

Mobile Smart Industrial Design in the Button Industry

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Abstract: In order to solve the problem of difficult communication between enterprises and customers in the button industry, to better meet the user's personalized product requirements, this article Proposed a button design APP cloud platform based on ASP.NET, Qt, Rhino and other technologies to build. The platform has been tested and validated according to user needs, button pop-up query, button fast combination and design.

Keywords: Buttons, Autonomous Design, Cloud Platform.

1. INTRODUCTION

With the rapid growth of the national economy and the booming development of the apparel industry, the demand for buttons and other clothing accessories is increasing. The button industry ushers in unprecedented opportunities for development, but also faces challenges, among them, the biggest challenge is between button companies and customers Communication difficulties. Now we can use the Design Cloud platform to bring our users a fast, quality button design experience in a very efficient way [1] [2].

2. NEEDS ANALYSIS

2.1 Pain points in the button design industry

Most button customers can not quickly realize new product customization, traditional button customization needs to go through the following steps. (1) According to the brochure provided by the factory to specify the sample style, as well as the basic style, material adjustment, size adjustment and other modifications. (2) The factory will produce design drawings according to the customer's demand, and communicate to confirm and Custom samples are mailed to the demand side; (3) The demand side receives the samples and then contacts the factory for adjustment; (4) The manufacturer mails custom samples again. To the demand side, after many iterations before the product can be shaped down; (5) shaping before delivery to generate orders for subsequent production processes. Cumbersome process, high communication costs, labor and time consuming. In addition, most of the lack of virtual shelves of button manufacturers, no stable and timely update of the electronic channel. The establishment of such a unified real-time update of the industry win-win button design library, to facilitate the button design multi-party rapid product selection.

2.2 System requirements

Based on the existing pain points of the industry, the platform needs to meet the support of the Internet, mobile terminals and other forms of access; the ability to online button appearance shape design, material / material / color selection, support users to carry out collaborative online virtual design, custom button effect browsing and display, to achieve the needs and creativity into industrial design works and other functions; the ability to display online button style over the years, in order to better grasp the popular trends of the industry.

3. CLOUD PLATFORM DESIGN

3.1 System architecture

The server side of the system is built in the cloud and consists of a Web server (including an interface server), a database server and a storage server. The Web server, as the core of interaction with the front-end, is analyzed for database data access according to the needs of the client. services, and file access services for storage servers. The clients of this system include Web client, App client. web client mainly focuses on the background management of the system. The app client is for end users and runs on their phones [3] [4].

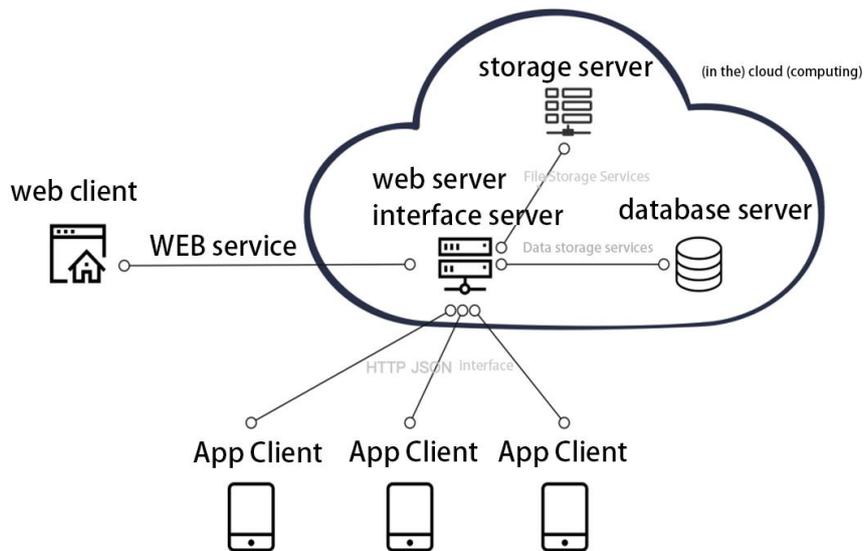


Fig. 1 System architecture

3.2 Technical routes

The technology lines used in the system and the main development environments used are as follows.

Table 1 Technology route and main development environment

Platform	System	Database	Programming Language	Software Framework
Web	Windows server 2008 R2	Sql server 2008	C#, Html, Javascript, CSS	Asp.net, ExtJs
Web	browser		Html, Javascript, CSS	Jquery, Bootstrap, Vue
iOS	iOS 12.0 and above	Sqlite	Swift, C++, QML	Qt
Andoid	Android 8.0 and above	Sqlite	Java, C++, QML	Qt

The server side of the system is mainly built using ASP.NET and the client side is mainly built using

Qt technology chain. Among them.

ASP.NET is a web runtime and web programming environment developed by Microsoft that builds on top of . Create content-rich, dynamic Web sites. ASP.NET is easy to learn, powerful, flexible and scalable. After years of development, ASP.NET supports WebForm, MVC, ASP.Net core and more. Multiple programming styles and platform portability (ASP.NET Core). This system uses this technology to build Web services and data interface services.

Qt is a cross-platform C++ GUI application development framework developed by the Qt Company. Qt is a leader in cross-platform application development, with a unique architecture designed to enable the development of desktop, mobile and mobile applications. QML (Qt Quick) is Qt's easy-to-learn interface description language. Qt 3D is Qt's near-real-time, real-time interface to the 3D graphics engine. 3D rendering system technology framework, also supports Qt c++ and Qt Quick application. In view of Qt's cross-platform and ease of use, the system uses Qt 3D/QML architecture to build the APP client.

3.3 Software architecture

(1) Storage layer: This layer mainly includes database server and file storage server, mainly responsible for data storage and physical file storage.

(2) Data access layer: This layer mainly encapsulates the access service to the database. Entity Framework OR Mapping framework to translate data from relational databases to C# classes and objects are used to facilitate upper-level calls. In addition, the data access modification and deletion requirements of the upper layer are also parsed into the access modification and deletion logic of the database records. This layer is a bonding layer that provides services to the storage and business layers.

(3) As the core service layer of the system, the business layer interfaces with the data access layer to operate the database service and storage service; and the upper layer interfaces with the data access layer to operate the database service and storage service. Provides data support for web services, caching services, and JSON interface services. It includes the following six core modules: (1) account, role permissions, organization system; (2) button material, color, shape, and Size Standards Library; (3) Button Pop Cloud Design Library; (4) Button Design Model Library; (5) Button Standard Cloud Parts Library; (6)) self-service button design service. It is the business logic of the system

(4) Data interface layer. On the basis of the business layer, we have to provide standard Json interface services for the Web client and App client, in this layer For example, we use the open source HttpAPI (<https://github.com/surfsky/App.HttpApi>) provides a Json interface service for clients, and the framework allows the Developers focus on data logic, as opposed to Microsoft's WebAPI service, and HttpAPI also provides caching, authentication, and Access frequency restrictions, file uploads, output format configuration, etc., the user provides Json service is very convenient, the system is widely used. This framework is used to provide data services.

(5) Web layer. This layer mainly for the system to provide Web backend services , it uses FineUI MVC UI library to write , the library provides Rich Web controls for setting up Web backend is very convenient, effectively reduce the amount of code and development time.

(6) Cache layer. As we all know, cache plays a very big role in the performance and throughput optimization of modern web system. The cache layer of this system mainly serves the data access

layer and data interface, which can effectively reduce the number of database accesses. Redis is an open source, efficient, memory-based, persistable, and flexible caching layer. The Key-Value network database, by architecting this caching service, can effectively reduce the number of database storage times, effectively reduce the number of database storage times, effectively reduce the number of database storage times, effectively reduce the number of database storage times. Reduce system load, increase system concurrent processing capacity, and provide shared cache capacity for load balancing.

(7) App layer. This layer adopts Qt QML and Qt 3D to implement, and uses three.js to assist in displaying 3D scenes. With Qt's cross-platform capability, it is effectively compiled and deployed to iOS and Android platforms.

4. CLOUD PLATFORM IMPLEMENTATION

4.1 The Button Model Library

The button model of this system is divided into two kinds: the complete model of the button; the parts model of the button. From the material, shape and other different classification methods on the market button modeling design in-depth analysis, shape geometric modeling and three-dimensional modeling extraction. Such as metal buttons shape modeling most common is round, hexagonal, unequal, equilateral and so on, three-dimensional modeling most common are spherical The buttons are made of plastic (resin, plastic), metal (copper, aluminum, iron, alloys, etc.), natural (shell, hemispherical, puffy, etc.), and other materials. Button materials can be broadly divided into plastic (resin, plastic), metal (copper, aluminum, iron, alloys, etc.), natural (shells, Wood, coconut shell, bamboo, stone, etc.), combination class. Button style can be divided into: four-eye buttons, two-eye buttons, cloth bag buttons, mushroom buttons, claw buttons, I-shaped buttons, etc. The shape of the button can be divided into round, square, star, multi-cornered, flower-shaped, horn, combination type. The shape of the button can be divided into round, square, star, polygonal, flower-shaped, horn, combination shape and so on.

Based on the above analysis, we use the three-dimensional design tool Rhino, the organization designer of various styles of buttons three-dimensional modeling, and entered into the system standard button model library.

For basic modeling, create button components and build a library of button parts models. The functional modules it contains are.

(1) button parts library maintenance: this module includes material, style, color, texture, production year and other basic information maintenance, and button parts information collection and classification, easy to succeed the retrieval and ranking system.

(2) button parts library search: according to the year of the button, material, style, color for quick retrieval.

4.2 The Button Bank

In response to the aforementioned pain point 2, there is no suitable tool or platform to provide no uniform and timely update of the popular button design library, we research and Reference to several large and medium button design manufacturer's product library, and these years the industry's popular button style, collected and built a popular button library! , and is architected on a cloud platform for

timely uploading by designers, this button pop library is mainly in the form of graphic articles. The functional modules it contains are.

Button library maintenance: this module includes material, style, shape, style, color, texture, production year and other basic information maintenance. Button, and button information collection and classification, easy to succeed the retrieval and ranking system.

Button library search: according to the year of the button, material, style, color for rapid retrieval.

Button library ranking system: we have built an evaluation system, according to the client score to rank the button. In addition, we collected that year's popular styles of clothing, and according to the brand of clothing to the weighting, to the subsidiary buttons to score. The overall ranking can be based on the rating system and weighting score overall decision, and then pushed to the specific needs of the customer.

Annual button popular style, color, material information maintenance. Administrators can annual color, style, material and other information maintenance into the library, as a search, sorting, and later trend prediction of the basic data! 5.

Estimation of the future year button fashion style. Same as clothing design, button design also has its trend and "reincarnation" factor, with reference to these elements, we use AI tools. Modeling is conducted to predict design colors, materials, and other factors for designers to consider in the coming year. At the same time, we also collect predictions from industry design leaders as a reference for design.

We used the above strategy, the successful construction of the popular button cloud design library, and through the promotion and invitation, accommodated a number of button design and production organizations settled, designers real-time global button design trends and popular styles uploaded to the cloud design library, the establishment of such a unified real-time update of the industry win-win button design library, to facilitate the button design of multiple rapid product selection, get better social and economic benefits.

5. APP IMPLEMENTATION

5.1 Selection of the development platform

Based on the button design cloud platform, we use Qt QML and Qt 3D technology to design and develop self-service buttons. Designing apps. the Qt architecture provided by Qt can be compiled to various platforms and is ideal for rapid development of cross-platform applications. Its technical framework is as follows.

As shown in the figure, Qt is cleverly designed with a set of development code that, thanks to its virtual platform interface layer, can be compiled and run into the various operating systems. And Qt offers two development languages, either C++ for developing widget-based applications or QML (hybrid). QML, part of the Qt Quick technology, is an easy-to-learn presentation of the It's a generic language used to describe the user interface of an application. The syntax is based on javascript optimization, with type and dynamic property binding, very easy to use, and The code is very beautiful. This system is using QML to write the app client.

5.2 Design of the App

As shown in the figure below, users can pick the right button parts to combine, and select the right

material, and adjust the size of the parts, angle and material parameters for quick button design. And the final design results will be exported, and share with manufacturers or customers.

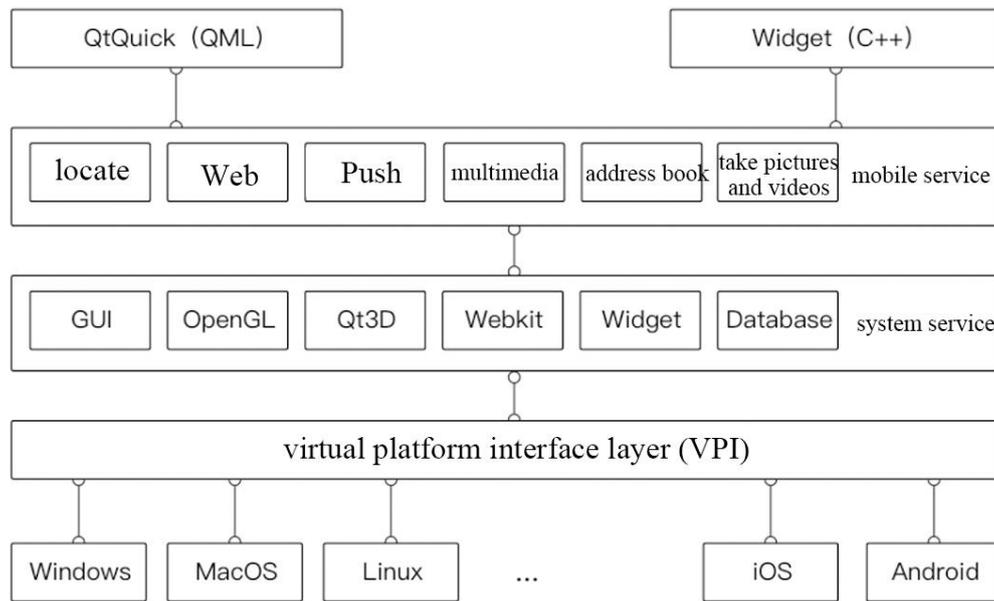


Fig. 2 Qt framework

6. CAPACITY EXPANSION

This platform is of great practical value in the button design and production industry. In addition, the following extensions can be made on this platform to deepen the business profitability of the platform and achieve a win-win situation for all parties.

6.1 Tripartite exchange platform for torsion buckle design

The cloud platform can be planned to provide communication channels, such as embedded instant messaging or supply and demand message boards, to the button design demand side, the design side, the manufacturer of three-party real-time and long-term communication channels, to achieve a win-win situation for all parties.

6.2 Designers Business Profit Platform

The cloud platform can be planned to provide designers with a profitable business platform to showcase the capabilities of designers and product design examples. The button product design and production of the stripped, so that specialize in the profession. For designers, they have a keen sense of industry smell, can be linked to industry trends in a timely manner, the design has a fashion and Foresight; for the production side, it can either directly reduce the hiring burden on product designers or through employment. Button designers, this way to achieve a win-win situation for all.

6.3 merchandise and order trading platform

The cloud platform can be used as a trading platform for products and orders, where demanders can post design and production requirements, and designers and manufacturers can make Undertake production. And track production progress on this platform.

7. CONCLUSION

This paper describes in detail the serious homogenization of products for buttons, companies and customers to communicate difficulties, can not quickly stereotyped products and other issues. Buttons independent design cloud platform technology framework, functionality and practical application results. With the gradual application of the platform will become an accelerator of the traditional button industry, will help enterprises to improve the level of personalized custom service, promote The transformation of traditional manufacturing from mass manufacturing to mass customization.

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