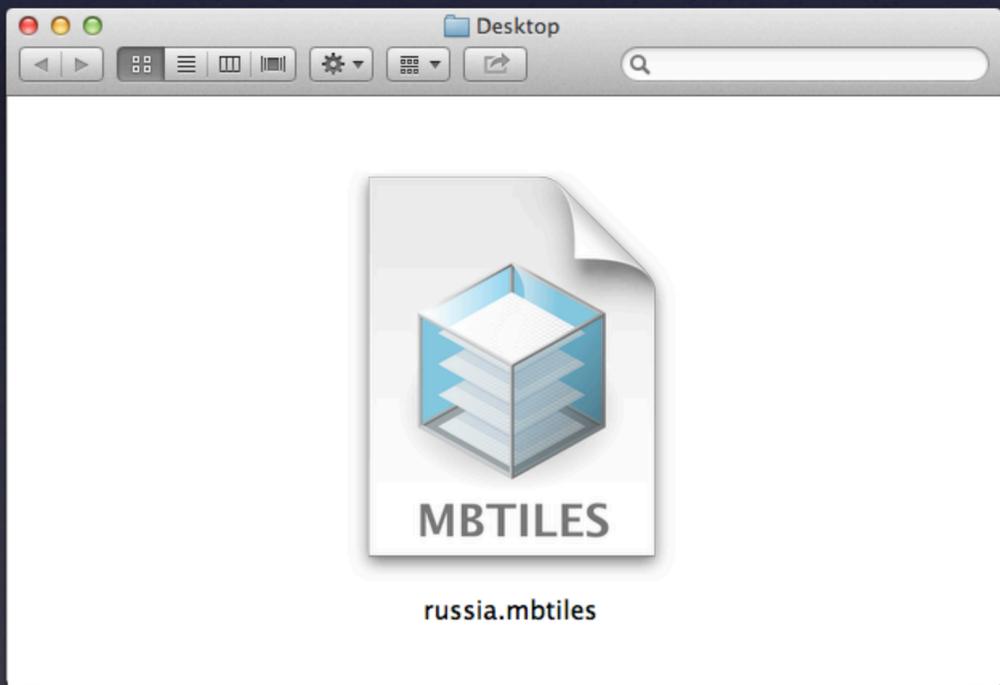
```
1 {
2   "type": "FeatureCollection",
3   "features": [
4     {
5       "type": "Feature",
6       "geometry": {
7         "type": "MultiPolygon",
8         "coordinates": [
9           [
10          [
11            [
12              143.648007440362875,
13              50.747600409541519,
```



# Import



# Export



# Code/Style

```
Russia
style.mss
1 #russia {
2   line-color:black;
3   line-width:1.0;
4   polygon-opacity:0.25;
5   polygon-fill:red;
6 }
```



TileMill

Editor

Projects

Manual

Plugins

Settings

ZOOM 3



Layers

+ Add layer

#russia

Russia

style.mss

```
1 #russia {
2   line-color:black;
3   line-width:1.0;
4   polygon-opacity:0.25;
5   polygon-fill:red;
6 }
```

Save Export

TileMill

Editor

Projects

Manual

Plugins

Settings

### Templates

Legend Teaser **Full** Location

Content to be shown on click or second tap (mobile).

You tapped {{{admin}}}.

```

```

Layer to use for interaction data: **russia**

```
{{{scalerank}}} {{{featurecla}}} {{{labelrank}}} {{{sovereign}}} {{{sov_a3}}} {{{adm0_dif}}}
{{{level}}} {{{type}}} {{{admin}}} {{{adm0_a3}}} {{{geou_dif}}} {{{geounit}}} {{{gu_a3}}}
{{{su_dif}}} {{{subunit}}} {{{su_a3}}} {{{brk_dif}}} {{{name}}} {{{name_long}}} {{{brk_a3}}}
```

These Mustache tags will be replaced by data. You can also use the full Mustache template language to customize your tooltips.

### Russia

style.mss

```
1 #russia {
2   line-color:black;
3   line-width:1.0;
4   polygon-opacity:0.25;
5   polygon-fill:red;
6 }
```

Save Export

TileMill

Editor

Projects

Manual

Plugins

Settings

ZOOM 3

You tapped Russia.



Russia

style.mss

```
1 #russia {
2   line-color:black;
3   line-width:1.0;
4   polygon-opacity:0.25;
5   polygon-fill:red;
6 }
```

Layers

+ Add layer

#russia

Hand icon

A icon

{ } icon

≡ icon

Save

Export

TileMill

Editor

Projects

Manual

Plugins

Settings

ZOOM 3

You tapped Russia.



Russia

style.mss

```
1 #russia {
2   line-color:black;
3   line-width:1.0;
4   polygon-opacity:0.25;
5   polygon-fill:red;
6 }
```

Save Export

- Upload
- PNG
- PDF
- SVG
- MBTiles
- Mapnik XML
- View exports

Layers

+ Add layer

#russia

Hand icon

A icon

{ } icon

≡ icon

# TileMill is Cross-Platform

- Supports OS X, Windows, and Linux
- Also can be run as a web service
  - It's made of Node.js
- Entirely open source and free
- Help us make it great(er)!

# Maps Produce Tiles

- 2D plane:  $x$  &  $y$  values
- Detail zooming:  $z$  value
  - Whole world in one tile at  $z0$
  - Maybe one city block at  $z17$

# Tiles Are Numerous

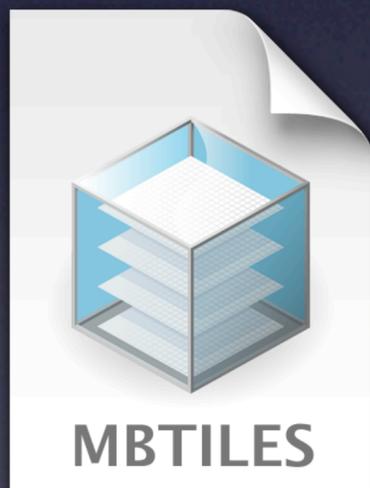
- For zoom level  $z$  there are  $4^z$  tiles
  - Whole world at once: 1 tile ( $4^0$ )
  - Whole world by blocks:  $4^{17}$  tiles (!)
- Transport at any reasonable scale becomes a problem

# MBTiles

- Take many tiles ( $z$ ,  $x$ ,  $y$  values + image data)
- Stuff them into database rows using SQLite
- Easily compress, transport, and bundle



or



# What Do We Need?

1. Custom maps ✓

2. Software to integrate them ←

3. Apple's blessing

# Software

- Apple's MapKit allows tile overlays
  - Since iOS 4 (MKOverlay protocol)
  - `-drawMapRect:...` (similar to `-drawRect:`)
- However, you can't turn off Apple's maps\*
  - Loading artifacts under your layer(s)
  - Network/rendering overhead
- Unpredictable caching & rendering

# So We Built...

- MapBox iOS SDK
  - Ground-up workalike of MapKit
  - Entirely open source & free
  - Fully-featured

# Example Usage

- **RMMapBoxSource**

- `[[RMMapBoxSource alloc]`

- `initWithMapID:@"justin.russia"]`

- **RMMBTilesSource**

- `[[RMMBTilesSource alloc]`

- `initWithTileSetResource:@"russia"`

- `ofType:@"mbtiles"]`

# Interactivity

- Simple key/value query on a `CGPoint` at the current zoom level

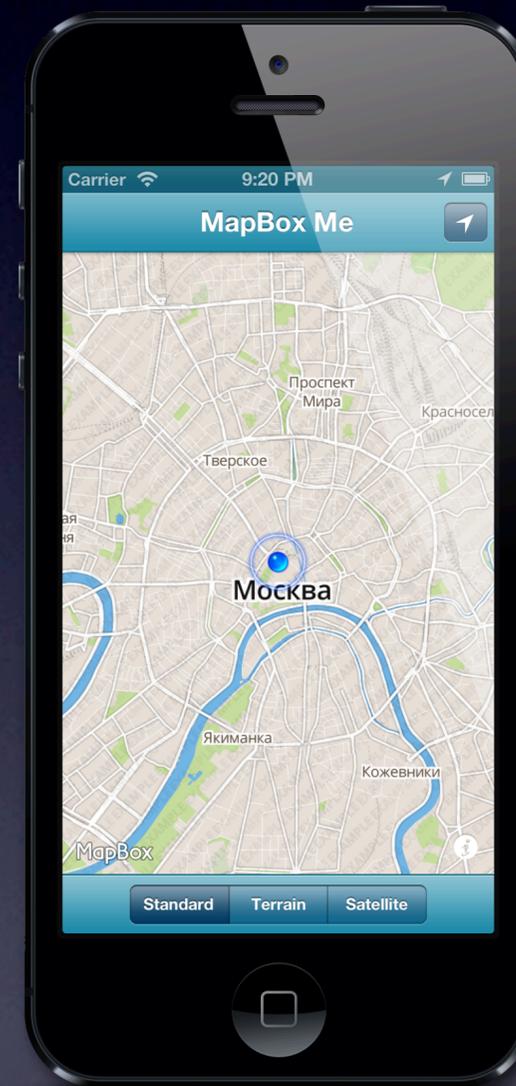
- `[mapView`

```
formattedOutputOfType:RMInteractiveSourceOutputTypeFull  
forPoint:gesturePoint]
```

- Returns HTML that can be used in `UIWebView`

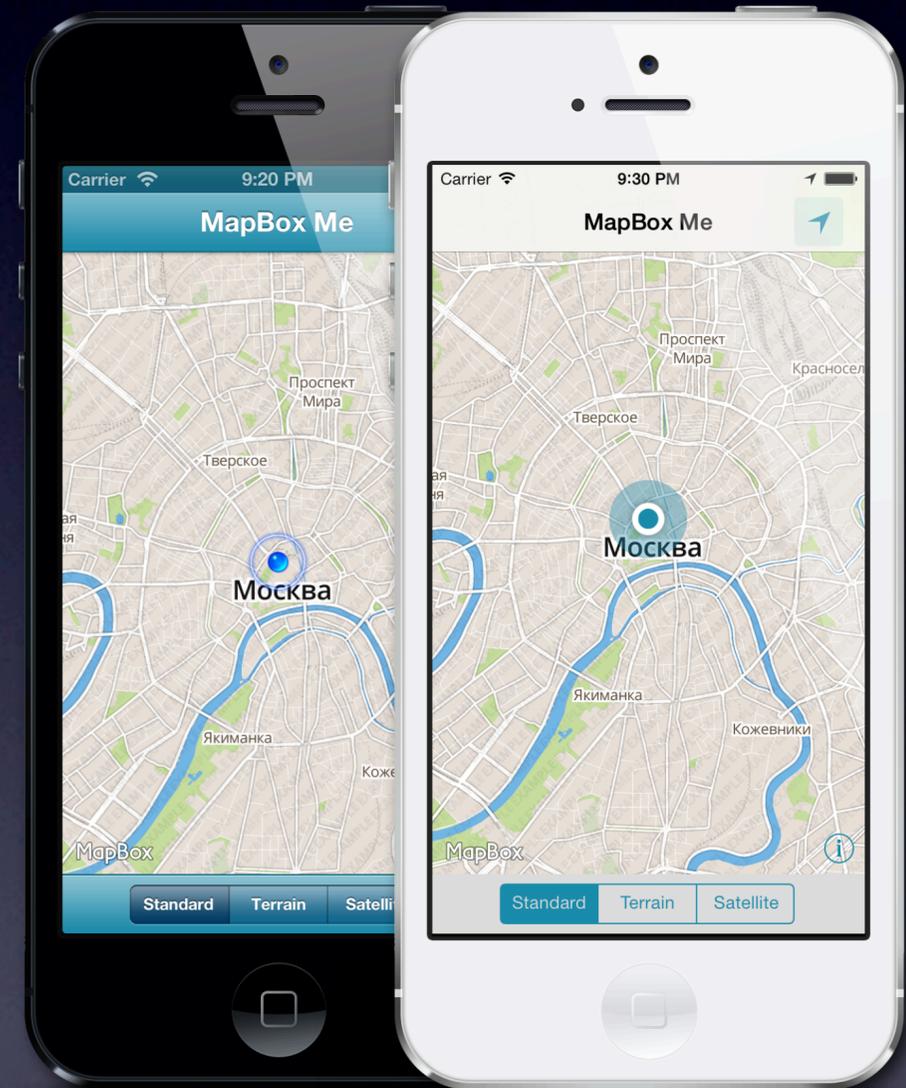
# Attention to Detail

- User location tracking
- Expected behavior & gestures



# Attention to Detail

- User location tracking
- Expected behavior & gestures
- Ready for iOS 7!



One More Thing...

Yet another Thing? ;-)

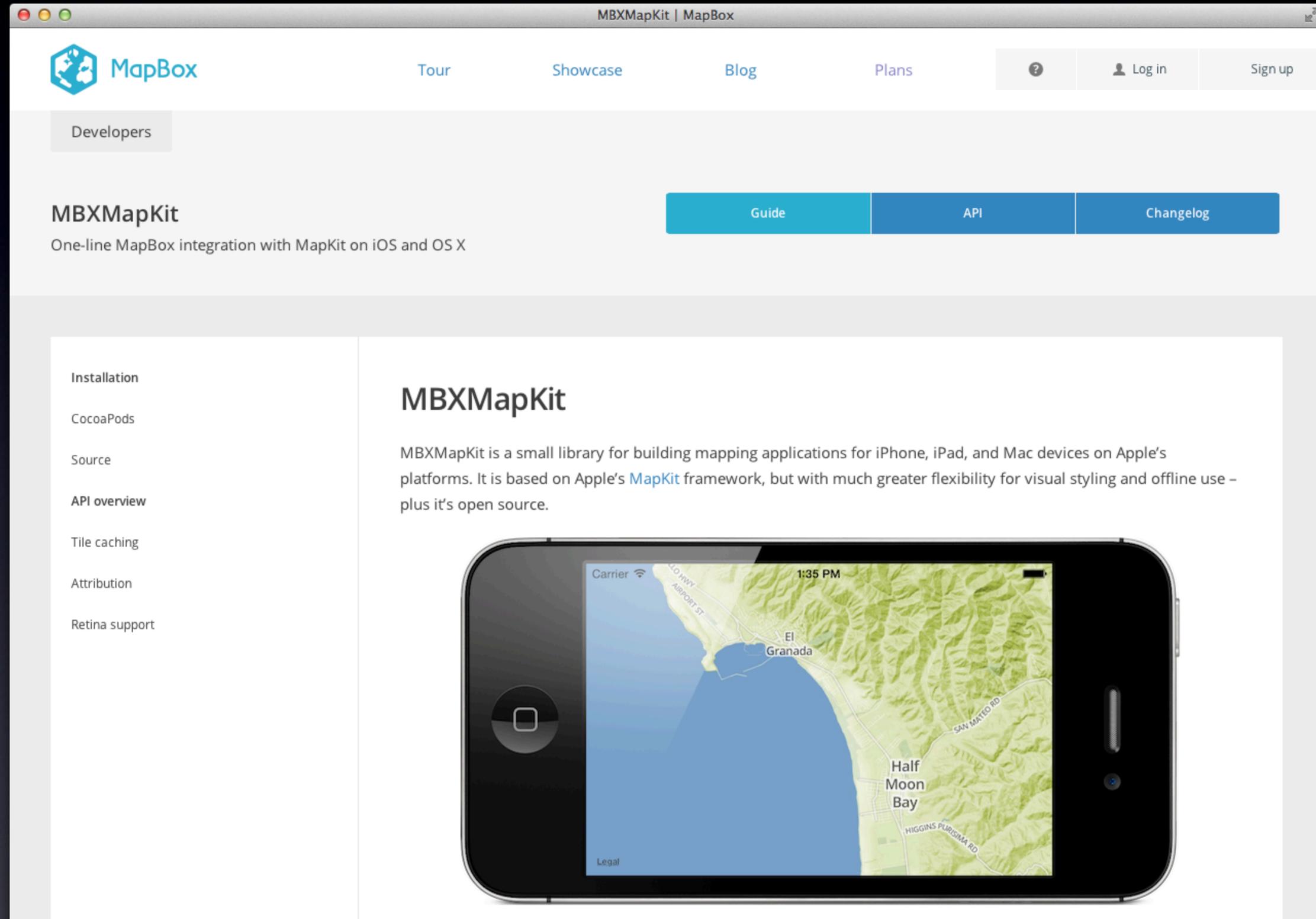
# What Do We Need?

1. Custom maps ✓
2. Software to integrate them ✓
3. Apple's blessing ←

# iOS 7 MapKit

- iOS 7 MapKit lets you bring your own tiles
- Apple's official blessing of open maps
- And it works on OS X 10.9!

# Announcing MBXMapKit



The image shows a screenshot of a web browser window displaying the MBXMapKit website. The browser's title bar reads "MBXMapKit | MapBox". The website's header includes the MapBox logo, navigation links for "Tour", "Showcase", "Blog", and "Plans", and user options for "Log in" and "Sign up". A "Developers" tab is active. The main content area features the "MBXMapKit" title, a subtitle "One-line MapBox integration with MapKit on iOS and OS X", and three buttons: "Guide", "API", and "Changelog". A left sidebar lists navigation items: "Installation", "CocoaPods", "Source", "API overview", "Tile caching", "Attribution", and "Retina support". The main text area contains the heading "MBXMapKit" and a paragraph describing it as a small library for building mapping applications for iPhone, iPad, and Mac devices on Apple's platforms, based on Apple's MapKit framework but with greater flexibility for visual styling and offline use, and being open source. Below the text is a photograph of an iPhone displaying a map of Half Moon Bay, California, with labels for "El Granada", "Half Moon Bay", and "SAV MATEO RD". The iPhone's status bar shows "Carrier", signal strength, Wi-Fi, and the time "1:35 PM".

MapBox

Tour Showcase Blog Plans

Log in Sign up

Developers

## MBXMapKit

One-line MapBox integration with MapKit on iOS and OS X

Guide API Changelog

- Installation
- CocoaPods
- Source
- API overview
- Tile caching
- Attribution
- Retina support

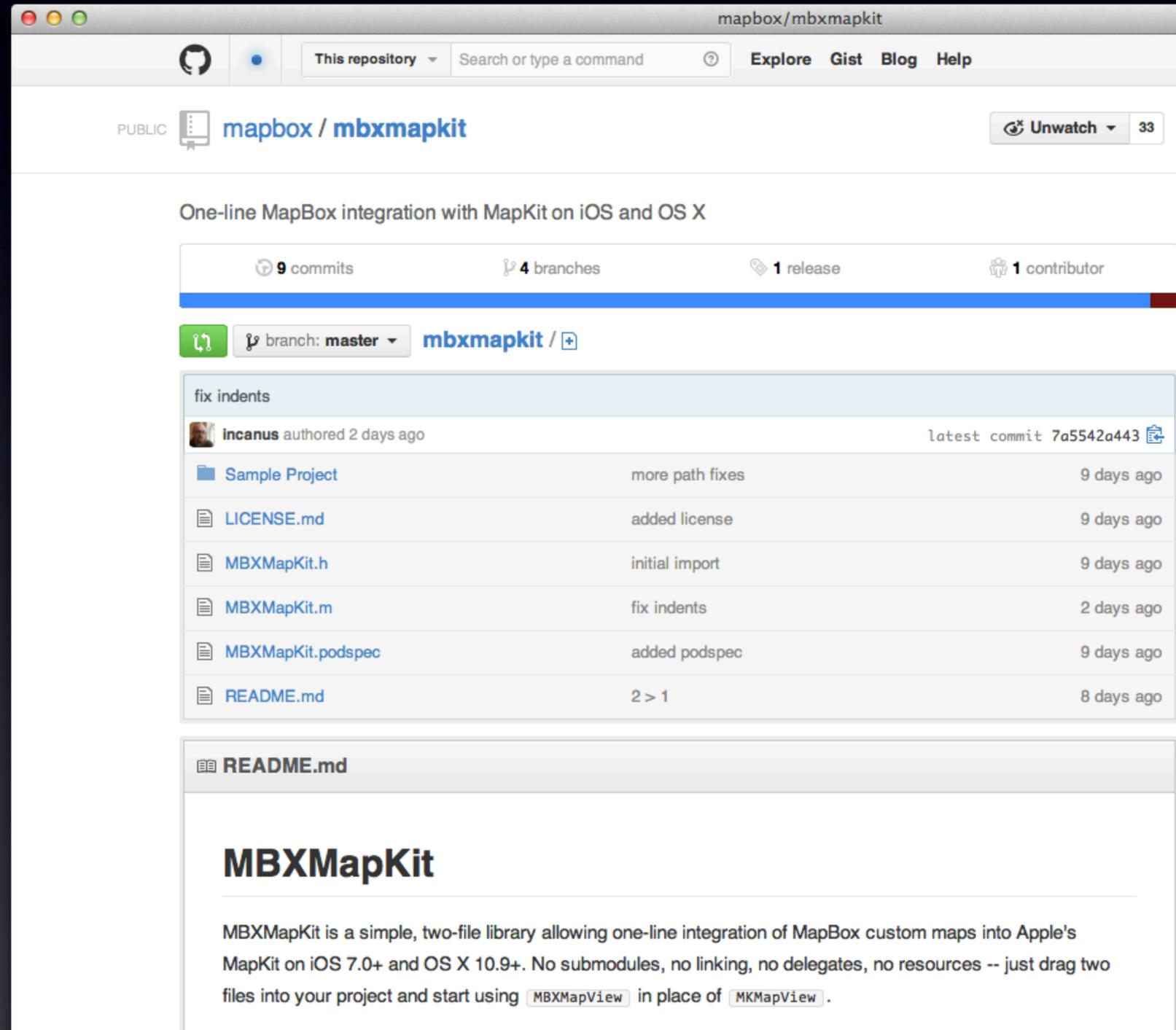
## MBXMapKit

MBXMapKit is a small library for building mapping applications for iPhone, iPad, and Mac devices on Apple's platforms. It is based on Apple's [MapKit](#) framework, but with much greater flexibility for visual styling and offline use – plus it's open source.



# MBXMapKit

- Builds on Apple's MapKit
- iOS 7+ and OS X 10.9+
- *No other dependencies*



The screenshot shows the GitHub repository page for `mapbox/mbxmapkit`. The repository is public and has 9 commits, 4 branches, 1 release, and 1 contributor. The current branch is `master`. The repository description is "One-line MapBox integration with MapKit on iOS and OS X".

The commit history shows the following files and their commit dates:

File	Commit Message	Commit Date
Sample Project	more path fixes	9 days ago
LICENSE.md	added license	9 days ago
MBXMapKit.h	initial import	9 days ago
MBXMapKit.m	fix indents	2 days ago
MBXMapKit.podspec	added podspec	9 days ago
README.md	2 > 1	8 days ago

The README.md file contains the following text:

## MBXMapKit

MBXMapKit is a simple, two-file library allowing one-line integration of MapBox custom maps into Apple's MapKit on iOS 7.0+ and OS X 10.9+. No submodules, no linking, no delegates, no resources -- just drag two files into your project and start using `MBXMapView` in place of `MKMapView`.

# Simpler Integration

- One class + one line of code!

1. `#import <MBXMapKit/MBXMapKit.h>`

2. `-[MBXMapView initWithFrame:mapID:]`

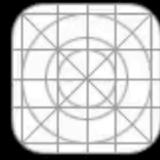
or

- `-[MBXMapView initWithFrame:MBTilesPath:]`

Carrier 

9:37 PM

100% 



MBXMapKit...



Safari



# Free & Open Source

- MBXMapKit will continue to evolve
- Will parallel development of our SDK
- This is a great validation by Apple of the value of open mapping!

# Review

- Custom maps from geodata using open source tools
- Native iOS interaction with open source libraries
- Lets you focus on combining great services together

# Thank You!

- Contact Info

- [@incanus77](#)

- [justin@mapbox.com](mailto:justin@mapbox.com)

- Software

- [github.com/mapbox/mapbox-ios-sdk](https://github.com/mapbox/mapbox-ios-sdk)

- [github.com/mapbox/mbxmapkit](https://github.com/mapbox/mbxmapkit)

- [tilemill.com](https://tilemill.com)

- Slides at [tinyurl.com/MapBoxYaC13](https://tinyurl.com/MapBoxYaC13)

