What's New in Map Kit

Session 304

James Howard
Software Engineer Maps Team

Overview

Overview

- Map Kit on OS X

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- Map Kit on OS X
- iOS 7 UI Updates

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- iOS 7 UI Updates
- New Perspectives

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- New Overlays Functionality

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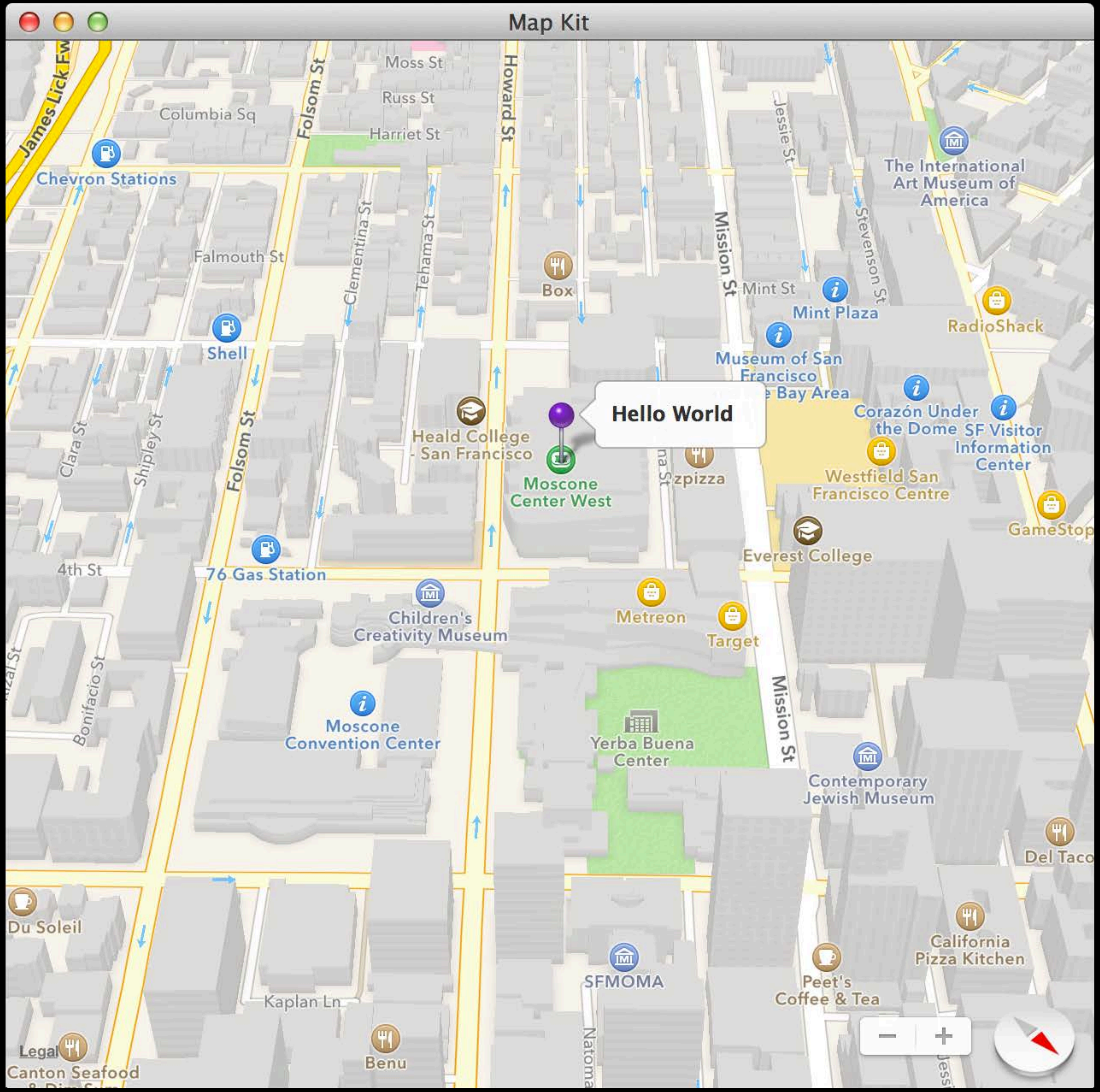
- Search API
- Directions API

Map Kit for OS X

Map Kit on OS X



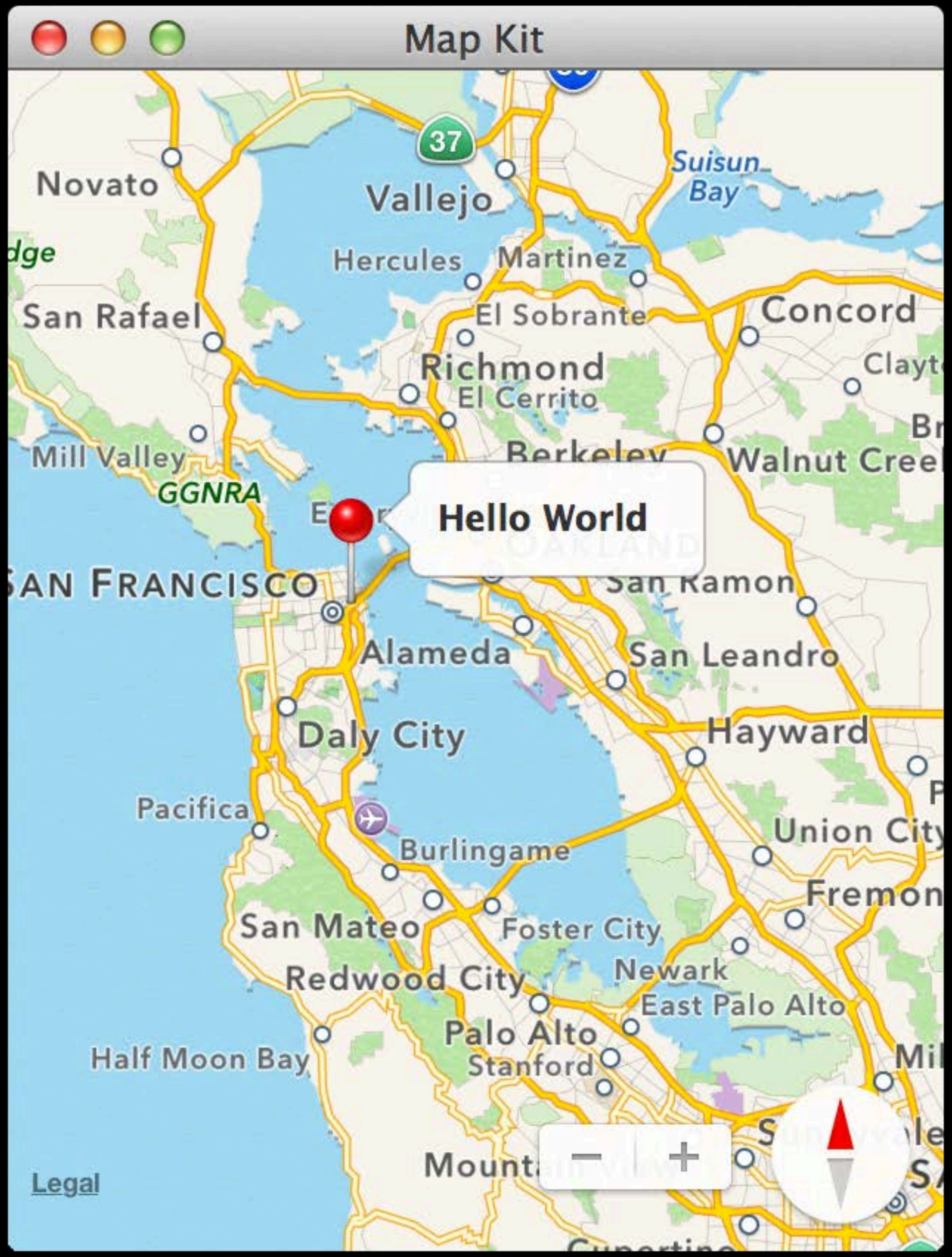
Map Kit on OS X

Just like iOS

- MKMapView
  - Nearly identical API
    - Differences are primarily AppKit types vs UIKit types
  - Annotations
  - Overlays
- Local Search
- Directions

Map Kit on OS X

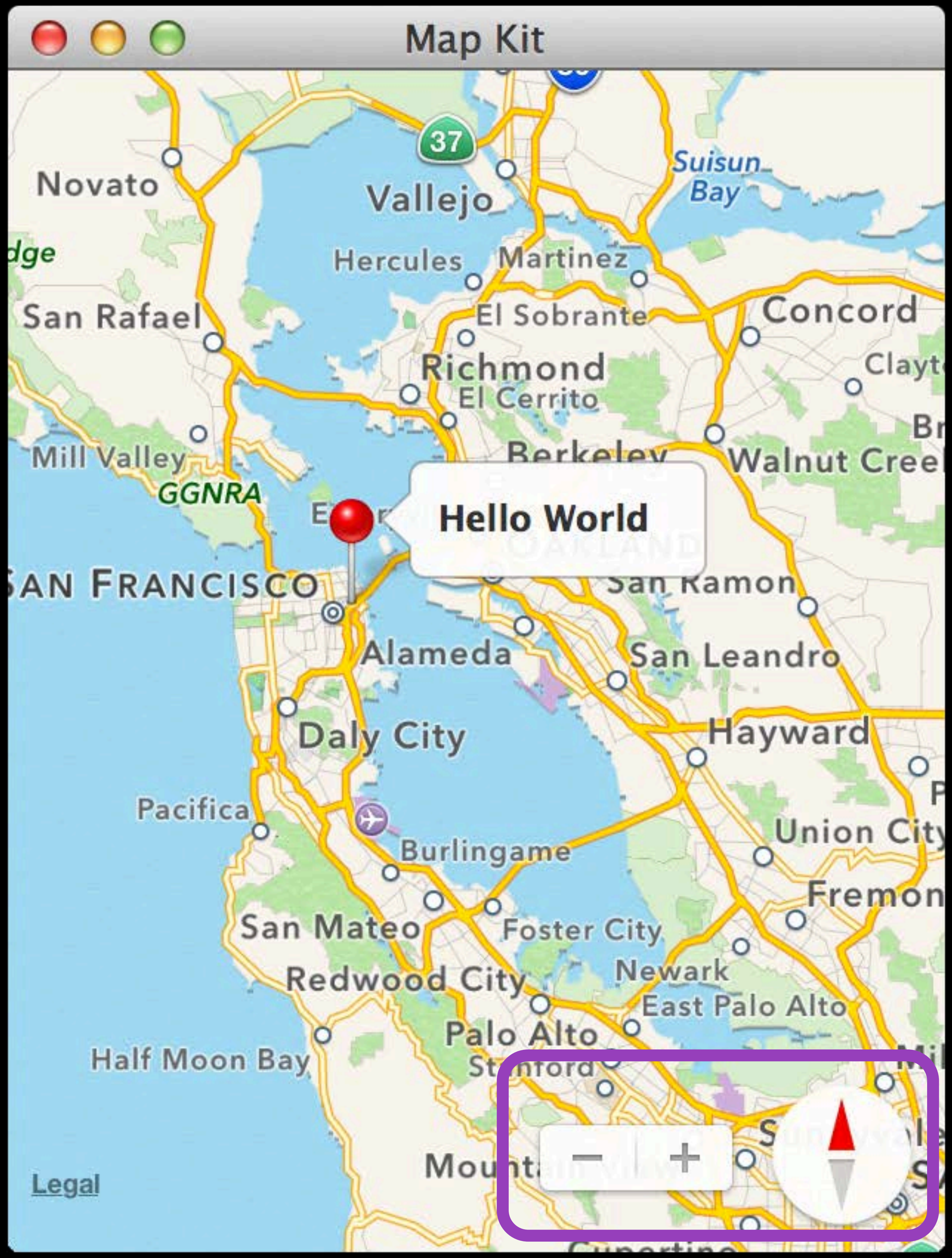
UI Differences



Map Kit on OS X

UI Differences

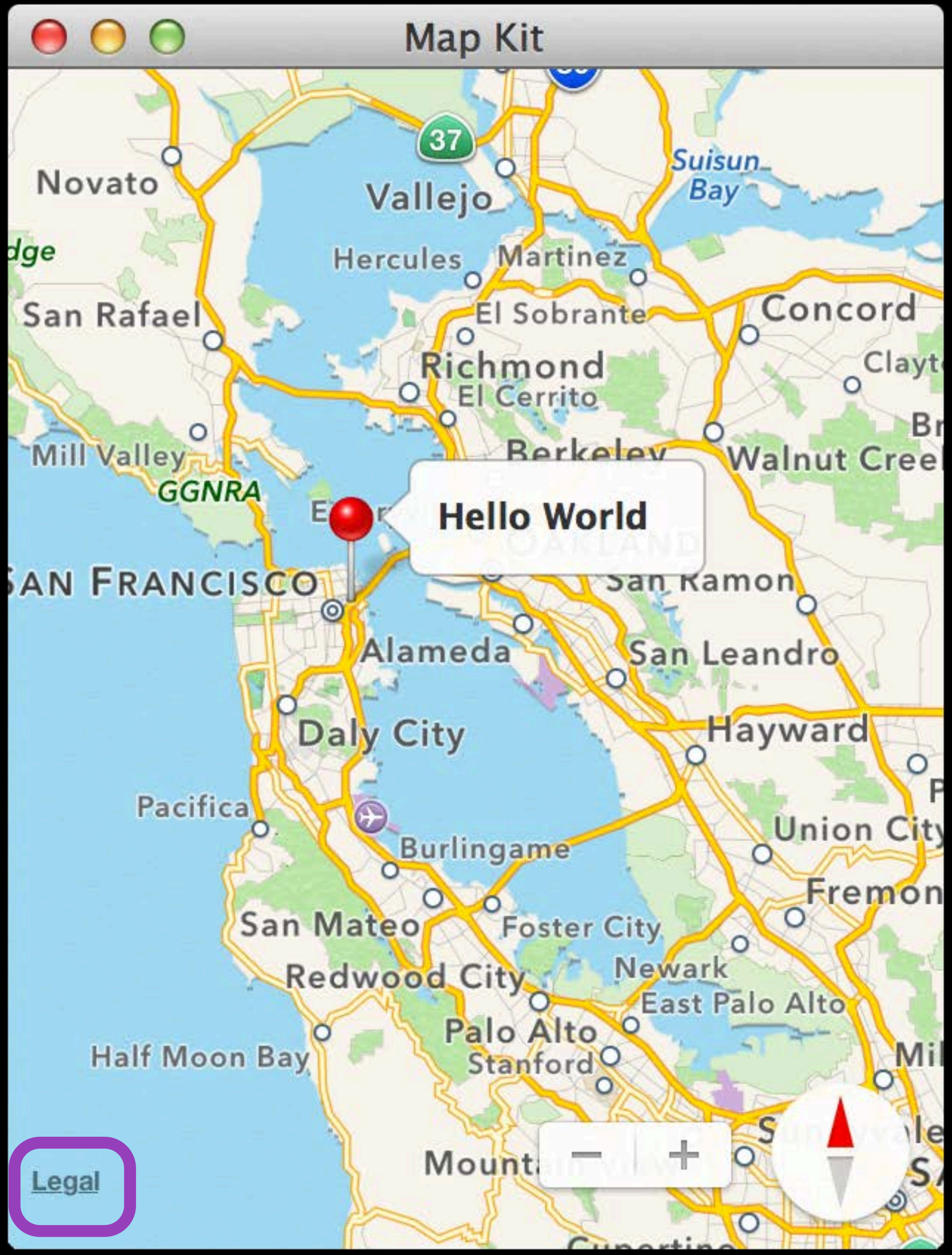
- Zoom / Compass controls
  - Can be shown or hidden via API



Map Kit on OS X

UI Differences

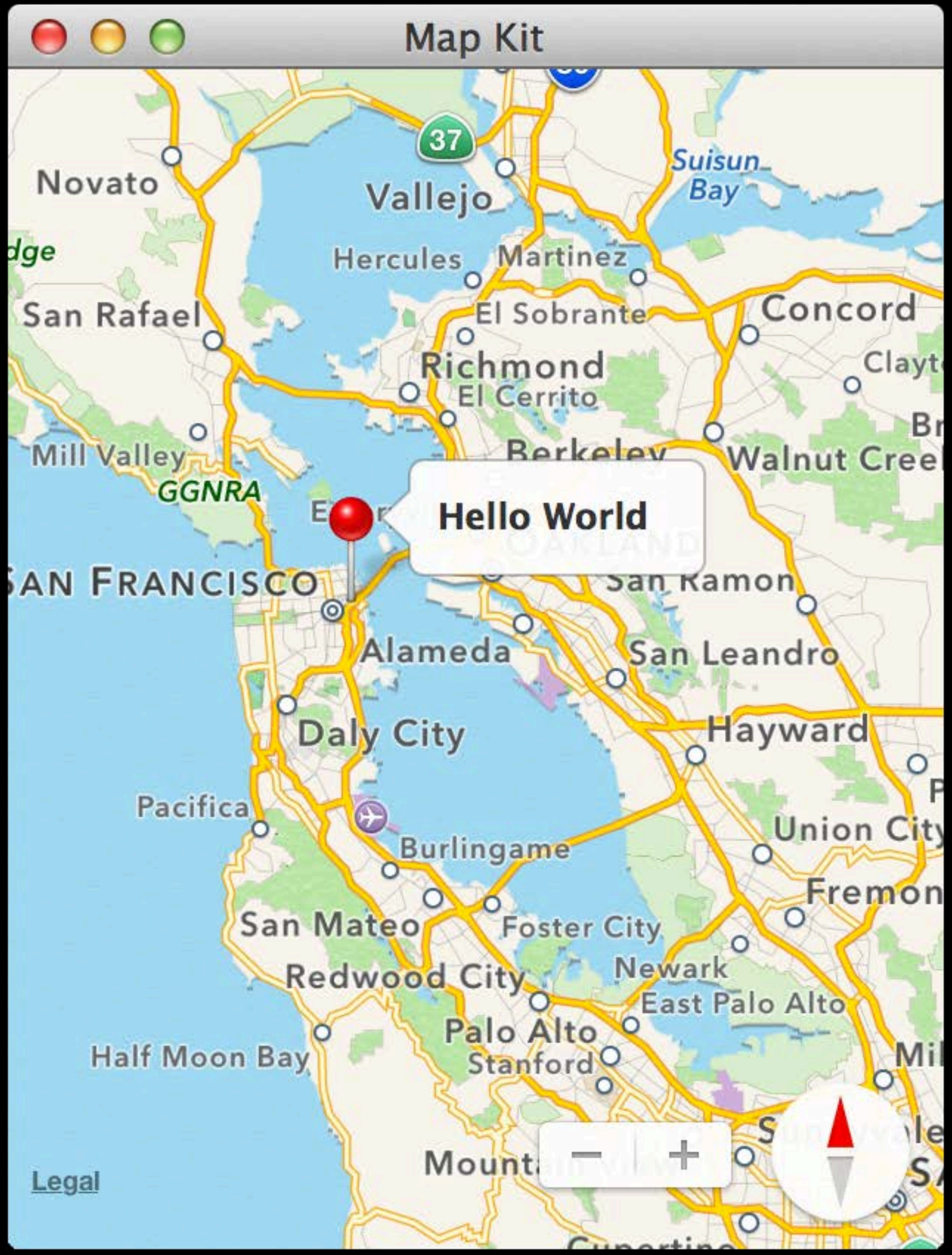
- Zoom / Compass controls
  - Can be shown or hidden via API
- Map data attribution label in lower left
  - Cannot be hidden, don't obscure it



Map Kit on OS X

UI Differences

- Zoom / Compass controls
  - Can be shown or hidden via API
- Map data attribution label in lower left
  - Cannot be hidden, don't obscure it
- Annotation view callout on side of annotation instead of top



Map Kit on OS X

Codesigning requirements

- Available for apps in the Mac App Store
- Uses `com.apple.developer.maps` entitlement
- Enabled via the Xcode 5 capabilities setting

Demo

Map Kit on OS X

Alexandre Carlhian
Software Engineer Maps Team

Map Kit on OS X

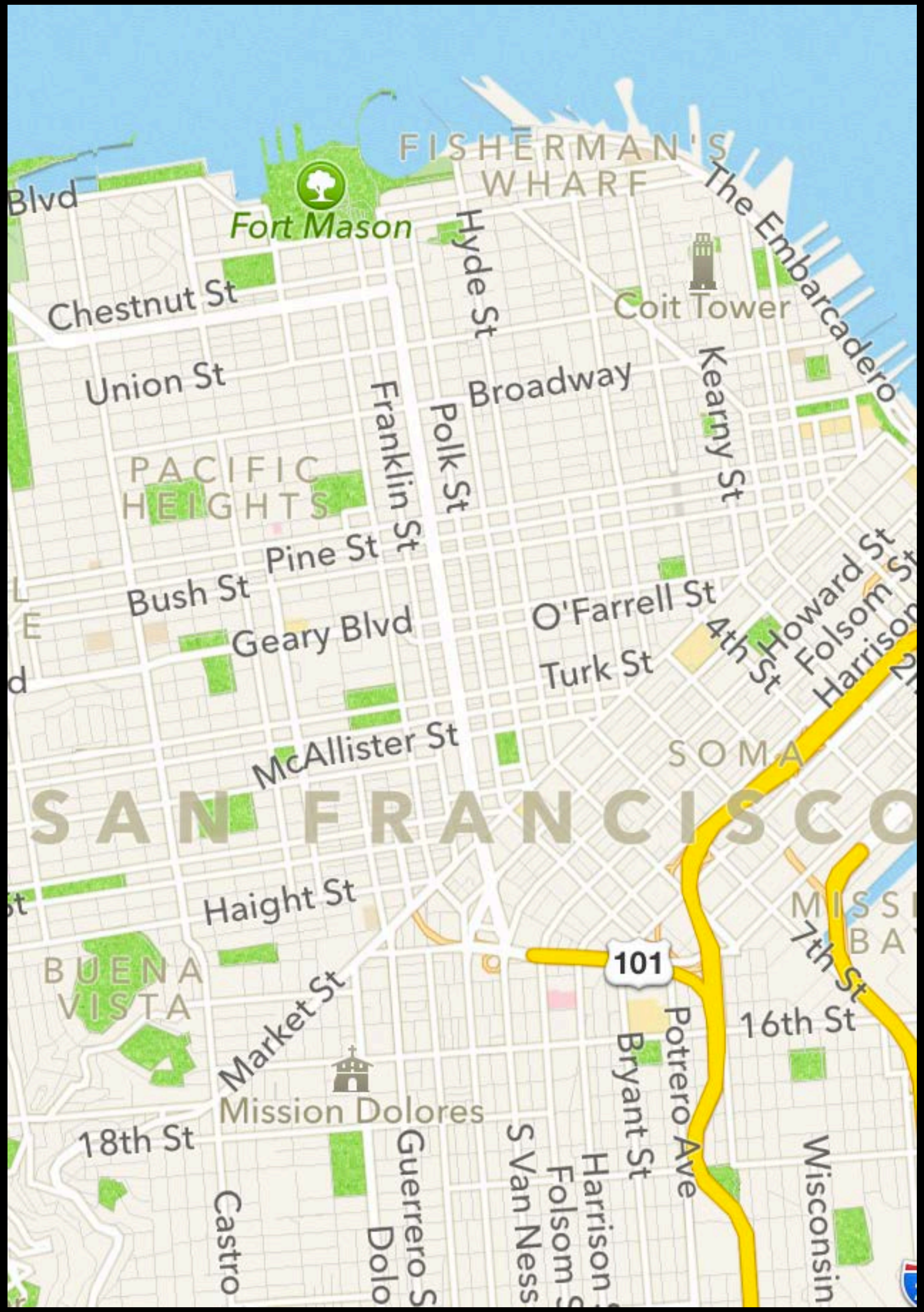
Lessons learned

- Adding Map Kit to your project
- Controlling user interaction with the map view
- Showing annotations on your map
- Creating custom annotation views
- Creating custom callout views

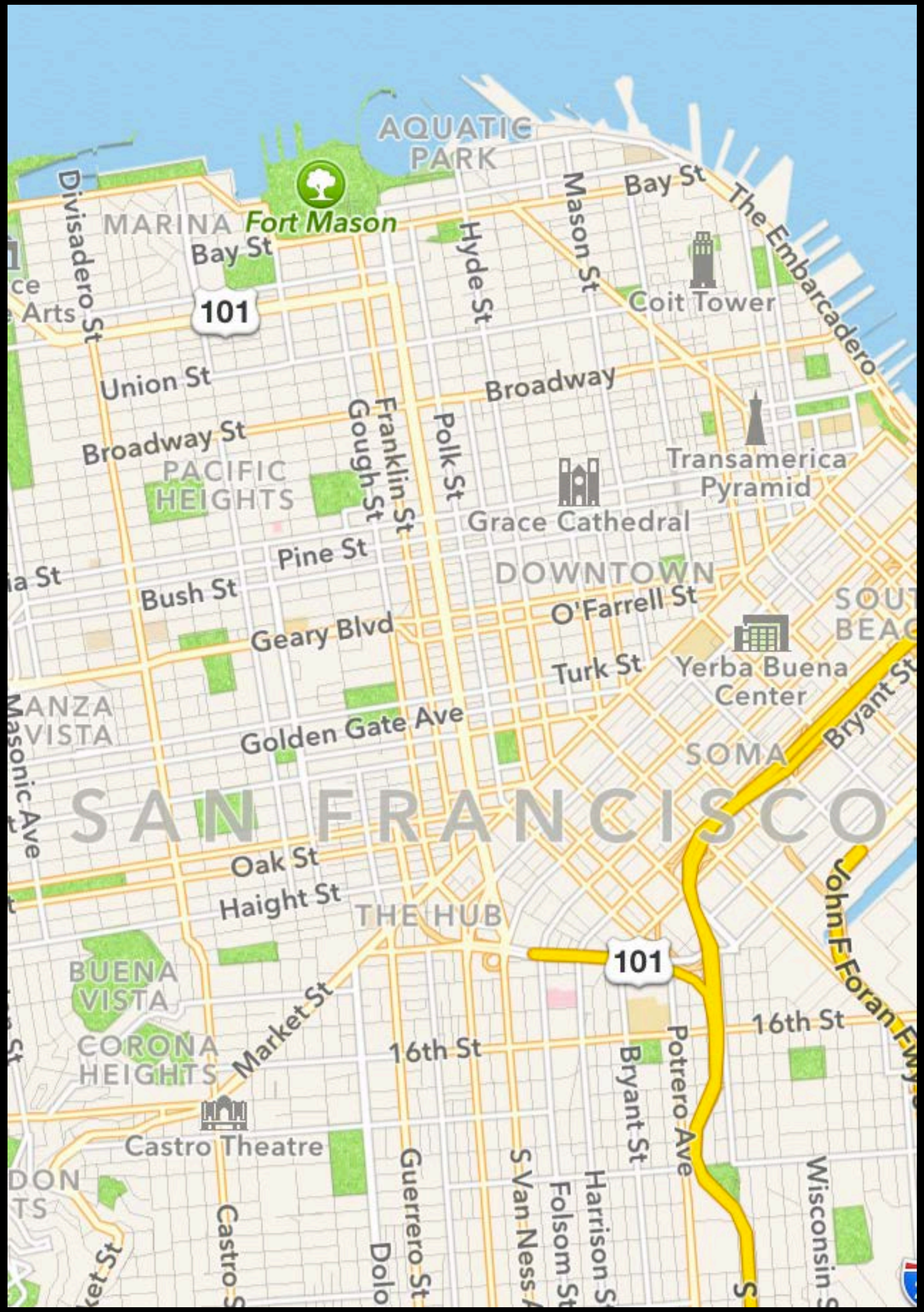
New UI in iOS 7

New UI

Updated cartography



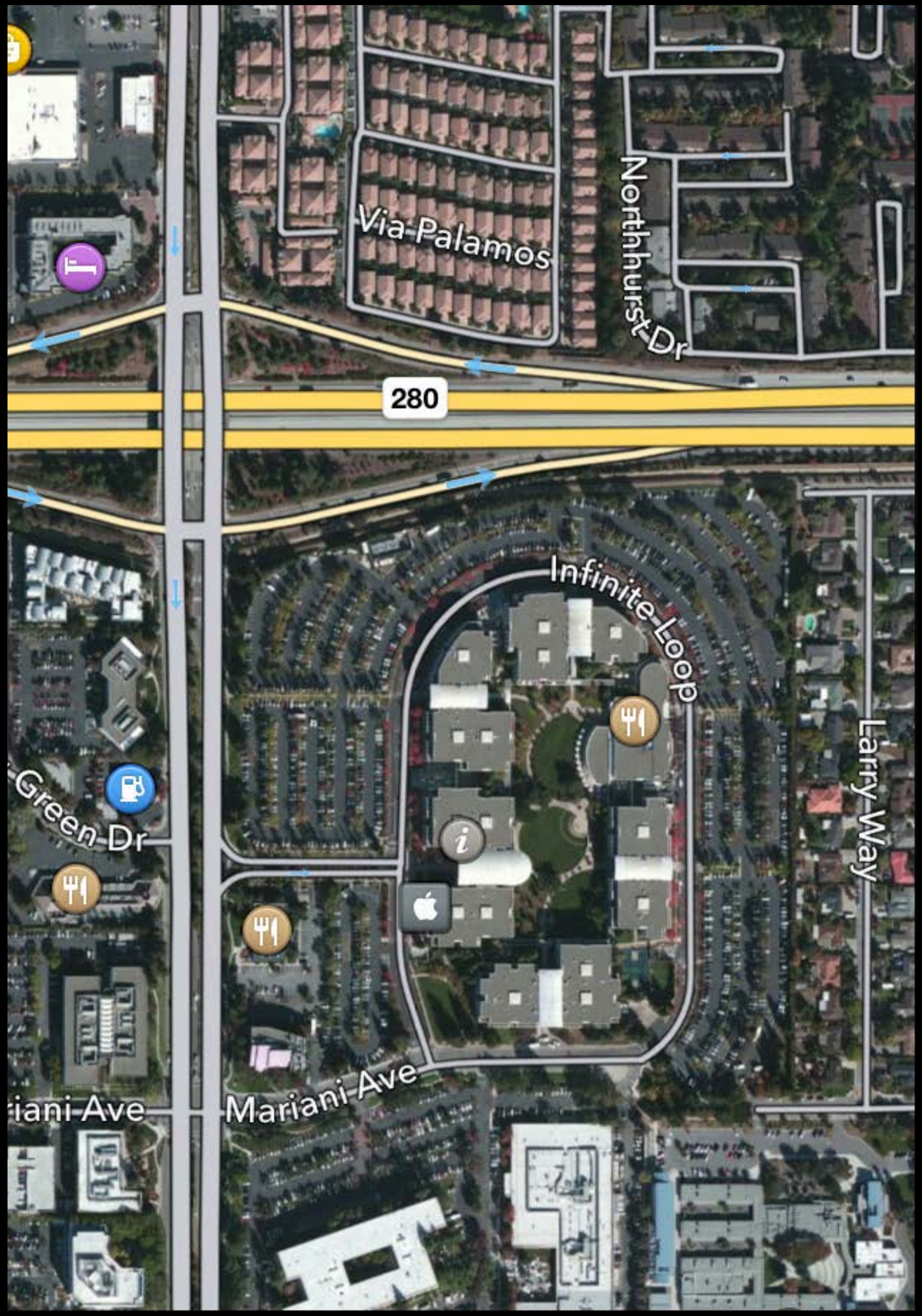
iOS 6



iOS 7

New UI

Updated MKMapTypeHybrid



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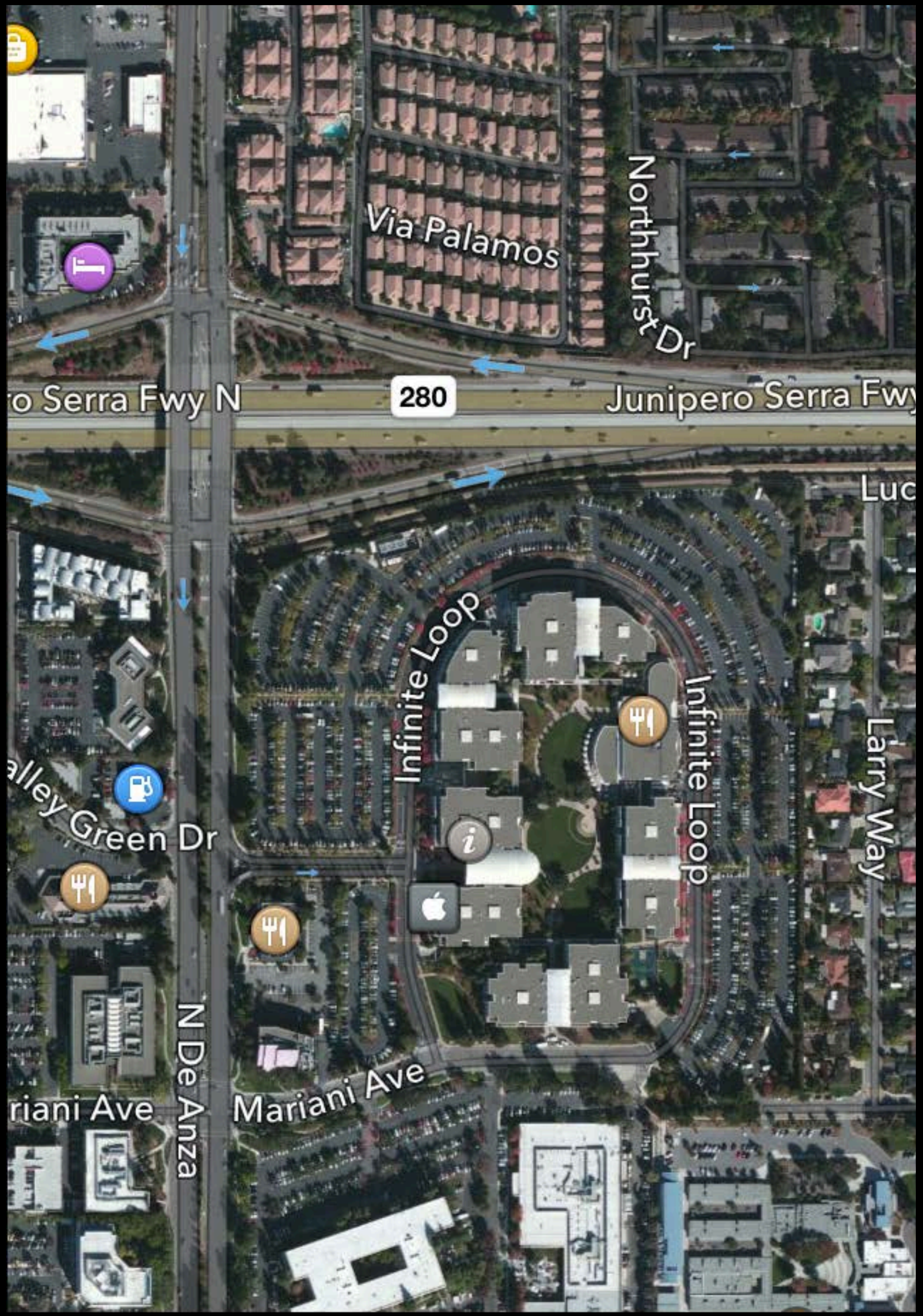
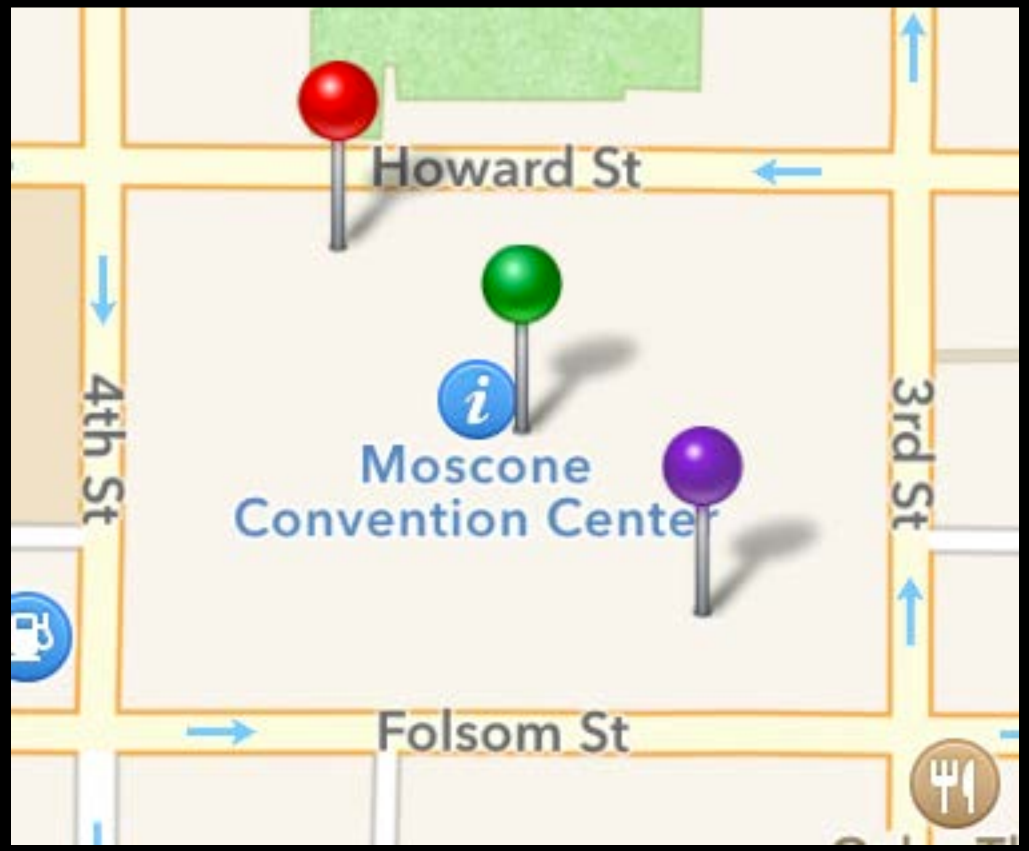


iOS 7

New UI

MKPinAnnotationView



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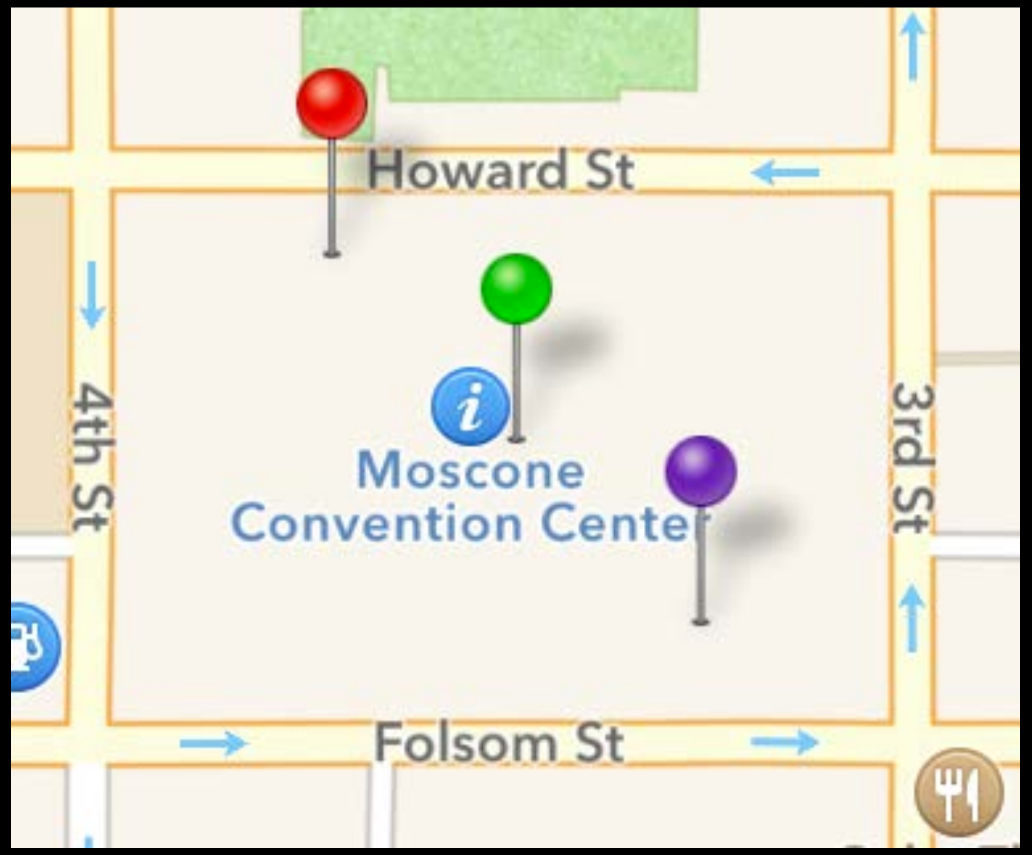
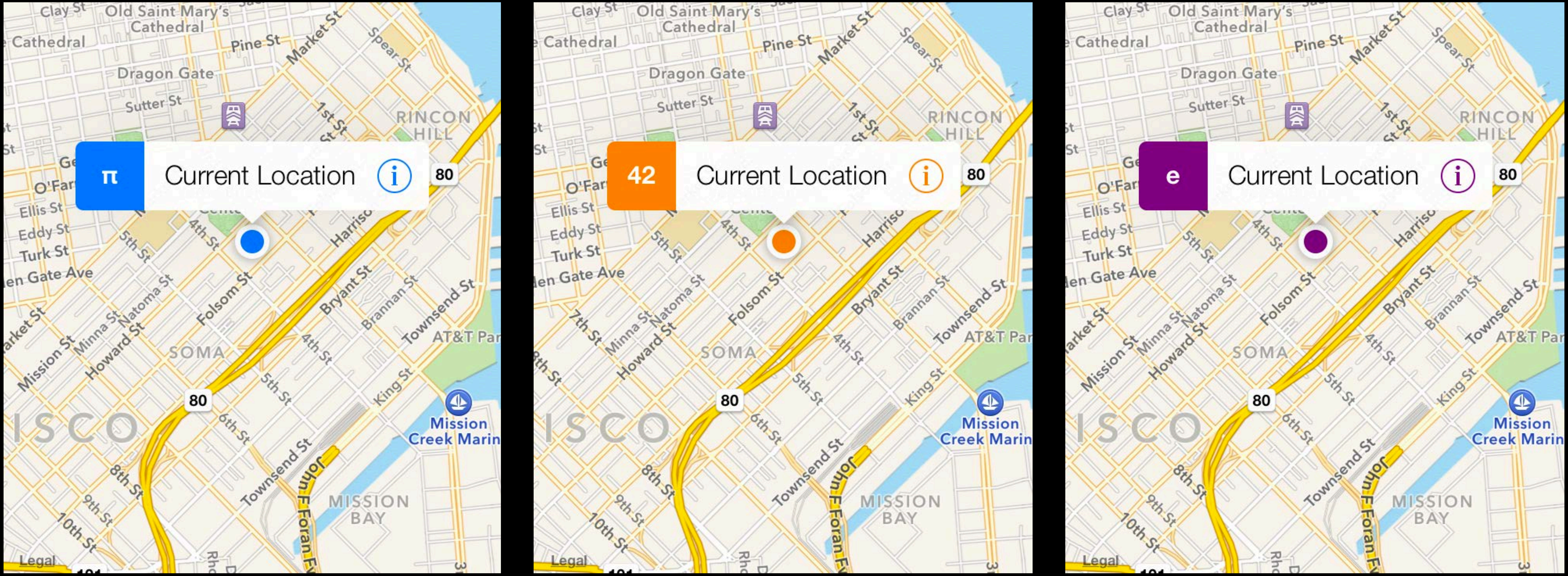


iOS 7

Same dimensions (32, 39)

New UI

New callout, user location view, and view tint

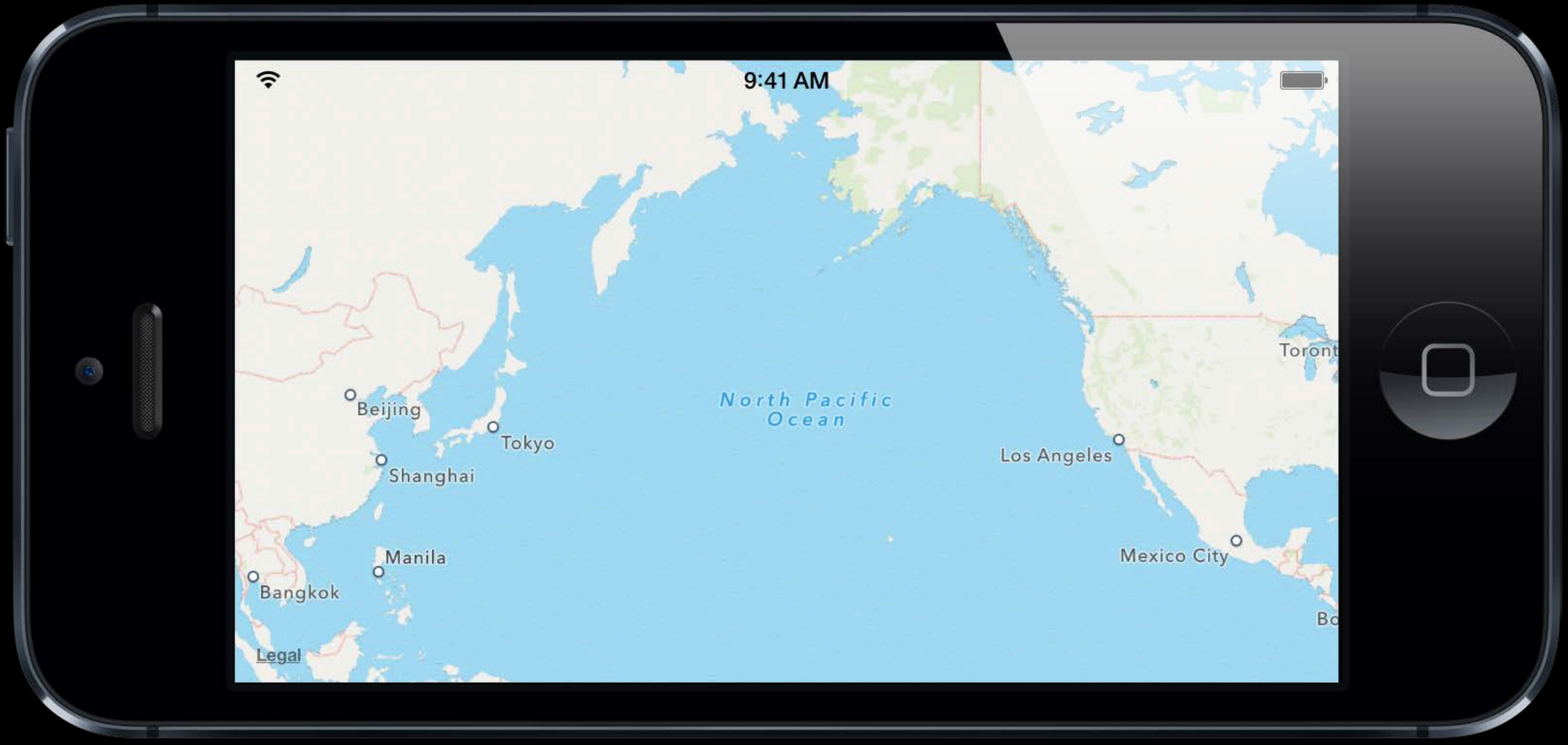


New Perspectives

New Perspectives

Spanning the 180th meridian

- Pan via touch
- Programmatically via API



New Perspectives

Positioning over 180th meridian

```
map.centerCoordinate = CLLocationCoordinate2DMake(0, 180);
```

New Perspectives

Positioning over 180th meridian

```
map.region = MKCoordinateRegionMakeWithDistance(
     CLLocationCoordinate2DMake(0, 180),
     1000.0 * 1000.0,
     1000.0 * 1000.0
);
```

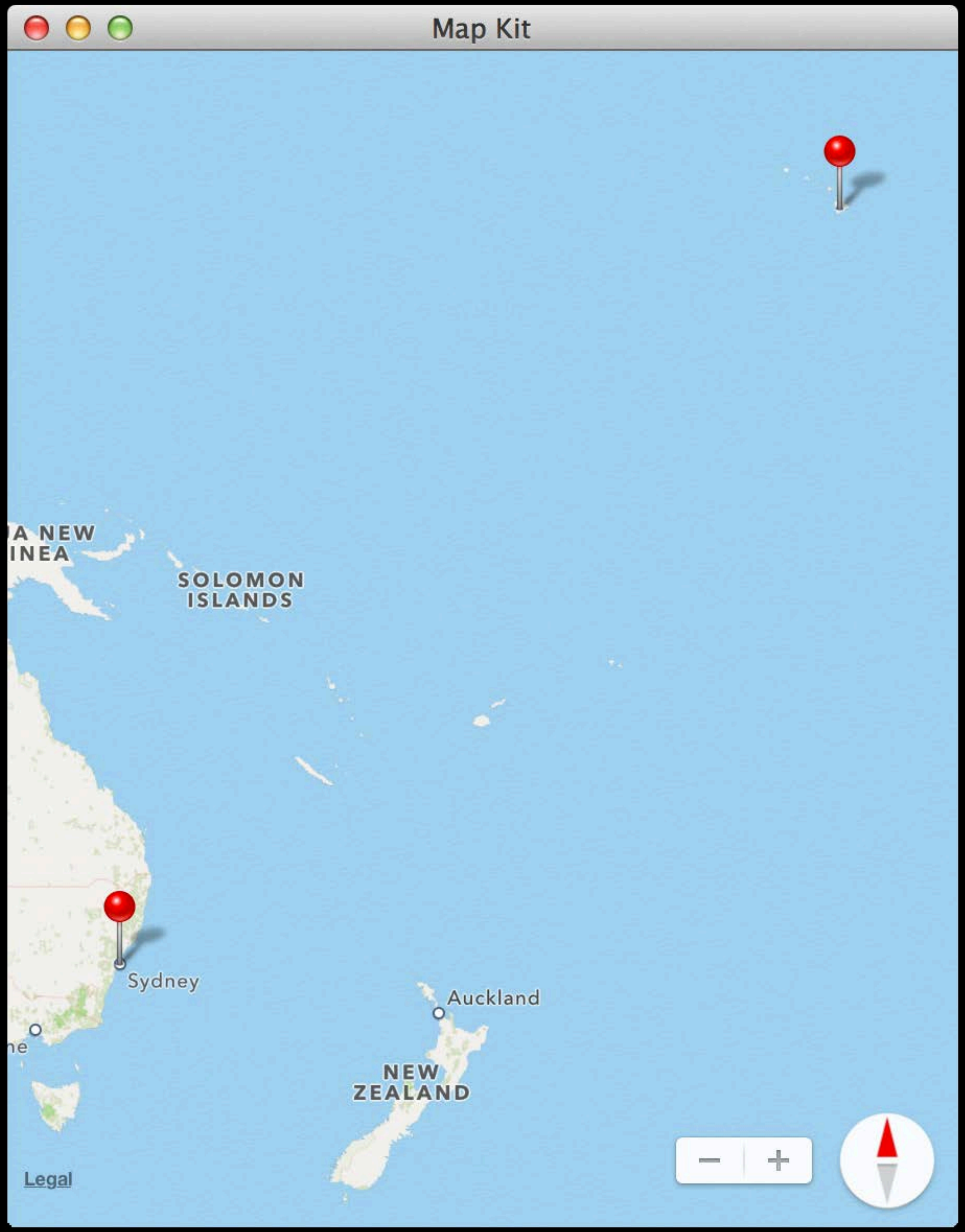
New Perspectives

Positioning over 180th meridian

```
map.visibleMapRect = MKMapRectInset(
     MKMapRectMake(
       MKMapRectGetMaxX(MKMapRectWorld),
       MKMapRectGetMidY(MKMapRectWorld),
       0, 0
     ),
     -1000.0 * 1000.0 * MKMapPointsPerMeterAtLatitude(0),
     -1000.0 * 1000.0 * MKMapPointsPerMeterAtLatitude(0)
);
```

Spanning the 180th Meridian

Enclosing annotation views on screen



Spanning the 180th Meridian

Enclosing annotation views on screen

```
MKPointAnnotation *a = [[MKPointAnnotation alloc] init];
a.title = @"Honolulu, HI";
a.coordinate = CLLocationCoordinate2DMake(19.47695,-155.566406);

MKPointAnnotation *b = [[MKPointAnnotation alloc] init];
b.title = @"Sydney, Australia";
b.coordinate = CLLocationCoordinate2DMake(-26.431228,151.347656);

[map showAnnotations:@[ a, b ] animated:NO];
```

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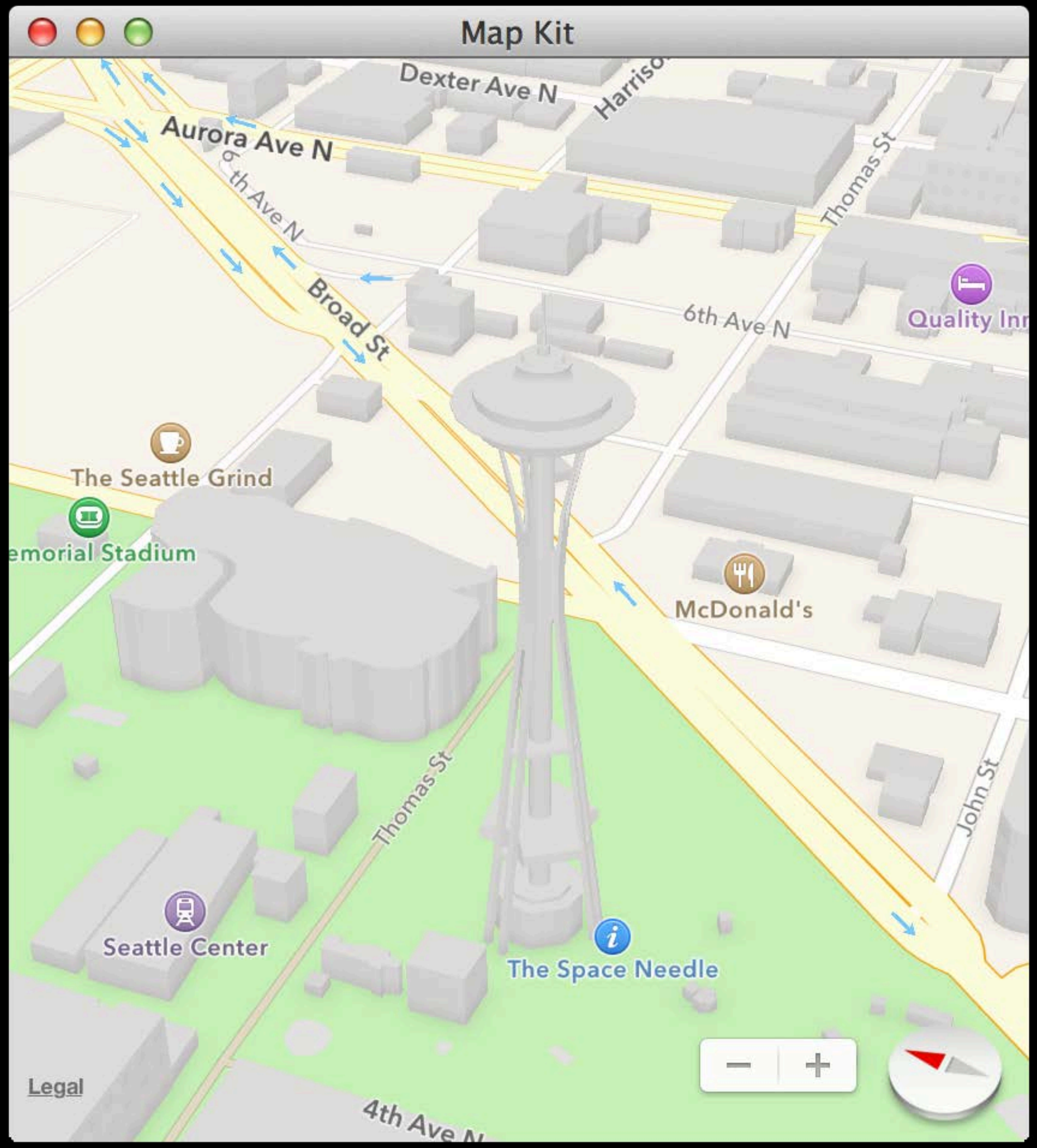
New Perspectives

3D

- On by default on iOS 7 and OS X
- New APIs for working with 3D



Related Sessions

Putting Map Kit in Perspective	Pacific Heights Thursday 2:00 PM

Overlays

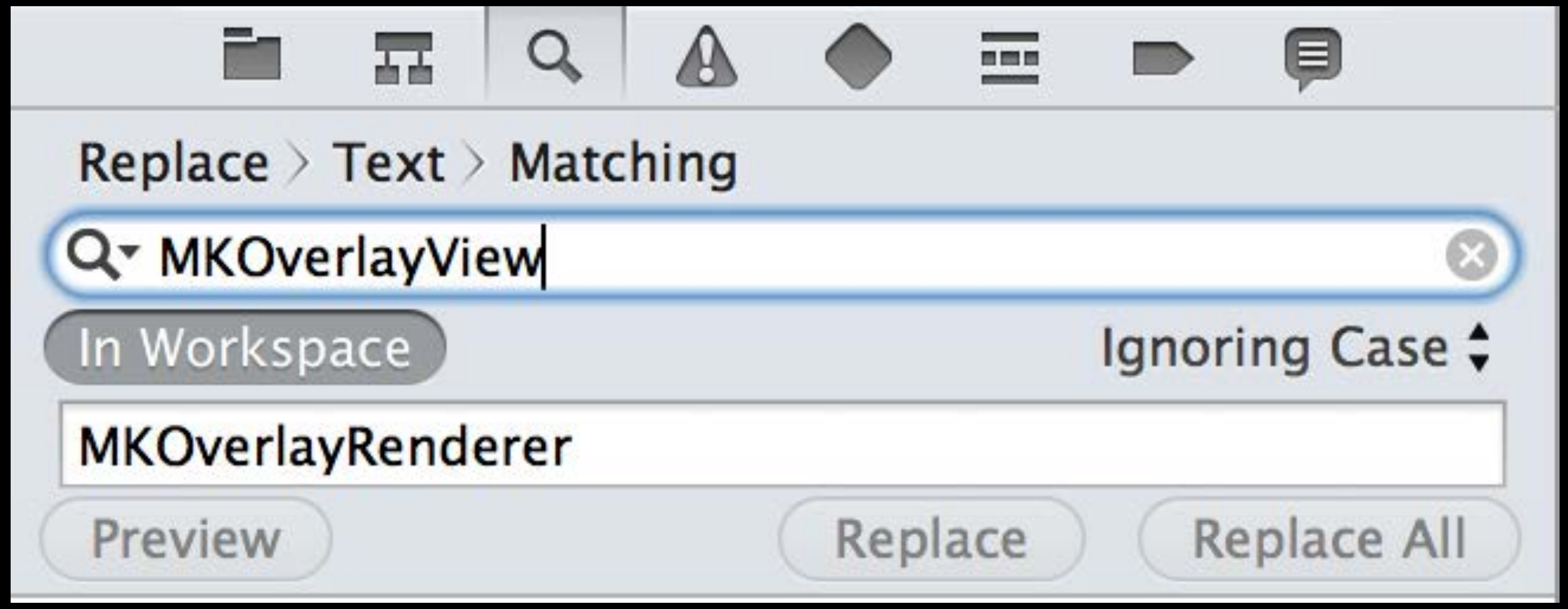
Overlays Overview

- MKOverlayRenderer
- Overlays beneath labels
- MKGeodesicPolyline
- MKTileOverlay
- Map data replacement
- Better performance

Overlays

MKOverlayRenderer

- Replace MKOverlayView with MKOverlayRenderer
- MKOverlayRenderer is lighter weight
- API is the same except no longer a view



Replace > Text > Matching

MKOverlayView

In Workspace

Ignoring Case

MKOverlayRenderer

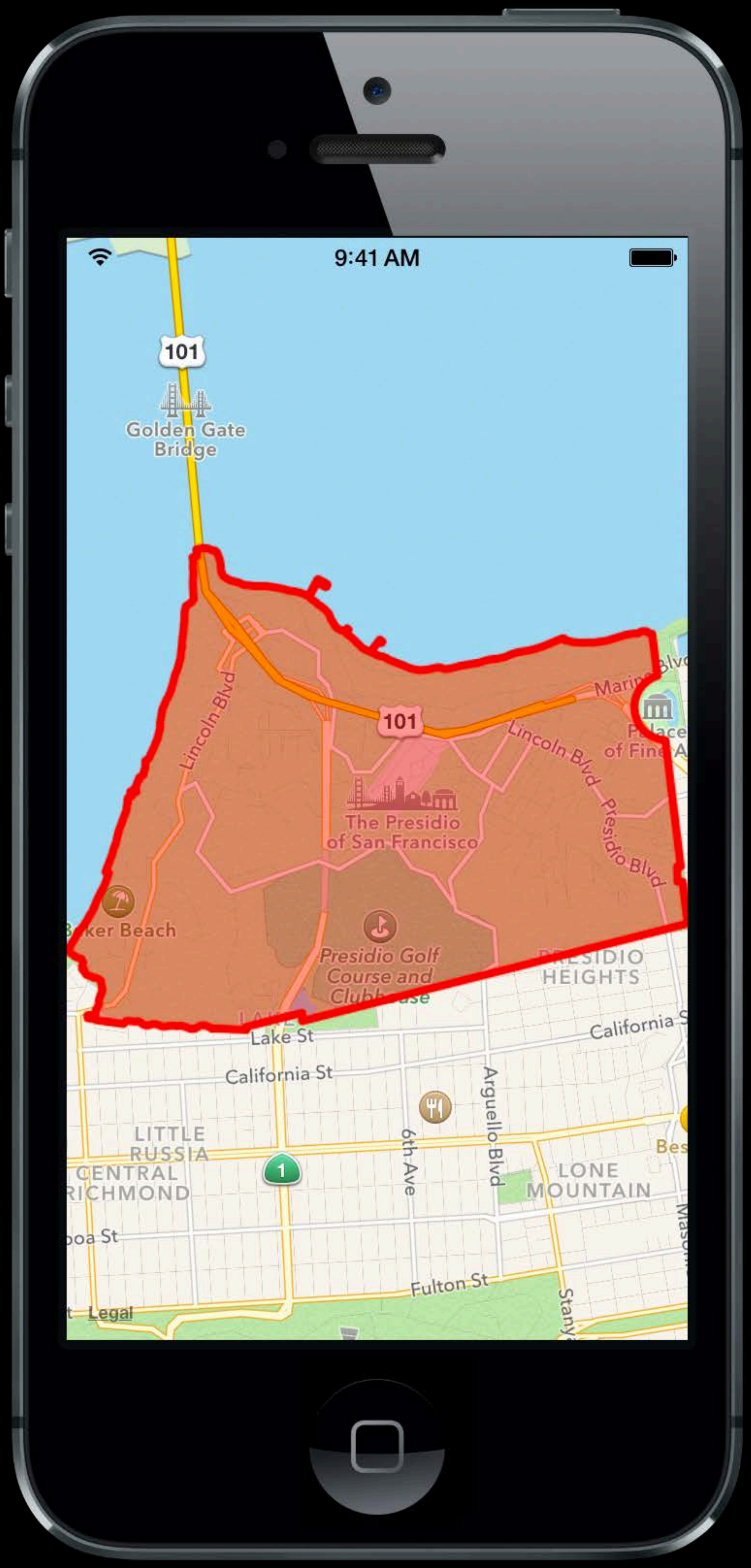
Overlays

Setting the level

- Overlays can be added to one of two levels:
    - MKOverlayLevelAboveRoads
        - Overlay rendered directly above roads, but beneath everything else (labels, points of interest, annotation views)
    - MKOverlayLevelAboveLabels
        - Overlay covers all map content, including labels, but still beneath annotation views

Overlays

Setting the level



`MKOverlayLevelAboveLabels`

Overlays

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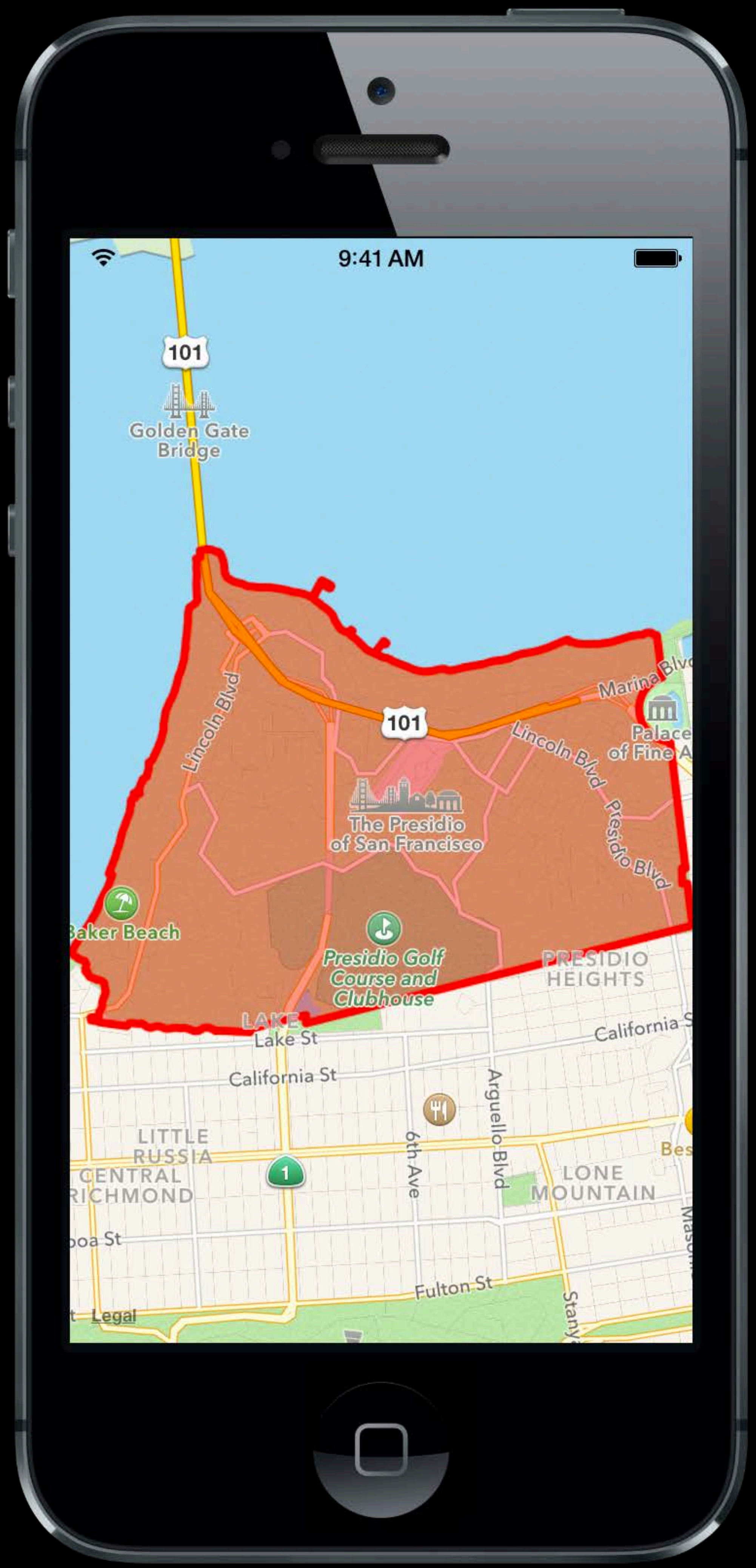

`MKOverlayLevelAboveRoads`

Overlays

Map layers visualized

6. Annotation Views
5. 3D Buildings
4. MKOverlayLevelAboveLabels
3. Labels
2. MKOverlayLevelAboveRoads
1. Base Map
0. Grid

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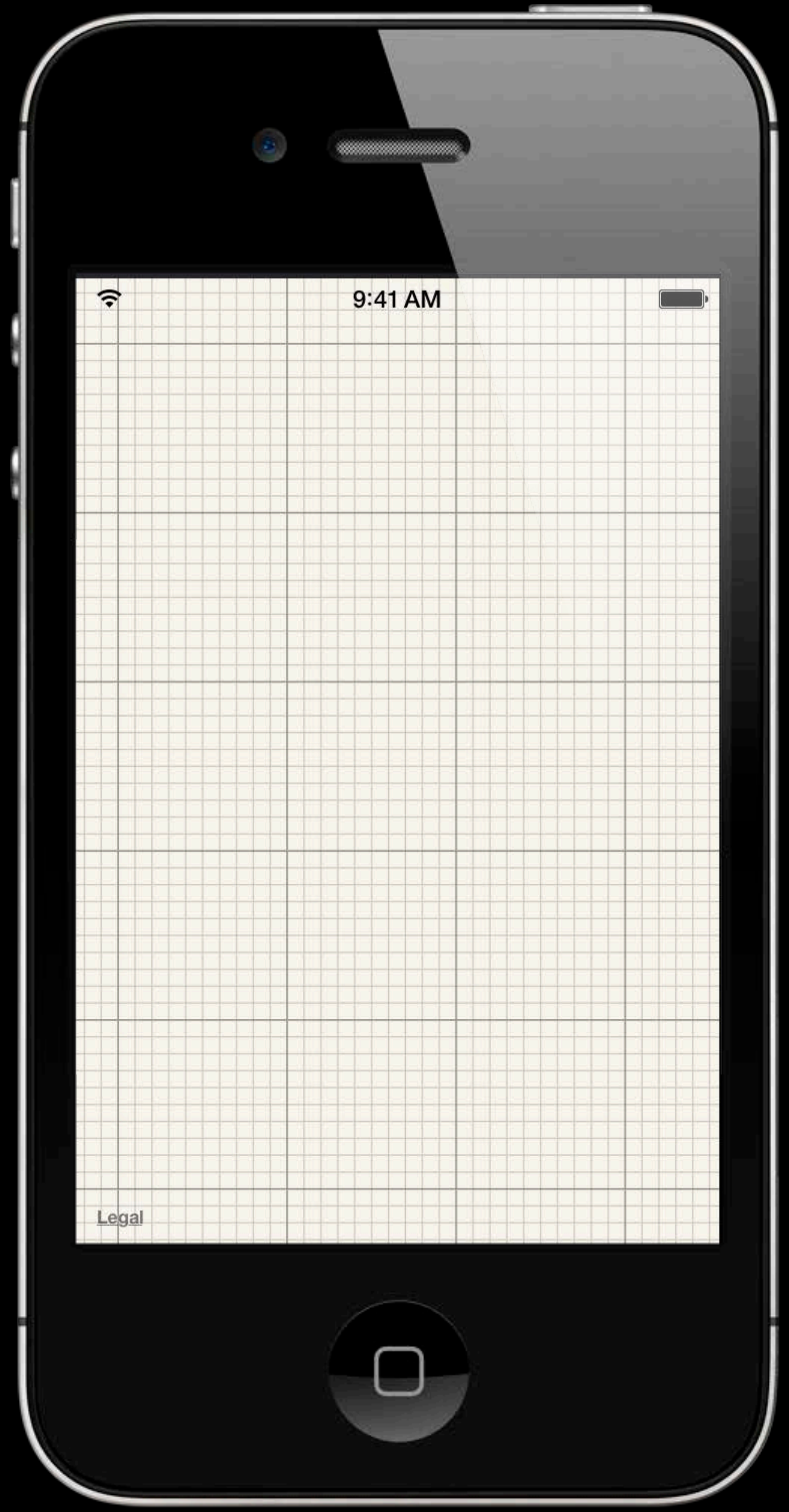

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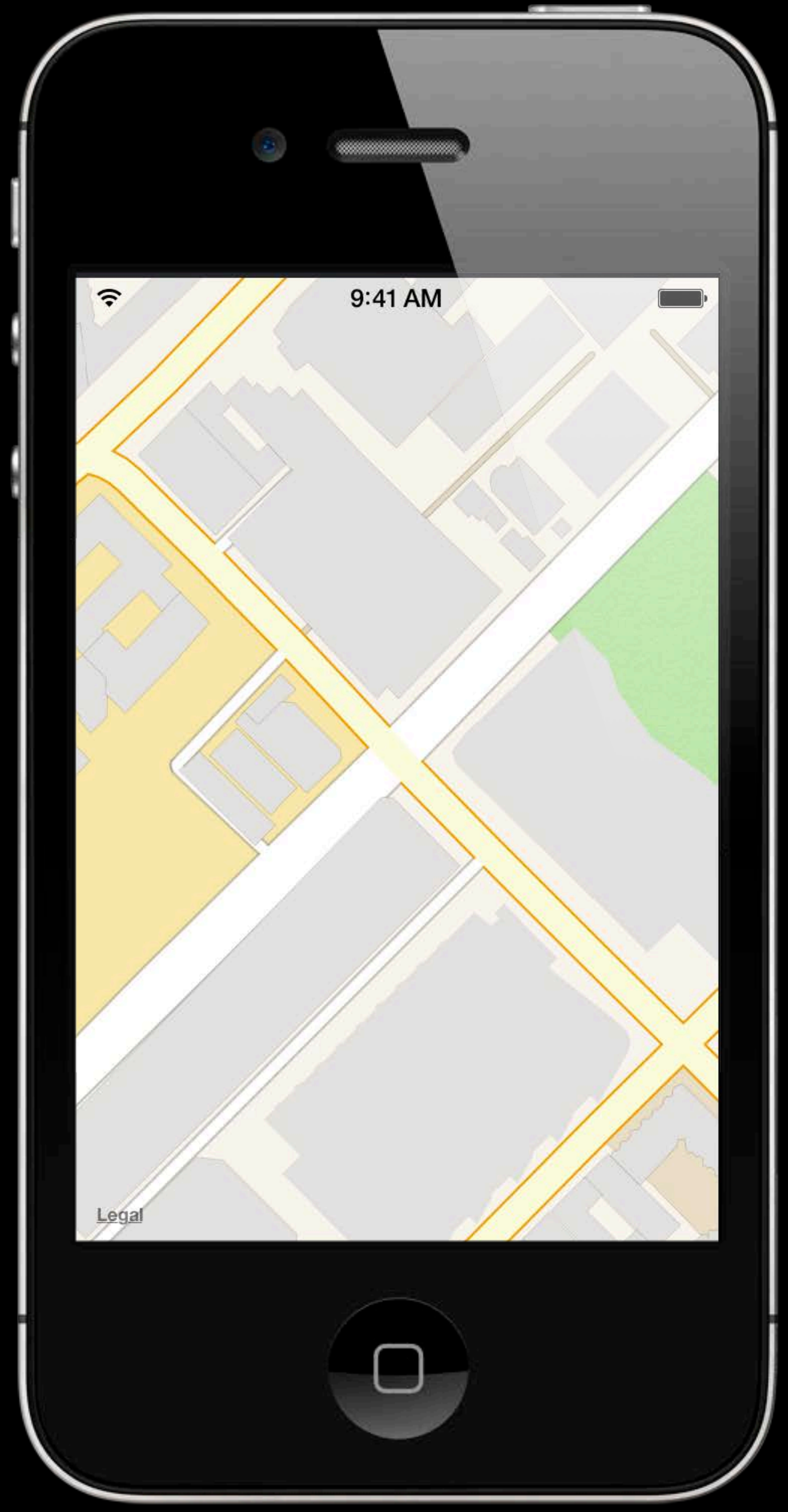

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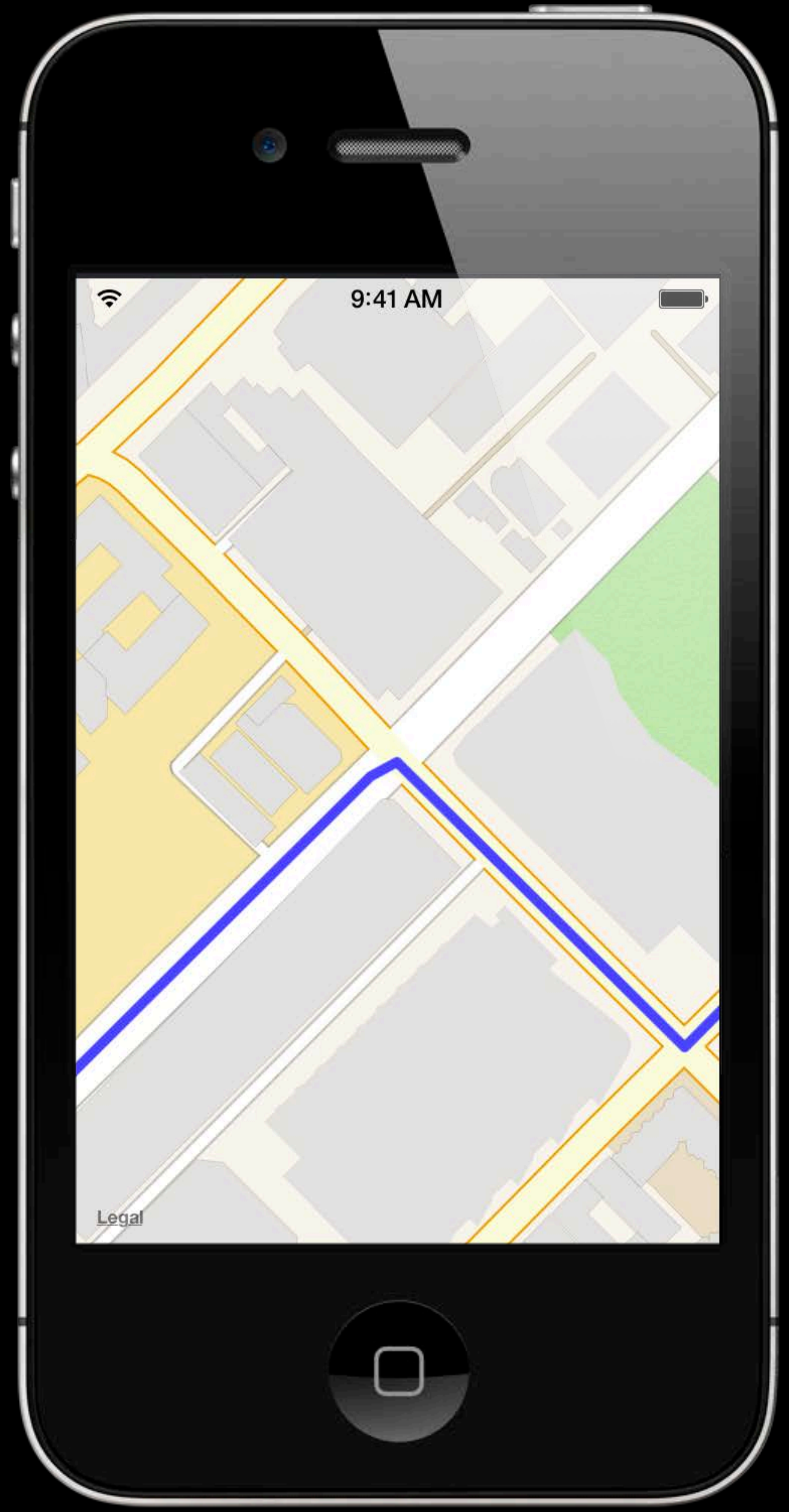

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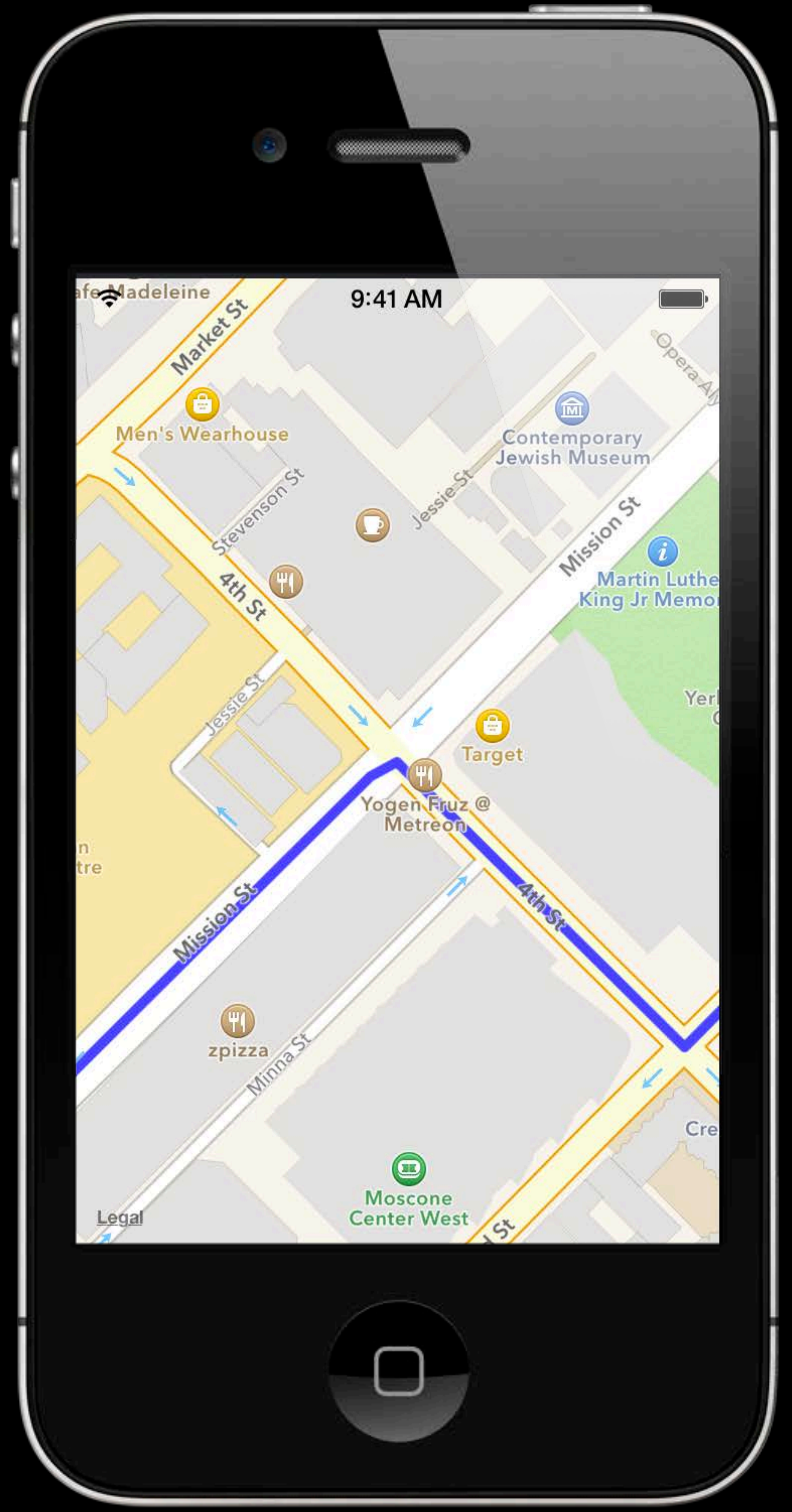

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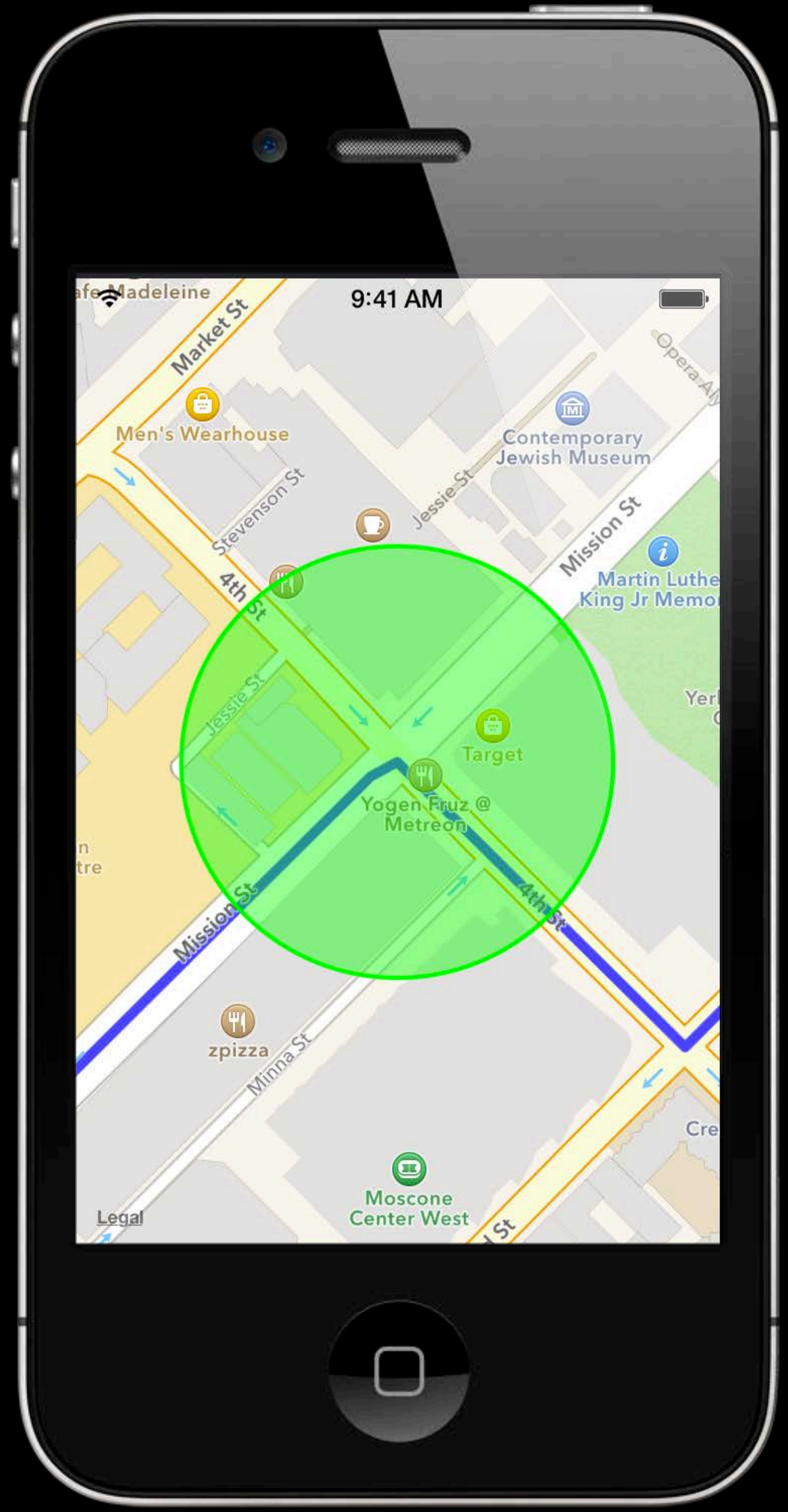

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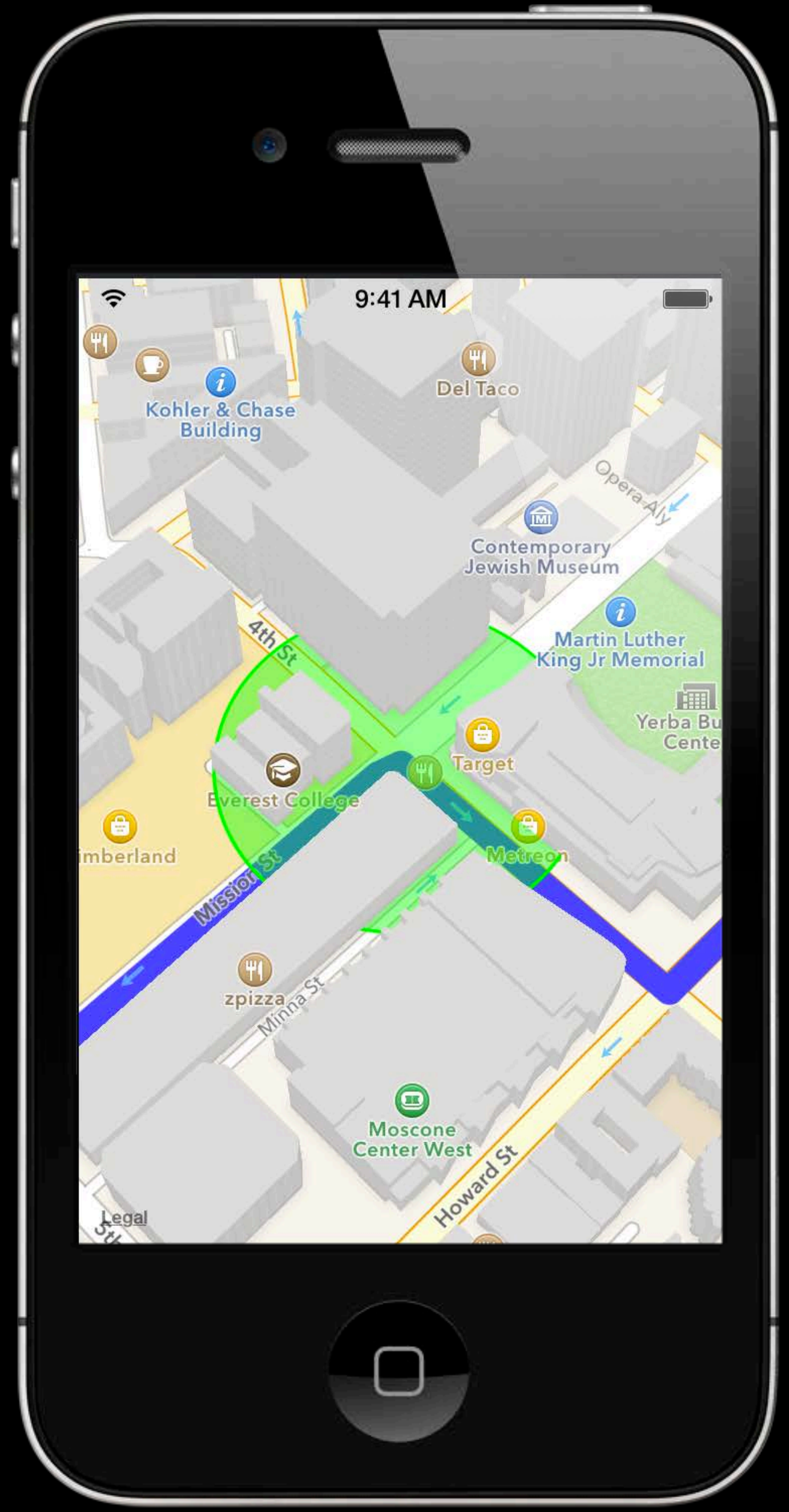

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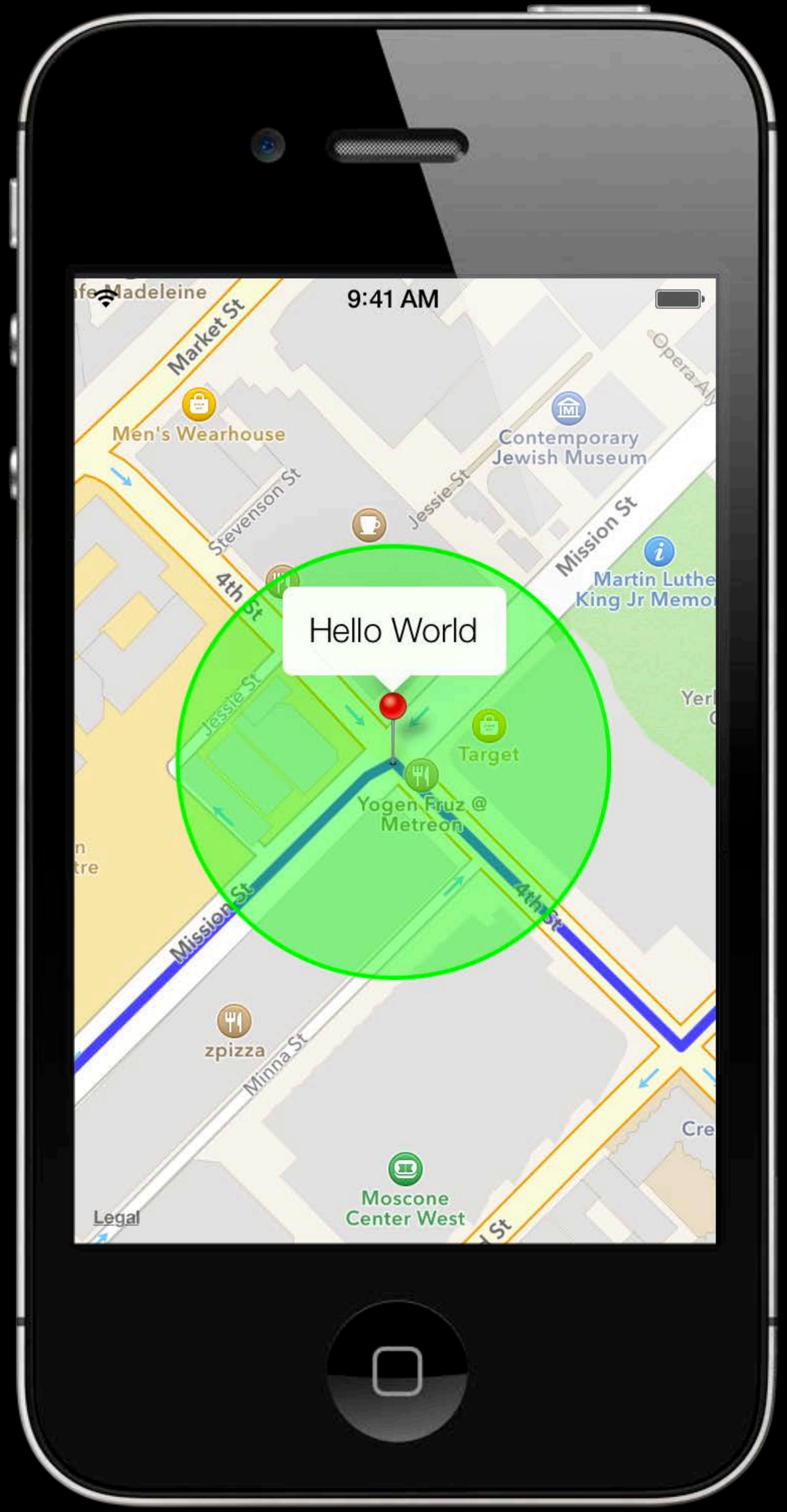

Overlays

Setting the level

```
MKPolygon *presidioPolygon =
     [MKPolygon polygonWithCoordinates:presidio
                                 count:presidioSize];
[map addOverlay:presidioPolygon level:MKOverlayLevelAboveRoads];
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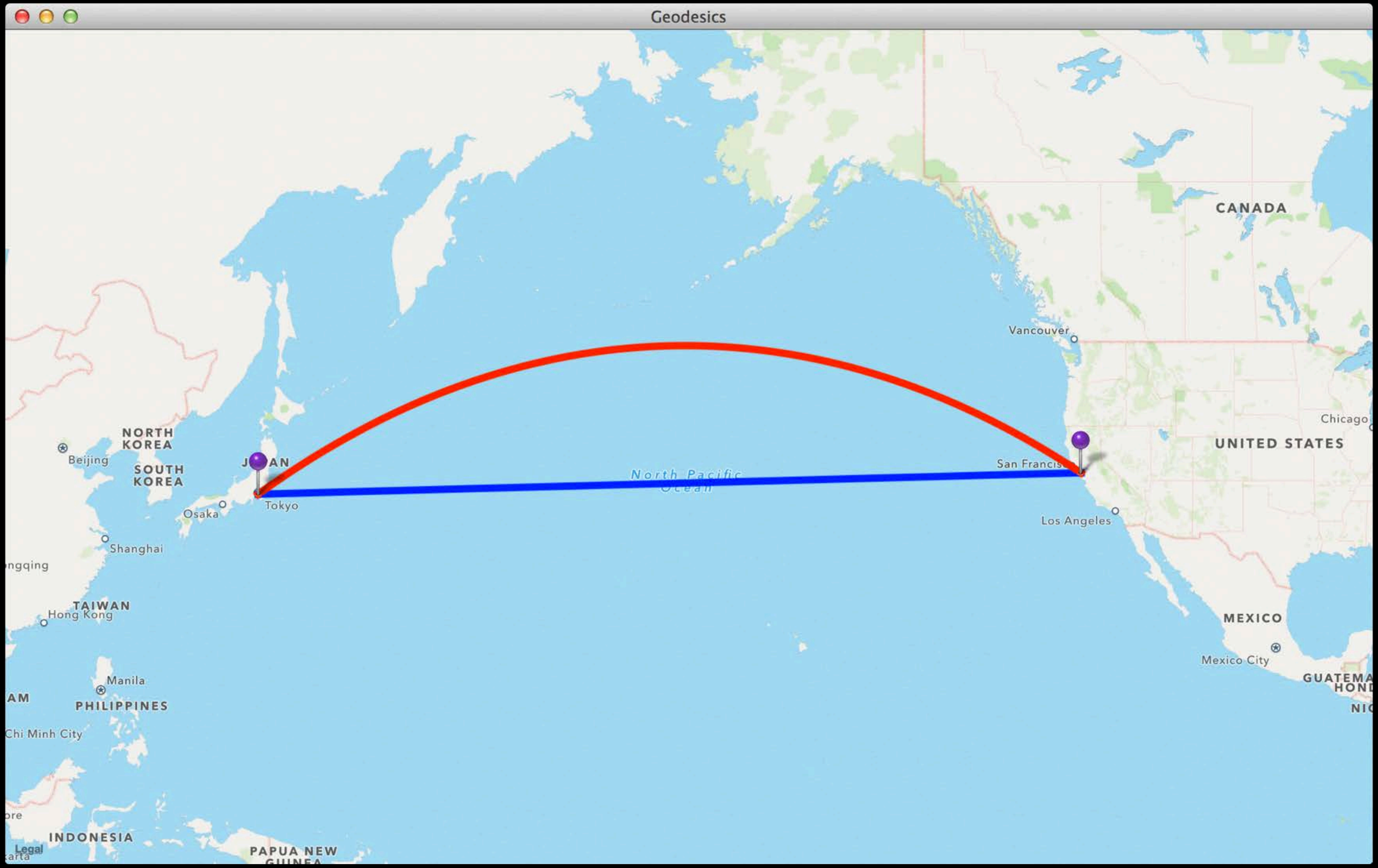
Overlays

Geodesic polyline



Overlays

Geodesic polyline

```
- (void)updateOverlays
{
    CLLocationCoordinate2D points[] =
      { start.coordinate, end.coordinate };
    geodesic = [MKGeodesicPolyline polylineWithCoordinates:points count:2];
    [map addOverlay:geodesic];
}

- (MKOverlayRenderer *)mapView:(MKMapView *)mapView
           rendererForOverlay:(id<MKOverlay>)overlay
{
    MKPolylineRenderer *renderer =
      [[MKPolylineRenderer alloc] initWithOverlay:overlay];
    renderer.lineWidth = 5.0;
    renderer.strokeColor = [UIColor purpleColor];
    return renderer;
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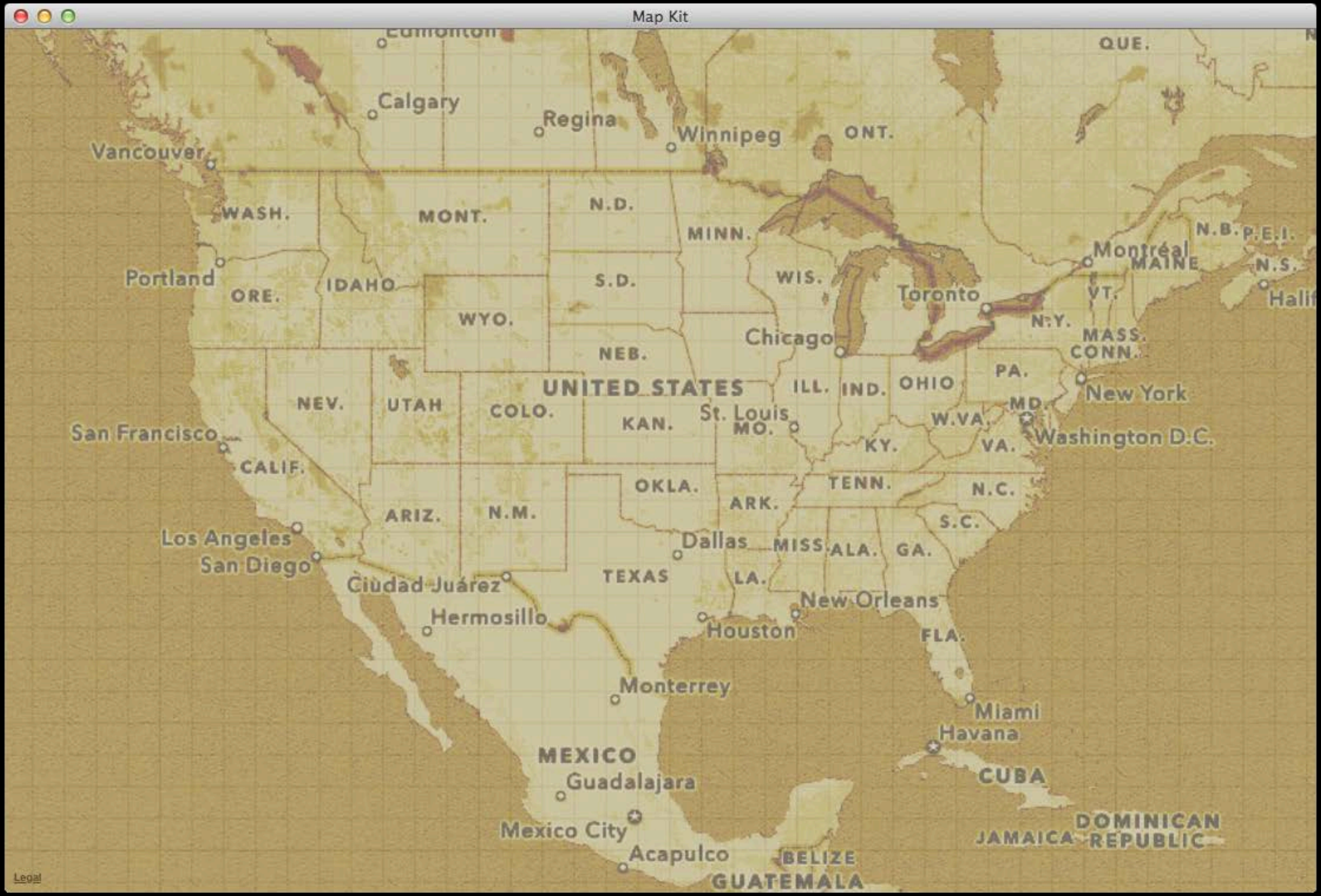
Overlays

MKTileOverlay



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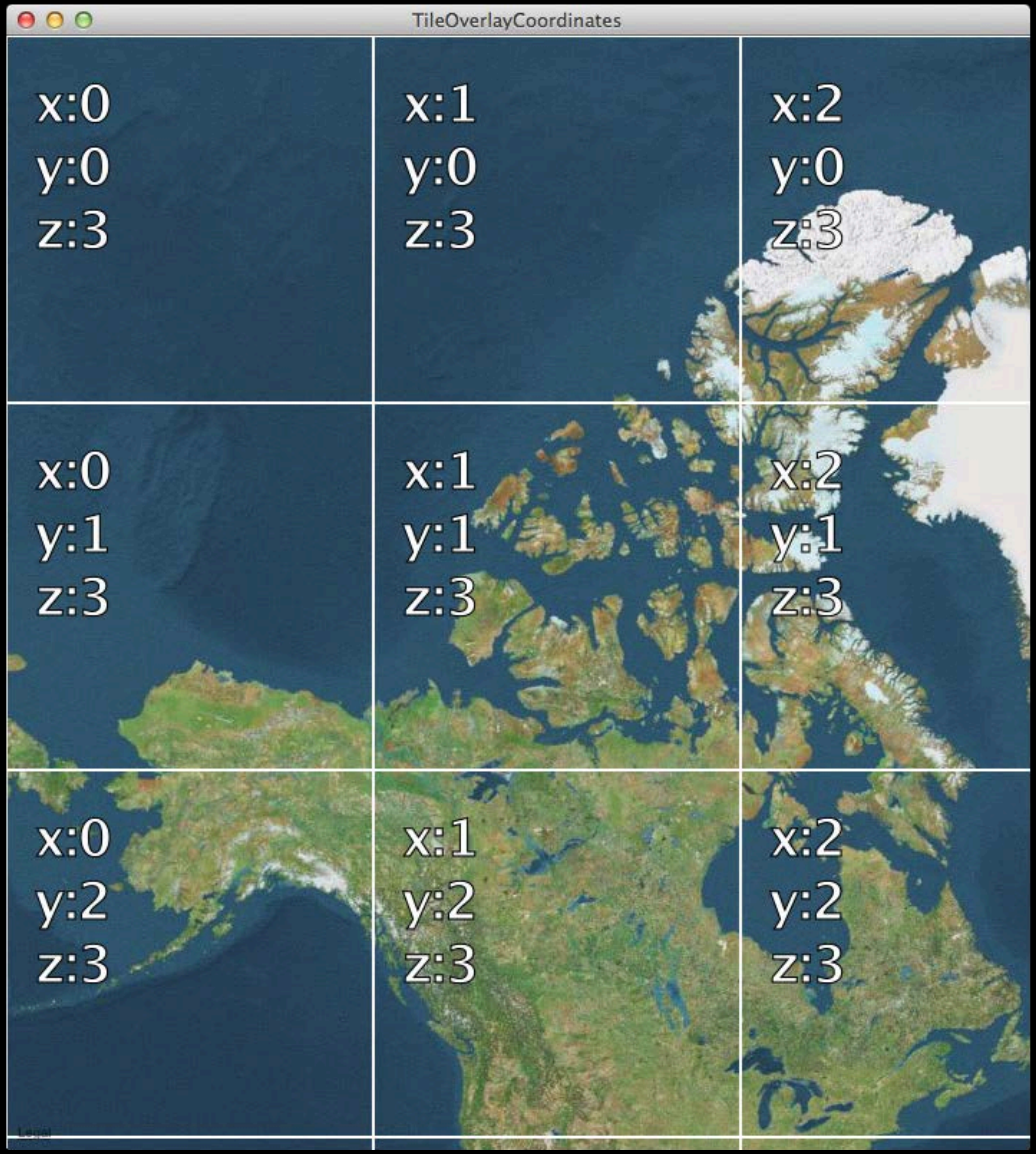
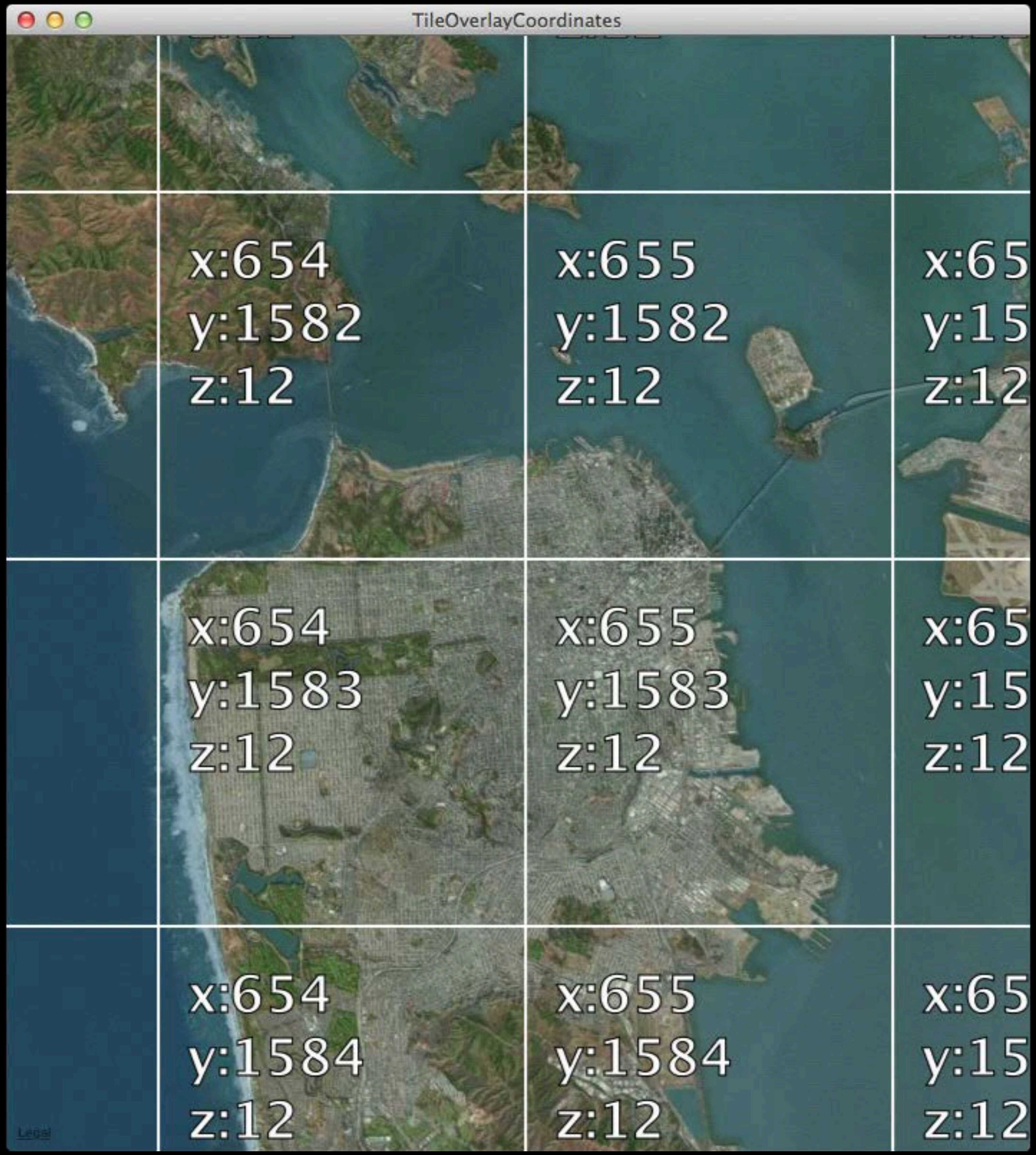
Overlays

`MKTileOverlay` coordinate system



Overlays

`MKTileOverlay` coordinate system



Overlays

MKTileOverlay coordinate system

Overlays

`MKTileOverlay` coordinate system

- Spherical mercator projection (EPSG:3857)

Overlays

`MKTileOverlay` coordinate system

- Spherical mercator projection (EPSG:3857)
- Various tools can produce tile images for use with MKTileOverlay
  - GDAL is a good one (http://www.gdal.org)

Overlays

`MKTileOverlay` coordinate system

- Spherical mercator projection (EPSG:3857)
- Various tools can produce tile images for use with MKTileOverlay
    - GDAL is a good one (http://www.gdal.org)
- Same system as popular web mapping frameworks

Overlays

Replacing Apple data with your data

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- Optional method on MKOverlay protocol

```
– (BOOL)canReplaceMapContent
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- Settable property on MKTileOverlay

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- Apple map data is neither loaded nor drawn

Overlays

Replacing Apple data with your data

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- Typically use with MKOverlayLevelAboveLabels

Overlays

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- Optional method on MKOverlay protocol

```
– (BOOL)canReplaceMapContent
```

- Settable property on MKTileOverlay

```
@property (assign) BOOL canReplaceMapContent
```

- Apple map data is neither loaded nor drawn
- Typically use with MKOverlayLevelAboveLabels
- But does work with MKOverlayLevelAboveRoads
    - Only Apple data necessary to draw labels is loaded

Demo

MKTileOverlay

MKTileOverlay

Lessons learned

- Tiles can be bundled with your app, or downloaded from your server
- MKTileOverlay can replace Apple Map Data, or show atop it

Local Search

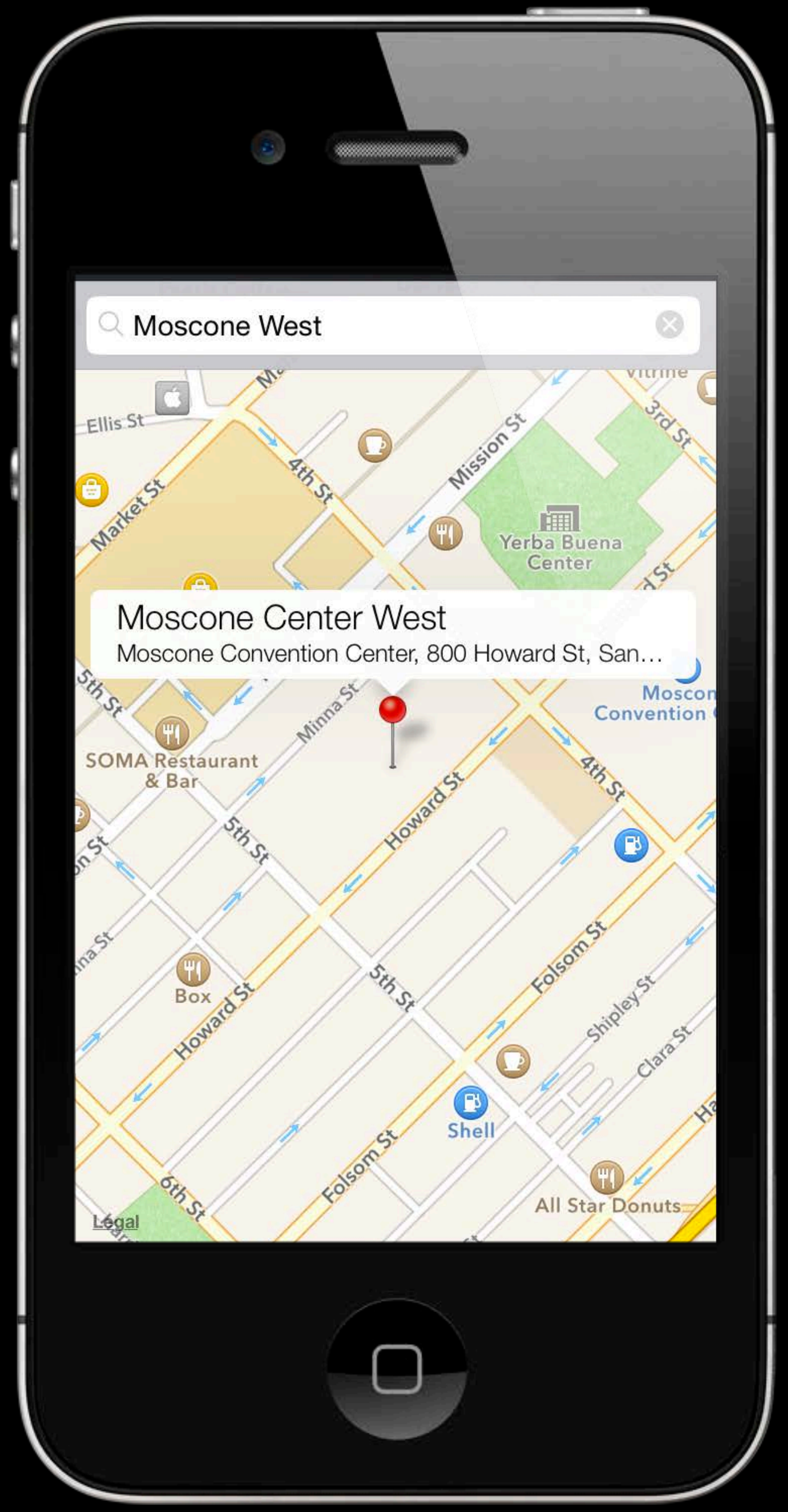
Local Search

Local Search

- Allows you to find ...

Local Search

- Allows you to find ...
    - A specific place by name



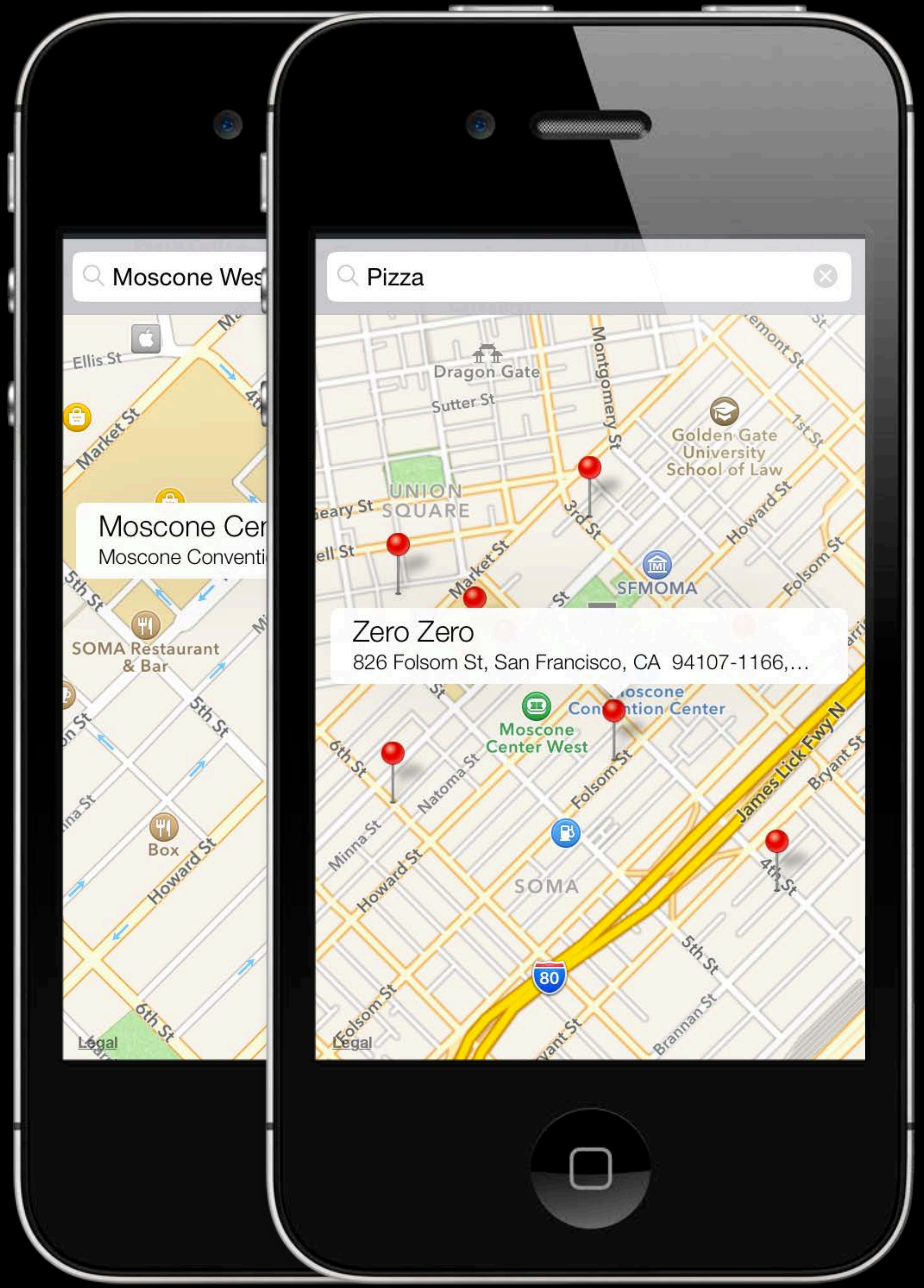
Moscone West

Moscone Center West

Moscone Convention Center, 800 Howard St, San…

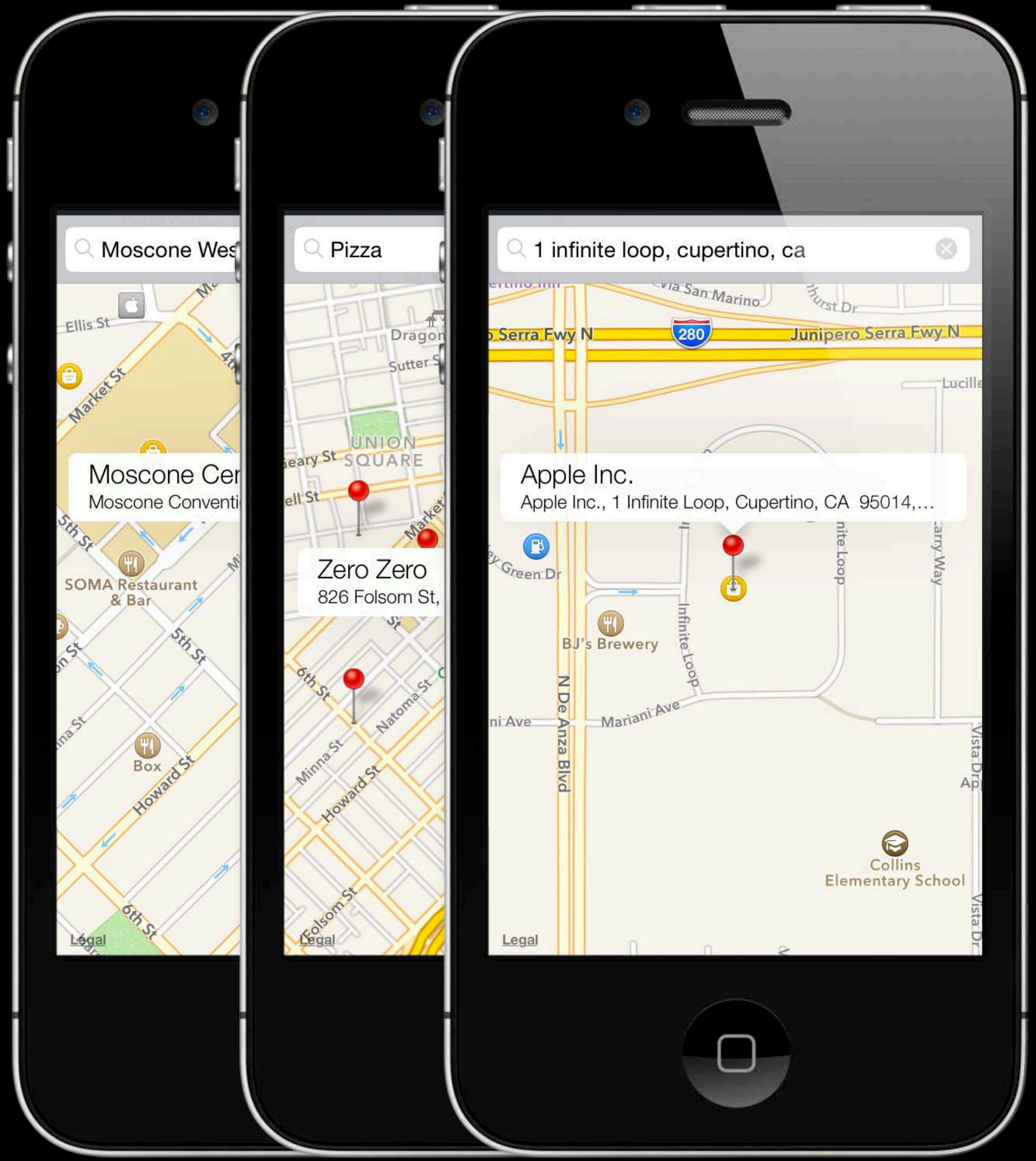
Local Search

- Allows you to find ...
  - A specific place by name
  - A list of places by type, e.g. “Pizza”



Local Search

- Allows you to find ...
  - A specific place by name
  - A list of places by type, e.g. "Pizza"
  - Addresses



Moscone Wes

Moscone Cen
Moscone Conventi

Pizza

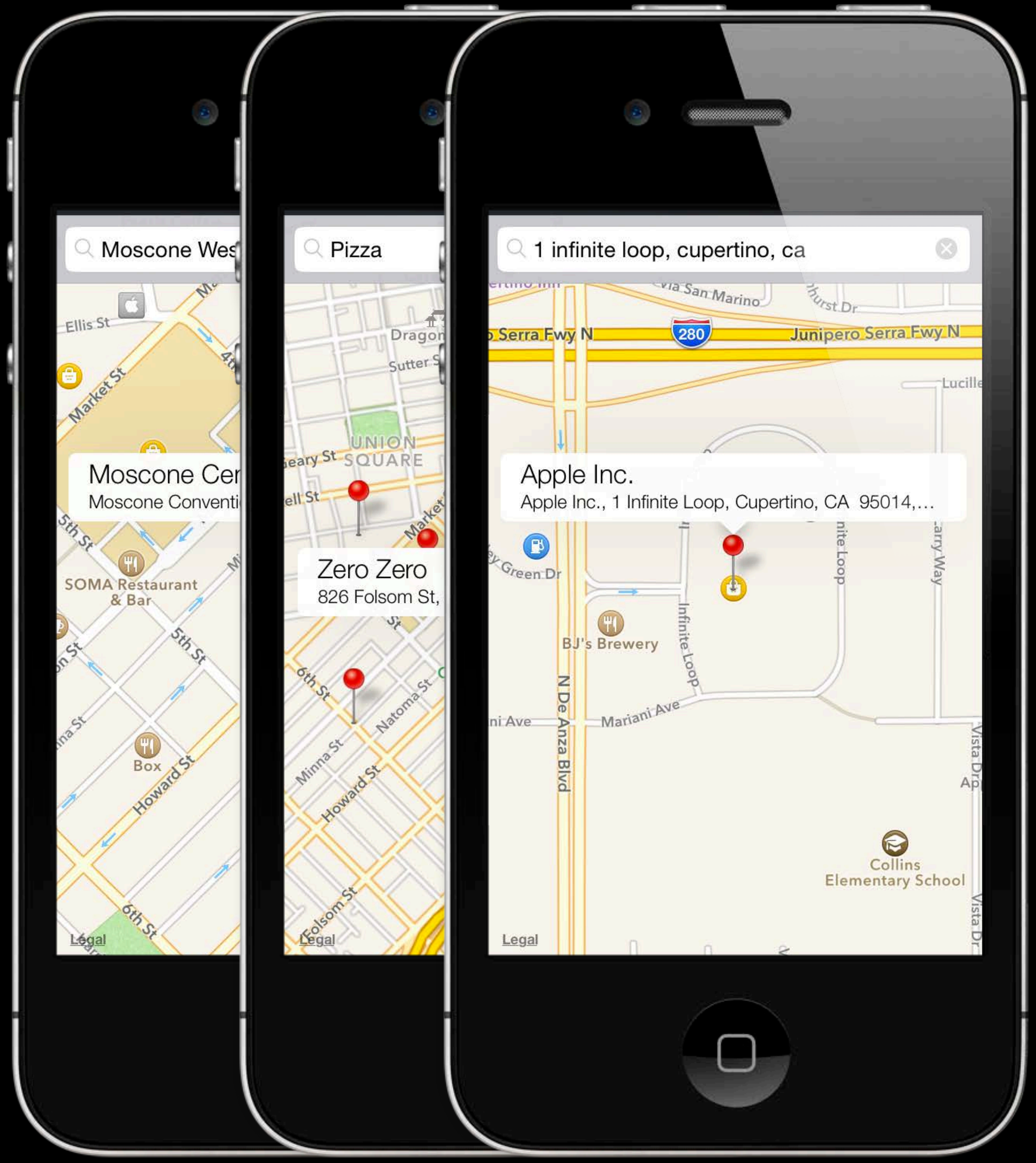
Zero Zero
826 Folsom St,

1 infinite loop, cupertino, ca

Apple Inc.
Apple Inc., 1 Infinite Loop, Cupertino, CA 95014,...

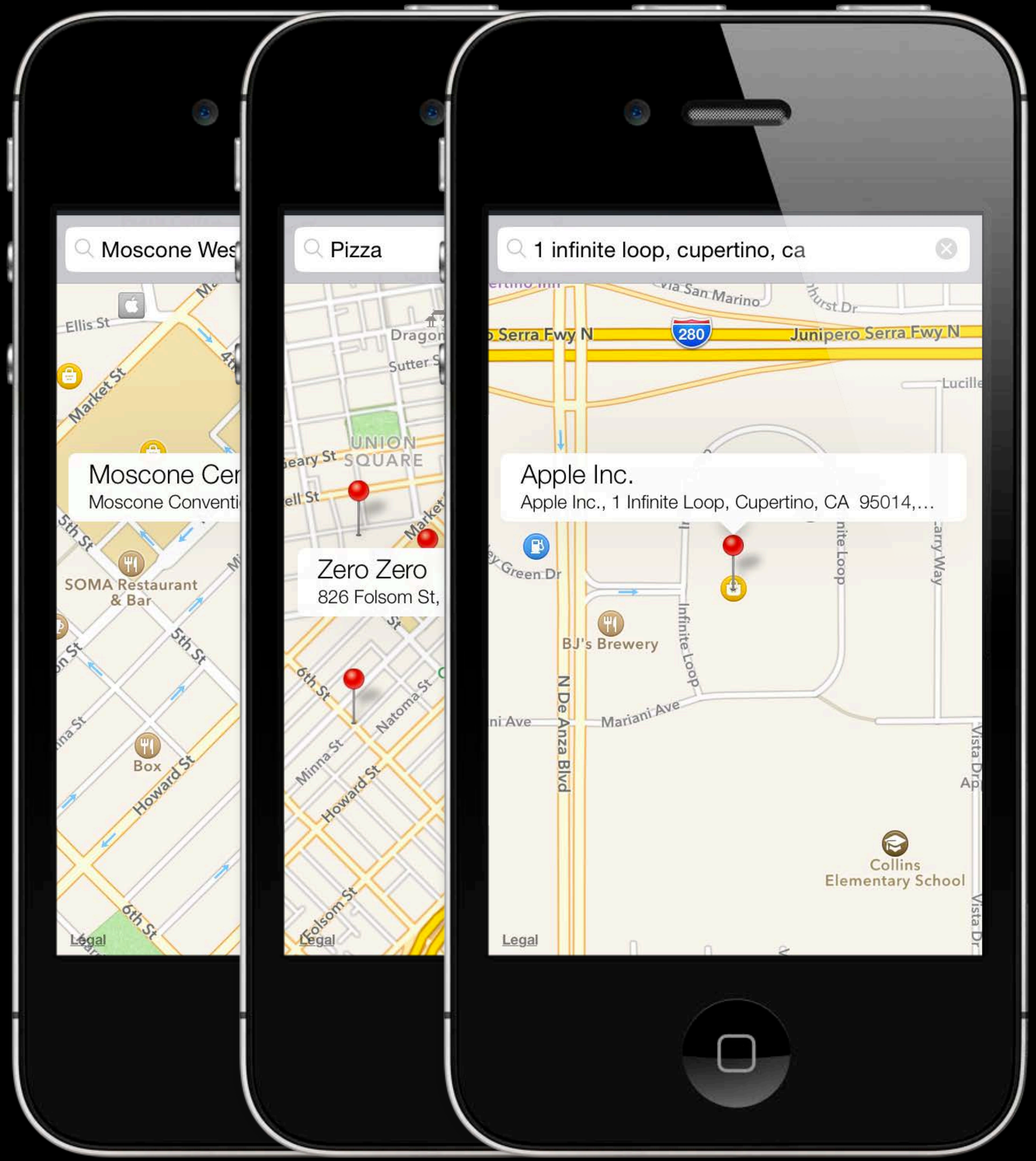
Local Search

- Allows you to find ...
    - A specific place by name
    - A list of places by type, e.g. "Pizza"
    - Addresses
- Introduced in iOS 6.1


Moscone Wes
Moscone Cer
Moscone Conventi
Pizza
Zero Zero
826 Folsom St,
1 infinite loop, cupertino, ca
Apple Inc.
Apple Inc., 1 Infinite Loop, Cupertino, CA 95014,...
Legal

Local Search

- Allows you to find ...
    - A specific place by name
    - A list of places by type, e.g. "Pizza"
    - Addresses
- Introduced in iOS 6.1
- Available on OS X 10.9



Local Search

VS Geocoding

- Reverse Geocoding
    - Coordinate → Address

Local Search

VS Geocoding

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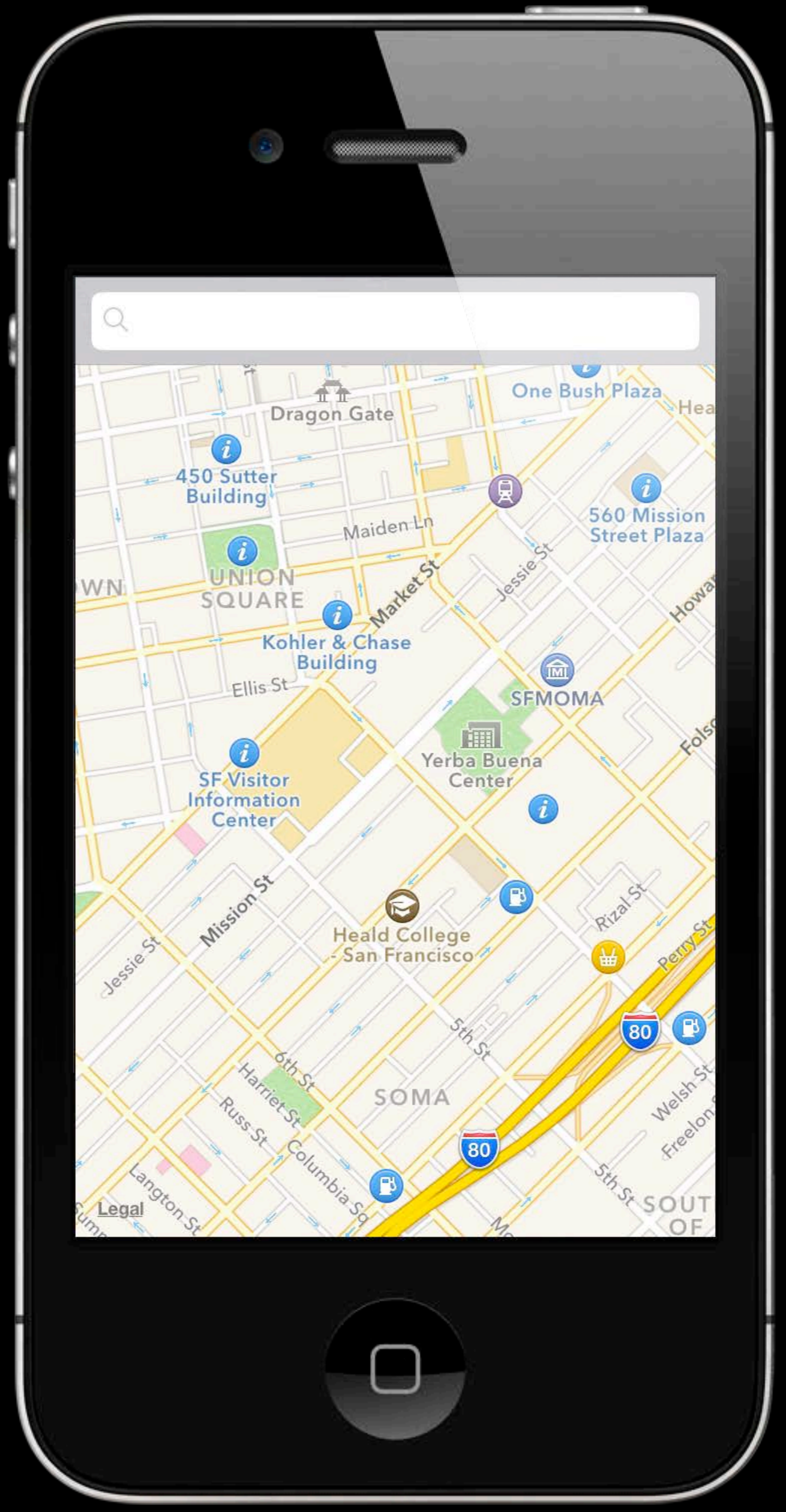
  - Coordinate → Address



Local Search

VS Geocoding

- Reverse Geocoding
    - Coordinate → Address
- Forward Geocoding
    - Address → Coordinate

Local Search

VS Geocoding

- Reverse Geocoding
  - Coordinate → Address
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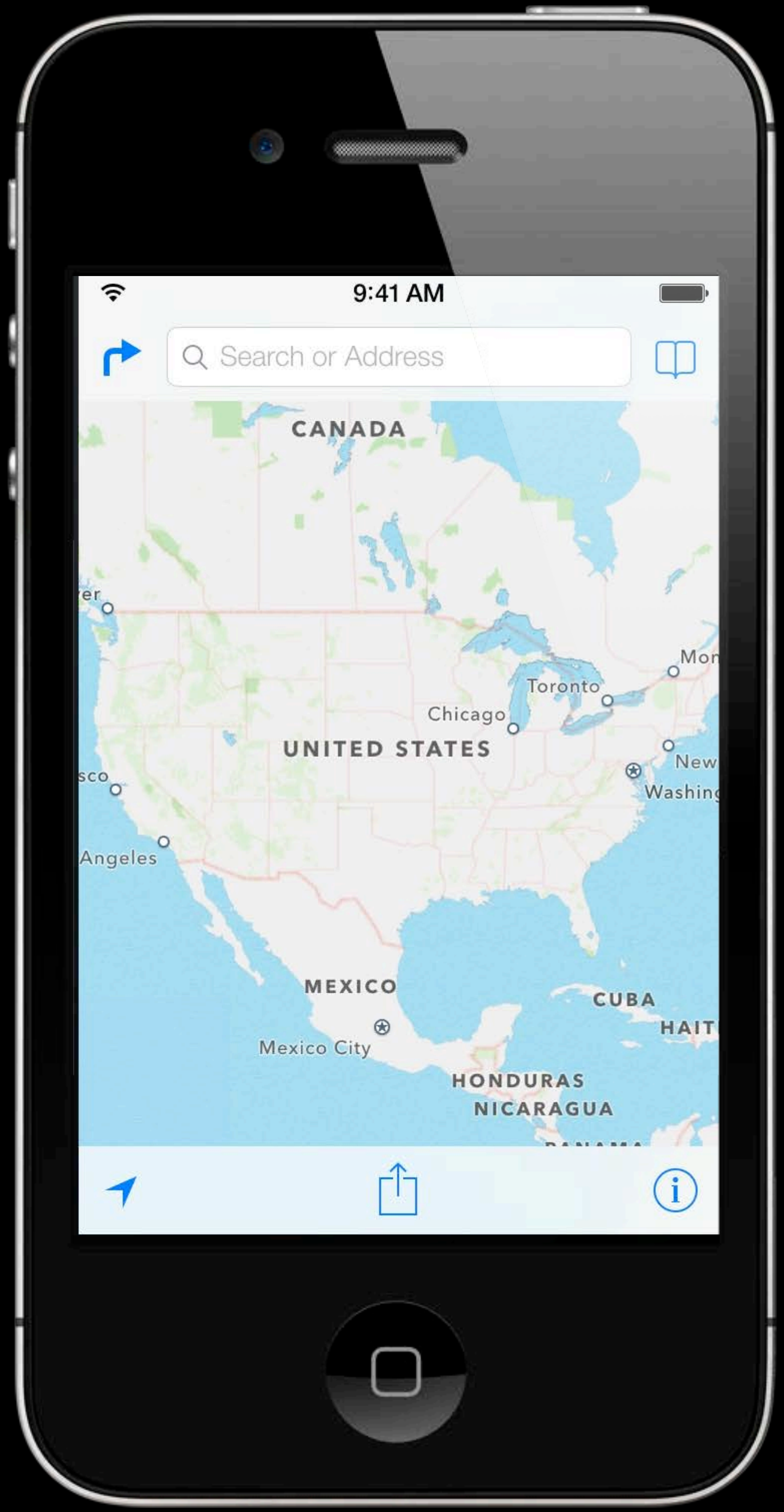
  - Address → Coordinate



Local Search

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- Reverse Geocoding
  - Coordinate → Address
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  - Freeform query string → List of Search Results

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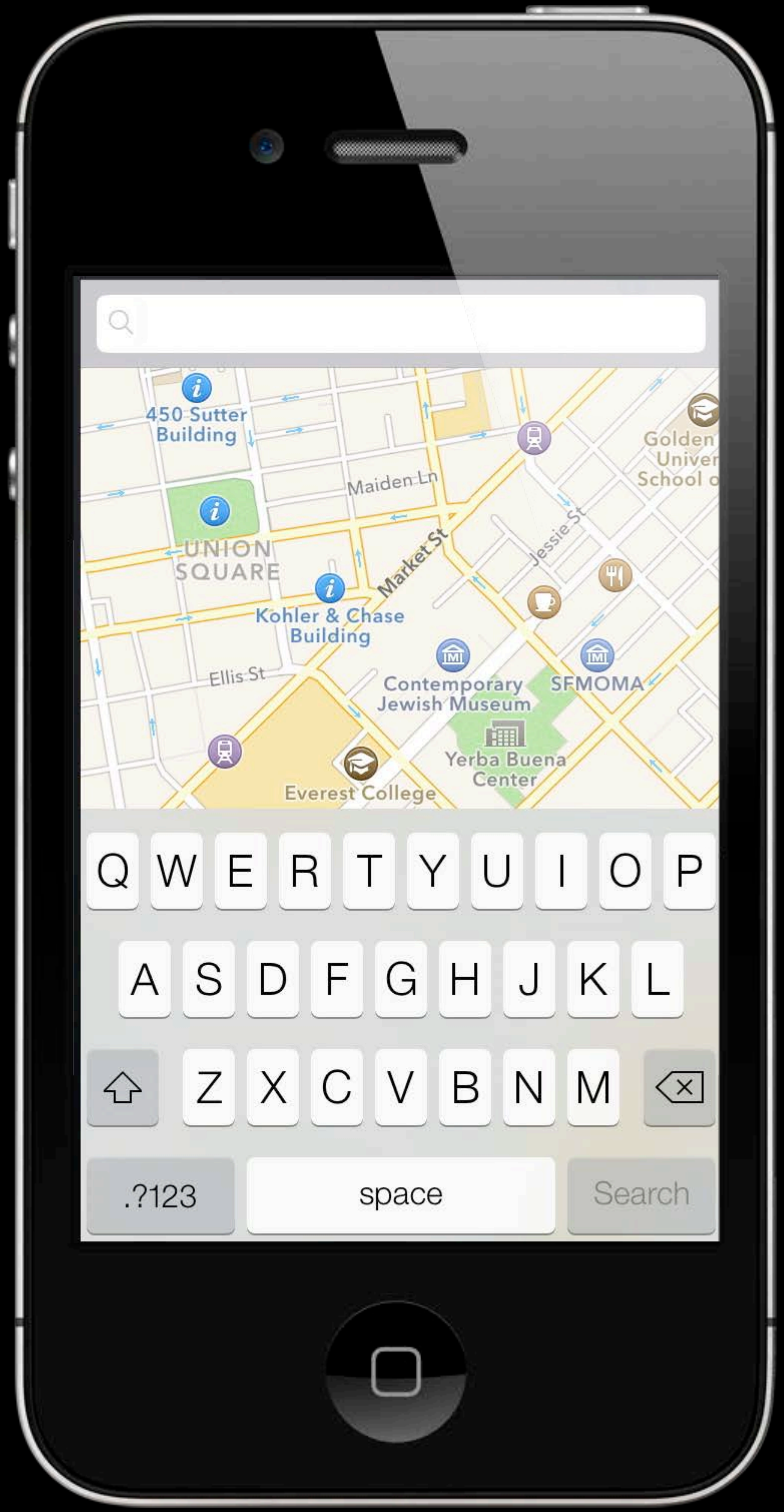

Local Search Results

- Represented by MKMapItem
    - Coordinate
    - Structured Address
    - Name
    - Phone #
    - URL

Local Search

Performing search requests

```
// Initialize request object
MKLocalSearchRequest *request = [[MKLocalSearchRequest alloc] init];
request.naturalLanguageQuery = query;
request.region = self.map.region

// Initialize search object
MKLocalSearch *search = [[MKLocalSearch alloc] initWithRequest:request]

// Run search and display results
[search startWithCompletionHandler:
 ^(MKLocalSearchResponse *response, NSError *error)
{

}];
```

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// Run search and display results
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 ^(MKLocalSearchResponse *response, NSError *error)
{
  NSMutableArray *placemarks = [NSMutableArray array];
  for (MKMapItem *item in response.mapItems) {
    [placemarks addObject:item.placemark];
  }
  [self.map removeAnnotations:[self.map annotations]];
  [self.map showAnnotations:placemarks animated:NO];
}];
```

Directions

Directions

- New API in iOS 7 and OS X 10.9
- General purpose route finding API
- Driving and walking directions
- Alternate routes
- Time estimates
    - By default based on current traffic
    - Set departure date to future date to access historical traffic

Directions

Requesting directions

```
- (void)findDirectionsFrom:(MKMapItem *)source
                        to:(MKMapItem *)destination
{
 MKDirectionsRequest *request = [[MKDirectionsRequest alloc] init];
 request.source = source;
 request.destination = destination;
 request.requestsAlternateRoutes = YES;

 MKDirections *directions = [[MKDirections alloc] initWithRequest:request]
 [directions calculateDirectionsWithCompletionHandler:
 ^(MKDirectionsResponse *response, NSError *error) {
   if (error) {
     [self handleError:error];
   } else {
     [self showDirections:response];
   }
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   }
 }];
}
```

Directions

What’s in a response

- Source and destination
- Route(s)
    - Localized Name
        - “US 101-S”
    - Distance
    - Localized advisory notices
        - “This route requires tolls”
    - Expected travel time
    - Geometry as a polyline
    - Steps …

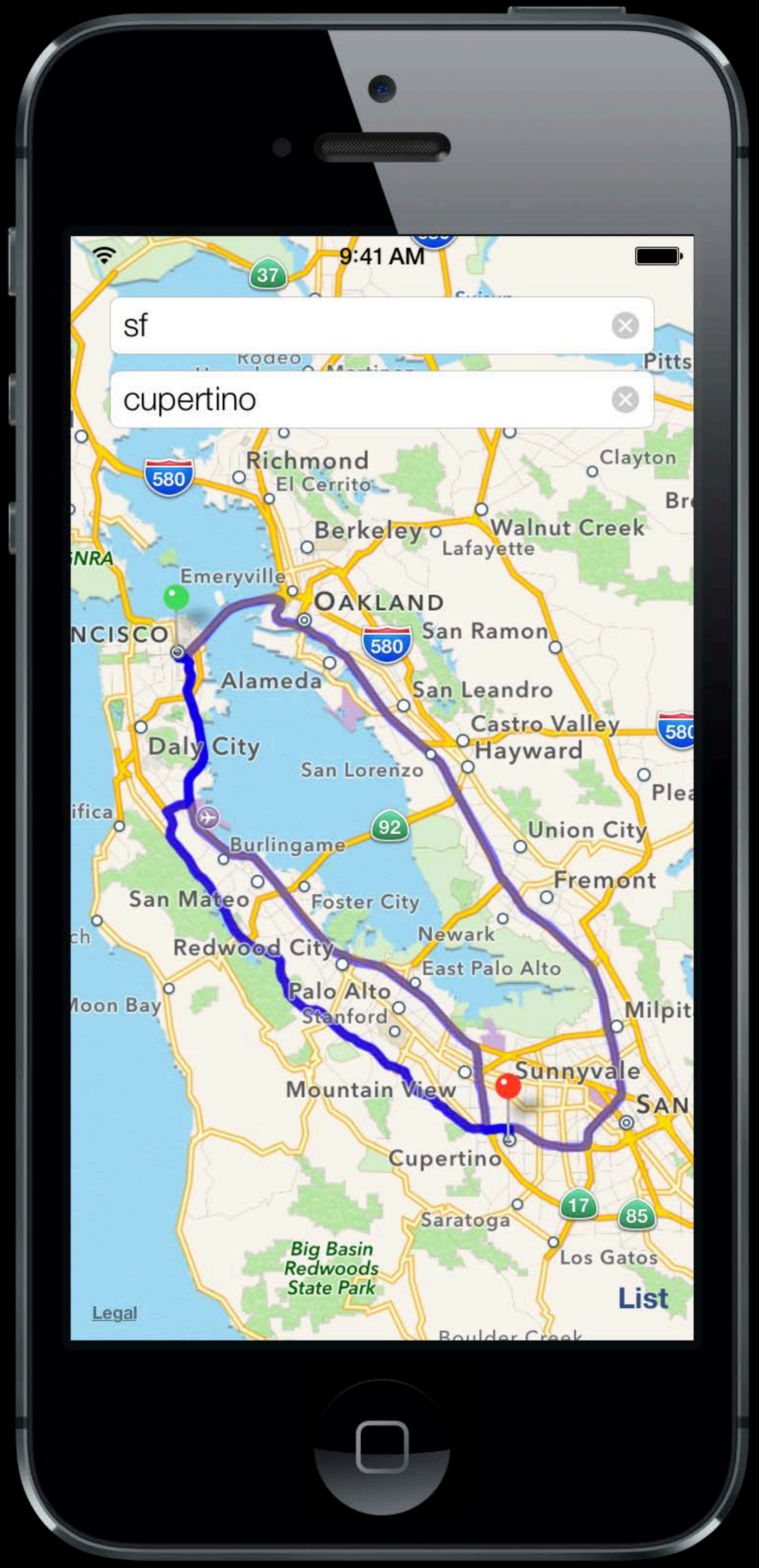
Directions

What’s in a step

- Localized instructions
    - “Take exit 11 onto De Anza Boulevard”
- Localized notice
    - Only present where applicable
    - “Do not cross tracks when lights flash”
- Distance
- Transport type (walking or driving)
    - May differ from overall route transport type
- Step geometry as polyline

Directions

Displaying routes



Directions

Displaying routes

```
- (void)showDirections:(MKDirectionsResponse *)response
{
     self.response = response;

     for (MKRoute *route in self.response.routes) {
       [self.map addOverlay:route.polyline level:MKOverlayLevelAboveRoads];
     }
}
```

Directions

Displaying routes

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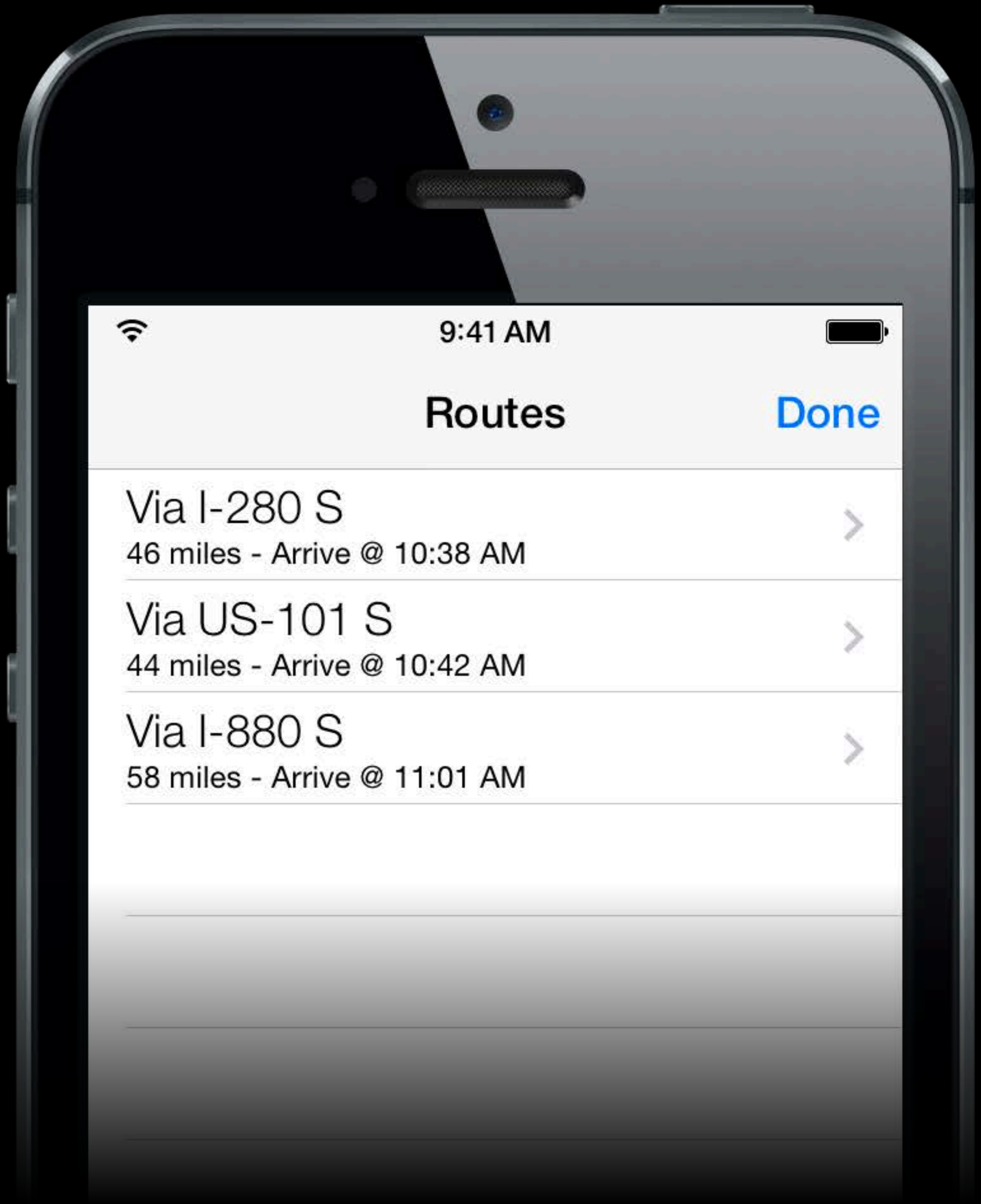
Directions

Disambiguating routes



9:41 AM

Routes

Done

Via I-280 S
46 miles - Arrive @ 10:38 AM

Via US-101 S
44 miles - Arrive @ 10:42 AM

Via I-880 S
58 miles - Arrive @ 11:01 AM

Directions

Disambiguating routes

```
- (UITableViewCell *)tableView:(UITableView *)tableView
         cellForRowAtIndexPath:(NSIndexPath *)indexPath
{
  // ... dequeue or create cell

  // Set main cell text label to route name
  MKRoute *route = self.response.routes[indexPath.row];
  cell.textLabel.text = [NSString stringWithFormat:@"Via %@", route.name];

  // Create formatter for distance
  MKDistanceFormatter *distanceFormat = [[MKDistanceFormatter alloc] init];

  // Set detail cell text label to distance and arrival time
  NSString *distance = [distanceFormat stringFromDistance:route.distance];
  NSString *time = formatTime(route.expectedTravelTime);
  cell.detailTextLabel.text =
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  return cell;
}
```

Demo

Adding walking directions

Adding Walking Directions

Lessons learned

- Directions API can be used to augment your routing app’s data
- MKRoute can be shown on MKMapView

Directions and Search Are Server Based

- Require a network connection to operate
- Don’t cache results for too long
  - More up to date results may be available

Directions and Search Usage Limits

Directions and Search Usage Limits

- No application or developer identifier wide usage limits
  - Popular apps will not be throttled for being popular

Directions and Search Usage Limits

- No application or developer identifier wide usage limits
    - Popular apps will not be throttled for being popular
- Some per device request throttling
    - Very high limits
    - Intended only to restrain buggy apps
    - Should not affect normal operation

Conclusion

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- Many New Features

Conclusion

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  - Map Kit on OS X

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  - iOS 7 UI Updates

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Conclusion

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  - Map Kit on OS X
  - iOS 7 UI Updates
  - 3D Maps and Spanning the 180th Meridian
  - New Overlays Functionality
  - Search API
  - Directions API
- Try Them Out!

More Information

Paul Marcos
Application Services Evangelist
pmarcos@apple.com

Documentation

MKMapView
http://developer.apple.com/library/ios/#documentation/MapKit/Reference/MKMapView_Class/

Location Awareness Programming Guide
http://developer.apple.com/library/ios/#DOCUMENTATION/UserExperience/Conceptual/LocationAwarenessPG/

Apple Developer Forums
http://devforums.apple.com

Related Sessions

Putting Map Kit in Perspective	Pacific Heights Thursday 2:00 PM

Labs

Map Kit Lab	Services Lab A Thursday 10:15AM	🟩
Map Kit Lab	Services Lab A Thursday 3:15PM	🟩

WWDC2013