

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



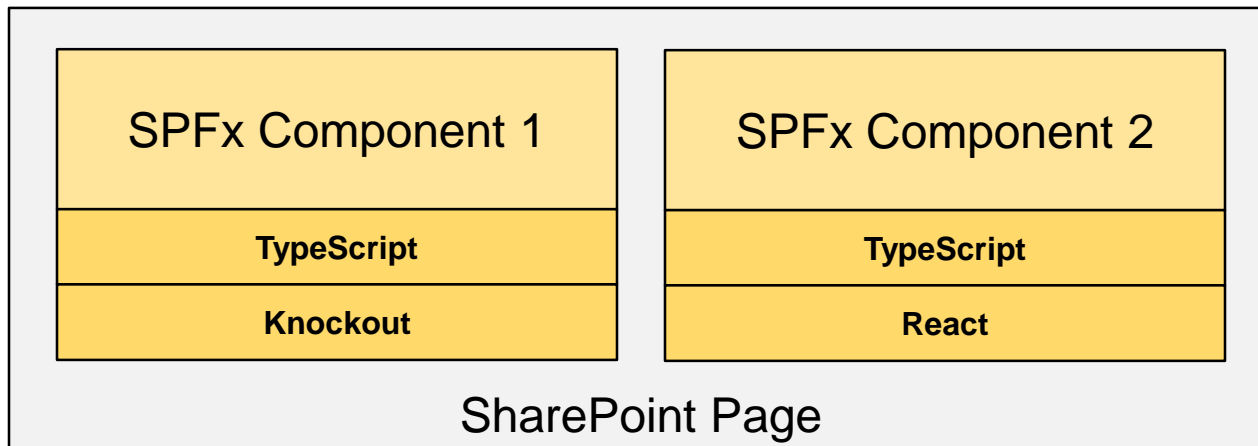
Evolution of the SharePoint Platform

- 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
 - You 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



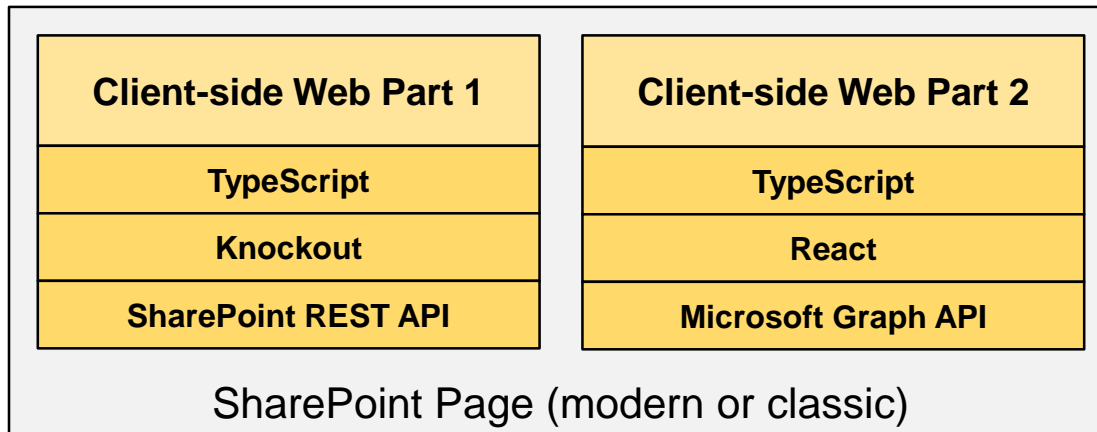
SPFx versus the SharePoint Add-in Model

- 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



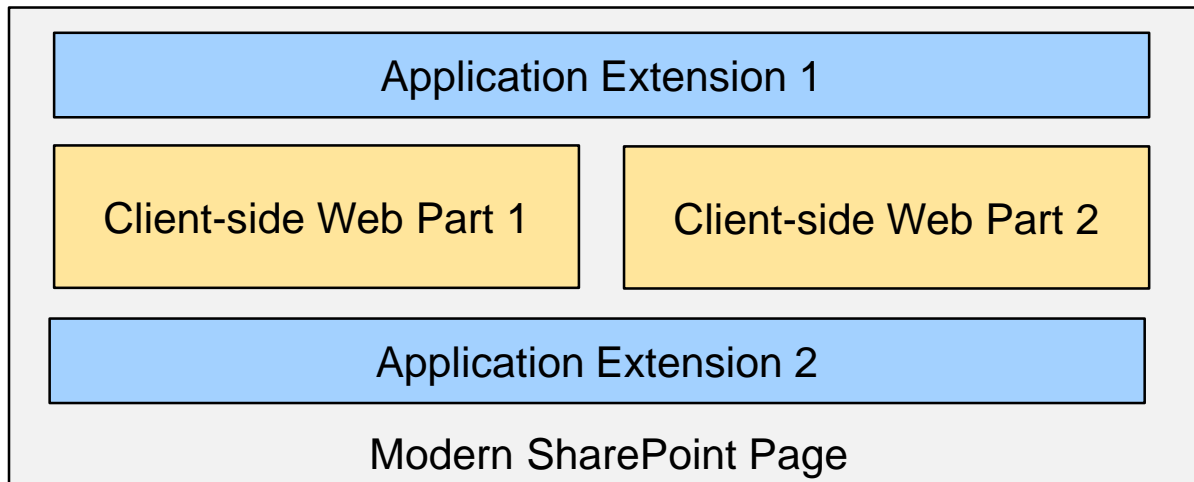
SharePoint Framework Webparts

- 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

```
npm install -g gulp
```

- Install Yeoman

```
npm install -g yo
```

- Install Yeoman Template for SPFx

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



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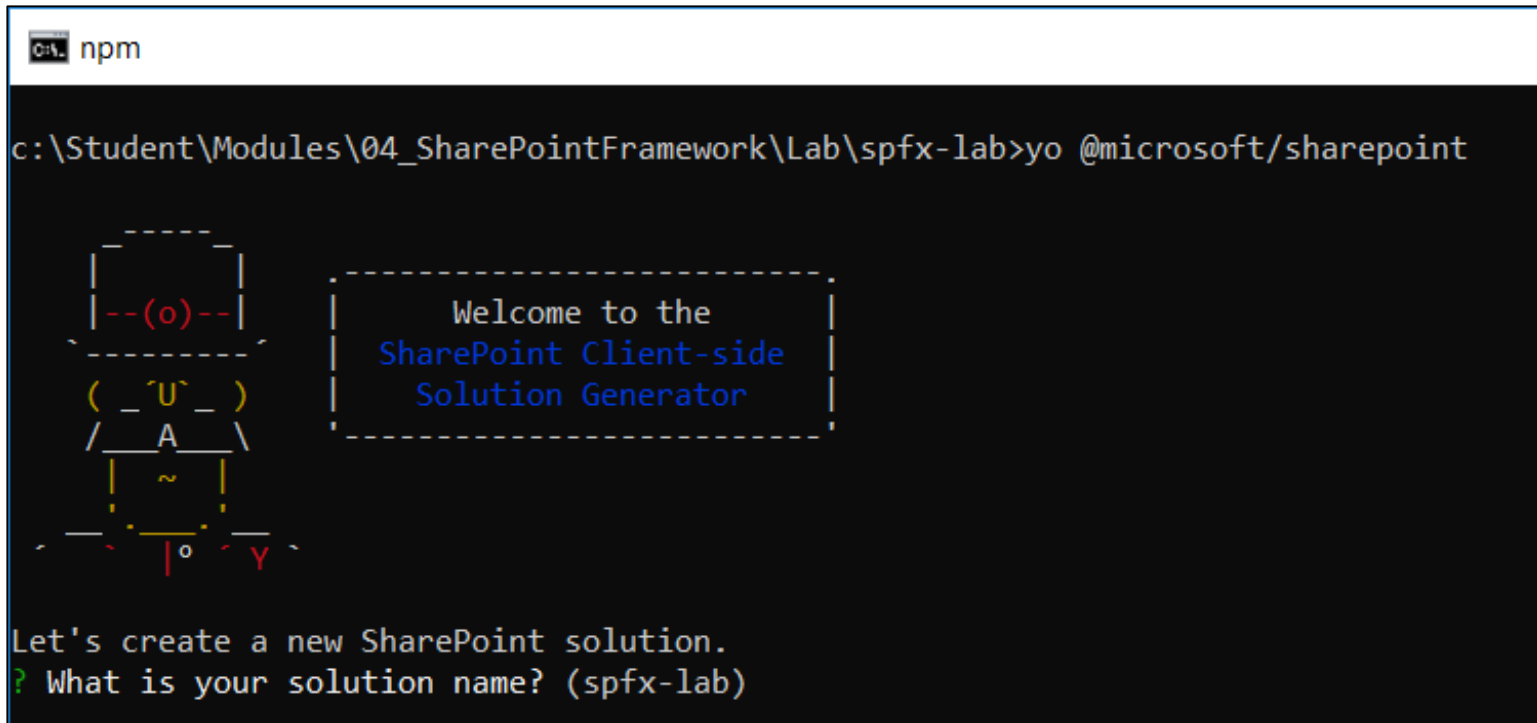


Using the SPFx Yeoman Template

- SPFx projects created with Yeoman template

```
yo @microsoft/sharepoint
```

- Template provides wizard-like experience when creating new project



The screenshot shows a terminal window with the title 'C:\ npm'. The command prompt shows the command `yo @microsoft/sharepoint` being executed in the directory `c:\Student\Modules\04_SharePointFramework\Lab\spfx-lab`. The output displays a ASCII art logo for the SharePoint Client-side Solution Generator, which includes a dashed box containing the text 'Welcome to the SharePoint Client-side Solution Generator'. Below the logo, the text 'Let's create a new SharePoint solution.' is displayed, followed by a prompt: '? What is your solution name? (spfx-lab)'.

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

  --(o)--
  |       |
  |  _U_  |
  |  A    |
  |  ~    |
  |  o    |
  |  Y    |

Welcome to the
SharePoint Client-side
Solution Generator

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
```

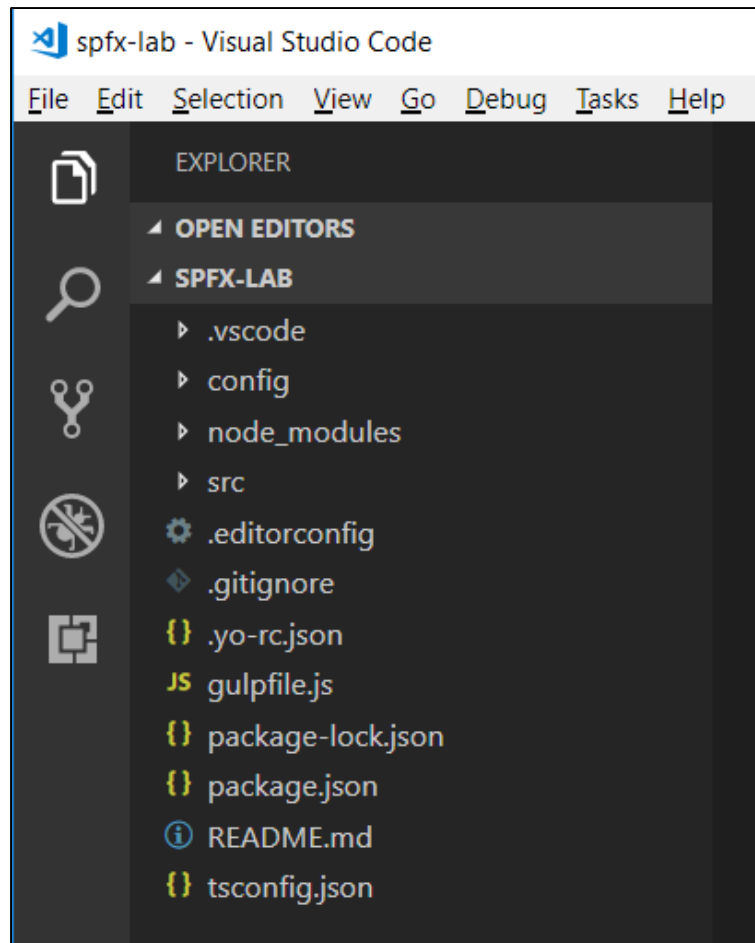
- Do you want to create a standard webpart or a React webpart

```
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

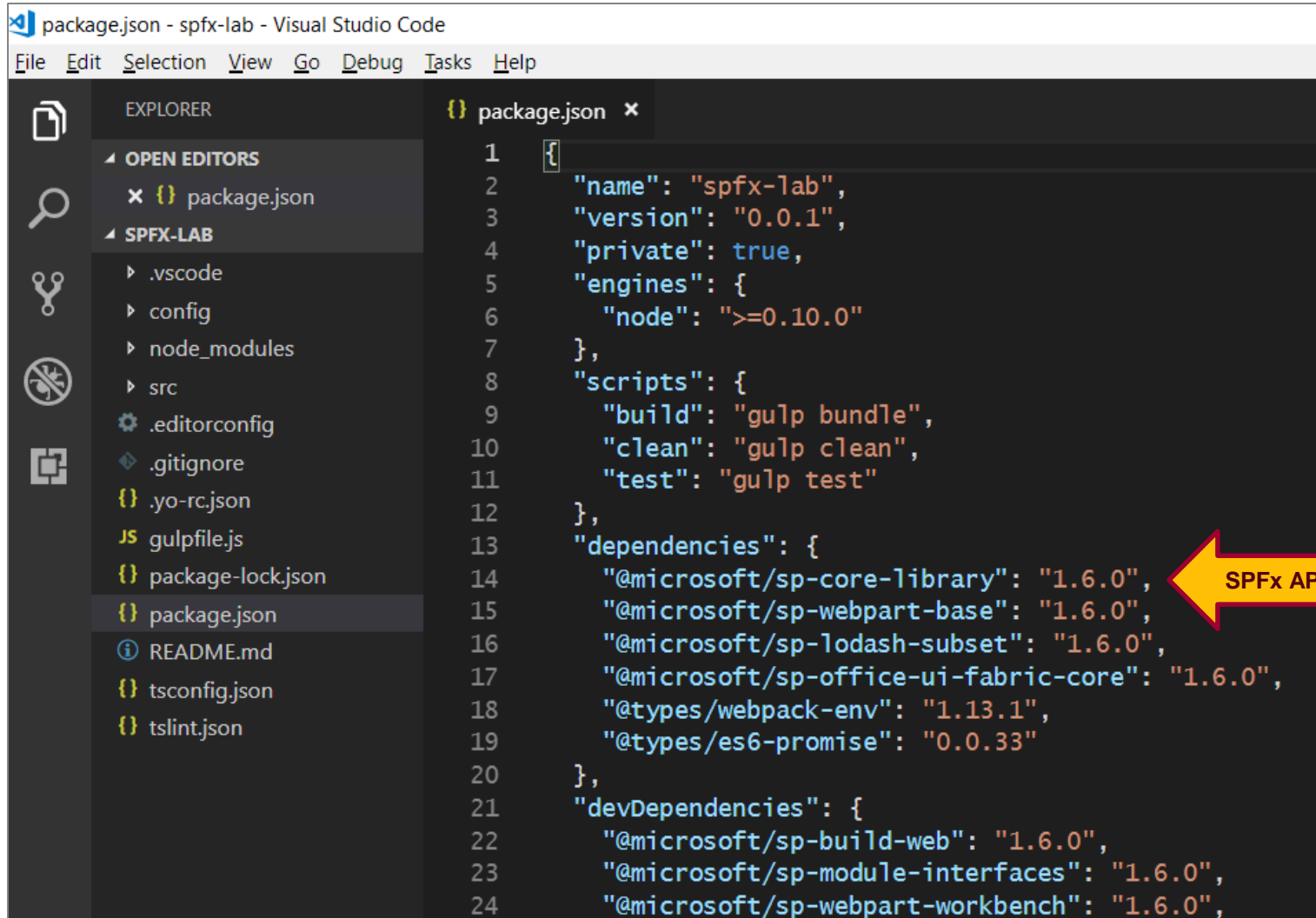
```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL

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



The screenshot shows the Visual Studio Code interface with the 'package.json' file open. The Explorer sidebar on the left shows the project structure, including files like '.vscode', 'config', 'node_modules', 'src', '.editorconfig', '.gitignore', '.yo-rc.json', 'gulpfile.js', 'package-lock.json', 'package.json', 'README.md', 'tsconfig.json', and 'tslint.json'. The main editor area displays the content of 'package.json' with line numbers 1 through 24. The JSON content is as follows:

```
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>
 - Certificate 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 {

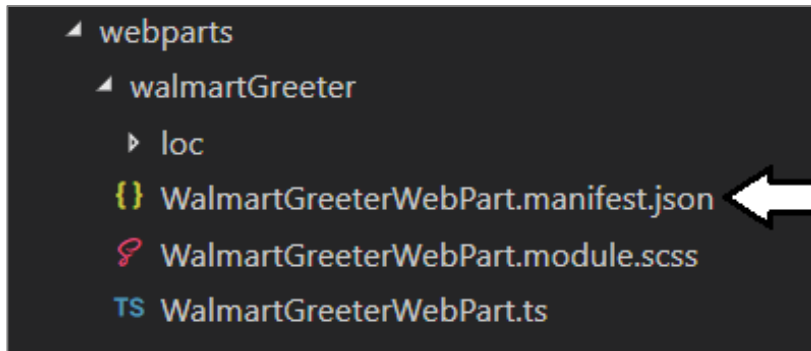
    let currentUser = this.context.pageContext.user.displayName;

    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.email:", this.context.pageContext.user.email);
    this.AddTableRow(table, "this.diplyMode:", this.displayMode.toString());
    this.AddTableRow(table, "context.webPartTag:", this.context.webPartTag);
    container.append(table);
}
```

| Property | Value |
|-------------------------|---|
| site.id: | a5aa0f03-16b6-4057-8704-daaa2f84494 |
| 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.email: | |
| this.diplyMode: | 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 x
1  $font-stack:    Helvetica, sans-serif;
2  $background-color: #ffffe0;
3  $font-size: 3.0em;
4  $padding: 18px;
5
6  .helloWebPart{
7    font: $font-stack;
8    font-size: $font-size;
9    background-color: $background-color;
10   border: 1px solid black;
11   border-radius: $padding;
12   padding: $padding;
13   text-align: center;
14 }
```

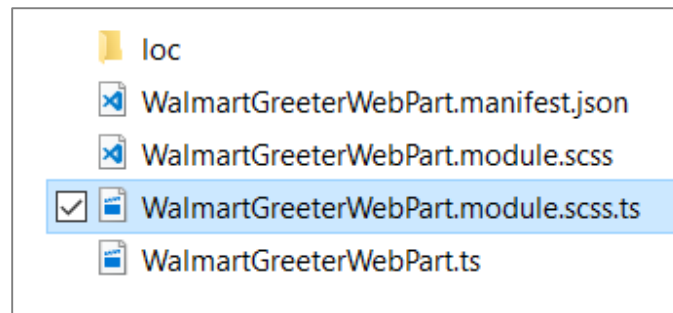
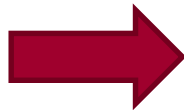
SASS

```
Hello.module.css •
1  .helloWebPart_0989818e{
2    font:Helvetica,sans-serif;
3    font-size:3em;
4    background-color:#ffffe0;
5    border:1px solid black;
6    border-radius:18px;
7    padding:18px;
8    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 x
1  .walmartGreeter {
2
3  .container {
4    max-width: 700px;
5    margin: 0px auto;
6  }
7
8  .title {
9    font-size: 24px;
10   color: darkblue;
11 }
12
13 }
```



```
TS WalmartGreeterWebPart.module.scss.ts x
1  /* tslint:disable */
2  require('./WalmartGreeterWebPart.module.css');
3  const styles = {
4    walmartGreeter: 'walmartGreeter_d498b2d0',
5    container: 'container_d498b2d0',
6    title: 'title_d498b2d0',
7  };
8
9  export default styles;
10 /* tslint:enable */
```

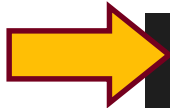
Importing Style Names in a TypeScript File

- 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 BaseClientComponent {

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

A red dashed rectangular box highlights the `styles` object in the code above it.

| | |
|--|----------------|
| | container |
| | title |
| | walmartGreeter |



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Web Part Properties

- Define interface with properties

```
IGreeterWebpartWebPartProps.ts •  
1  export interface IGreeterWebpartWebPartProps {  
2      greeting: string;  
3      largefont: boolean;  
4      color: string;  
5  }
```

- Add interface to web part class definition

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

- Override panelPropertySettings()

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



Property Panel Settings

```
protected get propertyPaneSettings(): IPropertyPaneSettings {
    return {
        pages: [
            {
                header: { description: "Greeter Web Part" },
                groups: [
                    {
                        groupName: "General Properties",
                        groupFields: [
                            PropertyPaneTextField('greeting', { label: 'Greeting' }),
                        ]
                    },
                    {
                        groupName: "Cosmetic Properties",
                        groupFields: [
                            PropertyPaneToggle('largefont', {
                                label: 'Large Font',
                                onText: 'On',
                                offText: 'Off'
                            }),
                            PropertyPaneDropdown('color', {
                                label: 'Font Color',
                                options: [
                                    { key: 'green', text: 'Green' },
                                    { key: 'blue', text: 'Blue' },
                                    { key: 'red', text: 'Red' },
                                    { key: 'purple', text: 'Purple' }
                                ]
                            })
                        ]
                    }
                ]
            }
        ]
    }
}
```

Walmart Greeter

Greeter Web Part

General Properties

Greeting

Welcome to Walmart

Cosmetic Properties

Large Font

☒ On ☐ Off

Font Color

Blue





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



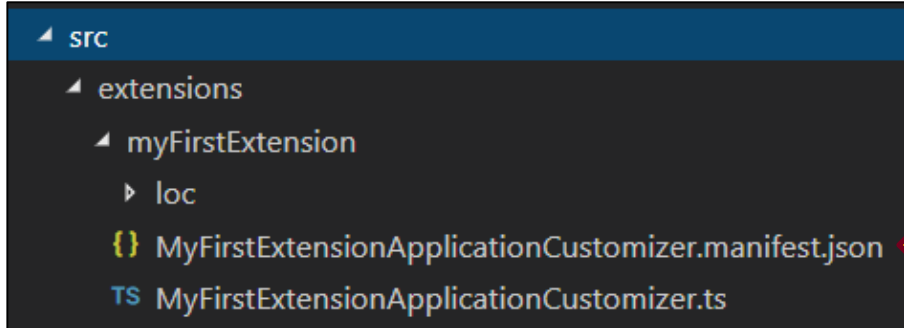
Creating an Application Customizer

- 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)? SharePoint
? 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



```
{ 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



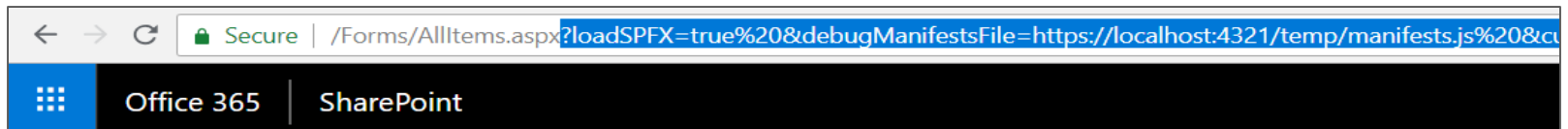
A screenshot of a Notepad window titled "ApplicationCustomizerInfo.txt - Notepad". The window contains the following text:

```
File Edit Format View Help
Application Customizer ID: 92700aa0-d156-4465-b4b3-aaf865e6e086

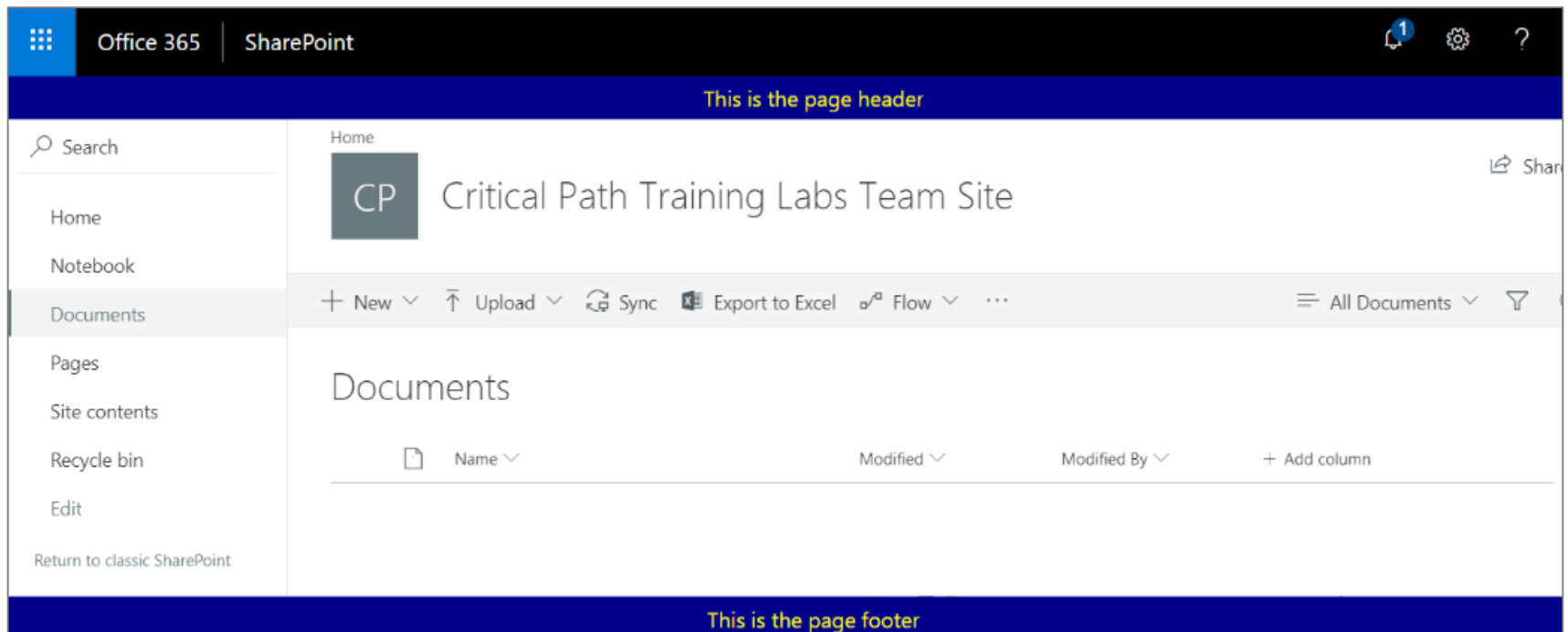
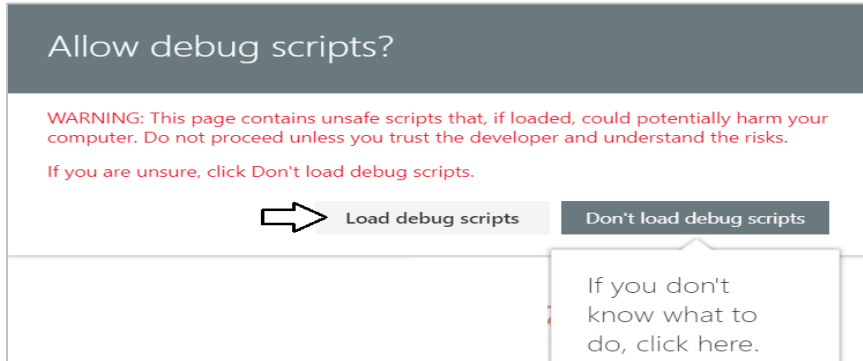
?loadSPFX=true
&debugManifestsFile=https://localhost:4321/temp/manifests.js
&customActions={"92700aa0-d156-4465-b4b3-aaf865e6e086":{
    "location":"ClientSideExtension.ApplicationCustomizer",
    "properties":{"testMessage":"Hello as property!"}}}
```

An arrow points to the GUID "92700aa0-d156-4465-b4b3-aaf865e6e086" in the customActions object.

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



Testing the Application Customizer



Summary

- ✓ 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

