Adding Location to your Web Applications

Aaron Parecki / @aaronpk
CTO, Esri R&D Center, Portland
Outline

- Displaying a map
- Browser Geolocation APIs
  - Single Location
  - Continuous Location Updates
- Reverse Geocoding
- Directions
- Drive Time Polygons
- Questions
Displaying a Map
Displaying a Map

```html
<script src="http://serverapi.arcgisonline.com/jsapi/arcgis/3.3compact"></script>
<script>
    dojo.require("esri.map");
    var map;
    function init() {
        map = new esri.Map("map", {
            basemap: "gray",
            center: [-122.69, 45.52],
            zoom: 3
        });
    }
    dojo.addOnLoad(init);
</script>
<div id="map"></div>
```

github.com/esri/quickstart-map-js
A recent update to the Javascript SDK reduces the amount of code needed for simple tasks!
Finding the User’s Location
Browser Geolocation APIs
Browser Geolocation

- Desktop browsers use nearby wifi hotspots
- Mobile devices may use GPS or cell tower positioning
- You can also use IP address lookups to get a rough location (but is usually very inaccurate)
Finding the User’s Location using Javascript

Use `getCurrentPosition`

```javascript
if(navigator.geolocation) {
    navigator.geolocation.getCurrentPosition(function(position){
        var zoom = 13;
        var pt = new esri.geometry.Point(position.coords.longitude, position.coords.latitude);

        var options = {
            title: "<b>Current Location</b>",
            content: "Latitude: " + pt.getLatitude(3) + "<br>Longitude: " + pt.getLongitude(3),
            symbol: map.defaultSymbols.Geolocation
        };

        map.graphics.addPoint(pt, options);
        map.centerAtPoint(pt, zoom);
    });
}
```
Browser Geolocation

- User sees the location permission prompt
- callback runs after they confirm
Geolocation Permission Prompt

Chrome
Geolocation Permission Prompt

Firefox

Would you like to share your location with aaronparecki.com?

Learn More...  Share Location
Geolocation Permission Prompt

iPhone
Browser Geolocation

- Potential usability problem:
- User is left with an empty map waiting for them to press “allow”
- You should do the best you can with no location, and then update your page after you get the user’s location
- Could use IP-based location to center a map somewhere that is (probably) nearby, or pick a default location
But what about errors?

```javascript
if(navigator.geolocation) {
    navigator.geolocation.getCurrentPosition(function(position) {
        // Success!
        alert('Latitude: ' + position.coords.latitude + 
        ' Longitude: ' + position.coords.longitude);
    }, function(error) {
        // Error!
        switch (error.code) {
            case error.PERMISSION_DENIED:
                alert("user did not share geolocation data");
                break;
            case error.POSITION_UNAVAILABLE:
                alert("could not detect current position");
                break;
            case error.TIMEOUT:
                alert("retrieving position timed out");
                break;
            default:
                alert("unknown error");
                break;
        }
    });
}
```
Handling Error Cases

- Permission Denied – The user did not allow access to the device’s location
- Position Unavailable – Couldn’t retrieve location data
- Timeout – Device couldn’t determine location in time
Browser Geolocation
The Inner Workings of the HTML5 Geolocation API
Browser Geolocation
1. Browser asks permission from the user
Browser Geolocation
2. Browser gets a list of visible wifi access points

```json
{
  "version": "1.1.0",
  "request_address": true,
  "wifi_towers": [
    {
      "mac_address": "00-22-0c-26-e8-90",
      "ssid": "Instant Internet",
      "signal_strength": -86
    },
    {
      "mac_address": "00-21-29-e4-30-18",
      "ssid": "\u0001E0_1-5",
      "signal_strength": -88
    },
    {
      "mac_address": "44-a7-cf-2c-87-10",
      "ssid": "Web Heavies",
      "signal_strength": -56
    },
    {
      "mac_address": "00-17-9a-9a-b8-e3",
      "ssid": "default",
      "signal_strength": -85
    },
    {
      "mac_address": "00-23-5d-0f-69-60",
      "ssid": "Unplugged",
      "signal_strength": -40
    }
  ]
}```
Browser Geolocation
3. Firefox sends the list to the geolocation server
Browser Geolocation
4. Server replies with the location

```json
{
  "location": {
    "latitude": 47.611389,
    "longitude": -122.33168,
    "accuracy": 10.0
  }
}
```
Monitoring Continuous Location
Monitoring Continuous Location in Javascript

Use `watchPosition`

```javascript
navigator.geolocation.watchPosition(function(position){
    var pt = new esri.geometry.Point(position.coords.longitude, position.coords.latitude);

    var options = {
        title: "Current Location",
        content: "Latitude: " + pt.getLatitude(3)
                + "</br>Longitude: " + pt.getLongitude(3),
        symbol: map.defaultSymbols.Geolocation
    };

    map.graphics.addPoint(pt, options);
    map.centerAtPoint(pt, 15);
});
```

Now go run around outside!
Monitoring Continuous Location in Javascript

• The callback function runs each time a new position is reported from the device

• Possible uses:
  - Update location on a map
  - Draw a line on a map
  - Report location to a server
Finding Information About a Location

Reverse Geocoding
ArcGIS Reverse Geocoder

LOCATION
45.51652,-122.6764
Latitude: 45.51652
Longitude: -122.6764

CONTEXT
Locality: Portland
Region: OR
Country: USA
Timezone:
America/Los_Angeles
ArcGIS Reverse Geocoder

Sample Request

http://geocode.arcgis.com/arcgis/rest/services/World/GeocodeServer/reverseGeocode

?location=-122.6764,+45.51652&outSR=4326&f=json

Sample Response

{
  - address: {
    Address: "928 Sw 3rd Ave",
    Neighborhood: null,
    City: "Portland",
    Subregion: null,
    Region: "OR",
    Postal: "97204",
    PostalExt: null,
    CountryCode: "USA",
    Loc_name: "USA.PointAddress"
  },
  - location: {
    x: -122.67646937664347,
    y: 45.51655981819686,
    - spatialReference: {
      wkid: 4326,
      latestWkid: 4326
    }
  }
}
ArcGIS Reverse Geocoder – Javascript Example

$.getJSON("http://geocode.arcgis.com/arcgis/rest/services/World/GeocodeServer/reverseGeocode",{
  location: "-122.6764,+45.51652",
  outSR: 4326,
  f: "json"
}, function(data) {
  console.log(data);
});

{
  - address: {
      Address: "928 Sw 3rd Ave",
      Neighborhood: null,
      City: "Portland",
      Subregion: null,
      Region: "OR",
      Postal: "97204",
      PostalExt: null,
      CountryCode: "USA",
      Loc_name: "USA.PointAddress"
    },
  - location: {
      x: -122.67646937664347,
      y: 45.51655981819686,
      - spatialReference: {
          wkid: 4326,
          latestWkid: 4326
        }
    }
}
Using the Directions Service from Javascript

http://aaron.pk/6pH
Using the Drive-Time Polygon Service

http://aaron.pk/6pJ
Thank You

email: aparecki@esri.com

web: aaronparecki.com

twitter: @aaronpk
esri
Understanding our world.