Building 3D Web Application with ArcGIS

Moxie Zhang
Topics

Introduce Web 3D
Why Web 3D for ArcGIS
Use cases
What is Web 3D for ArcGIS
Web 3D Architecture

Develop Web 3D Apps
What need for developing Web 3D applications
Create 3D map environment
Add 3D data
Show terrain elevation
Visualize feature data
Use geoprocess
Use InfoWindow
Render 3D Symbols
More …

Road Ahead
The Web 3D ecosystem
What else will be available
Why Web 3D
Web 3D Use Cases

- Digital City
- Emergency Response
- Urban Planning
- Earth Science
- Digital Ocean
- Digital Mining
- Digital Tourism
- Digital Planning
Introduce Web 3D for ArcGIS
Esri is developing 3D technologies around the world and around the clock.
New Web 3D Capabilities for ArcGIS Platform

- Render and apply analysis with 2D/3D data in web browser environment
- Support major browsers, IE, Firefox and Chrome
- Support major platforms, Windows and Mac (soon)
- Javascript SDK for developing Web 3D applications
Web 3D Client Architecture
Develop Web 3D Applications
What skill needed for developing Web 3D Apps?

ArcGIS API for Javascript
New ArcGIS API for Javascript 3D Capabilities

- 3D added to existing Javascript API
- Same Javascript class model with new 3D capabilities
- Same programming pattern that has been taught, learned and used for many years
- The 3D core and rendering technologies are transparent to developers and browsers
Let’s Code
Create a map...well, a globe

```javascript
var djConfig = {parseOnLoad: true};

<script type="text/javascript" src="dojO/dojo.js"></script>

dojo.require("esri3d.map");

var map;

function init() {
    var initViewpoint = new esri3d.Viewpoint(
        {position:[116.38, 39.90, 100000], target:[116.38, 39.90, 0], wkid:4326});
    map = new esri3d.Map("map", {viewpoint: initViewpoint});

    var baselayer = new esri3d.layers.ArcGISTiledMapServiceLayer("http://server.arcgisonline.com/ArcGIS/rest/services/ESRI_Imagery_World_2D/MapServer");

    dojo.connect(map, 'onLoad', function(theMap) {
        //resize the map when the browser resizes
        dojo.connect(window, 'resize', map, map.resize);
        bookmark();
    });
    map.addLayer(baselayer);
}

dojo.addOnLoad(init);
```
Add 3D Models

dojo.connect(map, 'onLoad', function(theMap) {
    //resize the map when the browser resizes
    dojo.connect(window, 'resize', map, map.resize);
    feature3dLayer();
});
map.addLayer(baselayer);
dojo.addOnLoad(init);

function feature3dLayer()
{
    var layer = new esri3d.layers.Feature3dLayer(
        "http://10.112.18.131/ArcGIS/rest/services/SanFrancisco/3DFeatureServer/0/");
    map.addLayer(layer);

    var sf = new esri3d.Lookat();
sf.longitude = -122.409;
sf.latitude = 37.7847;
sf.altitude = 180.619;
sf.heading = 37.3612;
sf.tilt = 72.6134;
map.setLookat(sf);
}
}
Add Elevation Layer

```javascript
dojo.require("esri3d.map");

var map;

function init() {
    var initViewpoint = new esri3d.Viewpoint(
        {position:[116.38,39.90,100000], target:[116.38,39.90,0], wkid:4326});
    map = new esri3d.Map("map", {viewpoint:initViewpoint});

    var baselayer = new esri3d.layers.ArcGISTiledMapServiceLayer("http://server.arcgisonline.com/ArcGIS/rest/services/ESRI_Imagery_World_2D/MapServer");
    dojo.connect(map, 'onLoad', function(theMap) {
        //resize the map when the browser resizes
        dojo.connect(window, 'resize', map, map.resize);
        addElevationLayer();
    });
    map.addLayer(baselayer);
}
dojo.addOnLoad(init);

function addElevationLayer() {
    map.addLayer(elevationlayer);
}
```

```html
</script>
</head>
<body class="claro">
    <div id="map">
    </div>
</body>
```
Visualize 2D Features

```javascript
map.addLayer(baselayer);
}
dojo.addOnLoad(init);

function polylineFeatureLayer() {
    var popupTemplate = new esri.dijit.PopupTemplate({
        title: "{objectId}",
        fieldInfos: [
            {fieldName: "admnclass", visible: true, label: "Admn Class"},
            {fieldName: "toll_rd", visible: true, label: "Toll Rd"},
            {fieldName: "type", visible: true, label: "Type"}
        ],
        showAttachments: false
    });
    var featurelayer_line = new esri3d.layers.FeatureLayer("http://sampleserver6.arcgisonline.com/arcgis/rest/services/USA/MapServer/1", {
        infoTemplate: popupTemplate, outFields: ["*""]
    });

    dojo.connect(featurelayer_line, "onUpdateStart",
        function(){
            document.getElementById("loading").style.display="";
        });

    dojo.connect(featurelayer_line, "onUpdateEnd",
        function(){
            document.getElementById("loading").style.display="none";
        });

    map.addLayer(featurelayer_line);
}
</script>
</head>
```
Use InfoWindow

```javascript
dojo.connect(map, 'onLoad', function(theMap) {
   // resize the map when the browser resizes
   dojo.connect(window, 'resize', map, map.resize);
   dojo.connect(map, 'onClick', null, infowindow);
});
map.addLayer(baselayer);
}
dojo.addOnLoad(init);

function infowindow(evt) {
   var x = evt.screenPoint.x;
   var y = evt.screenPoint.y;
   var longitude = evt.mapPoint.longitude;
   var latitude = evt.mapPoint.latitude;
   var altitude = evt.mapPoint.altitude;
   map.infoWindow.setTitle("Current position");
   map.infoWindow.setContent("<b>X : </b>"+x+"<br><b>Y : </b>"+y+
   "<br><b>Longitude : </b>"+longitude+
   "<br><b>Latitude : </b>"+latitude+
   "<br><b>Altitude : </b>"+altitude);
   map.infoWindow.show({"x":x,"y":y});
}
</script>
</head>
```
Use InfoTemplate

```javascript
var graphicsLayer = createGraphicsLayer();

var x = 116.46, y = 39.92,
    sr = new esri.SpatialReference(4326),
    point = new esri3d.geometry.Point({
        x: x,
        y: y,
        z: 0,
        spatialReference: sr
    }),
    symbol = new esri3d.symbol.Symbol(new esri.symbol.SimpleMarkerSymbol(  
        esri.symbol.SimpleMarkerSymbol.STYLE_SQUARE, 10,  
        new esri.symbol.SimpleLineSymbol(), new dojo.Color([255,0,0]).toJson()  
    ),
    popupContent = '<span style="color:red">x</span>:${x} <br><span style="color:green">y</span>:${y}',
    infoTemplate = new esri3d.InfoTemplate("point", popupContent),
    attributes = {x: x, y: y},
    graphic = new esri3d.Graphic(point, symbol, attributes, infoTemplate),

    graphicsLayer.add(graphic);

}

function createGraphicsLayer(){
    var graphicsLayer = new esri3d.layers.GraphicsLayer();
    map.addLayer(graphicsLayer);
    return graphicsLayer;
}

dojo.addOnLoad(init);
</script>
</head>
```
450

Admin Class: Interstate
Toll Rd: N
Type: Multi-Lane Divided
3D Symbolization

```javascript
var point = new esri3d.geometry.Point({
    x : geometry.x,
    y : geometry.y,
    z : geometry.z,
    spatialReference : sr
});
var s;
if(symbol.type === "esriCylindrical") {
    s = new esri3d.symbol.Cylinder3DMarkerSymbol(symbol);
} else if(symbol.type === "esriSpherical"){
    s = new esri3d.symbol.Sphere3DMarkerSymbol(symbol);
} else{
    s = new esri3d.symbol.Box3DMarkerSymbol(symbol);
}
var graphic = new esri3d.Graphic(point, s);
g_graphicsLayer.add(graphic);
```
Geoprocess – Driving Time Service

```javascript
var params = { "Input_Location": featureSet, "Drive_Times": "1 2 3" }
var gp = new esri.tasks.Geoprocessor(
  "http://sampleserver1.arcgisonline.com/ArcGIS/rest/services/Network/ESRI_DriveTime_US/GPserver/CreateDriveTimePolygons";
  gp.setOutSpatialReference({wkid:4326});
  gp.execute(params, displayTrack);
}

function displayTrack(results, messages) {
  document.getElementById("loading").style.display="none";
  var features = results[0].value.features;
  var symbol;
  var graphicsLayer = new esri3d.layers.GraphicsLayer();
  map.addLayer(graphicsLayer);
  map.bindToGround(graphicsLayer);
  for (var f=0; f<features.length; f++) {
    var feature = features[f];
    var json = feature.geometry.toJson();
    if(f == 0) {
      symbol = new esri.symbol.SimpleFillSymbol();
      symbol.setOutline(new esri.symbol.SimpleLineSymbol(esri.symbol.SimpleLineSymbol.STYLE_SOLID, new dojo.Color([0,0,0,0.5]), 1));
      symbol.setColor(new dojo.Color([255,0,0,0.7]));
    } else if(f == 1) {
      symbol = new esri.symbol.SimpleFillSymbol();
      symbol.setOutline(new esri.symbol.SimpleLineSymbol(esri.symbol.SimpleLineSymbol.STYLE_SOLID, new dojo.Color([0,0,0,0.5]), 1));
      symbol.setColor(new dojo.Color([0,255,0,0.7]));
    } else if(f == 2) {
      symbol = new esri.symbol.SimpleFillSymbol();
      symbol.setOutline(new esri.symbol.SimpleLineSymbol(esri.symbol.SimpleLineSymbol.STYLE_SOLID, new dojo.Color([0,0,0,0.5]), 1));
      symbol.setColor(new dojo.Color([0,0,255,0.7]));
    }
    var symbol3d = new esri3d.symbol.Symbol(symbol.toJson());
    var polygon = new esri3d.geometry.Polygon(json);
    var graphic = new esri3d.Graphic(polygon, symbol3d, null, null);
    graphicsLayer.add(graphic);
  }
```
There are a lot more...
Resources
How to get started when Web 3D is available
The Location Platform for Apps

Quickly add geo to your apps using Esri’s cloud services. Develop in the API of your choice and deploy on any device.

- **Take a Tour**
- **Free Trial**

---

**Power your applications with ArcGIS technology**

Use maps, content and APIs from ArcGIS in your web and mobile applications.

**Mapping and analysis for organizations**

Build custom applications to help your organization visualize, create and share spatial data.

**Get started with ready-to-use open source apps**

Use Esri’s sample code on Github as a starting point to build applications for your users or organization.

---

**Geocoding and Place Search**

Use the geocoding service to convert addresses to and from geographic coordinates. Search for places within a region and get places matching your search.

Learn More About **Geocoding**
Class: Map

Description
The esri3d.Map class creates a container and required DOM structure for adding layers, graphics, an info window, and other navigation controls. Typically a map is added to a page using a DIV. The map's width and height are initialized to those of the DIV container.

Class hierarchy
esri3d.Map

Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSOLUTE</td>
<td></td>
</tr>
<tr>
<td>CLAMP_TO_GROUND</td>
<td></td>
</tr>
<tr>
<td>RELATIVE_TO_GROUND</td>
<td></td>
</tr>
</tbody>
</table>

Constructor

```javascript
esri3d.Map(divId, options?)
var map = new esri3d.Map("divId", {autoResize, infoWindow, showAttribution, lookAt});
```

Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>autoResize</td>
<td>Boolean</td>
<td>Value is true when the map automatically resizes if the browser window or ContentPane widget enclosing the map is resized. Otherwise false.</td>
</tr>
<tr>
<td>defaultSpatialReference</td>
<td>spatialReference</td>
<td>Provides access to the Map's GraphicsLayer. The graphics object is available to use after the Map.onLoad event.</td>
</tr>
<tr>
<td>graphics</td>
<td>GraphicsLayer</td>
<td>Current height of the map in screen pixels.</td>
</tr>
<tr>
<td>height</td>
<td>Number</td>
<td>Current height of the map in screen pixels.</td>
</tr>
<tr>
<td>id</td>
<td>String</td>
<td>Reference to HTML DIV or other element where the map is placed on the page. This property is set in the Map constructor.</td>
</tr>
<tr>
<td>infoWindow</td>
<td>InfoWindow</td>
<td>Displays the InfoWindow on a map.</td>
</tr>
<tr>
<td>layerIds</td>
<td>String[]</td>
<td>Array of current TiledMapServiceLayers and DynamicMapServiceLayers added to the map.</td>
</tr>
<tr>
<td>loaded</td>
<td>Boolean</td>
<td>After the first layer is loaded, the value is set to true.</td>
</tr>
<tr>
<td>width</td>
<td>Number</td>
<td>Current width of the map in screen pixels.</td>
</tr>
</tbody>
</table>

Methods

Map actions:

<table>
<thead>
<tr>
<th>Method</th>
<th>Return Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>addLayer(layer, index?)</td>
<td>Layer</td>
<td>Adds an Esri Layer to the map.</td>
</tr>
<tr>
<td>draw</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>removeLayer</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
Featured Maps and Apps for United States

Maps   Web Apps   Mobile Apps

March Madness Mapped
Palm Springs Shortlist
The 2013 Formula One Championship Story

Treasures of Redlands
Weather Underground Widget Version 3.1.1 for FlexViewer 3.1
Community Maps and the Local Government Information Model

Mission Bay Marsh Reserve Map Tour
Yakima Transit iBus Widget
Utah Fires

Search for more Web apps or click below to find the:

- Highest Rated
- Most Recent
- Most Viewed

What is a Web app?

Create your own app using the ArcGIS API for:

- JavaScript
- Flex
- Silverlight
community
Road Ahead

2013 Developer Summit

2013 User Conference

2013 ArcGIS 10.x

3D Clients

3D Services

3D Content
A 3D Ecosystem for ArcGIS Platform
Provide Transparency to 3D Core Technologies
Cross Platforms and Enable Developers
Thank you