

KISS: A WEB APPLICATION FOR KEY RECORD TRACKING USING SERVER-SIDE SCRIPTING LANGUAGE AND ROBUST DATA STORAGE

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ABSTRACT

KKS2 is an educational institution equipped with rooms, labs and workshops ranging from Diploma in Photovoltage Solar Technology, Information Technology, Architecture, and Electrical Installation courses. These courses are using different rooms to adequate the lessons. Therefore, an efficient system to record and track keys to these rooms is crucial to maintain comfortable working environments. Keys are kept organized and easy to access whereas the locations can be monitored online. Whilst an approach to solve a problem often addressed using methods, procedures, frameworks, technical apparatus and many others, the researcher is introducing KISS. KISS can record and tracked keys virtually as it is using dynamic server-side scripting language. KISS introduces better ways to manage problems that arises prior to it because of keys displacement because the basic process of borrow and return keys can be checked online by users. Thus, users can retrieve and search any information about and on the key's whereabouts 24/7 on their fingertips. In addition, expanding user interaction within other institutions also possible through collaboration because KISS promised robust database storage. Also, HCS DLC model is used to develop the system as it is more flexible to maintain as each phase is organized with suitable activities towards fast and efficient system development.

Keywords: Records, Tracking, Server-side Scripting.

INTRODUCTION

Kolej Komuniti Segamat 2 (KKS2) is an educational institution located in Segamat, Johor, Malaysia. KKS2 offers Diploma in Photovoltage Solar Technology and certificates in Information Technology, Architecture and Electrical Installation. KKS2 focuses on hands on learning methods as well as classroom learning. There are many labs, workshops and rooms available to adequate these lessons. These infrastructures are well-guarded and locked when its vacant. Academic staffs are a regular user who get access to these keys for daily classes routine. Therefore, its challenging to maintain discreet about the key's whereabouts. The solution is by using manual record keeping and it has been relevant for years until users demand a more reliable, efficient, user friendly and paperless solution.

The biggest challenge of keeping the records manually are: (1) user is unable to consistently record every borrow and return process, (2) it is difficult to monitor the keys whereabouts whenever the borrower did not return the keys for others to use it, (3) scan through the records to return the keys is troublesome because the records are long, (4) waiting for turns to write on the record form is time consuming, and (5) wasting papers. Therefore, the researcher proposed an online system to facilitate and solve the problems, Sistem Maklumat Kunci (KISS). KISS is a web application developed using cutting edge server-side scripting language and robust database. Next, the researcher will discuss more on KISS technical part.

LITERATURE REVIEW

Server-side scripting are programming languages that facilitates in creating web pages which helps to create response to a process request (Modupeola, 2018). There are many programming languages used to develop these World Wide Web (WWW) pages such as PHP: Hypertext Preprocessor (PHP). Whilst PHP is embedded to GUI creator codes like HTML and CSS, a more dynamic and interactive user interface can be built to facilitate user interaction with web pages. This powerful tool worked effortlessly with Structured Query Language (SQL) as database program codes. Whereas, its robustness efficiently stores, search, sort and retrieve data faster than conventional data storage. This combination is widely used to build systems as it is open sourced software and easy to maintain.

Recently, (Tixier et al., 2016) suggested Graph-of-Words-based text visualization to build a web application that generate any inputted data into an extractive summary. This helps user to gain text summarization easily by only using key phrases and sentences. While (Rousseau et al., 2015) suggested extracting dense and cohesive subgraphs which could outperformed PageRank for unsupervised keyword extraction. KISS on the other hand, suggested to use key phrases to search queries whereas data inputted will be displayed in ascending order. The data retrieved from database is organized in column and arrays. Each data field is storing records ready to be manipulated using SQL codes.

Modupeola et al. (2018) introduces a mobile apps to empower consumers to effectively interact and engage in shared exercise decision making. Its results in effective uninterrupted virtual communication interaction between fitness instructor and their clients via text message, and video clips between users. Rose et al. (2015) on the other hand, introduces a javascript written language to develop fast, hardware accelerated molecular graphics such as molecular structures and project its GUI to the web. Whilst, Contrino et al. (2017) proposed a web application for interactive statistical analysis of chemoproteomics experiment to provide ranks for protein's most competed compounds and to generate standardizes results for downstream analysis. Similarly, KISS effectively provide a virtual platform for key records that allows user to borrow and return keys online, hassle free key monitoring, easy access to keys and user's directory, and supporting paperless green technology.

IMPLEMENTATION

SQL code and Database Storage

Structured Query Language (SQL) is the most commonly used language to access database. SQL can create new tables and fields, retrieve data, and changes data using command codes. These command codes can be embedded within programming language or it can be easily access through Graphical User Interface (GUI). It is used by the MySQL database feature inside a system's control panel (Modupeola et al., 2018). It allows single writer or multiple reader. The MySQL Control Panel works as a GUI displayed over the web browser to ease system administrator in controlling web-based database applications. Usually, SQL command are embedded in the written code as it is complementing the interaction between the scripting language and the database.

As it uses MyISAM storage engine (Modupeola et al., 2018), MySQL is able to expand its table types whenever the value inputted in the column by user is invalid or too large for its data type, MySQL did not give error message instead, the column will set to the value considered the best by the machine. The problem is, the value might not be as accurate because it has been altered automatically. Therefore, checking values before stored into the database is the best way to optimize MySQL.

PHP: Hypertext Preprocessor

PHP is widely used to create dynamic web pages. It may be embedded in HTML, CSS codes, Javascript and that has made it become a powerful tool in developing websites. PHP also known as server-side scripting language. When PHP and MySQL work together it builds a complex system that can manage robust data, stored, retrieve, sort, search and update records in the database.

PHP programming language creates a response to a process request (Modupeola et al., 2018). These requests are made by user using GUI. The command to complete these tasks tells the machine what it should do. This interaction is understandable as a communication between human and machine. These process loops until the requests stops.

METHODOLOGY

Systems Development Lifecycle (SDLC) has been used widely for its flexibility by defining improvement of the system's quality towards the overall development process. In this paper, the researcher will introduce Human Computer Interaction (HCI), which has been in the wide audience because of rapidly expanding number of devices connected to the Internet of Things (IoT) as it revolves around the concept of usability, human activity, and human experience with technology (Porter et al., 2016).

Over the years, user had experienced lack of technical support, incompatible tools and misunderstandings to use online systems. It is caused by lack of human interaction since the start of requirement and analysis phase. The challenges may derive from neglect of the dynamics of human interaction with technologies (Zhang et al., 2004). Therefore, the researcher is using Human-Centered Systems Development Life Cycle (HCSDLC) model (Zhang et al., 2004), a combination of HCI with SDLC model where each phase is added with human interaction to solve user frustration over problems and difficulties arises beyond machine reach that needed human intervention.

Figure 1 indicates HCSDLC as a method use to incorporated human touch throughout the development processes to meet the institutional requirements as well as to satisfy human needs in KISS. It provides certain timeline for human to do tests and evaluations in between phases to avoid problems, mistakes or error as the system reaches last phase of development. The researcher is not implementing this model as ideal but focuses on how human interaction can greatly influences the underlying process and enhanced the end results.

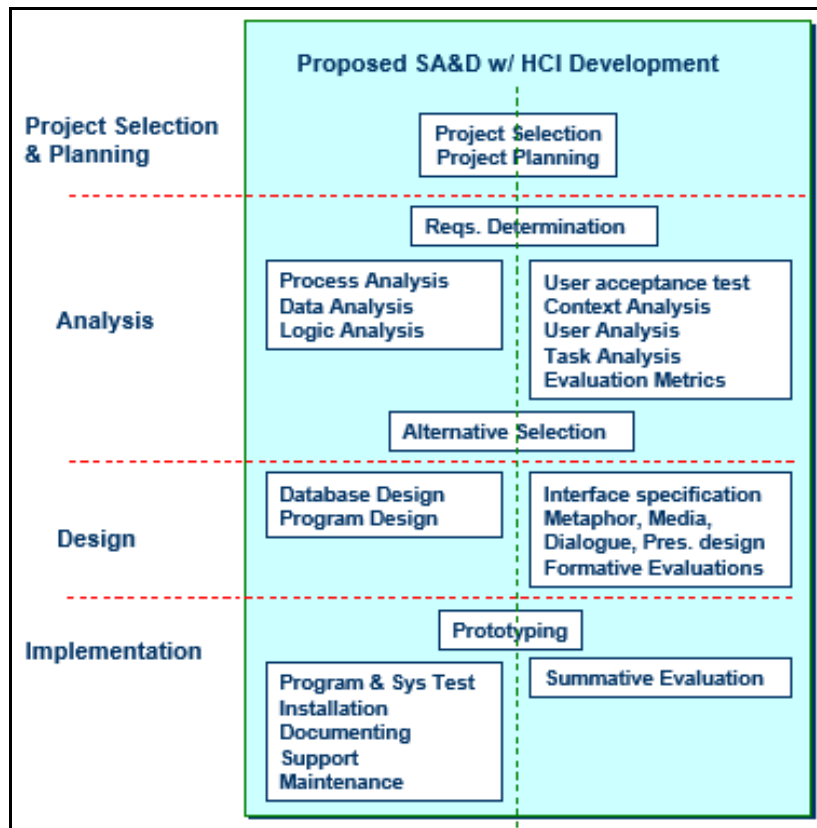


Figure 1 HCS DLC proposed by Zhang et al. (2004)

Project Selection and Planning

The idea of developing KISS has been defined prior by the problems faced by the user who also believes traditional records needs an uplift to comprehend with the organization’s interest in IoT. A brief discussion on institutional requirements for KISS has been held to determine the objectives and requirements for the newly develop system. Thus, drafted queries, data and all needs of internal, external factors and number of sources the organisation have was analysed to avoid any missing interest and criteria. Then, proper system development milestone is defined based on phases in HCS DLC.

Analysis Phase

In this phase, all system requirements are determined and congregated. Apart from that, all manual records and data are gathered. This task is essential before data normalization process can be done. In addition, instructions and processes involves in the system are predefined and summarize in a preliminary report.

Hence, to minimize system error and user dissatisfaction, a user acceptance test is conducted with selected target user to gather user’s feedback in order to improve system’s functionality and usefulness. Driven from the tests, users preferred (1) log in function as safety precautions from outside intruder, (2) search function to ease data searching, and (3) digital records of borrowing and returning of keys within 3-clicks rule (Porter et al., 2016). This rule is a belief amongst website developer that user should be able to grasps information they need within three mouse clicks even though

critics suggests that the click success and information sent is far important than number of clicks.

Design Phase

In this phase, randomize raw data is normalized. This process is based on Entity Relationship Diagram (ERD) drafted in analysis phase. Relations between each data components, entity or process are determines which it relates to in the database table. This process will eliminate vast amount of possibility of missing data and data redundancy which will regulate data integrity. Each data is analysed in a way that it can be used parallel with each module in KISS independently. Records then inserted and organized into mock fields and tables.

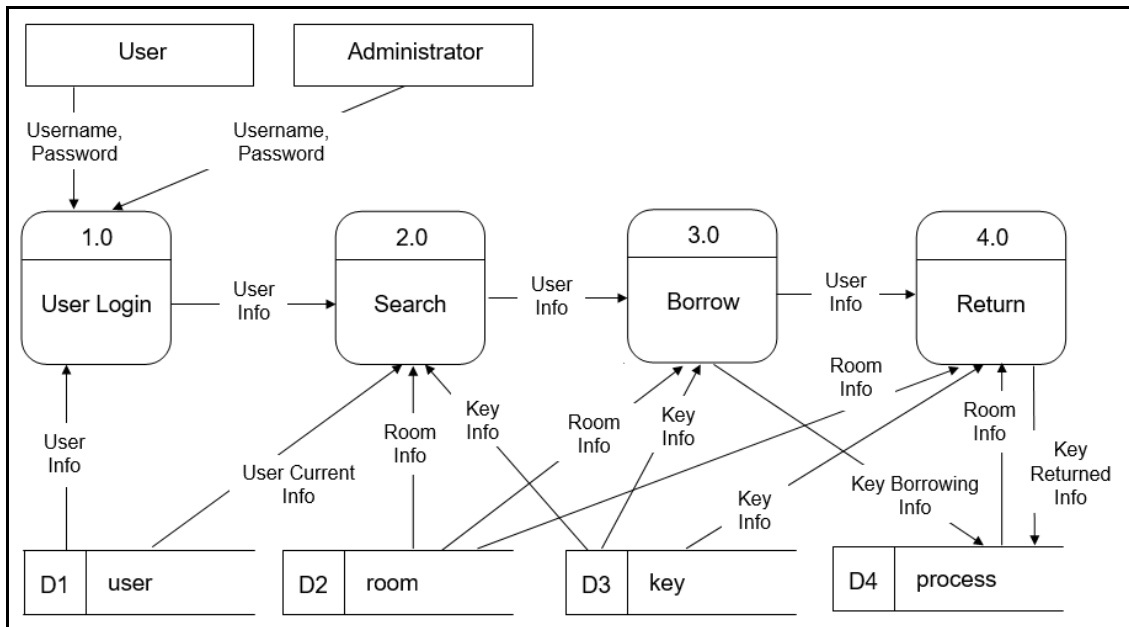


Figure 2 DFD structure for KISS

Then, system layouts and storyboards are drafted based on Data Flow Diagram (DFD) in Figure 2 for better understanding on system flow. Also, in this phase, the user interface is specified, sketched, and materialized (Zhang et al., 2004). Afterwards, in order to determine user’s understanding of the system flow and to gain their insights, a brief storyboard presentation to target users has been held. In Result, users had proposed (1) a simple layout with plain background, (2) a more user-friendly user interface and human-computer interaction, and (3) add a basic user update function so that user can change their username and password. In addition, cyber security is the main concern which the researcher believe that better protection can optimize user’s confidence on KISS’s data security.

Implementation Phase

Database management process initiated this phase where normalized data and records in design phase were inserted into database tables and sorted into fields. SQL language was written to communicate web pages with these data. Data and records are stored in the database for future retrieval.

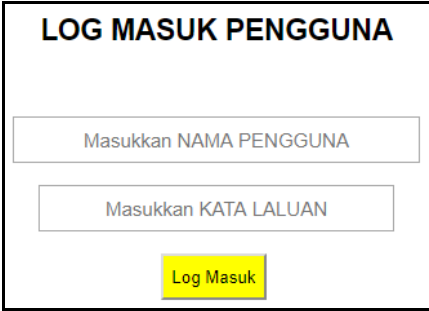
Then, PHP programming codes was written to dynamically build the system from scratch with all the requirements gathered being written into command codes meticulously to avoid any missing requirements and criteria. Technically, KISS allows user to record all borrow and return transactions seamlessly. Also, user can update their basic information dan data searching. Each process includes basic operations like SELECT, INSERT, UPDATE, DELETE, ARRAY, FETCH, %LIKE% and others. Next section will discuss these operations in detail.

SISTEM MAKLUMAT KUNCI (KISS)

KISS was developed using HCSDLC's structured development phases and can be broken down into four modules (Figure 2) which are User Login, Data Search, Borrow Keys, and Return Keys. This module will be discussed in detail in the next section.

Login module

The first module clarifies user authentication. Each data inputted as username and password will be checked for authorization. The command line will ask database to search for username and password as exact phrase inputted prior by the user. This process eliminates redundant and false data to make sure username and password inputted existed in the same column in the database. If the data confirms as valid, the system will clear the path and user will gain access to the system whether as regular user or an administrator. This process happened in less than 1 millisecond to adhere to fast-paced digital clarification. Figure 3 shown login interface shared by both regular user and system administrator.



The image shows a login interface titled "LOG MASUK PENGGUNA". It contains two text input fields: the first is labeled "Masukkan NAMA PENGGUNA" and the second is labeled "Masukkan KATA LALUAN". Below these fields is a yellow button with the text "Log Masuk".

Figure 3 Login module Interface

Search Module

In the Search module, users may search for key and room's directory. User will input data in searching text field. The system will serve the data as keywords and search using %LIKE% code for all relevant data that share the same keyword in the database fields. Once the process ends, similar records with keywords specified on rooms, keys and staff directory will be displayed in ascending order. Figure 4 shown an example of search results as the user inputted keyword.

| HASIL CARIAN | |
|---------------------------|----------------------------|
| Kunci Carian: saki | |
| SENARAI KUNCI | |
| KOD KUNCI | NAMA BILIK/MAKMAL/BENGGEL |
| C15 | TANDAS BILIK SAKIT (CG-05) |

Figure 4 Search Module Interface

Borrow Module

This module allows the user to record transactions for each key that they took. This action can only be done by verified user. Keys that has not been taken are recorded as “blue”. Once the Borrow process began, the key’s record status will turn “red”. User can easily check whether the key have been returned or not via online. The process initiated when the user asked for specific key room code; e.g. E2-08. The system will send the command using SQL code to fetch data as seen in Figure 5. Then, user will confirm the process by clicking “Peminjaman” button. SQL will send this command to database and updated the current key status from “available” to “occupy”. Thus, the status is “red”. No user can borrow key E2-08 until the same user return it online. This action saves time, energy and paperless.

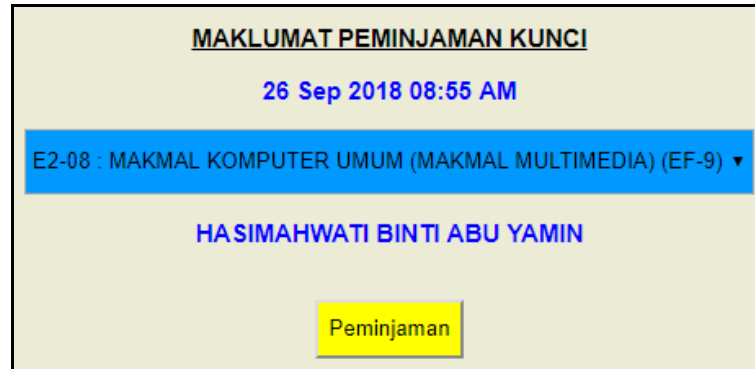


Figure 5 Borrow Module Interface

Return Module

As the key records status is in “red”, user needed to return the key. The process began after the user clicking on the key room code that have been borrowed prior. Then, the system will send SQL command to database to search, fetch and display the records as seen in Figure 6. Once the user clicked on “Pemulangan” button, the system will send SQL command to update the current key status from “occupy” to “available”. Thus, the status changed to “blue”, indicates the key is returned. This action will make sure lessons are done smoothly and ahead of its time.

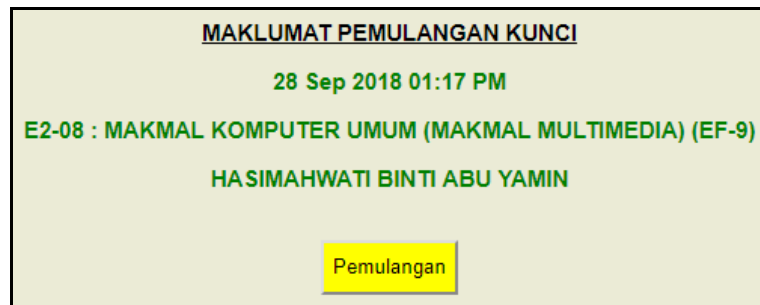


Figure 6 Return Module Interface

CONCLUSION

KISS had made key records monitoring easy. Users may borrow n return keys to its key-box effortlessly. KISS had solved all problems faced using manual key record form and it is better in terms of accessibility, reliability, technical support, easy to navigate and its flexible to continuous changes and improvement. In addition, expanding user interaction within other institutions also possible through collaboration because KISS promised expandable system functions and robust database storage.

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