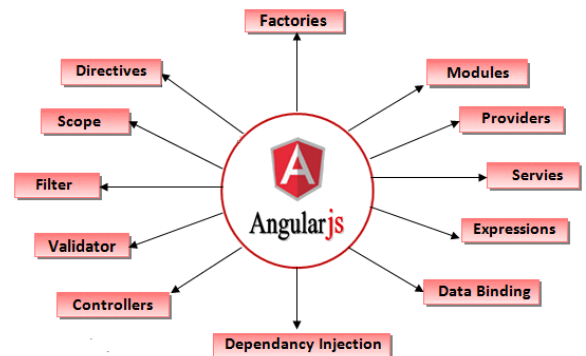


Web Development using Angular JS through Single Page Applications (SPA)

Priyanka Panchal

*Department of Information Technology, Madhuben & Bhanubhai Patel Women's Institute of Engineering for Studies & Research in Computer & Communication Technology (MBICT), New V. V. Nagar, (India)
Gujarat Technological University (GTU)*

ABSTRACT:- Web development using Angular JS through Single Page Applications (SPA) technologies. The document also illustrates at high level on how to use Angular JS with legacy technologies such as PHP, .Net, Ruby on Rails (ROR) and Java. The major driving factor for client side script is the complexity to maintain the business logic in the browser and trade off with a thin loading. As more and more logic ends up being executed in the browser, front-end code bases grow larger and more difficult to maintain. To solve this issue, developers have been turning to client-side MVC frameworks, which promise increased productivity and maintainable code. JavaScript has become the language of choice for development, especially for client-side development.



I. INTRODUCTION:

Angular JS is framework manage by Google, it help build responsive sites. Angular JS use to make a smooth web performance. Angular JS is a toolset for building the framework most suited to your application development. It is fully extensible and works well with other libraries.

Angular JS is a very powerful **JavaScript Framework**. It can be added to an HTML page with a `<script>` tag in which library written in JavaScript. Angular JS is used in **Single Page Application (SPA)** projects. Angular extends HTML attributes with **Directives**, and binds data to HTML with **Expressions**. It is open source, completely free, and used by thousands of developers around the world.

II. HISTORY:

Angular JS was originally developed in 2009 by Misko Hevery and Adam Abrons. It is now maintained by Google. Its latest version is 1.4.3. AngularJS version 1.0 was released in 2012. Miško Hevery, a Google employee, started to work with AngularJS in 2009. The idea turned out very well, and the project is now officially supported by Google.

Core Concepts of Angular JS

The diagram shows the various parts of angular JS.

Following are most important core features of AngularJS –

Data-binding: Data-binding in AngularJS apps is the automatic synchronization of data between the model and view components.

Scope: The scope is the binding part between the HTML (view) and the JavaScript (controller). The scope is available for both the view and the controller.

Controller: AngularJS applications are controlled by controllers. The ng-controller directive defines the application controller.

Services: AngularJS you can make your own service, or use one of the many built-in services.

Filters: AngularJS provides filters to transform data.

Directives: AngularJS directives are an extension over the HTML elements and that allow you to extend the HTML elements behavior by adding special attribute prefix **ng-**. AngularJS is having set of built in directives which allow us to implement required functionality by using html elements in application.

Routing: In angularJS routing is the way to view multiple views in the single HTML page. Now a day's lots of people are using single page applications (SPA) to show multiple html templates in single page without loading or changing page to implement this routing is the best feature to load content dynamically without changing page. The **ngRoute** module helps your application to become a Single Page Application.

Dependency Injection: Dependency Injection (DI) is a software design pattern that deals with how components get hold of their dependencies. The AngularJS injector subsystem is in charge of creating components, resolving their dependencies, and providing them to other components as requested.

Template: In AngularJS, templates are written with HTML that contains AngularJS-specific elements and attributes. AngularJS combines the template with information from the model and controller to render the dynamic view that a user sees in the browser.

Expression: AngularJS expressions are JavaScript-like code snippets that are mainly placed in interpolation bindings.

AngularJS Environment Setup

AngularJS is a JavaScript framework. It is a library written in JavaScript. AngularJS is distributed as a JavaScript file, and can be added to a web page with a script tag.

Online Script:

```
<script src="http://ajax.googleapis.com/ajax/libs/angularjs/1.4.8/angular.min.js"></script>
```

Offline Script:

```
<script src="scripts/angular.min.js"></script>
```

AngularJS Extends HTML

AngularJS extends HTML with ng-directives. The ng-app directive defines an Angular JS application. The ng-model directive binds the value of HTML controls (input, select, textarea) to application data. The ng-bind directive binds application data to the HTML view. AngularJS MVC Architecture

III. MVC Architecture

Model

In AngularJS, model consists of all primitive data type such as integer, string and Boolean and complex type in form of object.

In simple word model is just a plain Javascript object.

But you can build your model from any database like Sql Server or Mysql or from JSON file.

In below given syntax \$scope is an object, customer is variable which is added to scope object.

Syntax

```
<script>
```

```
$scope.customer =
```

```
{ 'Name' : 'Priyanka', 'Address' : '12-13-283/A1', 'Email' : 'priyanka@yahoo.com' }
```

```
</script>
```

View

View is the DOM elements which is used to display data in AngularJS

To display data from controller, use expression in view.

Since AngularJS supports two-way data binding any changes in model data, view will update automatically.

Example:

```
<script>
```

```
<p> {{customer.name}} </p>
```

```
<p> {{customer.address}} </p>
```

```
<p> {{customer.name}} </p>
```

```
</script>
```

Controller

The controller responds to user input and performs interactions on the data model objects. The controller receives input, validates it, and then performs business operations that modify the state of the data model.

It is a software Code that controls the interactions between the Model and View.

Syntax

```
<script>
```

```
function RealCustomer($scope){
```

```
}
```

```
</script>
```

IV. WORKING WITH AngularJS First Application

An AngularJS application consists of following three important parts –

ng-app – directive defines an AngularJS application.

ng-model – directive binds the value of HTML controls (input, select, text area) to application data.

ng-bind – This directive binds the application data to HTML tags.

Steps to create AngularJS Application

Step 1 – Load framework

```
<scriptsrc="https://ajax.googleapis.com/ajax/libs/angularjs/1.3.14/angular.min.js">
```

```
</script>
```

Step 2 – Define AngularJS Application using ng-app directive

```
<div ng-app = "myapp"> ... </div>
```

Step 3 – Define a model name using ng-model directive

```
<p>Enter your Name:
```

```
<input type = "text" ng-model = "name"></p>
```

Step 4 – Bind the value of above model defined using ng-bind directive.

<p>Hello !</p>

V. AngularJS Directives

AngularJS lets you extend HTML with new attributes called Directives.

These are special attributes starting with ng- prefix.

We're going to discuss following directives

ng-app – This directive starts an AngularJS Application.

ng-init – This directive initializes application data.

ng-model – This directive defines the model that is variable to be used in AngularJS.

ng-repeat – This directive repeats html elements for each item in a collection.

VI. ADVANTAGES

- AngularJS provides capability to create Single Page Application in a very clean and maintainable way.
- AngularJS provides data binding capability to HTML thus giving user a rich and responsive experience
- AngularJS code is unit testable.
- AngularJS provides reusable components.
- With AngularJS, developers write less code and get more functionality.
- In AngularJS, views are pure html pages, and controllers written in JavaScript do the business processing.
- On top of everything, AngularJS applications can run on all major browsers and smart phones including Android and iOS based phones/tablets.

VII. DISADVANTAGES

- Although AngularJS comes with lots of good thing but same time we should consider the following points :
- Not Secure – Being JavaScript only framework, application written in AngularJS are not safe. Server side authentication and authorization is must to keep an application secure.
- Not degradable – If your application user disables JavaScript then user will just see the basic page and nothing more.

VIII. Why Angular JS??

- Address Some Problems in Software Architecture
 - Angular JS has ng-resource to create services that hook up to REST APIs and return back that object in JSON and fully functional object.

- Angular JS encourages to also deal with models on client side just like on the server side.
 - Enable to Create Software quickly with Less Effort
- Angular JS provide ng-model and ng-class directives to cover common operations and allows 2-way data binding and saving to the server.
 - Reduces the code
 - Result in Software is more Maintainable
 - Angular JS encourages using the model object oriented design on the client-side
 - Object oriented design principle ensure software is more maintainable compared to procedural.
 - Improve Testability of Software
 - Angular JS provides dependency injection at its core making flexible testing
 - Encourage Good Programming Practices
 - Features like Model, dependency injection and ability to create directives lends to reusable and shareable components
 - REST API connection to server and benefits through Angular JS usage

IX. AngularJS Example:

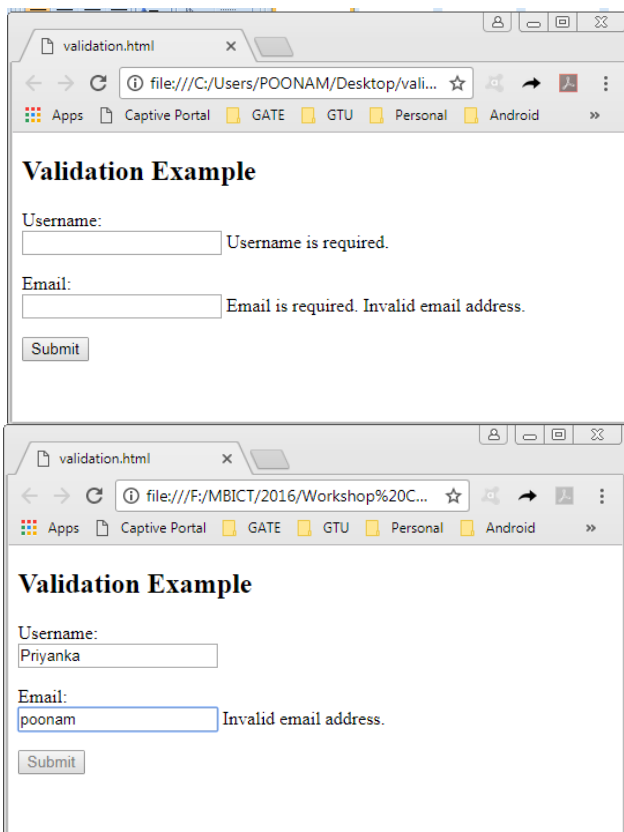
Following is the simple Example of Angular JS with source code

```
<!DOCTYPE html>
<html>
<script src="scripts/angular.min.js"></script>
<body>
<h2>Validation Example</h2>
<form ng-app="myApp" ng-controller="validateCtrl"
name="myForm" novalidate>
<p>Username:<br>
<input type="text" name="user" ng-model="user"
required>
<span ng-show="myForm.user.$error.required">Username
is required.</span>
</span>
</p>
<p>Email:<br>
<input type="email" name="email" ng-model="email"
required>
<span ng-show="myForm.email.$error.required">Email is
required.</span>
<span ng-show="myForm.email.$error.email">Invalid
email address.</span>
</span>
</p>
```

```

<p>
<input type="submit" ng-disabled="myForm.user.$dirty
&& myForm.user.$invalid ||
myForm.email.$dirty && myForm.email.$invalid">
</p>
</form>
<script>
var app = angular.module('myApp', []);
app.controller('validateCtrl', function($scope) {
$scope.user = 'Priyanka';
$scope.email = 'priyanka.panchal@gmail.com';
});
</script>
</body>
</html>

```



X. Conclusion:

The Angular JS which is deviated from the classical JavaScript development, uses or introduces new paradigms for the

development methodologies. Angular JS is the wise choose for those who need comprehensive all-in-one solution with 2-way data binding and in-built directives or filters which will allow teams to develop applications rapidly. This allows users to write less code, but note that Angular requires significant effort and time to learn. It has good test integration, which is really useful.

REFERENCE

- [1] A model-driven development of web applications using AngularJS framework, Wutthichai Chansuwath, Twittie Senivongse, IEEE Xplore, 25 August 2016
- [2] AngularJS Performance: A Survey Study, Miguel Ramos, Marco Tulio Valente, Ricardo Terra, May 2017
- [3] AngularJS in the Wild: A Survey with 460 Developers, Miguel Ramos, Marco Tulio Valente, Ricardo Terra, Gustavo Santos, August 2016
- [4] AngularJS: A Modern MVC Framework in JavaScript, Nilesh Jain, Priyanka Mangal and Deepak Mehta, VOL 5, NO 12 (2014)
- [5] AngularJS vs. Backbone.js vs. Ember.js (<https://www.airpair.com/js/javascript-framework-comparison>)
- [6] <https://www.airpair.com/angularjs/posts/jquery-angularjs-comparison-migration-walkthrough>
- [7] <http://code.tutsplus.com/tutorials/3-reasons-to-choose-angularjs-for-your-next-project--net-28457>
- [8] Comparative Analysis Of Angularjs And Reactjs, Anurag Kumar and Ravi Kumar Singh, International Journal of Latest Trends in Engineering and Technology, Vol.(7)Issue(4), pp.225-227.