Building Your Own Widget with the ArcGIS JSAPI

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Agenda

- Set up dev environment
- Develop
  - GuessWhere Class
  - Simple Widget
  - GuessWhere Widget
- Enhance GuessWhere Widget

Setting up the Dev Environment

Developer environment

JS API + TypeScript

TypeScript

Typed JavaScript

```ts
interface Person {
  name: string;
  age: number;
}

const person: Person = { name: "Franco", age: 33 };

person.age = "24"; // TS2322: Type '"24"' is not assignable to type 'number'
person.height = 5.11; // TS2339: property 'height' does not exist on type 'Person'
```

JS of the future, now

```
// let and const
let canChange = 5;
const cannotChange = 5;

// fat arrow functions
const logName = (person) => console.log(person.name);

// template strings
const greeting = `Hello, my name is ${person.name} and I am ${person.age} years old.`;

// destructuring
const { name, age } = person;

// property shorthand
const shorthand = { person };
```

IDE Support

- Visual Studio
- WebStorm
- Sublime Text
- and more!

Demo: Dev Environment

- Install TypeScript + JS API

Demo Recap: Dev Environment

- Installed TypeScript + JS API typings
- Built mapping application

Creating a Class

esri/core/Accessor

esri/core/Accessor

- JavaScript API foundation

`esri/core/Accessor`

- JavaScript API foundation
- Consistent developer experience

```
// unified object constructor
const me = new Person({ name: "Franco", age: 33 });

// watch for changes to `age`
me.watch("age", singHappyBirthday);
```

Demo: GuessWhere Class

```
interface GuessWhere extends Accessor {
  view: MapView | SceneView;
  readonly choices: Choice[];
  readonly points: number;
  start(): void;
  choose(choice: Choice): boolean;
  end(): void;
}

interface Choice {
  name: string;
  feature: Graphic;
}
```

Demo Recap: GuessWhere Class

- Implemented `GuessWhere`
  - Extended `esri/core/Accessor`
  - Created properties with `@property`
  - Typed constructor arguments
  - Created public + private methods

Writing a Widget

About Widgets

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- What?
  - Single-purpose pieces of functionality
  - Encapsulated UI components
  - Cohesive (integrated, unified)

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- What?
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- Why?
  - Reusable
  - Interchangeable
- How?
  - Extend `esri/Widgets/Widget`

`esri/widgets/Widget`

- Base widget class (View)
- Extends `esri/core/Accessor`
  - Properties
  - Watching properties
- Lifecycle

Lifecycle

- *constructor*
- *postInitialize*
- *render*
- *destroy*

render

- Defines UI
- Reacts to state changes
- Uses JSX (VDOM)

Lets create a simple widget

Simple widget view that renders the an *enabled* state of a button

```
interface SimpleWidget extends Widget {
  enabled: boolean;
}
```

Demo: SimpleWidget

Develop a simple widget

Demo Recap: SimpleWidget

- Extended `esri/widgets/Widget`
- Implemented `render()`
- Added a `renderable()` property
- Added `onclick` event
- Added CSS Object + BEM Methodology
- Toggled property with event to re-render

Improving Our Widget

Architecture

- Separation of concerns
  - Views + ViewModels
  - UI replacement
  - Easier integration

Views

- "SimpleWidget" example
- Extend `esri/widgets/Widget`
- Rely on ViewModel
- Focus on UI

ViewModels

- "GuessWhere" class example
- Extend `esri/core/Accessor`
- Provide APIs to support View
- Focus on business logic

View + ViewModel in action

- View renders the state of the VM
  - Looks at properties on VM and renders accordingly

View + ViewModel in action

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- User interacts with View (property/method)
  - Causes a change on VM or View

View + ViewModel in action

- View renders the state of the VM
  - Looks at properties on VM and renders accordingly
- User interacts with View (property/method)
  - Causes a change on VM or View
- View updates
  - Renders again due to changes on VM

Lets create *GuessWhere* Widget

Simple *GuessWhere* game widget

Demo VM Interface

```
interface GuessWhereViewModel extends Accessor {
  view: MapView | SceneView;
  readonly state: "splash" | "playing" | "game-over";
  readonly choices: Choice[];
  readonly points: number;
  start(): void;
  choose(choice: Choice): boolean;
  end(): void;
}
```

```
interface Choice {
  name: string;
  feature: Graphic;
}
```

Demo: View Interface

```
interface GuessWhere extends Widget {
  view: MapView | SceneView; // alias of `viewModel.view` property
  viewModel: GuessWhereViewModel;
}
```

Demo: Updated View

- Use `GuessWhere` class as `GuessWhereViewModel`
  - Add a state property
- Create `GuessWhere` view
  - Alias VM properties
  - Create BEM classes object
  - Render menu, HUD, round

Updated View | ViewModel Test Page

Demo Recap: Update View

- Paired View and ViewModel
- Rendered property from ViewModel
- Wired up interactivity
- Learned to apply styles
- Dynamically rendered UI based on a property value change

Going Further

Final Recap

- Set up dev environment
- Wrote `GuessWhere` class
- Developed a `GuessWhere` Widget
- Enhanced `GuessWhere` Widget
- Went further

Additional Resources

- Implementing Accessor
- Setting up TypeScript
- Widget Development
- JavaScript API SDK
- Styling
- Widget Patterns

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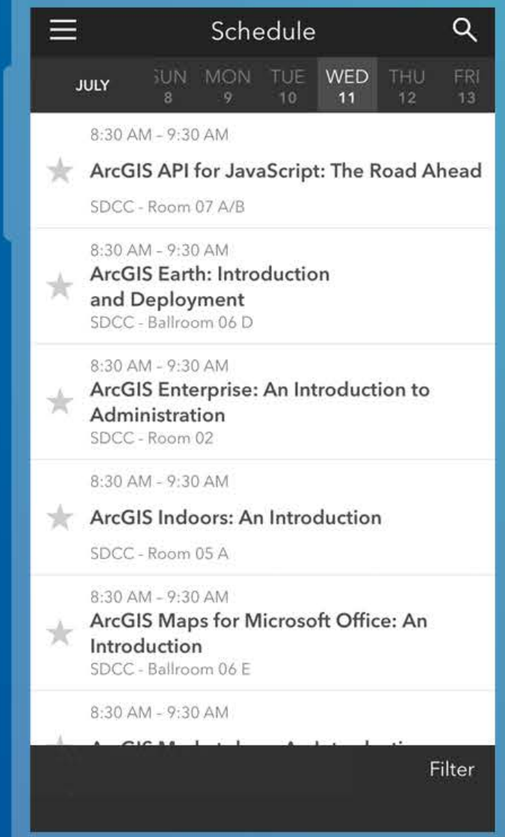

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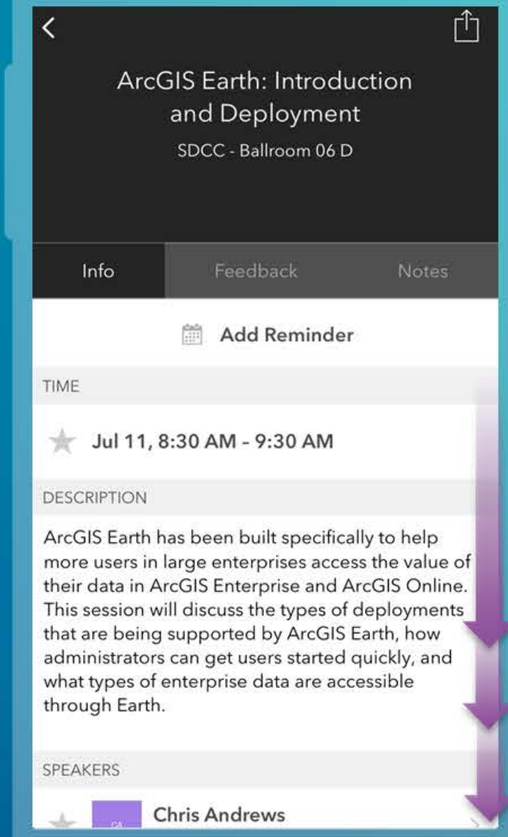

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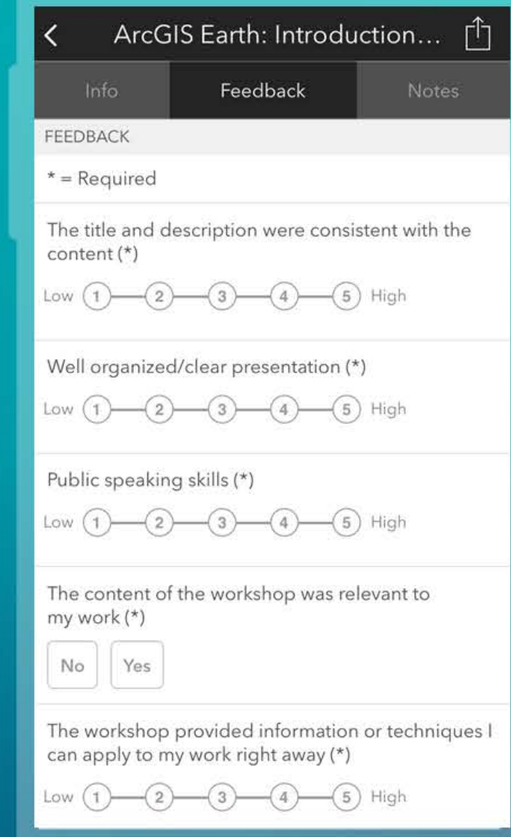

Question Time

🤔 *Where can I find the slides/source?*

👉 bit.ly/buildwidgetsds19 👈

esri

THE SCIENCE OF WHERE