



ArcGIS GeoEvent Server: Visualizing Real-Time Data

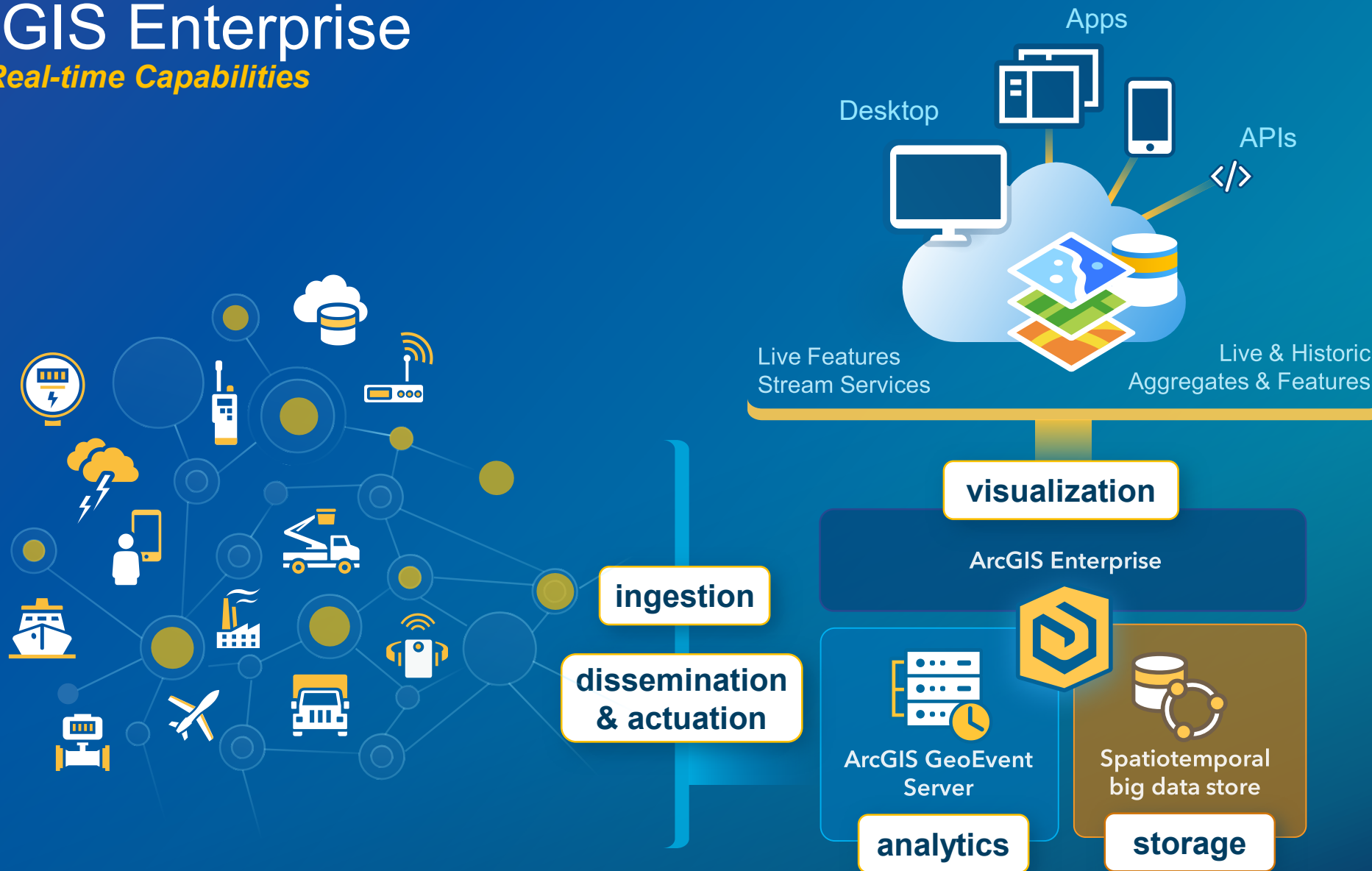
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2019 ESRI DEVELOPER SUMMIT
Palm Springs, CA

ArcGIS Enterprise

With Real-time Capabilities





Agenda:

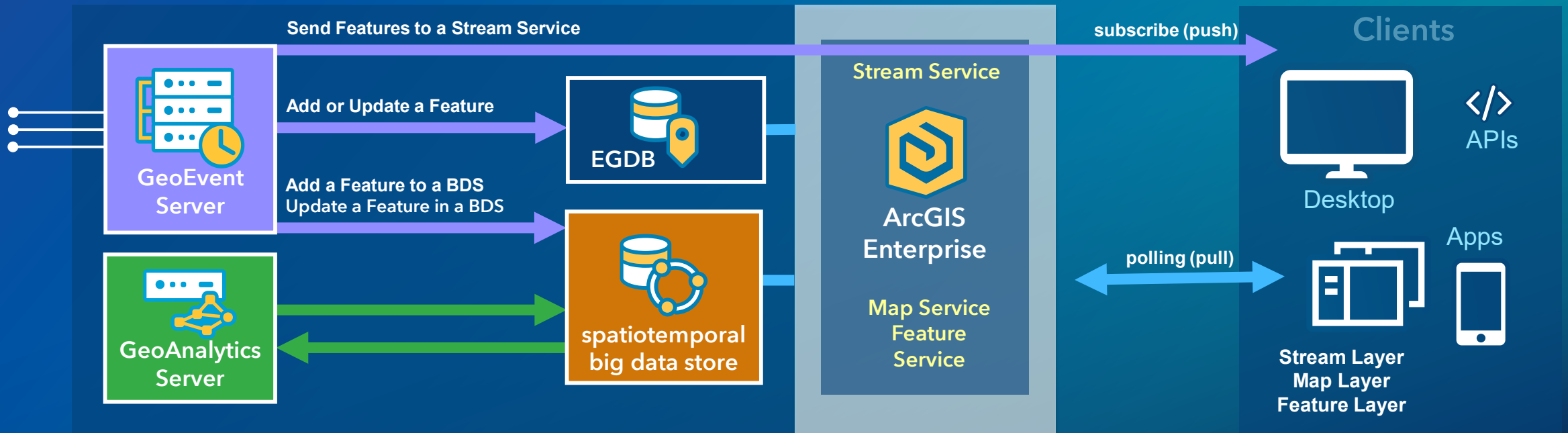
- 1 Visualization Overview
 - 2 Visualizing Stream Layers
 - 3 Visualizing Features
 - 4 Resources & Wrap-Up
-



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 **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





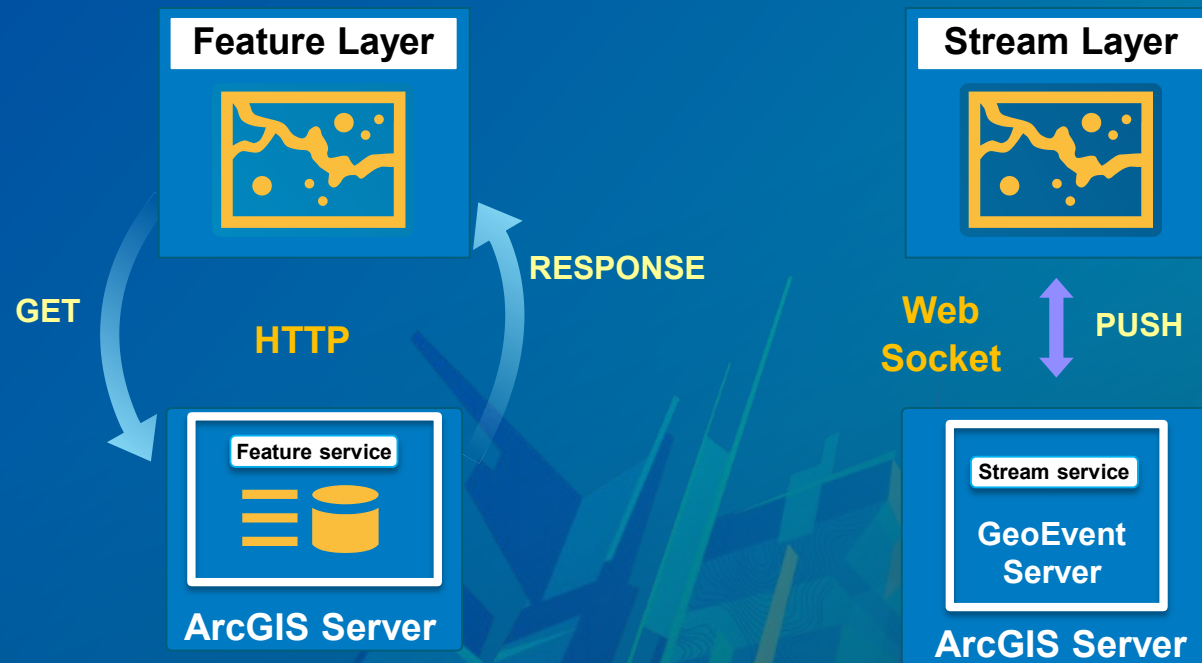
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Visualizing Stream Layers

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

Add Layer from Web

What type of data are you referencing?

An ArcGIS Server Web Service

URL: <https://mymachine16443/arcgis/rest/services/UC2017/ASDITrackInformation/Stream>

☐ Use as Basemap

ADD LAYER CANCEL

Configure the Layer

Change Style

ASDITrackInformation

Showing Location Only

Symbols

This layer streams updated feature observations.

☒ Draw previous 5 observa

Symbol: •

☒ Connect observations

Symbol: —

☒ Rotate symbols (degrees)

Heading

☒ Clockwise from 12

☐ Counterclockwise from 3

Transparency

Map

Map showing real-time data points (yellow airplane icons) over the United States. The map includes a legend and navigation controls.

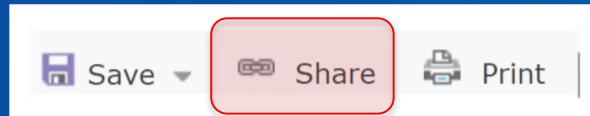
An abstract graphic on the left side of the slide, composed of numerous overlapping, semi-transparent rectangular and polygonal shapes in various colors including blue, green, yellow, orange, and pink. These shapes are layered to create a sense of depth and represent different data layers in a web map. The background of the entire slide is a gradient from dark blue on the left to a lighter teal on the right.

Stream Layers in Webmaps

Visualization of real-time data

In a web app using Web AppBuilder

From The Map Viewer



Link to this map

<http://idtsteelportal.esri.com/portal/home/webmap/viewer.html?webmap=0ee9d9da73804a7bbbb364f1d785f08d&extent=-103.7988,32.9267,-74.6411,43.7005>

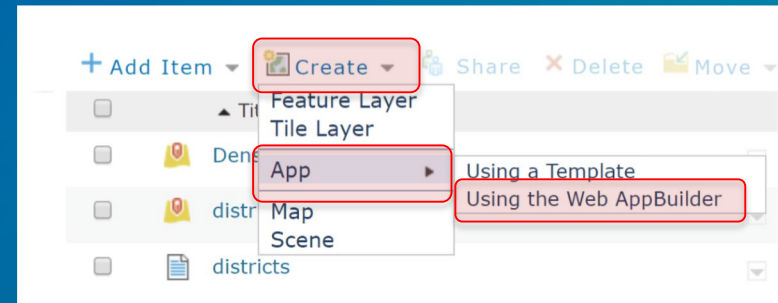
☒ Share current map extent

Embed this map

EMBED IN WEBSITE

CREATE A WEB APP

From My Contents



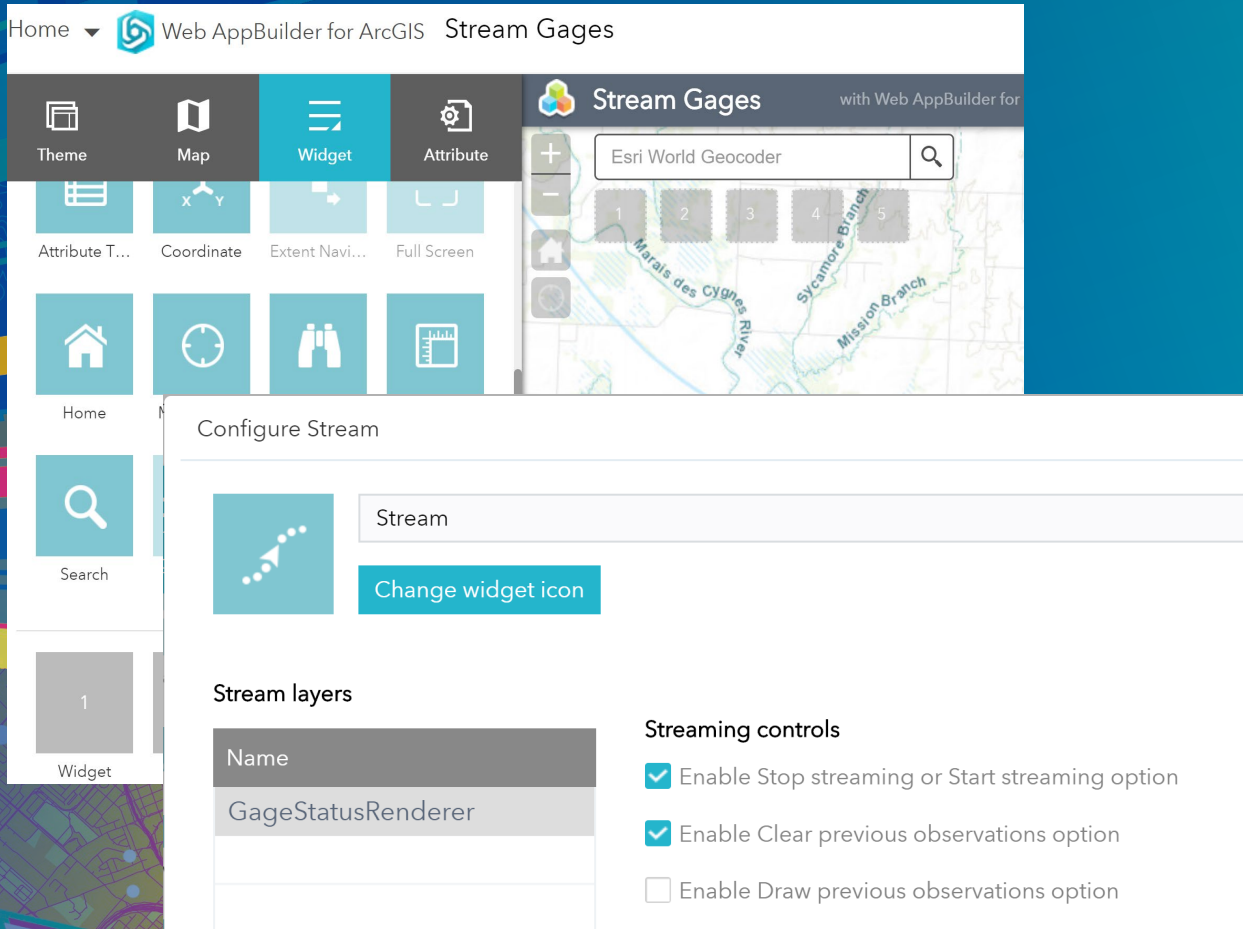
Create a New Web App

☒ 2D ☐ 3D

Specify a title, tags, and summary for the map

Title:

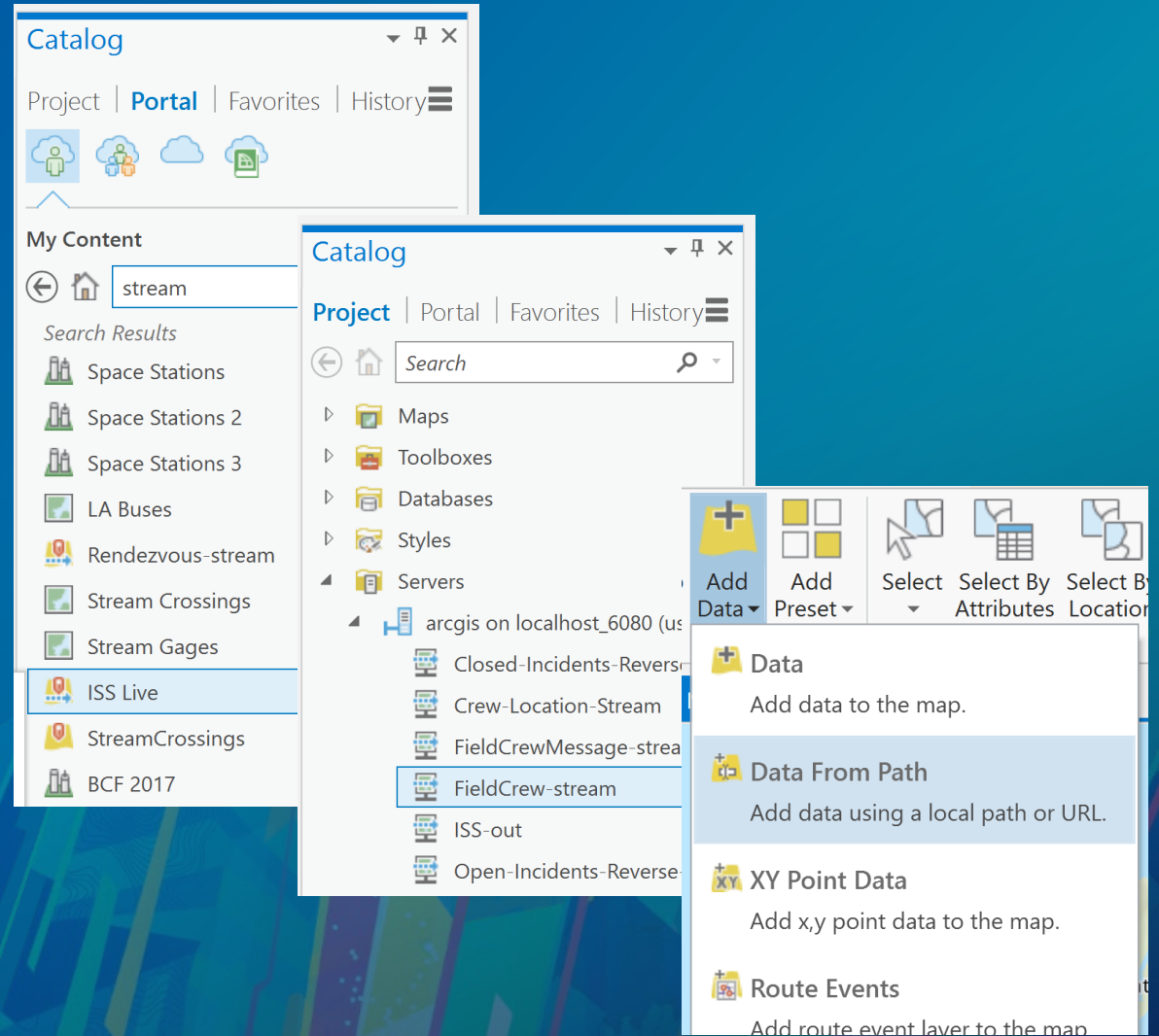
Stream Layers in Web AppBuilder



Visualization of real-time data

adding a stream service to ArcGIS Pro 2.2+

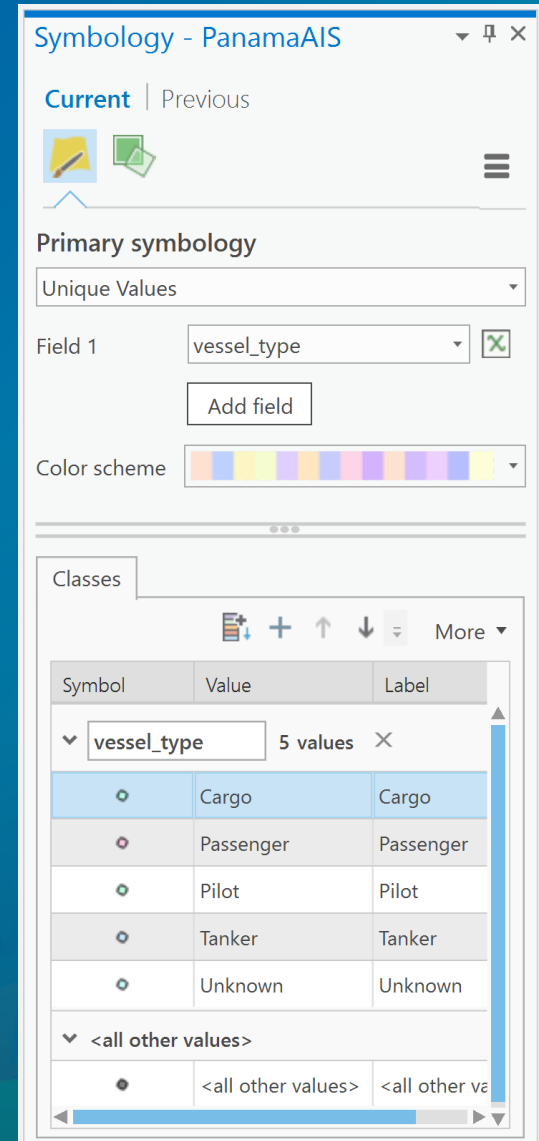
- Add a Portal or ArcGIS Online item
- From a server connection
- Add Data From Path



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



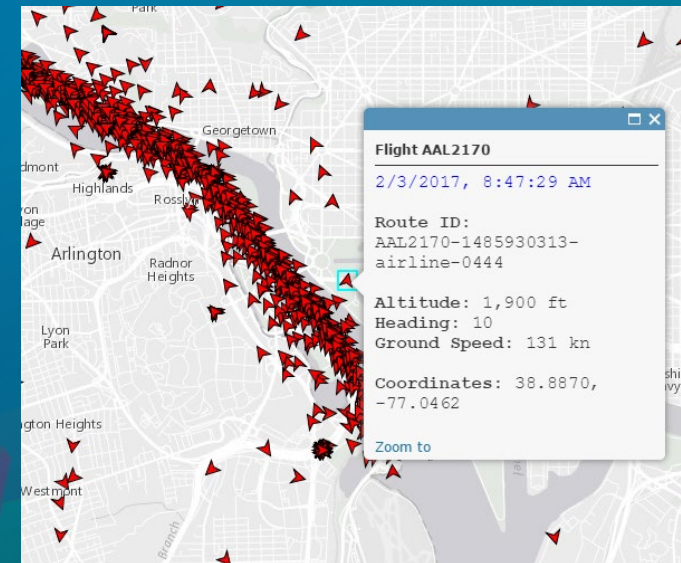
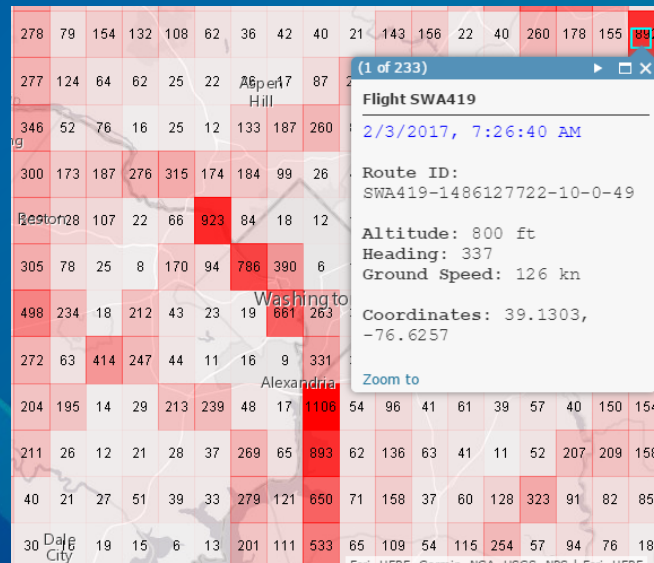
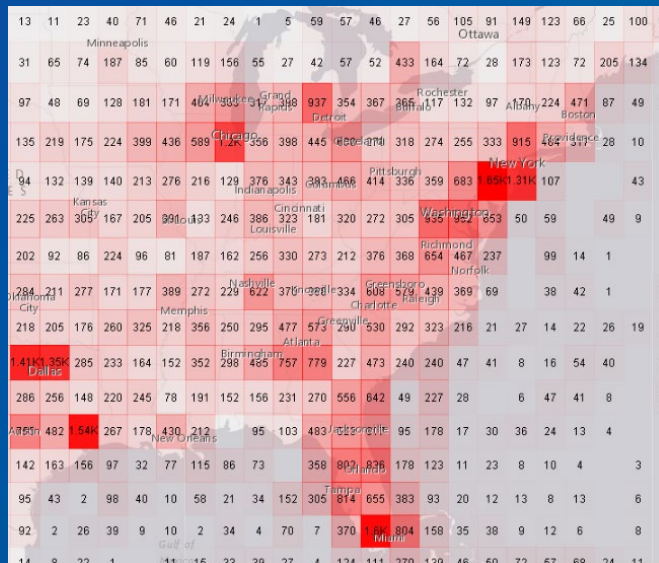
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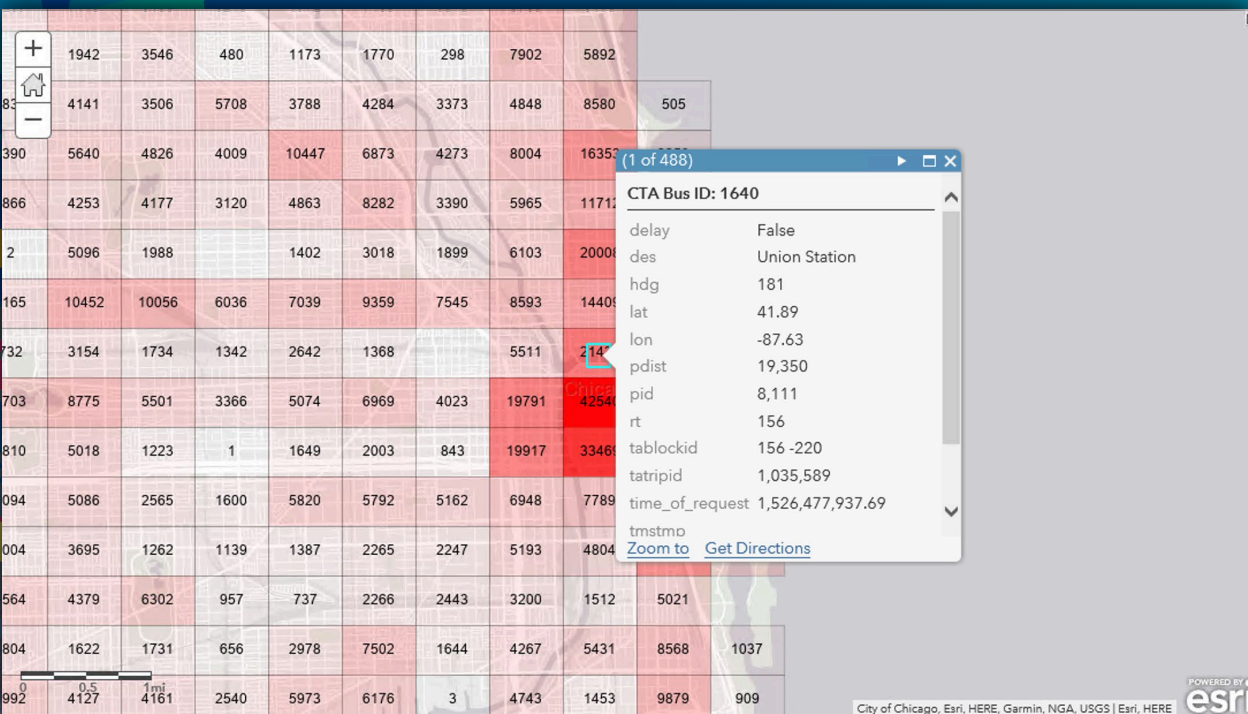
Visualizing Features



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





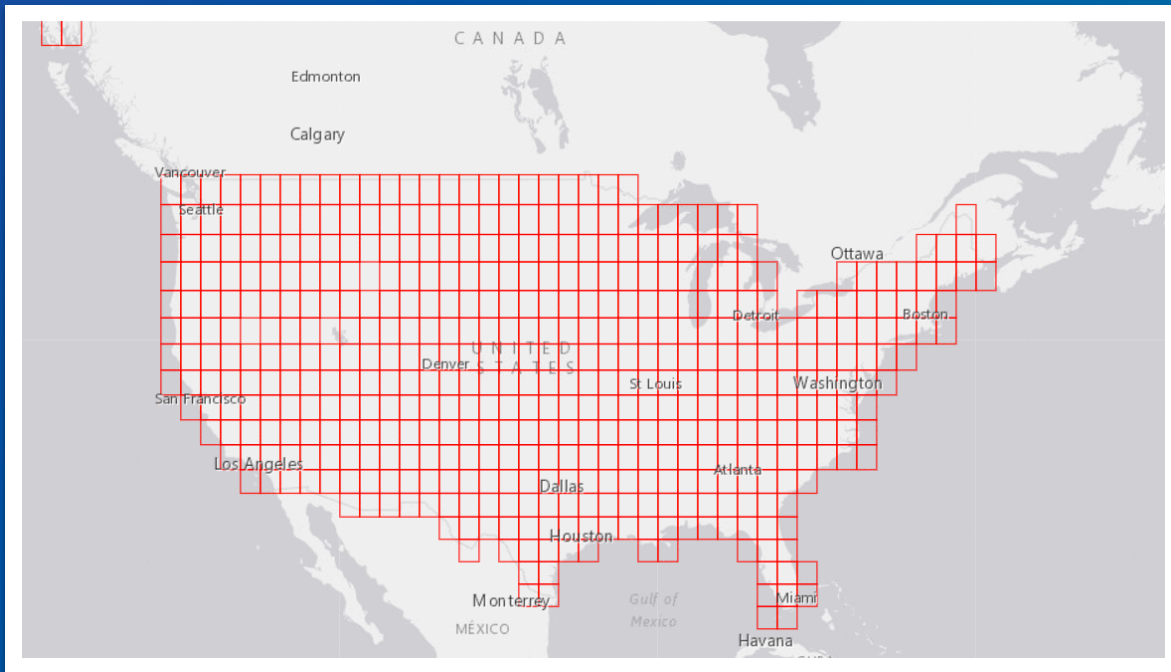
Visualizing observation data

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

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

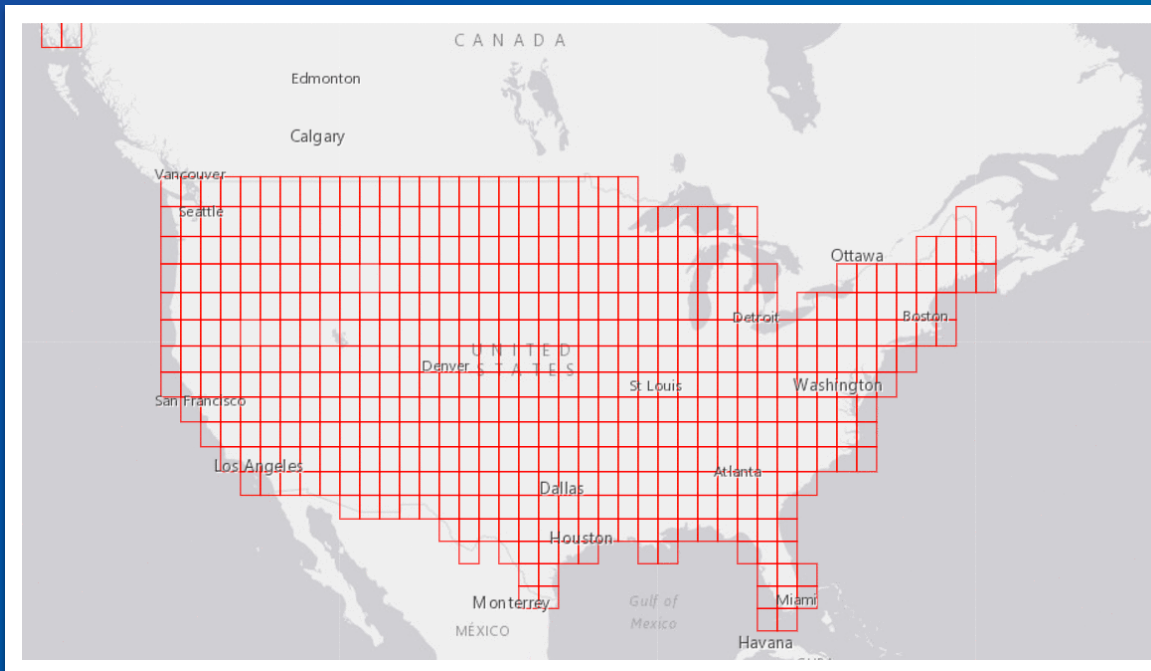


geohash aggregation (based on a geohash index)

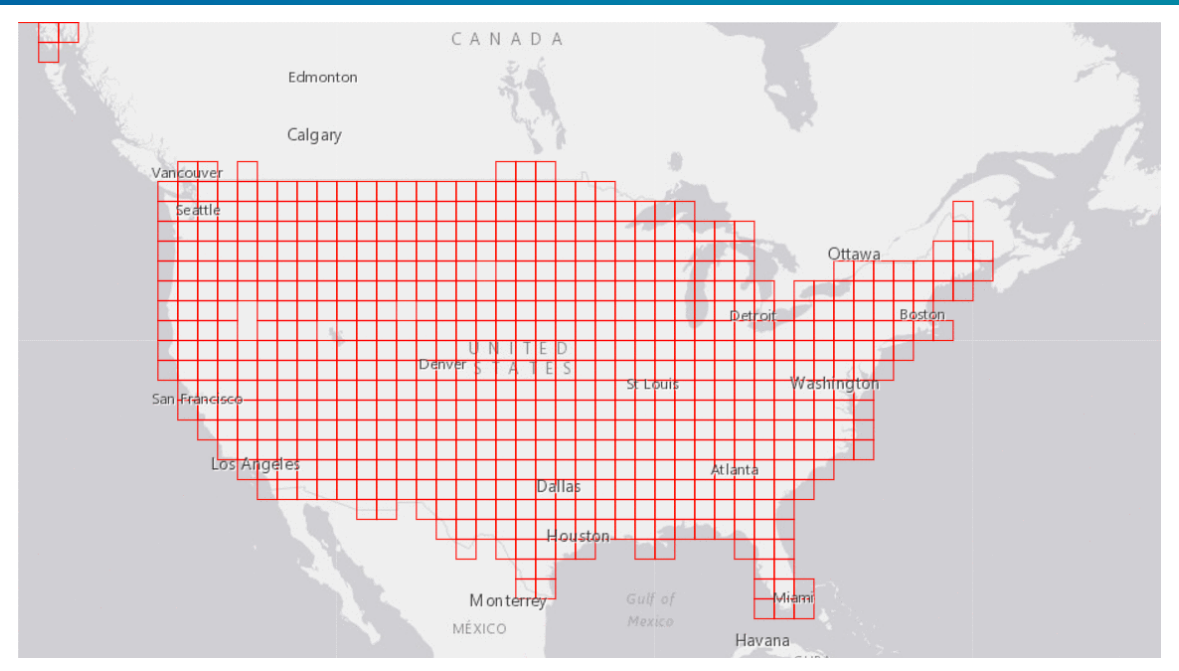
Spatiotemporal big data store

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



geohash aggregation (based on a geohash index)

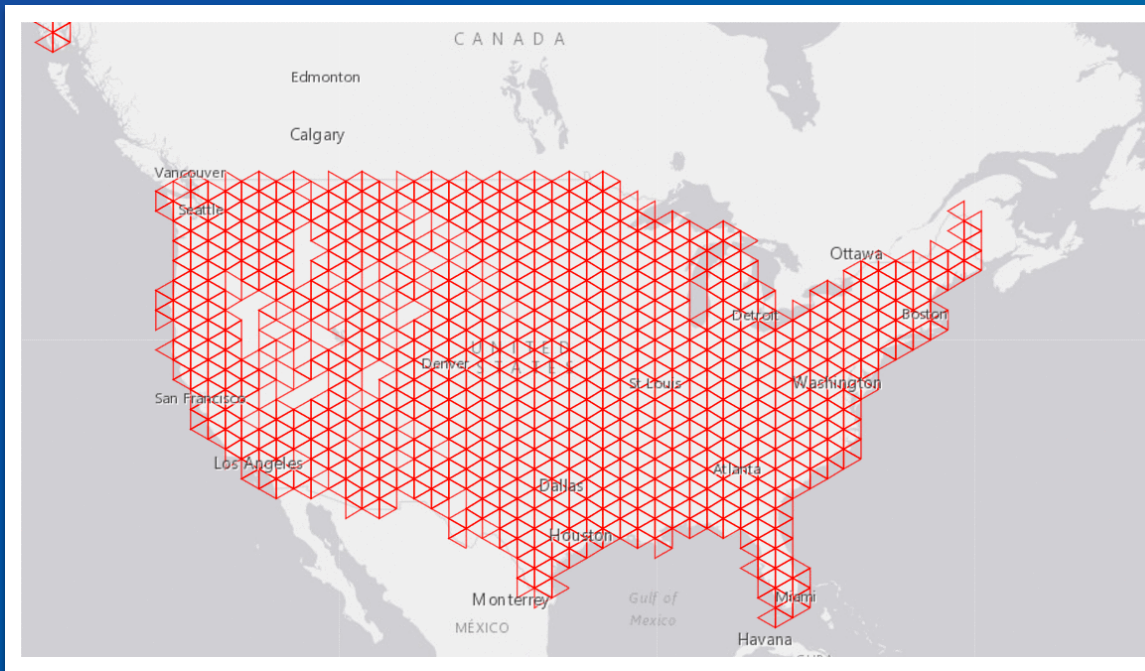


square aggregation (based on a square index)

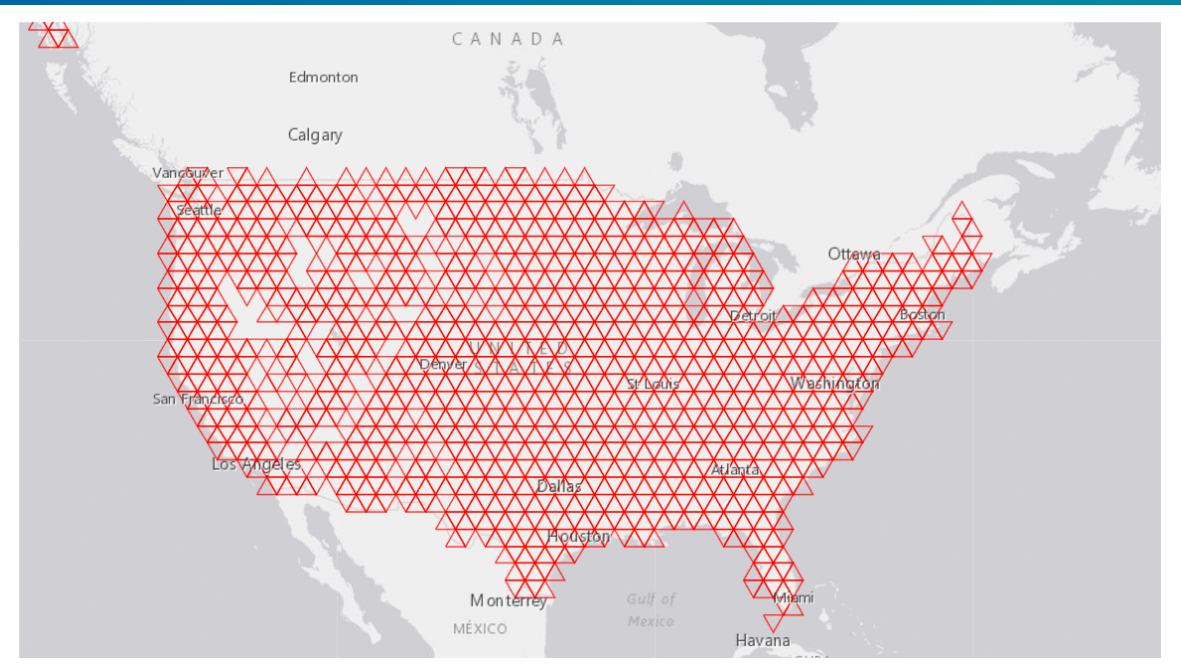
Spatiotemporal big data store

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



pointy triangle aggregation (based on a pointy triangle index)



flat triangle aggregation (based on a flat triangle index)

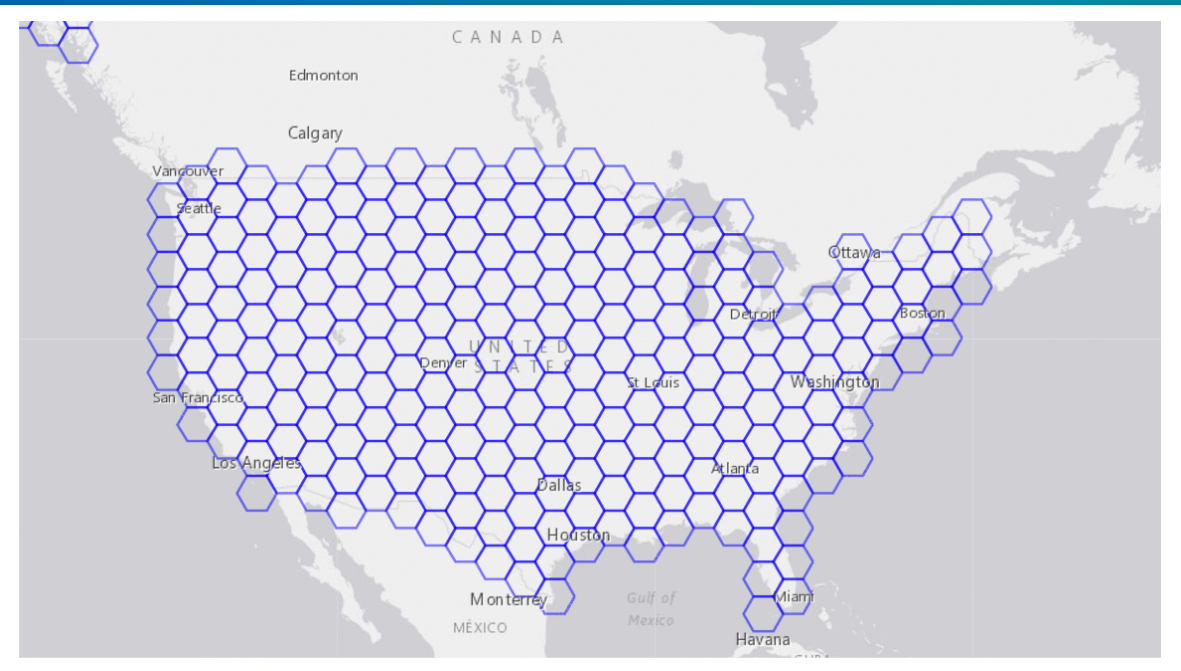
Spatiotemporal big data store

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



pointy hexagon aggregation (based on a pointy triangle index)

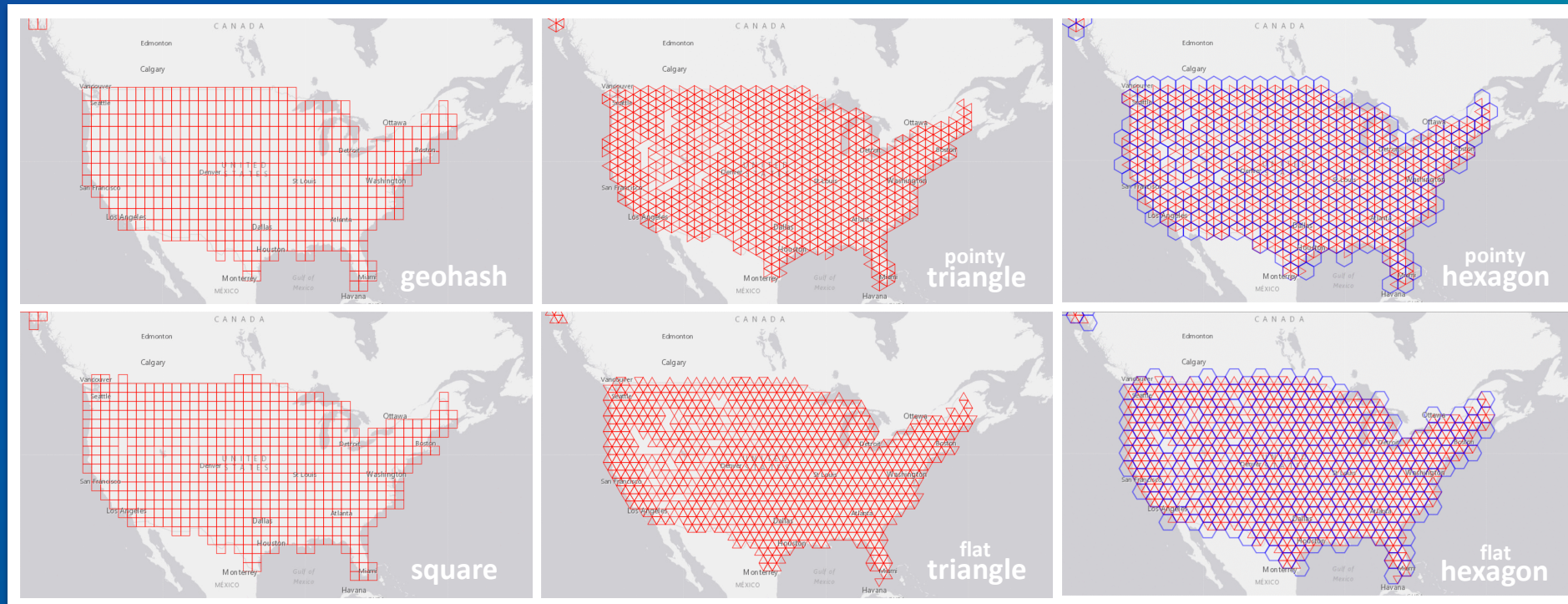


flat hexagon aggregation (based on a flat triangle index)

Spatiotemporal big data store

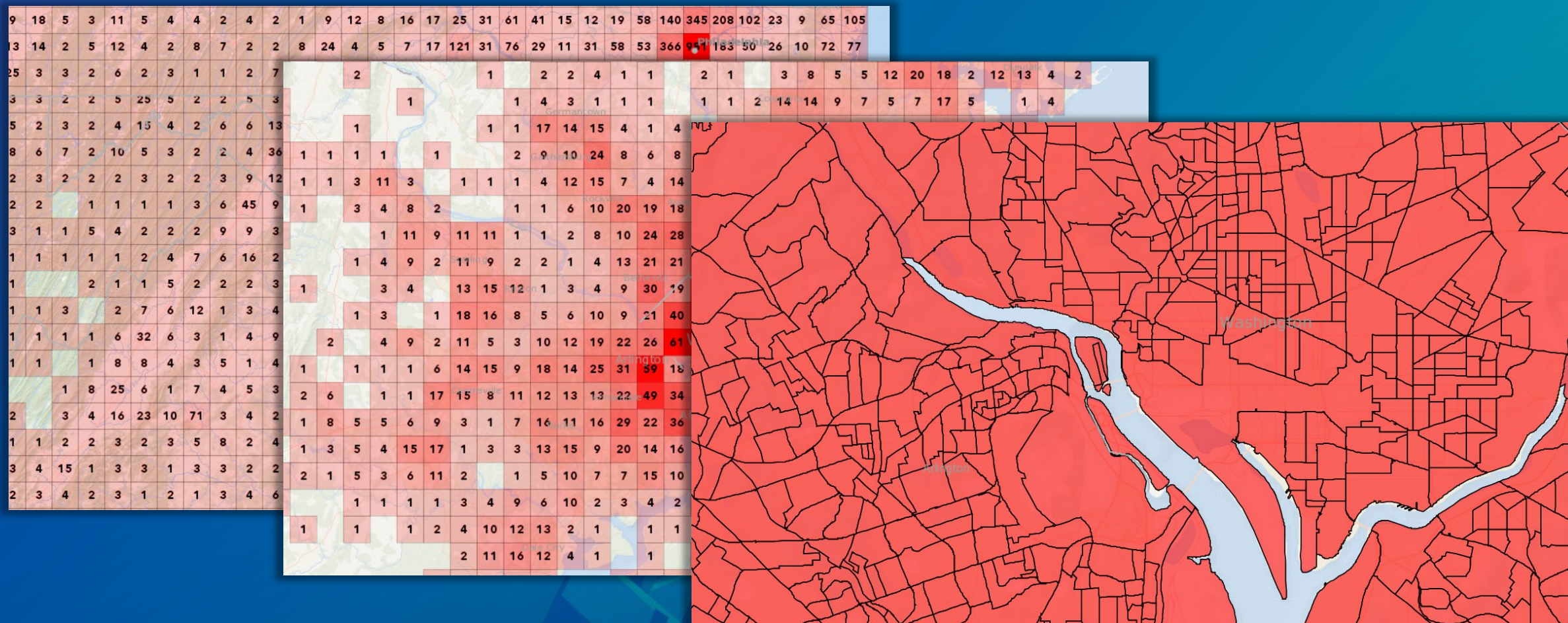
spatial indexing to support on-the-fly aggregation

- 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**

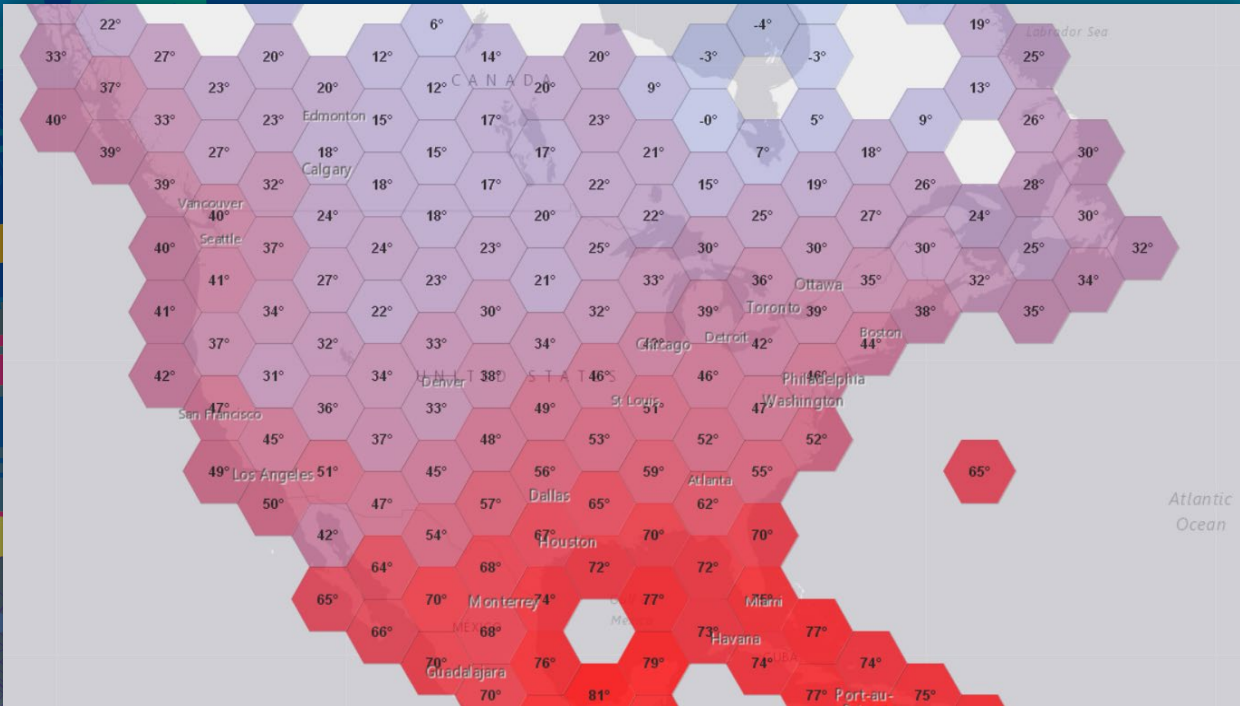


Visualization

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



aggregation using centroid of polyline & polygon features



Storage, visualization & replay

Map and feature services backed
by the spatiotemporal big data store

Sample Applications & Tutorials

helpful links

- StreamLayer API help:
 - 4.x: <https://developers.arcgis.com/javascript/latest/api-reference/esri-layers-StreamLayer.html>
 - 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:

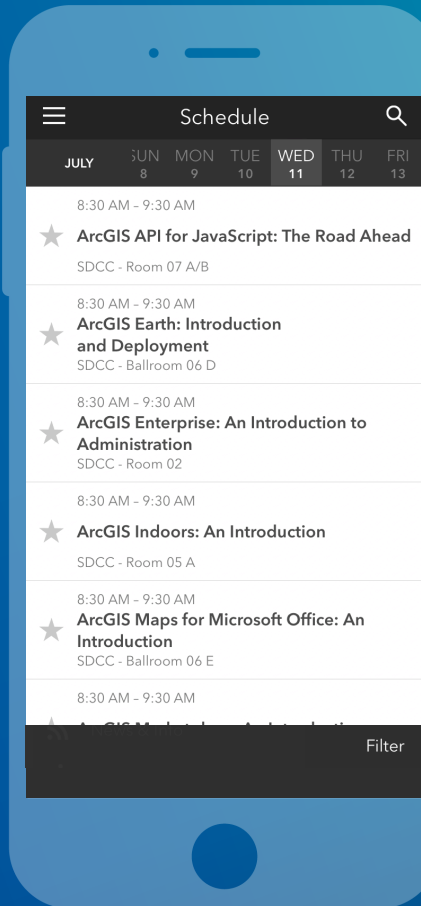
01:00 PM - 02:00 PM : **Real-Time and Big Data GIS: Road Ahead** (Primrose C-D)

Please Take Our Survey on the App

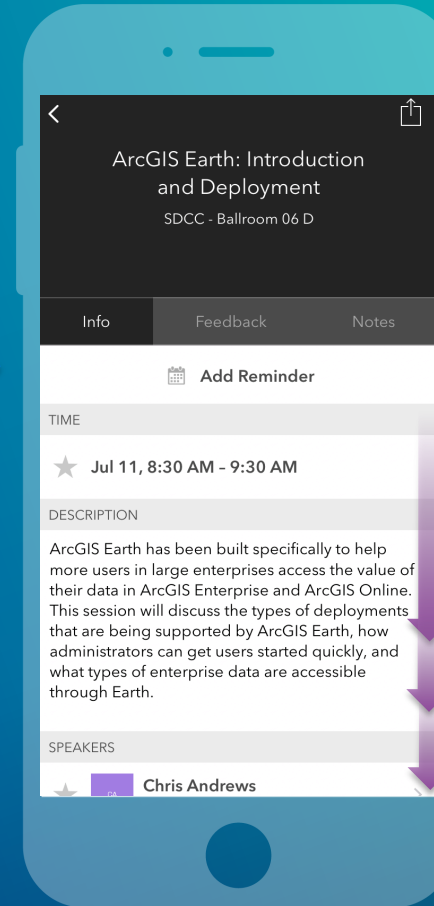
Download the Esri Events app and find your event



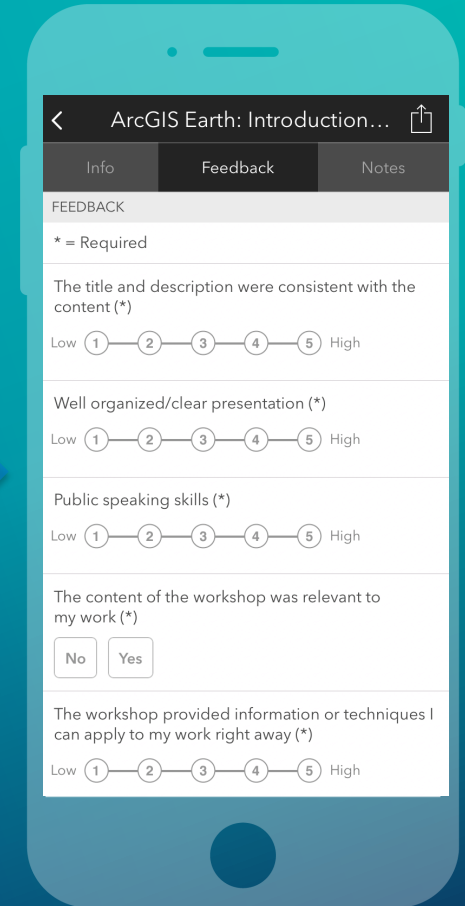
Select the session you attended



Scroll down to find the feedback section



Complete answers and select "Submit"



Questions / Feedback?



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esri

THE
SCIENCE
OF
WHERE