ArcGIS GeoEvent Server: Leveraging Stream Services

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Agenda

• Overview of Stream Services and Stream Layers
• Publishing Stream Services
• Viewing Real-Time Data in Web Maps and Web Application Templates
• Building Web Applications with Web AppBuilder using Stream Layers
• Using the Stream Layer in Custom Applications
• Questions
What is Real-Time Data

observations whose location and/or attributes change over time

Things that Move

- planes
- satellites
- animals

Stationary Sensors

- water gauges
- weather stations
- traffic sensors
- air quality sensors

Things that Just Happen

- crime incidents
- lightning strikes
- accidents
Stream Services and StreamLayers
An overview
ArcGIS Enterprise

with real-time & big data capabilities

- Ingest high velocity real-time data into ArcGIS
- Perform continuous analytics on events as they are received
- Store observations in a spatiotemporal big data store
- Run batch analytics on stored observations
- Visualize high velocity & volume data:
  - as an aggregation
  - as discrete features
- Notify those who need to know about patterns of interest
Stream services vs traditional feature services

Two patterns, two important differences

- **Feature layers** pull from feature services
  - Layers poll to get periodic updates
  - Must be backed by an enterprise geodatabase (EGDB) or Spatiotemporal Big Data Store

- **Stream layers** subscribe to stream services
  - Service pushes data to layer as soon as it is received
  - Data is not stored in database
Stream Layer

*Advantages when using real-time data*

- **More responsive** and more **efficient** than feature layers
- Stream layers display **immediately** and refresh **automatically**
- Data is only sent to the client **once**
Stream Layer
Requirements

• ArcGIS GeoEvent Server
  - Stream services are published as part of the configuration of an outbound connector

• Web Browsers that support Web Sockets
  - http://caniuse.com/websockets

• Network support for the Web Socket protocol
  - ws://  wss://

• No custom plug-in required: Standard JavaScript implementation
Stream Services

What can I use to consume stream services?

- ArcGIS Online and Portal for ArcGIS Web Maps
- ArcGIS Online and Portal for ArcGIS web application templates
- Web applications built using Web App Builder
- Your own web apps that use the ArcGIS API for JavaScript
Publishing Stream Services
Use GeoEvent Manager

Create Output Connector
Publish Service
Wire Together With Input
Publishing Stream Services
ArcGIS REST Services Directory

Folder: /

Current Version: 10.4

View Footprints In: ArcGIS Online Map Viewer

Folders:
- Utilities

Services:
- ASDITrackInformation (StreamServer)
  - Flights (StreamServer)
- Gages (MapServer)
- SampleWorldCities (MapServer)

Supported Interfaces: REST SOAP Sitemap Geo Sitemap

ArcGIS REST Services Directory
Home > services > Flights (StreamServer)

View In: ArcGIS JavaScript
View In: ArcGIS Online Map Viewer
Geometry Type: esriGeometryPoint
Geometry Field: Location
Spatial Reference: 4326 (4326)

Fields:
- MsgTime (type: esriFieldTypeDate, alias: MsgTime, nullable: true)
- DepArpt (type: esriFieldTypeString, alias: DepArpt, nullable: true)
- FltId (type: esriFieldTypeInteger, alias: FltId, nullable: true)
- Hdg (type: esriFieldTypeInteger, alias: Heading, nullable: true)
- AltitudeFeet (type: esriFieldTypeInteger, alias: AltitudeFeet, nullable: true)
- FID (type: esriFieldTypeInteger, alias: FID, nullable: true)

Web Socket URLs:
- ws://USRUS.ESRI.COM:6180/arcgis/ws/services/Flights/StreamServer
- ws://USRUS.ESRI.COM:6143/arcgis/ws/services/Flights/StreamServer

Capabilities: Subscribe
Publishing
Stream Service and the REST Endpoint
Web Maps and Apps
Real-time Data in a Web Map
Real-time Data in a Web Map

Adding a Stream Service

Add Stream Service

Configure the Layer
Web Maps and Apps
Real-time Data in Web AppBuilder
Custom Applications

Using the JavaScript API
Real-time data in Your Own Web App

Very little code!!  3.x API

- Dojo “require”
- Construct and add to map

```javascript
var streamLayer = new StreamLayer ( url );
var map = new Map( "mapDiv", { basemap: "topo" });
map.addLayer ( streamLayer );
```
Real-time data in Your Own Web App

• Dojo “require”
• Construct and add to map

```
require([
  "esri/Map",
  "esri/views/MapView",
  "esri/layers/StreamLayer",
  "dojo/domReady!"
]


var streamLayer = new StreamLayer ( { url: url } );

var map = new Map( {
  basemap: "topo",
  layers: [ streamLayer ]
} );

var view = new MapView( { container: "mapDiv", map: map } );
```
Stream Layer
Get rid of unneeded features

- **purgeOptions**
  - **displayCount**: Maximum number of features to display
  - **age**: Maximum age of features (in minutes). Defaults to no maximum.

- **maximumTrackPoints**: Maximum features per trackId to display. Defaults to 1

- **purgeInterval**: The purge method is automatically called at this interval (in minutes). Defaults to 0 so purging performed when new message is received.

Note: GeoEvent definition “TIME_END” field is honored

```javascript
var streamLayer = new StreamLayer(url, { 
  purgeOptions: {
    displayCount: 1000,
    age: 20
  }
});
```
Stream Layer
Setting Filters on Data

- **definitionExpression**: The where clause used to filter data using attributes.

- **geometryDefinition**: The Extent used as a spatial filter. Only Extent is allowed.

```javascript
var streamLayer = new StreamLayer(url, {
  definitionExpression: "AltitudeFeet > 18000",
  geometryDefinition: new Extent({
    xmin: -120,
    ymin: 38,
    xmax: -115,
    ymax: 42,
    spatialReference: {
      wkid: 4326
    }
  })
});
```
Sample Applications
Available on my GitHub repository
Real-time: Leveraging Stream Services

Helpful links

- **StreamLayer API help:**
  - 3.x: https://developers.arcgis.com/javascript/3/jsapi/streamlayer-amd.html

- **Sample Applications on Github:**

- **Sample Stream Services with Simulated Data:**
  - https://geoeventssample3.esri.com:6443/arcgis/rest/
Real-time: Leveraging Stream Services

Helpful links

• GeoEvent Server Tutorials
  - http://links.esri.com/geoevent-tutorials
  - http://links.esri.com/geoevent-streamservices

• GeoEvent Server Discussions and Blogs (on GeoNet)
  - https://geonet.esri.com/community/gis/enterprise-gis/geoevent/content
Other Real-Time and Big Data Technical Workshops

Remaining sessions this conference

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