Research on Web Front-End Framework Technology

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Abstract. With the development of the times, web front-end applications continue to follow up, and the topic discussion of microblogging front-end framework technology continues to rise, which is a hot topic of technical personnel and even society. This technology for the web front-end framework technology development and application to reduce the difficulty, improve efficiency, enhance user security and confidentiality, better service for users, to provide convenience. The front-end page of Weibo is becoming more and more complex, the popularity of smart devices, and new breakthroughs in visual experience. The functionality of the front-end is getting stronger and stronger, the development difficulty is gradually increasing, and more technology investment also reduces the development cost and improves the development efficiency. This paper expounds the design pattern of micro-blog front-end frame technology, conducts research on it, and further analyzes the application scenarios of different frame technologies, as well as their advantages and disadvantages, to provide reference for Internet developers.

Keywords: Web front-end, framework technology, model-view-controller mode.

1 Introduction

With the changes of the times, in this big data environment, Internet technology develops rapidly. Mobile phone models are constantly changing, and web applications are constantly being updated. web front-end technology has become an important link and a key role. Therefore, in this respect, a lot of talents are needed, hard innovation, the introduction and promotion of intelligent equipment is fully popularized, so that the front-end web page in all levels, to a higher level [1]. Microblogging front-end framework is widely used in the development and design of web pages. This technology runs on a variety of browsers to present the web page to the user. Hyper Text Markup Language(HTML), Cascading Style Sheets(CSS), JavaScript and other core technologies, front-end framework applications, cross-platform responsive Web design can adjust to different screen sizes and employ appropriate dynamic design to provide users with an excellent user experience [2]. Front-end framework is an important tool for developing efficient, maintainable and extensible Web applications. Generally speaking, commonly used front-end frameworks include React, Angular, Vue, etc. Mastering common front-end frameworks can help developers quickly build

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Web applications, improve development efficiency and code quality. With the popularity of mobile devices, Web front-end development pays more and more attention to responsive design, that is, automatically adjust the page presentation and function display according to different device types, which can provide better user experience. The use of Vue.js, React and other front-end frameworks makes front-end development more efficient and can quickly build stable and easy to maintain Web applications. At the same time, the user's privacy and data have a more secure layer of protection, and the web application is more optimized [3]. The framework model of the Web front-end java environment, My Structured Query Language(MySQL) database and other development environment and the use of tools [4], including structural design (system interface design, the main interface and the relationship between the interface, the function points involved in each part of the system main interface includes: Registration and login interface, front end system display main interface, background system management main interface) more improvement, in order to promote the development efficiency, simplify the code, convenient for later maintenance, in the development of the application of hierarchical structure model came into being.

2 Framework Overview

2.1 Model View Controller(MVC) Framework Pattern

The MVC framework pattern is the model Type (Model, model is the application of data and business logic representation. It is responsible for handling the reading, storage, and manipulation of data, as well as the processing of business rules. Models are usually independent of the user interface and can be shared and reused across different views and controllers.) Views (Views, models are representations of the application's data and business logic. It is responsible for handling the reading, storage, and manipulation of data, as well as the processing of business rules. Models are usually independent of the user interface and can be shared and reused across different views and controllers.) And controllers (The Controller, model is a representation of the application's data and business logic [5]. It is responsible for handling the reading, storage, and manipulation of data, as well as the processing of business rules. Models are usually independent of the user interface and can be shared and reused across different views and controllers.) 's points Layer pattern. The goal of using MVC is to divide the implementation code of M and V so that the same program can utilize different kinds of representation. In the standard MVC design, M stands for model, V for view, and C for controller. Among these, the user interface, or View, is clearly defined. In order to develop a dynamic software, it is the modification and extension of the program to simplify, and the reuse of a certain part of the program is called possible. To achieve a dynamic program design, the modification and extension of the program are simplified complying with the program, and the reuse of a certain part of the program is called possible.

The advantages of MVC framework:

1. Low coupling separates the view layer from the business layer, preventing the need to recompile the controller and model code when making changes to the view layer code. Similarly, only the MVC model layer needs to be modified when altering an application's business process or business rules. It is simple to modify the data layer and business rules of the application because the model is independent of the controller and the display.

2. High reusability

3. Because several views can share a model, people can use a range of different view styles to access the same server-side code using the MVC paradigm. Any Web browser (HTTP) or wireless browser (WAP) is included. For instance, users have the option to place product orders using a computer or a mobile device, but the process varies. The requested goods is processed in the same manner, though. Various interfaces can use the same artifacts since the formatted data given by the model is not set.

4. Fast deployment and low lifecycle cost.

5. MVC reduces the technical content of developing and maintaining user interfaces. Using the MVC pattern reduces development time considerably, Giving Java developers the opportunity to concentrate on business logic, while HTML and JSP developers can concentrate on display, is known as interface programming. 4. Sustainability Maintaining and modifying Web applications is facilitated by the strong division between the view layer and the business logic layer.

The disadvantages of MVC framework:

1. It's challenging to comprehend MVC completely. To fully understand and learn MVC is not an easy task, as the model has not been proposed for a long time and students have not had enough practical experience.

2. It was difficult to debug. Because of the strict separation of model and view, it is also difficult to debug the application, and each component needs to be thoroughly tested before being used.

3. The utilization of MVC in small to medium-scale applications may not be ideal as it can be time-consuming and fail to showcase its benefits, resulting in complex development processes.

4. Adhering strictly to MVC principles by separating model, view, and controller components can lead to increased structural complexity within a system. This approach might also result in excessive update operations that could potentially hinder operational efficiency even for simpler interfaces.

5.The strong interdependence between views and controllers limits access to model data from views. Without controllers present alongside views would restrict their functionality significantly impeding independent reusability. Depending on the interface of the model operation, the view of frequent access to unchanged data will also hurt operational performance.

The following uses a user-submitted form as an example to demonstrate the MVC design pattern. The MVC pattern diagram is shown in figure 1.

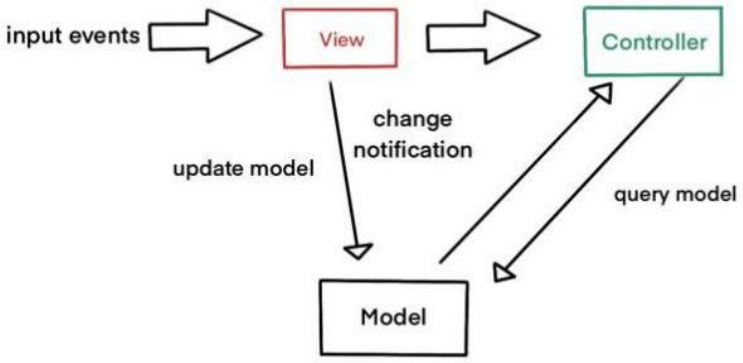

Fig. 1. Front-end mainstream framework-MVP (Photo/Picture credit: Original)

To make the program structure more user-friendly, it is important to simplify its complexity. This can be achieved by separating the internal representation of information from its presentation and allowing for efficient code reuse through component separation. The C language ensures that the model and view remain synchronized, so any changes made to one are immediately reflected in the other. For instance, a batch of statistics can be displayed using different representations such as bar charts or pie charts. MVC, of course, has low coupling, high reuse, low lifecycle costs, and high maintainability, but it is not suitable for small, medium-sized applications, and requires increased reusability of system structure and implementation, as well as stronger security system enhancements.

2.2 Model-View-Presenter(MVP)Framework Pattern

The MVP pattern evolved from the classic MVC pattern. In software development, various design patterns have been proposed to address the complexity of applications and to improve the maintainability and testability of code. Among them, MVC and MVP are designed to separate the data, interface and logic of the application. Model: The part responsible for dealing with data and business logic. It interacts with the data source and retrieves or stores data. The model does not rely on View and Presenter, so it can be unit tested independently. View: The presentation part of the user interface. It is only concerned with how to display information to the user, without any complicated logical processing involved. The View interacts with the Presenter to update what it displays. Presenter (Presenter/host): Acting as a bridge between the Model and the View, it takes data from the Model and presents it through the View [6]. At the same time, it also receives user input from the View and passes it to the Model for processing. The presence of the Presenter allows the View and Model to be completely decoupled, which improves code flexibility and reusability. By separating view, model, and Presenter, the MVP architecture helps reduce software development complexity and improve code quality and maintainability. It has been widely used and promoted in the application development of platforms such as Android. The view is completely isolated from the Model, and there is a good loose coupling design

between Model and View. Windows forms, Windows Presentation Foundation （WPF), Web forms and other user interface building techniques to implement the View layer, without changing the rest of the system. Even to enable B/S and C/S deployment architectures to be supported simultaneously, applications can use the same Model layer to fit the View layer built by multiple technologies. There is no direct dependency between View and Model, and developers can test either with mock object injection. The obvious disadvantage of MVP is that it adds complexity to the code, especially for small Android applications. The MVP pattern diagram is shown in figure 2.

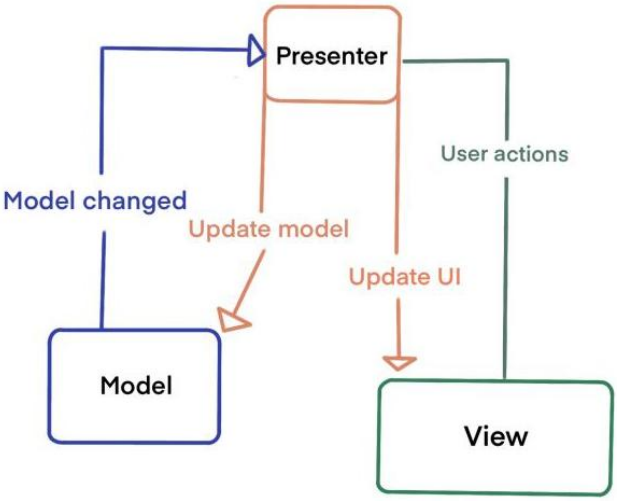

Fig. 2. Front-end mainstream framework-MVP (Photo/Picture credit: Original)

2.3 Model-View-View Model(MVVM) Framework

MVVM is short for Model-View-View Model. It stands for Model-View-View Model. The MVVM Architecture pattern is a software design pattern that divides an application into three parts: Model, View, and View Model. The purpose of this pattern is to separate the user interface (UI) logic from the business logic so that developers can manage and modify the application more easily. In the MVVM pattern, the model represents the data and business logic in the application, the view represents the user interface, and the view model is the bridge between the model and the view [7]. The model takes data from the model and transforms it into a form that the view can understand, and then passes it to the view. The view model also receives user input from the view and passes it to the model for processing. The view model can implement commands, validation, exception handling, and more to implement more complete and robust business logic in application. The advantages of MVVM mode: improve the maintainability, testability and reusability of the code; Isolation of complex UI logic; Improve teamwork (developers can focus on their area), etc.

3 Mainstream front-end framework

3.1 REACT Framework

React is a JavaScript library developed internally at Facebook for constructing user interfaces. An early prototype of React was called "FaxJS" and it was developed by Facebook engineer Jordan Walke because he was heavily influenced by XHP, a simple PHP HTML component framework. React made its debut in 2011, first used in Facebook's Newsfeed. React is a JavaScript library developed internally at Facebook for constructing user interfaces. An early prototype of React was called "FaxJS" and it was developed by Facebook engineer Jordan Walke because he was heavily influenced by XHP, a simple PHP HTML component framework. React made its debut in 2011, first used in Facebook's Newsfeed. It was used in Instagram the following year [8]. In May 2013, react was open sourced at JSConf in the US. When the data changes, react can update and render the appropriate components efficiently. At the same time, it has a certain flexibility, and when the data changes, react can update and render the appropriate components efficiently.

3.2 Vue.js Framework

Vue, on the other hand, is not just a framework but also an ecosystem that caters to various front-end development requirements. The web world is incredibly diverse, and developers create websites of different forms and scales. Considering this diversity, Vue's design places significant emphasis on flexibility and seamless integration. Depending on the specific scenario, Vue can be utilized in multiple ways: gradually enhancing static HTML without requiring extensive building processes; embedding as Web Components within any webpage; developing Single Page Applications (SPA); enabling full stack/server-side rendering (SSR); facilitating Jamstack/Static Site Generation (SSG); creating interfaces for desktops, mobile devices, WebGL applications, and even command line terminals. Additionally, Vue automatically monitors changes in JavaScript state and updates the DOM accordingly [9].

3.3 AngularJS Framework

Angular is a comprehensive framework and development platform designed for the creation of high-performance, intricate, and advanced single-page applications. It enhances HTML by introducing novel properties and expressions, thereby facilitating the implementation of a suite of frameworks suitable for diverse platforms, including mobile and desktop environments. AngularJS, a JavaScript-based framework, incorporates a multitude of essential features. Notably, it employs the Model-View-View-Model (MVVM) architecture, promotes modular design, facilitates automatic two-way data binding, incorporates semantic HTML labeling, and supports dependency injection, among other capabilities. AngularJS is engineered to address

the limitations of HTML in application development. While HTML excels as a declarative language for the presentation of static text, it lacks the robustness required for the construction of web applications [10]. Thus, a minor manipulation (which could be perceived as slight deception, depending on perspective) was employed to direct the browser to perform the desired actions. Certainly, here is the rewritten paragraph in a scientific tone: AngularJS facilitates browser comprehension of novel syntax through the implementation of directives. This enables functionalities such as data binding via double braces; manipulation of the Document Object Model (DOM) to iterate or obfuscate elements; comprehensive support for form handling and validation; the conjunction of logical code with pertinent DOM components; and the capacity to consolidate HTML into reusable modules. AngularJS primarily serves the purpose of constructing single-page applications, as well as web applications. A single-page application, or SPA, encompasses an application framework where all activities are contained within a single page. Upon encountering alterations within the dataset currently displayed on a given page, the system avoids a complete pagination reload; instead, it opts for a selective refresh of the affected area. AngularJS is a JavaScript-based structured framework that primarily concentrates on the dynamic data within a webpage, rather than the Document Object Model (DOM).

4 Conclusion

In the process of completing this project, the paper deeply realized the greatness and importance of team strength, including the flexible application of knowledge, rather than simply talking on paper, which is a practical use and improvement, and the mode application of front-end space technology, which still has a very large room for progress, requires more talents to invest energy and develop innovation today. A good front-end architecture can bring many benefits to the project, such as improving code quality, readability and maintainability, optimizing the development process, and making the code easier to refactor and extend. To design a good front-end architecture, researchers need to consider technology selection and toolchains, create an organized file structure, develop specifications and standards, adopt modularity and componentization ideas, and write detailed documentation and comments. Today, front-end framework technology is widely used, at the same time in order to meet the needs of major websites, major Internet manufacturers invest a lot of money and manpower, and concentrate a large number of talents, into the front-end framework technology cause, front-end framework technology development is becoming more and more mature, continuous innovation, constantly overcome difficulties, continuous breakthrough, for the future technology development brings hope.

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