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# Software as a Service: Design and Build Lower Usage Cost Email Marketing for Hospitality Industry

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## Abstract

The hospitality industry is an industry that is very customer-focused because it relies on customer information. Therefore, Customer Relationship Management (CRM) is implemented worldwide in this sector. Many features of CRM applications that are often not suitable for use by small and medium companies also make features in CRM applications tend to be wasteful. This paper aims to develop a software as a service CRM with lower usage costs without imposing development costs on users and focuses on email marketing features and data exchange integration. The system development uses the SDLC (System Development Life Cycle) method. Testing in this paper was conducted with User Acceptance Testing (UAT) where managers or hotel owners and students in the field of information technology use the application system then provide an assessment through a questionnaire. The total score obtained from 30 respondents is 1233 and be on point between the Quartile III (1200) and the Maximum score point (1500) base on LSR interpretation scaling and showed the system is considered positive and successful. The conclusion of this study is the application system can be used by hoteliers in the hospitality industry at various levels of the company to carry out functions that support customer relationship management and email marketing.

**Keywords:** Hospitality, Customer Relationship Management, Software as a Service, Email Marketing.

## 1. INTRODUCTION

Indonesia is one of the most popular travel destinations in the world. Indonesia has a huge potential in the tourism sector, and is one of the important economic sectors in Indonesia. Cumulatively in January to June 2019 the number of foreign tourists visiting Indonesia reached 7.83 million visits, up 4.01 percent compared with the number of foreign tourists visiting in 2018 [1]. Most tourists will come back to Indonesia after their first visit. That happens because Indonesia has a unique culture and exotic potential to attract tourists coming to Indonesia [2].

According to the situation where tourists will come back to Indonesia after their first visit, opens a huge opportunity for businesses in the hospitality sector such as hotels, villas, guest houses, and various types of lodging. The question is how hoteliers can establish good relations with their guests and can bring their guests back to stay overnight when visiting Indonesia after their first visit.

Indonesia, as an emerging tourism destination in Asia, have well known for its natural and cultural richness [3]. One of the biggest motivations for the arrival of foreign tourists to Indonesia is because they are interested in culture such as festivals, music and Indonesian dances. Foreign tourists like new things that have never been seen in their home countries, such as traditional sports like bull-races, a variety traditional games, traditional processions, and carnivals with the unique appearance of the region, combining music and dance areas [4]. Based on Hendijani research in 2018 bring up a solution that can be done by the hoteliers to build good relations with their guests so that they can bring their guests back by means of the hoteliers can always notify these guests if there will be interesting events such as, religious ceremonies, traditional festivals, or any cultural performances to be held in the area around the hotel is located that can attract guests to comeback and to stay overnight in the hotel. Information regarding the event must be sent some time before the event is held to attract the interest of guests who previously had stayed at the hotel.

Computer-based software or software as a services that can help companies build good relationships with their customers are now widely available in the market. According to research from Gartner, Inc. CRM software grew by 15.6% to reach \$ 48.2 billion in 2018. This makes CRM remains the biggest category of software applications with the fastest growth. Hotelier should optimize their investment in CRM software by carefully analyzing the different solutions available in the market and choosing only those that are truly tailored to the company's strategic objectives and resources [5].

Barbara Neuhofer, Dimitrios Buhalis and Adele Ladkin in [6] identify the needs of smart technology for the creation of experiences in the hospitality industry, including information gathering, flexible access, and synchronization in real time. The research also highlights how the integration of smart technology can lead to two levels of personalized tourism experience. This study provides an overview of how the use of smart technology can be used as a business solution in the hospitality industry.

Amit Kr Mandal and Anirban Sarkar in [7] proposed a hierarchical graph-based specification called business component graphs for SaaS. This proposed integration approach facilitates high scalability and reuse of the elements that compose business components and ensures consistency between business processes and rules. In addition, this paper also covers the service orientation of the concepts proposed in the SaaS framework.

To develop cloud service based applications that have strong security systems, Putra and Hidayat in [8] designed and developed a marketplace generator using web-based technology with the CodeIgniter framework that provides RESTful web services. The use of CodeIgniter RESTful also makes system development more practical and structured. This research shows how to use the framework as a tool to develop an application system

Peer-to-peer (P2P) approaches for service-oriented Feature-Based Data Exchange (FBDE) have been proposed by Yiqi Wu, Fazhi He, Dejun Zhang, and Xiaoxia Li in [8]. The existing FBDE approach is almost based on a centralized architecture and uses a lot of neutral files that are difficult to be compatible with service-oriented computing (SOC) / service-oriented architecture (SOA) and cloud computing. The contribution of this paper is to explore new P2P approaches and P2P files to integrate FBDE-as-a-Service into cloud-based applications.

Liliana Enciso, Ruben Baez, Alvaro Maldonado, Elmer Zelaya-Policarpo, and Pablo Alejandro Quezada-Sarmiento in [9] developed an application with a feature that can send emails to various email addresses at once at a time by using the SMTP protocol. This study shows how the use of the SMTP protocol is used in implementing an email sending application.

V. Vetriselvi1, C. Sugadev, P. Manimurugesan, N.T. Vignesh and P. Prabha Rani in [10] developed the Email application on Named Data Networking (NDN) using the SMTP and IMAP protocols to transfer email via NDN. This research explains how communication and the process that occurs when sending email using SMTP and receiving email using IMAP, also how these protocols are implemented in the development of an application.

From the problems that have been explained and based on the knowledge and technology from the studies above, this paper proposes a Software as a service (SaaS) that can be used by hotelier. SaaS provides the ability to scale resources quickly based on market conditions continue to change [7]. The application is designed to send emails automatically using an email account that has been registered by the user. The email will be sent to guests who have previously stayed at the user's hotel. The email sent contains event information that will be held in the near future. Application system can also be integrated with the user's reservation system or property management system (PMS). Integration aims to enable guest data exchange as a source of data for customer relationship management. This application system is expected to establish a good relationship between the hotel and its guests, also can attract guests to come back and stay at the hotel.

## **2. METHODS**

The research methodology used in this paper is the Software Development Life Cycle (SDLC) method with a waterfall model. The waterfall model is a sequential design process that is often used in the software development process. In the waterfall model Each step must be completed before proceeding to the next step [11]. The design method used in software development using the Waterfall Model consists of several steps, from initial analysis to feedback and maintenance [12].



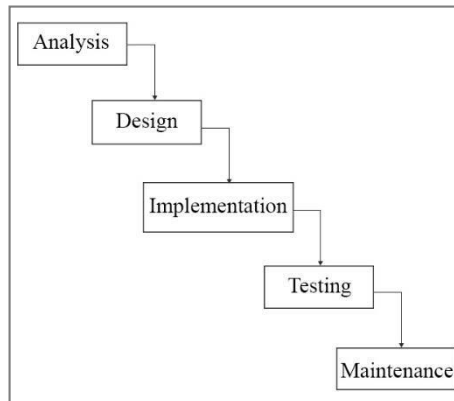


Figure 1. Waterfall life cycle model (Pressman & Maxim, 2015)

## 2.1. Analysis

The analysis phase is the first stage in the development of an application system where a function, behavior, and specification of user needs are defined. Data collection is done through observation and interviews with several hoteliers to obtain specifications of the developed application system. Requirements function obtained after identifying the user's needs including determining how to use the system, data to be entered into the system, and the output requirements of the system process [13].

### 2.1.1 Input Requirements

The following are the input requirements from the user to be able to use the application:

- 1) User data includes email address and password as user account information. Property name, property address, website address, and property logo as user property information.
- 2) Content data includes event data and user guest data
- 3) System configuration data includes setting the user's email account and user's mail server as the sender and recipient of emails to and from the user's guests.

### 2.1.2 Process Requirements

Analysis of process requirements in the developed application system consists of:

- 1) User account registration process
- 2) User email account configuration process
- 3) User guest data integration process
- 4) Create an event process
- 5) Emails sending process
- 6) Emails reception process

### 2.1.3 Output Requirements

Output requirements include emails about the event that has been created by the user sent automatically to the user's guests via the user's mail server.

## **2.2. Design**

The design phase focuses on the design of the developed application system. In this phase, the system is described using a chart showing the flow and process of the application system and also the database design.

## **2.3. Implementation**

The application system was developed using several tools and frameworks in its implementation, the tools and framework are:

- 1) CodeIgniter, as a framework used to develop web-based application systems with PHP programming language. CodeIgniter is a framework that enforces MVC (Model View Controller) file structures [14].
- 2) Bootstrap 4.0, as a library that is used to create the application interface. Bootstrap is an open-source framework that can be used for web front-end interface development [15].
- 3) CodeIgniter REST API, as a framework used to build web services as a media for receiving guest data sent by users.
- 4) SMTP, as the protocol used to send emails to guest users through the user's mail server.
- 5) IMAP, as a protocol used to retrieve email from guests residing on the user's mail server.
- 6) Cron Jobs, as an application that is used to executing checks on events scheduled and automatically send emails to predetermined guests. Cron is a scheduler program that allows executing commands or scripts automatically at a specified time based on date or interval.

## **2.4. Testing**

There are several factors that influence the acceptance of a software system. These factors mainly include satisfaction, quality, safety, hedonic motivation (enjoyment of the system), performance, usability (complexity), culture, and social identification [16]. To test the success of the application system has met all the specified business requirements thus that the user will receive a solution from the developed application system, the testing will apply User Acceptance Testing (UAT). User Acceptance Testing is User Acceptance Testing is a type of functional testing technique that involves validating software in actual conditions by directly involving the user in its testing. User actions can be simulated for this to test if the requirements have been met. The purpose of testing is not just to check requirements but to ensure that the software satisfies the customer's needs [17]. Data obtained through UAT will be measured using the Likert's Summated Rating (LSR) scaling method. LSR is very useful for comparing a person's attitude score with the scale distribution of another group of people [18]. The answer statement is stated in a choice that accommodates the answer between Strongly agree to Disagree.

## 2.5. Maintenance/Evaluation

The maintenance or evaluation phase is carried out after the application system goes through the testing phase. At this stage, improvements to the application system will be done based on analysis of results after the test results obtained.

## 3. RESULT AND DISCUSSION

### 3.1 System Overview

The proposed application system is a software as a service intended for hotelier to build relationships with guests by sending automatically emails containing event information to guests who have registered on the system. Each guest data from the user is obtained directly from the user's PMS that has been integrated with the system or can be entered manually on the application. General overview of system application is displayed in Figure 2.

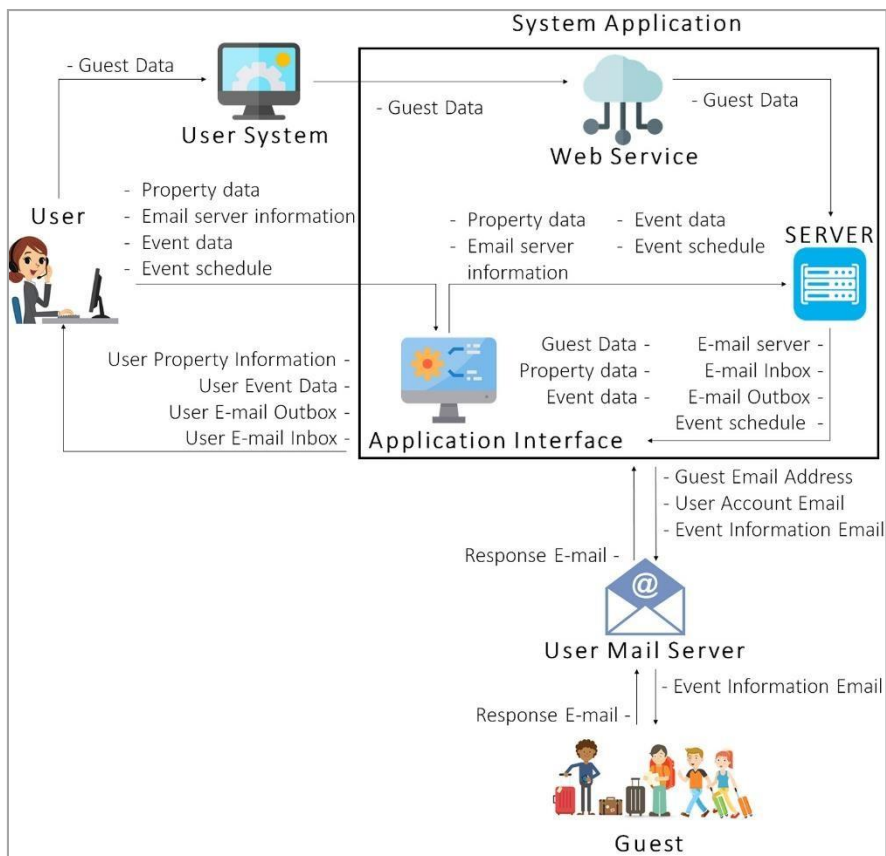


Figure 2. General overview of the system application

Users who have registered and logged into the application may registering more than one user account email data that is used to receive and send email, user property data, user calendar event data, and format of sending email events through the application interface. Application system can be integrated with the user's PMS via a web service. Web services support XML-based data exchange which can help the development of cloud service platforms to exchange data better [19]. Datasent from the user's PMS through the web service is guests data from the user. All user data received through the application interface or web service is stored on the server. The system will send email automatically according to the date the email event information must be sent. The system can also retrieve all emails from the user's guest on the user's registered mail server. Users can access all of their data stored on the server through the application interface.

### 3.2 Database Design

The database design of the system application is depicted in the form of a PDM (Physical Data Model) diagram. This PDM has 8 tables that are interconnected. The PDM consists of 8 interconnected tables except tbl\_log\_load\_inbox. The tables on the database are, tbl\_user, tbl\_inbox, tbl\_outbox, tbl\_event, tbl\_event\_photos, tbl\_guest, tbl\_email\_sender, tbl\_log\_load\_inbox. The function of each Table will be explained in Table 1.

Table 1. The function of the table on the system application

No	Table	Function
1	tbl_user	Storing users data
2	tbl_inbox	Storing email inbox data from user's guest
3	tbl_outbox	Storing email outbox data sent to the user's guest
4	tbl_event	Storing events data
5	tbl_event_photos	Storing photos of event data
6	tbl_guest	Storing user's guests data
7	tbl_email_sender	Storing user's email accounts data
8	tbl_log_load_inbox	Storing the time and date of the guest email retrieval on the user's email server

### 3.3 Features of The Proposed System

#### 3.3.1 Guest Data Integration

This feature is used to integrate guest data on hotel systems or user's PMS with the application system. This guest data will be used as a data source in determining the recipient of the user's event email. Users can use the data exchange feature by embedding the user's API key and secret key in the data header. The API key and secret key will be used by the system to authenticate users. Guest data to be inputted or updated by the user must be in accordance with the variables that have been determined and embedded in the body of the data. Then the data is sent to the web service address. The user's API key and secret key can be obtained from the application. When data is received by the web service, the system will validate the sender's API key and secret key with user data on the server. If the API key and secret key are valid, the guest data will be stored on the server. If the requested process is updating, deactivating, or activating guest data, then the system requires

a guest ID previously inputted by the user to synchronize data updates. If the data has been successfully stored on the server, the system will respond that synchronization is successful. If the API key and secret key are invalid, the system will respond that synchronization failed. The synchronization can run automatically if the user's reservation system or PMS has been paired with a code to send data to the web service.

### *3.3.2 Create Emails About Events*

This feature allows users to create and send emails about an event that can be sent on a scheduled basis to their guests. Users can create an email containing information about the event, the date when the event will be held, and invitations or campaigns to attract guests to come to visit the event and stay at the user's hotel. Users can also attach photos about the event. The user must specify the date when the email must be sent to the guests. Data about the event is inputted by the user in the application interface. The system will generate an email template based on event data that has been inputted by the user and user hotel data. The email template is stored on the server. The email templates can also be seen by the user in the application.

### *3.3.3 Send Emails Automatically*

This feature allows the system to automatically check the date of sending emails from each event that has been stored on the server. If the date of sending an email from an event is today, then the system will search for the data of guests belonging to the user who created the event. After that, the system will prepare the event's email template that has been stored on the server previously, the guest email address as the recipient of the email, and the user's email account data used to send the email. The system will repeatedly do this process until all events that must be sent on that day are sent to the appropriate guest email address. If in the process of sending email, the sender's email account has reached the maximum number of emails sent in one day, the system will replace the sender's email account into another email account that has been registered by user. If all senders have reached the maximum limit, then the rest of the emails that must be sent to guests will be stored on the server with a pending status and will be sent on the next day. Event emails sent to guests will be stored on the server and can be accessed by users in the application.

### *3.3.4 Guest Response Email*

This feature allows the user to view all emails sent by guests to user's email that has been registered. These Emails can also be replied back by the user directly through the application. Every single email on the inbox has a reply option. The user must specify the sender's email, email subject, and contents of the email reply. The email recipient will be automatically filled by the system. The user can determine the sender's email with emails that have been registered. Every event emails sent to guests will be stored on the server and can be accessed by users in the application.

### 3.4 Testing

The testing of the Application system is done by requesting the testers to try all the features of the application system, from registering as a new user to creating email events and communicating using the sending and receiving email features of the application system. Guest data exchange testing is done with a simulation reservation system that has been prepared to be integrated with the application system. After trying all the features of the application, the testers then fill the UAT questionnaire consisting of 16 questions divided into 4 aspects, namely suitability, performance, security, and usability aspects.

Table 2. Questionnaire and Result of UAT

No	Suitability Aspects	Response					Total
		SD	D	N	A	SA	
1	The application system integration feature with the user's reservation system or PMS to get guest data can be done on the user's current hotel system	0	3	4	12	11	30
2	Event information sent in the form of emails to guests has includes appropriate and informative information	0	0	4	10	16	30
Total		0	3	8	22	27	60
Percentage (%)		0	5	13.33	36.67	45	100

No	Performance Aspects	Response					Total
		SD	D	N	A	SA	
1	The process of integrating guest data from the user's reservation system or PMS to the application system runs quickly and precisely	0	2	2	15	11	30
2	Retrieving incoming email data on the Email Inbox page runs quickly and precisely	0	7	2	10	11	30
3	The reply to incoming email feature on the Email Inbox page runs quickly and precisely	0	6	2	12	10	30
4	The function of sending event information emails to guests automatically runs correctly and according to user-defined schedules	0	3	0	10	17	30
Total		0	18	6	47	49	120
Percentage (%)		0	15	5	39.17	40.83	100

No	Security Aspects	Response					Total
		SD	D	N	A	SA	
1	Registration of email server and email account that includes sensitive user information is done through secure procedures	0	7	5	11	7	30

2	User guest data on the application system is deemed to be maintained properly and safely	0	5	2	16	7	30
Total		0	12	7	27	14	60
Percentage (%)		0	20	11.67	45	23.33	100

No	Usability Aspects	Response					Total
		SD	D	N	A	SA	
1	The application system can be used in the marketing process to bring in guests who have stayed before	0	1	0	13	16	30
2	The application system can be used in a one-door communication process via email with guests	0	0	1	12	17	30
Total		0	1	1	25	33	60
Percentage (%)		0	1.67	1.67	41.67	55	100

Response explanation:

- 1) SD = Strongly Disagree (Value = 1)
- 2) D = Disagree (Value = 2)
- 3) N = Neutral / Neither Agree or Disagree (Value = 3)
- 4) A = Agree (Value = 4)
- 5) SA = Strongly Agree (Value = 5)

Table 2 displays the results of testing and filling out the questionnaire conducted by tester consisting of managers or owners who directly manage the 0-3-star hotel on the islands of Bali and Nusa Penida, and college students in the field of information technology.

### 3.5 UAT Result

Based on the valuation given by respondents from the questionnaire in Table 2, the obtained results were the following:

- 1) Suitability Aspect  
The response with the largest percentage on the Suitability Aspects is the Strongly Agree (SA) with a percentage value of 45%.
- 2) Performance Aspect  
The response with the largest percentage on the Performance Aspects is the Strongly Agree (SA) with a percentage value of 40,83%.
- 3) Security Aspect  
The response with the largest percentage on the Security Aspects is the Agree (A) with a percentage value of 45%.
- 4) Usability Aspect  
The response with the largest percentage on the Usability Aspects is the Strongly Agree (SA) with a percentage value of 55%.

The calculation to measure the success of the application using the Likert's Summated Rating (LSR) scaling technique base on the results of the questionnaire in Table 2, is explained as follows:

#### 3.5.1 Total Responses to Questionnaire Results

- 1) Total responses SD =  $0+0+0+0=0$
- 2) Total responses D =  $3+18+12+1 = 34$
- 3) Total responses N =  $8+6+7+1 = 22$
- 4) Total responses A =  $22+47+27+25 = 121$
- 5) Total responses SA =  $27+49+14+33 = 123$

#### 3.5.2 Total Score Response on Questionnaire Results

- 1) Total response score TS =  $0 \times 1 = 0$
- 2) Total response score KS =  $34 \times 2 = 68$
- 3) Total response score CS =  $22 \times 3 = 66$
- 4) Total response score S =  $121 \times 4 = 484$
- 5) Total response score SS =  $123 \times 5 = 615$
- 6) Total score overall =  $0+68+66+484+615 = 1233$

#### 3.5.3 Total Score for Each Respondent

- 1) Maximum score =  $5 \times 10 \text{ items} = 50$
- 2) Minimum score =  $1 \times 10 \text{ items} = 10$
- 3) Median score =  $3 \times 10 \text{ items} = 30$
- 4) Quantum score I =  $2 \times 10 \text{ items} = 20$
- 5) Quantum score III =  $4 \times 10 \text{ items} = 40$

#### 3.5.4 Total Score for All Respondents

- 1) Maximum =  $50 \times 30 \text{ respondents} = 1500$
- 2) Minimum =  $10 \times 30 \text{ respondents} = 300$
- 3) Median =  $30 \times 30 \text{ respondents} = 900$
- 4) Quartile I =  $20 \times 30 \text{ respondents} = 600$
- 5) Quartile III =  $40 \times 30 \text{ respondents} = 1200$

#### 3.5.5 Number of Score Interpretations

1.  $900 \leq \text{Score} \leq 1500$ , the meaning is very positive.
2.  $1200 \leq \text{Scores} \leq 900$ , which means positive (the application system is considered quite successful).
3.  $900 \leq \text{Scores} \leq 600$ , which means negative (the application system is considered less successful).
4.  $600 \leq \text{Scores} \leq 300$ , which means very negative (the application system is considered unsuccessful).

The results of user acceptance test on the application system in the LSR interpretation are displays in Figure 3.



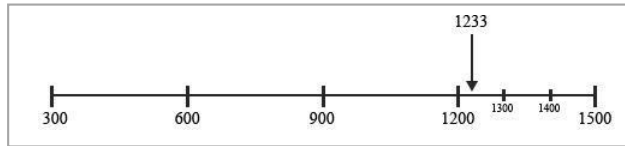


Figure 3. Research results on LSR interpretation

The total score obtained from 30 respondents is 1233 and be on point between the Quartile III (1200) and the Maximum score point (1500).

### 3.6 Analysis of Results and Evaluation

Based on the test results obtained, the analysis of the test results concluded as follows:

- 1) There are no bugs or errors on every feature that has been used in testing the application system by the testers.
- 2) Adding the guest data bulk insert feature as a solution to application users who do not have a reservation system or PMS to be able to input all guest data that has been recorded in an excel file.
- 3) Adding the Application Email feature as a solution for the users who don't want to register their email accounts and email server as senders and recipients of emails from guests.
- 4) Based on the results of the questionnaire found that all four aspects of getting responses agree and strongly agree from the respondents. Responses agree and strongly agree are the responses with the largest percentage results of each aspect on the questionnaire results. The percentage of responses strongly agree on the suitability aspect is 45%, the percentage of responses agree on the performance aspect is 40,83%, the percentage of responses agree on the security aspect is 45%, and the percentage of responses strongly agree on the usability aspect is 55%.
- 5) The examiner assessed that the application made was very positive and successful, which can be proven by the overall data of the questionnaire results which got a total score of 1233, where the total score was between quartile III (1200) and maximum (1500) in the LSR interpretation.

### 3.7 Research Novelty

The main novelty of this research is to propose an application system based on software as a service CRM that can be used by hoteliers with lower usage costs without imposing development costs. The application system can be used by users without incurring application development costs because the application is service based. In addition to making this application can be used at a low cost, every emails delivery that occurs on the system is done through the user's email server. Every user can register more than one email server on the application and the limitation of sending email will also be determined by the user in accordance with the user's email server capabilities.

#### 4. CONCLUSION

The suitability, performance, safety, and usability aspects of the application system have received good responses from the testers. The testers come from backgrounds in the fields of the hospitality industry and information technology. There are additional features of bulk insert guest data and add application email as a solution to simplify and improve the security of application system usage based on the testing of the features in the application system. And finally, system application has several features that can be used by hoteliers with lower usage costs without imposing development costs.

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