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**Question 1:**

**Mongoose vs MongoDB:**

Mongoose is an Object Data Modeling (ODM) library for MongoDB and Node.js. It manages relationships between data, provides schema validation, and is used to translate between objects in code and the representation of those objects in MongoDB whereas, MongoDB is a schema-less NoSQL document database. It means you can store JSON documents in it. The structure of these documents can vary, as they are not enforced like SQL databases.

**Why use mongoose package?**

We use Mongoose package instead of MongoDB package as it speeds up application development and reduces the complexity of deployments. Moreover, it is known as one of the most popular ODM tools for mongo. Mongoose makes the transition into a NoSQL environment much easier. It also saves you time writing your own validations and instance methods. It is highly recommended and quite useful for smaller DBs and basic Mongo operations.

**How will we perform CRUD operations?**

We will perform crud operations using MongoDB.

**Crud operations:**

These are the following CRUD operations create, read, update and delete.

***Create:***

It is also known as insert. It adds a new document to collections. It targets a single collection.

Mongodb provides following methods for insertion:

* db.collection.insertOne()
* db.collection.insertMany()

***Example:***

db.Books.insertOne (

{ Title: “The Alchemist”

Author: “Ali”

})

***Read:***

It is used to retrieve existing documents from collections.

Mongodb provides following methods for retrieval:

* db.collection.find()
* db.collection.findOne()
* db.collection.findAll()

***Example:***

db.Books.find({Title: “The Alchemist”})

***Update:***

The update method is used to modify an existing collection. It targets a single collection. A few of the methods provided by Mongodb for modification are:

* db.collection.updateOne()
* db.collection.updateMany()
* db.collection.replaceOne()

***Example:***

db.bookReview.updateMany(

{rating: { $gt: 4 } },

{ $set: { "Review" : true } }

);

***Delete:***

Delete operation is used to remove documents from a collection. It targets a single collection. These are the following methods Mongodb provides to perform delete operations:

* db.collection.deleteOne()
* db.collection.deleteMany()

***Example:***

db.Books.remove(

{ qty: { $lt: 10

}

} );

**Question 2:**

**Put vs Post:**

Both PUT and POST methods are used to send data to the server to create or update resources. The difference between both is that PUT method is idempotent i.e. if we call PUT multiple times it will produce the same results. On the other hand, if we call POST method repeatedly it will duplicate data, creating the same resource multiple times. Moreover, put should be used if you know the exact URI and if not it is recommended to use POST.

**Why did we use POST in updating Employee Record?**

We used POST operation instead of PUT in updating employee records because we have to send the data from form and do not know the exact URI. Therefore, it is better to use POST in this scenario.

**Replacing post with put:**

If we replace post with put, the fields will not be duplicated, instead would be replaced with updated data. Thus, we will lose older data, which would be a disadvantage for those who want to update and also keep record of the older data. Moreover, for PUT we need to define the entire resource at all times, otherwise we could end up with an undesired result.

**Question 3:**

PUT can be used for updating fields like a name on University forum but it has a disadvantage that is that if we only update the name field without rewriting other attributes all of the previous fields will be deleted. Thus, we have to write all the fields repeatedly even if we are updating a single field. Thus, it is better to use Patch, which means that we are applying a partial update, this will only update the field that we mentioned to be updated and will not affect the rest of the fields. But, it is important to note that patch only works for existing collections and does not create new collections like post or put.

**Question 4:**

Angular is a TypeScript-based, open-source front-end web application platform. It is an MVC framework created by Google whereas React, created by Instagram, Facebook and the community, is a JavaScript library used for building user interfaces. React in comparison to Angular JS is not that powerful as it is just a JavaScript library, but when it is combined with other libraries you get a powerful solution to any problem. Thus, this is why react is such a powerful competitor to angular JS.

***Advantages and disadvantages:***

**React** **AngularJS**

* provides one way binding provides two way binding

i.e you can make model affect view i.e you can make model affect view and

not the other way around. Vice versa.

* React uses virtual DOM which AngularJS uses browser’s DOM which as

Simplifies and speeds up processes. Compared to virtual DOM is slower.

* React is quite simple and it is not easy to learn and specifically creates

easy-to-learn, but it consumes time third part syntax and stores.

while setting up a project in React.

* React does not enforce an app AngularJS follows MVC structure, which

structure by itself, it depends on the produces a well-structured code.

developer.

**Question 5**

***Vue.js:***

Vue is a progressive framework for building user interfaces. It is designed from the ground up to be incrementally adaptable. It focuses on view layer only. Vue can be easily integrate with other libraries. Moreover, it is also quite helpful in developing single paged powerful applications when used in combination with modern tooling and supporting libraries.

* **Size**

One of the greatest advantages of Vue.js is its small size. The size of this framework is 18 to 21KB and the user can download and use it in a very short amount of time unlike other frameworks, which are quite heavy in size. It is also quite fast and thus, beats all the bulky frameworks in speed as well like React.js, Angular.js, and Ember.js.

* **Role of Directives and Components**

Vue has a clearer separation between directives and components. Directives help encapsulate DOM manipulations, while components are self-contained units that have their own view and data logic. In AngularJS, directives do everything and components are just a specific kind of directive.

* **Flexibility**

It provides a great deal of flexibility, which is another advantage of Vue.js. It allows the users to write their template in HTML file, JavaScript file, and pure JavaScript file using virtual nodes. Its flexibility also makes it easy to understand for the developers of React.js, Angular.js, and any other new JavaScript framework.

* **Easy to learn**

Vue.js is very easy to understand which attracts a lot of attention to this framework. The user can easily add Vue.js to his web project because of its simple structure. Both the small as well as large scales templates can be developed through this framework, which saves a lot of time, thus it is also not time consuming at all. It also simplifies error detection; the user can easily trace the blocks with errors.

**Question 6:**

**AngularJS:**

AngularJS is an open-source, JavaScript-based, front-end web application framework for dynamic web app development. It utilizes HTML as a template language. By extending HTML attributes with directives and binding data to HTML with expressions, AngularJS creates an environment that is readable, extraordinarily expressive and quick to develop.

**AngularIO:**

Angular is the blanket term used to refer to Angular 2, Angular 4 and all other versions that come after AngularJS. Both Angular 2 and 4 are open-source, TypeScript-based front-end web application platforms.

Angular 4 is the latest version of Angular. Although Angular 2 was a complete rewrite of AngularJS, there are no major differences between Angular 2 and Angular 4. Angular 4 is only an improvement and is backward compatible with Angular 2.

**Differences between AngularJS and AngularIO:**

* **Three different types:**

Angular JS is an open source JS-based, frontend web application framework for dynamic web app development whereas, AngularIO (angular-2 and angular-4) are open-source, Typescript based frontend web application platforms.

* **Architecture:**

The architecture of angularJS is based on MVC structure i.e. Models, Views and Controllers. This in angularIO, was first replaced by controllers and directives, which were later on improved.

* **Language:**

Angular JS is written in JavaScript. Angular uses Microsoft’s TypeScript language, which is a superset of ECMAScript 6 (ES6). This has the combined advantages of the TypeScript features, like type declarations, and the benefits of ES6, like iterators and lambdas. Angular 4 is compatible with the most recent versions of TypeScript that have powerful type checking and object-oriented features.

* **Speed:**

By providing features like 2-way binding, AngularJS reduced the development effort and time. However, by creating more processing on the client side, page load was taking considerable time. Angular2 provides a better structure to more easily create and maintain big applications and a better change detection mechanism. Angular 4 is the fastest version yet.

* **Dependency injection**

Angular implements unidirectional tree-based change detection and uses Hierarchical Dependency Injection system. This significantly boosts performance for the framework.

* **Mobile support:**

AngularJS is not supported on mobile but AngularIO is.

* **Routing:**

AngularIO has simpler routing as compared to Angular JS. For example, AngularJS uses $routeprovider.when() to configure routing while Angular uses @RouteConfig{(…)}.

* **Implementation:**

The implementation scale of AngularJS is poorer as compared to AngularIO.

* **Set up:**

AngularIO is more complex to set up as compared to AngularJS.

**Question 7:**

**Linting:**

Linting is the process of checking the source code for Programmatic as well as Stylistic errors. This is most helpful in identifying some common and uncommon mistakes that might occur during coding.

A Lint or a Linter is a program that supports linting (verifying code quality). They are available for most languages like JavaScript, CSS, HTML, Python, etc.

Some of the useful linters are ESLint, JSLint, CSSLint, JSHint, Pylint.

**ESLint:**

1. ESLint is a tool for identifying and reporting on patterns found in JavaScript code, with the goal of making code more consistent and avoiding bugs.
2. Linting tools like ESLint allow developers to discover problems with their JavaScript code without executing it.
3. The primary reason ESLint was created, was to allow developers to create their own linting rules.
4. ESLint is written using Node.js to provide a fast runtime environment and easy installation via npm.
5. In many ways, it is similar to JSLint and JSHint with a few exceptions:

* ESLint uses Espree for JavaScript parsing.
* ESLint uses an AST to evaluate patterns in code.
* ESLint is completely pluggable, every single rule is a plugin and you can add more at runtime.

**Question 8:**

**AJAX vs AngularJS:**

Ajax is a technology that enables fetching/sending data from/to the server without requiring a page reload. AngularJS is a framework that implements Ajax technology to make building Single Page Applications easier.

**Ajax application:**

* ***Comments***

Comments on blogs or even just articles are a great use of Ajax. Comments can change all the time, and especially when a commenter hits the comment button, it is nice to see the comment appear immediately on the page. It is better to use ajax in retrieving and adding new comments as it is an synchronous request and can easily handle fast changing information.

**AngularJS application:**

* ***Creating a SPA***

AngularJS can be used for making Single Page Applications. It is better to use angularJS in this scenario as AngularJS is made by google in order to provide a framework for applications. It is important to note that if your content or data never changes or rarely changes, then you shouldn't use Ajax to access it and usually in Single Page applications you do not change data frequently.