ArcGIS GeoEvent Server: Visualizing Real-Time Data

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ArcGIS Enterprise

With Real-time Capabilities

Live Features
Stream Services

Live & Historic
Aggregates & Features

visualization

ArcGIS Enterprise

ArcGIS GeoEvent Server

analytics

Spatiotemporal
big data store

storage

ingestion
dissemination & actuation
Agenda:

1. Visualization Overview
2. Visualizing Stream Layers
3. Visualizing Features
4. Resources & Wrap-Up
1 Visualization Overview
Visualization

- Stream layers in apps subscribe to stream services to immediately visualize observations
  - does not require storage, low latency, no playback

- Map & Features layers in apps periodically poll to visualize most current observations
  - backed by an enterprise geodatabase (EGDB) or a spatiotemporal big data store (BDS)
  - history can be retrieved & queried for playback
Visualizing Stream Layers
Stream Layers
advantages when working with 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.
Visualization of real-time data in a web map by adding a stream service

Add Stream Service

Configure the Layer
Stream Layers in Webmaps
Visualization of real-time data
In a web app using Web AppBuilder

From The Map Viewer

From My Contents
Stream Layers in Web AppBuilder
Visualization of real-time data
adding a stream service to ArcGIS Pro 2.2+

- Add a Portal or ArcGIS Online item
- From a server connection
- Add Data From Path
Visualization of real-time data symbolizing a stream service in ArcGIS Pro 2.2+

- **Set Renderer**
  - Single Symbol
  - Unique Values
  - Graduated Symbols
  - Graduated Colors

- **Current Observations**

- **Previous Observations**

- **Vary by attribute:**
  - Transparency
  - Rotation
  - Size
  - Color
Stream Layers in ArcGIS Pro
3 Visualizing Features
Visualization
of observation data

- Map & Feature services that use data in the spatiotemporal big data store enable you to:
  - Visualize on-the-fly aggregations of data
  - Perform exploratory queries over any combination of space, time, and attributes
  - Switch visualization from aggregation to raw features
  - Inspect feature-level attributes while in aggregation or raw feature view
  - Replay (via time slider) historic observations in aggregation or raw feature view
### Visualizing Observation Data

Map & feature services using data from the spatiotemporal big data store

| CTA Bus ID: 1640 | delay | False | dec | Union Station | hig | 181 | lat | 41.89 | len | 87.63 | pdr | 19,350 | pit | 0.111 | r1 | 156 | tablockid | 156.220 | tnp | 1,035,589 | time_of_request | 1,526,477,937.69 | tnpid | 152 | 5021 |
|------------------|-------|-------|-----|---------------|-----|------|-----|------|-----|-------|-----|--------|----|-------|---|-----|---------|-------------|-----|-------|---------|------------------------|
|                  | delay | False | dec | Union Station | hig | 181 | lat | 41.89 | len | 87.63 | pdr | 19,350 | pit | 0.111 | r1 | 156 | tablockid | 156.220 | tnp | 1,035,589 | time_of_request | 1,526,477,937.69 | tnpid | 152 | 5021 |
Spatiotemporal big data store

geohash spatial indexing to support on-the-fly aggregation

- As data is written to a dataset in the spatiotemporal big data store
  - A spatial index for geohash aggregation is continuously updated
Spatiotemporal big data store

*geohash & square spatial indexing to support on-the-fly aggregation*

- As data is written to a dataset in the spatiotemporal big data store
  - A spatial index for geohash aggregation is continuously updated
  - A spatial index for square aggregation is continuously updated
Spatiotemporal big data store

*triangle spatial indexing to support on-the-fly aggregation*

- As data is written to a dataset in the spatiotemporal big data store
  - A spatial index for ‘pointy triangle’ aggregation is continuously updated
  - A spatial index for ‘flat triangle’ aggregation is continuously updated
Spatiotemporal big data store

*hexagon (same as triangle) spatial indexing to support on-the-fly aggregation*

- As data is written to a dataset in the spatiotemporal big data store
  - A spatial index for ‘pointy hexagon’ (pointy triangle) aggregation is continuously updated
  - A spatial index for ‘flat hexagon’ (flat triangle) aggregation is continuously updated
As data is written to a dataset in the spatiotemporal big data store:
- Up to four types of spatial indices are supported: geohash, square, pointy & flat hexagon/triangle.
- This is in addition to a temporal index on the time field.
- And an inverted index on each of the attribute fields.
Visualization

*map services: on-the-fly aggregation of polyline and polygon features*

aggregation using centroid of polyline & polygon features
Map and feature services backed by the spatiotemporal big data store

Storage, visualization & replay

Map and feature services backed by the spatiotemporal big data store
Sample Applications & Tutorials

helpful links

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

• Sample stream services with simulated data:
  - https://geoeventsample1.esri.com:6443/arcgis/rest/services

• Sample applications on GitHub:
  - https://github.com/Esri/aggregation-viewer-server-map-service

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

• Discussions & Blogs (on GeoNet)
  - https://geonet.esri.com/community/gis/enterprise-gis/geoevent/content
See Us Here

**Tuesday:**
- 01:00 PM - 02:00 PM: **ArcGIS GeoEvent Server: An Introduction** (Mojave Learning Center)
- 04:00 PM - 05:00 PM: **ArcGIS GeoEvent Server: Visualizing Real-Time Data** (Primrose A)
- 05:30 PM - 06:30 PM: **ArcGIS GeoEvent Server: Applying Real-Time Analytics** (Smoketree A-E)

**Wednesday:**
- 10:30 PM - 11:30 PM: **Real-Time and Big Data GIS: Best Practices** (Catalina/Madera)
- 04:00 PM - 05:00 PM: **ArcGIS GeoEvent Server: Creating Connectors & Processors using the GeoEvent SDK** (Mesquite G-H)

**Thursday:**
- 01:00 PM - 02:00 PM: **Real-Time and Big Data GIS: Road Ahead** (Primrose C-D)
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Questions / Feedback?

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