

ORGANIZATION OF A RESIDENT'S PERSONAL CABINET IN WEB SERVICES OF RESIDENTIAL COMPLEXES

Vinnitsia National Technical University

Анотація

У тезах розглянуто особливості організації особистого кабінету мешканця у вебсервісах житлових комплексів. Проаналізовано основні функціональні модулі, що забезпечують взаємодію мешканця з управляючою компанією в режимі онлайн: управління обліковим записом, фінансові операції, подання заявок на технічне обслуговування, отримання оголошень, участь в електронному голосуванні та робота з документами. Розглянуто вимоги до автентифікації, рольової моделі доступу та інтерфейсних рішень. Запропоновано структуру особистого кабінету на основі аналізу сучасних підходів до розробки уніфікованих вебсервісів для мешканців.

Ключові слова: особистий кабінет, вебсервіс, житловий комплекс, автентифікація, управління нерухомістю, мешканець, онлайн-сервіс.

Abstract

The research paper examines the specifics of organizing a resident's personal cabinet in web services of residential complexes. The main functional modules that ensure the resident's online interaction with the management company are analyzed: account management, financial transactions, maintenance request submission, announcements delivery, electronic voting participation, and document management. Requirements for authentication, role-based access control, and interface design are discussed. A personal cabinet structure is proposed based on an analysis of modern approaches to developing unified web services for residents. The research results can be used in the design and development of software for residential complex management.

Keywords: personal cabinet, web service, residential complex, authentication, property management, resident, online service.

Introduction

The rapid digitalization of urban infrastructure has transformed the expectations of residents in modern residential complexes. People increasingly demand access to management services without having to visit offices, make phone calls, or deal with paper-based workflows. This shift has prompted property management companies to adopt web-based platforms that consolidate communication, billing, and administrative functions into a single digital environment [1].

A central element of any such platform is the personal cabinet – a dedicated, authenticated user workspace that gives each resident access to services relevant specifically to their tenancy or ownership. Unlike general-purpose portals, a personal cabinet in the context of residential complexes must address a specific set of needs: transparent utility billing, maintenance coordination, community governance, and document exchange [2].

Despite the growing number of commercial property management software products, the academic literature on the structural and functional organization of resident personal cabinets remains limited. Most existing solutions are either too generic or proprietary, lacking a unified conceptual framework that developers can apply when building custom web services [3]. This research paper addresses that gap by systematically examining the functional architecture, authentication mechanisms, role model, and interface requirements of a resident personal cabinet.

1. Conceptual Role of the Personal Cabinet

A personal cabinet (also referred to as a “resident dashboard”) is a password-protected online workspace that aggregates all interactions between an individual resident and the residential complex management system. It acts as the primary digital touchpoint, replacing or supplementing traditional methods of communication such as notice boards, paper invoices, and in-person visits [4].

From an architectural perspective, the personal cabinet is a client-facing layer that sits atop the core business logic of the property management platform. It communicates with back-end services via RESTful APIs, a

concept formally defined by Fielding in his foundational dissertation on network-based software architectures [5]. This separation of concerns allows the cabinet interface to evolve independently of the underlying infrastructure, which is a key advantage in long-lived property management systems.

The value of a well-designed personal cabinet extends beyond mere convenience. It reduces the administrative burden on management staff, decreases error rates associated with manual data entry, and creates an auditable digital trail of all interactions. For residents, it fosters a sense of transparency and control over their living environment [1].

2. Functional Modules of the Resident Personal Cabinet

The functional scope of a resident personal cabinet can be decomposed into six primary modules, each addressing a distinct domain of resident–management interaction. Table 1 presents these modules, their core functions, and the primary benefits they deliver to residents.

Table 1 – Functional modules of the resident personal cabinet and their primary benefits

Module	Functions	Benefit for Resident
Account & Profile	Registration, login, personal data editing, password management	Secure personalized access to all services
Finance & Payments	Utility bill viewing, online payment, payment history, debt alerts	Transparent financial control without visiting offices
Requests & Support	Submitting maintenance requests, status tracking, feedback rating	Fast resolution of household issues with progress visibility
Announcements & News	Reading management announcements, event notifications, surveys	Timely awareness of complex news and community events
Voting & Governance	Participation in online polls, viewing meeting minutes	Direct involvement in residential community decisions
Documents	Downloading contracts, certificates, receipts in digital form	Convenient paperless document management

The Account and Profile module forms the foundation of the cabinet, ensuring that each resident has a unique, verified digital identity within the system. The Finance and Payments module is typically the most actively used, since utility costs constitute a recurring obligation for every resident. The Requests and Support module digitalises what was previously a fragmented process of telephone calls and paper forms, providing a structured workflow with clear accountability [4].

The Announcements and Voting modules collectively transform the cabinet from a transactional tool into a community platform, enabling participatory governance of the residential complex. The Documents module addresses the growing demand for paperless record-keeping, allowing residents to access legally significant documents at any time [2].

3. Authentication and Access Control

Secure access to the personal cabinet is a prerequisite for resident trust. Authentication mechanisms must balance security with usability, since residents of different age groups and technical proficiency levels must all be able to log in without friction. Table 2 compares the most common authentication methods applicable to residential web services.

Modern residential web services are recommended to implement a multi-factor authentication (MFA) approach, combining a primary credential (password or OAuth 2.0 token) with a secondary factor such as an SMS one-time password or a biometric check on mobile devices. The OAuth 2.0 framework, standardised as RFC 6749, is particularly suited to residential platforms because it enables delegated authorisation through trusted identity providers such as Google or Apple without exposing resident passwords to third parties [6].

Beyond authentication, the platform must implement role-based access control (RBAC). The RBAC model, comprehensively described by Ferraiolo, Kuhn, and Chandramouli [7], provides a mechanism for assigning permissions to roles rather than directly to individual users, which greatly reduces administrative overhead in multi-tenancy environments. The primary roles in a typical residential web service include: (1) Resident – access to own apartment data, bills, and requests only; (2) Property Manager – read and write access to all

residents' records within their managed complex; (3) Administrator – system-wide configuration and user management rights; (4) Service Technician – access to assigned maintenance requests only. Clear role boundaries prevent data leakage between tenants and protect sensitive billing information [7].

Table 2 – Comparison of authentication methods for residential web service personal cabinets

Authentication Method	Security Level	Ease of Use	Recommended For
Login + Password	Low–Medium	High	Basic entry-level access
SMS One-Time Password	Medium	Medium	Two-factor verification for payments
OAuth 2.0 (Google / Apple)	High	High	Modern mobile-first platforms
Email Confirmation Link	Medium	High	Account registration & recovery
Biometric (fingerprint/face)	Very High	Very High	Mobile apps with sensitive data

4. Interface Design Principles

The interface of a resident personal cabinet must adhere to established usability principles while accommodating the specific constraints of the target audience. Unlike enterprise software or professional tools, residential web services are used by a diverse population that includes elderly residents, individuals with limited digital literacy, and users accessing the service from mobile devices [8].

Key interface design principles applicable to resident personal cabinets are as follows. First, progressive disclosure should be adopted: the dashboard (home screen) should present only the most time-sensitive information – unpaid bills, open requests, and recent announcements – while detailed functions are accessible through clearly labelled navigation. Second, the layout must be responsive, adapting seamlessly to screen sizes ranging from small smartphones to wide desktop monitors [5].

Third, accessibility standards per the Web Content Accessibility Guidelines (WCAG 2.0), developed by the W3C Web Accessibility Initiative [9], should be observed to ensure usability for residents with visual or motor impairments. Fourth, transactional flows – particularly payment and request submission – must provide clear confirmation and error messages so that users can be confident that their actions have been processed. Finally, the interface should support localisation to accommodate multilingual residential communities.

5. Integration with External Systems

A resident personal cabinet does not operate in isolation. Its full value is realised only when it is integrated with the broader ecosystem of systems involved in residential complex management. These typically include: utility metering systems (for automated meter reading data import), payment gateways (for processing bank card and mobile payment transactions), notification delivery services (email, SMS, and push notifications), and governmental registries (for property ownership verification and tax reporting) [3].

Integration is best achieved through a microservices architecture, where each functional module of the personal cabinet communicates with its corresponding back-end service via a well-defined API contract. As demonstrated in empirical research on microservice API evolution [10], maintaining backward compatibility and clear versioning discipline is critical for long-running systems such as residential management platforms. This approach also provides fault isolation – a failure in the notification service, for instance, does not prevent residents from paying their bills – and enables independent scaling of high-load modules such as the payment processing engine.

Conclusions

This research paper has examined the organization of a resident's personal cabinet as a core element of web services for residential complexes. The analysis demonstrates that an effective personal cabinet must integrate at least six functional modules covering account management, finance, maintenance requests, community communication, voting, and document management.

Authentication and role-based access control are critical security foundations. Modern residential platforms should implement multi-factor authentication based on the OAuth 2.0 framework and clearly defined RBAC user roles to protect both resident privacy and system integrity. Interface design must prioritise accessibility in line with WCAG 2.0 guidelines and responsiveness to serve a demographically diverse resident base.

The proposed functional structure and the principles described in this research paper provide a conceptual framework that can be applied in the design of unified web services for residential complex management. Future research should address the measurement of user satisfaction and the quantitative impact of personal cabinet adoption on operational efficiency in property management organizations.

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Гринчак Максим Олегович – студент групи ІПІ-22б, факультет інформаційних технологій та комп’ютерної інженерії, Вінницький національний технічний університет, м. Вінниця, e-mail: 1234567maxgrynchak@gmail.com.

Мельник Олександр Васильович – кандидат технічних наук, доцент, доцент кафедри програмного забезпечення, Вінницький національний технічний університет, м. Вінниця, e-mail: o.melnyk@vntu.edu.ua.

Maksym O. Hrynchak – student of group 1PI-22b, Faculty of Information Technologies and Computer Engineering, Vinnytsia National Technical University, Vinnytsia, e-mail: 1234567maxgrynchak@gmail.com.

Oleksandr V. Melnyk – Candidate of Technical Sciences, Associate Professor, Associate Professor of the Software Engineering Department, Vinnytsia National Technical University, Vinnytsia, e-mail: o.melnyk@vntu.edu.ua.