



ESRI DEVELOPER SUMMIT 2023

ArcGIS Maps SDK for JavaScript: Using Arcade with your Apps

Anne Fitz & Omar Kawach

Session Overview

- Introduction
- Learning the Arcade basics
- Using Arcade in the JavaScript SDK Profiles
- Arcade executor APIs
 - Executing Arcade on your own terms
 - Creating custom profiles

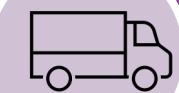
What is Arcade?

Create flexible content from existing data

- **Expression language** for...
 - calculating and formatting data values,
 - enforcing rules,
 - generating content elements, and
 - Creating any of the above conditionally.
- Works across ArcGIS applications
 - ArcGIS Pro
 - ArcGIS Online
 - ArcGIS Dashboards
 - Developer SDKs



What is Arcade?



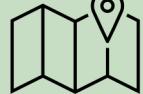
Portable

- expressions work across ArcGIS



Lightweight

- scripts and expressions execute quickly



Geospatial

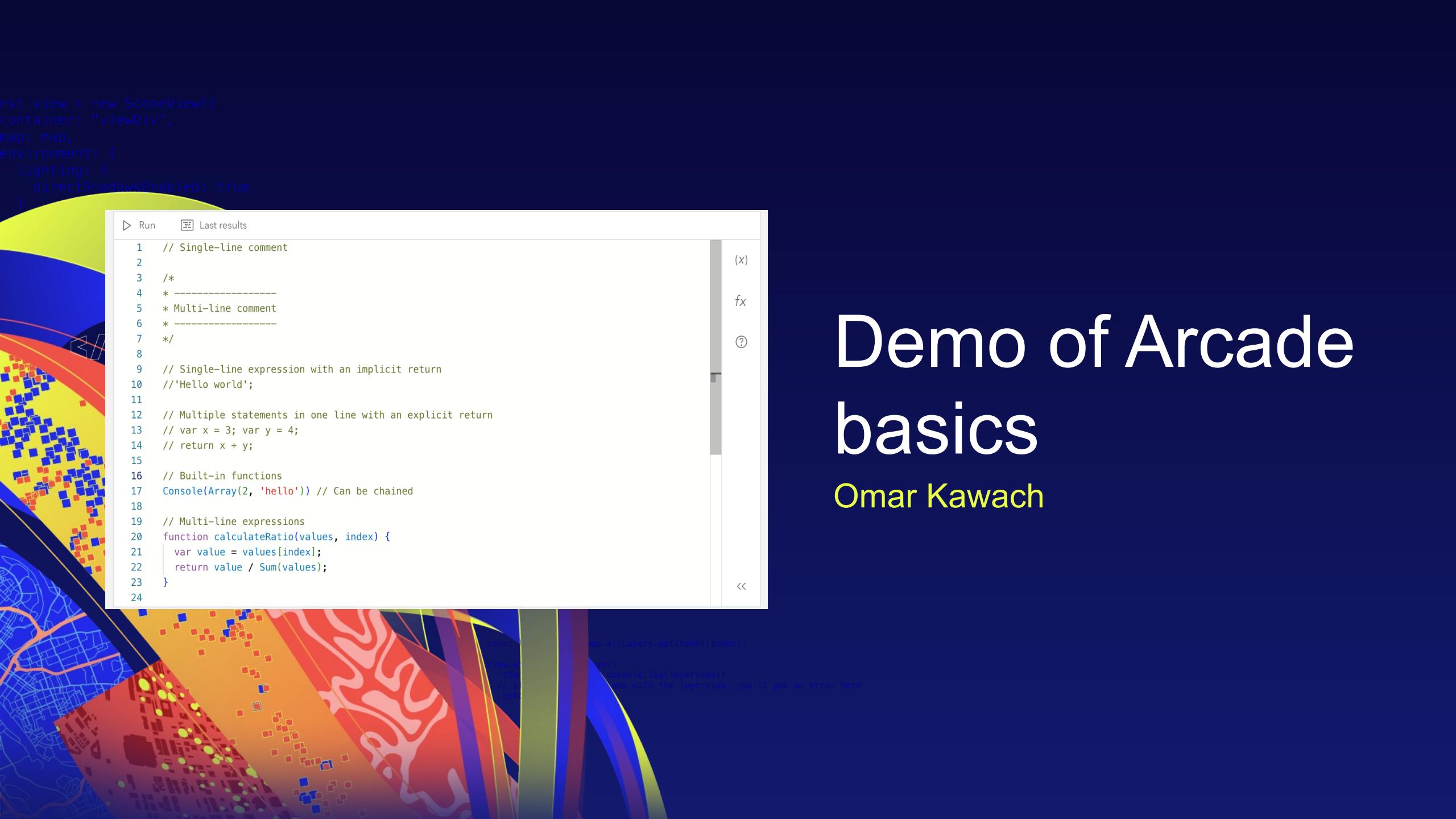
- treat geospatial data as first-class members



Secure

- expressions do not compromise security

```
const view = new SceneView({
  container: "viewDiv",
  map: map,
  environment: {
    lighting: {
      directShadowsEnabled: true
    }
  }
})
```



```
// Single-line comment
/*
 * -----
 * Multi-line comment
 * -----
 */

// Single-line expression with an implicit return
//'Hello world';

// Multiple statements in one line with an explicit return
// var x = 3; var y = 4;
// return x + y;

// Built-in functions
Console(Array(2, 'hello')) // Can be chained

// Multi-line expressions
function calculateRatio(values, index) {
  var value = values[index];
  return value / Sum(values);
}
```

Demo of Arcade basics

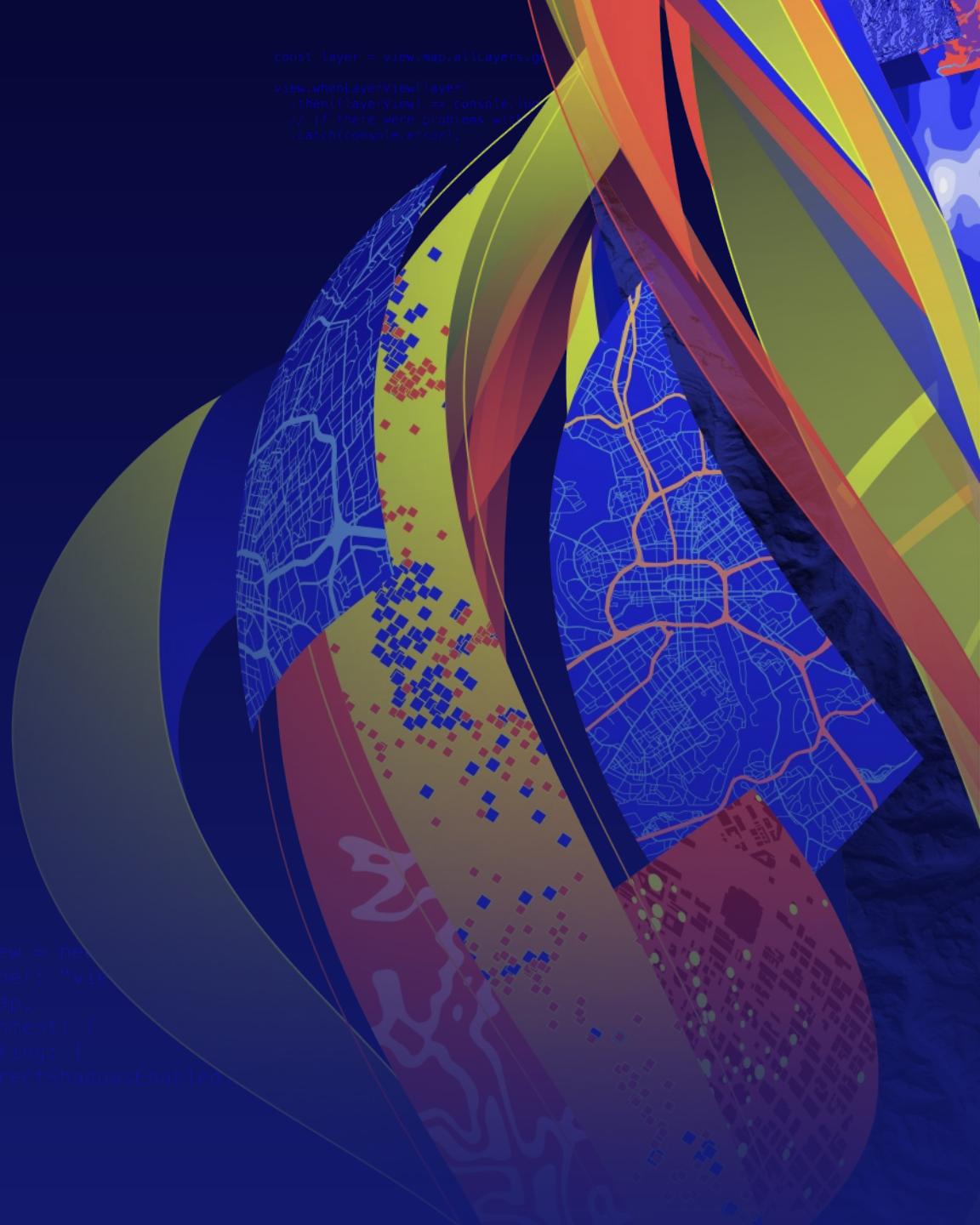
Omar Kawach

Arcade Profiles

Anne Fitz

```
const layer = view.map.allLayers.get(0);
view.whenLayerView(layer)
  .then(layerView => console.log(`Layer loaded`))
  // if there were problems with loading
  .catch(console.error);
```

```
const view = new View({
  container: "view",
  map: map,
  environment: {
    lightings: {
      directShadowsEnabled: true
    }
  }
});
```



What's a profile?

Arcade Profile = The context in which an Arcade expression is evaluated and interpreted

- Specifies:
 - The execution context
 - Profile variables
 - Function bundles
 - Valid data types that can be returned

<https://developers.arcgis.com/arcade/profiles/>

Function bundles

Describes a set of functions to include in a profile implementation

	Core bundle	Data access bundle	Database bundle	Geometry bundle	Portal access bundle	Track bundle
Constants	✓	✗	✗	✗	✗	✗
Array functions	✓	✗	✗	✗	✗	✗
Date functions	✓	✗	✗	✗	✗	✗
Debugging functions	✓	✗	✗	✗	✗	✗
Dictionary functions	✓	✗	✗	✗	✗	✗
Enterprise functions	✗	✗	✓	✗	✗	✗
Feature functions	✓	✗	✗	✗	✗	✗
FeatureSet functions	✗	✓	✗	✗	✗	✗
Geometry functions	✗	✗	✗	✓	✗	✗
Logical functions	✓	✗	✗	✗	✗	✗
Math functions	✓	✗	✗	✗	✗	✗
Portal functions	✗	● ¹	✗	✗	✓	✗
Text functions	✓	✗	✗	✗	✗	✗
Track functions	✗	✗	✗	✗	✗	✓

1. Excludes FeatureSetByPortalItem

✓ Full support ● Partial support ✗ No support

Profiles in the JavaScript SDK

Visualization

Popup

Labeling

Feature Z

Form Constraint

Form Calculation

Context	ClassBreaksRenderer UniqueValueRenderer Visual Variables	Popup Template	LabelClass	ElevationInfo in 3D Scenes Feature ordering	FeatureForm widget FieldElement	FeatureForm widget FieldElement
Profile variables	\$feature \$view.scale	\$feature \$layer \$map \$datastore	\$feature	\$feature	\$feature	\$feature \$layer \$map \$datastore
Return Type	Text Number	Text Number	Text	Number	Boolean	Text Number Date
Function bundles	Core Geometry	Core, Geometry, Data Access, Portal Access	Core Geometry	Core Geometry	Core Geometry	Core, Geometry, Data Access, Portal Access

Arcade Profiles: Self-contained environments for executing Arcade

Case Study: Labeling

\$feature

```
AIR_TEMP: 37.20000076293945  
ATM_PRESSURE: Null  
AVG_PERIOD: Null  
DEWPOINT_TEMP: Null  
DOM_WAVE_PERIOD: 4  
OBS_DATETIME: Jan 30, 2023, 4:00:00 PM  
PRESSURE_TENDENCY: Null  
R_HUMIDITY: Null  
STATIONID: "22101"  
TIDE: Null  
VISIBILITY: Null  
WATER_TEMP: 37.599998474121094  
WAVE_HEIGHT: 0.5  
WIND_CHILL: 26.799999237060547  
WIND_DIRECT: 170
```

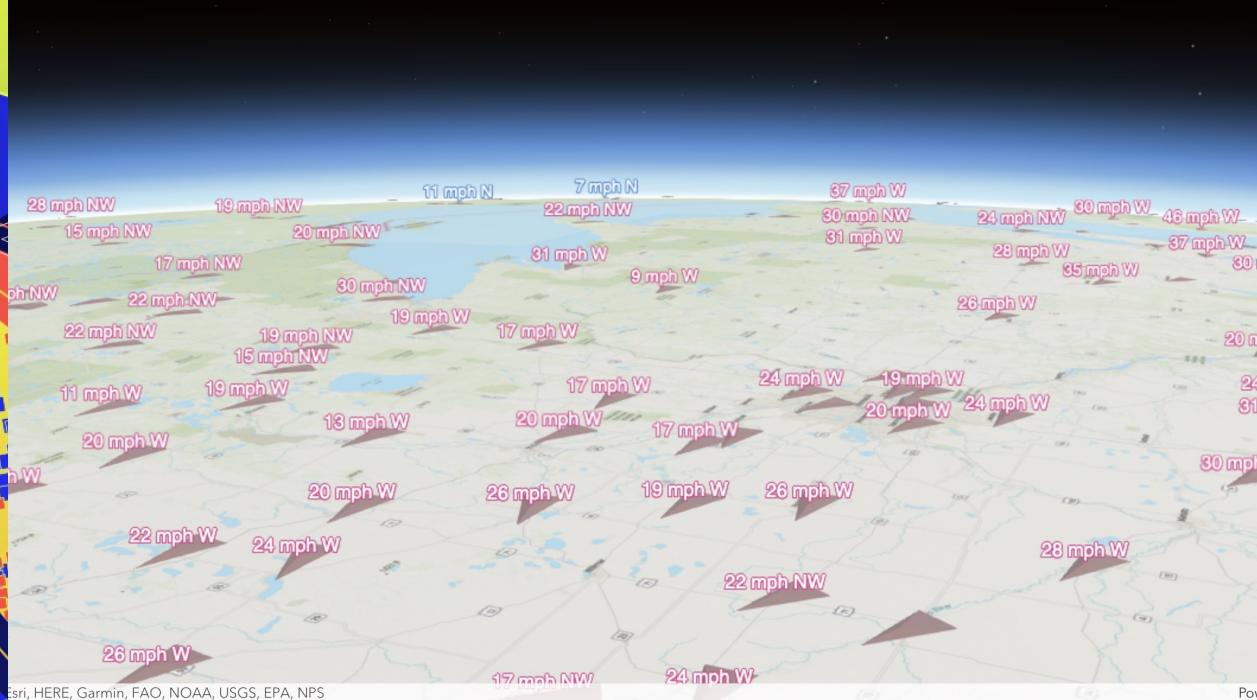
Core functions

Geometry
functions

```
1 var f = $feature["TEMP"];  
2 var c = (f - 32) * (5/9);  
3  
4 return Text(c, "#°C")
```

3° C

```
    const view = new SceneView({  
      container: "viewDiv",  
      map: map,  
      environment: {  
        lighting: {  
          directShadowsEnabled: true  
        }  
      }  
    })
```



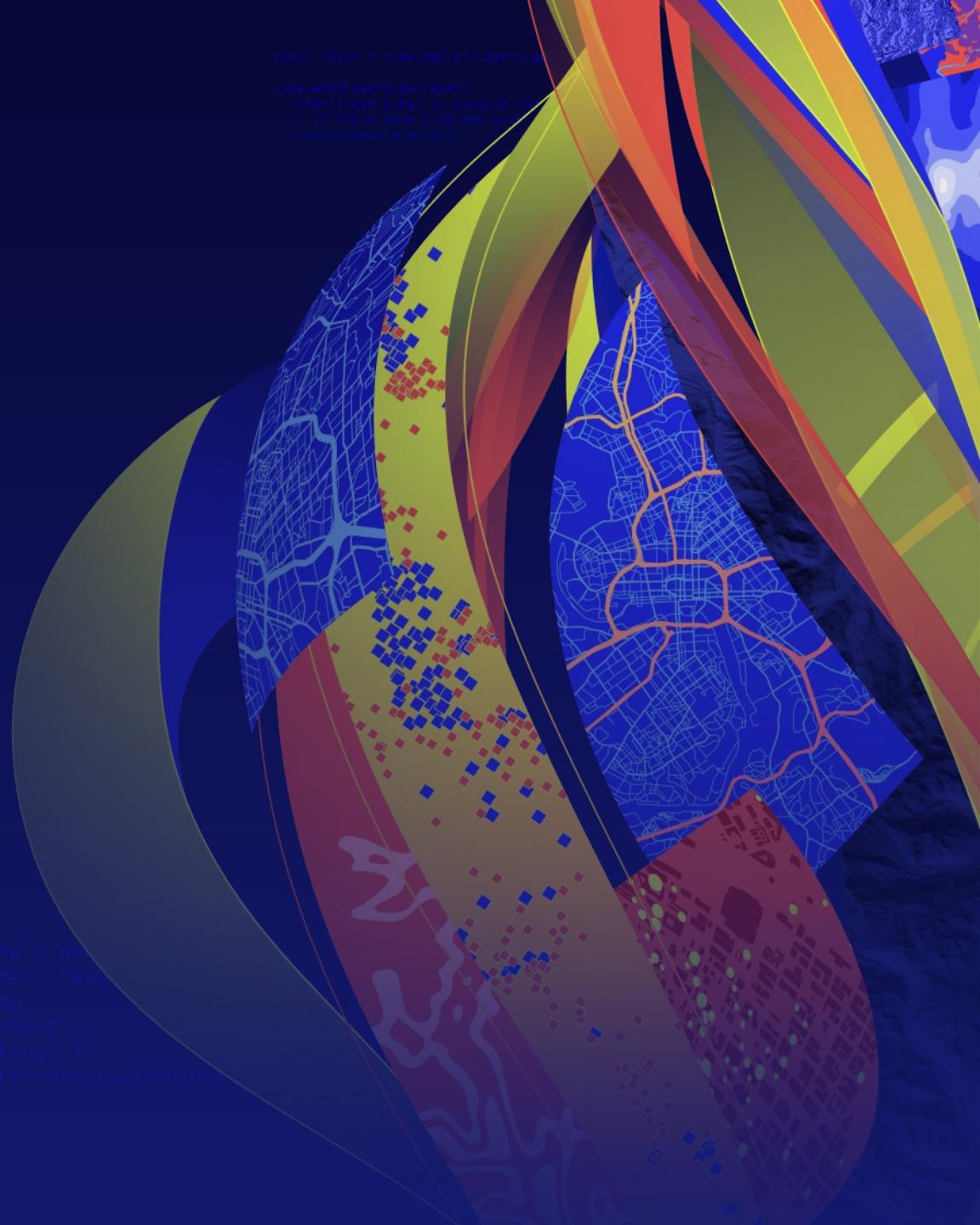
Profile Demos

Anne Fitz and Omar Kawach

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Arcade Executor

Anne Fitz



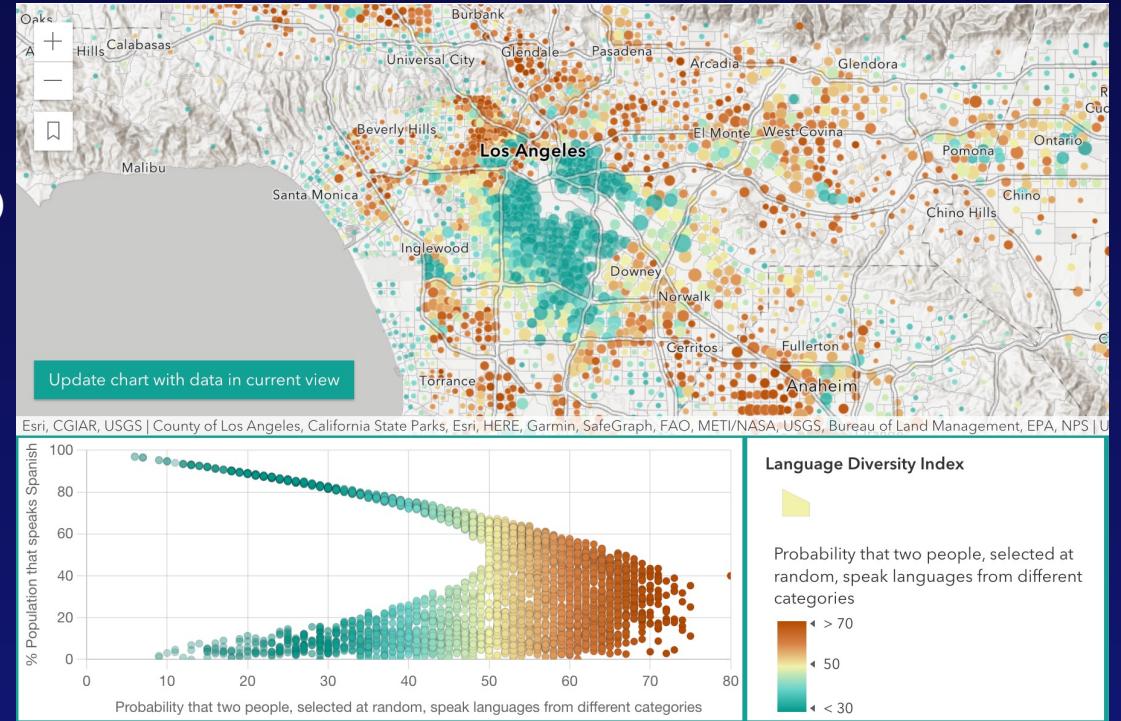
```
const layer = view.map.allLayers.get(0);
view.whenLayerView(layer)
  .then((layerView) => console.log(`Layer ${layer.name} loaded`))
  // if there were problems with loading
  .catch(console.error);
```

```
const view = new View({
  container: "view",
  map: map,
  environment: {
    lightings: [
      { directShadowsEnabled: true }
    ]
  }
});
```

Execute expressions on your own terms

[esri/arcade-module for evaluating Arcade](#)

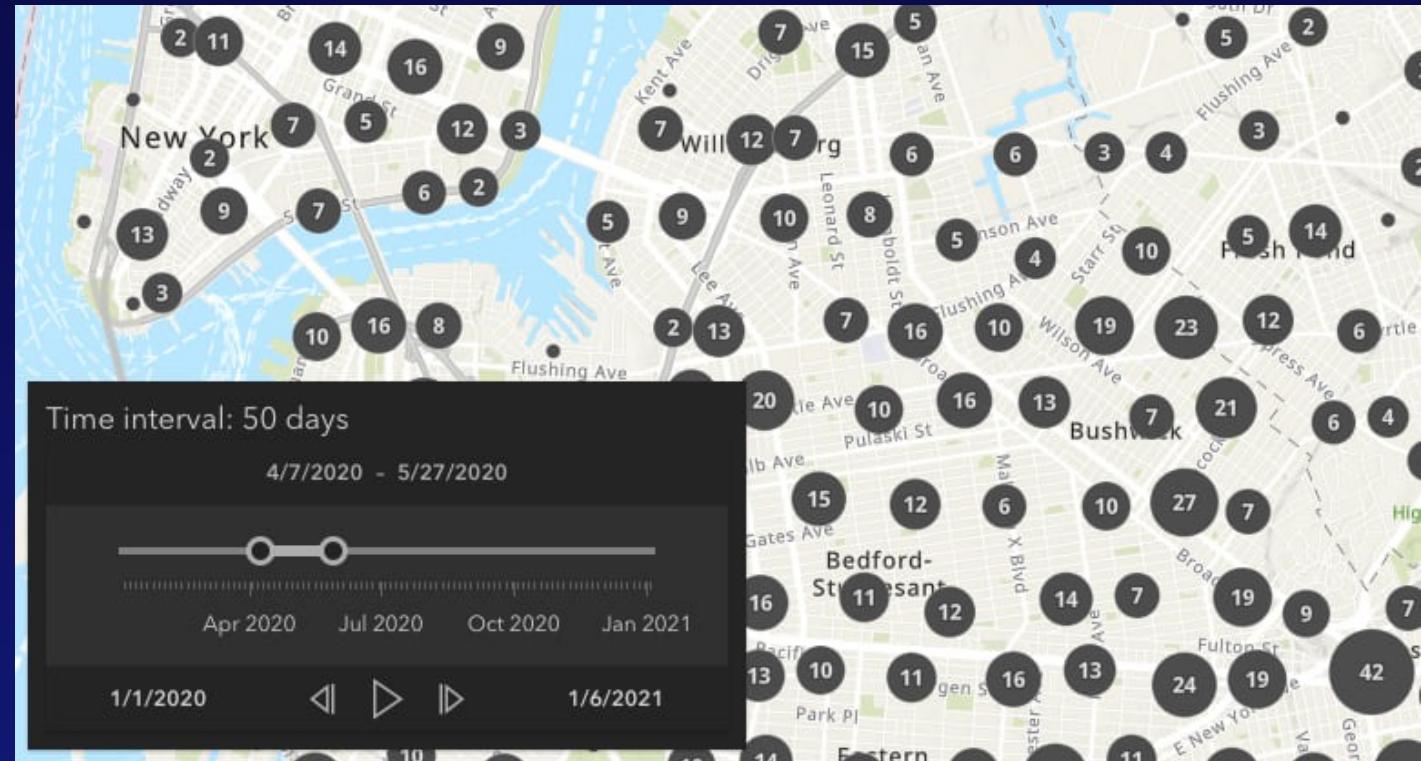
1. `createArcadeProfile`
2. `createArcadeExecutor(script, profile)`
 returns [ArcadeExecutor](#)
3. `ArcadeExecutor.execute()` or
`executeAsync()`
 - pass in an object defining profile variables & optional spatial reference
 - Returns value of evaluated expression



[Blog post: Execute expressions on your own terms](#)

Create a custom profile

- STEPS:
 1. Define the profile variables
 2. Write the Arcade expression
 3. Create an Arcade executor
 4. Execute the script
 5. Display the output



[Blog post: How to create a custom Arcade profile](#)

Resources

- Arcade documentation: <https://developers.arcgis.com/arcade>
- Using Arcade with the JavaScript SDK:
<https://developers.arcgis.com/javascript/latest/guide/arcade/>
- Arcade doc's resources page for quick links to blogs, samples, training, and videos:
<https://developers.arcgis.com/arcade/guide/resources>

This screenshot shows the ArcGIS Developers website with the URL <https://developers.arcgis.com/arcade>. The page title is "ArcGIS Arcade". It features a sidebar with navigation links like "Introduction", "Language features", "Statements", "Functions", "Variables", "Data types", "Template literals", "Operators", "If & Else", "Loops", "Profiles", "Feature sets", "Type casting", "Debugging", "Reserved words", "Release notes", "Supported products", "Resources", "Known issues", and "FAQ". The main content area has sections for "Introduction", "Where to use Arcade", and "Why Arcade is useful". A "Find page..." search bar is at the top.

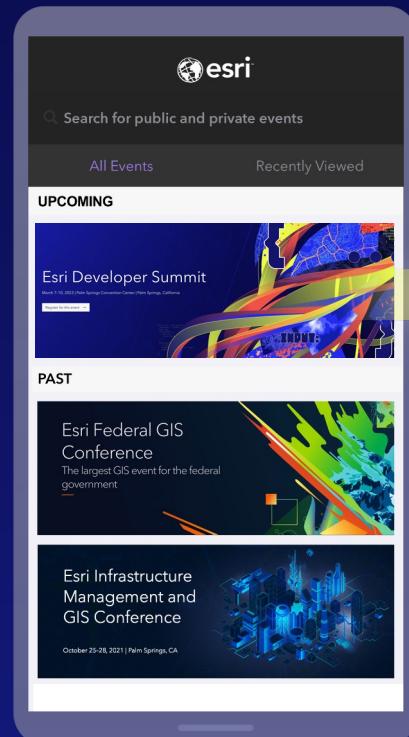
This screenshot shows the ArcGIS Developers website with the URL <https://developers.arcgis.com/javascript/latest/guide/arcade/>. The page title is "ArcGIS Maps SDK for JavaScript". It features a sidebar with navigation links like "Home", "Profiles", "Function Reference", and "Playground". The main content area has sections for "Arcade", "What is Arcade?", "How to write Arcade expressions", and a code editor window showing a snippet of Arcade code:

```
// returns the % of the population that is age 25 and older
render.valueExpression = "Round((Feature.AGE_18P / Feature.TOTAL_POP) * 100)";
```

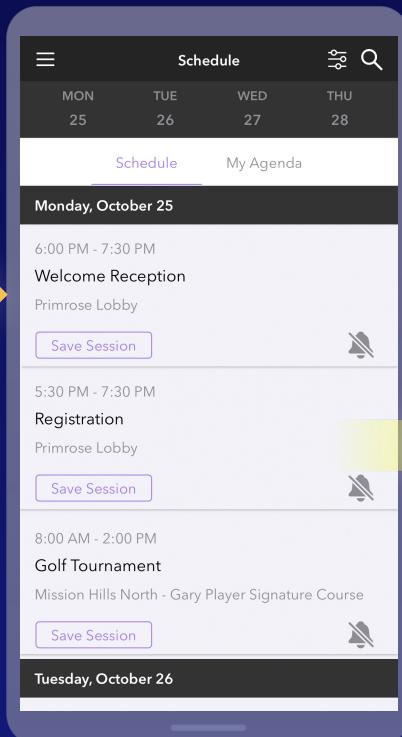
This screenshot shows the ArcGIS Developers website with the URL <https://developers.arcgis.com/arcade/guide/resources>. The page title is "ArcGIS Arcade". It features a sidebar with navigation links like "Home", "Profiles", "Function Reference", and "Playground". The main content area has sections for "Resources", "Examples", "ArcGIS Online", "ArcGIS Maps SDK for JavaScript", "Arcade Templates", "Blogs", and "Get started". A "Find page..." search bar is at the top.

Please Share Your Feedback in the App

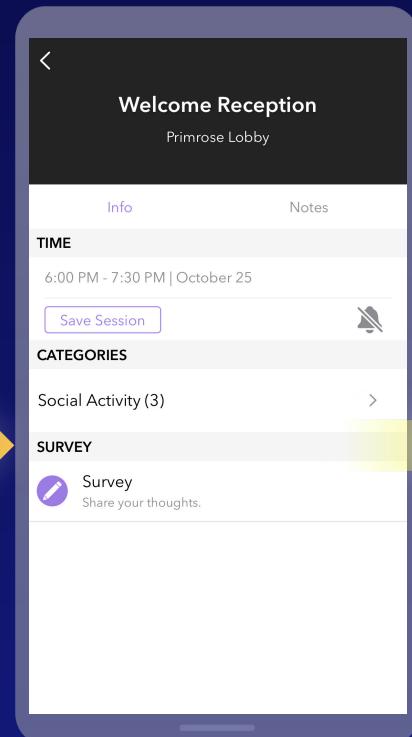
Download the Esri Events app and find your event



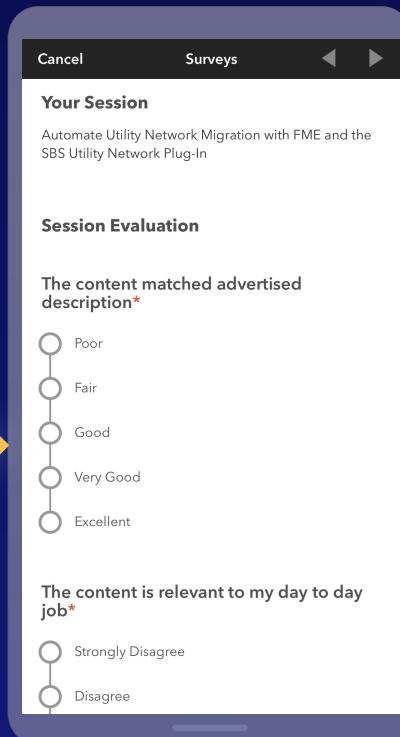
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```
const layer = view.map.addLayer(  
  view.whenLayerView(layer)   
    .then(layerView => const  
      {  
        if (there were problems)  
          catch(console.error);  
      }  
    );  
  );
```

E/SCRIPT>

```
const view = new SceneView({  
  container: "viewDiv",  
  map: map,  
  environment: {  
    lighting: {  
      directional:  
    },  
  },  
});
```

LIVE
BY
THE
CODE