



## Data Backup System in the Library of Universitas Sebelas Maret (UNS) Surakarta

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### ABSTRACT

**Research Objectives.** Data in the library contains various intellectual property and knowledge so that it can be accessed by anyone, anytime and anywhere. The development of information technology provides convenience in storing digital data. Digital data backup is vulnerable to various threats such as cyber, malware, hackers, and hardware damage, so library data security management is needed. The Technical Implementation Unit of the Universitas Sebelas Maret (UNS) Surakarta Library manages digital data through *digilib.uns.ac.id*, *unsla.uns.ac.id*, and *library.uns.ac.id*. **Method.** The research method uses a mixed method, exploratory, action research. Data was collected through observation, interviews, FGDs, and documentation.

**Research Results.** Digital data backup of the UNS Library in the form of unsla: All circulation transactions, printed book collection data, member data; Digilib: student final assignment files, academic community research results, and so on; Library: news, announcements, various electronic information; Ezproxy: to access SSO electronic journal and ebook. They are stored at the UNS ICT. The UNS Library Unit backs up some of these data, namely soft files of final assignments, old magazines, and compact disks (CDs), as an effort to secure digital data caused by hacker attacks, viruses, or hardware damage.

**Conclusion.** The UNS Library Unit's digital data backup consists of unsla: All circulation transactions, printed book collection data, member data; Digilib: student final assignment files, academic community research results, and so on; Library: news, announcements, various electronic information; Ezproxy: to access SSO ejournal and ebooks. It is stored at the UNS ICT Unit. The UNS Library Unit backs up some of these data, namely soft files of final assignments, old magazines, and compact disks (CDs), as an effort to secure digital data caused by hacker attacks, viruses, or hardware damage.

**Keywords:** Backup Data, Digital Data Security, Digital Data, Digital Preservation, Data Library



## A. INTRODUCTION

Information security is an action to prevent illegal access, use, disruption, disclosure, recording, inspection, modification or damage of information, the main objective of which is to ensure that the information stored is not misused; to maintain confidentiality, integrity, availability, no declination against information; to avoid unexpected action such as cyber-crime, plagiarism, exploitation, hacking, etc (Venter & Eloff, 2003; Frederick, 2023; Sillaber et al., 2019).

The easiest way to keep some information secure is to back up and improve the librarian's performance by encouraging them to attend training. In addition, various digital devices used in the library need to be updated to make the system implemented not disturbed easily; a simulation of information leakage should be held to prepare the library for facing the unexpected incident by taking appropriate measures to prevent it from having a wider impact (Galih, 2020). Cybersecurity is the main challenge in the implementation of cybersecurity in university libraries. Bad password management and inadequate training in cybersecurity make cyber-crime a threat. This will impact the sustainability of the university library as an information institution and, therefore, decrease the quality of service (Igbinovia & Ishola, 2023).

Along with the rapid development of new network technology, such as cloud computing, the server side of digital libraries becomes more untrustworthy and thereby seriously threatens library readers' privacy (Wu et al., 2022). Successful information security in the library depends on the effective behavior of the administrator, librarian, users, and all human staff (Amini et al., 2021). The library is vulnerable to social reengineering attacks and must know how to manage the risk of human-caused cyberspace threats (Kont, 2024). Digitalization and digital transformation have led to the more critical adoption of information and communication technology (ICT) and information science in running a business (Loebbecke & Picot, 2015).

Considering some disruptions likely arising, impacting the availability of IT facilities and inhibiting the corporate/institutional operation, a Disaster recovery plan (DRP) is needed. A DRP is a planning method used to carry out the operation in the condition of disruption (Makpul, 2022).

The library staff's awareness of information security is reasonable, but the awareness in two focused divisions needs special attention and improvement (Kont, 2024). Information and Communication Technology (ICT) has significantly influenced library users and how they search for data. Cloud computing aligns with the fourth principle suggested by Dr. Ranganathan, which is to make information available anytime and anywhere and save readers time (Sivankalai, 2021).

Academic librarians face a bigger challenge in accommodating and supporting Open Big Data, consisting of a compilation of existing raw data and a compilation of new big data resulting from data-based research. For this, the fund is assumed jointly by the institutional budget, grant, and public fund in building and supporting the institutional repository (Tzanova, 2020).

Many libraries have converted intellectual content into digital form today. The considerations to convert them into digital form include faster publication through the internet, saving storage space, can be stored in various media, and can be



transferred easily in other storage media forms, faster process of retrieving and accessing information, easy to duplicate to be reserve (back up), easy to find and to access, security of data from extinction so that it can be utilized from one generation to the next, being the material of promotion as the nation's wealth (Harvey, 1993). The backup of the digital collection is intended to preserve the digital library (Safri, 2020). Data backup (making or duplicating data) is the most straightforward way to ensure the data stored is safe (David Hizkia Tobing & Yohanes Kartika Herdiyanto, 2016).

Leackage-related data loss is a severe threat to cloud security. Data compromise and modification occur without storing the reserve copy by changing or deleting the original information. In addition, data storage in cloud media is less dependable because insiders and third parties can access the data (Alouffi et al., 2021). Encryption, password use, fingerprint scanning, watermarking, digital signatures, duplicated detection systems, and payment systems are ways to protect technology information (Hanafiah, 2023). The National Library provides a menu of "backup data" in the *Inlistlite* application (an information system developed by the National Library). Data backup is intended to store essential files (e.g., in cataloging or preparing bibliography descriptions (Fatmawati, 2020).

The threat of information security against digital libraries attacks programs or applications used to manage information and the physical objects to store the information. Many types of malware are an example of a threat against information security in digital libraries. The easiest way to store information safely is to back up (making or duplicating some information). However, backing up alone is not enough. The performance of librarians and other officers should be improved by encouraging them to attend various training held nationally or internationally (Galih, 2020).

The application and utilization of Information and Communication Technology (ICT) in either state or private university neighborhoods has been one of the necessities in academic activities. A backup process should be carried out routinely to ensure the information technology remains safe, available, and running. Each activity of the backup process should be monitored to make it run as planned and targeted. Monitoring can provide information on the process performance and specify the measures for continuous improvement (Haryanzi et al., 2018). This article aims to discover the data backup system and its supporting and inhibiting factors in the Library of Universitas Sebelas Maret (UNS), Surakarta.

## B. METHODS

This study is an exploratory research. The informant selection used a purposive sampling technique adjusted to research needs and interests (Savin-Baden, 2008). The main informant consists of students of the Informatics Department of the Faculty of Information Technology and Data Science (FATISDA) and the Information and Computer Technology Department of the Faculty of Teacher Training and Education (TIK FKIP) of UNS, librarians, staff of Information and Communication Technology, lecturers, and academic community of Sebelas Maret University (Indonesian: Universitas Sebelas Maret or UNS).

Supporting informants are Information and Communication Technology practitioners. Data were collected using observation, in-depth interviews, Focus Group Discussion (FGD), and documentation.

To validate data, source triangulation was used, and information was obtained through different sources; method triangulation was also used, i.e., using different methods (e.g., interview and observation or FGD). Action research is a form of self-reflection collectively involving daily activities, including studying, diagnosing, planning, implementing, monitoring, and establishing necessary relations between evaluation and self-development (Savin-Baden, 2008; Sholikin., 2008). This research was carried out using FGD to collect data, which was then processed. This research was conducted in March-July 2024.

## C. RESULT AND DISCUSSION

### General Description of Research Location

#### 1. The Library of UNS

The Library of UNS, or UNS Library, was founded along with its parent institution. UNS was originally the merger of 10 private universities in Surakarta and a State Institute of Teacher Training and Education (Indonesian: *IKIP Negeri*) in Surakarta. According to the Library Public of Indonesia Minister of Education and Culture's Regulation Number 82/2014 about the Organization and Work Procedure of Universitas Sebelas Maret (UNS) Surakarta, the Library must provide Library Services. Meanwhile, the Library's functions are to prepare a plan, program, and budget for the Library to prepare a plan and need and to provide a divining manual; to process library materials; to provide service and to utilize library materials; to maintain the library materials, and to implement administrative affairs of the Library (Universitas Sebelas Maret., 2016). The Library of UNS provides various services, among others, including book borrowing/returning/extension, *bebas pustaka* (a letter shows and proves that the library user or library member no longer has any responsibilities in the Library, whether in the form of book responsibilities or fines), on-site reading services, SNI Corner services, BI Corner, Taiwan Corner, Demographic Corner, *Angringan Pustaka*, reading corner, Self-Access Terminal (SAT), The Gade Creative Longue, and reading corner in Literacy Park.

#### 2. Library's Digital Data

Data plays a main role in helping the library clearly understand the changing needs of academic library users and making service innovations (Raharjo, 2022). Digital preservation requires new skills and collaboration among library staff to maintain long-term access to information (Drijfhout & de Boer, 2015). The digital

library keeps improving its application of technology, including data analysis, decision-making analysis, semantic analysis, data quality, and data processing and visualization presentation technology (Li et al., 2019).

In the industry 4.0 era, it is time to apply the latest technology focusing on infrastructure, including construction design and disaster prevention, to mitigate damage and life toll. Digital Twin (DT) is a technology promising to subjugate the challenge of predicting disaster by relying on previous data history (Nasution, 2008).

The management of digital security processing in the Library UNS is divided into four databases:

1. [library.uns.ac.id/](http://library.uns.ac.id/) constituting an official website of UNS Library.
2. A catalog of the printed collections, which include books, references, journal articles, and students' final projects, can be accessed through [uncle.uns.ac.id](http://uncle.uns.ac.id/).
3. An institutional repository containing a digital collection that can be downloaded, including students' final projects, journals, proceedings, books, and research reports, can be accessed through [digilib.uns.ac.id/](http://digilib.uns.ac.id/).
4. EZproxy. [uns.ac](http://uns.ac). It is a website that allows users to access the collection of e-books and e-journals subscribed to by UNS Library from outside the campus using Single Sign On (SSO).

The Library's Informatics and Communication Technology Division manages the four databases in collaboration with the UNS Informatics and Communication Technology Technical Service Unit (thereafter called the UNS ICT Team).

### 3. Characteristics of Digital Data in the Library of UNS

The Library's digital data stored in UPT TIK UNS consists of *unsla* encompassing circulation transaction data, printed book collection data, and member data; *digilib* includes data of students' final project files, academic community's research results; the library website contains announcements, various electronic information; [ezproxy.uns.ac.id](http://ezproxy.uns.ac.id) includes various databases and e-journal/e-book subscribed by UNS with access using SSO UNS. Considering the result of the interview, the statistical data indicates that the borrowing of collections stored in *unslain* the last 3 (three) years amounts to 29,292 specimens in 2023, 25,269 specimens in 2022, and 3,142 specimens in 2021 (the decrease occurred because of limited service during new average/post-pandemic era).

*Digilib* is a database containing data of students' final project files and research result of UNS academic community. Digital document stored at [digilib.uns.ac.id](http://digilib.uns.ac.id) includes, among others, final project documents classified per faculty in detail. The data can be seen in Figure 1.

No	Fakultas	Jumlah Dokumen
1.	Fak. ICP	22549 dokumen
2.	Sekolah Pascasarjana	12417 dokumen
3.	Fak. Ekonomi dan Bisnis	12159 dokumen
4.	Fak. ISIP	8526 dokumen
5.	Fak. Teknik	7675 dokumen
6.	Fak. Kedokteran	6489 dokumen
7.	Fak. Hukum	6030 dokumen
8.	Sekolah Vokasi	5393 dokumen
9.	Fak. Pertanian	5108 dokumen
10.	Fak. MIPA	4564 dokumen
11.	Fak. Sastra dan Seni Rupa	4332 dokumen
12.	Fak. Ilmu Budaya	2850 dokumen
13.	Fak. Seni Rupa dan Desain	1510 dokumen
14.	Fak. Keolahragaan	815 dokumen
15.	Fak. Psikologi	100 dokumen
16.	Kantor Pusat	69 dokumen
17.	Fak. Peternakan	31 dokumen
18.	Fak. Teknologi Informasi dan Sains Data	26 dokumen
Total Dokumen		100434 dokumen

Figure 1. Digital Document of final project in digilib.uns.ac.id based on data classified per faculty

Source: Primary Data, July 2024

The official website of UNS Library addressed at <https://library.uns.ac.id>. This website contains various news about the Library of UNS and announcement and shares various links related to electronic data. The Library's website display can be seen in Figure 2.

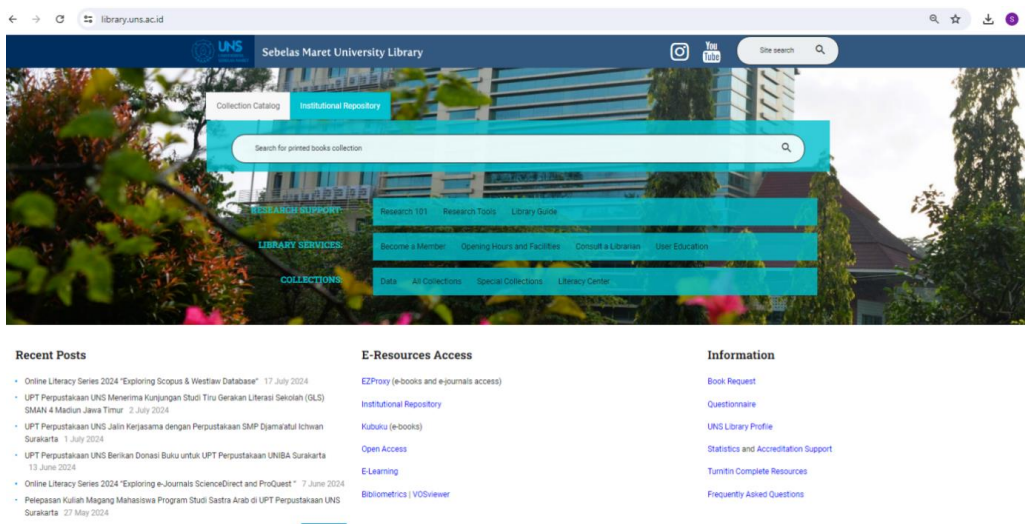


Figure 2. Initial Display of UNS Library's Official Website

Source: Screenshot, July 2024

Ezproxy is a helpful platform that facilitates safe and dependable access to electronic sources for library users. Ezproxy.uns.ac.id is a database subscribed to by UNS and contains databases and electronic journals. Some journals and databases are subscribed by UNS: Scopus, Emerald, EbscoHost research database,

*Hukum Online* (Online Law), ScienceDirect, SpringerLink, CNKI, Westlaw, and ProQuest. The collection of electronic books in the Library of UNS includes, among others, SpringerLink, IGI Global, EbscoHost, ScienceDirect, Gale, Cambridge Core, ProQuest eLibrary, and Kubuku. This database can be accessed using the Single Sign On (SSO) email of UNS students/staff.

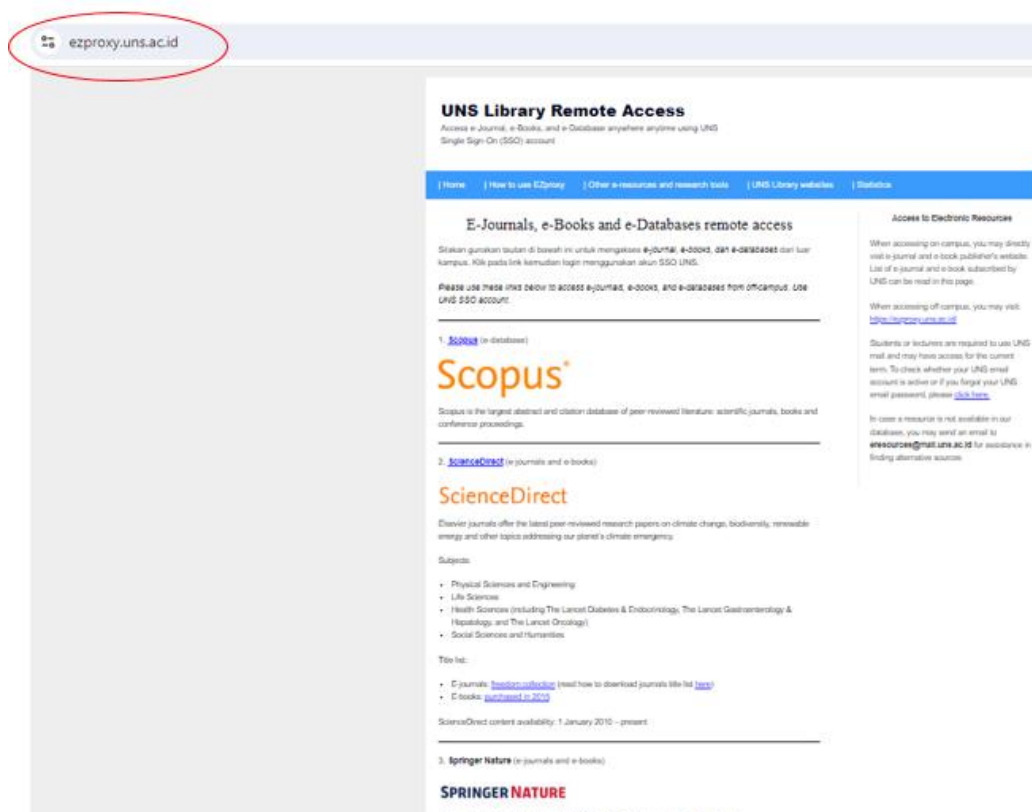


Figure 4. Screenshot of ezproxy.uns.ac.id display

Source: <https://ezproxy.uns.ac.id/>, accessed in August 2024

#### 4. Digital Data Management in the Library of UNS

Considering the interview result with the Library's Information and Communication Technology Staff (TS), the following data are obtained. The Library has two digital data storage media: the storage media in the Library and the storage media in UNS' ICT Technical Service Unit (UPT TIK UNS). The Library stores a backup of the thesis softcopy, the result of the old manuscript and magazine digitalization, and a compact disk. The backup of the final project is stored in the Library's server room in 8 terabytes (TB)-sized Network Attached Storage (NAS). Meanwhile, old manuscripts and magazine digitalization are stored on the computers on the third floor and the magazine division staff's computer. The CD collection is stored in the reference division. Based on the interview result



with (TS), it can be concluded that the UNS ICT Technical Service Unit and UNS Library carry out the Library's digital data management.

## 5. Security of Digital Data in UNS Library

*Digital data* can be defined as the representation of fact, concept, or instruction expressed in digital form that can be stored, processed, and transmitted by computer, the format of which can be numeric, letter, symbol, image, audio, or video digital data format (Suwondo, 2024). Data security is an attempt to protect and ensure cyberspace's three most essential aspects: data confidentiality, data integrity, and data availability (Garfinkel, S., & Lipford, 2014). Meanwhile, the backup of printed collection metadata at *unsla* is automatically made every day at 00.00 in UPT TIK's server. The data stored are only those in the last 20 (twenty) days. The data beyond 20 days will be deleted to save the UPT TIK's service capacity. Data from the final project at *Digilib* are put in the UPT TIK's server files; these files are stored on one server only (not backed up on another server). Data backup in the Library's NAS is carried out only on the final project files before 2022 because all final project files have been uploaded directly to *Digilib* through independent upload since 2022. Meanwhile, the Library and *EZproxy* websites are not backed up. This is based on an interview with TS, an ICT staff member at the UNS Library.

## 6. Strategy of Developing Human Resource (HR)

One of the research respondents, TS, stated that the strategy of developing Human Resources for the security of digital data had not been explicitly formulated until today in UNS Library; therefore, some workshop or seminar needs to be held concerning the protection of personal data to enable the Library's staffs to find out which data is public or which data is private (personal), because the Library also asks the students' data including phone number, address, etc. (*uncle*), and file of the final project (*digilib*). The Library has not yet declared the guarantee of digital data security for the guarantee of digital data being used anytime by library users.

## 7. Factors Supporting and Inhibiting the Backup of Digital Data in UNS Library

Factors supporting digital data backup in UNS Library are, among others, the available digital databases, including *unsla*, *digilib*, *library website*, and *EZproxy*. In addition, the available server of digital database storage and adequate internet connection are other supporting factors. Another supporting factor is that databases are separated from each other. It can be an advantage because if one of the databases is attacked or disturbed, the attack or disturbance may not affect other databases. It is based on the information given by TT, one of the resource persons in FGD.

The factor inhibiting the backup of digital data in the UNS Library is, among others, the limited human resources handling the database security. The Library's





human resources knowledge is still inadequate in terms of the security of digital data. Non-integrated databases can be obstacles because each of the databases needs different management. Socialization/training related to digital data security has not been provided. The computer supporting the backup of the entire digital data of the Library is still limited.

## DISCUSSION

The backup of digital data in the UNS Library of Surakarta is essential to ensure that stored information and data remain safe from internal and external threats. The Library has four databases: *unsla*, including circulation transaction data, printed book collection data, and member data; *digilib* includes data of students' final project files and research results of the academic community; *the library website* includes announcements, various electronic information; *ezproxy.uns.ac.id* includes various databases and e-journal/e-book subscribed by UNS with access using SSO UNS. The backup of digital data in the UNS library up to July includes 208.907 titles and 352.442 specimens at *Library.uns.ac.id/* and *unsla.uns.ac.id/*; 112.602 titles and 7.452 e-book titles at *digilib.uns.ac.id/* up to July 2024; the three databases are managed by the Library's ICT division in collaboration with UNS ICT Team. The Library's *seam* stores the library's digital data. Meanwhile, the data backup of *EZproxy.uns.ac.id* includes 2133 electronic collection journals belonging to ScienceDirect, 318 journals to Emerald, 2144 to Proquest, 3000 students' accounts subscribed to Turnitin, Grammarly, End Note, Kubuku stored in e-journal server and database subscribed.

## D. CONCLUSION

The backup of digital data in UNS Library consists of *unsla*, including all circulation transaction data, printed book collection data, and member data; *Digilib* including students' final project file, research results of the academic community, etc.; *Library* including news, announcement, and various electronic information; and *EZproxy* including SSO to access e-journal and e-book, stored in UNS ICT Team UNS Library backs up those data (final project soft files, old magazines, and (compact disk or CD) to secure digital data from hacker and virus attacks and hardware damage.

The factors supporting the backup of digital data in the library are, among others, available databases and adequate internet. Meanwhile, the inhibiting factors include limited human resources handling data security and minimal computers to store digital data. Socialization/training concerning digital data security has not been provided, so the understanding and management of data security are still poor. Databases of libraries still stand separately from each other. This can be either an advantage or a disadvantage in database security because in the separated databases, if one of the databases is disturbed, the disturbance may not affect the other database. This can be a disadvantage because each database will need different management strategies.



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