The Power of In-Memory Feature Layers

Joey Harig and Shawn Goulet

2025 ESRI DEVELOPER & TECHNOLOGY SUMMIT

Agenda

What

- What are in-memory feature layers?
- Differences from a service-based layer

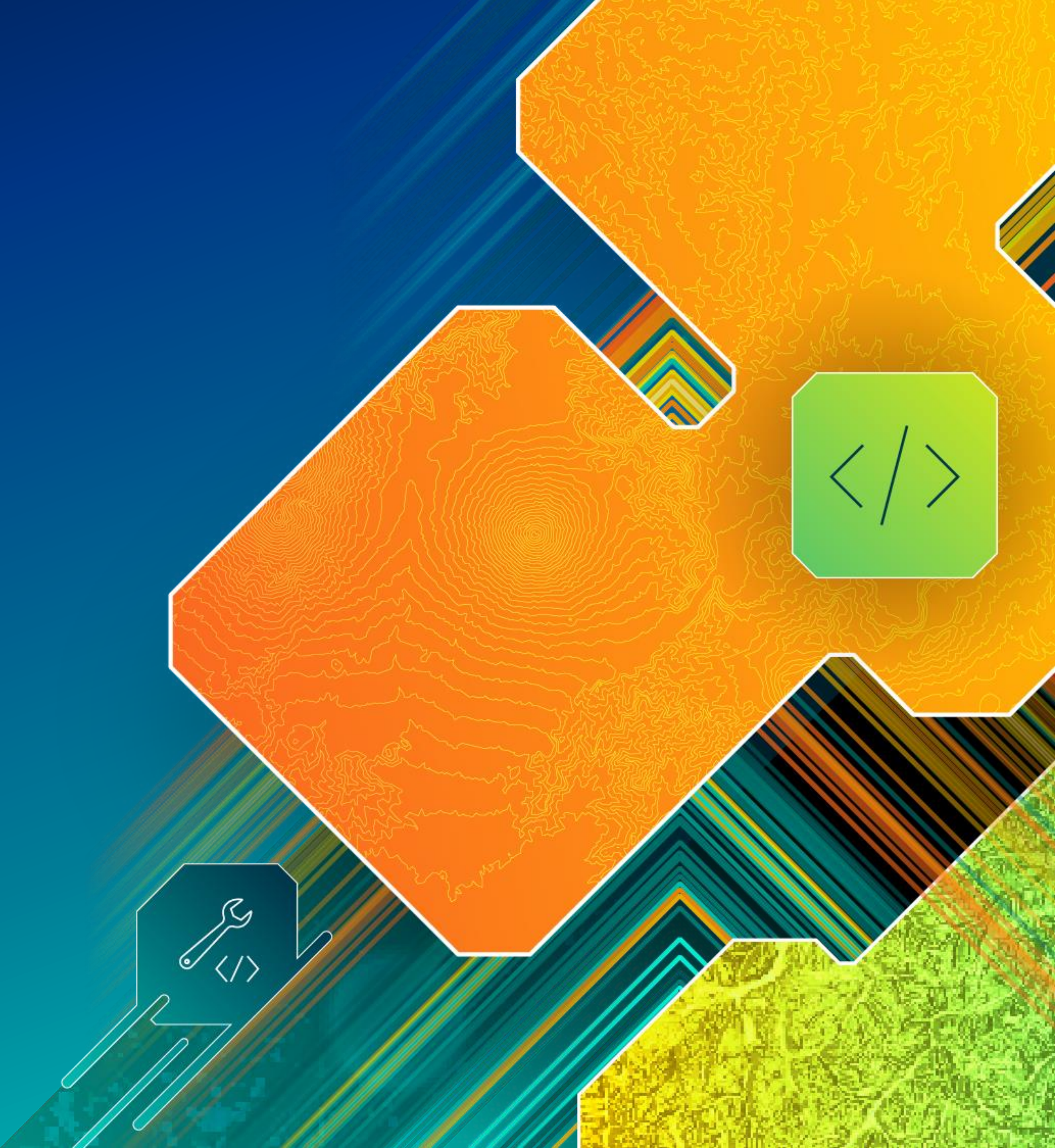
Why

- Use cases for in-memory feature layers
- Performance and data structure benefits

How

- How do we use in-memory feature layers?
- Live demo

What



What are in-memory feature layers?

In-memory feature layers are temporary layers that exist solely on the client-side, disappearing once the application is closed.

Comparison

Service based vs in-memory feature layers

Feature service	In-memory
• Created using a portal item ID or feature service URL • Fields and schema defined at the service level • Edits applied to source feature service • Support all operations	• Created using client-side graphics • Fields and schema explicitly defined on the client-side • Edits only applied locally and deleted when application is closed • Operations including "clone" and "save" are not supported

Example: create in-memory feature layer

```javascript
// create a feature layer from a set of graphics
const layer = new FeatureLayer({
  source: graphics,
  fields: [
    {
      name: "ObjectID",
      alias: "ObjectID",
      type: "oid",
    },
    {
      name: "place",
      alias: "Place",
      type: "string",
    },
  ],
  objectIdField: "ObjectID",
  geometryType: "polygon",
});
```

Example: apply edits to layer

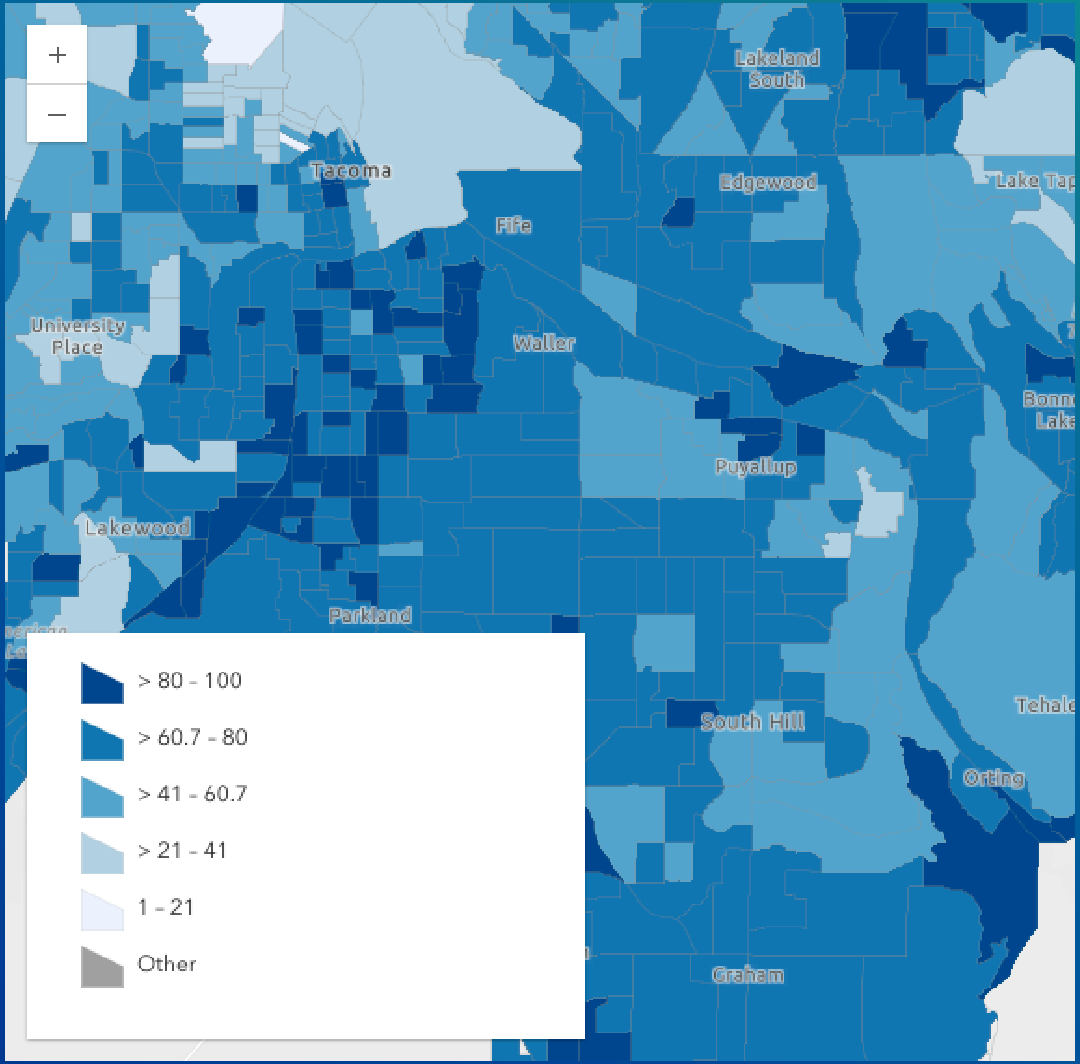
```
// define features to add, update and delete
const addFeature = new Graphic({
  geometry: geometry,
  attributes: attributes,
});
const updateFeature = {
  objectId: 123,
  field: 'value',
};
const deleteFeature = {
  objectId: 123,
};

// update in-memory layer
const response = layer.applyEdits({
  addFeatures: [addFeature],
  updateFeatures: [updateFeature],
  deleteFeatures: [deleteFeature],
});
```

Smart Mapping

The ultimate set of data visualization tools

Smart Mapping helps developers implement dynamic data visualizations. The Smart Mapping modules generate renderers specific to your data and utilize color schemes designed by expert cartographers.

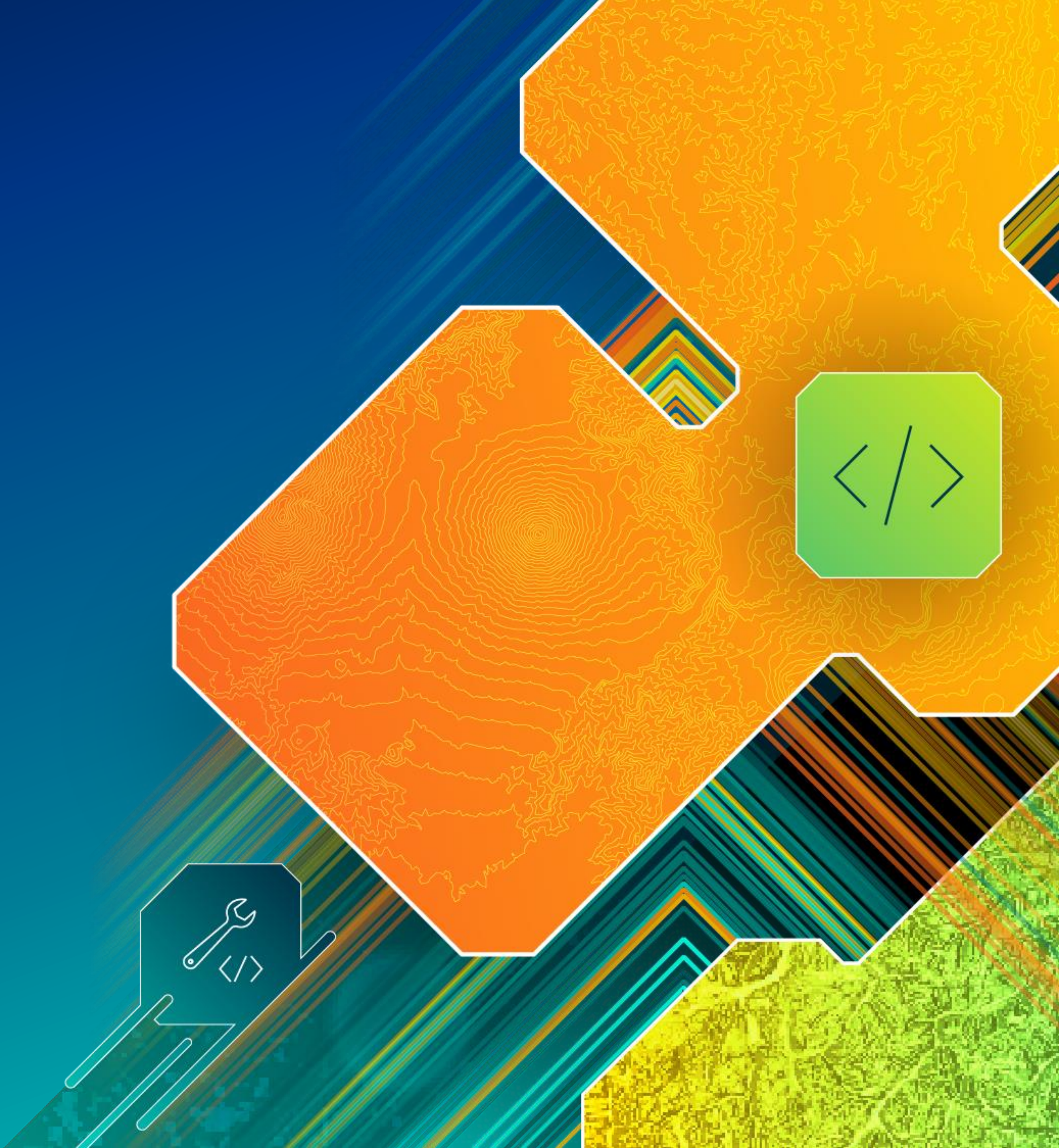
- Generated based on available data
- Use color, size, opacity and more
- Continuous or class breaks
- Multi variable (bivariate choropleth)



Example: generate a continuous color renderer

```
// visualization based on field
const colorParams = {
  layer: layer,
  view: view,
  field: "FIELD_NAME",
  theme: "above-and-below",
};


// create a continuous color renderer and apply to the layer
colorRendererCreator
  .createContinuousRenderer(colorParams)
  .then(function (response) {
    layer.renderer = response.renderer;
  });
```

Why



Why use in-memory feature layers?

In-memory feature layers allow developers to support advanced workflows by joining multiple data sources on the client-side using JavaScript.

Use cases

When it makes sense to use in-memory feature layers

Complex data models	Utilize multi-dimensional datasets that include elements such as time, geographic resolution, and demographic disaggregation without duplicating geometry definitions.
Translation	Support data translation for multiple languages without needing to publish, maintain, or query for duplicate data.
"What if" scenarios	Enable users to edit and adjust values on the map and explore "what if" scenarios without needing to update an underlying service and without needing "edit" access.
External data	Integrate external data (3rd party APIs) with geospatial data on the fly without the need for preprocessing or publishing.

Performance implications

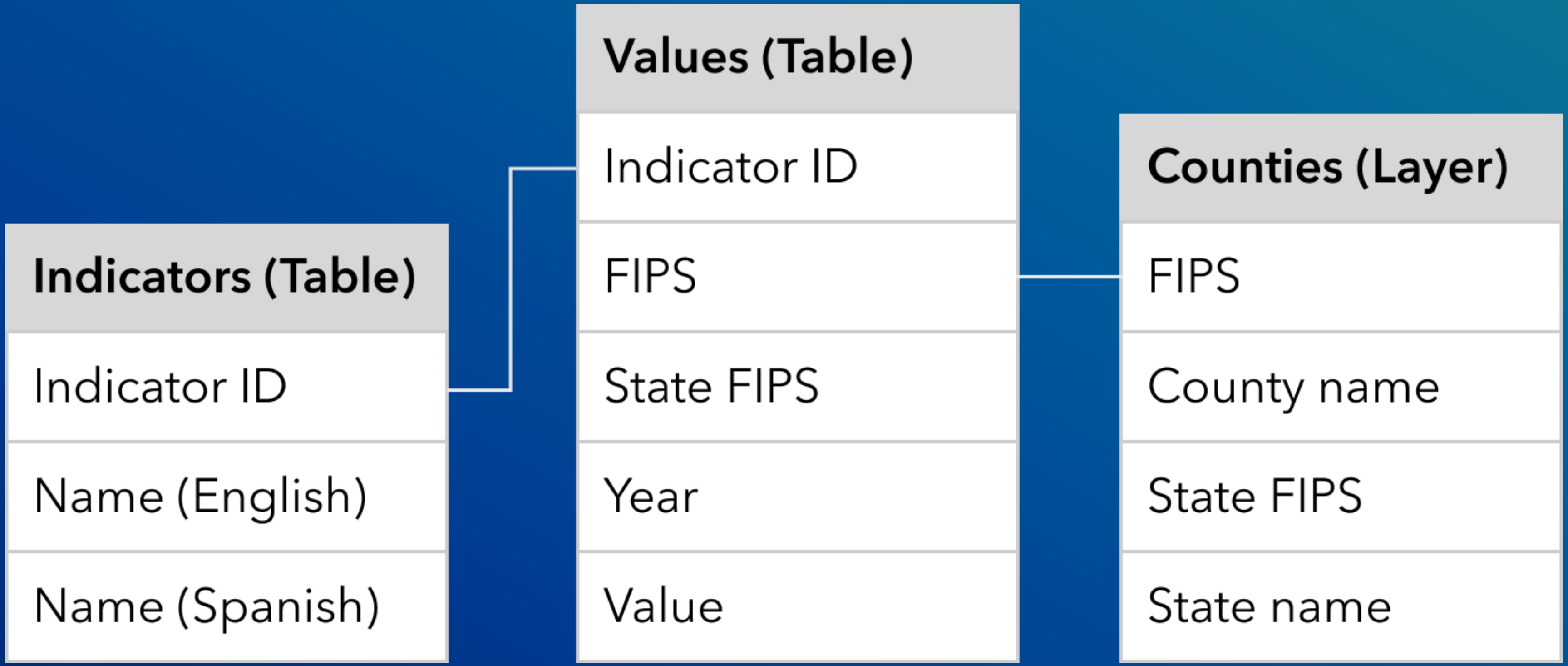
Pros and cons of using in-memory feature layers

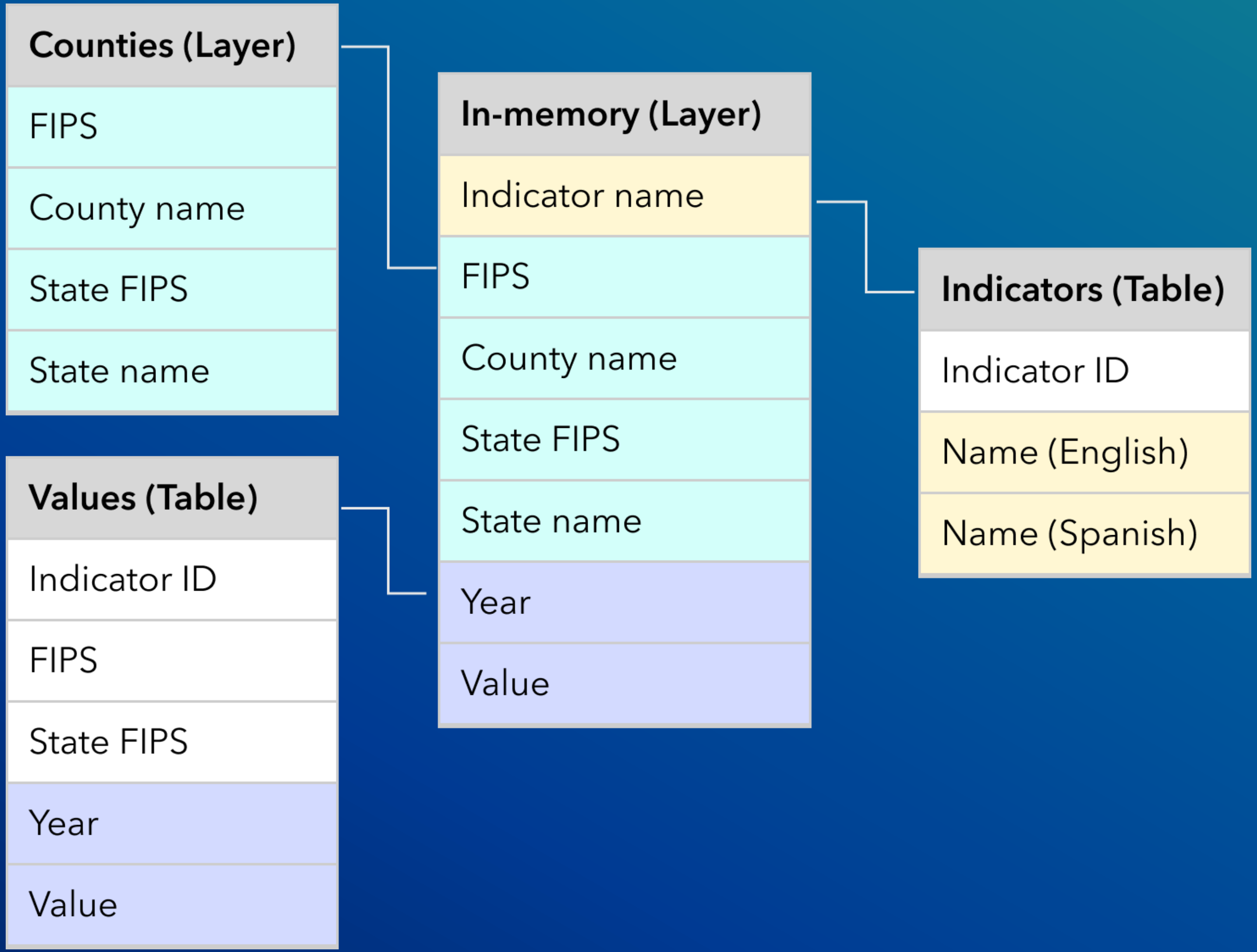
Pros	Cons
• Reduces the need for redundant geometry queries by separating geospatial data from tabular data • Able to update subsets of data without needing to re-run entire queries • Allows for the use of smaller tables and more performant services	• Higher upfront processing requirements that can impact initial app load time • Memory constraints (client-side) when dealing with large data sets

How

Our Goal

Build an application that allows users to view Census population data by county and by year in both English and Spanish.


Indicators (Table)
Indicator ID
Name (English)
Name (Spanish)
Values (Table)
Indicator ID
FIPS
State FIPS
Year
Value
Counties (Layer)
FIPS
County name
State FIPS
State name


Counties (Layer)
FIPS
County name
State FIPS
State name
Values (Table)
Indicator ID
FIPS
State FIPS
Year
Value
In-memory (Layer)
Indicator name
FIPS
County name
State FIPS
State name
Year
Value
Indicators (Table)
Indicator ID
Name (English)
Name (Spanish)

Live Demo

Leveraging Libraries

What tools are we using?

React

A powerful web development framework

Calcite

Esri's web component library for cohesive and accessible UI

i18next

An internationalization framework used to translate JavaScript apps

Development strategy

How we set up and update our application

Step 1

On application mount

- Define all data layers in application state
- Load all county and indicator features

Step 2

When features load

- Render the indicator list
- Create an in-memory layer and add to the map
- Query for unique states

Step 3

On state selection

- Filter the in-memory layer
- Zoom to the filtered features

Step 4

On indicator selection

- Find available years
- Query for indicator data
- Update the in-memory layer and generate a renderer

Code & Slides

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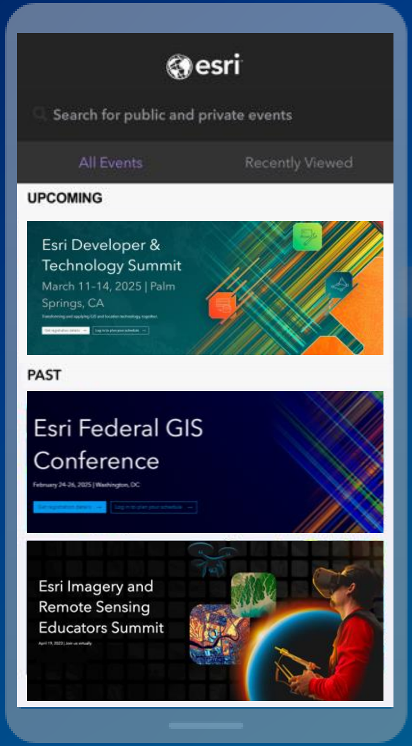

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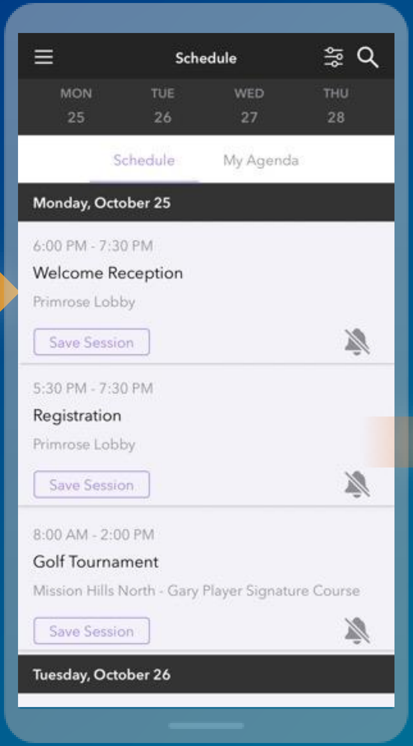


Schedule

MON 25 | TUE 26 | WED 27 | THU 28

Schedule | My Agenda

Monday, October 25

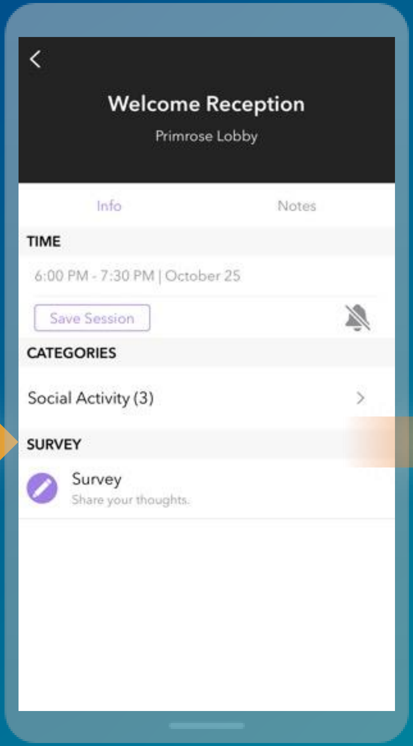
6:00 PM - 7:30 PM
Welcome Reception
Primrose Lobby
Save Session

5:30 PM - 7:30 PM
Registration
Primrose Lobby
Save Session

8:00 AM - 2:00 PM
Golf Tournament
Mission Hills North - Gary Player Signature Course
Save Session

Tuesday, October 26

Scroll down to “Survey”



Welcome Reception
Primrose Lobby

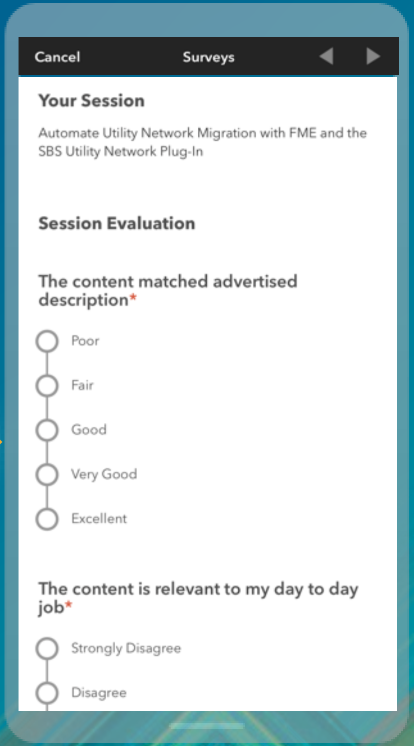
Info | Notes

TIME
6:00 PM - 7:30 PM | October 25
Save Session

CATEGORIES
Social Activity (3)

SURVEY
Survey
Share your thoughts.

Log in to access the survey



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Your Session
Automate Utility Network Migration with FME and the SBS Utility Network Plug-In

Session Evaluation

The content matched advertised description*
- Poor
- Fair
- Good
- Very Good
- Excellent

The content is relevant to my day to day job*
- Strongly Disagree
- Disagree

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