



Road Ahead for Vector Mapping

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Agenda

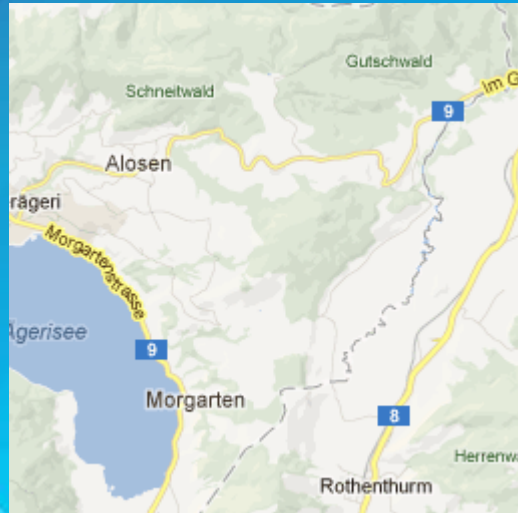
- Why vector tiles?
- Vector tiles in ArcGIS
- ArcGIS content demo (styles etc.)
- Roadmap for vector tiles (APIs etc.)
- How we build them, what's different
- Additional demonstrations
- Recap

Web Mapping today

- Typically vector content (points, lines, polygons)
- Displayed on top of basemaps
- Since ~2005, basemaps have usually been raster tiles
- Dynamic updates of the map consist of two things:
 - Updating overlay content as drawn in client
 - Changing the basemap
- Paradigm is changing

Raster tiles for high dpi devices

128



256

256



Example from Google Maps

Why vector tiles?

Raster is ~~Faster~~, but Vector is Corrector

– Joseph Berry

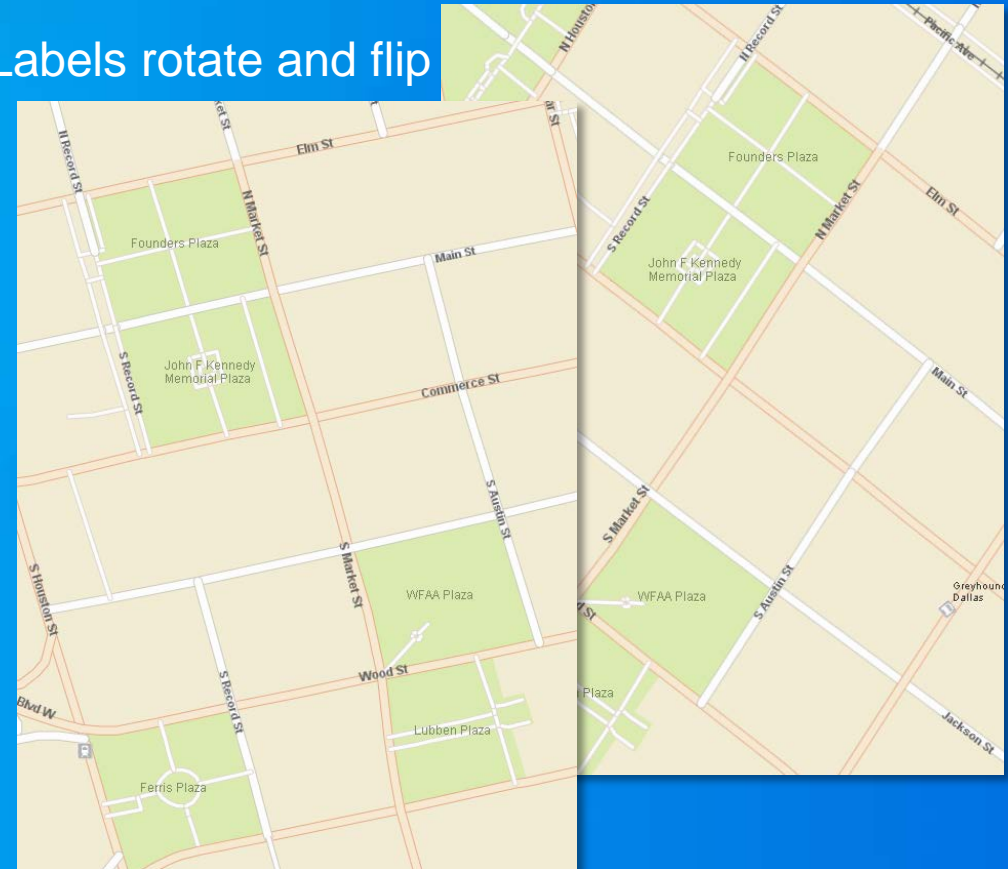
Why vector tiles?

- **GPUs have changed the landscape**
 - On your devices (OpenGL)
 - In your browser (WebGL)
 - On your desktop (DirectX, OpenGL)
 - Even in virtualized systems (vGPU)
- **Vector data can remain vector**
- **Raster data still best served as raster in most circumstances**

Advantages of vector tiles

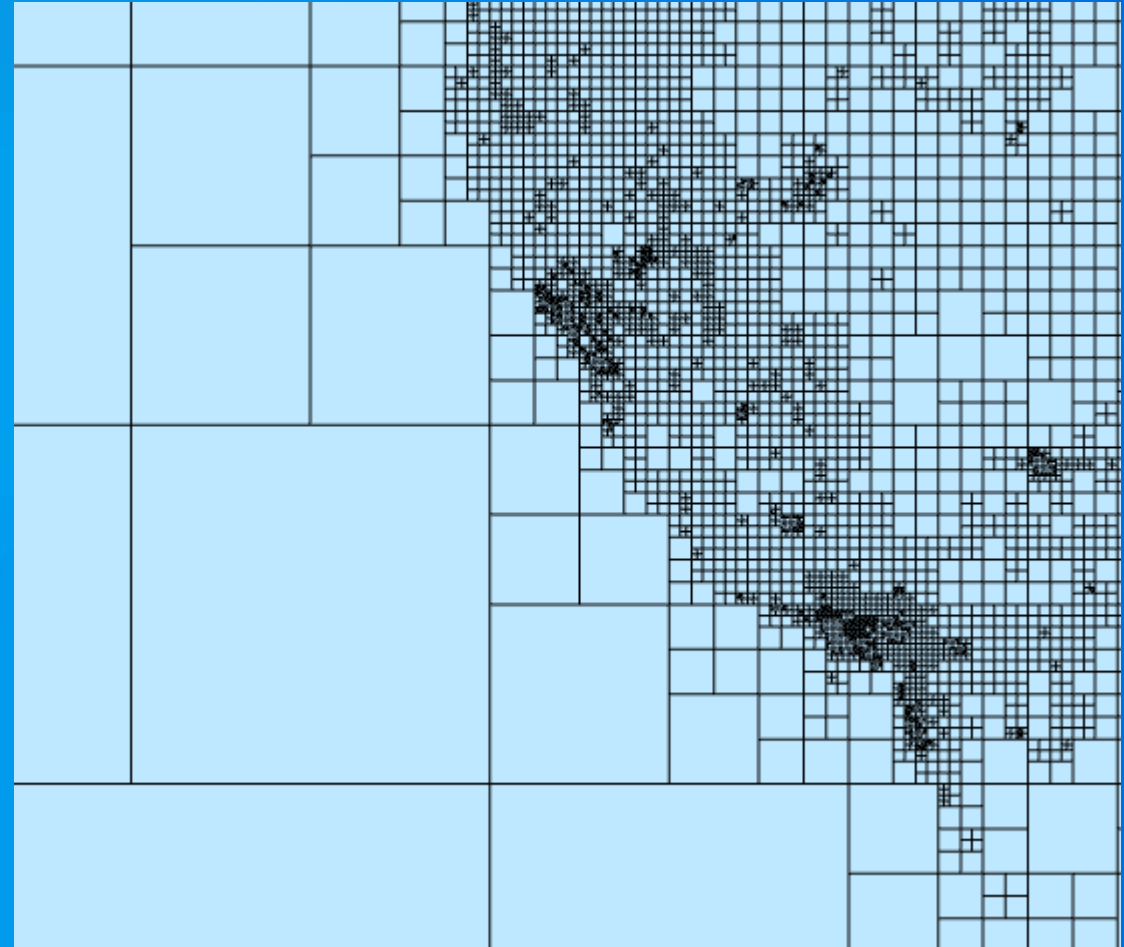
- **Display quality**
 - Best possible resolution for Retina displays
 - Small efficient format
- **Dynamic labeling**
 - Clearer, more readable text
 - On the fly labeling for heads up display
- **Map Styling**
 - Streets, Topo, Canvas from one tileset
 - Day and Night mode
 - User restyling

Labels rotate and flip



Vector tiles in ArcGIS

- Tiles produced in ArcGIS Pro
 - Use the Mapbox [vector tile spec](#)
 - Which uses [Google protocol buffers](#)
 - Styling converted to Mapbox [gl style spec](#)
- More aggressive overzoom
 - Builds on generalization work done in past ArcGIS releases
 - More work and research to be done in this area



Vector tile format

- **Vector tiles are compressed into protocol buffers**
 - Compact binary format for transferring data
 - Data is organized into layers of geometry with key/value pairs of attributes
- **A style file defines**
 - The layer order
 - Definition query for each layer
 - Symbol information for each layer



Preview of ArcGIS Basemaps

Cooking process

- Entire world
 - ~ 8hrs on a desktop machine
 - Tiles ~ 13 GB
 - Styles share tiles
- Compared to raster
 - ~ many weeks on a server cluster per map style
 - Tiles ~ 20 TB

ArcGIS vector tiles roadmap

- **Cooking tools to be released in ArcGIS Pro 1.2 (early 2016)**
- **Services in ArcGIS Online and ArcGIS Server 10.4 (early 2016)**
- **Tile consumption**
 - **ArcGIS Runtime Quartz – Beta 2**
 - Ground up implementation
 - **ArcGIS Pro 1.2**
 - Will share Runtime implementation
 - **ArcGIS JavaScript 4.0 API – Demonstration capability now in Beta 1**
 - Currently uses [mapbox-gl-js](#) library

ArcGIS vector tiles service

`http://<catalog-url>/<folder>/<serviceName>/VectorTileServer`

`|--fonts/
|--styles/
|--sprites/
|--tilemap/
|--tile
|--root.json`

Optional export tiles capability

[Service preview example](#)



Producing tiles in ArcGIS Pro

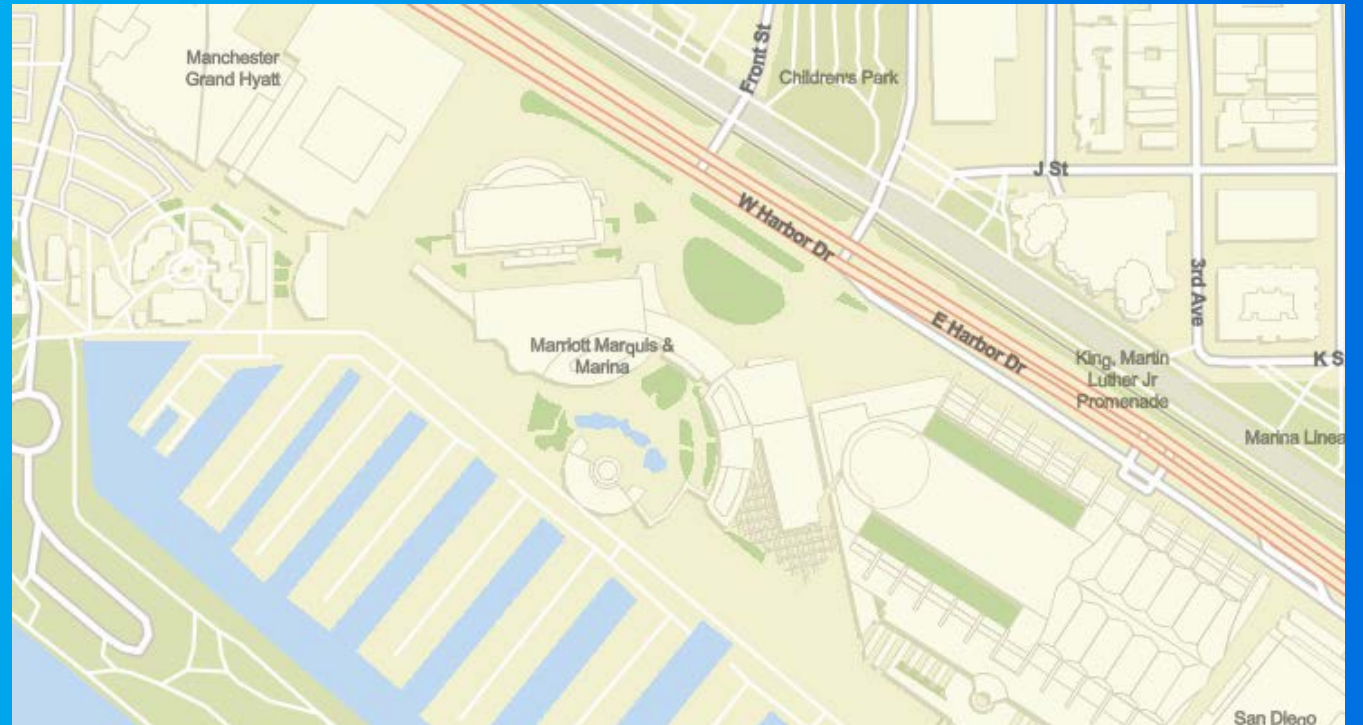


Tiles in the JavaScript API

4.0 Beta 1

Vector tile client code (Runtime)

- The client code is implemented in C++ and JavaScript
- The C++ code is using both OpenGL and DirectX for rendering
- Shared code across our platform



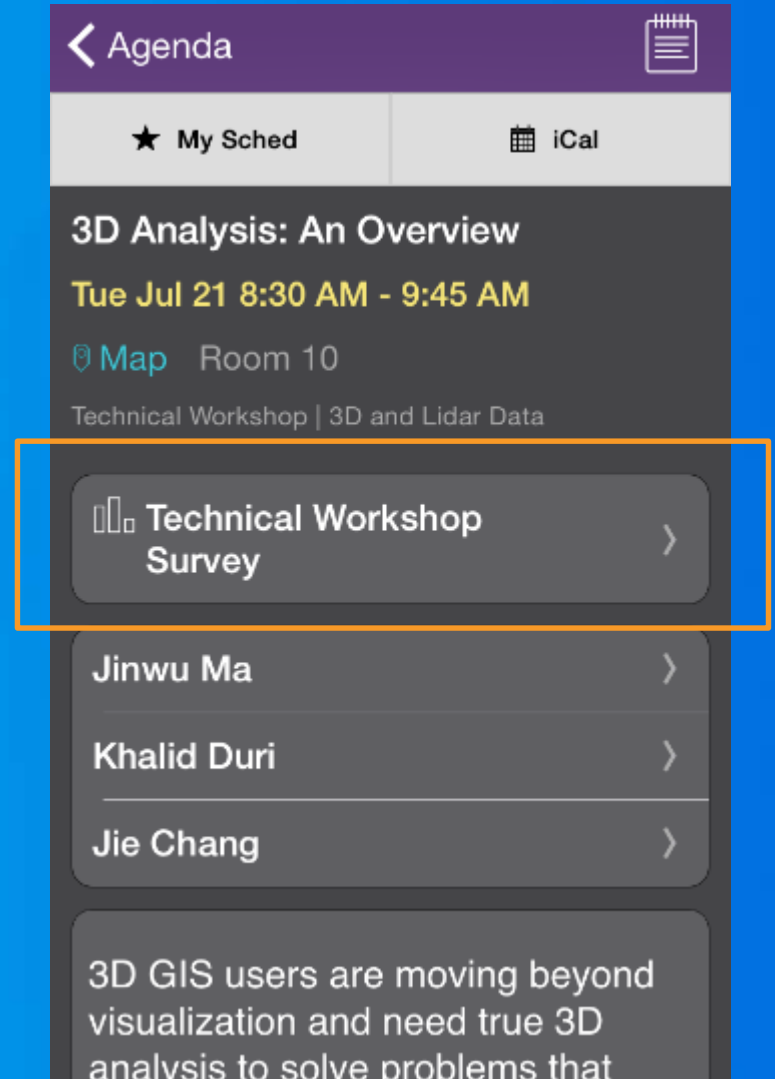


Tiles in ArcGIS Runtime

Preview of Quartz implementation

Thank you...

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- Answer a few short questions and enter any comments





Understanding our world.