

Digital Transformation in Real Estate Services: Development and Implementation of the Housing Selection Platform

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Abstract: This article provides a detailed elaboration on the design and development of the Housing Selection Platform, an online platform that responds to current real estate market demands and integrates modern technologies. The paper comprehensively introduces the platform's system modules, including online housing rental, buying and selling, as well as related shopping mall experiences. The platform adopts a front-end/back-end separation and microservices architecture, making development efficient and the system easy to maintain. It also emphasizes performance optimization through technologies like Redis and has adopted the latest authentication and authorization measures for security. The article widely discusses the implementation of the system and the technical challenges faced, providing solutions such as API gateways and event-driven architectures. The conclusion revisits key learned points and successful experiences, predicting that the introduction of innovative technologies like artificial intelligence and machine learning will drive the platform's development. The importance of user experience throughout the developmental process is emphasized, looking forward to how the Housing Selection Platform will continue to lead the industry in the future.

Keywords: Housing Rental Platform; Front-end/Back-end Separation; Microservices Architecture; Performance Optimization; Technical Challenges; User Experience.

1. Introduction

As we advance further into the information age, the real estate market faces unprecedented opportunities for digital transformation. This process not only redefines the delivery of property services but also significantly enhances the way users access information and conduct transactions. The focus of this paper is on the development and practice of the Housing Selection Platform—an innovative online platform designed to connect tenants, homebuyers, and property service providers, offering integrated housing solutions. The introduction explicates the significance of the platform's concept and practice, as well as how it responds to the rapidly evolving demands of the current real estate market.

This paper provides a detailed overview of the platform's key functional modules, system architecture, implementation, and deployment strategies, along with related performance assessments and user experience optimization tactics. Special attention is given to the enhanced development efficiency and system maintainability achieved through the use of a front-end/back-end separation and microservices architecture. By leveraging caching technologies like Redis and advanced authentication and authorization measures, the study delves into the technical challenges encountered during implementation and the corresponding resolution strategies.

Centered around user experience, the Housing Selection Platform has successfully maintained its market competitiveness, offering targeted features and services to meet the needs of different user groups. The introduction concludes by emphasizing the platform's role in the industry, providing convenience for users and driving the future development of the entire real estate services sector. With the introduction of technologies such as artificial intelligence and machine learning, the Housing Selection Platform is expected

to continue optimizing its offerings, further enhancing the user experience, and expanding its market reach.

2. Project Background

2.1. Industry Background

With the rapid advancement of urbanization and population growth, the real estate market has experienced unprecedented expansion and evolution in recent years. The dynamism of urban development has fueled the pursuit of high-quality living environments, subsequently leading to the vigorous growth of the entire housing rental and transaction sector[1-2]. The demands of modern housing[3] are no longer limited to meeting basic survival needs, as people desire residences that reflect personalized preferences and provide convenient services along with a high-quality living experience. As the digital transformation deepens, online property transaction platforms have shifted from being an emerging option to the focus of the market. These platforms facilitate swift connections between tenants and landlords and usher in highly transparent and efficient housing transaction processes. Moreover, they lead the reshaping of the real estate industry's value chain, greatly enhancing the overall user experience in property search, assessment, transactions, and management through digital tools. In this era, real estate platforms have become more than just aggregators of information; they have transformed into intermediaries and service providers for housing rental and transactions. This shift not only stands as a testament to the industry's innovation and progress but also aligns with modern society's quest for efficiency and convenience in lifestyle.

2.2. The Necessity and Significance of the Research

The comprehensive housing selection platform leads the innovation wave in the property service industry with its front-end and back-end decoupled architecture, aiming to enhance both technological implementation and user experience. The platform thoughtfully adopts a microservices architecture, breaking through the boundaries of traditional monolithic applications, and enabling service components to be modularized, significantly enhancing the system's maintainability and scalability. This modular design also endows the platform with greater flexibility in updating and maintaining various services. Integrating cutting-edge technologies such as Spring Cloud, Eureka registration center, and OpenFeign remote service invocation, the platform demonstrates its commitment to modern software engineering principles and best practices. Beyond providing core functions of housing rentals and transactions, the housing selection platform also integrates related e-commerce features, offering a one-stop residential solution to meet a broad range of user needs.

The housing selection platform focuses on creating a simple, swift, and highly personalized property exchange platform. By optimizing the operational flow of the mobile user interface, augmented with robust back-end technology support, the platform is dedicated to enhancing the overall user experience from searching and browsing to filtering and finalizing transactions. This user-centric design philosophy, coupled with the use of technological innovation, aims to maximize the efficiency of the housing rental and sale market and provide users with a safer and more transparent transaction environment. The grand vision of the housing selection platform is to become a leading housing service platform in the market, continually pursuing technological advancement and perfection of service details to meet the ever-changing expectations of the market and users.

3. System Functional Modules

3.1. Online Housing Rental Module Overview

The online rental module of the housing selection platform offers a rich property browsing experience, covering a wide range of property types including apartments, detached villas, and shared rental spaces. To meet the needs of renters in finding their ideal housing, the module provides a series of multidimensional filtering and sorting options based on factors such as price, geographical location, and room characteristics. Specifically for mobile users, the platform has undergone specialized optimization, offering high-definition images and detailed property information to assist users in making efficient decisions.

3.2. Overview of the Housing Buying and Selling Module

3.2.1. Construction of the Online Transaction Environment

As a crucial component of the housing selection platform, the housing buying and selling module provides a convenient online channel specifically for the transaction of properties. This module allows sellers to easily post listings, while also supporting potential buyers to efficiently search and filter through the multitude of property options available. Upholding the concept of providing a one-stop service for

users, the platform places a special emphasis on optimization of usability and functionality, ensuring a clean and clear user interface that allows buyers and sellers to quickly match with each other, facilitating the efficient completion of transactions.

3.2.2. Value Assessment and Transaction Security

Different from traditional property trading channels, the housing buying and selling module of the comprehensive housing selection platform provides detailed market data analysis functions, which helps users to evaluate the value of real estate in real-time and accurately. This is crucial for enhancing the transparency of the trading process and facilitating the consensus between buyers and sellers on price issues. Furthermore, to ensure the security of transactions, the platform integrates a stable and reliable payment system and a comprehensive contract management process, providing solid security for every transaction. By improving the transparency and security of transactions, the housing selection platform has greatly increased user trust in the platform, establishing its competitive edge in the field of online real estate transactions.

3.3. Housing-Related Shopping Experience in the Marketplace

The marketplace module of the housing selection platform is dedicated to providing a one-stop shopping experience for house-related products and services. It integrates various technological advantages to optimize the online shopping process comprehensively, from a user-friendly interface to efficient backend data management. Customers can find a wide array of home products and renovation services in the marketplace, including embedded appliances, custom furniture, smart system setups, and decoration design service packages tailored for different types of houses. This feature not only offers convenience for upcoming residents but also adds extra value for those looking to improve their current living situation. Technologies widely used in the project, such as MongoDB for database management and FastDFS for file storage, ensure real-time updates and rich visual presentations of the products in the marketplace. The search engine ElasticSearch provides swift and precise product searching capabilities. Additionally, Docker's containerization technology affords faster deployment and a more stable service running environment for the marketplace. With FastDFS, the marketplace benefits from efficient image uploading services, allowing users to view high-definition images that load quickly, enhancing the pleasure of shopping. The tight integration of the database and search services delivers a streamlined searching and filtering experience for the users. The platform further improves customer purchase efficiency with targeted product recommendation algorithms. In terms of security, the marketplace employs cutting-edge data encryption technology and secure payment solutions to ensure the security of user transactions. The entire purchasing process, from browsing to selection, payment, and order tracking, is meticulously crafted to ensure convenience and reliability without compromising security.

4. System Architecture Design

4.1. Overview of Front-End/Back-End Separation Architecture

The design philosophy of front-end/back-end separation is based on the clear distinction between the user interface layer

(front-end) and the data processing layer (back-end) in the web development process, with the aim of optimizing the maintainability and development efficiency of applications. In this architectural model, front-end developers can focus on building the user interface and user experience, while back-end developers concentrate on implementing business logic and managing the database. The two independent units communicate and exchange data through well-defined API protocols. This separation strategy means that teams can work in tandem, speeding up the development process. More importantly, because the front-end and back-end interaction is based on stable APIs, updates and maintenance can be carried out independently without affecting each other, greatly enhancing the overall maintainability and scalability of the application. Moreover, the separation structure also facilitates testing work, allowing developers to test the front-end and back-end separately. As the application scales and requirements diversify, the flexibility exhibited by the front-end/back-end separation architecture makes the system more amenable to integrating new technologies and services. In the practical application of the housing selection platform, this architecture has effectively sped up the iteration and deployment process of new features, maintained the service's competitive edge in the market, and simplified collaborative development phases.

4.2. Advantages of Microservices Architecture

Within the housing selection platform, the choice of Redis as a caching server[4] provides a high-performance solution for handling large-scale data sets. Thanks to its in-memory storage feature, Redis ensures rapid read and write access to data, which is particularly beneficial for frequently queried housing information by users. It effectively reduces database load and shortens response times. The data persistence feature of Redis ensures that important data is saved in the event of an unexpected system shutdown, while its rich data structures and the mechanism for automatically cleaning old data help the platform maintain efficient operations and keep data up to date.

The microservices architecture[5] empowers the housing selection platform with the ability to divide a large application into multiple independent, small-sized services, each built around a specific business capability with its own logic and database. Compared with traditional monolithic architectures, the application of microservices architecture significantly increases the system's scalability and maintainability. The capability for individual deployment and expansion of services is particularly suited to the housing selection platform's continuous optimization of functional modules such as rentals, buying and selling, and the marketplace. The updates and optimizations of different services do not interfere with each other. This architecture also promotes agile development, continuous integration, and continuous deployment, accelerating the rollout of features and enhancing the level of service. In the event of a service failure, it can also be quickly located and repaired without affecting the entire application, ensuring the platform's stable operation.

5. System Implementation and Deployment

5.1. Technology Stack Analysis

The technology stack of the housing selection platform is an intuitive manifestation of its profound understanding of

modern software engineering. The technical construction based on Spring Cloud endows the platform's distributed system with patterns such as service discovery, configuration management, and message routing. Utilizing the Eureka service registry, the platform achieves automatic service retrieval and registration, which is crucial for the discovery mechanism in a microservices architecture. The housing selection platform also adopts OpenFeign for declarative remote communication between microservices, reducing the complexity of inter-service connectivity and improving development efficiency. Furthermore, Redis is chosen as a caching server to accelerate data access and enhance performance. Redis's efficient key-value storage is particularly critical for the optimization of frequent queries. In addition to this, integrated security components, message queues, and other supportive tools ensure the system's robustness and scalability. The selection of these technologies reflects a careful assessment of system scale, security, high availability, and extensibility requirements. Their collaborative operation in the context of microservices has built a robust, flexible, and reliable platform architecture that not only optimizes the development process but also supports stable system operations alongside continuous maintenance and service iteration to meet the ever-evolving user demands.

5.2. System Deployment and Strategy

The deployment process of the housing selection platform begins with code writing and testing. Each code submission triggers an automated build and testing sequence. After successfully passing the automated tests, the code is packaged into container images using Docker technology[6], ensuring consistency in application performance across various deployment environments. The containerized images are then uploaded to a registry and deployed and managed via a container orchestration tool like Kubernetes, which is responsible for tasks including scheduling, load balancing, and health checks. Kubernetes enables the platform to achieve automatic scaling and self-healing, maintaining high availability. During deployment, all configuration items and sensitive data, such as service keys, are securely managed through environment variables or key management systems, eliminating the practice of hard coding and enhancing the system's security level.

Throughout the deployment process, real-time monitoring and logging systems operate in sync, providing the team with instantaneous system status information and performance issue feedback, so that problems can be identified and resolved promptly. By adopting containerization and automated deployment strategies, the housing selection platform has realized efficient management of the deployment process, providing solid technical support for meeting the demands of rapid development and stable operation.

6. Implementation and Challenges

6.1. Core Project Issues

During the development [7] and deployment of the housing selection platform, the team encounters a series of core technical challenges, which mainly involve the complexity of system architecture, integration of the technology stack, maintenance of security, assurance of scalability, and the implementation of Continuous Integration/Continuous Deployment (CI/CD). While the adoption of microservices

architecture has enhanced the modularity and flexibility of the system, it has also introduced complexities in communication between services. Modules such as configuration service, API gateway, product details query, and user authentication need to establish efficient collaboration and communication. Ensuring effective inter-service communication and data consistency relies on well-designed API gateways and service registry and discovery mechanisms. With the increase in the number of services, managing and synchronizing configuration files to maintain consistency across different environmental settings becomes particularly complex, demanding centralized configuration management and dynamic updating capabilities. Security of each microservice in the system is another significant challenge, where each service must implement corresponding security measures, such as using OAuth and JWT technologies for service authentication and authorization.

As user loads continue to grow, key concerns include how the system can automatically scale services to maintain high performance and how to achieve load balancing. To address this, container orchestration tools like Kubernetes may be necessary to optimize the lifecycle management of services. Moreover, CI/CD processes support rapid iterations and new feature deployments, but automation of their build, test, and deployment introduces various complexities. Building a stable and efficient CI/CD pipeline is crucial for guaranteeing product quality and accelerating product release.

The housing selection platform team's response to these challenges will involve continuous technical refinement and improvement to ensure efficient operation and stable, reliable service of the platform. The capability to address these issues not only reflects the team's understanding and application of microservice architecture but also signifies the platform's ongoing exploration and practical application of cutting-edge technologies.

6.2. Problem Resolution and Specific Solutions

In response to the challenges faced during the development and deployment of the housing selection platform, the team implemented a variety of strategies and effective solutions. The issue of inter-service communication was effectively resolved via the implementation of an API gateway. Serving as a unified entry point for services, the API gateway simplified the interaction between clients and services and addressed the complexities of cross-service calls, such as request routing, load balancing, and the security authentication process, significantly increasing the overall interaction efficiency of the system. Data consistency issues were alleviated by adopting an event-driven architecture. This architecture allowed services to communicate through asynchronous message passing, reducing direct dependencies between services and enhancing system responsiveness and flexibility. In terms of configuration management, the team opted for a configuration server like Spring Cloud Config to unify different environment configurations, ensuring the timeliness and synchronicity of configurations and augmenting the dynamic management capabilities of the services. For enhancing security, the deployment of authentication and authorization technologies like OAuth and JWT provided a robust security barrier for data access and communication between services. These technologies ensured encryption of data transmission and that only authorized services could access sensitive data, while also limiting the potential risks from unsecured public endpoints

to system resources. To address scalability issues, the team utilized containerization and automated deployment for service scaling. Advanced container orchestration tools like Kubernetes enabled automatic adjustment of service instances under high load, greatly increasing the system's elasticity and stability. Facing the challenges brought by CI/CD processes, the team built a stable automation pipeline to facilitate quick building, testing, and deployment of code. With CI/CD tools like Jenkins, the team achieved automated testing and deployment processes following code submissions, ensuring high-quality code and accelerating feature iteration and release speeds.

The implementation of specific solutions has been proven to significantly optimize the operational efficiency of the housing selection platform in general cases, reduce the risks in daily operations, and accelerate the response to changes in user demands. Continuous system optimization and maintenance ensure that the housing selection platform can continue to provide reliable and efficient real estate services to meet the growing demands of the market and users.

6.3. Project Objectives and User Expectations

The construction of the housing selection platform is dedicated to ushering the real estate service industry into a new era of technological innovation, with a focus on enhancing user experience and market seamless integration. The primary goal is to streamline and simplify every aspect of the housing rental and transaction process, using technology to reduce operational complexity, ensuring high efficiency and transparency in transactions, thus promoting the flexibility of the property market, while meeting the diverse residential requirements of users. The team is committed to creating an easy-to-use platform with strong interactivity and the capacity for rapid response, aspiring to provide a more comprehensive and convenient experience for real estate-related commercial activities through a one-stop integrated service platform.

The prospective user base targeted by the housing selection platform includes but is not limited to first-time homebuyers, investors, international students, professionals in need of relocation, and short-term renters. The platform has designed specific functions and services to ensure that it can satisfy their complete requirements for housing selection, payment, and follow-up services. With an intuitive user interface and customized search tools, the housing selection platform helps users quickly find the ideal place that meets their personal preferences. The platform's one-stop-shop feature also offers users a wider range of residential value-added services, enhancing the living experience post-purchase.

In summary, the housing selection platform strives to elevate the efficiency, convenience, and professionalism of real estate services to new heights through its powerful technological capabilities, catering to the dual needs of the modern urban lifestyle: a fast pace and a high-quality living environment.

7. Performance Evaluation and Analysis

7.1. System Performance Evaluation

7.1.1. Performance Testing

Performance testing is a key category of tests for assessing the architecture and design of the housing selection platform. Its purpose is to verify whether the application meets the

established business requirements in terms of performance. Performance testing covers multiple aspects, including response time, system throughput, resource utilization, and scalability. To obtain accurate test results, we conduct performance evaluations in a simulated production environment, emulating the concurrency of real user operations and data loads. These test scenarios are designed to simulate the volume of user access to the platform during peak periods, observing the system's behavior and performance under stress. Specific performance testing methods include load testing, stress testing, stability testing, and capacity testing. Load testing involves gradually increasing the user load to the maximum level the platform can sustain to determine the operational performance of the system. Stress testing, on the other hand, involves applying a load that exceeds the normal operational range to identify the system's failure points and recovery capabilities.

7.1.2. Stability Testing

The purpose is to ensure that the system can maintain stable operations under prolonged sustained loads, detecting whether the system might become unstable over long periods of usage due to resource leaks or other issues. Capacity testing, on the other hand, helps us understand the utilization of system resources, as well as the number of users and volume of transactions the system can support. The results of performance testing require detailed analysis, and monitoring tools and logging can be used to identify bottlenecks and trends in performance degradation, allowing the technical team to optimize the application's performance. Thanks to continuous performance optimization, the housing selection platform ensures fast response and stable service for users, even under high load conditions.

7.1.3. Security Testing

Security testing is a crucial part of the housing selection platform project, ensuring that the application can protect user data and services from external threats. The main purpose of these tests is to uncover and remedy vulnerabilities and weaknesses that may expose the platform to security risks. In the security tests, exhaustive methods and specialized security testing tools were employed to simulate various attack scenarios. This includes testing for SQL injection, defenses against Cross-Site Scripting (XSS) attacks, and detecting vulnerabilities to Cross-Site Request Forgery (CSRF). Tests such as password cracking, session hijacking, and network scanning were also performed to gain a comprehensive understanding of potential security issues within the system.

In addition to proactive security testing, the housing selection platform project also includes passive security measures, such as static code analysis to identify potential security pitfalls. These static tools can analyze code complexity and identify unsafe coding patterns and vulnerabilities before the code is executed. Configuration management testing was also conducted, including checks on server configurations and database access settings to ensure that all systems are configured as intended, avoiding security gaps due to configuration errors. Furthermore, encryption protocols and certificates were tested to ascertain their compliance with the latest security standards, ensuring that all data transfers are encrypted.

7.2. User Experience and Performance Optimization Analysis

User Experience (UX) encompasses the feelings and

experiences of a user throughout their interaction with a product or service. The housing selection platform is dedicated to optimizing every step from searching and browsing listings to renting or purchasing properties to provide a first-class user experience. Performance optimization has a significant impact on enhancing UX since users prefer online services that are responsive, intuitive, and operate smoothly. To improve user experience, the housing selection platform has implemented strategies such as reducing page load times, enhancing interface responsiveness, and optimizing user workflows. A fast-responding search engine and quick-loading image features can significantly enhance the smoothness and pleasure of browsing property listings for users. Additionally, optimizing database query performance and data caching can provide immediate feedback for user filtering and sorting, enhancing their decision-making efficiency. Improvement in system availability is also a critical aspect of performance optimization. Frequent system failures or functional impairments can diminish users' trust in the housing selection platform and affect its market reputation. Therefore, constructing a resilient system and implementing effective error handling mechanisms are indispensable for ensuring the continuity and stability of the service.

Good scalability ensures that the housing selection platform maintains consistent performance levels as the user base grows. This means that during peak times, users can still enjoy high-quality service, regardless of how much the platform's usage increases, without diminishing their experience. To further improve user experience, the housing selection platform also plans to adopt best practices in user interface design, such as a clean design style, intuitive navigation, and clear operational guidance to simplify user actions. Personalized services, such as recommendation systems, smart reminders, and customized services, will also be crucial tools for increasing user satisfaction.

Continual optimization of performance is key to ensuring that the housing selection platform provides an outstanding user experience. This involves not just technical improvements but also a profound understanding of user needs, preferences, and behavior patterns. By constantly monitoring user interactions, collecting feedback, and applying data analytics, the housing selection platform can identify and optimize performance bottlenecks that directly affect UX, enhance user loyalty, and improve overall satisfaction. Through these measures, the housing selection platform commits to the relentless pursuit of the ultimate user experience, ensuring the platform maintains its leading position in the real estate service market.

8. Conclusion and Future Outlook

8.1. Key Learning Points and Successful Experiences

Throughout the evolution of the housing selection platform project, key learning points have been reflected across multiple facets. The adoption of front-end/back-end separation and microservice architecture was a vital decision in enhancing development efficiency and system maintainability. This architectural strategy supported team collaboration, allowing members to focus on different functional blocks while also enhancing adaptability to business changes. The practice of microservices architecture deepened the understanding of managing complexity within

large-scale systems and executing independent service updates.

In terms of system performance, the use of caching technologies like Redis to optimize database performance and accelerate data access ensured platform stability under high traffic and an exceptional user experience. In security protection, the successful experience of the housing selection platform included utilizing the latest authentication and authorization technologies to enhance the security of user data and transaction processes, which is integral to establishing user trust and ensuring long-term operations. The realization of containerized and automated deployment processes elevated release efficiency and ensured the continuity and high quality of updates. Additionally, the integration of CI/CD processes significantly accelerated the development cycle, guaranteeing code quality and continuous project optimization.

The successful experiences concerning user experience have highlighted the importance of listening to user needs and continually iterating the product, which is central to maintaining the platform's competitiveness. By finely tuning the user interface (UI) and user experience (UX), the platform has made breakthroughs in meeting user expectations and providing personalized services. Continuous performance monitoring and optimization became a guarantee for quick response, high availability, and scalabilities essential for maintaining user satisfaction and the platform's appeal.

Through intelligent technological investments, emphasis on security, automated processes, continuous improvement in user experience, and relentless pursuit of system performance, the housing selection platform has amassed rich experience in project execution and laid a firm foundation for future technological and business innovations. Looking ahead, these experiences will enable the housing selection platform to maintain a leading position amidst technological changes and market competition, continually exploring and adapting to new trends in the real estate service domain.

8.2. Prospects for Improvement and Future Impact

While the housing selection platform has made significant progress towards achieving its initial objectives, there are still opportunities for improvement and expansion in the future. In terms of technological innovation, the introduction of advanced artificial intelligence and machine learning features will further enhance user experience and platform performance. For instance, precise market trend predictions and personalized property recommendations powered by algorithms will expedite the process for users to find their ideal homes. Utilizing blockchain technology can increase the transparency and reliability of transactions, attracting more security-conscious property buyers and investors.

User experience is an ongoing pursuit, and the housing selection platform plans to further refine the user interface and processes through data-driven design optimization, improving the intuitiveness and ease of use of the product. Accessibility optimization is also essential to ensure a broader audience, including users with special needs, can use the platform without barriers.

Service diversification is another key point for the future

development of the housing selection platform, expanding additional real estate-related services such as moving, renovation, and property management, to promote the comprehensive development of the real estate ecosystem. This will enhance user stickiness to the platform and provide a one-stop housing solution.

In terms of market expansion, with the trend of globalization, the housing selection platform faces the opportunity to extend its services to new markets. This may require adaptability adjustments to different cultures, including support for multiple languages and currencies, to offer a localized service experience that is both customized and highly localized.

For housing transaction platforms, these advancements will drive the entire industry towards greater efficiency, intelligence, and user-centricity. With the introduction of these innovations, the housing selection platform has the potential to reshape the workflow of real estate transaction platforms, enhance the interactive experience of all participants, and become a key driver of industry transformation. In the future, the gradual evolution of the housing selection platform heralds a real estate transaction field that will place even more emphasis on technology-driven solutions, offering a new experience for buyers, sellers, agents, and other real estate service providers, thus enabling efficient operation and growth of the entire industry.

References

- [1] Yi Chengdong, Chen Jing'an, Huang Hui, et al. The Dilemmas and Policy Choices in the Development of Large-city Long-rent Housing Market in China[J]. *Economic Research Reference*, 2021(24): 46-62. DOI: 10.16110/j.cnki.issn2095-3151. 2021.24.004.
- [2] Shao Ting. Difficulties in Development and Policy Breakthroughs in China's Housing RentalMarket[J]. *International Urban Planning*, 2020, 35(06): 16-22. DOI: 10.19830/j.upi.2020.351.
- [3] Zhang Yihan. Shanghai Residents' Housing Rental Demand Characteristics Survey Report[C]// China Institute of Real Estate Appraisers and Agents, China Construction News Society, Jianxin Housing Services Co., Ltd. Regulation and Development and Best Practices - Collection of Papers from the China Housing Rental Development Forum. China City Press, 2023:13. DOI: 10.26914/c.cnkihy.2023.037257.
- [4] Gu Shaowei, Jing Bo. Application of Redis in Software Projects[J]. *Computer ProgrammingSkills and Maintenance*, 2023 (11): 16-19+32. DOI: 10.16184/j.cnki.comprg. 2023. 11. 046.
- [5] Huang Yandi. Research and Implementation of an Online Housing Rental Platform Based on Microservices[D]. Xidian University, 2022. DOI: 10.27389/d.cnki.gxadu.2021.001123.
- [6] Zhang Yubing. Discussion on the Application of Docker Technology in Computer Software Development[J]. *Computer Programming Skills and Maintenance*, 2023(12):16-18+22. DOI: 10.16184/j.cnki.comprg.2023.12.014.
- [7] Pei Chunjie. Design and Implementation of a University Student Online Housing Rental System[D]. Beijing Jiaotong University, 2023. DOI: 10.26944/d.cnki.gbfnu.2022.000961.
- [8] Liu Yangyu. Design and Implementation of an Online Housing Rental System[D]. Huazhong University of Science and Technology, 2019.