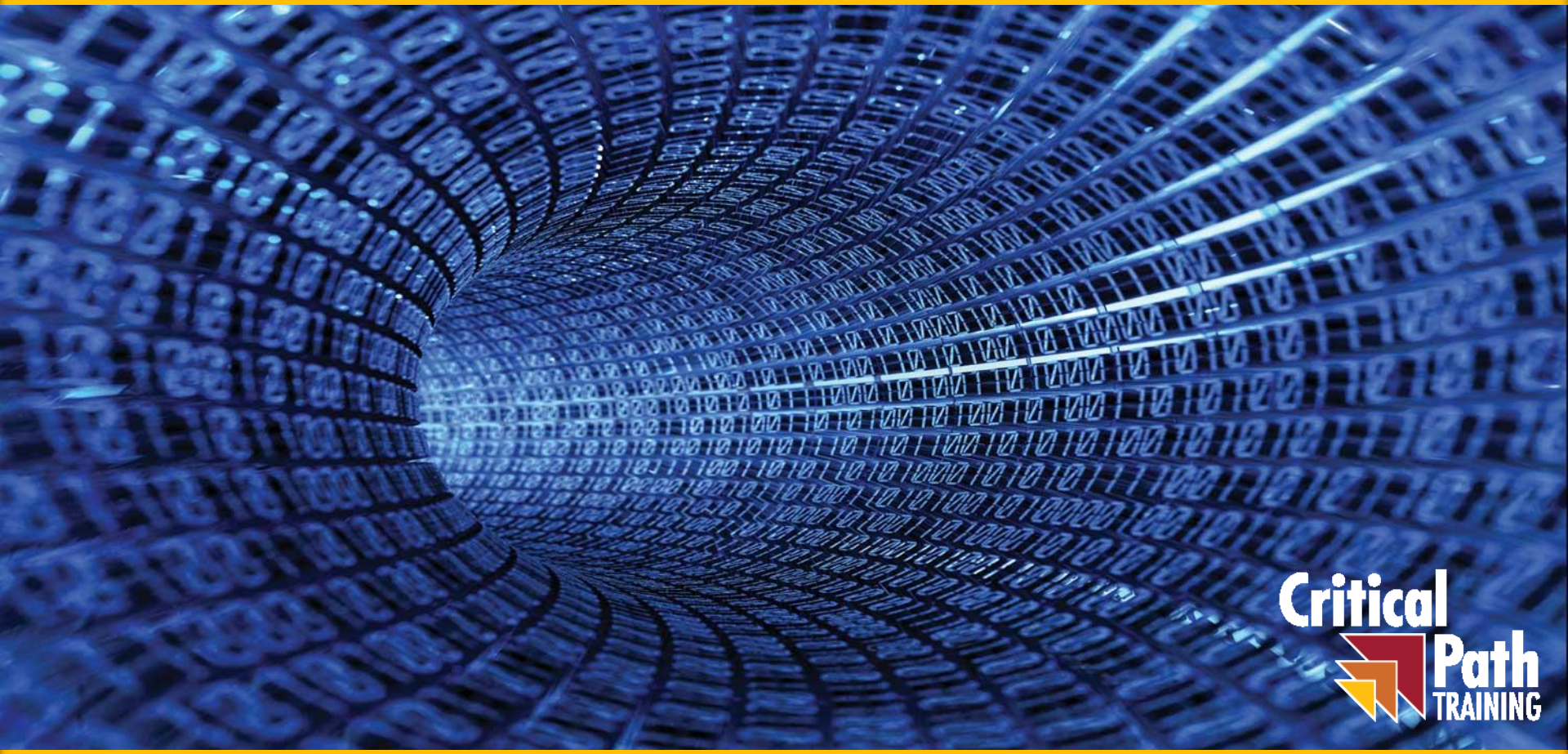
Developing React Web Parts

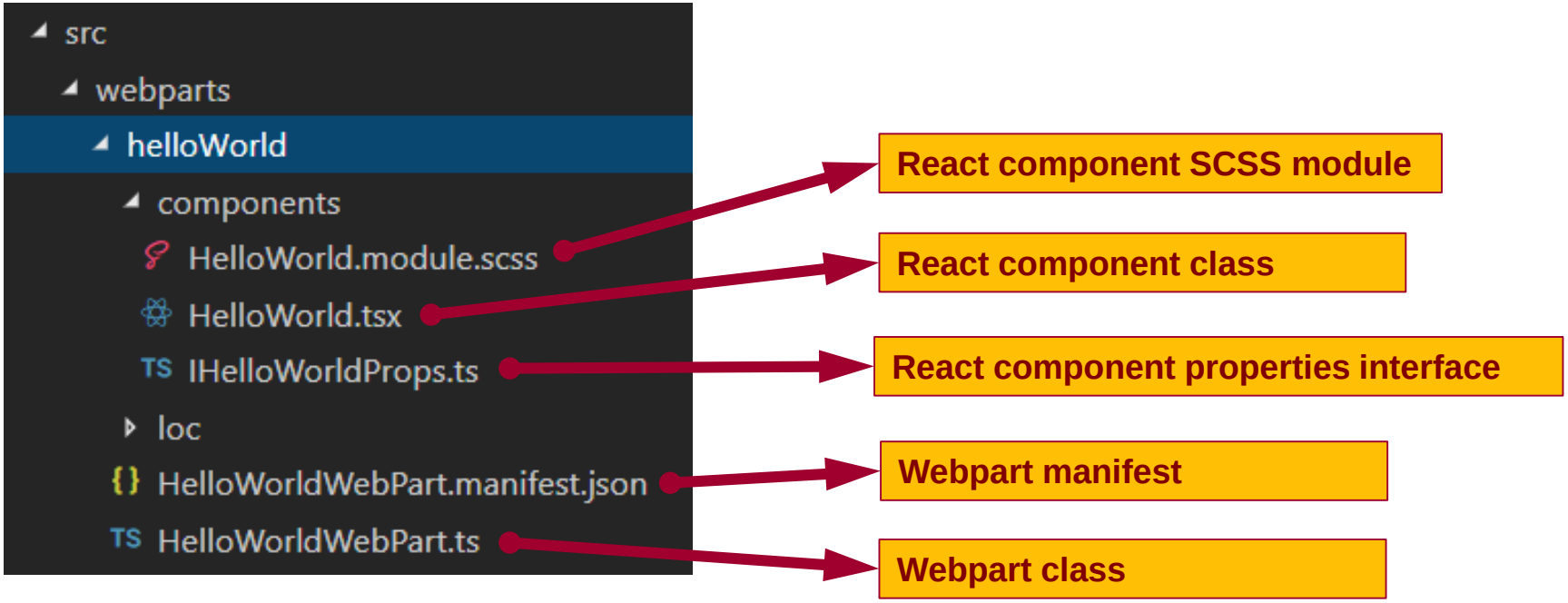


Agenda

- Designing and Developing React Web Parts
- Web Part Properties versus React Component State
- Leveraging the Office UI Fabric React Library
- Developing Web Parts using the SharePoint REST API

Creating a React Webpart

- You can select React as framework for your webpart
  - You can create a React webpart when creating new project
  - You can add React webpart to existing project
  - React webpart made up of several different source files



React Webpart Architecture

```
export default class HelloWorldWebPart extends BaseClientSideWebPart<IHelloWorldWebPartProps> {

  public render(): void {
    const element: React.ReactElement<IHelloWorldProps > = React.createElement(
      HelloWorld, { description: this.properties.description }
    );
    ReactDom.render(element, this.domElement);
  }
```

```
export interface IHelloWorldProps {
  description: string;
}
```

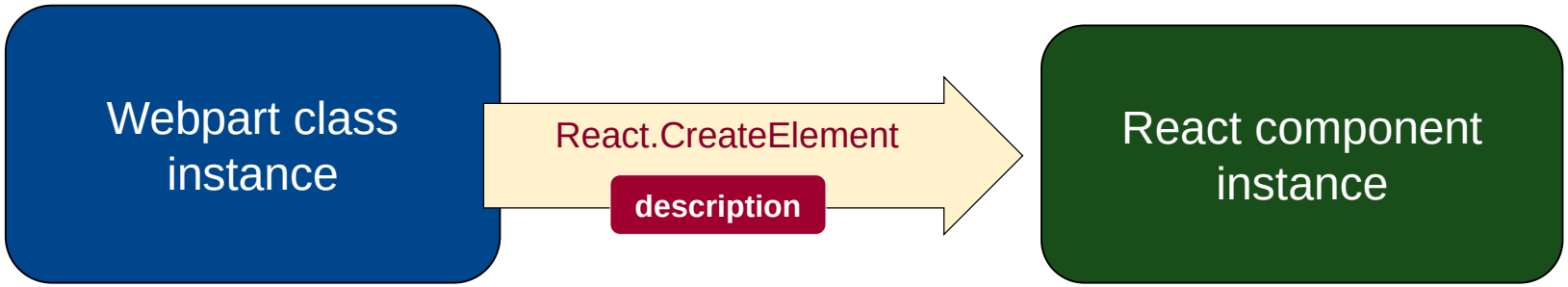
```
import * as React from 'react';

import { IHelloWorldProps } from './IHelloWorldProps';

export default class HelloWorld extends React.Component<IHelloWorldProps, {}> {

  public render(): React.ReactElement<IHelloWorldProps> {
    return <div>{this.props.description}</div>;
  }

}
```



React Webpart Styling

HelloWorld.module.scss

```scss
.helloWorld {
  background-color: lightsalmon;
  border: 4px solid purple;
  border-radius: 12px;

  .title {
    padding: 8px;
    font-size: 48px;
  }

}
```

HelloWorld.tsx

```tsx
import * as React from 'react';

import { IHelloWorldProps } from './IHelloWorldProps';

import styles from './HelloWorld.module.scss';

export default class HelloWorld extends React.Component<IHelloWorldProps, {}> {

  public render(): React.ReactElement<IHelloWorldProps> {
    return (
      <div className={styles.helloWorld}>
        <div className={styles.title}>
          {this.props.description}
        </div>
      </div>
    );
  }

}
```

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Webpart Persistent Properties

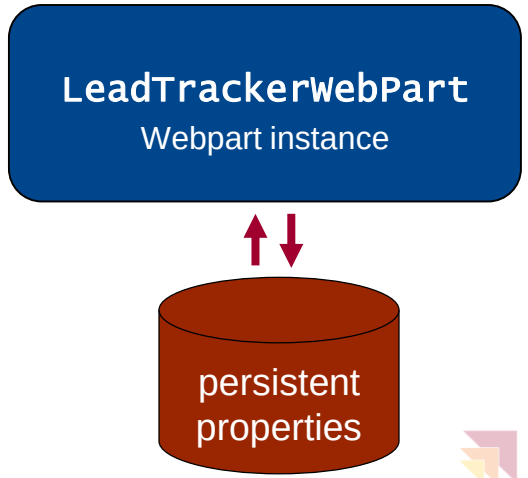
- Persistent properties defined in webpart using interface

```
export interface ILeadTrackerWebPartProps {
  targetList: string;
}

export default class LeadTrackerWebPart extends BaseClientSideWebPart<ILeadTrackerWebPartProps> {

  private MyMethod() {
    let list: string  = this.properties.targetList;
  }
```

- Property default values add to webpart manifest

LeadTrackerWebPart.manifest.json

```
  "preconfiguredEntries": [
    {
      "groupId": "5c03119e-3074-46fd-976b-c60198311f70",
      "group": { "default": "Other" },
      "title": { "default": "Lead Tracker" },
      "description": { "default": "a React webpart for tracking leads in SharePoint"},
      "officeFabricIconFontName": "ContactCard",
      "properties": {
        "targetList": "Leads"
      }
    }
  ]
}
```



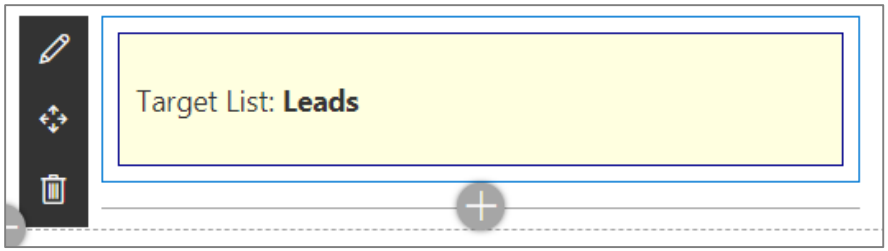
Designing the React Component

```tsx
export interface ILeadTrackerProps {
  targetListDefault: string;
}
```

```tsx
export interface ILeadTrackerState {
  targetList: string;
  loading: boolean;
}
```

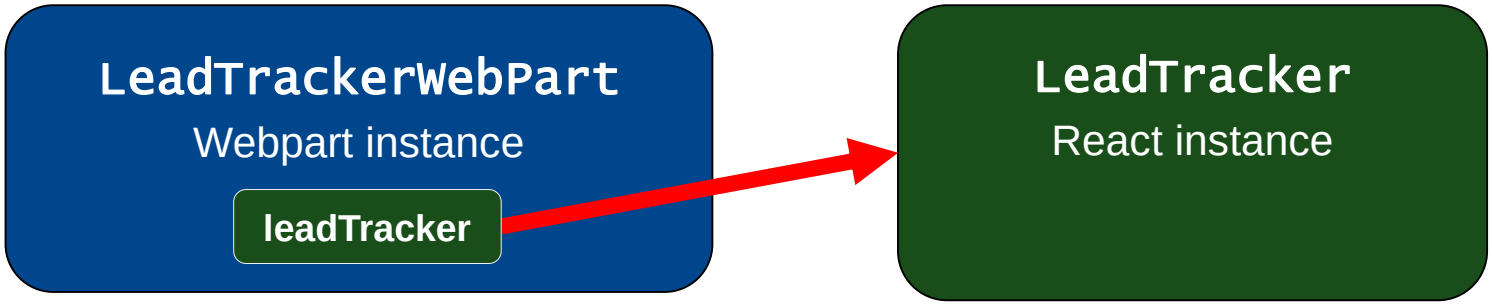
```tsx
import { ILeadTrackerProps } from './ILeadTrackerProps';
import { ILeadTrackerState } from './ILeadTrackerState';

export default class LeadTracker extends React.Component<ILeadTrackerProps, ILeadTrackerState> {

  public state: ILeadTrackerState = {
    targetList: this.props.targetListDefault,
    loading: false
  };

  public render(): React.ReactElement<ILeadTrackerProps> {
    return (
      <div className={styles.leadTracker}>
        <p>Target List: <strong>{ this.state.targetList }</strong></p>
      </div>
    );
  }
}
```

LeadTracker
React component

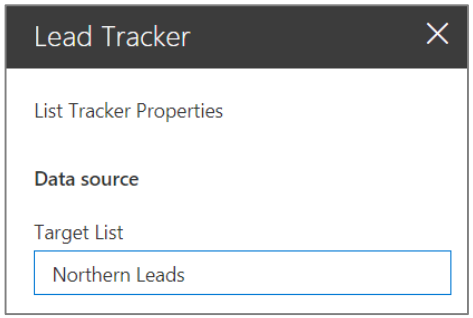


Referencing the React Component Instance

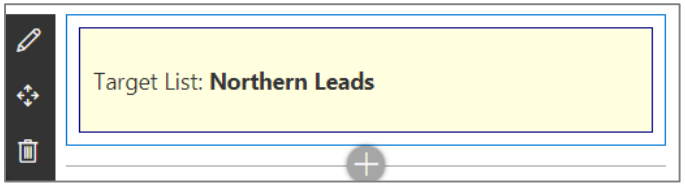
```
import LeadTracker from './components/LeadTracker';
import { ILeadTrackerProps } from './components/ILeadTrackerProps';

export default class LeadTrackerWebPart extends BaseClientSideWebPart<ILeadTrackerWebPartProps> {

  private leadTracker: LeadTracker;

  public render(): void {
    const element: React.ReactElement<ILeadTrackerProps> = React.createElement(
      LeadTracker, { targetListDefault: this.properties.targetList }
    );
    this.leadTracker = <LeadTracker>ReactDom.render(element, this.domElement);
  }
```



Synchronizing React State with Webpart Properties



Automatic updates




```
protected onPropertyPaneFieldChanged(propertyPath: string, oldValue: any, newValue: any): void {
  super.onPropertyPaneFieldChanged(propertyPath, oldValue, newValue);

  if (propertyPath === 'targetList' && newValue) {
    this.leadTracker.setState({ targetList: newValue });
  }

}
```

LeadTrackerWebPart
Webpart instance

React.Component.setState

targetList

LeadTracker
React instance

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- ✓ Designing and Developing React Web Parts
- ✓ Web Part Properties versus React Component State
- ➢ Leveraging the Office UI Fabric React Library
- • Developing Web Parts using the SharePoint REST API

What is the Office UI Fabric?

- Office UI Fabric is responsive, mobile-first, front-end style framework
  - Built by Microsoft to style Office 365, OneDrive and SharePoint sites
  - All about styling instead of JavaScript
  - Can be used by 3rd party developers

Fabric Core

Core elements of the design language including icons, colors, type, and the grid

or

Components

Fabric React

Robust, up-to-date components built with the React framework.

Fabric JS

Simple, visuals-focused components that you can extend, rework, and build on.

ngFabric

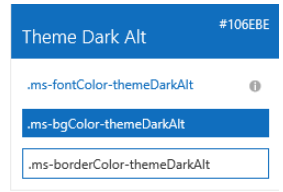
Community-driven project to build components for Angular-based apps.

Fabric iOS

Native Swift colors, type ramp, and components for building iOS apps.

Fabric Core styling

- Fonts and typography
  - Segoe font family + type ramp
  - Official Office 365 iconography
- Color
  - Official Office 365 color palette
- Branded assets
  - Product symbols + product filetype symbols
- Animations
  - Official Office 365 selection of easings and animations
- Responsive grid
  - Tailored to Office 365 silhouettes



Styles

- The Office UI Fabric provides styles for..
  - Typography
  - Color
  - Icons
  - Animations
  - Responsive Grid
  - Localization

Typography

- Base font classes
  - Fabric includes 10 base font classes
  - Each base class sets a default size, weight, and color.

Class	Size	Weight	Color
.ms-font-su	42px	Segoe UI Light	ms-color-neutralPrimary
.ms-font-xxl	28px	Segoe UI Light	ms-color-neutralPrimary
.ms-font-xl	21px	Segoe UI Light	ms-color-neutralPrimary
.ms-font-l	17px	Segoe UI Semilight	ms-color-neutralPrimary

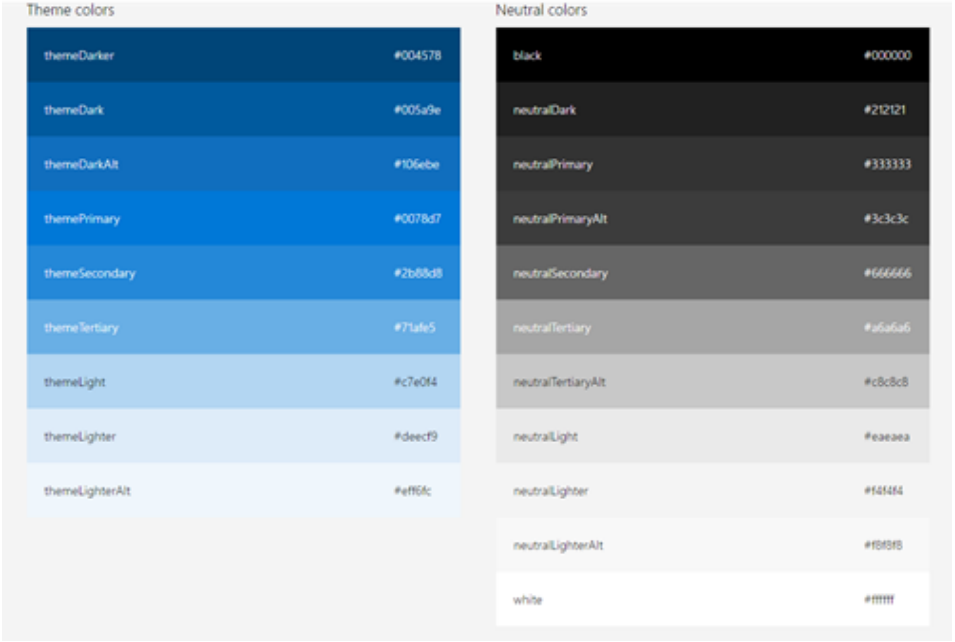
Typography

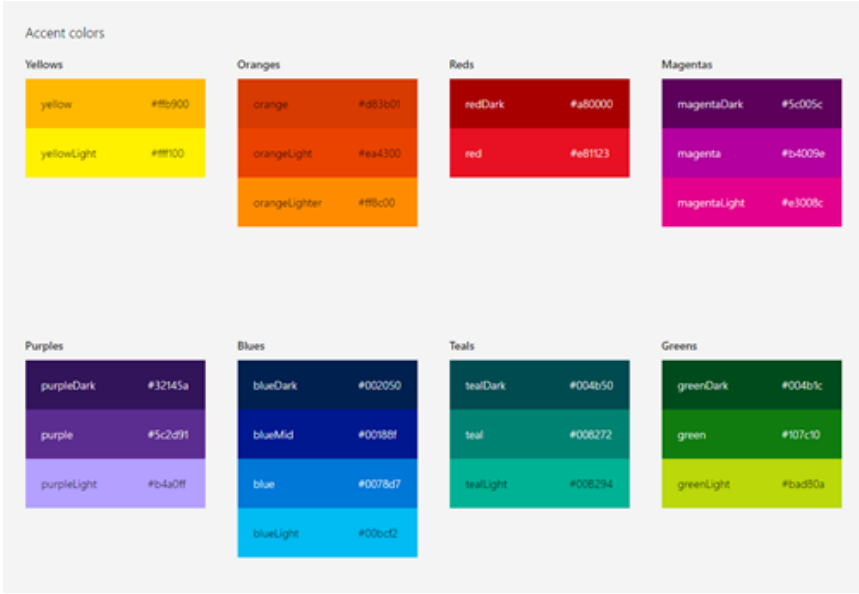
- Helper font classes
  - There are helper font classes to change the text weight.

Class	Weight
.ms-fontWeight-light	Light
.ms-fontWeight-semilight	Semilight
.ms-fontWeight-regular	Regular
.ms-fontWeight-semibold	Semi Bold

Color

- Includes 9 theme colors and 11 neutral colors.
  - Helper classes for text, border, background, and hover states.
  - Color classes act as hooks into the Office 365 theming system





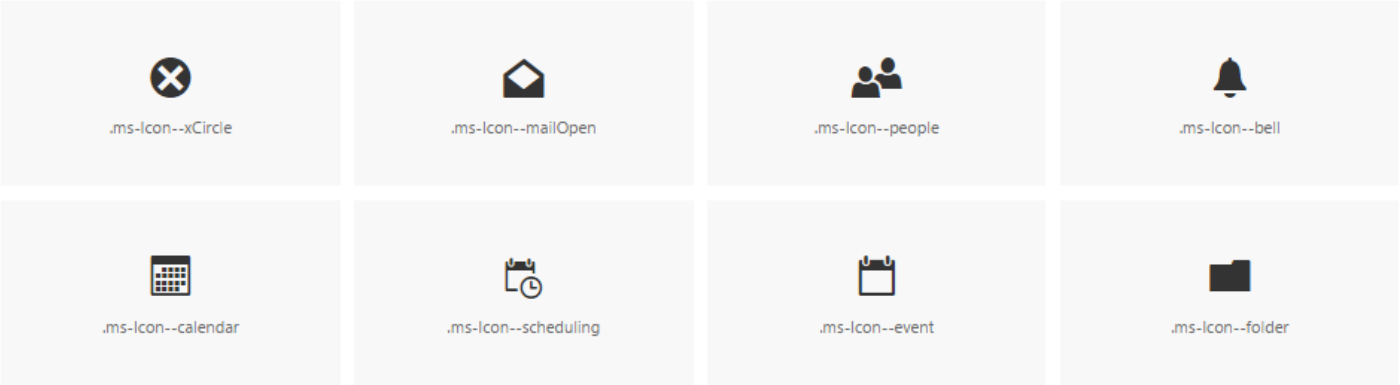
Icons

- Fabric uses a custom font for its iconography.
  - Font contains glyphs you can scale, color, and style

Icons

- To use the icons, combine the base **ms-Icon** class with a modifier class for the specific icon.

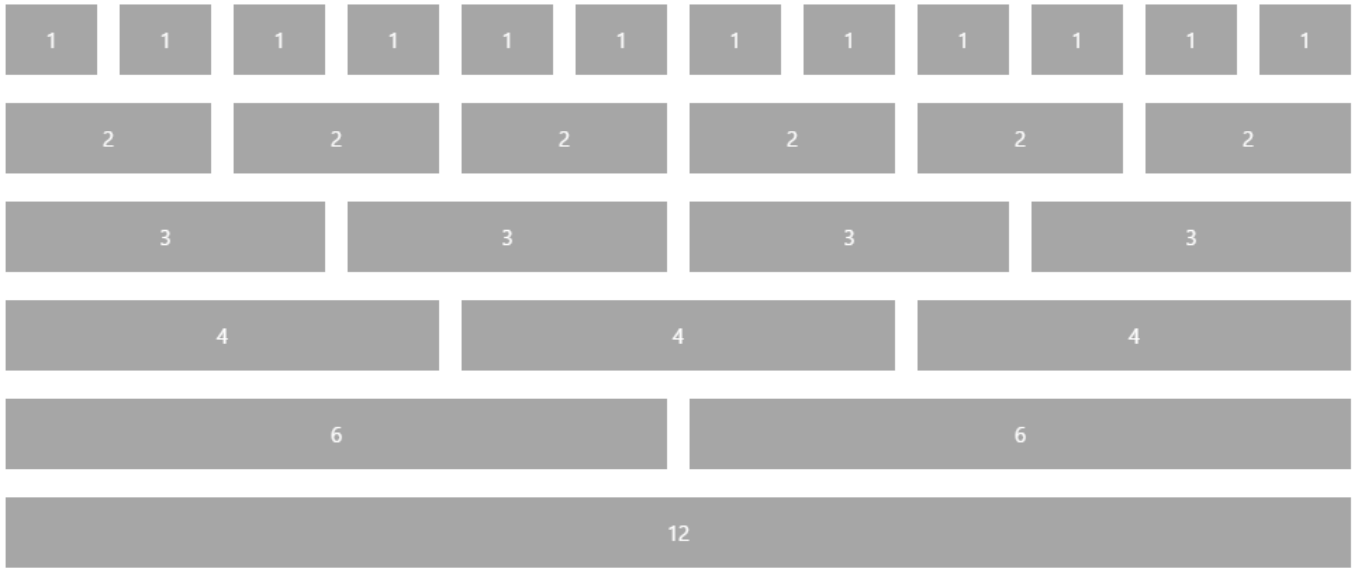
```
<i class="ms-Icon ms-Icon--mail" aria-hidden="true"></i>
```



Responsive Grid

- Fabric comes with a mobile-first, responsive grid
  - Based on 12 column grid
  - Used to create flexible layouts

```
<div class="ms-Grid">
    <div class="ms-Grid-row">
        <div class="ms-Grid-col ms-u-sm6 ms-u-md4 ms-u-lg2">First</div>
        <div class="ms-Grid-col ms-u-sm6 ms-u-md8 ms-u-lg10">Second</div>
    </div>
</div>
```



Office UI Fabric React Components

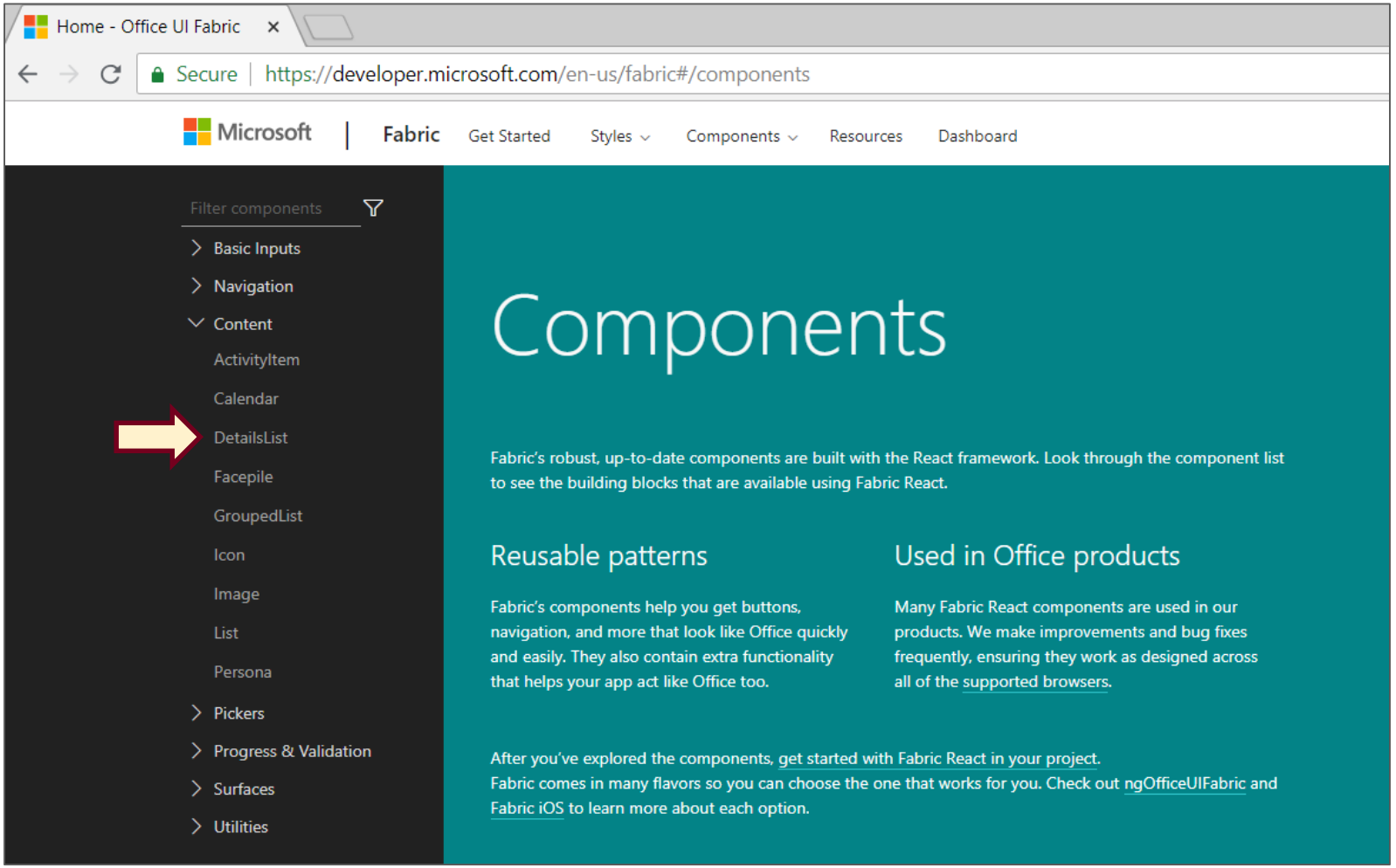
- Fabric's React components are building blocks for UI
  - Components can be used in general React development
  - Components can be used in SharePoint Framework development

```
import * as React from 'react';
import * as ReactDOM from 'react-dom';
import { PrimaryButton } from 'office-ui-fabric-react/lib/Button';

ReactDOM.render(
  <PrimaryButton>
    I am a button.
  </PrimaryButton>,
  document.body.firstChild
);
```

Office UI Fabric React Component Library

- https://developer.microsoft.com/en-us/fabric#/components



Using the DetailsList Component

```
import {
  DetailsList,
  IColumn,
  DetailsListLayoutMode
} from 'office-ui-fabric-react';
```

```
const leadColumns: IColumn[] = [
  { key: 'id', fieldName: 'id', name: 'ID', minWidth: 12, maxWidth: 24 },
  { key: 'firstName', fieldName: 'firstName', name: 'First Name', minWidth: 24, maxWidth: 64 },
  { key: 'lastName', fieldName: 'lastName', name: 'Last Name', minWidth: 24, maxWidth: 64 },
  { key: 'company', fieldName: 'company', name: 'Company', minWidth: 64, maxWidth: 120 },
  { key: 'emailAddress', fieldName: 'emailAddress', name: 'Email', minWidth: 100, maxWidth: 240 }
];
```

```
public render(): React.ReactElement<ILeadTrackerProps> {
  return (

    <div className={styles.leadTracker}>

          <DetailsList
            items={this.state.leads}
            columns={leadColumns}
            setKey='set'
            layoutMode={DetailsListLayoutMode.fixedColumns}
          />

    </div>
  );
}
```

Agenda

- ✓ Designing and Developing React Web Parts
- ✓ Web Part Properties versus React Component State
- ✓ Leveraging the Office UI Fabric React Library
- ➢ Developing Web Parts using the SharePoint REST API
- • Designing Web Parts to Manage SharePoint Lists

RESTful Web Services

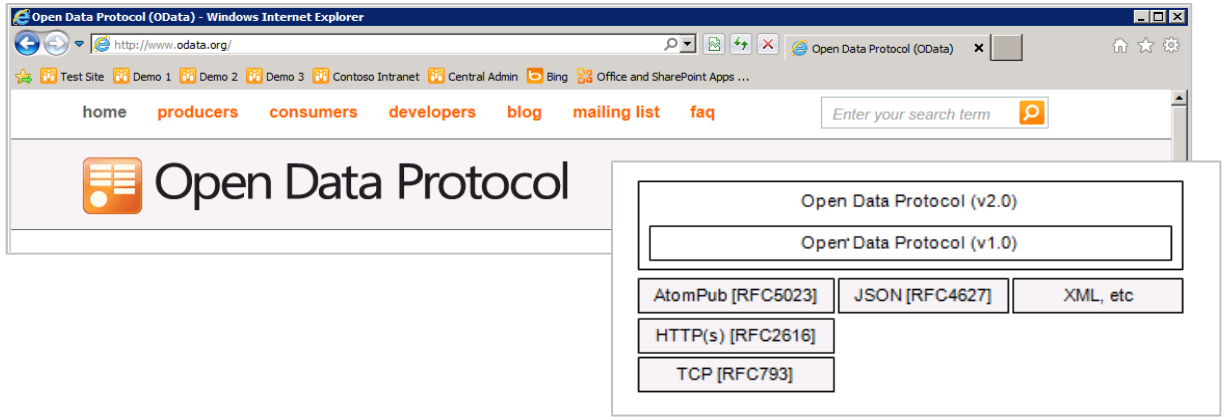
- RESTful Web Service
  - implemented using the principles of REST
  - REST URI = [base URI] + [resource path] + [query options]
  - Calls based on standard HTTP verbs (**GET**, **POST**, **PUT**, **DELETE**)
  - Passes data to and from client using representations
  - Can be designed to implement custom APIs and/or standard APIs

- Data passed across network using representations
  - Representations model resources – but they're different
  - Based on common formats: HTML, XML, ATOM and JSON
  - Based on specific Internet media types

OData Primer

- What is OData?
  - A standardized REST API interface for common CRUD operations
  - Defined by Open Data Protocol specification
  - OData services becoming more popular on Internet (e.g. NetFlix)
  - SharePoint 2010 introduced a REST API for dealing with list items
  - SharePoint 2013 introduces new and expanded REST API

for an excellent resource go to
http://www.odata.org



OData Query Option Parameters

- **$select**
  - http://services.odata.org/OData/OData.svc/Products?$select=Price,Name
- **$filter**
  - http://services.odata.org/OData/OData.svc/Products?$filter=startswith(CompanyName, 'Alfr')
- **$orderby**
  - http://services.odata.org/OData/OData.svc/Products?$orderby=Rating
- **$top**
  - http://services.odata.org/OData/OData.svc/Products?$top=5
- **$skip**
  - http://services.odata.org/OData/OData.svc/Products?$skip=5
  - http://services.odata.org/OData/OData.svc/Products?$skip=5&$top=5
- **$expand**
  - http://services.odata.org/OData/OData.svc/Categories?$expand=Products

Using the $filter Parameter

Logical Operators		
Eq	Equal	`/Suppliers?$filter=Address/City eq 'Las Vegas'`
Ne	Not equal	`/Suppliers?$filter=Address/City ne 'London'`
Gt	Greater than	`/Products?$filter=Price gt 20`
Ge	Greater than or equal	`/Products?$filter=Price ge 10`
Lt	Less than	`/Products?$filter=Price lt 20`
Le	Less than or equal	`/Products?$filter=Price le 100`
And	Logical and	`/Products?$filter=Price le 200 and Price gt 3.5`
Or	Logical or	`/Products?$filter=Price le 3.5 or Price gt 200`
Not	Logical negation	`/Products?$filter=not endswith(Description,'milk')`
Arithmetic Operators		
Add	Addition	`/Products?$filter=Price add 5 gt 10`
Sub	Subtraction	`/Products?$filter=Price sub 5 gt 10`
Mul	Multiplication	`/Products?$filter=Price mul 2 gt 2000`
Div	Division	`/Products?$filter=Price div 2 gt 4`
Mod	Modulo	`/Products?$filter=Price mod 2 eq 0`
Grouping Operators		
( )	Precedence grouping	`/Products?$filter=(Price sub 5) gt 10`

$filter Parameter String Functions

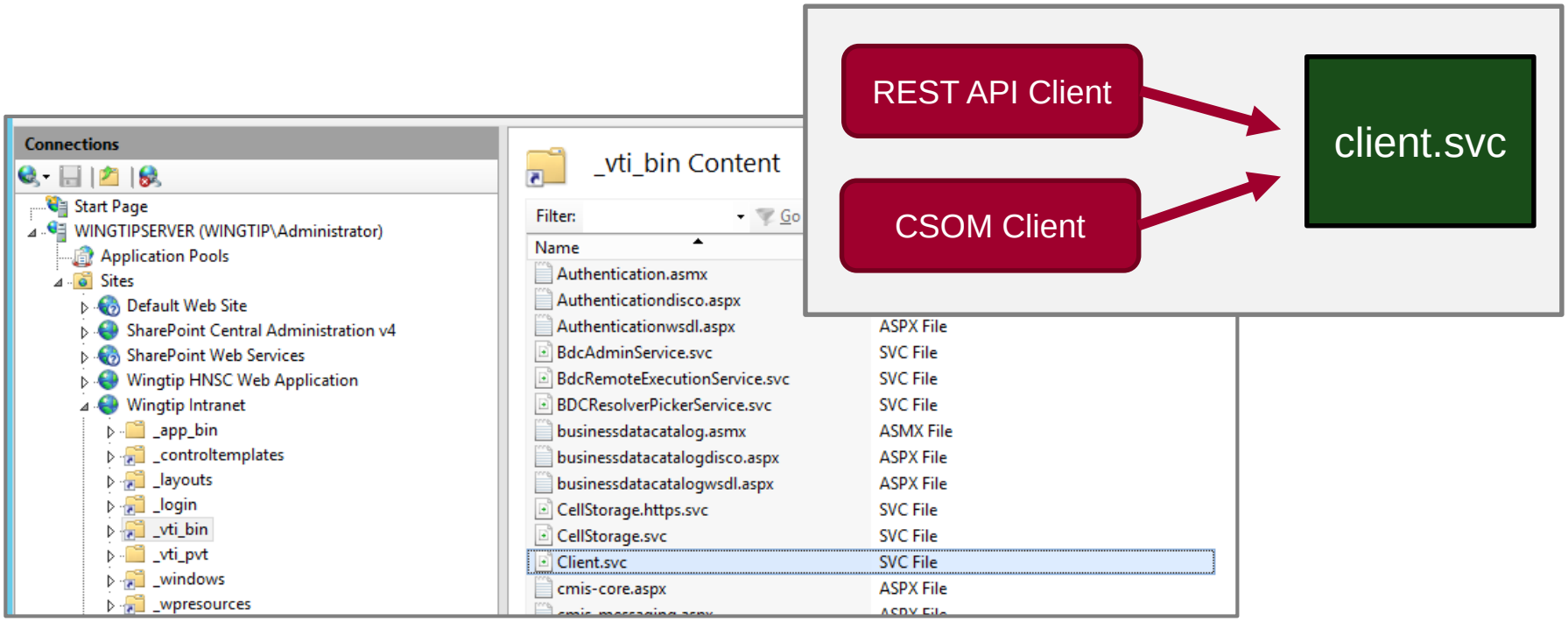
String Functions	
bool substringof(string po, string p1)	Customers?$filter=substringof('Alfreds', CompanyName) eq true
bool endswith(string p0, string p1)	Customers?$filter=endswith(CompanyName, 'Futterkiste') eq true
bool startswith(string p0, string p1)	Customers?$filter=startswith(CompanyName, 'Alfr') eq true
int length(string p0)	Customers?$filter=length(CompanyName) eq 19
int indexof(string p0, string p1)	Customers?$filter=indexof(CompanyName, 'lfreds') eq 1
string replace(string p0, string find, string replace)	Customers?$filter=replace(CompanyName, ' ', '') eq 'AlfredsFutterkiste'
string substring(string p0, int pos)	Customers?$filter=substring(CompanyName, 1) eq 'lfreds Futterkiste'
string substring(string p0, int pos, int length)	Customers?$filter=substring(CompanyName, 1, 2) eq 'lf'
string tolower(string p0)	Customers?$filter=tolower(CompanyName) eq 'alfreds futterkiste'
string toupper(string p0)	Customers?$filter=toupper(CompanyName) eq 'ALFREDS FUTTERKISTE'
string trim(string p0)	Customers?$filter=trim(CompanyName) eq 'Alfreds Futterkiste'
string concat(string p0, string p1)	Customers?$filter=concat(concat(City, ', '), Country) eq 'Berlin, Germany'

Remote Communications with SharePoint

- In SharePoint 2003 and SharePoint 2007
  - SOAP-based web services (e.g. Lists.asmx)
- In SharePoint 2010
  - Client-side Object Model (CSOM)
  - REST API for list items accessible through **ListData.svc**
- In SharePoint 2013
  - Expanded CSOM Support
  - New SharePoint REST API replaces **ListData.svc**
- In SharePoint 2016 and SharePoint Online
  - REST API improved with greater support for ODATA 4.0

SharePoint REST API Architecture

- REST API entry point is client.svc
  - In SharePoint 2010, client.svc only used by CSOM
  - Since SharePoint 2013, client.svc used by CSOM and REST API



SharePoint REST URLs and the _api Alias

- SharePoint REST API provides _api alias
  - The **_api** alias maps to **_vti_bin/client.svc**
  - Alias used to make SharePoint REST API URLs cleaner
  - Alias serves to decouple URLs from underlying architecture
- This URL works but it is not recommended
  - **http://intranet.wingtip.com/_vti_bin/client.svc/web**
- SharePoint REST API URLs should be created with _api
  - **http://intranet.wingtip.com/_api/web**

Anatomy of a SharePoint REST URL

- SharePoint REST made up of three parts
  - Base URI

    `http://intranet.wingtip.com/_api`
  - Target SharePoint Object

    `web`
  - Query String Parameter options

    `?$select=Id,Title,MasterUrl`

```
http://intranet.wingtip.com/_api/web/?$select=Id,Title,MasterUrl
```

Mapping SharePoint Objects to URLs

SharePoint Object	Object mapping
Site Collection	`site`
Site	`web`
Lists collection	`web/lists`
List by ID	`web/lists(guid'402cd788-9c5c-4931-92d6-09f18efb368c')`
List by Title	`web/lists/getByTitle('Customers')`
List property	`web/lists/getByTitle('Customers')/Title`
List items collection	`web/lists/getByTitle('Customers')/items`
List item	`web/lists/getByTitle('Customers')/items(1)`
List item property	`web/lists/getByTitle('Customers')/items(1)/FirstName`

ODATA Formats and the Accept Header

- Verbose (aka Full Metadata)

```
accept: application/json; odata=verbose
```

- Minimal Metadata

```
accept: application/json; odata=minimalmetadata
accept: application/json
```

- No Metadata

```
accept: application/json; odata=nometadata
```

Passing SPHttpClient to the React Component

```
import { SPHttpClient } from '@microsoft/sp-http';

export interface ILeadTrackerProps {
  targetListDefault: string;
  siteUrl: string;
  spHttpClient: SPHttpClient | undefined;
}
```

```
public render(): void {

  const element: React.ReactElement<ILeadTrackerProps> = React.createElement(
    LeadTracker, {
      targetListDefault: this.properties.targetList,
      siteUrl: this.context.pageContext.web.absoluteUrl,
      spHttpClient: <SPHttpClient>this.context.spHttpClient
    }
  );

  this.leadTracker = <LeadTracker>ReactDom.render(element, this.domElement);
}
```

Service Class using SPHttpClient

```
import {
  SPHttpClient,
  SPHttpClientResponse
} from '@microsoft/sp-http';

export default class SharePointLeadsService implements ILeadsService {

  constructor(private spHttpClient: SPHttpClient, private siteUrl: string) {
  }

  public getLeads(targetList: string): Promise<ILead[]> {

    let restUrl = this.siteUrl +
      `/_api/web/lists/getByTitle('${targetList}')/items/` +
      "?$select=Id,FirstName,Title,Company,Email";

    return this.spHttpClient.get(restUrl, SPHttpClient.configurations.v1)
      .then(response => response.json())
      .then(response => {
        return response.value.map(lead => <ILead>({
          id: lead.Id,
          firstName: lead.FirstName,
          lastName: lead.Title,
          company: lead.Company,
          emailAddress: lead.Email
        }));
      });
  }
```

Calling SPHttpClient.get

```
public getLeads(targetList: string): Promise<ILead[]> {

  let restUrl = this.siteUrl +
    `/_api/web/lists/getByTitle('${targetList}')/items/` +
    "?$select=Id,FirstName,Title,Company,Email";

  return this.spHttpClient.get(restUrl, SPHttpClient.configurations.v1)
    .then(response => response.json())
    .then(response => {
      return response.value.map(lead => <ILead>({
        id: lead.Id,
        firstName: lead.FirstName,
        lastName: lead.Title,
        company: lead.Company,
        emailAddress: lead.Email
      }));
    });
}
```

```
public getLeadsLists(): Promise<IList[]> {

  let restUrl = this.siteUrl + "/_api/web/lists/" +
    "?$select=Id,Title&$filter=BaseTemplate+eq+105";

  return this.spHttpClient.get(restUrl, SPHttpClient.configurations.v1)
    .then(response => response.json())
    .then(response => {
      return response.value.map(list => <IList>({
        id: list.Id,
        title: list.Title
      }));
    });
}
```

Agenda

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DEMO
Reading Items from a SharePoint List

Summary

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