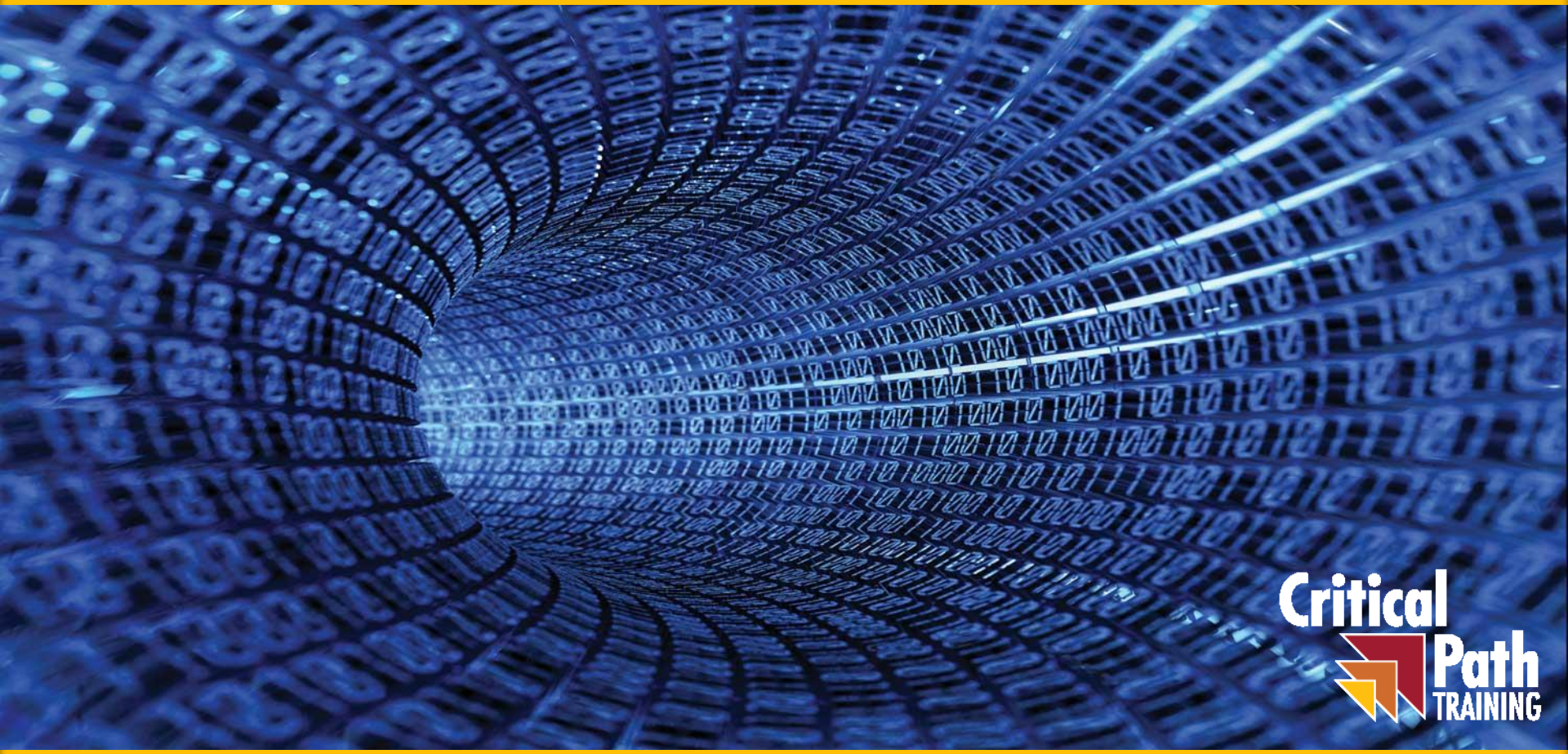
Introduction to the SharePoint Framework



Agenda

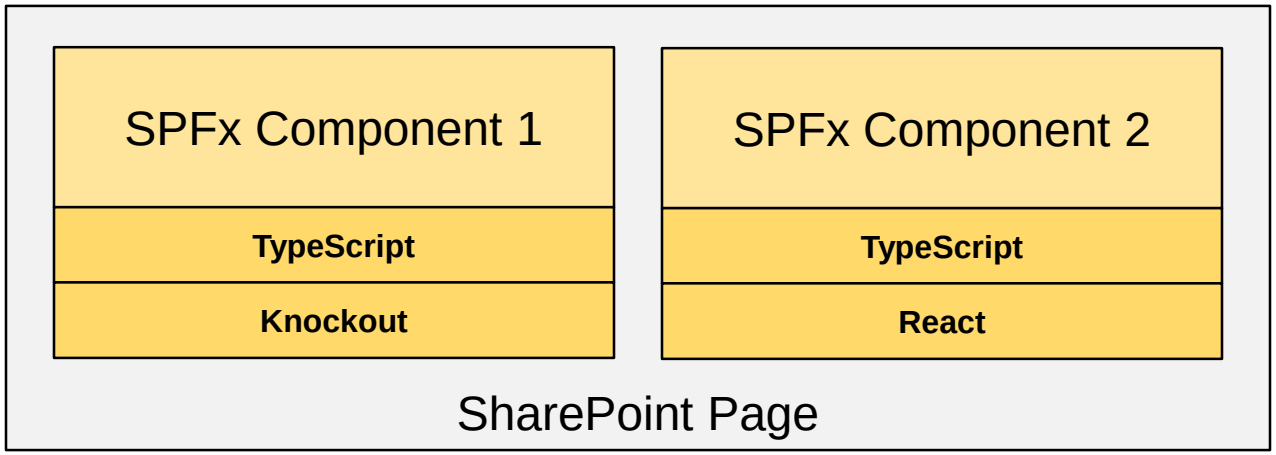
- Introduction to the SharePoint Framework
- Creating SPFX Projects using the Yeoman Generator
- Testing & Debugging Webparts in SharePoint Workbench
- Managing Styles using SCSS Files and CSS Modules
- Creating a Web Part with Custom Properties
- Creating Application Customizers

Evolution of the SharePoint Platform

- Farm Solutions
  - Server-side DLLs and XML-based Definitions
- ~~Sandboxed Solutions~~
- SharePoint ~~Apps~~ Add-ins
  - iFrames used to add in extra security dimension
  - Introduced complexity with 2 domains (app web vs host web)
- JavaScript Injection
  - Scripting can be disabled in SharePoint Online
  - No formal deployment model
- SharePoint Framework
  - A natural evolution and formalization of JavaScript Injection model

SharePoint Framework (SPFx)

- Getting Started with the SharePoint Framework
  - Your write your logic using client-side TypeScript code
  - You can use any JavaScript libraries (e.g. React, Knockout, etc.)
  - Your code runs under the identity of the current user
  - You don't worry about authenticating the user - it's already done
  - You can leverage the APIs added by SharePoint Framework
  - You create components like webparts and application customizers

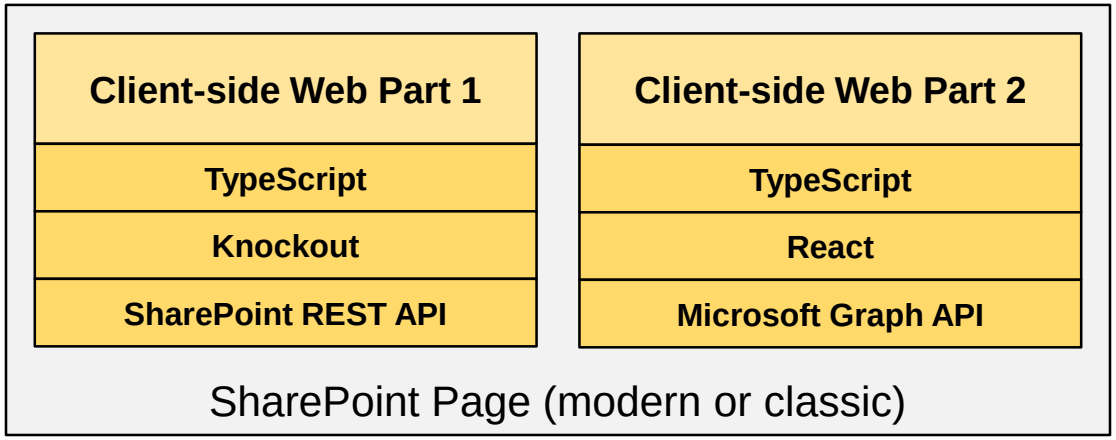


SPFx versus the SharePoint Add-in Model

- SPFx is quite different from SharePoint Add-in model
  - SPFx components hosted directly on page, not in iFrame
  - SPFx components rendered using DOM of hosting page
  - No more confusion over "host web" versus "app web"
- SPFx developer experience is completely different
  - SPFx uses modern tools (npm, Yeoman, gulp and webpack)
  - Requires move from Visual Studio to Node.js & Visual Studio Code
- Considerations for migrating to SharePoint Framework
  - SPFx is replacement for SharePoint-hosted add-in model
  - SPFx has nothing similar to provided-hosted add-in model

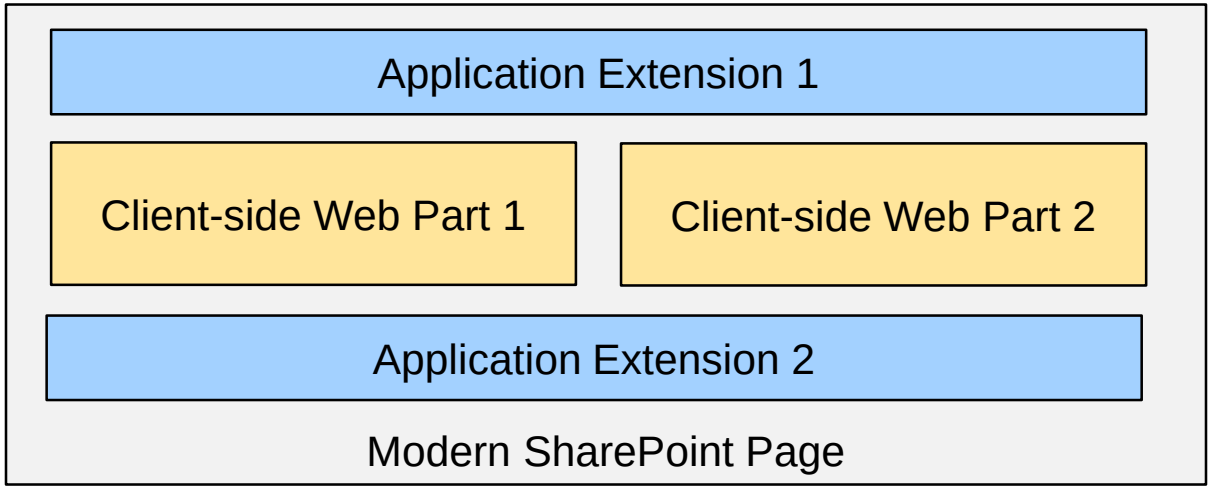
SharePoint Framework Webparts

- Webparts play central role in SharePoint Framework development
  - SPFx webparts designed to run on modern pages
  - SPFx webparts can also be added to classic pages
- Developing Webparts
  - You create webparts using classes defined in Typescript
  - Webpart class inherits from base class defined by SPFx APIs
  - SPFx support webpart lifecycle methods (e.g. render, load, serialize. etc.)
  - SPFx APIs provide easy access to content in SharePoint and Office 365



SharePoint Framework Component Types

- SPFx allows you to create several styles of webparts
  - Standard Webparts
  - React Webparts
- SPFx also provides several other Application Extensions
  - Application Customizer
  - Field Customizers
  - Command Sets



Installing Packages for SPFx Development

- Install Gulp (version 3)

```
npm install -g gulp@3
```

- Install Yeoman

```
npm install -g yo
```

- Install Yeoman Template for SPFx

```
npm install -g @microsoft/generator-sharepoint
```

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Using the SPFx Yeoman Template

- SPFx projects created with Yeoman template

```
yo @microsoft/sharepoint
```

- Template provides wizard-like experience when creating new project

npm

```
c:\Student\Modules\04_SharePointFramework\Lab\spfx-lab>yo @microsoft/sharepoint

     _-----_
    |       |    .--------------------------.
    |--(o)--|    |      Welcome to the      |
   `---------´   |  SharePoint Client-side  |
    ( _´U`_ )    |    Solution Generator    |
    /___A___\    '--------------------------'
     |  ~  |
   __'.___.'__
 ´   `  |° ´ Y `

Let's create a new SharePoint solution.
? What is your solution name? (spfx-lab)
```

Answering Questions about a New Project

- Do you want to support SharePoint On-premises?

```
Let's create a new SharePoint solution.
? What is your solution name? spfx-lab
? Which baseline packages do you want to target for your component(s)? (Use arrow keys)
> SharePoint Online only (latest)
  SharePoint 2016 onwards, including SharePoint Online
```

- Do you want to create a webpart or an SPFx extension

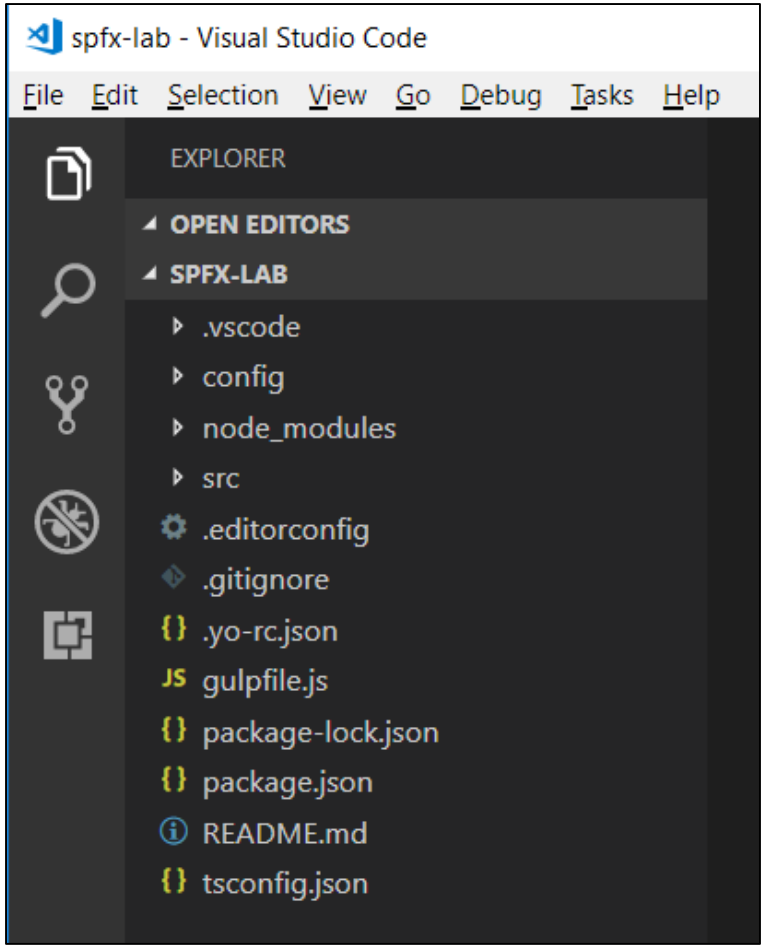
```
? Which type of client-side component to create? (Use arrow keys)
> WebPart
  Extension
```

- Do you want to create a standard webpart or a React webpart

```
Add new Web part to solution spfx-lab.
? What is your Web part name? WalmartGreeter
? What is your Web part description? My first SPFX webpart
? Which framework would you like to use? (Use arrow keys)
> No JavaScript framework
  React
  Knockout
```

SharePoint Framework Project Structure

- Project created as Node.js project



SharePoint Framework Adds Gulp Tasks

- Run **gulp --tasks** to see SPFx gulp tasks added to project

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Student\Modules\04_SharePointFramework\Lab\spfx-lab> gulp --tasks
[00:05:07] Using gulpfile C:\Student\Modules\04_SharePointFramework\Lab\spfx-lab\gulpfile.js
[00:05:07] Tasks for C:\Student\Modules\04_SharePointFramework\Lab\spfx-lab\gulpfile.js
[00:05:07] ├── clean
[00:05:07] ├── build
[00:05:07] ├── default
[00:05:07] ├── bundle
[00:05:07] ├── dev-deploy
[00:05:07] ├── deploy-azure-storage
[00:05:07] ├── package-solution
[00:05:07] ├── test
[00:05:07] ├── serve
[00:05:07] ├── trust-dev-cert
[00:05:07] └── untrust-dev-cert
PS C:\Student\Modules\04_SharePointFramework\Lab\spfx-lab>
```

Package.json

package.json - spfx-lab - Visual Studio Code

File Edit Selection View Go Debug Tasks Help

EXPLORER

OPEN EDITORS

package.json

SPFX-LAB

- .vscode
- config
- node_modules
- src
- .editorconfig
- .gitignore
- .yo-rc.json
- gulpfile.js
- package-lock.json
- package.json
- README.md
- tsconfig.json
- tslint.json

package.json

```
1  {
2    "name": "spfx-lab",
3    "version": "0.0.1",
4    "private": true,
5    "engines": {
6      "node": ">=0.10.0"
7    },
8    "scripts": {
9      "build": "gulp bundle",
10     "clean": "gulp clean",
11     "test": "gulp test"
12   },
13   "dependencies": {
14     "@microsoft/sp-core-library": "1.6.0",
15     "@microsoft/sp-webpart-base": "1.6.0",
16     "@microsoft/sp-lodash-subset": "1.6.0",
17     "@microsoft/sp-office-ui-fabric-core": "1.6.0",
18     "@types/webpack-env": "1.13.1",
19     "@types/es6-promise": "0.0.33"
20   },
21   "devDependencies": {
22     "@microsoft/sp-build-web": "1.6.0",
23     "@microsoft/sp-module-interfaces": "1.6.0",
24     "@microsoft/sp-webpart-workbench": "1.6.0",
```

SPFx API Version Number

Running gulp trust-dev-cert

- Testing SPFx code requires self-signed certificate
  - Certificate used serve pages with SSL at https://localhost
  - Certificated created and registered using **gulp trust-dev-cert**

```
PS C:\Student\Modules\04_SharePointFramework\Lab\spfx-lab> gulp trust-dev-cert
Build target: DEBUG
[07:51:33] Using gulpfile C:\Student\Modules\04_SharePointFramework\Lab\spfx-lab\gulpfile.js
[07:51:33] Starting gulp
[07:51:33] Starting 'trust-dev-cert'...
[07:51:33] Starting subtask 'configure-sp-build-rig'...
[07:51:33] Finished subtask 'configure-sp-build-rig' after 4.71 ms
[07:51:33] Starting subtask 'trust-cert'...
[07:51:33] Finished subtask 'trust-cert' after 67 ms
[07:51:33] Finished 'trust-dev-cert' after 73 ms
[07:51:33] ==================[ Finished ]==================
[07:51:34] Project spfx-lab version:0.0.1
[07:51:34] Build tools version:3.7.4
[07:51:34] Node version:v8.11.4
[07:51:34] Total duration:3.28 s
PS C:\Student\Modules\04_SharePointFramework\Lab\spfx-lab>
```

- **gulp trust-dev-cert** must be run within project directory
  - However, you only have to run this command once
  - No need to run **gulp trust-dev-cert** on a per-project basis

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The "Hello World" SPFx Webpart

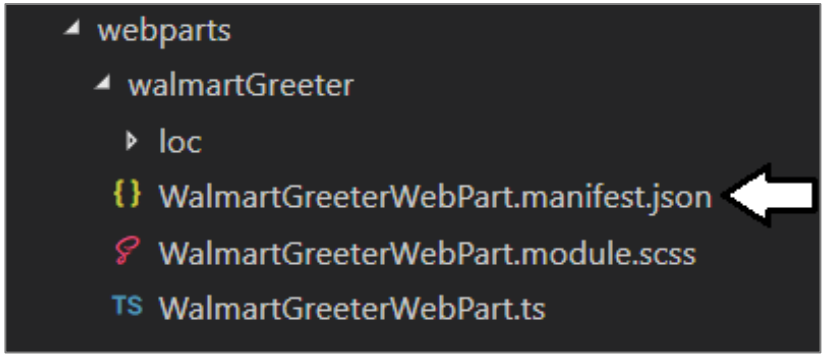
- Webpart class must extend BaseClientSideWebPart
  - Override render() for minimal “hello world” functionality
  - Base class provides API though **context** and **pageContext**
  - Base class provides **domElement** to access hosting page DOM

TS WalmartGreeterWebPart.ts

```
import { BaseClientSideWebPart } from '@microsoft/sp-webpart-base';

export default class WalmartGreeterWebPart extends BaseClientSideWebPart<any> {

  public render(): void {

    let currentUser = this.context.pageContext.user.displayName;

    this.domElement.innerHTML = `
      <div>
        <h2>Hello ${currentUser}</h2>
      </div>`;
  }

}
```

Webpart Manifest

- Each webpart requires its own manifest file
  - Manifest file automatically added by SPFx Yeoman template



  - Update manifest to set webpart title and icon

```
    "preconfiguredEntries": [{
      "groupId": "5c03119e-3074-46fd-976b-c60198311f70",
      "group": { "default": "Other" },
      "title": { "default": "Walmart Greeter" },
      "description": { "default": "My first SPFX webpart" },
      "officeFabricIconFontName": "Emoji2",
      "properties": {
        "description": "WalmartGreeter"
      }
    }]
  }
```

Web Part Context

```
public render(): void {

  var container = jquery(this.domElement);
  container.append( jquery("<h2>").text("Web Part Context Demo") );

  var table: JQuery = this.CreateTable();
  this.AddTableRow(table, "site.id:", this.context.pageContext.site.id.toString());
  this.AddTableRow(table, "web.id:", this.context.pageContext.web.id.toString());
  this.AddTableRow(table, "web.title:", this.context.pageContext.web.title);
  this.AddTableRow(table, "web.absoluteUrl:", this.context.pageContext.web.absoluteUrl);
  this.AddTableRow(table, "web.serverRelativeUrl:", this.context.pageContext.web.serverRelativeUrl);
  this.AddTableRow(table, "web.templateName:", this.context.pageContext.web.templateName);
  this.AddTableRow(table, "web.currentCultureName:", this.context.pageContext.cultureInfo.currentCultureName);
  this.AddTableRow(table, "web.language:", this.context.pageContext.web.language.toString());
  this.AddTableRow(table, "user.displayName:", this.context.pageContext.user.displayName);
  this.AddTableRow(table, "user.loginName:", this.context.pageContext.user.loginName);
  this.AddTableRow(table, "user.emal:", this.context.pageContext.user.email);
  this.AddTableRow(table, "this.diplayMode:", this.displayMode.toString());
  this.AddTableRow(table, "context.webPartTag:", this.context.webPartTag);
  container.append(table);
```

Property	Value
site.id:	a5aa0f03-16b6-4057-8704-daaea2f84494
web.id:	b68b2b24-63c2-42af-a10b-fabb37c034f3
web.title:	Labs for CBD365 Team Site
web.absoluteUrl:	https://labsforcbd365.sharepoint.com
web.serverRelativeUrl:	/
web.templateName:	1
web.currentCultureName:	en-US
web.language:	1033
user.displayName:	Ted Pattison
user.loginName:	student@labsforcbd365.onmicrosoft.com
user.emal:	
this.diplayMode:	2
context.webPartTag:	WebPart.InspectorWebPart.eaf44355-2d45-4e1c-b8de-e8b3bce60279

DEMO

Hello World with SPFx

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Issues with CSS in Web Development

- CSS can be hard to manage in large applications
  - Global style names can conflict with one another
  - Component CSS should not affect other parts of page
  - Component CSS should be isolated
  - You should avoid using element IDs in CSS
  - Prefer using classes instead of IDs
  - You should create class names unique across page

Bad, Bad, Bad - do not use IDs in a webpart

```
public render(): void {
  this.domElement.innerHTML = `
    <div id="myWebPart" >
      <div id="myTitle" >Hello World</div>
    </div>`;
}
```

Working with SASS and .SCSS Files

- SPFx uses Syntactically Awesome Style Sheets (SASS)
  - Styles maintained in .scss files instead of .css files
  - SASS is superset of CSS with variables, selector nesting & mixins
  - SASS compilation occurs when you build project using **gulp build**
  - Webpack compiles .scss files into .css files
- SASS compilation generates unique style names
  - **helloWebPart** renamed to **helloWebPart_0989818e**

Hello.module.scss

```
$font-stack:    Helvetica, sans-serif;
$background-color: lightyellow;
$foont-size: 3.0em;
$padding: 18px;

.helloWebPart{
  font: $font-stack;
  font-size: $foont-size;
  background-color: $background-color;
  border: 1px solid black;
  border-radius: $padding;
  padding: $padding;
  text-align: center;
}
```

SASS

Hello.module.css

```
.helloWebPart_0989818e{
    font:Helvetica,sans-serif;
    font-size:3em;
    background-color:#ffffe0;
    border:1px solid #000;
    border-radius:18px;
    padding:18px;
    text-align:center}
```

SCSS Compilation Generates TypeScript File

- SASS compilation also generates TypeScript file
  - Used to provide strongly-types style names in TypeScript code

WalmartGreeterWebPart.module.scss

```scss
.walmartGreeter {

  .container {
    max-width: 700px;
    margin: 0px auto;
  }

  .title {
    font-size: 24px;
    color: darkblue;
  }

}
```

TS WalmartGreeterWebPart.module.scss.ts

```typescript
/* tslint:disable */
require('./WalmartGreeterWebPart.module.css');
const styles = {
  walmartGreeter: 'walmartGreeter_d498b2d0',
  container: 'container_d498b2d0',
  title: 'title_d498b2d0',
};

export default styles;
/* tslint:enable */
```

Importing Style Names in a TypeScript File

- You can run **gulp build** to force SASS compilation
  - **import** statement to .scss file displays error until you run **gulp build**

```
import styles from './WalmartGreeterWebPart.module.scss';
```

- Once compiled, SCSS styles names can be referenced in TypeScript

```
import styles from './WalmartGreeterWebPart.module.scss';

export default class WalmartGreeterWebPart extends BaseClie

  public render(): void {
    this.domElement.innerHTML = `
      <div class="${styles.container}" >
        <div class="${styles.}" >Hello World</div>
      </div>`;
  }

}
```

```
container
title
walmartGreeter
```

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Web Part Properties

- Define interface with properties

IGreeterWebpartWebPartProps.ts

```
export interface IGreeterWebpartWebPartProps {
  greeting: string;
  largefont: boolean;
  color: string;
}
```

- Add interface to web part class definition

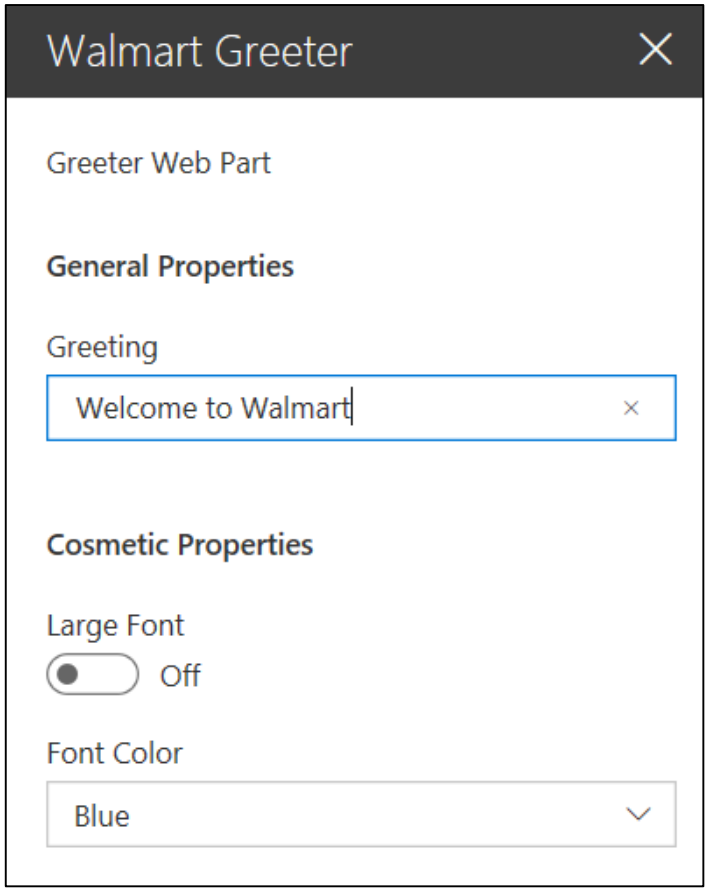
```
class GreeterWebpartWebPart extends BaseClientSideWebPart<IGreeterWebpartWebPartProps> {
```

- Override getPropertyPaneConfiguration()

```
protected getPropertyPaneConfiguration(): IPropertyPaneConfiguration {
  return {
    pages: [
      {
        header: { description: "Greeter Web Part" },
        groups: [
        {
            groupName: "General Properties",
            groupFields: [
              PropertyPaneTextField('greeting', { label: 'Greeting' }),
```

Property Panel Settings

```
protected getPropertyPaneConfiguration(): IPropertyPaneConfiguration {
  return {
    pages: [ {
        header: { description: "Greeter Web Part" },
        groups: [ {
            groupName: "General Properties",
            groupFields: [
              PropertyPaneTextField('greeting', { label: 'Greeting' }),
            ]
          },
          {
            groupName: "Cosmetic Properties",
            groupFields: [
              PropertyPaneToggle('fontBold', {
                label: 'Font Bold',
                onText: 'On',
                offText: 'Off'
              }),
              PropertyPaneDropdown('fontType', {
                label: 'Font Type',
                options: [
                  { key: 'Arial', text: 'Arial' },
                  { key: 'Courier,', text: 'Courier' },
                  { key: 'Verdana', text: 'Verdana' }
                ]
              }),
              PropertyPaneSlider("fontSize", {
                label: "Font Size",
                min: 24,
                max: 64
              }),
            ]
        }]
      }
    ]
  };
}
```



DEMO

Web Part Properties

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SPFx Application Extensions

- Application Customizers
  - Used to add page header and/or page footer into modern pages
  - Application customizers not supported in classic pages
- Field Customizers
  - Used to add client-side behavior on top of site columns
  - Allows you to create custom field rendering experience
- Command Sets
  - Allows you to add custom commands into SharePoint UI
  - SPFx component for creating user custom actions
  - Users invoke commands which trigger your client-side code

Creating an Application Customizer

- Yeoman templates support creating application extension
  - You can choose between the 3 types of application extensions

```
Let's create a new SharePoint solution.
? What is your solution name? spfx-extension-lab
? Which baseline packages do you want to target for your component(s)? SharePoi
? Where do you want to place the files? Use the current folder
Found npm version 5.6.0
? Do you want to allow the tenant admin the choice of being able to deploy the s
 running any feature deployment or adding apps in sites? No
? Which type of client-side component to create? Extension
? Which type of client-side extension to create? Application Customizer
Add new Application Customizer to solution spfx-extension-lab.
? What is your Application Customizer name? MyFirstExtension
? What is your Application Customizer description? My first extension
```

The Application Customizer Manifest

- src
  - extensions
    - myFirstExtension
      - loc
      - MyFirstExtensionApplicationCustomizer.manifest.json
      - MyFirstExtensionApplicationCustomizer.ts

MyFirstExtensionApplicationCustomizer.manifest.json

```
1  {
2    "$schema": "https://developer.microsoft.com/json-schemas/spfx/client-side
3    "id": "92700aa0-d156-4465-b4b3-aaf865e6e086",
4    "alias": "MyFirstExtensionApplicationCustomizer",
5    "componentType": "Extension",
6    "extensionType": "ApplicationCustomizer",
7    "version": "*",
8    "manifestVersion": 2,
9    "requiresCustomScript": false
10 }
```

ApplicationCustomizerInfo.txt - Notepad

File Edit Format View Help

```
Application Customizer ID:
92700aa0-d156-4465-b4b3-aaf865e6e086
```

Implementing an Application Customizer

TS MyFirstExtensionApplicationCustomizer.ts

```
import {
  BaseApplicationCustomizer,
  PlaceholderContent,
  PlaceholderName
} from '@microsoft/sp-application-base';

import styles from './MyApplicationCustomizerStyles.module.scss'

export default class MyFirstExtensionApplicationCustomizer
  extends BaseApplicationCustomizer<any> {

  private PageHeader: PlaceholderContent | undefined;
  private PageFooter: PlaceholderContent | undefined;

  @override
  public onInit(): Promise<void> {
    this.context.placeholderProvider.changedEvent.add(this, this.RenderPlaceHolders);
    this.RenderPlaceHolders();
    return Promise.resolve<void>();
  }

  private RenderPlaceHolders(): void {…
  }

}
```

Rendering Content into Placeholders

```
private RenderPlaceHolders(): void {

  if (!this.PageHeader) {
    this.PageHeader = this.context.placeholderProvider.tryCreateContent(PlaceholderName.Top);
    if (!this.PageHeader) {
      console.error('The expected placeholder (Top) was not found.');
      return;
    }
    this.PageHeader.domElement.innerHTML = `
  <div class="${styles.app}">
    <div class="${styles.top}">
      <div>This is the page header</div>
    </div>
  </div>`;
  }

  if (!this.PageFooter) {
    this.PageFooter = this.context.placeholderProvider.tryCreateContent(PlaceholderName.Bottom);
    if (!this.PageFooter) {
      console.error('The expected placeholder (Bottom) was not found.');
      return;
    }
    this.PageFooter.domElement.innerHTML = `
  <div class="${styles.app}">
    <div class="${styles.bottom}">
      <div>This is the page footer</div>
    </div>
  </div>`;
  }

}
```

Debugging an Application Customizer

- You must build debug URL with query string parameters
  - You must add GUID which is application customizer ID

ApplicationCustomizerInfo.txt - Notepad

File Edit Format View Help

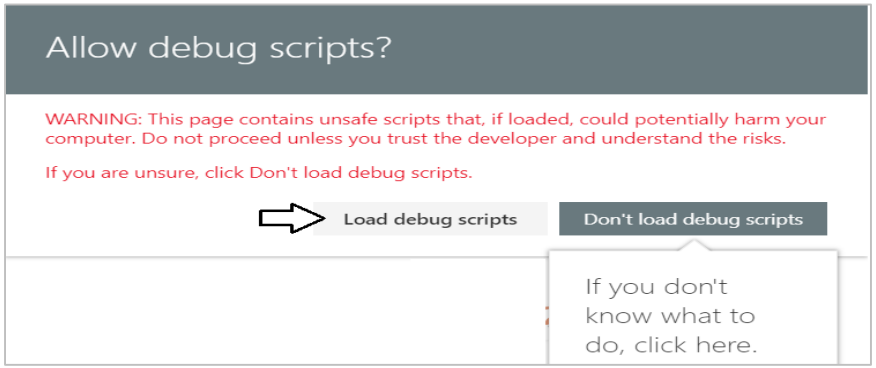
```
Application Customizer ID: 92700aa0-d156-4465-b4b3-aaf865e6e086

?loadSPFX=true
&debugManifestsFile=https://localhost:4321/temp/manifests.js
&customActions={"92700aa0-d156-4465-b4b3-aaf865e6e086":
                {"location":"ClientSideExtension.ApplicationCustomizer",
                 "properties":{"testMessage":"Hello as property!"}}}
```

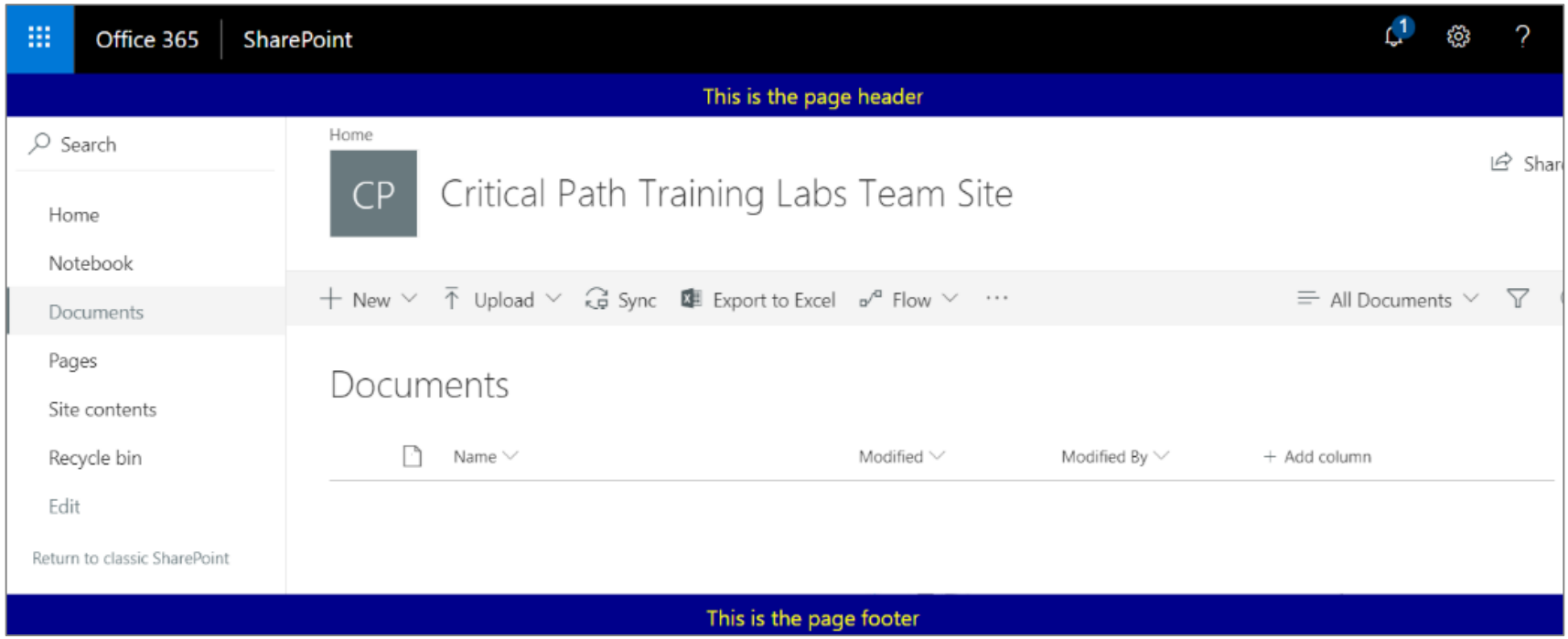
  - Next, you copy and paste URL into browser address bar

Secure | /Forms/AllItems.aspx?loadSPFX=true%20&debugManifestsFile=https://localhost:4321/temp/manifests.js%20&cu

Office 365 | SharePoint

Testing the Application Customizer





Summary

- ✓ Introduction to the SharePoint Framework
- ✓ Creating SPFX Projects using the Yeoman Generator
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