
OPTIMIZING SCHOOL LIBRARY WITH CODELESS APP DEVELOPMENT: A GOOGLE CLOUD'S APPSHEET APPROACH

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Abstract

Technological developments have integrated school facilities into information systems, as evidenced by the enhanced efficiency of school libraries. However, the book lending system is often still managed manually. This non-coding information system simplifies borrowing procedures, seamlessly aligning library management and technology without requiring in-depth programming knowledge. Librarians can optimize information systems using Google Sheets and AppSheet, which are integrated with Optical Character Recognition (OCR) technology to retrieve data on library book borrowers. The integration of OCR technology with AppSheet is a pivotal aspect of information system development, enabling accelerated book identification, reduced error likelihood, and enhanced recording accuracy. The analysis of school library needs takes center stage in system implementation, with the information system design following the software development life cycle (SDLC) approach. The AppSheet application's appearance is consistent across devices, yielding no significant differences between mobile and desktop displays. The OCR feature utilization on AppSheet yields a 90% accuracy rate in identifying book titles and authors.

Keywords: Library Information System, Appsheet, Google Sheet, Optical Character Recognition (OCR)

Introduction

The development of technology leads to the integration of various school facilities into the school information system. One significant example is the improved efficiency of the school library through the implementation of an information system. Information technology has been utilized to manage daily tasks, including administrative and financial responsibilities, as well as overseeing database management, data processing, and so forth (Suryanata, 2013).

The Book Borrowing Information System has played a crucial role in streamlining the procedures of borrowing and returning books in the school library. The simplicity in creating the information system also becomes a significant consideration for educational institutions. By harnessing technology through coding-free application, the alignment between library management and information technology can be further seamless (Rokan, 2017).

The ability to create custom applications without the need for in-depth programming knowledge gives librarians a powerful tool for optimizing library operations. Google is offering Google Sheets and Google AppSheet application features for this purpose. These two applications can be combined to create application programs by inputting data that can be directly stored in cloud-based storage. Moreover, the integration of AppSheet with Optical Character Recognition (OCR) technology (Kurniawan, 2008) will significantly enhance the process of identifying book titles and accelerating access to information for library users.

Literature Review

Building an information system requires a process of designing the system that will be created, followed by the implementation process to develop the application program. One application program that can be utilized during the implementation phase is Google Sheets and Appsheets. The role of Google Sheets is to serve as a database, and AppSheets acts as a platform that connects data to users, which is then combined to assess its reliability (M. Fariz, 2020) Users of the program must employ creativity to ensure that the resulting product aligns with the intended design. Google Sheets is a cloud-based application program, necessitating an internet connection for its users. Google Sheets is available for free, and the resulting products maintain their quality.

From the official google.com, AppSheets is a no-code platform that offers configurable templates, which can be tailored or customized according to users' needs. The resulting application programs can be run on mobile app devices, tablets, and the web, using data sources such as Google Drive, Spreadsheets, and databases. AppSheets has been launched since 2014 and continues to experience rapid growth. AppSheets provides advantages such as:

1. AppSheets assists users in effortlessly creating customized mobile apps.
2. AppSheets can be consistently accessed using browsers like Google Chrome, Mozilla Firefox, and others.
3. Offering mobile app templates based on categories, AppSheets eliminates the need for users to write specific code for developing their own mobile applications. AppSheets has provided various examples categorized as Inspections & Surveys, Field Service, Property Management, Inventory Management, Sales & CRM, among others.

The Optical Character Recognition (OCR) feature is a process that extracts text from images (JPG, PNG, PDF, etc.). Some of the best OCR apps for Android devices include Google Lens, Text Scanner, Adobe Scan, Microsoft Lens, CamScanner, OCR Text Scanner, FineScanner, SimpleOCR, Smart Lens, and Text Fairy.

The fundamental algorithms for OCR use pattern recognition, which involves processing raw data and acting on data classification, and feature detection, which is employed to identify more specific characters. Integrating OCR technology with AppSheet is a crucial aspect of developing a book lending information system. The utilization of OCR technology expedites book identification, minimizes the possibility of errors, and enhances recording accuracy.



Figure 1 Optical Character Recognition (OCR) Process

Optimizing digital-based school library services (Wahyu Supriyanto, 2008), with the appsheets application is not just a management tool, but also has the potential to increase the efficiency of library management.

Research Method

The research method employed in this study is a developmental approach and field experiments involving an analysis of the requirements of the school library, which will be the focal point of system implementation. Researchers establish communication with the library to identify system necessities, the flow of book borrowing, and other vital aspects. Meanwhile, the method utilized to create a book lending information system employs the software development life cycle (SDLC) approach. The SDLC consists of five stages: planning, analysis, design, implementation, and utilization (Raymond McLeod, 2010). An evaluation process is conducted at each stage; if the design criteria are met, the progression proceeds to the subsequent stage. Once all stages are successfully completed, a trial phase for system usage is initiated. In case there is a disparity between the attained outcomes and the predefined standards, the SDLC cycle is reiterated starting from the initial stage.

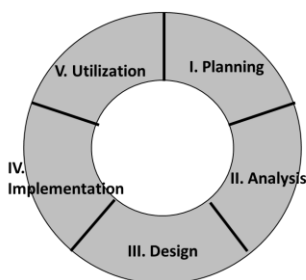


Figure 2. Software Design with SDLC Approach

During the design stage, an analysis of the library needs for a junior school in Bandung was conducted to gather initial information, which revealed that book borrowing and inventory recording were still being managed using Excel. The system's design will encompass various aspects, including interface design, lending flow configuration, integration of OCR features, and database settings for storing book borrowing information. The processing of the collected data guides the subsequent implementation stage. The information system for borrowing library books encompasses the following components:

- a. Google Sheets serves as a database for storing data within cells.
- b. Appsheets will provide a user interface for the library's book borrowing information system.
- c. Optical Character Recognition (OCR) feature will insert as a formula on Appsheet System.

The activity diagram of the intended process is as follows:

1. Activity Diagram for Input Data: the data input process will engage both users and administrators, who will interact with each other throughout the borrow approval procedure.

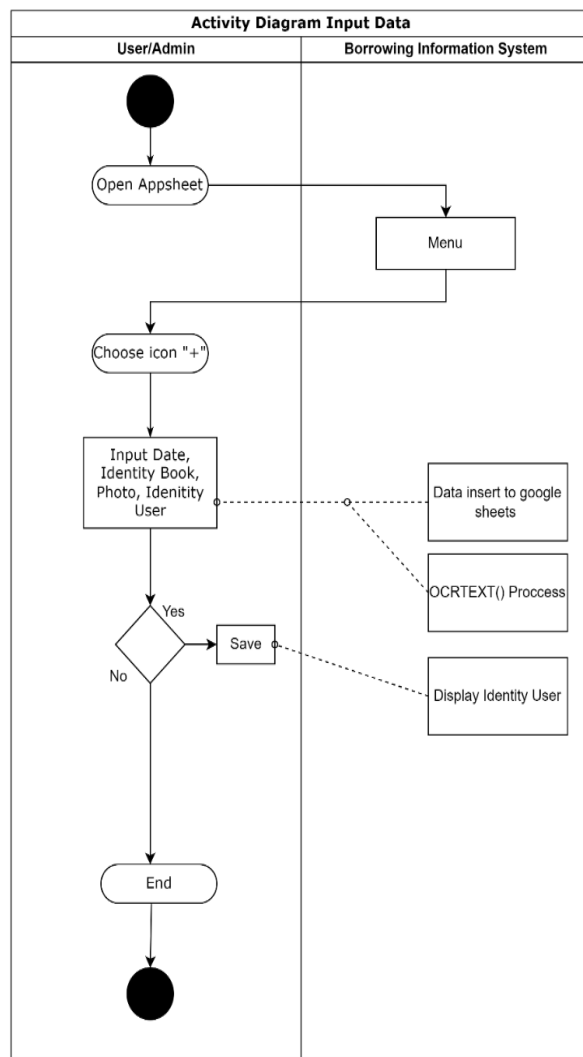


Figure 3. Activity Diagram Process Input Data

2. Activity diagram view status user: in this activity, users/administrators can observe the status of the application data that has been inputted. Show in Figure 4. User is student, teacher or a borrower of library books. Administrator (Admin) is a staff of library.

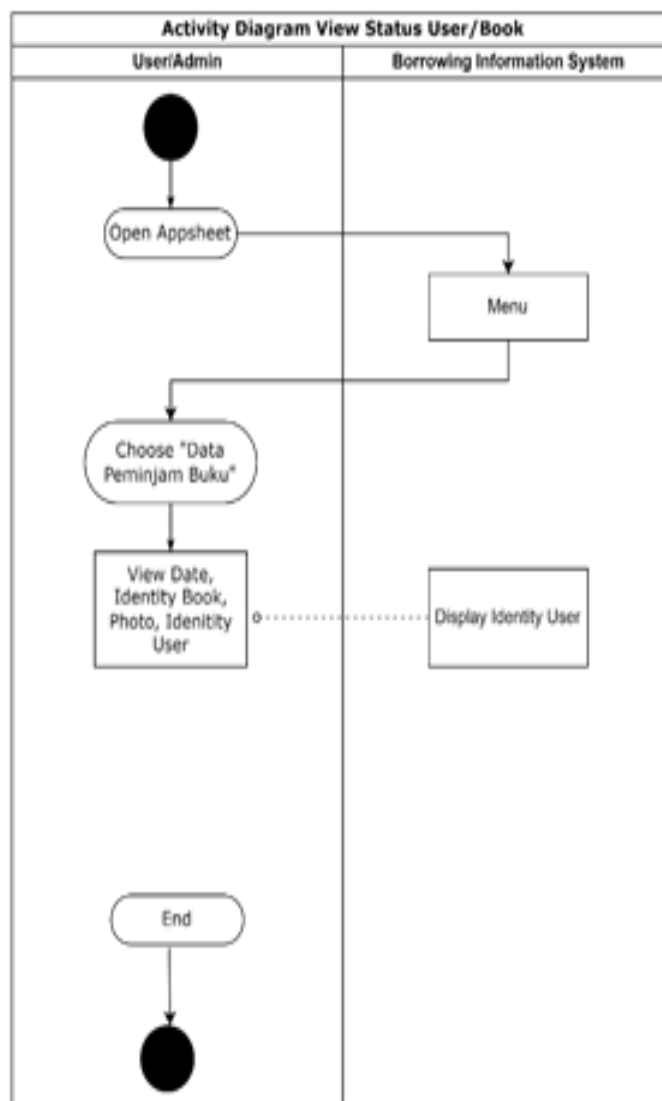


Figure 4. Activity Diagram View Status Detail User

3. Activity Diagram Database: The input data is stored in a Google Sheets database. Show in Figure 5. Columns found on Google are columns generated in the Appsheet application. The filled row are the data that is input by the user/admin when filling out the information system form for borrowing books.

During the testing and evaluation stage, the successful implementation of the library book borrowing information system using AppSheets was assessed. Process efficiency and book identification accuracy served as benchmarks for evaluating this implementation's success. This phase involved identifying deficiencies, advantages, and errors within the application. Performance testing was conducted to evaluate the system's competence when used by users.

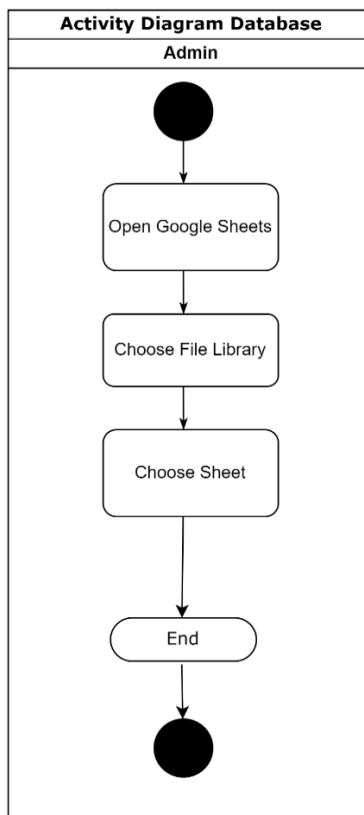


Figure 5 Activity Diagram Database with Google Sheets

Result and Discussion

The display of the library book lending information system using AppSheet yields the following outcomes:

a. Data Input Display

There is no substantial contrast in the data input display on both mobile and desktop devices.

The figure shows three screenshots of the "Daftar Peminjam Form" (Book Borrower Registration Form) interface. The first screenshot shows the form on a mobile device with fields for "Tanggal Peminjaman Buku*", "Tanggal Pengembalian Buku", "Kategori Buku*" (with options: Agama, Matematika, Seni, Pengetahuan Umum), "Kode Buku*", and "Jumlah*". The second screenshot shows the form on a desktop device with fields for "Foto*", "Peminjam*", "Hp*", "Status*" (with options: Dipinjamkan, Sudah Dikembalikan, Hilang), and "Keterangan*". The third screenshot shows the form on a desktop device with fields for "Paraf Peminjam*" and "Paraf Admin Perpustakaan*", both with "Tap to unlock" prompts. Each screenshot has a "Cancel" and "Save" button at the bottom.

Figure 6. Data Input Display

b. Borrowing Status Display

On mobile devices, the display arrangement is categorized based on book status. when filling out the form the user must choose one of the 3 statuses for the book, namely Borrowed, returned or lost. In the description section, you can also fill in the condition of the book (bad or good) or a statement that you have paid a fine if you lose the book.

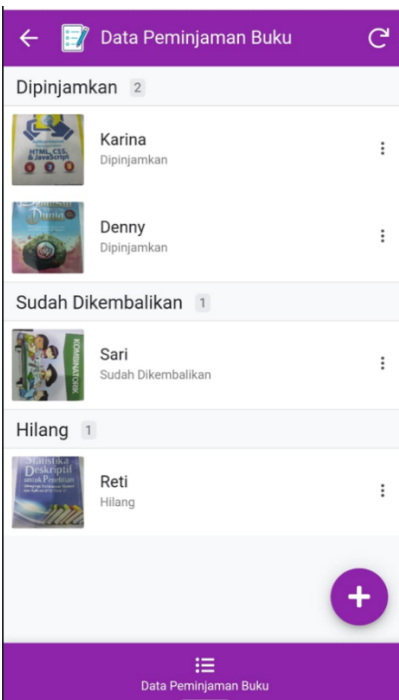


Figure 7 Borrowing Status Display-mobile device

On Desktop, the display arrangement will appear integrated. On the left side are book category types (Religion, Mathematics, General Knowledge), followed by the middle section which categorizes book lending based on their status, and on the right side are book and borrower details.

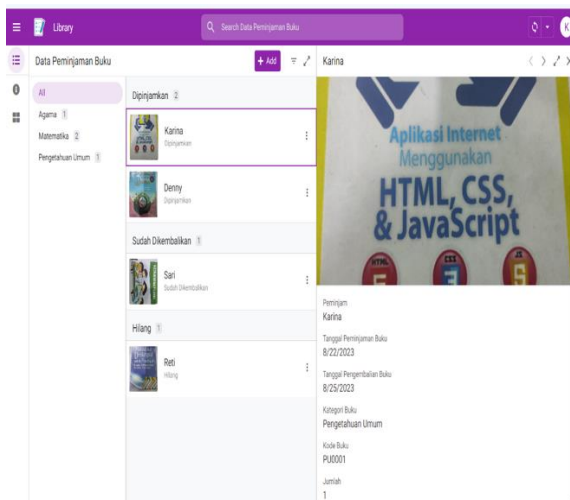


Figure 8. Borrowing Status Display-desktop

c. Library book borrower data detail display.

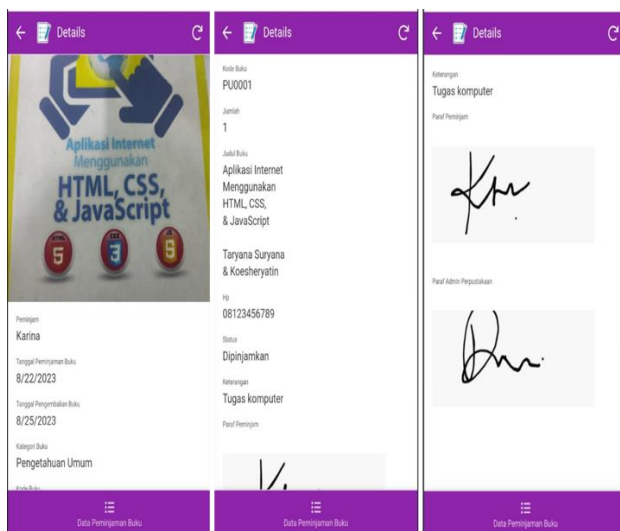


Figure 9. Library book borrower data detail display.

d. Google Sheets Display Database

Tanggal Peminjaman Buku	Tanggal Pengembalian Buku	Kategori Buku	Kode Buku	Jumlah	Foto	Judul Buku	Peminjam	Hp	Status	Keterangan	Paraf Peminjam	Paraf Admin/Pejabat
8/22/2023	8/25/2023	Pengetahuan Umum	PU0001	1	gms8 Foto 153 438.jpg	Apikasi Internet Menggunakan HTML, CSS, & JavaScript	Karna	08123456789	Dipinjamkan	Tugas komputer	Datar Peminjam_Imag es5 Paraf Peminjam 1534 Admin Perpusakaan 153439.png	
8/22/2023	8/31/2023	Agama	AG0001	1	gms8 Foto 153 842.jpg	RAHASYA Semesta SESEKELUM Dunia Menyangkap Miden Agama Islam yang Belum Pernah Ditanyakan TOPIC Dulu	Denry	08123456789	Dipinjamkan	Baca	Datar Peminjam_Imag es2 Paraf Peminjam 1538 Admin Perpusakaan 153442.png	
8/22/2023	8/28/2023	Matematika	MA0008	1	gms8 Foto 154 122.jpg	SELE OMPALICE DARING MATEMATIKA KOSM KUBERNATORIK Tin Teol 'Yuhanes Suryk Ph.D.	Sai	08123456789	Sudah Dikembalikan	Kundubuku baik saat dikembalikan	Datar Peminjam_Imag es4 Paraf Peminjam 1540 Admin Perpusakaan 154022.png	
8/22/2023	8/30/2023	Matematika	MA0003	1	gms8 Foto 154 146.jpg	Statistika Deskriptif untuk Pendidikan Diungkap Perhitungan Manual dan Aplikasi SPSS Versi 17	Rah	08123456789	Hilang	Sudah Inquir denta ke admin 43.png	Datar Peminjam_Imag es5 Paraf Peminjam 1541 Admin Perpusakaan 154149.png	

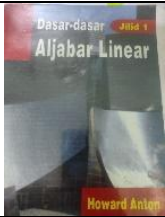


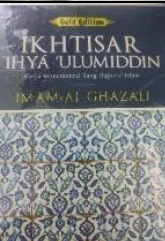
Figure 10. Google Sheets Display Database

The integration of the OCRTEXT feature within AppSheet significantly aids in identifying book information from images stored in textual format, enhancing the speed of information retrieval.

Analysis results demonstrate that the OCRTEXT feature boasts a 90% accuracy rate across the ten tested books when reading book cover images that have been captured. Activation of the OCRTEXT feature occurs during the AppSheet application design phase, with the OCRTEXT formula being incorporated in the title section following the book's photo.

Table 1 Result OCR feature from Appsheet

Original Title	OCR read Title Book	Error
	<p>Aplikasi Internet Menggunakan HTML, CSS,& JavaScript Taryana Suryana & Koesheryatin</p>	<p>no error</p>
	<p>RAHASIA Semesta SEBELUM Dunia Menyingkap Misteri Agama Islam yang Belum Pernah Diungkapkan TOROS Ditulis 1100 tahun yang lalu HAKIM TIRMIDZI Sang Bijak Bestari (820-932M)</p>	<p>no error</p>
	<p>SERI OLIMPIADE SAINS MATEMATIKA SD/MI KOMBINATORIK Tim Prof. Yohanes Surya, Ph.D.</p>	<p>no error</p>
	<p>Statistika Deskriptif untuk Penelitian Dilengkapi Perhitungan Manual dan Aplikasi SPSS Versi 17 MIZ Ir. Syofian Siregar, M.M.</p>	<p>No error</p>
	<p>Danang Mursita -0 Aljabar Linear aljabar</p>	<p>No error</p>
	<p>Untuk Pelajar. Mahasiswa. dan Umum Pintar Bahasa Inggris dengan Mind Map</p>	<p>No error</p>

	Dasar-dasar Jilid 1 Aljabar Linear Howard Anton	No error
	THE FUTURE Pemrograman Web Dinamis SIMILE ANSTHOME M. Rudyanto Arief BONUS CD menggunakan PHP dan MySQL	2 miss
	Pemrograman Database dengan Python dan MySQL Langkah-langkah praktis membuat aplikasi database menggunakan Python dan MySQL Jubilee Enterprise	No error
	Gold Edition IKHTISAR THYA 'ULUMIDDIN Karya Monumental Sang Hujjatul Islam IMAM AL-GHAZALI	No error

Conclusion

The approach of creating applications without coding using AppSheet and OCR features holds great potential to enhance the efficiency of managing the book lending information system for library administrators. The library can uniquely tailor its needs without the hassle of application development. The integration of OCR technology accelerates the book identification process by 90%. The successful implementation of this technology can yield a positive impact on school library management and student literacy development.

When implementing a Book Lending Information System with AppSheet and OCR features, it is crucial to start by conducting a specific needs analysis to assist in designing an appropriate and efficient application interface. Secondly, provide training for library administrators regarding the usage of the AppSheet application. Lastly, regular data collection and analysis are key factors for assessing the effectiveness of the implemented system.

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