



An Overview of the ArcGIS JavaScript APIs

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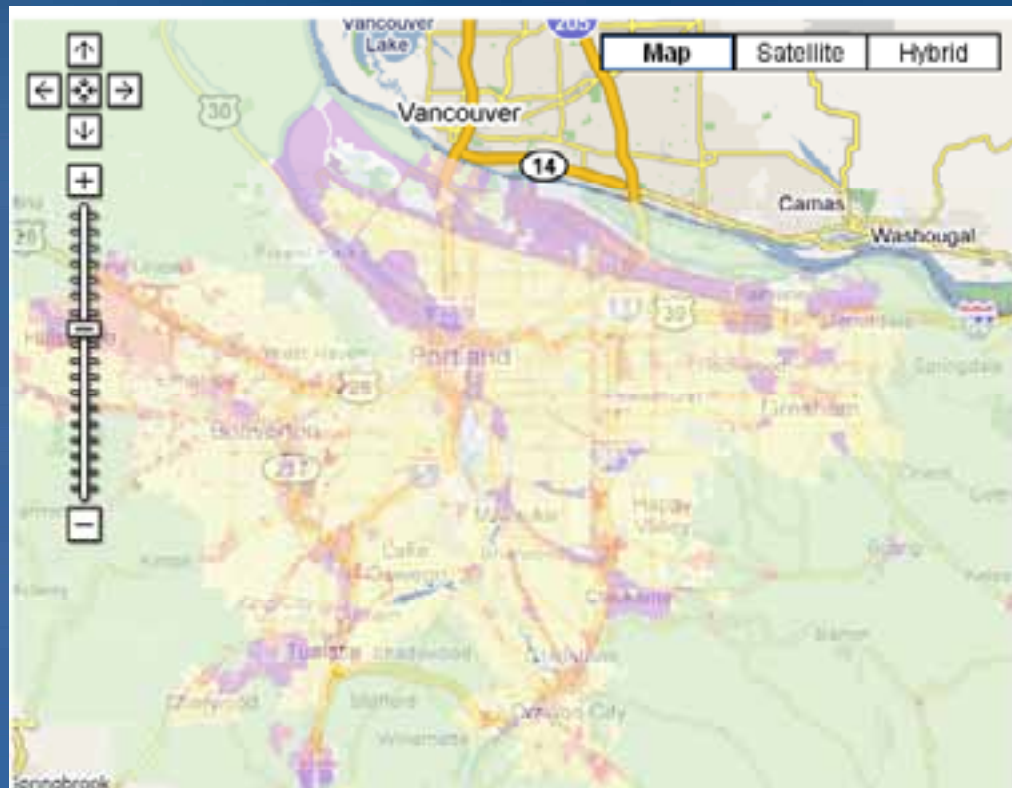


The Simple ArcGIS JSAPIs Demo



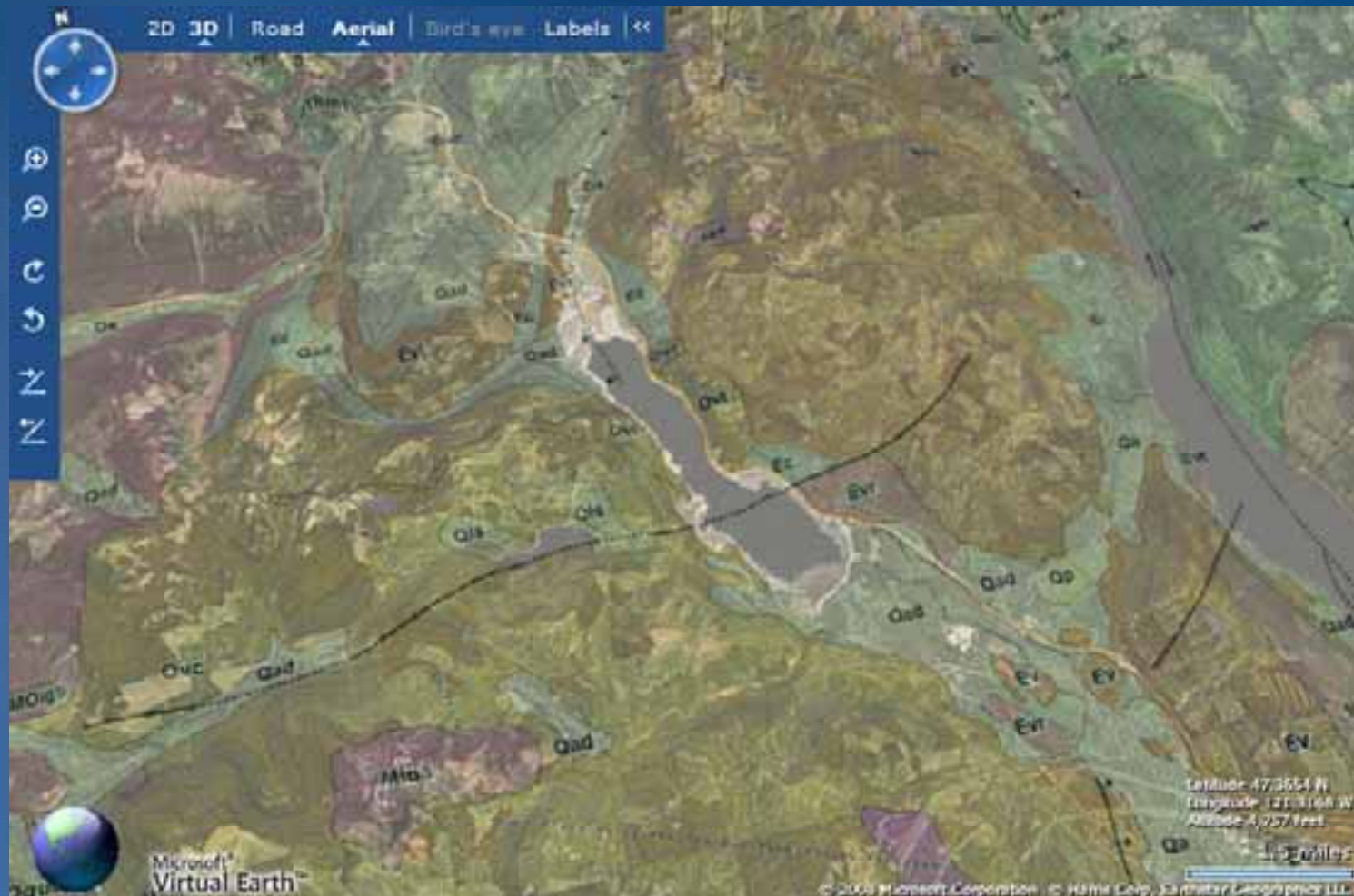
Come on guys, It can't be that easy.

What about Google Maps?



Alright I give you those two.

You will never be able to do 3D in VE...

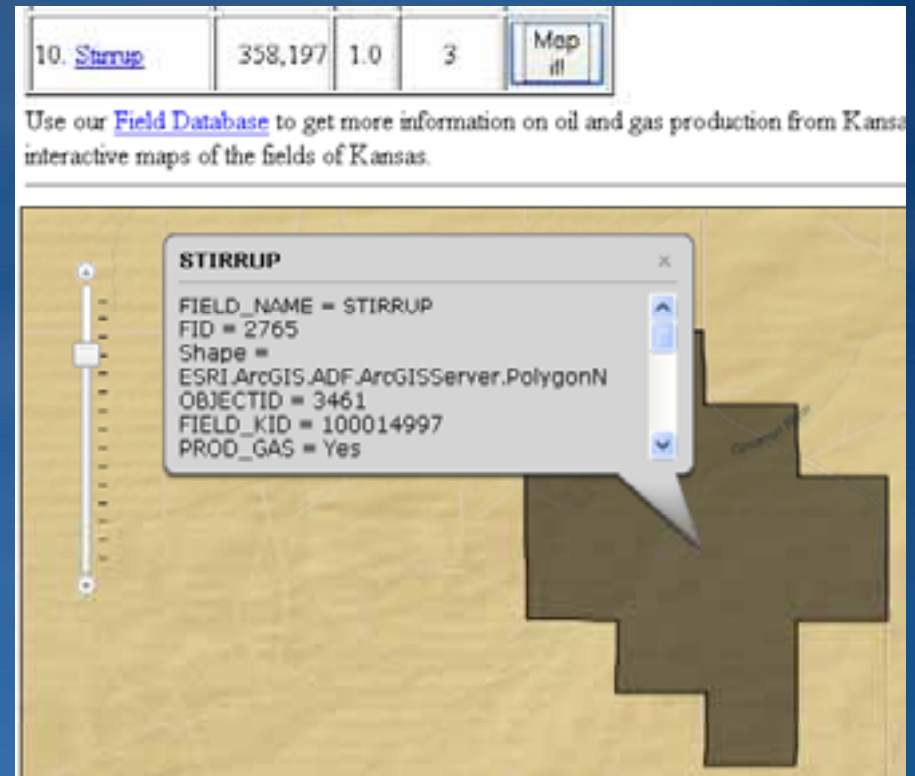


What does a simple mapping API offer you?

- Easily integrate maps and services into your existing web pages

Kansas total production for 2007 was 36,576,849 barrels. The production from the top ten fields (5,422,663 barrels) amounted to 14.8% of the state's total, down 1% from 2006.

| Field | bbl | % of total | 2006 Rank |
|--------------------------------------|-----------|------------|-----------|
| 1. Bemis-Shutts | 1,035,515 | 2.8 | 1 |
| 2. Chase-Silica | 652,488 | 1.8 | 2 |
| 3. Trapp | 580,234 | 1.6 | 6 |
| 4. El Dorado | 553,828 | 1.5 | 5 |
| 5. Spivy-Grabs-Basil | 528,508 | 1.4 | 4 |
| 6. Hall-Gurney | 474,114 | 1.3 | 7 |
| 7. Pleasant Prairie | 451,439 | 1.2 | 8 |
| 8. Fairport | 424,210 | 1.2 | 9 |
| 9. Kraft-Prusa | 364,130 | 1.0 | unranked |
| 10. Stirrup | 358,197 | 1.0 | 3 |



Build Enterprise Mashups with ArcGIS Server

- **Develop custom JavaScript applications that mashup ArcGIS services, Google Maps, and Microsoft Virtual Earth**
- **You can build ArcGIS Server Web applications using pure JavaScript APIs powered by backend REST services**
- **For ArcGIS Server developers, no development or deployment license is required on the Web server hosting your application**

How do you go from your data to a Mashup?

- Author GIS resources (eg maps, locators, models) using desktop.
- Publish GIS resources to create GIS Services.
- Each capability is exposed to consumers as an independent GIS Web Service accessible over HTTP via SOAP or REST
- <http://resources.esri.com/arcgisserver>

ArcGIS Server 9.3 REST API

- Simple view of ArcGIS Server
- ArcGIS Server hosts a Services Directory
 - Used by developer while building application

ArcGIS Server 9.3 REST API

- **All GIS Services are exposed as resources**
 - Service level metadata
- **Some resources have operations**
 - Map Service (export, find, identify)
 - Map Service Layers (query)
 - Image Services (export)
 - Geocode Service (findAddressCandidates, Reverse Geocode)
 - Geoprocessing (execute, submit job)
 - Geometry Service (project, simplify, and others*)

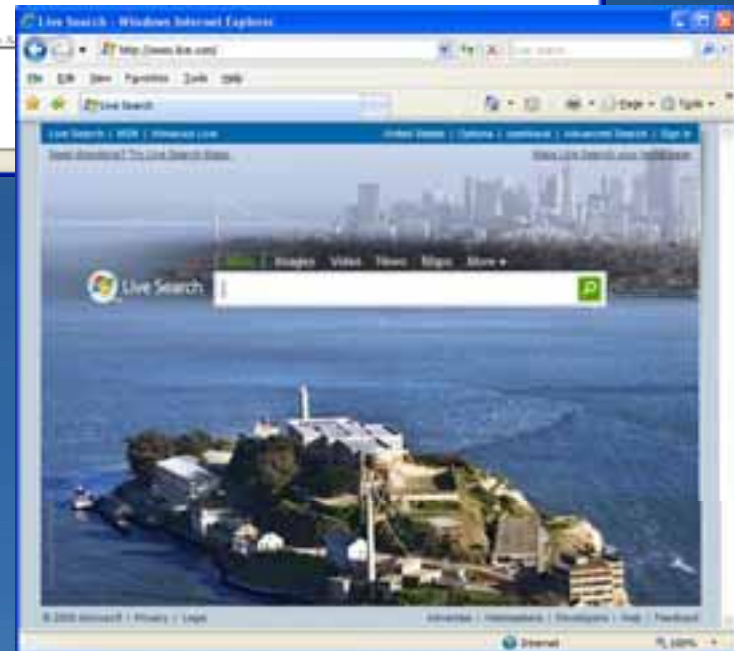
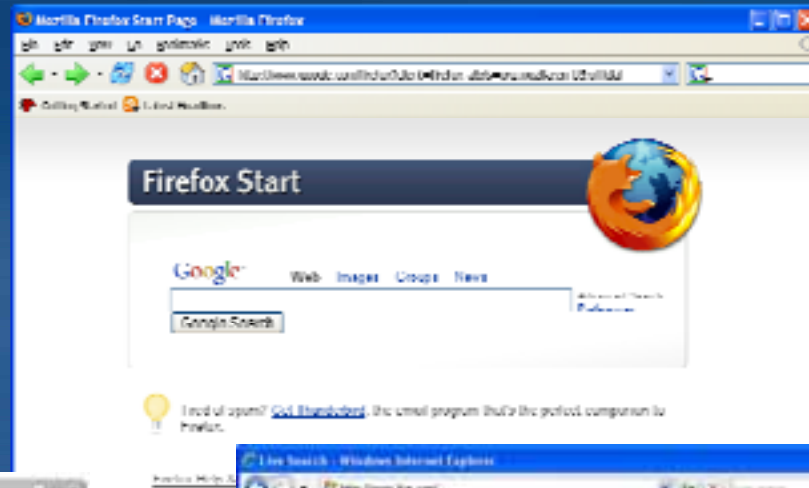
ArcGIS JavaScript APIs – Why JavaScript?

- JavaScript is one of the most used languages in the world.
- Pure client development
- JS Frameworks abstract away the browser complexity
- Stability
- Accessible programming language
- Multiple development patterns supported

JavaScript – the bad parts

- Lots of bad code out there!
 - Try the resource center
 - Dojo
- Difficult to setup layouts
 - Code Gallery [1](#)
- Nothing out of the box
 - Code Gallery [1](#), [2](#), & [3](#)
- No IDE integration
 - Code Gallery [1](#)

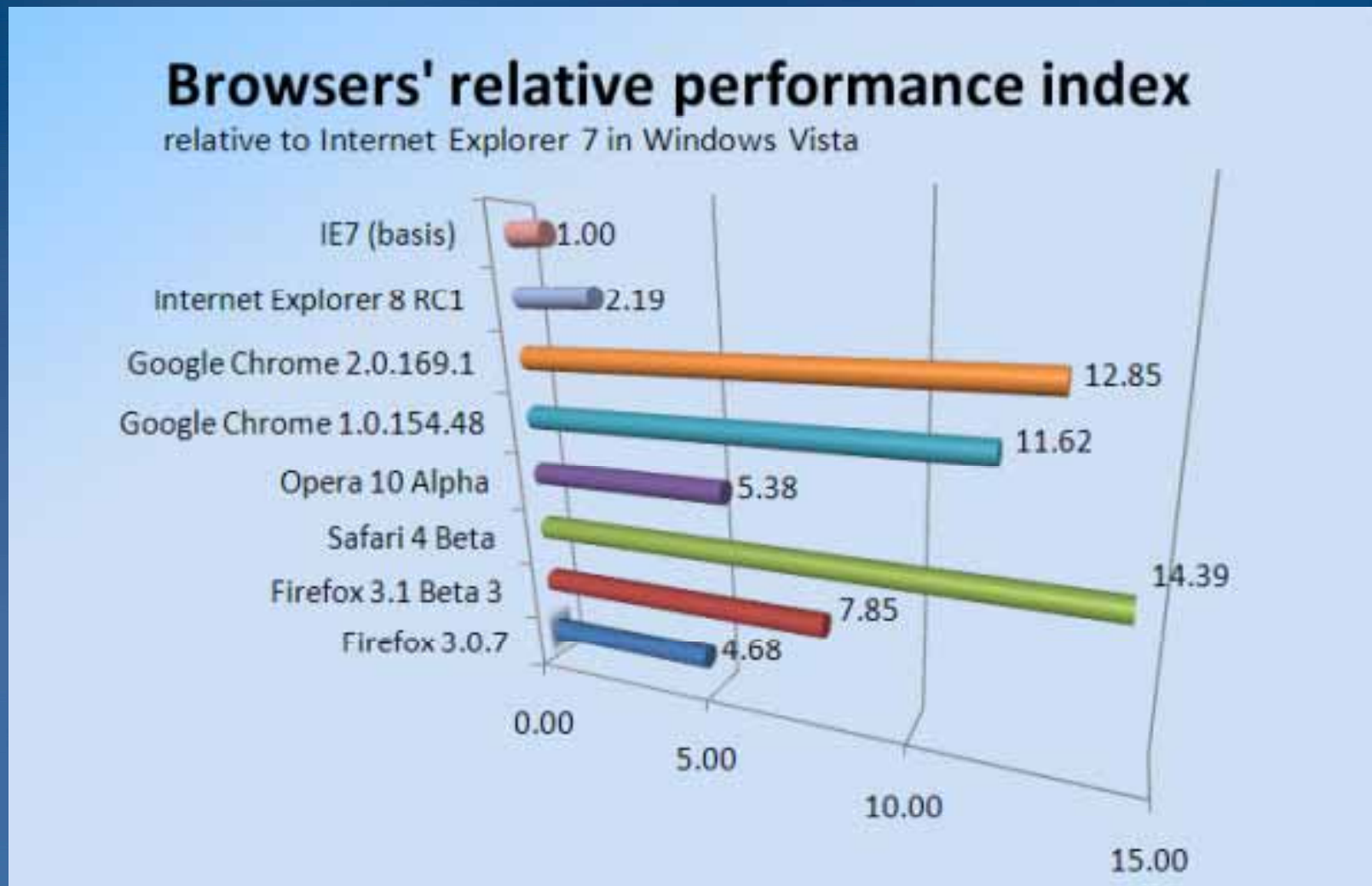
Race for the fastest browser



Race for the fastest browser

- **JavaScript Engine**
 - Just in time compilation to byte code
 - Faster property access
 - Efficient garbage collection
- **Graphics engine improvements**
- **DOM improvements**
- **Networking improvements**
 - 2 to 6 simultaneous connections per domain in IE8

Browser Performance (multiple tests)



From Betanews.com

ArcGIS JavaScript API

ArcGIS JavaScript API

- Embed maps and tasks from any ArcGIS Server into your website
- Use content provided by ESRI or use your own content as a basemap
- Map can be in any supported projection
 - This is a big advantage...
- Built on top of Dojo JavaScript toolkit.

What is Dojo?

- Robust JavaScript Toolkit
- Active Community
- Dojo Dijits
 - Strong Widgeting system
 - Grids, charts, toolbars, trees, and many more
- Powerful eventing model
- Rich client side Graphics
- <http://dojotoolkit.org>

ArcGIS JavaScript API Status

- Released May 2008
- Fast development cycle
 - Current Version 1.3—released February 2009
 - Plan to release Version 1.4 in April
- When going from one version to the next we try not to break compatibility
- Older versions are set in stone and will not change

What is in the JavaScript API?

- **Map Layers**
- **Graphics**
- **Tasks**
 - QueryTask
 - Locator
 - FindTask
 - IdentifyTask
 - Geoprocessor
 - Geometry
 - RouteTask

Map Service Layer

- **Cached map services**
 - **ArcGISTiledMapServiceLayer**
 - Layers in map service can still be consumed from web client via tasks
 - **Virtual Earth Layers (version 1.4)**

- **Dynamic map services**
 - **ArcGISDynamicMapServiceLayer**

ArcGIS JavaScript API -- Maps

- Tiled Maps--ArcGISTiledMapServiceLayer

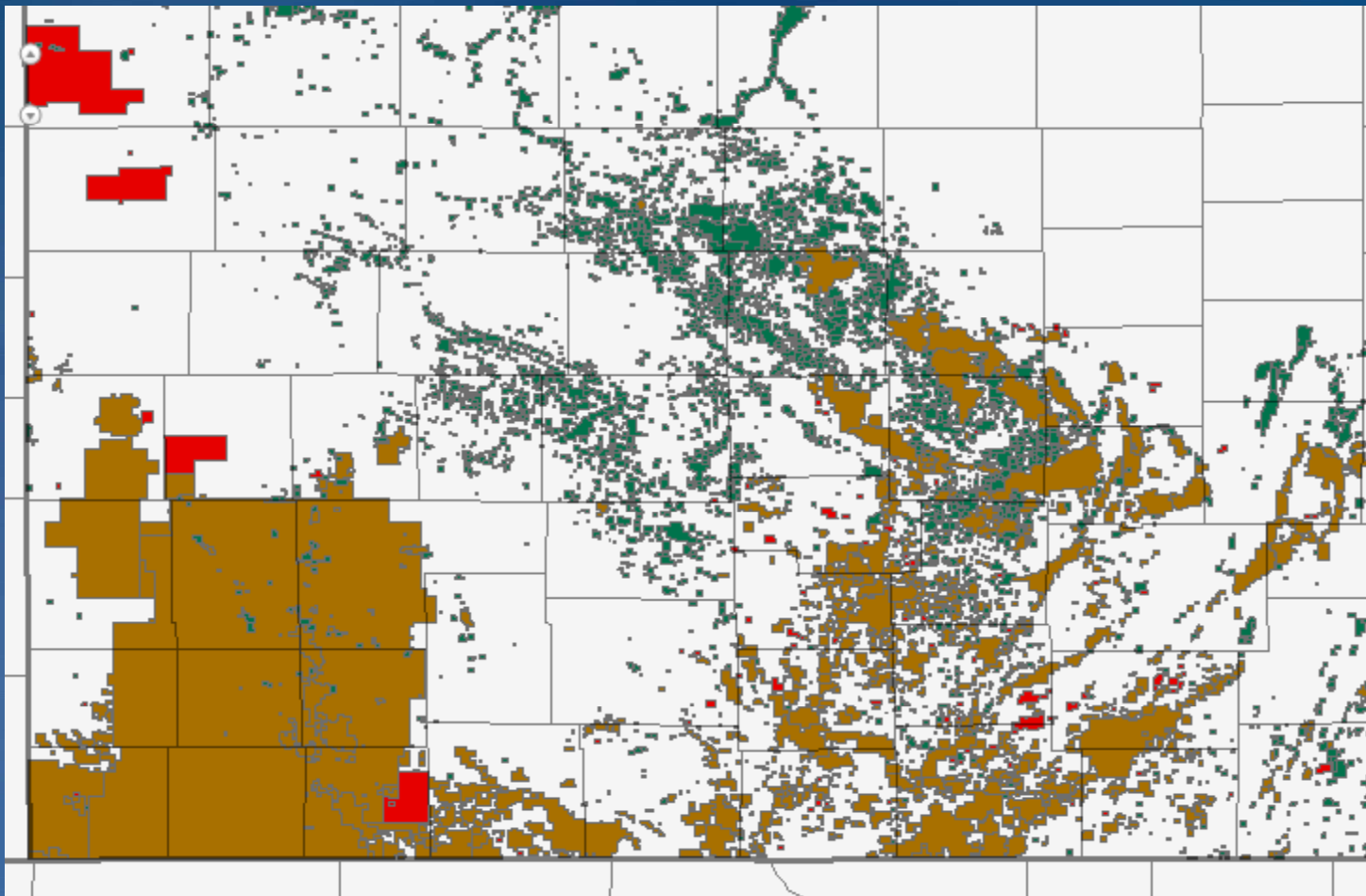


Virtual Earth – coming in 1.4

- Use Virtual Earth base maps in ArcGIS JavaScript API

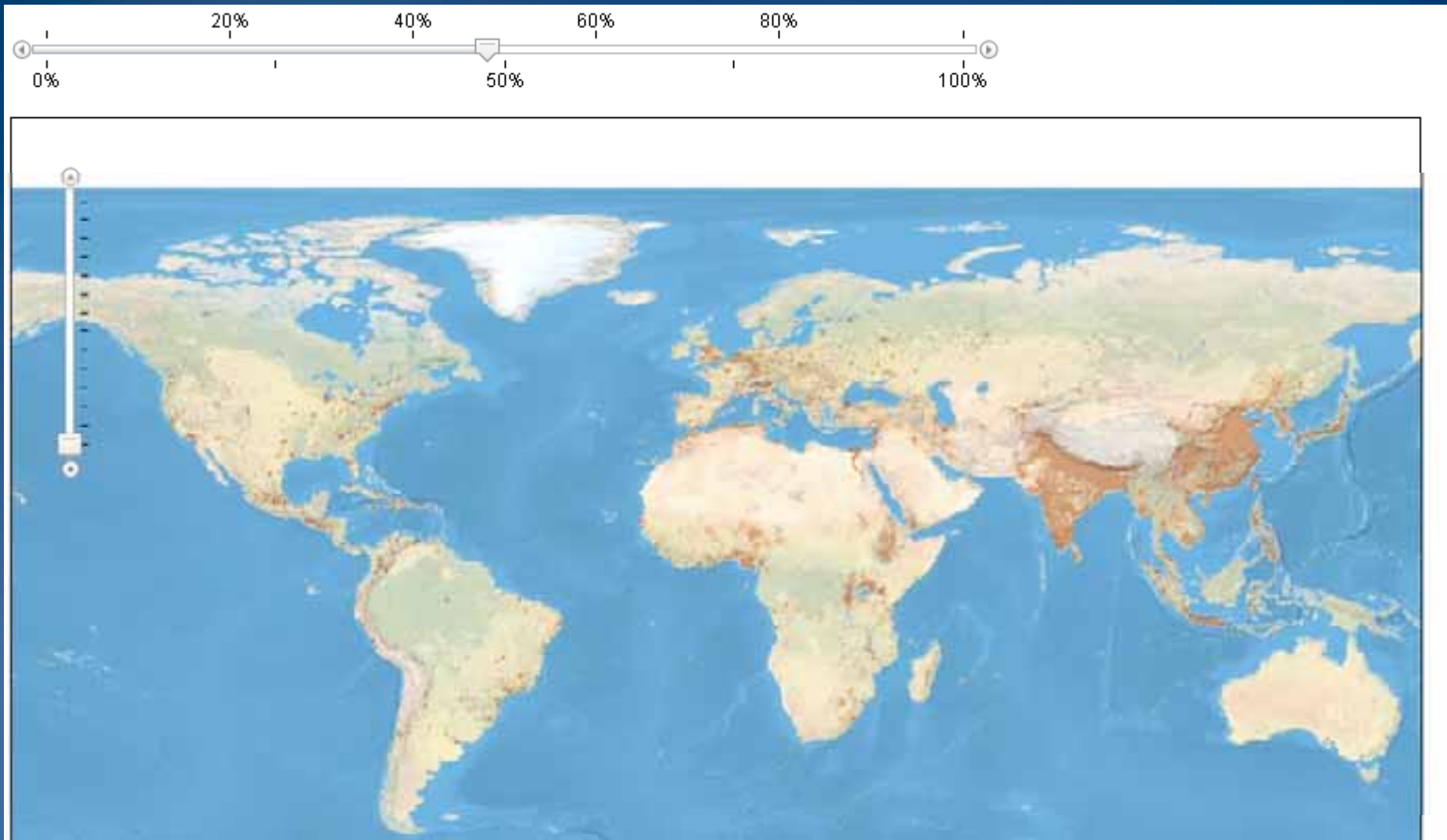


ArcGIS JavaScript API -- Maps



- Dynamic Maps

ArcGIS JavaScript API -- Maps



- Tiled + Dynamic

Custom Layers

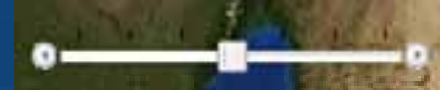
- TiledMapServiceLayer and DynamicMapServiceLayer are extendable
- You can extend to include:
 - WMS ([sample](#))
 - ArcIMS ([sample](#))
 - Open StreetMap
 - ArcGIS Cache from Virtual Directory ([sample](#))

ArcGIS JavaScript API – Map Navigation

- Drag the mouse to pan
- Mouse Scroll Forward to zoom in
- Mouse Scroll Backward to zoom out
- SHIFT + Drag the mouse to zoom in
- SHIFT + CTRL + Drag the mouse to zoom out
- SHIFT + Click to recenter
- Double Click to Center and Zoom in
- Use arrow keys to pan
- Use + key to zoom in a level
- Use - key to zoom out a level

ArcGIS JavaScript API – Map Navigation

- Slider



- Pan Navigation Arrows



- Navigation Toolbar

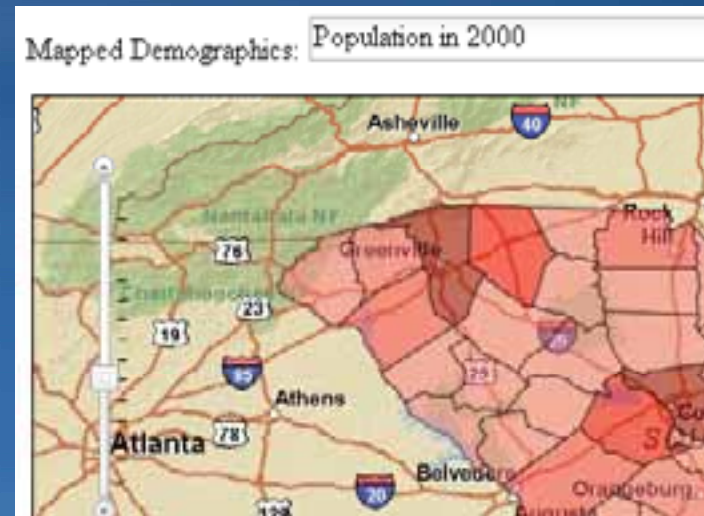
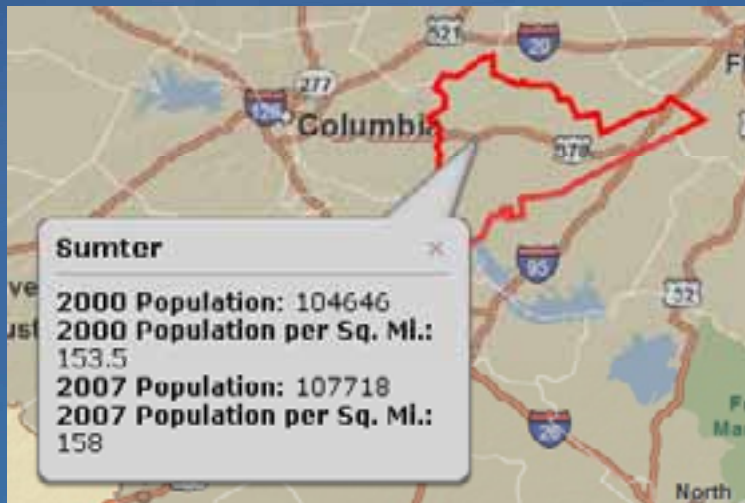


Tiled or Dynamic map control behavior?

- Map is not initialized until after first layer has been loaded
- Map behavior defined:
 - Initial layer type (tiled or dynamic)
 - Predefined tiling scheme in constructor

GraphicsLayer

- **Contains Graphics**
 - Graphic is Geometry + Attributes + Symbol + InfoTemplate
- **Mouse Events on GraphicsLayer**
 - onClick, onMouseIn, onMouseOut, onMouseOver



Graphics Layer -- What's coming

- **Multiple Graphics + Eventing**
 - Multiple Graphics Layers
 - Drag n' Drop (v1.3)
 - Drag n' Drop (v1.4?)
- **Renderers (v1.4)**
 - Unique Value Renderer
 - Class Break Renderer

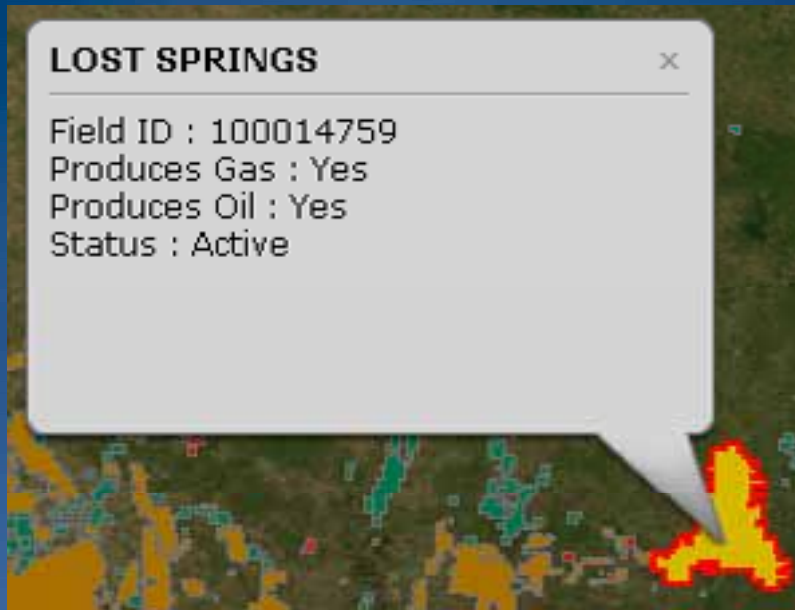
Web API Tasks

- **Tasks**
 - QueryTask
 - Locator
 - FindTask
 - IdentifyTask
 - GeometryService
 - Geoprocessor (synchronous or asynchronous)
 - As data or as map image
- **Task results contain graphic features that can be displayed in the graphics layer (conceptually in the operational layer)**

Tasks – QueryTask

- QueryTask works off a single layer in a map service
- You can query by attribute or geometry or both
- You can make use of rich spatial relationships when querying by geometry
 - Intersects, contains, touches, crosses, and others

Tasks – QueryTask



- Query Geometry: Point
- Query Relationship: Intersects
- Layer Geometry: Polygon

- Query Geometry: Polygon
- Query Relationship: Intersects
- Layer Geometry: Polygon

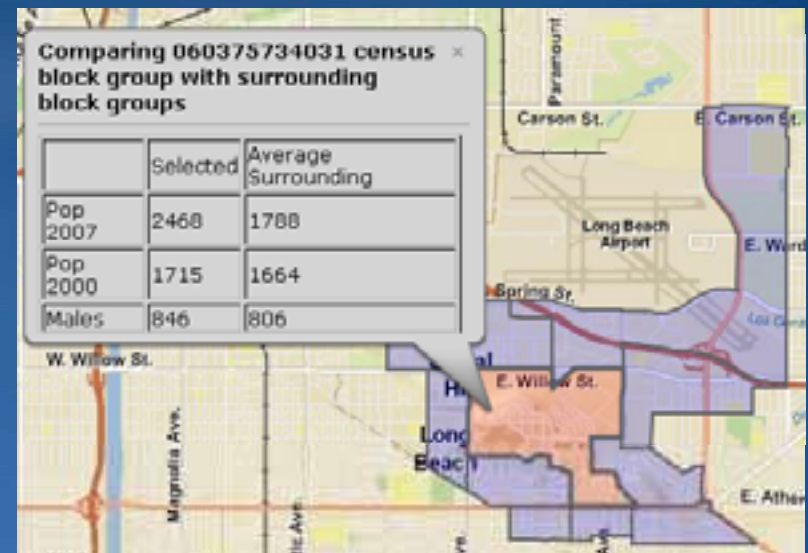


Tasks – QueryTask



- Query Geometry: Polygon
- Query Relationship: Contains
- Layer Geometry: Polygon

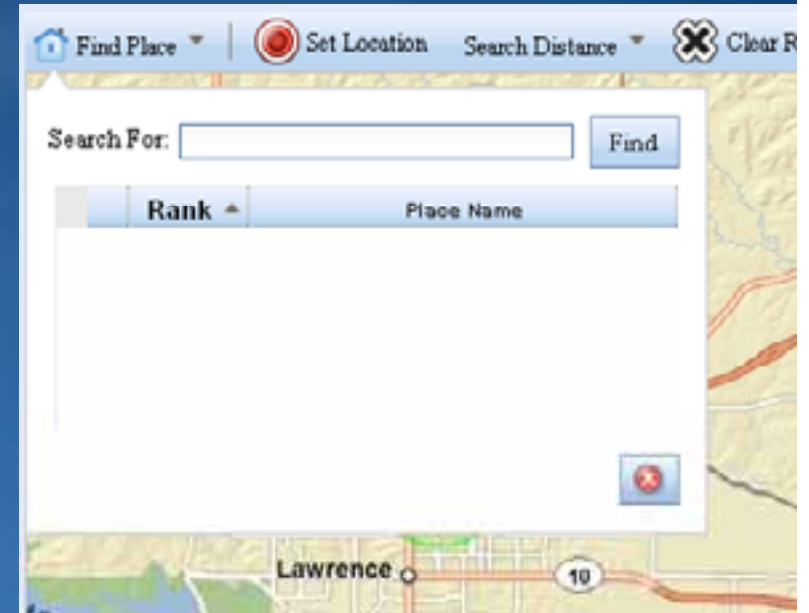
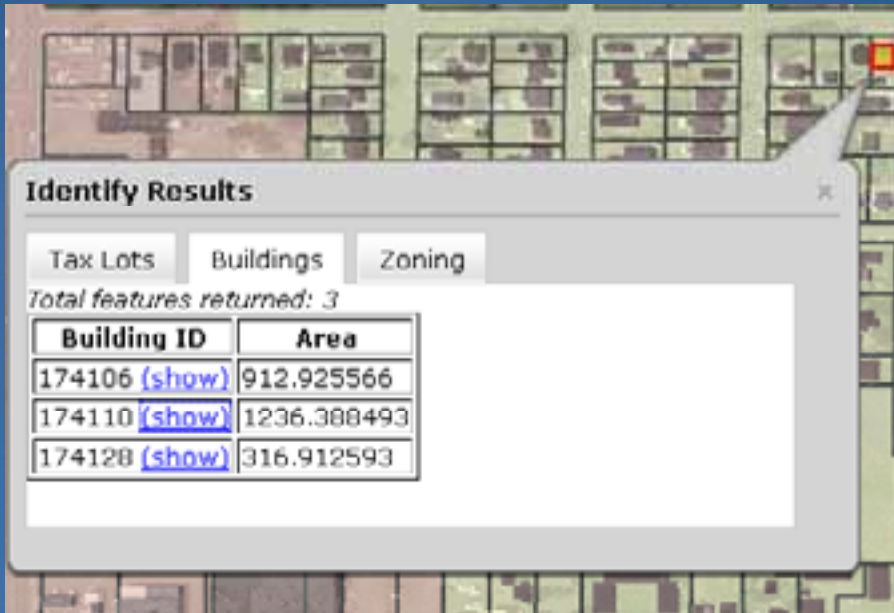
- Query Geometry: Polygon
- Query Relationship: Touches
- Layer Geometry: Polygon



Query Task – Demo working with results

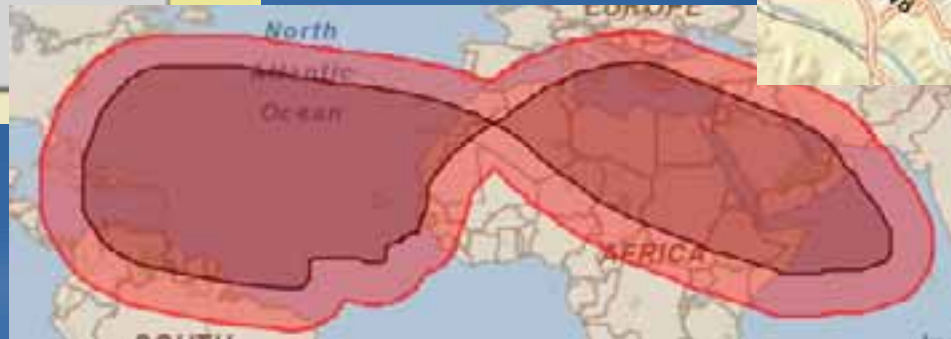
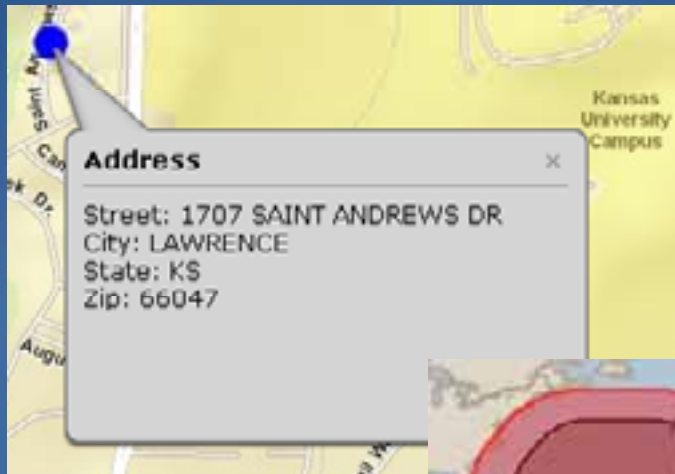
Tasks – IdentifyTask & Find

- Identify by geometry on multiple layers in a map service
 - Input Geometry can be Point, Polyline, Polygon, & Multipoint
 - Can specify a tolerance
- Find by attribute against multiple layers in a map service



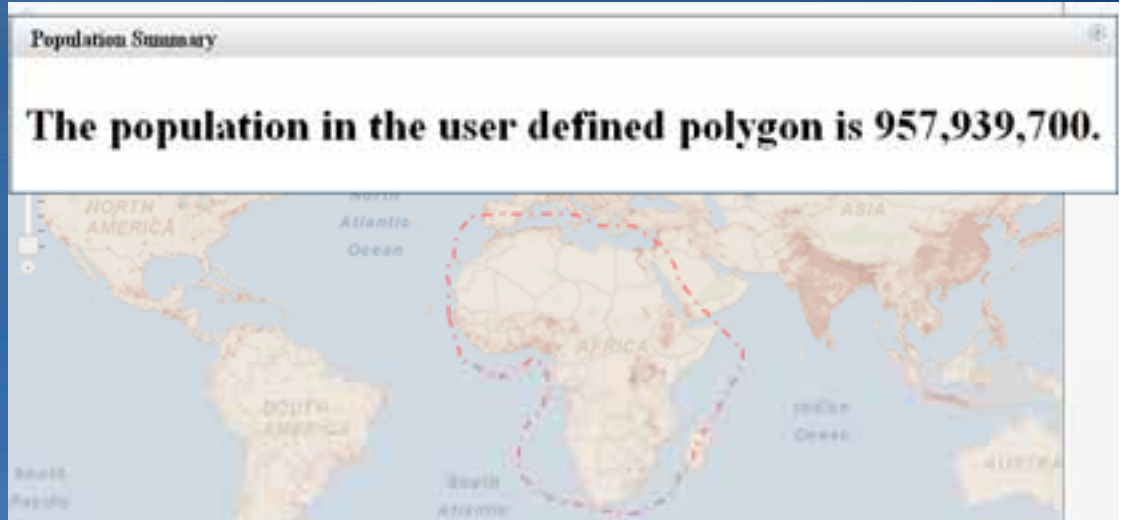
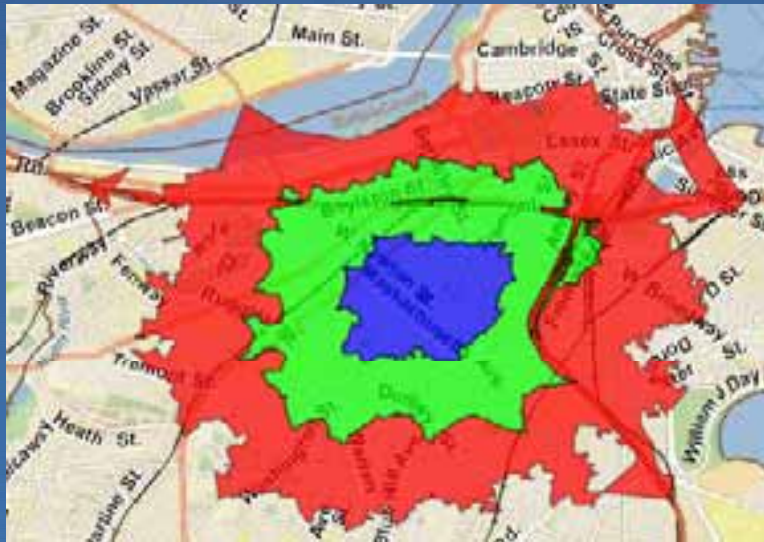
Tasks – Locator & Geometry

- Access ArcGIS Server Locators
 - Geocode and Reverse Geocode
- Perform geometric operations on the server
 - Buffer, Simplify, Areas and Lengths, Lengths, Project, Test Spatial Relationships, Get Label Point



ArcGIS JavaScript API – Geoprocessor

- Access ArcGIS Server Geoprocessing Tasks
 - Synchronous and Asynchronous
 - Results as data or as map image
 - Geoprocessing Service corresponds to a Toolbox
 - Geoprocessing Task corresponds to a Model in a Toolbox



ArcGIS JavaScript API – Geoprocessor

- Water Interpolation
 - Asynch GP
 - Results as Map Service Layers



- Optimal location analyses
 - *Bringing GIS to the masses* ([demo](#))

ArcGIS JavaScript API – RouteTask

- **REST API exposed solve operation on Route Layer at 9.3.1**
 - Exposed in JavaScript API at 1.4
- **Can solve against route layers**
- **Simple:**
 - point to point
- **Complex:**
 - reordering of stops, time windows, barriers

ArcGIS JavaScript API – What do you need to know?

- Online SDK

- <http://resources.esri.com/arcgisserver/apis/javascript/arcgis>
- Sample driven
- Code gallery
- Samples powered by an ArcGIS Server sample server
 - <http://sampleserver1.arcgisonline.com/arcgis/rest/services>
 - <http://sampleserver2.arcgisonline.com/arcgis/rest/services>

- JavaScript hosted by ESRI

- <http://serverapi.arcgisonline.com/jsapi/arcgis/?v=1.3>
- Flexible release cycle
- Hosted by ArcGIS Online
 - 24/7

ArcGIS JavaScript Extension for Virtual Earth

ArcGIS JavaScript Extension for Virtual Earth

- Combine GIS content hosted in ArcGIS Server with content on top of Virtual Earth base maps.
- Works with backend ArcGIS Server services.
- Content (VE Shapes, Tiles) can be viewed in 2D or 3D
- Tiled Maps are in the WGS 1984 Web Mercator projection
 - WKID: 102113
 - Same as Google Maps

ArcGIS JavaScript Extension for Virtual Earth

- **Maps**
 - Tiled
- **VEShape (geometry + symbol + InfoBox)**
 - All task results can be converted to
 - VEShape
 - VEShapeLayer

ArcGIS JavaScript Extension for Virtual Earth

- **Tasks**

- QueryTask

- Locator

- FindTask

- IdentifyTask

- Geometry

- Geoprocessor (synchronous or asynchronous)

- Only data, no map image results

ArcGIS JavaScript Extension for Virtual Earth

- Online SDK

- <http://resources.esri.com/arcgisserver/apis/javascript/ve>
- Interactive SDK
- Code Gallery
- Samples powered by an ArcGIS Server sample server
 - <http://sampleserver1.arcgisonline.com/arcgis/rest/services>
 - <http://sampleserver2.arcgisonline.com/arcgis/rest/services>

- JavaScript hosted by ESRI

- <http://serverapi.arcgisonline.com/jsapi/ve/?v=1.3>
- Flexible release cycle
- Hosted by ArcGIS Online
 - 24/7

ArcGIS JS Extension for VE Applications



ArcGIS JavaScript Extension for the Google Maps API

ArcGIS JavaScript Extension for the Google Maps API

- **Combine GIS content hosted in ArcGIS Server with content on top of Google Maps base maps**
- **Works with backend ArcGIS Server services**
 - REST API
 - KML
- **Applications can be built in *traditional* Mashup form or as Google Mapplets**
- **Tiled Maps are in the WGS 1984 Web Mercator projection**
 - WKID: 102113
 - Same as VE

ArcGIS JavaScript Extension for the Google Maps API

- **Maps**
 - Tiled
 - Dynamic (via GGroundOverlay)
- **GOverlay (geometry* + symbol)**
 - All task results can be added to the map through the `esri.arcgis.gmaps.MapExtension`
 - Takes care of `InfoWindow`, `click listeners`, `overlayOptions`, and `infowindowOptions`

ArcGIS JavaScript Extension for the Google Maps API

- **Tasks**

- QueryTask
- Locator
- FindTask
- IdentifyTask
- Geometry
- Geoprocessor (synchronous or asynchronous)
 - As data or as map image

ArcGIS JavaScript Extension for the Google Maps API

- Online SDK

- <http://resources.esri.com/arcgisserver/apis/javascript/gmaps>
- Sample driven, SDK is in Google Maps Style
- Code Gallery
- Samples powered by an ArcGIS Server sample server
 - <http://sampleserver1.arcgisonline.com/arcgis/rest>
 - <http://sampleserver2.arcgisonline.com/arcgis/rest>

- JavaScript hosted by ESRI

- <http://serverapi.arcgisonline.com/jsapi/gmaps/?v=1.3>
- Flexible release cycle
- Hosted by ArcGIS Online
 - 24/7

ArcGIS JavaScript Extension for Google Mapplets

- Mapplets are mini-applications that run within Google Maps.
- ArcGIS Server Users could choose to publish Google Mapplets that expose a certain functionality to the user
- Mapplets are accessible from <http://maps.google.com>

Additional Resources

Questions, answers and information...

- **Tech Talk**

- *Outside this room right now!*

- **Meet the Team**

- *Wednesday 6pm*

- **Other sessions**

- *Developing advanced applications with the ArcGIS JavaScript API*

- *Patterns and best practices for building ArcGIS JavaScript applications*

- **ESRI Resource Centers**

- PPTs, code and video



resources.esri.com

- **Social Networking**



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