ArcGIS API 4.0 for JavaScript: Patterns and Best Practices

Short URL: esriurl.com/4xpatterns2017
Presenters

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Agenda

- 4x: What do I get?
- 4x What are my options?
- Working with Widgets
- Getting responsive with Views
- Using Existing Apps + Tools
- Resources
What do I get with the 4x JSAPI?

- Simplified and consistent API
- Write apps in ES6 or TypeScript
- Modern browser support (IE11+)
What are my options?

- Needs?
- Resources?
- Time?
- Customizations?
What do you need?

- Charts and operational monitoring
  - Dashboard, Insights (data exploration)
- Mobile and offline
  - Native app
What can you get with the JavaScript API?

- Suite of templates and configurable apps
- Out-of-the-box widgets
- Integration with various frameworks
Needs

Custom App

Web AppBuilder

Templates

Config Apps

Resources
Custom App

Web AppBuilder

Resources
Widgets!

- ~20 Widgets out of the box
- Widgets help make great apps
- Less code for you to write
- Designed with responsive apps in mind
- We'll look at a few key widgets
Default Widgets

- MapView & SceneView
  - Popup
  - Attribution
  - Zoom
- SceneView
  - NavigationToggle
  - Compass
Widgets: SDK

Widgets in SDK
Widgets: Popup

- Responsive Design
- Size changes depending on size of view
- Can be docked to top, bottom, center and sides
Demo

- **Popup Demo**
Widgets: Expand

- Collapsible button/panel
- Can be used with widgets, dom node, HTML
- Designed for view component use
Widgets: Expand Sample

- **Expand Sample**

```javascript
var htmlString = "<div style='background:red; color: white;'>Hello World</div>

var node = document.createElement("div");
node.innerHTML = "Hello World";
node.style.backgroundColor = "blue";
node.style.color = "white";

var bgExpand = new Expand({
    view: view,
    //content: htmlString,
    //content: node,
    //content: basemapGallery,
    expandIconClass: "esri-icon-basemap"
});
```
View

Useful view properties for building apps

- height
- width
- heightBreakpoint
- widthBreakpoint
- orientation
- size
- padding
- ui
  - components
View UI

- View has `ui` property => class for user interface
- Can has `components` that can hold...
  - Widget, DOM node, text, html string
- [Default UI](#)
View UI: Components

- Provide easy way to add/position widgets on a view
- **SDK**

```javascript
var myWidget = new MyWidget();
view.ui.add(myWidget, "top-right");
```
Demo

- Components Demo
- UI Positions Demo
View: Padding

- View will work off a subsection of the full view
- Useful when UI covers portion of the view
  - [SDK](#)
Demo

- View Padding Demo
View: Sizing

Useful view sizing properties for responsive apps

- height
- width
- heightBreakpoint
- widthBreakpoint
- orientation
- size
View: Breakpoints

- [Breakpoints SDK](#)
View UI: CSS

- Breakpoints also add classes on view

```css
.esri-view esri-view-height-xsmall,
esri-view-height-less-than-small,
esri-view-height-less-than-medium,
esri-view-height-less-than-large,
esri-view-height-less-than-xlarge,
esri-view-width-xlarge,
esri-view-width-greater-than-xsmall,
esri-view-width-greater-than-small,
esri-view-width-greater-than-medium,
esri-view-width-greater-than-large,
esri-view-orientation-landscape {}  
```
Demo

- View UI Sizes
Apps

- Lots of existing apps
- Use as starting point
- Customize
- Code on Esri Github
Apps: Configurable AGOL

- Configurable Apps Gallery
- Choose an app
Apps: Boilerplates & Examples

• 3x
  ▪ [Creating App Templates](#)
  ▪ [Application Boilerplate](#)

• 4x
  ▪ [Application Base](#)
  ▪ [Configurable App Examples](#)
Apps: Calcite Maps

Bootstrap theme made with ArcGIS Maps in mind

- Calcite Maps GitHub
- Live Examples
Web AppBuilder
Apps: Web AppBuilder

- Two Options
  - Online
  - Developer Edition
Web AppBuilder - Online

- Easy to set up
- Hosted on ArcGIS.com
- Share settings
- Custom widgets in Portal
  - blog post
Web AppBuilder - Developer Edition

- Deploy on your own site
- Use custom widgets
- Download the SDK
Web AppBuilder - Developer Edition

- Custom Widgets
  - Solutions Widgets
  - Widget Generator
Apps: Scaffolding app
Architect your app

- TypeScript (widgets)
- Modular
- Tests
- Performance (don't over-optimize)
TypeScript

- **Typings** npm install --save @types/arcgis-js-api
- **Widget Development Guide**
- **Implementing Accessor**
Structure your app

- Keep it modular

```
src/
  app/
    interfaces/  <-- TypeScript Interfaces used in app
    sources/     <-- external APIs
    stores/      <-- manage application state
    styles/      <-- css files
    widgets/     <-- custom widget code
    main.ts      <-- entry point for application
    tests/       <-- unit and functional tests
```
Take it further

dist/   <-- compiled and runnable application
public/ <-- non-code resources
    assets/   <-- images, fonts, icons
    favicon.ico  <-- page icon
    index.html   <-- HTML for application
manifest.appcache  <-- application cache (fallback)
manifest.json     <-- installable app
oauth-callback.html     <-- authentication
service-worker.js     <-- any service worker caching you want

src/
typings/  <-- any custom typings you need
    extensions.d.ts  <-- package file
package.json
postcss.config.js  <-- Optional PostCSS configurations
tsconfig.json     <-- TypeScript compilation configuration
tsllint.json  <-- Linting for your TypeScript code
TypeScript Best Practices

- Use interface over type
- For JSAPI modules, import `WebMap = require("esri/WebMap")`
  - We don't use default exports (need to support vanilla JS users)
  - Or JS users would need to do `var webmap = new WebMap.default()`
- Use provided decorators (Accessor and Widget)
Progressive Web Apps

- *Tough with a mapping library*
- Avoid starting with a white page (application shell)
- Cache all images/css/js (appcache or service worker)
- Offline is sketchy, tricky and all around tough for mapping
- [Learn more](#)
Sample manifest.appcache

CACHE MANIFEST
# v0.1
index.html
oauth-callback.html
app/main.js
assets/icons/icon-256x256.png

http://js.arcgis.com/4.4/dojo/nls/dojo_en-us.js
http://js.arcgis.com/4.4/esri/views/MapView.js
http://js.arcgis.com/4.4/esri/WebMap.js

app/styles/main.css
https://s3-us-west-1.amazonaws.com/patterns.esri.com/files/cal

https://s3-us-west-1.amazonaws.com/patterns.esri.com/files/cal
https://js.arcgis.com/4.4/esri/themes/base/icons/fonts/Calcite
https://js.arcgis.com/4.4/esri/themes/base/fonts/avenir-next/A
https://js.arcgis.com/4.4/esri/themes/base/fonts/avenir-next/A

NETWORK:
*
Sample Service Worker

```javascript
var filesToCache = [
    "./",
    "./index.html",
    "./oauth-callback.html",
    "./app/main.js",
    "http://js.arcgis.com/4.4/esri/views/MapView.js",
    "./app/styles/main.css",
    "./assets/icons/icon-256x256.png",
    "https://s3-us-west-1.amazonaws.com/patterns.esri.com/files/
    "https://js.arcgis.com/4.4/esri/themes/base/icons/fonts/Cal
    "https://js.arcgis.com/4.4/esri/themes/base/fonts/avenir-
    "https://js.arcgis.com/4.4/esri/themes/base/fonts/avenir-
  ];
self.addEventListener("install", function(e) {
  e.waitUntil(
    caches.open(cacheName).then(function(cache) {
      return cache.addAll(filesToCache);
    });
});
```
Take advantage of some modern tooling

- **PostCSS** - plugin based CSS processing
- **Prettier** - automatically beautify code
- Use Grunt, Gulp, or even just npm scripts
Review an app
Lets Recap

- What you get in 4x
- Options for creating apps
- Widgets you can use
- View properties, components, responsiveness
- Existing apps available to customize
  - Configurable
  - Boilerplates
  - Calcite Maps
  - WebAppBuilder
- App tools, building good apps
Additional Resources

- Documentation
- 4x What's new
- 4x FAQ
JSAPI Resources

- TypeScript definition files
- Bower
- JSHint

esriurl.com/resources
ArcGIS API for JavaScript

Developers > Web Developers
Blogs

- [ArcGIS Blog](http://www.esri.com/arcgisblog)
- [odoe.net](http://www.odoe.net)
Get The Code

esriurl.com/4xpatterns2017
Related Sessions

- **ArcGIS API for JavaScript: What’s New**
- **Getting Started with ArcGIS API for JavaScript**
- **Building 3D GIS**
- **Applications with JavaScript**
- **Optimizing Your JavaScript App for Performance**
- **ArcGIS API for JavaScript: Customizing Widgets**
- **Strategies for Building Mobile Apps Using ArcGIS API for JavaScript**
Questions?
Thank you!