Maps on iOS

(And also a little OS X)

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Introduction

- Mobile lead at Mapbox

- Working on iOS developer tools

- Mapbox is about completely customizing maps, then hosting them at scale

- Also: open source and open data

Overview

- Define some terms (won't go too deep)

- Talk about MapKit (esp. iOS 7 & Mavericks)

- Overview of Mapbox iOS SDK

- Quick demo of what I'm working on

Some Terms

- Vector vs. raster

- Base maps vs. annotations

- Can pretty much ignore the rest

Raster Maps

- This is what iOS had before iOS 6 (via Google)

- Billions of square image tiles to cover the world

  - "Tile pyramid": 4^z tiles per level of detail

- They don't scale smoothly (interpolated)

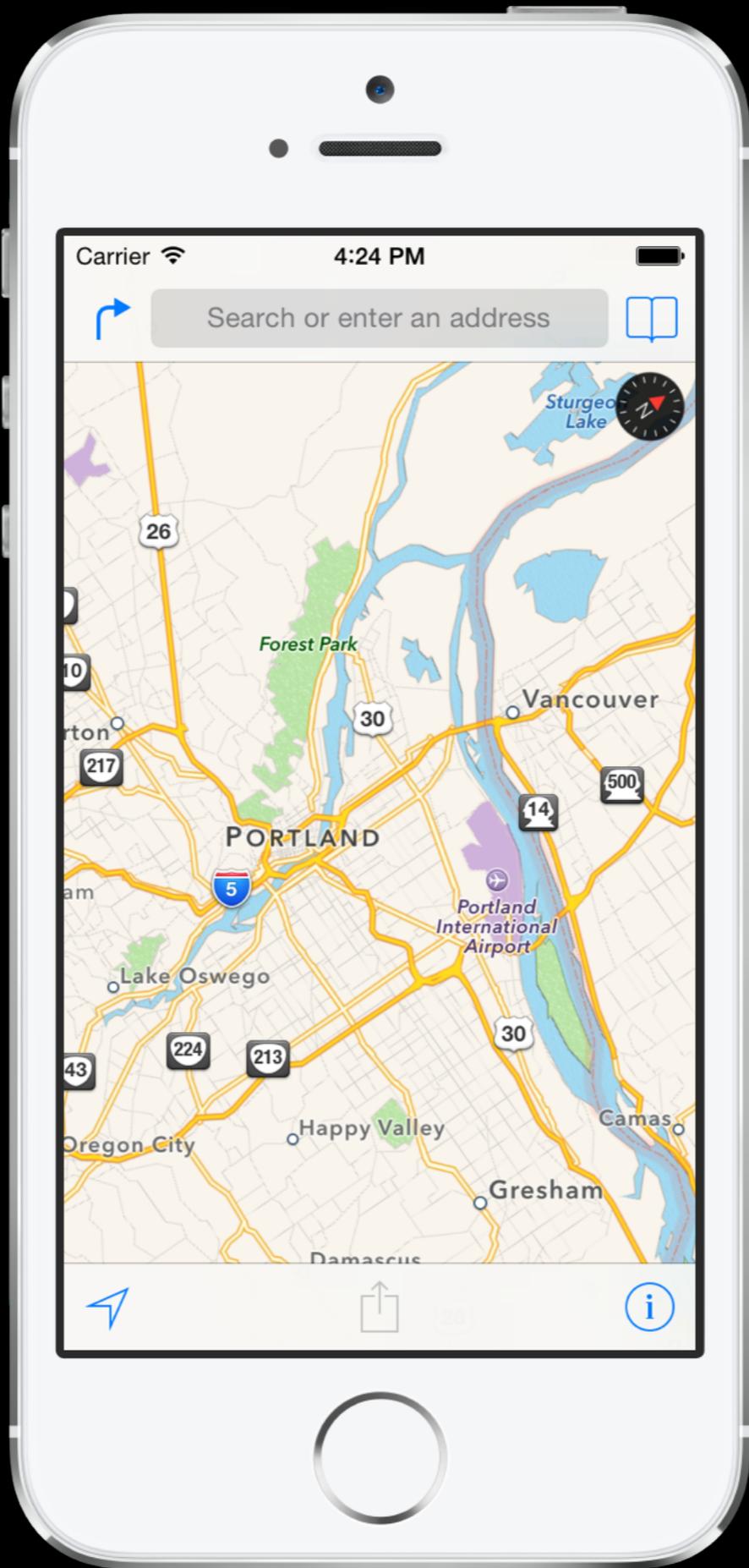- But: easy to work with (debugging, stitching)
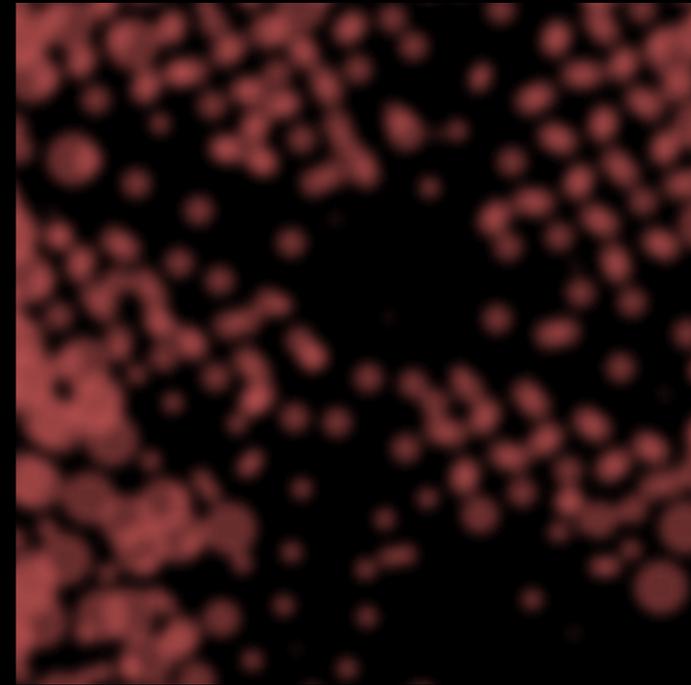
Vector Maps

- Google had this on Android before Apple brought it to iOS

- Came to Apple in iOS 6

- Also available in some other SDKs

Vector Maps

- Still tiled for ease of retrieval, caching, parsing, and rendering

- Custom rendered, usually with OpenGL, but can use Core Graphics, for example

- Tiles are just geographic areas packed with feature data

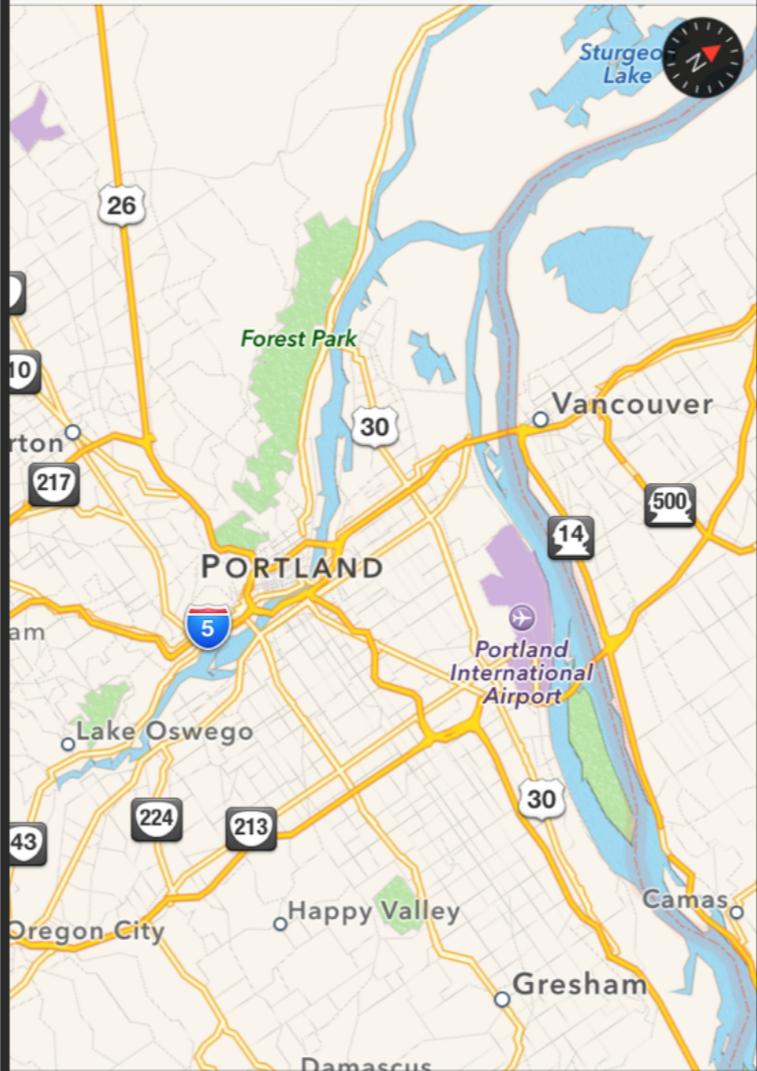- Typically much smaller than equivalent rasters

Base Maps

- Base maps are your "geo canvas"

- Usually opaque

- Can be raster or vector

- Usually cover the whole world

  - Except maybe when you are making them from scratch

Annotations

- Point & polygon data

- Drawn client-side

- Can respond better to user environment

  - Current location, stores near me, custom or dynamic icons and views

MapKit

- Introduced in iOS 3 (2009!)

- iOS 4 brought polygon annotations

- iOS 5 brought user location & heading tracking

- iOS 6 brought Apple data & vector rendering

- iOS 7 brought industry-standard tile overlays & ability to turn off Apple data

- MapKit also came to the Mac in Mavericks![*]

Basic Moving Parts

- `MKMapView` class: your main canvas

- `MKAnnotation` protocol: annotation data objects

- `MKAnnotationView` class: visualizing annotations

- `MKOverlay` protocol: extends `MKAnnotation` to work with polygons

- `MKOverlayRenderer` class: visualizing overlays

- `MKTileOverlay` protocol: extends `MKOverlay` to work with raster tiles

- `MKTileOverlayRenderer`: extends `MKOverlayRenderer` for visualizing raster tile overlays

Analogy

|		
Container	`UITableView`	`MKMapView`

Data Presentation	`UITableViewCell`
	
	(supported by views)
		`MKAnnotation`
		`MKOverlay`
		`MKTileOverlay`
		
		(supported by views & renderers)

MKMapView

- `#import <MapKit/MapKit.h>`

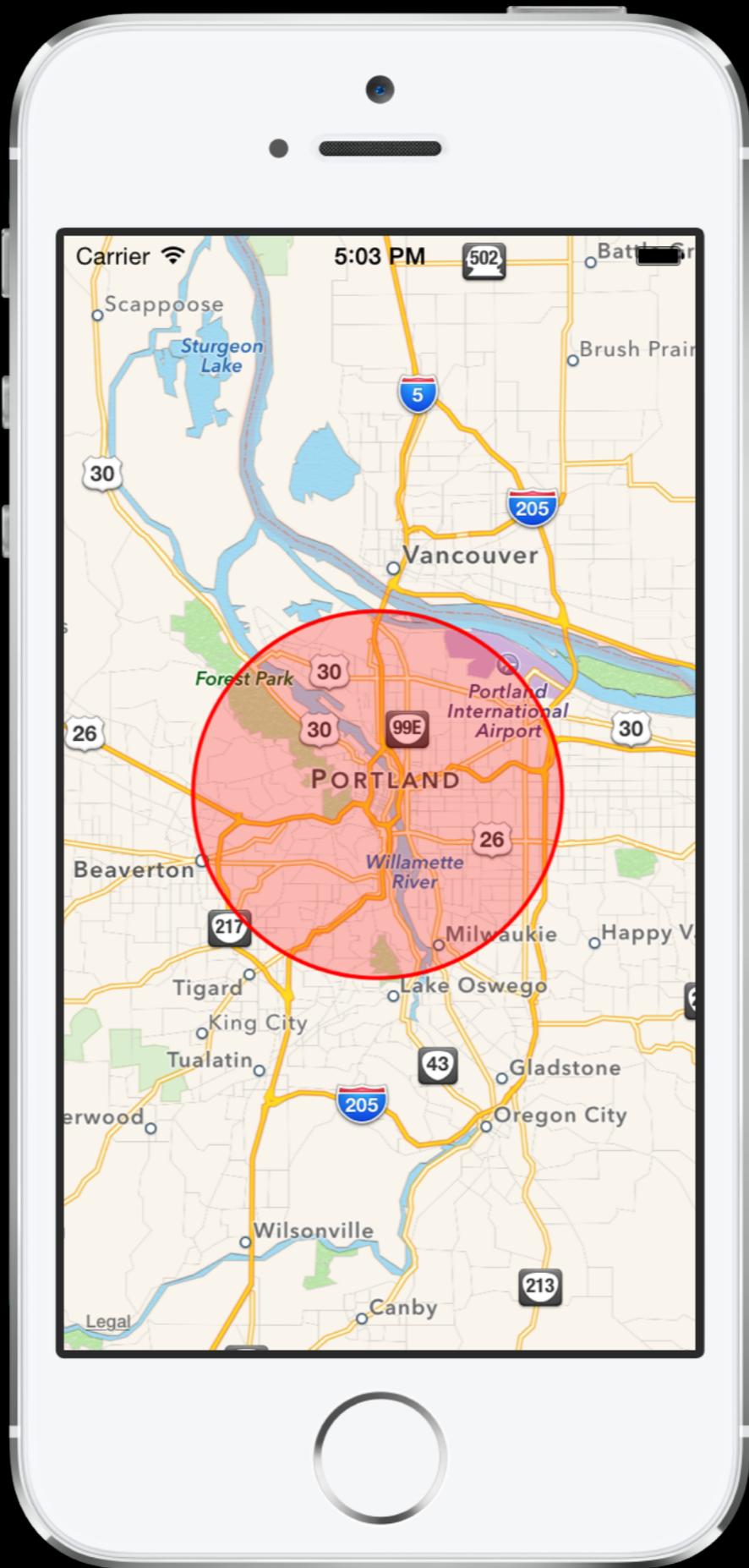- `[[MKMapView alloc] initWithFrame:]`

- Add as a subview
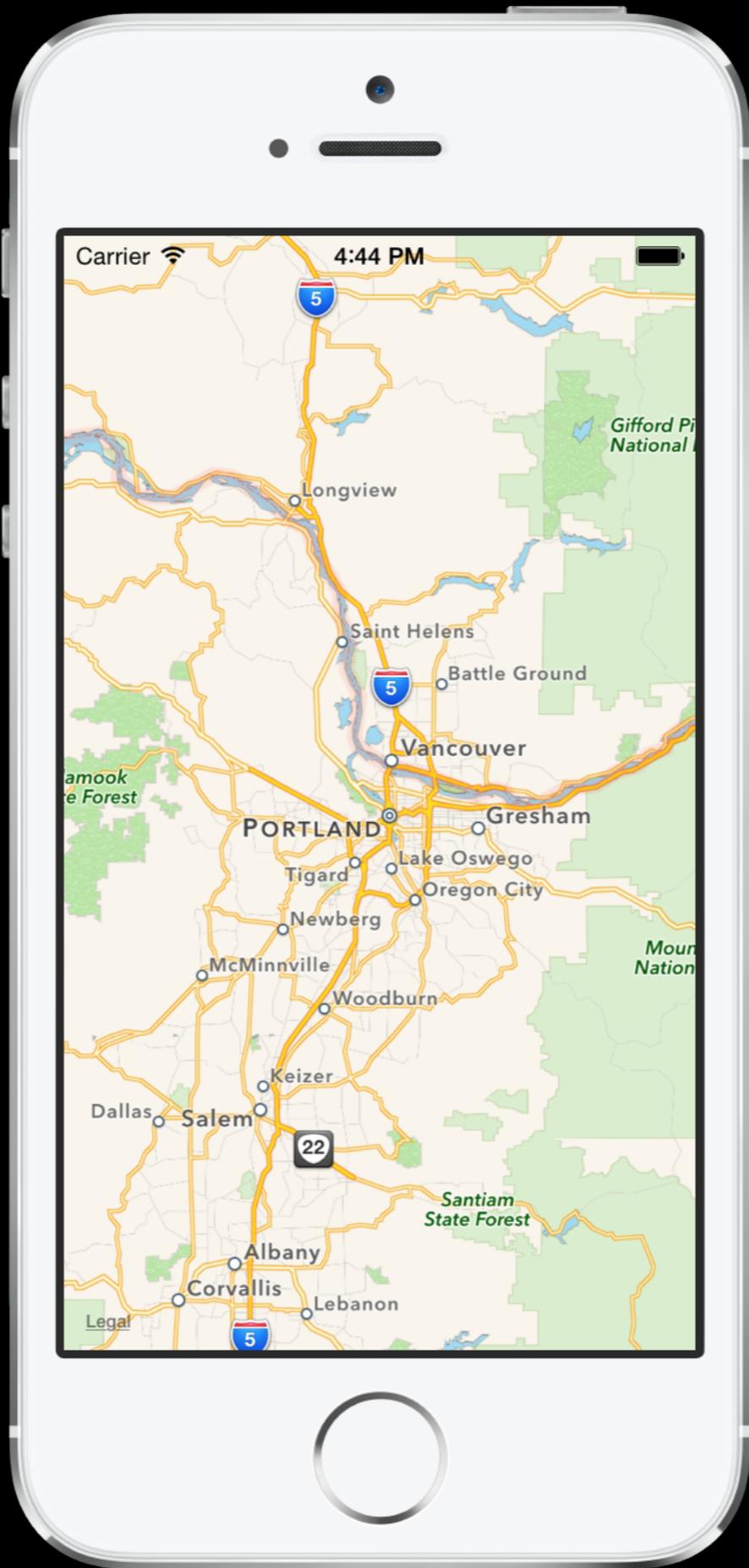
Add Point Annotation

- View controller:

  - `[[MKPointAnnotation alloc] init]`

  - `annotation.coordinate = CLLocationCoordinate2D…`

  - `[mapView addAnnotation:…]`

  - `mapView.delegate = …`

- Delegate's `mapView:viewForAnnotation:`

  - `[[MKAnnotationView alloc] initWithAnnotation:reuseIdentifier:]`

  - `annotationView.image = …`

  - `return annotationView`

- See also `MKPinAnnotationView`
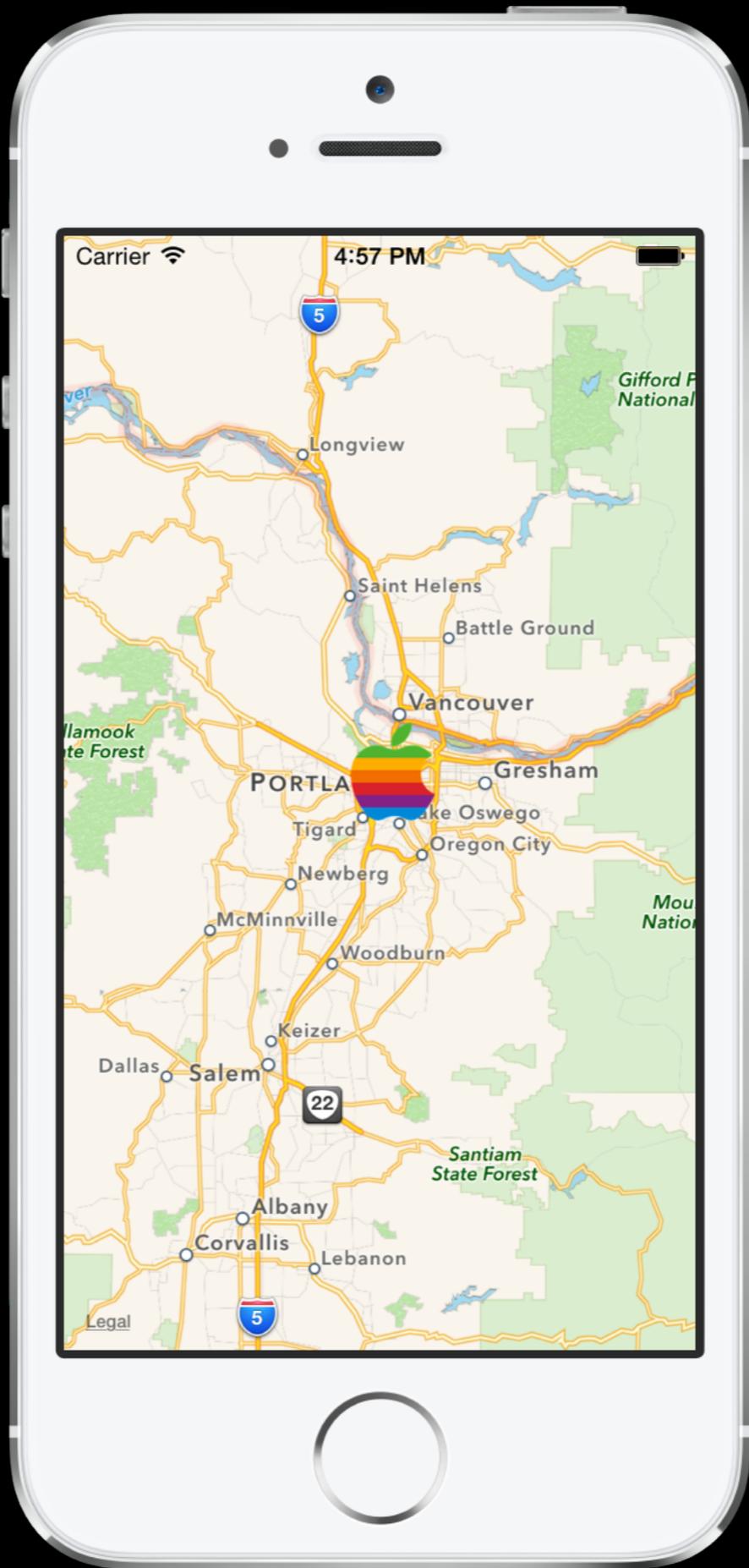
Add Circle Overlay

- View controller:

  - `[MKCircle circleWithCenterCoordinate:radius:]`

  - `[mapView addOverlay…]`

  - `mapView.delegate = …`

- Delegate's `mapView:rendererForOverlay:`

  - `[[MKCircleRenderer alloc] initWithCircle:]`

  - `renderer.lineWidth = …`

  - `renderer.strokeColor = …`

 - `renderer.fillColor = …`

  - `return renderer`

Add Tile Overlay

- View controller:

  - `[[MKTileOverlay alloc] initWithURLTemplate:]`

  - `tileOverlay.canReplaceMapContent = …`

  - `[mapView addOverlay:…]`

- Delegate's `mapView:rendererForOverlay:`

  - `[[MKTileOverlayRenderer alloc] initWithTileOverlay:]`

  - `return renderer`
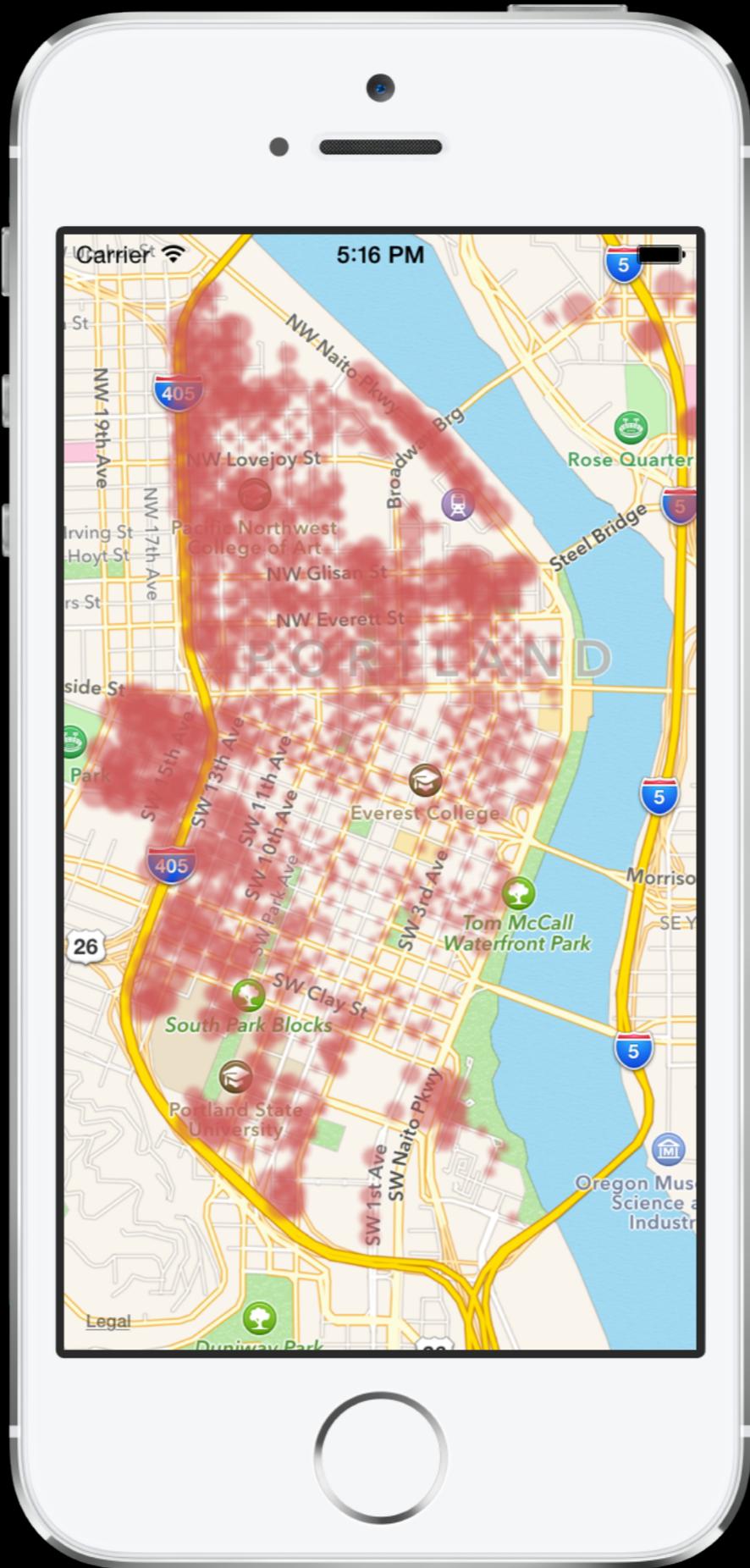
iOS 7 New Stuff

- 3D mode

    - `mapView.pitchEnabled`

    - `mapView.rotateEnabled`

    - `MKMapCamera`

        - `centerCoordinate`

        - `heading`

        - `pitch`

        - `altitude`

        - `[mapView setCamera:animated:]`
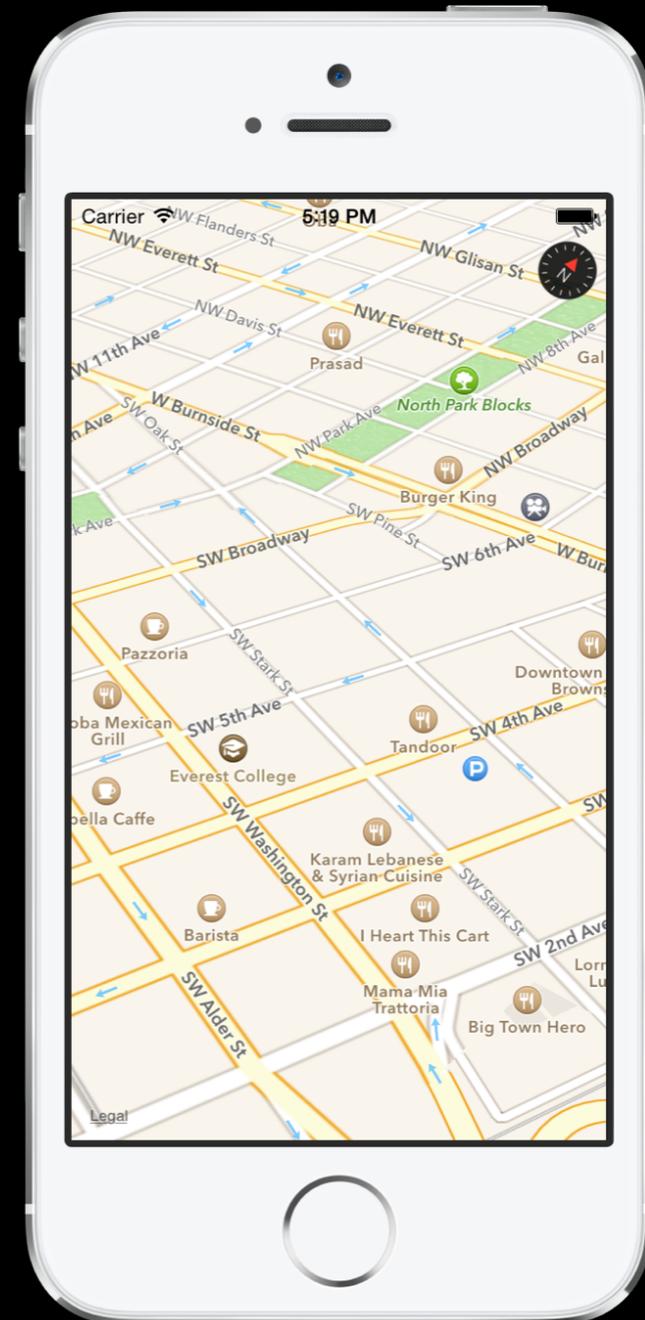
iOS 7 New Stuff

- 3D buildings

  - Not your buildings, though (sorry)

  - Hope you like Apple's buildings
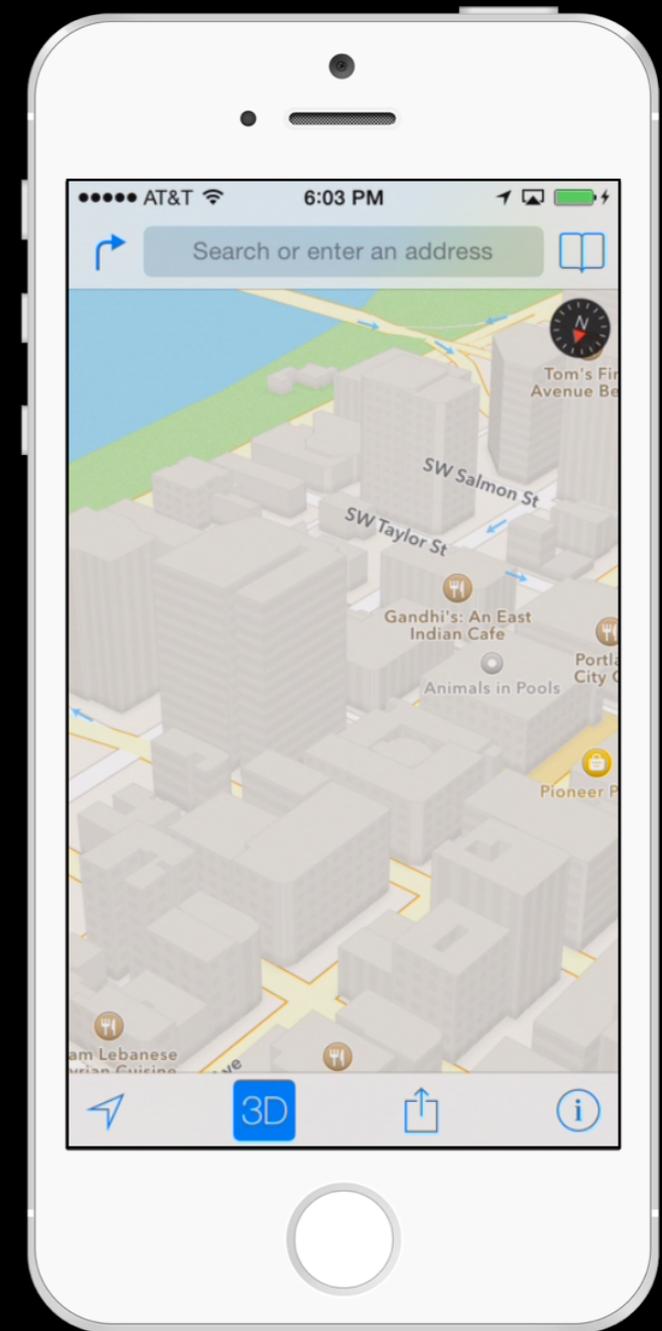
iOS 7 New Stuff

- More knobs for controlling data density

  - `mapView.showsPointsOfInterest`

  - `mapView.showsBuildings`

iOS 7 New Stuff

- Via `MKTileOverlay`, the ability to replace Apple's map data

    - `tileOverlay.canReplaceMapContent = …`

    - Granted, replacing vector with raster…

    - But a step in the right direction API-wise

iOS 7 New Stuff

- Addition of `MKOverlayLevel`

  - Allows for placement:

    - Above labels but below annotations & buildings

    - Above roads but below labels

    - "Roads" = all roadways

    - "Labels" = text, shields, point-of-interest (POI) icons

iOS 7 New Stuff

- Moved from overlay views to overlay renderers

    - Renderers draw content into passed `CGContext`

    - Can suffer from aesthetics in certain circumstances

        - Previously, views were atomic & drawn all at once

        - Now, overlays are rendered tile-by-tile

        - This scales better but doesn't guarantee atomic appearance

OS X 10.9 New Stuff

- MapKit itself!

  - Boy, that's swell.

- About that asterisk earlier…

  - Requires Mac App Store distribution

  - Even when turning off Apple's data with overlays

  - Hope you like the Mac App Store

- Otherwise, just like iOS

Mapbox iOS SDK

- Open source alternative to MapKit (iOS only)

- BSD licensed

- Based on rasters (for now)

- "Workalike" APIs

mapbox/mapbox-ios-sdk · GitHub

mapbox/mapbox-ios-sdk · Git...

🔒 GitHub, Inc. (US) | https://github.com/mapbox/mapbox-ios-sdk

GitHub

This repository ▾ | Search or type a command ⊘ | Explore Features Enterprise Blog | **Sign up** | **Sign in**

📓 **mapbox** / **mapbox-ios-sdk**

forked from Alpstein/route-me

⭐ Star 603   Fork 533

Mapbox iOS SDK, an open source alternative to MapKit. http://www.mapbox.com/mapbox-ios-sdk/

| ⊙ **1,574** commits | ⑂ **11** branches | 🏷 **15** releases | 👥 **34** contributors |

⟲ | ⑂ branch: **release** ▾ | **mapbox-ios-sdk** / ⊞

<> **Code**

① Issues **92**

⑁ Pull Requests **9**

This branch is 0 commits ahead and 0 commits behind release | ⑂ Pull Request ⊡ Compare

Merge pull request **#408** from GannettDigital/release ⋯

incanus authored a month ago   latest commit 3223e01e00 ⊟

📁 MapView	Added call to [super updateConstraints] when no view controller could…	3 months ago
📁 Proj4	Proj4 static lib with 64-bit slices	5 months ago
📄 .gitignore	updated ignores	a year ago
📄 .gitmodules	point at our callout fork for now	5 months ago
📄 CHANGELOG.md	finalize 1.1.0 changelog	3 months ago
📄 CONTRIBUTING.md	fixes #359: add contribution guidelines	a month ago
📄 License.txt	company rename in contents	3 months ago
📄 Mapbox.podspec	Update Mapbox.podspec	a month ago
📄 README.markdown	be clearer about iOS 7 support	2 months ago

✦ Pulse

📊 Graphs

⑂ Network

HTTPS clone URL

https://github.com/

You can clone with **HTTPS** or Subversion. ⊘
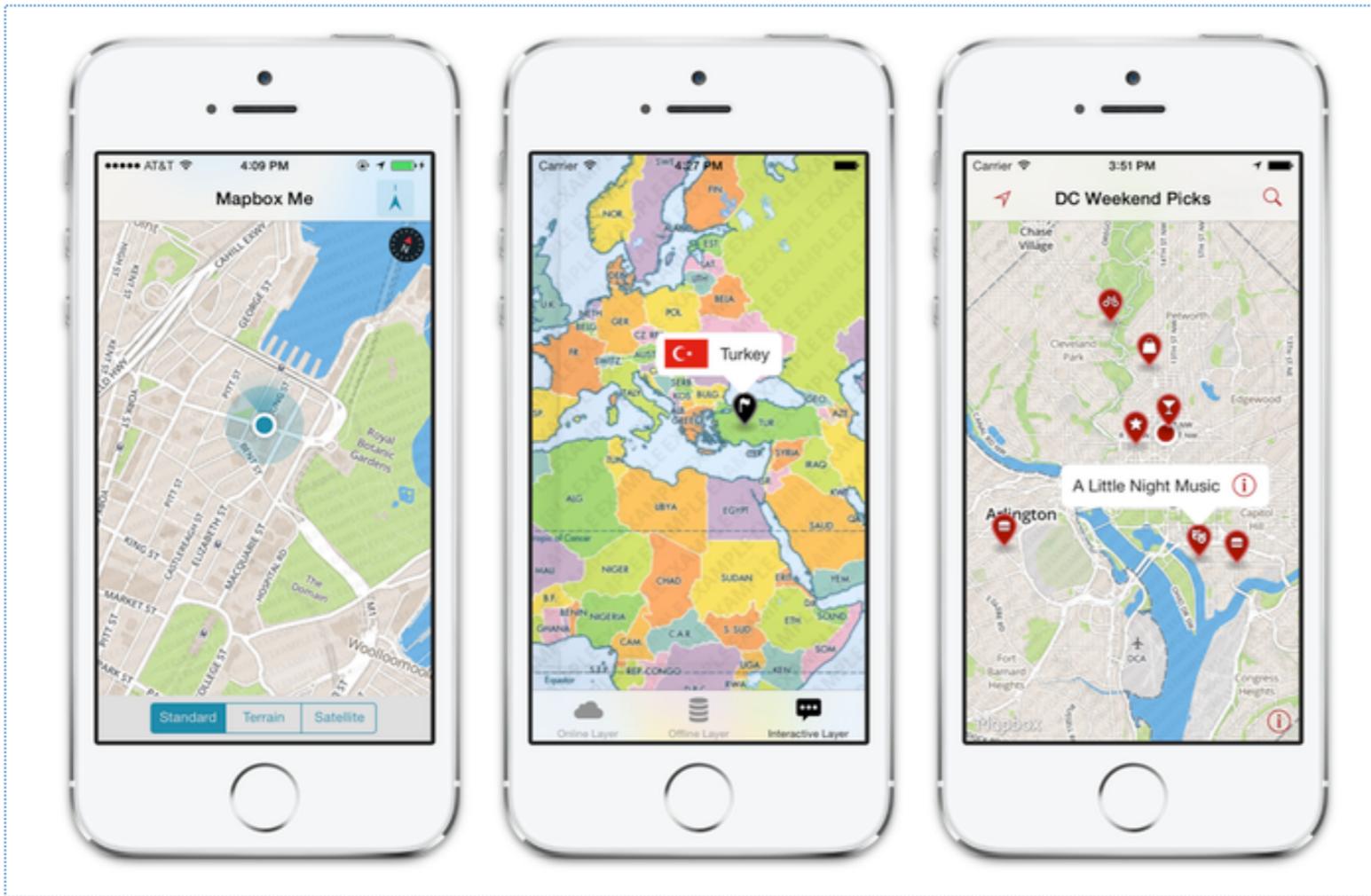
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📖 **README.markdown**

Mapbox iOS SDK

Based on the Route-Me iOS map library (Alpstein fork) with Mapbox customizations.

Requires iOS 5 or greater (includes iOS 7 support at runtime), Xcode 5.0 or greater, and ARC.

Things It Helps With

- Just being open source

- Oriented towards **complete** data and stylistic control

- Controllable offline caching

- Point annotation clustering

- More options for interactivity

Where It's Headed

- Vector rendering, naturally

- Still keeping offline cache control

- Still allowing for interactive introspection of the source data

- Still keeping full data & stylistic control, including with client-side APIs

  - Example: Vary road width based on user's running pace

Demo

Questions?

- Sample code:

  - http://tinyurl.com/pdx-ch-maps-2014

- justin@mapbox.com

- @incanus77

- Talk to me afterwards or find me later