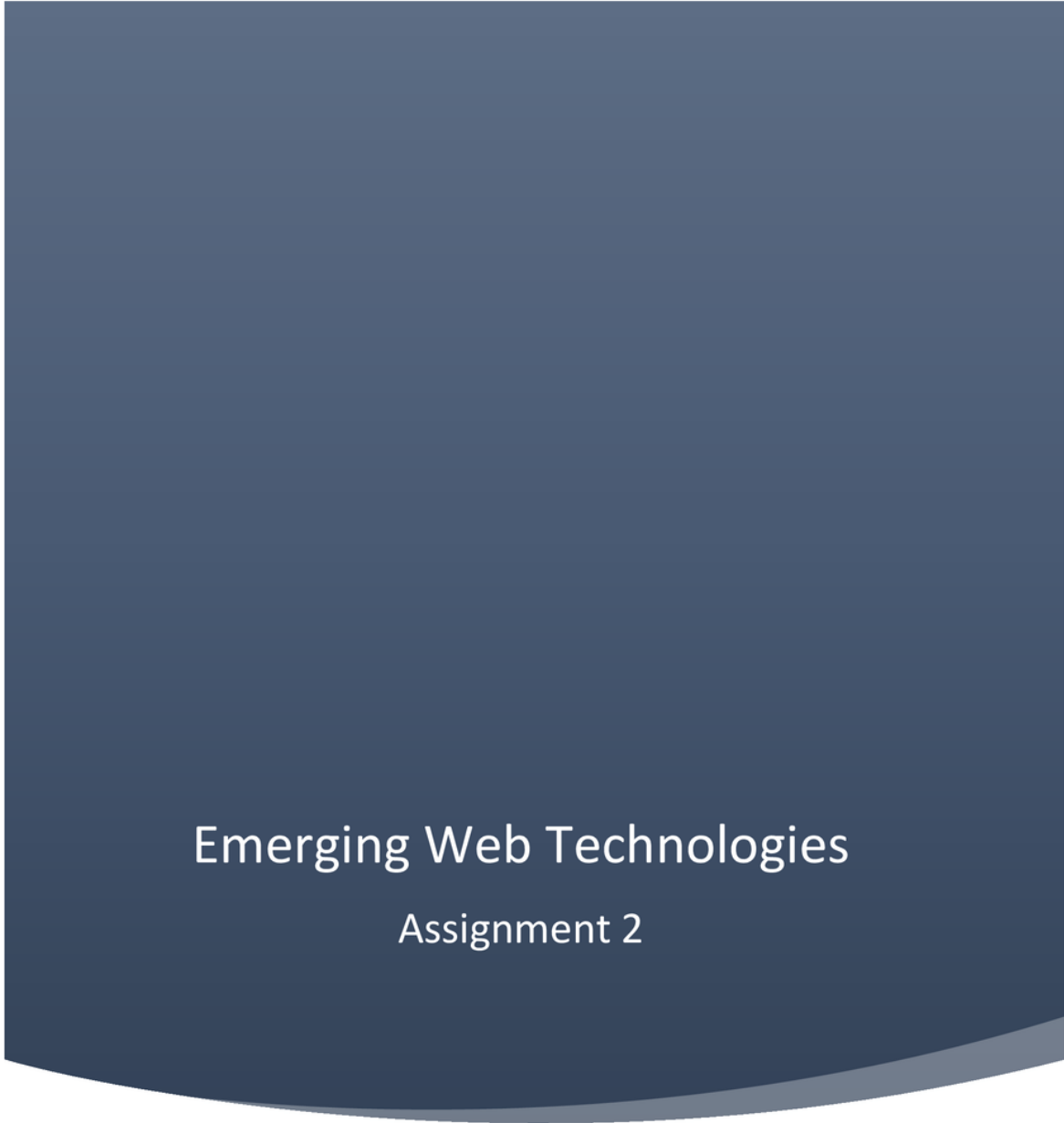


Emerging Web Technologies

by Jack Holland

FILE	1331_JACK_HOLLAND_EMERGING_WEB_TECHNOLOGIES_178152_11320732.DOCX (350.39K)		
TIME SUBMITTED	05-APR-2019 09:29PM (UTC+0100)	WORD COUNT	2032
SUBMISSION ID	104243022	CHARACTER COUNT	11997

A large, dark blue, curved graphic element that serves as a background for the title text. It has a slight gradient and a curved bottom edge.

Emerging Web Technologies

Assignment 2

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Website Development
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1. Future of Web Development

The web technology chosen for this assignment is AngularJS. AngularJS is a JavaScript based front end web framework. It was released in October 2010 and is now developed by Google. The technology aims to simplify the development and testing of web applications.

AngularJS is a popular web technology and is used by Microsoft, Google, Forbes, Tesco Mobile, GitHub and many more companies.

AngularJS works by extending HTML tags, to define an AngularJS application the attribute "ng-app" is added to the parent tag. Then to bind a value the attribute "ng-model" is used, to display the result the "ng-bind" attribute is added.

The framework is built using the MVC design pattern, a diagram of this can be viewed below:

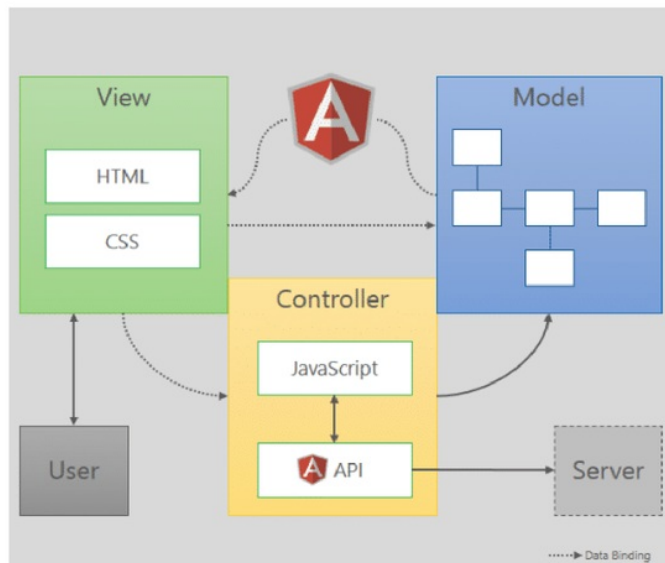


Figure 1 How AngularJS using the MVC Architecture [1]

Code:

```
<div ng-app="">
  <p>First Name: <input type="text" ng-model="first_name"></p>
  <p ng-bind="first_name"></p>
```

This would output:

First Name:

Jack

1.1 AngularJS Features

The example above is a simple piece of code. Below are some features that will explain AngularJS further.

MVC or MVW

AngularJS can be configured using the MVC (Model View Controller) or (MVW) Model View Whatever. MVW means that other things can be used instead of a controller. [1]

Data Binding

AngularJS allows developers to use two-way data binding. This helps developers from writing a lot of code.

Dependency Injection

Developers can use dependency injection to help natural development, understanding and testing.

Directives

This feature allows developers to create custom HTML tags that act like widgets.[1]

1.2 Advantages of using AngularJS

Listed below are some advantages of using AngularJS.[2]

- **Developed by Google:** As AngularJS is developed by Google, it means developers will consider the framework due to Google's backing. This means there is a large community of developers out there that can help with problems.
- **MVC Approach:** AngularJS uses a MVC approach, MVC (Model View Controller) is a design pattern that is familiar within the web development industry and is commonly used within other web frameworks, adding familiarity allowing the AngularJS to be learnt quickly.
- **Intuitive:** By using the existing HTML Tags, AngularJS is an intuitive technology.
- **Testing:** Unit tests can be performed on AngularJS, allowing developers to test their code easily.

1.3 Disadvantages of AngularJS

There are some disadvantages of using AngularJS, they are: [2]

- **Overcomplicated:** In AngularJS, there are many ways to do the same thing. This can cause confusion and cause overcomplicated code.
- **Name Clashing:** If two NG-Apps are called the same, they can conflict with each other causing the developer to be careful with their naming.

1.4 Future of AngularJS

As Google is the developer of AngularJS, the project will most likely be a well-known JavaScript client-side framework. The community of AngularJS developers is large and frequent updates are being made to the project.

2. NoSQL Database

The NoSQL database that have been chosen is MongoDB. MongoDB is a NoSQL database which was released in February 2009. MongoDB is one of the most popular NoSQL alternatives and is being updated regularly with new features.

There are three versions of MongoDB available, they are:

- **MongoDB Community Server:** This version of MongoDB is free to use for Windows, Mac OS and Linux
- **MongoDB Enterprise Server:** This version is the enterprise version of MongoDB, it requires a monthly subscription fee.
- **MongoDB Atlas:** This version of MongoDB is available for Amazon Web Service, Microsoft Azure and Google Cloud.

2.1 MongoDB Features

Below are important features of MongoDB that make it popular for web applications.

Aggregation Framework

MongoDB uses an aggregation framework to allow the database to be used efficiently. It allows for batch processing of data by using the operations Map and Reduce[3].

Map and Reduce is a programming model with two procedures, map is a filtering and sorting procedure and reduce performs a summary of the database.



The framework allows MongoDB users to get similar results to SQL GROUP BY clauses.

BSON Format

MongoDB uses a JSON-like formatting system called BSON. It stands for binary JSON which uses binary to encode the data stored in the database.

BSON has extended JSON by adding support for dates and using enabling primary keys.

An example of BSON:[3]

```
{
  "_id": ObjectId("12e6789f4b01d67d71da3211"),
  "title": "Key features Of MongoDB",
  "comments": [
    ...
  ]
}
```

Sharding

This feature of MongoDB allows the application be scaled upwards. It is a key feature of MongoDB, sharding allows for data to be shared and stored across multiple servers or machines.

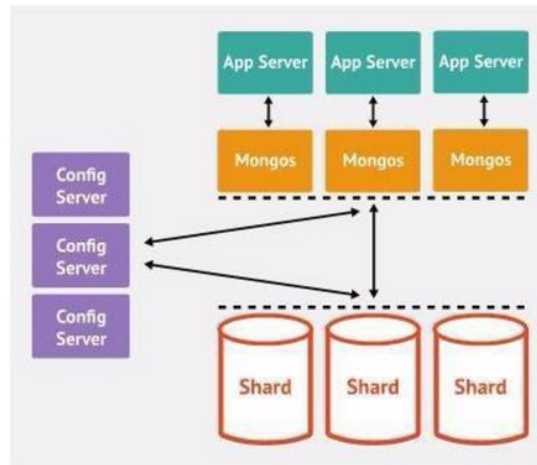


Figure 2 How MongoDB Sharding works across multiple servers[3]

Ad Hoc Queries

MongoDB adds a query like system similar to regular SQL, ad hoc queries support field, range and regular expression queries.

A comparison of SQL and MongoDB queries: [3]

SQL Query	<code>SELECT * FROM Employees WHERE emp_name LIKE '%MOHIT%';</code>
MongoDB Query	<code>db.Employees.find({emp_name:/MOHIT/ });</code>

This query is similar to SQL queries and the syntax is easy to understand.

2.2 MongoDB Advantages

Below are some advantages of why MongoDB is a good NoSQL alternative:

- **Fast:** MongoDB is a fast document-orientated database, it allows for indexing which helps the system find results faster.
- **Sharding:** As mentioned above, Sharding allows databases to be connected easily. This can make running a web application cheaper.[4]
- **Flexible:** MongoDB is a flexible database, this is because it doesn't use a schema compared to SQL databases. The database has the freedom of storing any data of different types.

2.3 Disadvantages of MongoDB

Some disadvantages of MongoDB can be found below:

- **High RAM usage:** MongoDB can sometimes use a lot of RAM, when the database is performing indexing and when storing key names for each value.
- **No Join Support:** There is no join support in MongoDB unlike relational databases, this means joins have to be coded manually which often is slow and effects performance.
- **Limited Data Size:** There is limited data size in MongoDB, a file cannot be more than 16MB currently.
- **Limited Nesting:** There is limited nesting available for MongoDB, the limit is 100 levels. This is enough for most but there are rare use cases which require more than 100 levels.[4]

3

2.4 Conclusion

In conclusion, MongoDB seems like a suitable approach for replacing a SQL database. The features available are good enough to be used on a live working web application.

4

The syntax used for querying the database is familiar with SQL queries with minor syntax changes. There is plenty of resources available for MongoDB including the MongoDB University which, this is a guide on how to use the database from the authors of MongoDB.

There is also full documentation on the website which can be read for free and referred to when working on a MongoDB database.

MongoDB can be used with all modern technology such as Node.js (for JavaScript/TypeScript), PHP, C#, ASP.NET and other technology.

3. Web Application

The web application created for the assignment was called "UWTSD Student Enrolment Form". It allowed administration staff to add, delete and edit students into the University system. Additionally, the system could list every student existing in the system.

The CSS for the web application is built using Bootstrap, this is because it is an easy to integrate styling to a web application or website. Icons used within the web application is from Font Awesome.

REST Service

The REST Service used for the web application is WCF. It stores the Student details into a C# list, the REST service allows the list to be added, deleted, edited and a list of students generated. The data between the web application and REST service is sent using JSON.

Add New Student

The index page of the application is the Add New Student page (AddNewStudent.html). This is because the purpose of the system is to enrol new students.

The form is built up of input text fields except the final input, which is a dropdown menu selecting the students course.

Once the "Submit Form" button is pressed, the function "Ajax_AddNewStudent" is called. The values are then assigned to different variables. The variables are then written into a JSON format and then sent.

If the data is sent to the REST service successfully, a success message is appended to a div which is located above the "Add New Student" title. But if there is a problem with either the REST service or form validation an error message is showed in the same place.

Delete Student

The delete student is a form with a dropdown box, it lists every student currently in the list. Once the button is submitted, the function "Ajax_DeleteStudent" is called. In the dropdown box, the value of each student is their index in the list. The web application sends a URL to the REST service with the student ID attached to it.

Once the REST service gets a DeleteStudent request, the student is then removed from the list.

Edit Student

The edit student is similar to adding a new student, at the top there is a dropdown menu listing every student. Underneath that is a form for changing the student details.

Once the submit button is pressed, a JSON array gets generated with the student ID attached. The student ID is gathered the same way as the "Delete Student".

An improvement for this page could be to add the existing student details to the input options.

List Students

The List Students is a table which contains every student. The students are fetched using the ListStudents URL on the REST service. If the function is successful, the Ajax_ListStudents_Success function is called.

The data is sent from the REST service in a JSON array, the data is then parsed and displayed in a table using a for loop. The data is then appended in three places they are:

- List Students Table
- Delete Student Form
- Edit Student Form

An improvement for this section of the website, the data is loaded when the DOM of each page is loaded. This means it is loaded on the "Add New Students" page when it is not needed.

4. Testing

4.1 Add New Student

Successful Outcome

UWTSD Student Enrolment Form

[+ Add New Student](#)[Delete Student](#)[Edit Student](#)[List Students](#)

Add New Student

Use this form to add a new student to the UWTSD Enrolment system.

First Name

First Name of the Student - Example: Steve

Surname

Surname of the Student - Example: Jobs

Postcode

Postcode of the Student - Example: NP19 0J

House Number

Postcode of the Student - Example: 14

Course

[Submit Form](#) [Reset Form](#)

UWTSD Student Enrolment Form

[+ Add New Student](#)[Delete Student](#)[Edit Student](#)[List Students](#)

✓ Success A new student was added successfully.

Add New Student

Use this form to add a new student to the UWTSD Enrolment system.

First Name

First Name of the Student - Example: Steve

Surname

Surname of the Student - Example: Jobs

Postcode

Postcode of the Student - Example: NP19 0J

House Number

Postcode of the Student - Example: 14

Course

[Submit Form](#) [Reset Form](#)

As the success message was sent, the REST Service and Web Application communicated successfully and stored the data into the list.

Unsuccessful Outcome

UWTSD Student Enrolment Form

[+ Add New Student](#)[🗑 Delete Student](#)[✎ Edit Student](#)[👤 List Students](#)

✖ Error Something went wrong with the Enrolment System, please check **all** fields and try again.

Add New Student

Use this form to add a new student to the UWTSD Enrolment system.

First Name

Enter First Name

First Name of the Student - Example: Steve

Surname

Enter Surname

Surname of the Student - Example: Jobs

Postcode

Enter Postcode

Postcode of the Student - Example: NP19 0JJ

House Number

Enter House Number

Postcode of the Student - Example: 14

Course

Select a Course

Submit Form ➡

Reset Form ↺

As none of the fields were filled in, there was an issue storing the data inside the object. Therefore, an error has been sent back to the web application triggering the `Ajax_AddNewStudent_Error` callback function.

4.2 Delete Student

Students appearing in the dropdown menu

Delete Student

Delete a Student from the UWTSD Enrolment system by selecting their name from the form below.

Select a Student...

Select a Student...

Jack Holland - Website Development

Students are permanently deleted from the UWTSD Enrolment System.

This shows a student being sent successfully from the REST service.

Successfully deleting a student

✓ **Success** Successfully deleted the student from the UWTSD Enrolment System.

Once the form has been submitted, the success message shows the REST service deleting the student and sending a callback.

A refresh of the page should take place before as the student still shows in the dropdown list even though they have been deleted. This is a client side (jQuery) fix so it was not relevant to testing.

4.3 Edit Student

Students Appearing in Dropdown Menu



A screenshot of a web form's dropdown menu. The dropdown is titled 'Select a Student' and shows a list of students. The first option, 'Jack Holland - Website Development', is highlighted in blue. Below the dropdown, the text 'Select a Student...' is visible, followed by the same student name.

Screenshot above shows the students successfully being loaded from the REST service.

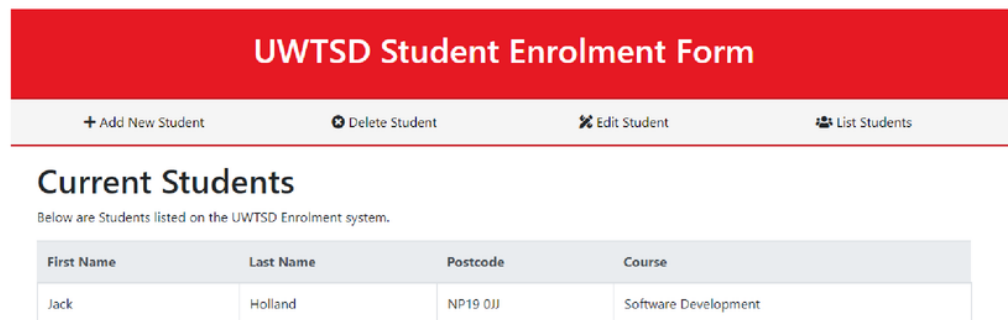
Successfully updating student

✓ **Success** Successfully deleted the student from the UWTSD Enrolment System.

The success message is from the callback, this means that the request have been sent to update a student.

4.4 List Students

Students loading successfully



A screenshot of the 'UWTSD Student Enrolment Form'. The form has a red header with the title 'UWTSD Student Enrolment Form'. Below the header is a navigation bar with four buttons: '+ Add New Student', '✕ Delete Student', '✕ Edit Student', and '👤 List Students'. The 'List Students' button is active. Below the navigation bar is a section titled 'Current Students' with the text 'Below are Students listed on the UWTSD Enrolment system.' and a table of students.

First Name	Last Name	Postcode	Course
Jack	Holland	NP19 0JJ	Software Development

The screenshot above shows the students in the system being loaded successfully.

Multiple students being loaded

Current Students

Below are Students listed on the UWTSD Enrolment system.

First Name	Last Name	Postcode	Course
Jack	Holland	NP19 0JJ	Software Development
Steve	Jobs	APPLE	Website Development

The screenshot above shows multiple students being loaded and the JSON array being iterated through.

5. References

- [1] "10 Best JavaScript Frameworks You Should Know," Geekflare, 16-Jun-2018. [Online]. Available: <https://geekflare.com/best-javascript-frameworks/>. [Accessed: 04-Apr-2019].
- [2] "AngularJS - What, Why, Advantages and Disadvantages | Blog by WeblinesIndia," WeblinesIndia, 06-Jul-2016. [Online]. Available: <https://www.weblinesindia.com/blog/angularjs-what-why-advantages-and-disadvantages/>. [Accessed: 04-Apr-2019].
- [3] F. meMohit AroraHi, I. am M. Arora, A. P. Blogger, addicted reader C. working as a T. A. in I. L. Y. can check my other blog-C. com Y. can connect with me on I. O. Quora, and L. as well, "What Are The Top 10 Key Features Of MongoDB?," TutorialsJar, 19-Mar-2017. .
- [4] D. Team, "Advantages of MongoDB | Disadvantages of MongoDB," DataFlair, 17-Apr-2018. [Online]. Available: <https://data-flair.training/blogs/advantages-of-mongodb/>. [Accessed: 04-Apr-2019].

Emerging Web Technologies

GRADEMARK REPORT

FINAL GRADE

64/100

GENERAL COMMENTS

Instructor

Eval emergent tech (20) 13

Eval of NoSQL (30) 27

Typescript application (20) 13

REST web service (20) 11

Tech demo (10) 0

The emergent technology that you chose was AngularJS. Although you did list some benefits and drawbacks. You could have provided a little more detail of its operation to support your arguments for its future wide scale adoption.

The NoSQL database you chose was MongoDB. I have raised some minor points in the text.

Generally application worked although I had to add a button to reload the students that had been added. The code is a bit formulaic and there is no database code in the REST service.

PAGE 1

PAGE 2

PAGE 3



Comment 1

Since you introduced it, you should explain what it does.

PAGE 4

PAGE 5



Comment 2

Very interesting, how does it achieve this

PAGE 6

PAGE 7



Comment 3

Another disadvantage is that it does not support transactions



Comment 4

I do not think it will replace SQL, but there are use cases where MongoDB is a more suitable approach than SQL.

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