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Web-Based Digital Archive Management Information System

Rouna Meisda Paoki* & Jimmy Herawan Moedjahedy

Universitas Klabat, Airmadidi, Sulawesi Utara, Indonesia

Abstract

Archive management remains a critical yet frequently neglected administrative function in many organizations. Manual, paper-based archiving introduces persistent problems including physical document loss, time-consuming retrieval, uncontrolled data duplication, and limited and deteriorating storage space. This study addresses these problems by developing a web-based digital archive management information system designed to store, organize, search, and retrieve archive records effectively, efficiently, securely, and with ease of access. The objective of the research is to design and implement a lightweight system that can operate entirely within a web browser without requiring server infrastructure, thereby lowering adoption barriers for small organizations. The system was developed using the Waterfall model, progressing through requirements analysis, system design, database design, implementation, and testing. It was implemented using HTML5 for structure, CSS3 for a responsive interface, and JavaScript (ES6) for application logic, while the browser-native LocalStorage facility serves as a local database for persistent record storage. The resulting application provides user authentication, an informative dashboard, full create-read-update-delete (CRUD) operations on archive records, keyword search, category and date filtering, file attachment simulation, archive statistics, and data export. Black-box testing of the principal functions confirmed that all tested scenarios produced the expected results. The findings indicate that the system substantially improves the speed and accuracy of archive search and management compared with manual practices, while remaining inexpensive and easy to deploy. The study contributes a practical reference model for browser-based document management suitable for resource-constrained institutions.

Keywords: digital archive, management information system, web application localstorage, document management, digital transformation

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1. Introduction

Archives constitute the documented memory of an organization. They record decisions, transactions, agreements, and the institutional knowledge accumulated over time. In both public agencies and private enterprises, archives serve as evidence of accountability, as a basis for managerial decision-making, and as a legal record that must be preserved and produced when required. The proper management of archives is therefore not a peripheral clerical task but a strategic activity that underpins organizational governance and continuity.

Despite this importance, many organizations continue to manage their archives manually. Documents are stored in physical folders, filing cabinets, and storage rooms, and are located by browsing through them by hand. Manual archiving generates several recurring problems(Perdana & Putra, 2016). First, physical documents are vulnerable to loss, misplacement, and damage from moisture, fire, or simple deterioration over time. Second, searching for a specific document is slow because retrieval depends on the memory and diligence of individual staff and on the physical accessibility of the storage location. Third, manual processes encourage data duplication, since copies are made and distributed without a central record, leading to inconsistency between versions. Fourth, physical storage space is finite and expensive, and it expands continuously as the organization grows(Lanuary, 2026; Sumrah Yadi, 2009; Verry Mardiyanto, 2017).

These limitations point clearly toward the need for archive digitization. Converting archives into digital form and managing them through an information system addresses the weaknesses of manual practice: digital records can be duplicated for backup without ambiguity, retrieved instantly through search, and stored compactly without consuming

* Corresponding author.
E-mail address: *rouna.paoki@unklab.ac.id*

physical space(As'ad et al., 2025; Eka Yulianti et al., 2025). Digitization also enables controlled access, audit trails, and integration with other organizational systems.

Web-based information systems are particularly well suited to this purpose. A web application is accessible through an ordinary browser, requires no specialized client software, and can present a consistent interface across desktop and mobile devices. For small organizations in particular, a browser-based solution that does not depend on a dedicated server reduces both cost and technical complexity, making digital archive management feasible even where information-technology resources are scarce.

The objectives of this research are: (1) to analyze the functional and non-functional requirements of a digital archive management system; (2) to design the system using standard modeling tools, namely a flowchart, a use case diagram, and an architecture diagram; (3) to implement a working web-based application using HTML, CSS, JavaScript, and a browser-native local database; and (4) to test and evaluate the system against representative usage scenarios.

The contributions of this study are threefold. It provides a concrete requirements and design specification for a digital archive system that small institutions can reuse. It demonstrates that a fully functional document management application can be built without server infrastructure by exploiting browser storage. Finally, it offers empirical evidence, through structured testing, that such a system improves the efficiency and reliability of archive management relative to manual methods.

2. Literature Review

2.1 Management Information Systems

A management information system (MIS) is an integrated arrangement of people, processes, and technology that collects, processes, stores, and distributes information to support the operational and managerial functions of an organization. An MIS transforms raw data into meaningful information that managers use for planning, control, and decision-making. A digital archive system is a specialized form of MIS in which the managed information consists of organizational documents and their associated metadata(Baker El-Ebiary, 2020; MIoD, FCGBA, Lord Emmanuel Yamoah et al., 2024; Protti, 2003).

2.2 Digital Archives and Document Digitization

A digital archive is an organized collection of documents that have been captured, described, and stored in electronic form so that they can be preserved and retrieved over time. Document digitization is the process of converting physical or analog documents into digital representations and enriching them with descriptive metadata such as title, category, date, owner, and description. Effective digitization depends not only on capturing the document but on structuring the metadata so that records can be classified, searched, and filtered systematically(Hodder & Beckingham, 2022; Opgenhaffen, 2022; Shanthi et al., 2026; Zahara & Salim, 2022).

2.3 Web-Based Information Systems

Web-based information systems deliver their functionality through web technologies and are accessed via a browser. They are typically built on a presentation layer (HTML and CSS), an application logic layer (JavaScript executing in the browser or code running on a server), and a data layer (a database). Web-based delivery offers platform independence, centralized maintenance, and broad accessibility. Modern browsers also provide client-side capabilities that allow data to be processed and stored locally, enabling applications that function without a continuously available server(Setiabudi & Tjahyana, 2013).

2.4 Local and Browser Databases

Contemporary browsers expose persistent storage mechanisms to web applications, principally the Web Storage API (LocalStorage and SessionStorage) and IndexedDB. LocalStorage offers a simple key-value store that persists across browser sessions and is well suited to modest volumes of structured data serialized as JSON. IndexedDB is a transactional, indexed object store designed for larger and more complex datasets. These mechanisms make it possible to build self-contained applications in which data persists on the user's device without any server-side database.

2.5 Archive Data Security and Access

Security in archive systems concerns authentication(Rahim et al., 2018), authorization(Roslan et al., 2018), integrity and confidentiality(Bertino & Sandhu, 2005). At a minimum, access should be restricted through a login mechanism so that only authorized users can view or modify records. More advanced systems add role-based authorization,

encryption of stored data, and audit logging. In a client-side system, security is necessarily limited because data resides on the user's device; the design must therefore balance simplicity against the protections that a server-backed deployment would provide.

2.6 Related Work

A substantial body of prior research has examined electronic and digital archive systems, document management systems, and the broader process of digital transformation in administrative settings. These studies consistently report that digitizing archives reduces retrieval time, lowers the risk of document loss, and improves the consistency of records. Much of the existing work, however, assumes a server-based architecture with a relational database, which entails infrastructure and maintenance costs. The present study differs in deliberately targeting a server-less, browser-based design appropriate for small organizations, while preserving the core functionality reported in the literature.

3. Method

This research applies the Waterfall model of software development(Nurhayati et al., 2023; Purwaningsih, 2018; Utami et al., 2022), a sequential approach in which each phase is completed before the next begins. The Waterfall model was chosen because the requirements of an archive management system are well understood and stable, making a structured, document-driven process appropriate. The phases applied in this study are as follows.

a. Requirements analysis. The functional and non-functional requirements were elicited from the typical needs of organizational archive management and formulated as a definitive requirements specification.
b. System design. The behavior and structure of the system were modeled using a flowchart, a use case diagram, and a system architecture diagram.
c. Local database design. The data structure for archive records was defined as a set of fields stored as JSON objects in the browser's local storage
d. Implementation. The system was coded using HTML5, CSS3, and JavaScript (ES6), with LocalStorage as the persistence layer
e. System testing. The principal functions were tested using black-box test scenarios to verify that each produced its expected result
f. Evaluation of results. The test outcomes and the operational characteristics of the system were analyzed and discussed

3.1 System Design

The system was modeled from three complementary perspectives: a flowchart describing the operational flow, a use case diagram describing the interactions between the user and the system, and an architecture diagram describing the structural organization of the software.

3.1.1. System Flowchart

The flowchart in Figure 1 describes the main operational flow. The process begins when the user opens the application and submits login credentials. If the credentials are invalid, an error message is shown and the user is returned to the login step. If the credentials are valid, the user enters the dashboard, where archive statistics are displayed. The user then manages archives by adding, editing, deleting, searching, or filtering records; each change is saved to the local database, and the updated archive data is displayed. The user may continue working or proceed to log out, after which the process ends.

3.1.2. Use Case Diagram

The use case diagram in Figure 2 identifies a single actor, the Admin/User, who interacts with the system through the following use cases: Login, Manage Archives, Add Archives, Edit Archives, Delete Archives, Search Archives, Filter by Category/Date, View Dashboard and Statistics, Export Data, and Logout. The Add, Edit, and Delete use cases are included within the broader Manage Archives function.

3.1.3. System Architecture Diagram

The architecture diagram in Figure 3 presents the system as a client-side, layered model. The user interacts with the web browser, which hosts the entire application. Within the browser, the presentation layer (HTML and CSS) renders the interface; the application logic layer (JavaScript) handles validation, search, filtering, and statistics; and the data

access layer communicates with the local database (LocalStorage or IndexedDB), where the digital archive records and their metadata are stored. Because every component runs inside the browser, no external server is required.

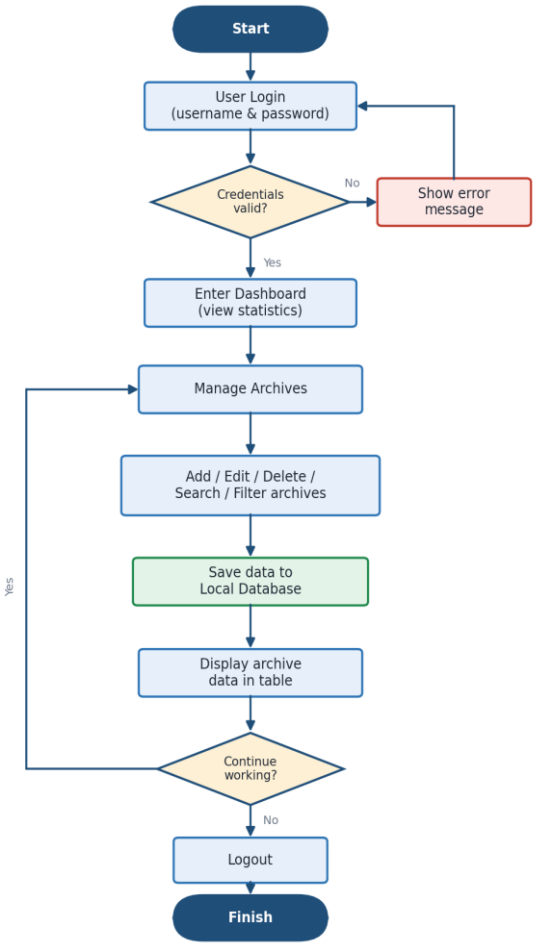

Fig 1. System flowchart of the digital archive management system.

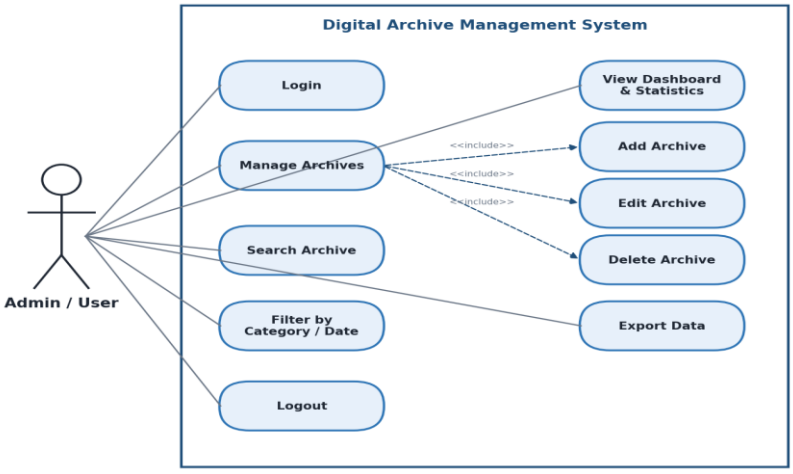

Fig 2. Use case diagram of the digital archive management system

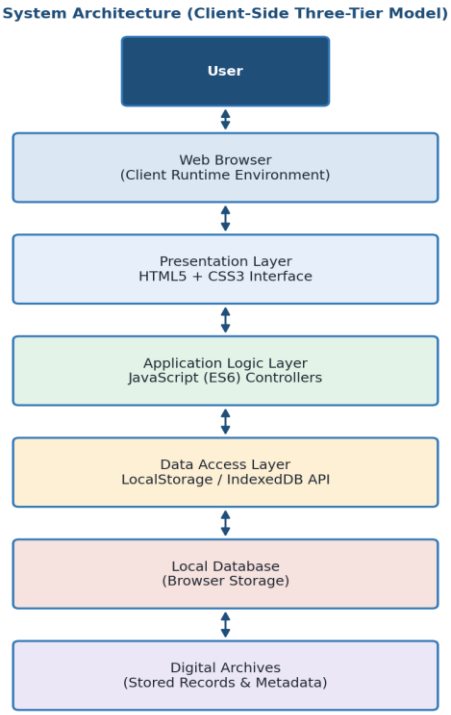

Fig 3. System architecture diagram (client-side three-tier model).

3.2 Local Database Design

The system stores archive records in the browser using LocalStorage, where the complete collection of records is held as a single JSON array under a dedicated key. IndexedDB may be substituted where larger volumes or indexed queries are required. Each archive record is an object with the fields defined in Table 1.

Table 1. Data structure of an archive record stored in the local database.

Field	Name	Description
id	id	Unique system-generated identifier for the archive record.
archiveNumber	Archive number	Official reference number assigned to the archive.
archiveTitle	Document title	Title or subject of the archived document.
category	Archive category	Classification of the archive (e.g., Finance, Legal).
date	Archive date	Date associated with the archive document.
owner	Document owner	Person or unit responsible for the document.
description	Archive description	Brief description of the archive content.
fileName	File name	Name of the attached or simulated archive file.
addTime	Time added	Timestamp recording when the record was created.

The system was implemented as a single self-contained web application combining HTML5, CSS3, and JavaScript with LocalStorage as the persistence layer. The application runs directly in a browser by opening a single HTML file, with no server or installation required.

The login page authenticates the user and establishes a lightweight session. Upon successful login, the dashboard presents statistic cards reporting the total number of archives, the number of distinct categories, the number of records added in the current month, and the most frequent category. The add-archive form captures the archive number, title, category, date, owner, file attachment, and description, validating that the required fields are present before saving.

Archive records are listed in a responsive data table. A search box filters the records instantly by keyword across the title, archive number, and owner, while a category selector and a date-range filter narrow the results further. Each row

provides an Edit control, which loads the record back into the form for modification, and a Delete control, which removes the record after confirmation. Selecting a record's title opens a detail view showing its complete metadata. An export function serializes the entire archive collection to a downloadable JSON file. All create, update, and delete operations persist immediately to LocalStorage, so the data remains available after the browser is closed and reopened. The stylesheet implements a responsive layout that reflows for smaller screens, and the source code is documented with explanatory comments throughout.

The principal functions of the system were verified using black-box testing, in which inputs are supplied and the resulting outputs are compared against expected results without reference to the internal code. The test scenarios and their outcomes are summarized in Table 2.

Table 2. Black-box test scenarios and results

No.	Feature	Test Scenario	Expected Result	Status
1	Login	User enters correct username and password.	User accesses the dashboard.	Success
2	Add Archive	User fills out and submits the archive form.	Data is saved to the local database.	Success
3	Search Archive	User searches by title keyword.	Matching records are displayed.	Success
4	Edit Archive	User modifies an existing record.	Data is successfully updated.	Success
5	Delete Archive	User deletes an archive record.	Record is removed from the local database.	Success

4. Result and Discussion

The implemented system successfully fulfilled all of the specified functional requirements, and every test scenario in Table 2 produced its expected result, yielding a complete pass rate across the tested functions. The following discussion examines the principal aspects of the system in operation.

4.1 Application Interface

The interface is organized around a clean dashboard layout. Statistic cards at the top give an immediate overview of the archive holdings, a form panel supports data entry, and a records panel presents the archives in a sortable, filterable table. The visual design favors clarity over decoration, in keeping with the usability and simplicity requirements.

4.2 Login and Storage Processes

The login process authenticates the user against stored credentials and establishes a session, preventing unauthenticated access to the archive data. The storage process serializes each record as a JSON object within an array held in LocalStorage. Because writes occur immediately after each operation, the data remains consistent and persistent across browser sessions, satisfying the local-persistence requirement. Figure 1 and 2 showed the login system and the archive digital system.

4.3 Search and Effectiveness of the Local Database

The search and filter processes operate entirely on the client, reading the in-memory collection and matching it against the user's keyword, category, and date criteria. Because no network round-trip is involved, results appear effectively instantly even as the number of records grows into the hundreds. This responsiveness demonstrates that a local database is sufficient for the storage and retrieval needs of a small to medium archive collection, and it confirms the performance requirement. Figure 6 illustrates the distribution of stored archives across categories for a representative dataset.

4.4 Advantages over Manual Archiving

Compared with manual archiving, the system offers clear advantages. Retrieval that previously required physically locating a folder is reduced to typing a keyword and reading the result in seconds. The risk of permanent document loss is reduced because records can be exported and backed up. Data duplication is controlled because each record has a unique identifier within a single store. Physical storage space is conserved because the archive is held digitally. These benefits directly address the four problems of manual archiving identified in the introduction.

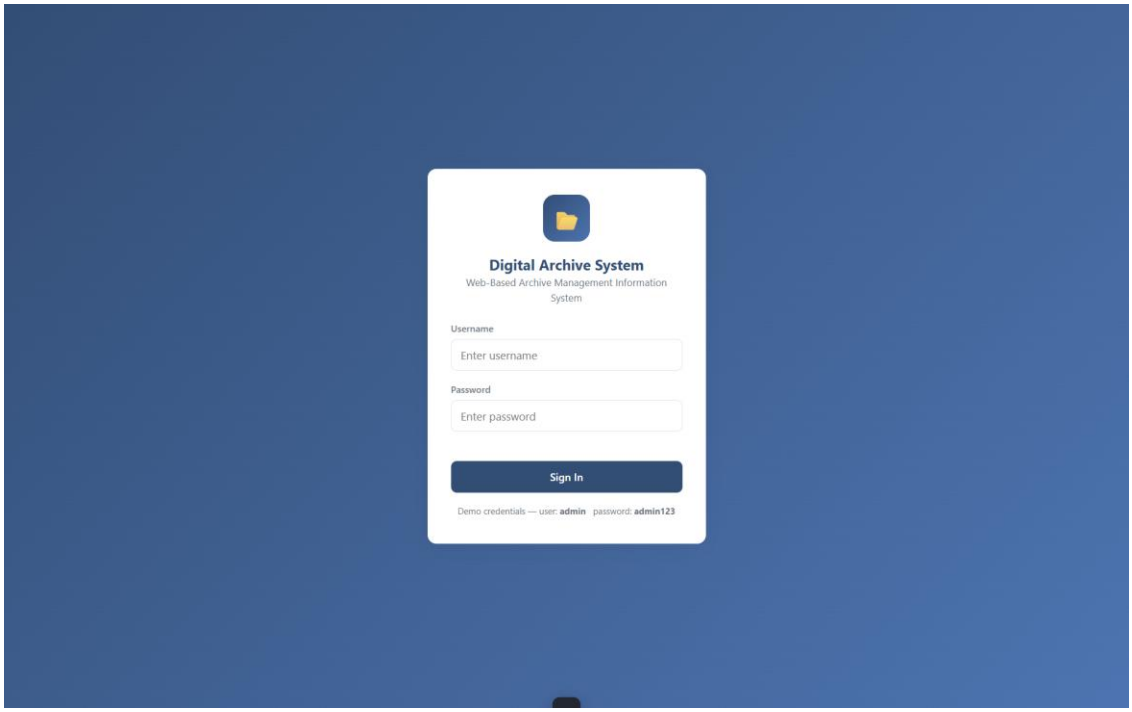

Fig 4. Login system

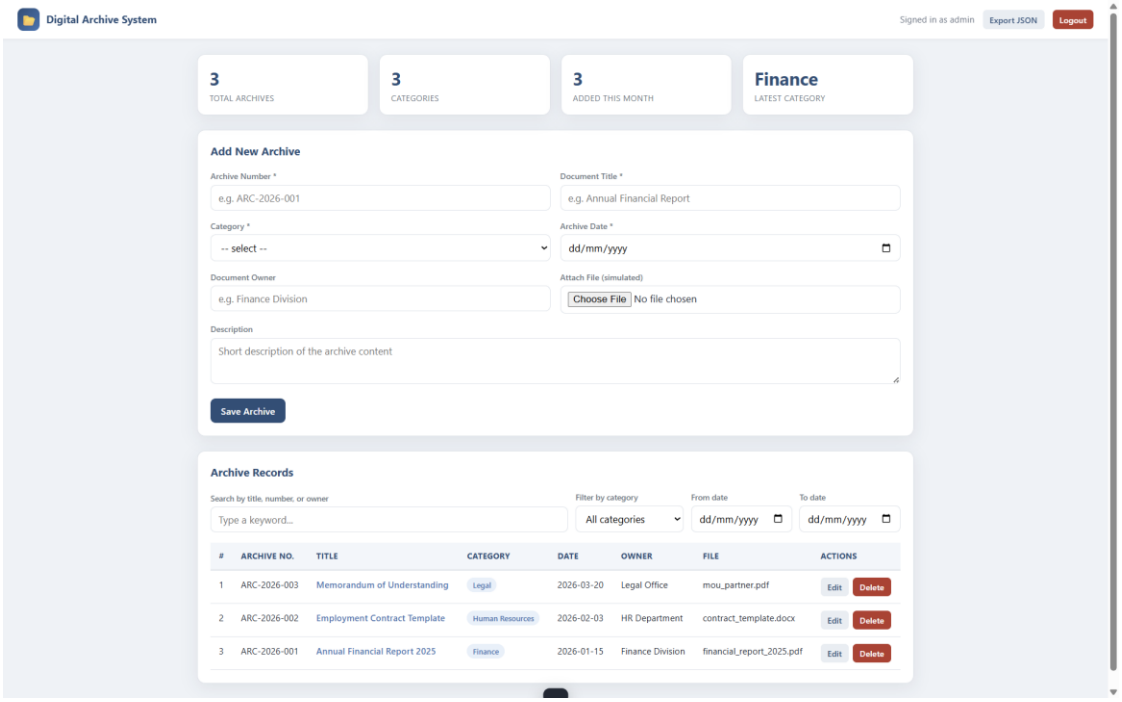

Fig 5. Archive Digital System

4.5 Limitations of the System

The system also has limitations that follow from its deliberately lightweight design. Because data is stored in the browser's LocalStorage, it resides on a single device and is not automatically shared between users or machines; clearing the browser data removes the records. LocalStorage also imposes a storage-capacity limit and stores actual document files only by reference rather than uploading their full content. The authentication mechanism is intentionally simple and is not a substitute for server-enforced security. These limitations define the direction of future development.

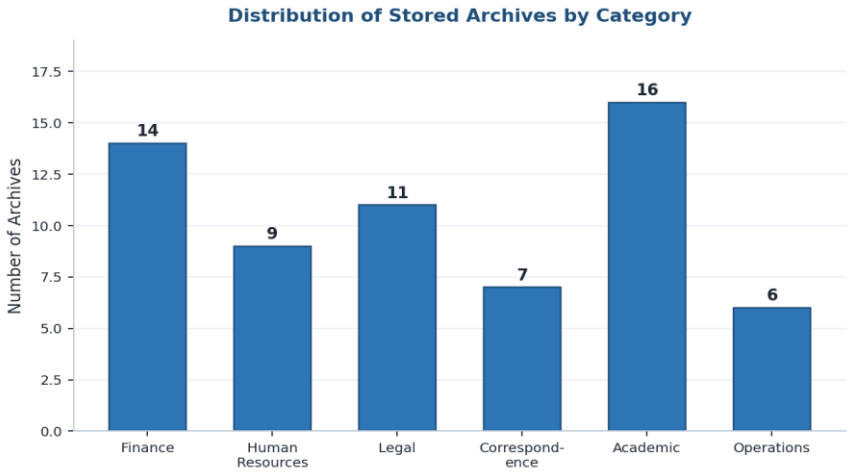

Fig 6. Distribution of stored archives by category for a representative dataset.

5. Conclusion

This study set out to address the well-documented problems of manual archive management, namely document loss, slow retrieval, data duplication, and limited physical storage, by developing a web-based digital archive management information system. The system was successfully developed and is fully operational, meeting all of the functional and non-functional requirements established during analysis.

The research demonstrates that a complete and useful digital archive application can be built entirely with client-side web technologies. Using HTML5, CSS3, and JavaScript together with the browser-native LocalStorage facility, the system provides authentication, a statistical dashboard, full create-read-update-delete operations, keyword search, category and date filtering, file attachment, archive detail viewing, and data export, all without requiring a server or any installation. This confirms that a local database is a viable and appropriate mechanism for simple, self-contained document storage in small organizations.

The black-box testing of the principal functions returned a complete pass rate, providing evidence that the system performs reliably. In operation, the system markedly improves the efficiency of archive search and management relative to manual methods: documents that once took minutes to locate physically can now be retrieved in seconds, records are protected against accidental loss through export and backup, duplication is controlled through unique record identifiers, and physical storage space is conserved. The system therefore achieves its central aim of managing digital archives effectively, efficiently, securely, and with ease of access.

At the same time, the study acknowledges the limitations inherent in a purely client-side approach. Data is confined to a single browser on a single device, storage capacity is bounded, attached documents are recorded by reference rather than stored in full, and the security model is deliberately minimal. These constraints, while acceptable for the intended small-organization context, indicate clear avenues for further work.

Future development should focus on extending the system from a single-device tool toward a shared, secure platform. Promising directions include integration with a database server so that records are stored centrally and synchronized across devices; the addition of multi-user support with role-based access control to distinguish administrators from ordinary users; the introduction of document encryption to protect sensitive archives at rest; and the use of cloud storage so that the full content of attached documents can be uploaded, preserved, and shared. Together, these enhancements would transform the present prototype into an enterprise-grade archive management system while retaining the simplicity and accessibility that make the current design valuable. In conclusion, the research confirms that web-based digitization offers a practical and low-cost path to modernizing archive management, and it provides both a working application and a reusable design model for organizations seeking to make that transition.

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