

Cake-Hut: A Novel E-Commerce Platform for Booking and Purchasing Cakes Online

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ABSTRACT

This research paper proposes an e-commerce cake shopping system: 'Cake-Hut' which will enable customers and cake bakery owners to handle their regular online selling and buying activities. Cake Hut is a Web Application where people can purchase customized cakes online from their favorite cake bakery according to their preferred designs or else, they can choose pre-defined cake designs from set of designs which were uploaded by sellers. The system is developed to replace the existing cake purchasing and order management methods, making it more effective and efficient while also addressing user needs. Agile software development methodology approach has been used to develop and test the system in a systematic manner, which includes the development phases of planning, design, and testing and implementation. This system is developed using React JS for frontend development and Express JS for backend development, MongoDB database, and runs on Node JS runtime environment.

Keywords-- Bakeries, Customers, E-commerce, Online Cake Ordering Platform, Web-Based

I. INTRODUCTION

The straightforward idea of supply and demand is the power of today's economy. Because of the technological growth in this era, people no longer need to go to the grocery store to buy household items, instead online shopping has become a part of our lifestyle. Similar to our basic needs and desires as well as online ordering for bakeries and pastries should be possible.

The goal of this proposed system is to create a website for an online cake ordering platform that includes n bakeries and assists them in increasing their sales and improving efficiency by allowing users to purchase the product, search the product from different bakeries, receive suggestions about the product of their choice, and receive notification/bill via email after delivery on B2B or B2C transactions. This online service enables customers to look for goods and services, place orders for them, and pay for

them online. As long as a user is connected to the internet, they can access a product or service from anywhere, which makes using an online booking system more comfortable, immediate, and transactions are made simpler.

However, most existing online bakery item ordering systems were designed only for a single bakery shop, and users had to download another app to compare the items. They have not yet included advanced web techniques in bakery shop systems that help both the bakery owner and the customer increase their efficiency and reduce costs and time, and they do not have proper notification/billing services via email. The e-bakery store system was created to address the aforementioned problem with the old system.

II. LITERATURE REVIEW

To completely comprehend the workflow of a booking system, a thorough examination of comparable systems was conducted as a reference for the construction of the proposed system and resolving the shortcomings of the existing system. This paper have directly reviewed numerous online booking systems in our work, including Divine Cakes [1], Cake Factory [2], and Cake.lk [3]

A. Divine Cake

Divine cake uses a very simplistic user interface. [1] They facilitate pre-defined cake types for the customers to choose from and customers cannot request a custom cake design through here. It may somewhat disappointing experience to some users because available cake designs are not very appealing but rather ordinary. Also, Divine cake provides other bakery cuisines with seasonal food items and party packs. Through the online shop, a customer can get cake delivered. There are couple of payment methods available, and prices are fixed. No registration is required for the users to place an order and users can choose a delivery date as their wish. Divine cake uses social media platforms such as Facebook, Instagram and Twitter to boost their sales.

B. Cake Factory

The Cake Factory web application [2] only provide the facility to order cakes online from The Cake Factory shop. The home page shows different categories of cake products including cupcakes, cakes, celebration cakes, desserts, nibbles, and traditional Sri Lankan cakes. The customer can choose the preferred one and they can continue ordering the cakes that they have already displayed in the web application. The customer cannot place fully customized cake order from this application, but they can customize the selected cake up to some extent using the remarks column. The customer can add their orders to the cart (except cupcake orders – cupcake orders should order through a phone call). Moreover, the customer can use coupons to get discounts, and they can update their orders as well. The system displays the discount, subtotal and final total and the customer can proceed to checkout from there. Then the customer must enter billing details and pickup details and they can proceed with a card payment and the system is redirecting the customer to relevant payment gateways from there. And there are two types of delivery methods as Self Pickup / PickMe Flash in this web application.

C. Cake LK

Cake.lk cake ordering system [3] consists of several modules such as search module, payment module, user login module, registration module, customization module. Also, this system has added to cart option and add to favorite option. User can order custom cake by using chatting options. Delivery option also available in this system. The incorporation of these modules offers users an online customization and self-design cake purchasing experience that is uniform and cohesive. Live chat option gives great user interaction for this system. To make it simple for customers to create their own cakes without expert help, a number of pre-customized cake options have been created.

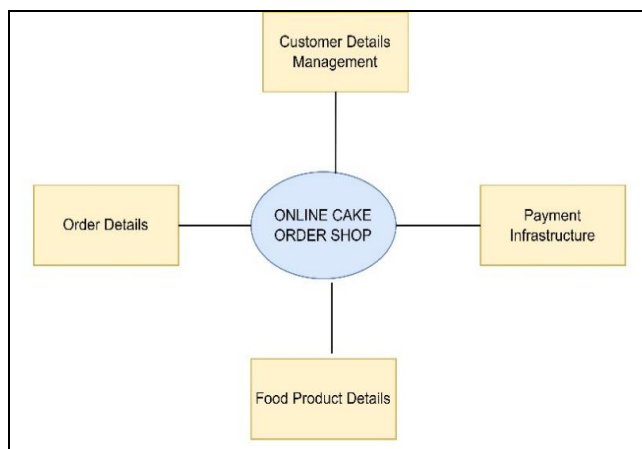


Figure 1: High-level data flow diagram

D. The Proposed System (Cake-Hut)

The system has developed is a cake ordering system, known as Cakehut. The suggested system is made up of various modules. This proposed system has major differences compared to competing systems. More importantly, Cake-Hut allows customers to customize their cake in too much extent. They can request a custom cake design through this system apart from seller defined existing designs. Also, there is a capability to choose the flavor, sugar (low, medium, high), size (small, medium, large) of the cake according to their wish. In this system, it has three payment methods. Those are cash on delivery, cash payment, credit/debit card payment. In this cake ordering system there is a capability to order some accessories with the cake, as examples candle, balloons, cakeboxes etc. They can add a text to print on the cake if want. Customers will be given a QR code to present upon exchanging and this helps to identify their cake order more conveniently. There are two delivery options present. The customer can pick up their order by visiting the store or the order can be delivered to the customer’s address. Those are some newly created functions in this system instead of existing cake ordering systems.

Although, in the proposed system, there are some minor drawbacks present comparing to other systems. They are customers who must be logged in to the system in order to place a cake order in this system, there are not much of an admin side to oversee and verify the validity of contents (profiles, designs, etc.) and rudimentary delivery options.

III. AGILE DEVELOPMENT METHODOLOGY

Agile development is distinguished by the following characteristics: [4] (a) acceptance of changing requirements, (b) an adaptable development process, (c) short iterations that deliver tangible functionality, (d) frequent, open communication between software developers and customers, and (e) system designs that are as simple as possible.

This study employs agile development approach, which attempts to increase research understanding while also tackling a real-world problem. This study is attempting to comprehend the differences between informing and automating, as well as the role that agile development approaches may play in the creation of online purchasing functions. The real-world problem included building this system to overcome the limits and issues associated with sluggish and labor-intensive order processing and administration of cake suppliers and purchasers.

A conversation was held to obtain the system needs from the stakeholders. Brainstorming has also been used to define the problem's context, the aims of the system to be designed, and the system's goals and scope. The

development timeframe and available resources were originally established at first phase. Then the data is further analyzed, and an extensive literature study is performed to compare the required demands with similar existing systems. The procedures were followed to examine the benefits of each system, producing a framework for building the new recommended system.

IV. MODULE DESCRIPTION

In the Cake-Hut web application, there are 4 main modules. Customer Management, Shop owner Management, Order Management, and Payment Management.

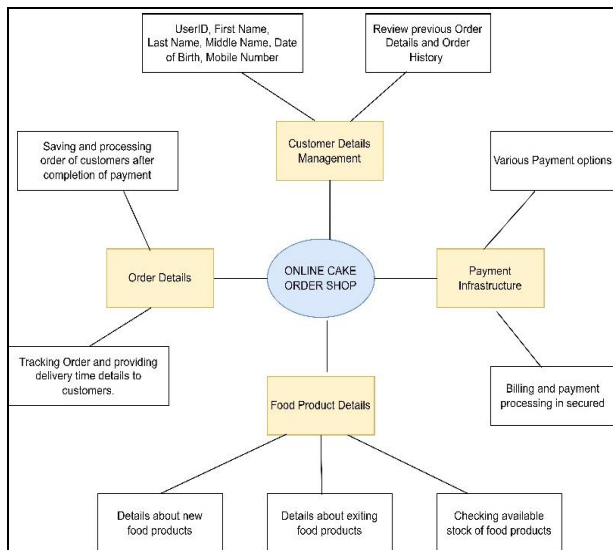


Figure 2: Low-level data flow diagram

In the design phase, the system wireframes were designed, and feedbacks were gathered. System was developed in such a way that a user will get a highest user experience upon using the system.

Then the system development conducted through two iterations (Sprints). In the 1st sprint, the development of major functionalities was carried through. Home page, login, registration, order placing, order viewing, adding cake designs, view designs and payment handling were them.

As for the sprint 2, the extended functionalities: update/delete profile, cake order, reviewing, rating, coupon manipulation and report generation implementation were compassed. Kanban project board provided by Microsoft Azure Board [5] has been used to track the system development progress. See the above figure 1 and figure 2, for the high-level and low-level data architecture model of the system.

Interactive user interface has been developed to provide users the optimum user experience possible. Thorough validations are performed on the available inputs to maintain the data integrity. Hashing techniques has been used to store the sensitive data in the database such as passwords. One-Time-Password (OTP) has been used to authenticate user’s contact number in placing order phase. QR code generation and scanning is implemented to further improve the workflow of the system.

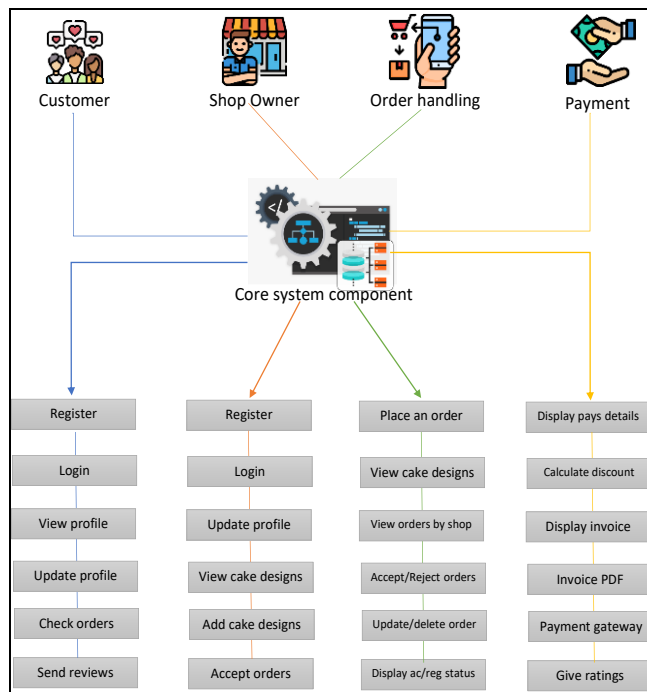


Figure 3: High level module architecture diagram

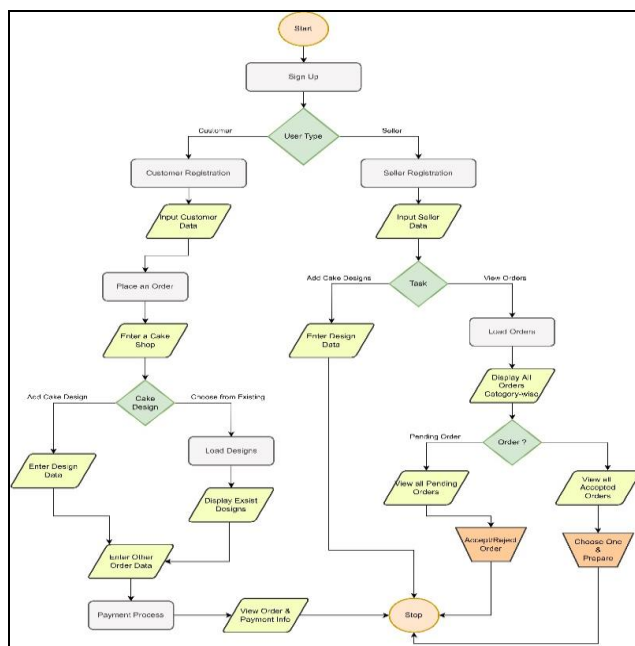


Figure 4: Dominant process flow

A. Customer Management

This customer management function includes user registration, login, user profile, update profile, check previous orders, and send reviews for selected orders, the admin can view user list and do changes if needed, and admin can reviews given by user.

User can log in to the system by using their email and password. If login credentials are correct user is redirect to the user profile page. In that page, display all the details of the relevant user. If the user wants to update their details, the user can do so by clicking the update button. If there is no user account, the user is required to register for the system by filling the registration form. It is necessary to select an account type in that form. Also, the user needs to fill all the fields in that form to submit. The user cannot submit the form without filling all the fields because it gives an error. When the user submits the registration form, notification of the user's password will be sent to the respective email address. This function is implemented from the 3rd party solution called EmailJS. [6] If the user wants, the user can change the password. Admins can view the user list and if there are any changes the user can do those changes. Also, user can send reviews for selected orders and user can view previous orders.

Figure 5: User sign-up UI

B. Shop Owner Management

This shop owner management functionality includes login, add new users to the system, update profile, display cake design patterns, add new cake designs to the system, update/delete cake designs, accept/reject pending orders, view accepted orders and generation of PDF report from all the orders. Shop owner can login to the system by using relevant email and the password. When user logs in to the system, user is redirects to the display design page, in that page it displays all the cake designs added by the relevant shop owner. User can update or delete their cake designs by clicking relevant button. Also, User can add new cake designs to the system. When user add new cake designs to the system, adding image is required. Also, without filling all the details user cannot submit the form because it gives an error message. When customer placed

an order, shop owner can view those pending orders and can accept or reject that orders by clicking accept and reject button. Also shop owner can view orders accepted by him. User can view more details about accepted orders when click view details button in the accepted orders page.

C. Order Management

Order management functionality includes place a cake order (Pre-defined or Custom), view uploaded random cake designs, view placed orders for a specific cake shop, update or delete specific order, and display acceptance/rejection state. When ordering a cake through the system, a user has to be logged in. Because it will help the system to track the user's order and maintain previous orders. Then the user has to choose a cake seller from a list of sellers who are already registered to the system. Upon placement of the order user can enter various customization details of the cake. This includes choosing a cake design which can be done in two ways: uploading a cake design image or choose from already defined cake designs by that respective seller. When user is prompted to enter delivery information, they have to verify mobile contact number through OTP services which was implemented using Google Firebase. [7] After placement of the order, it will be added to the seller's pending order list. Meanwhile, customers can view the progress of their order. There are 3 states of an order, which are pending, accepted and rejected. Sellers can accept or reject the order after inspecting the order details. In accepted stage, customers are allowed to modify order, delete order or download the QR code. Sellers are equipped with QR code scanner in the system, and they can generate a PDF from pending, accepted, rejected orders.

D. Payment Management

Payment management functionality includes display payment details to customer, calculate discount by coupon code, display payment invoice, generate invoice PDF, payment gateway implementation, create customer rating and admin can view, update, delete coupon details. After authentication process, an admin can add coupons to the system which can then be used by the customers upon payment to claim discounts. PayHere [8] payment gateway service is implemented to cater the online payment transaction requirements of a customer. Customers can get a PDF document of their transaction details. Customers can then rate the seller or system.

Figure 3 shows the module structure diagram (High level system architecture diagram) of the system.

The main process flow of the system starts with the signing up of a user and ultimately getting a cake order/purchasing a cake order through the system. There are sub-process flows like updating, deleting, report generating, coupon handling, etc. The said main process involved all the code modules discussed above. See figure 4 for the main process flow of the system.

V. RESULTS AND DISCUSSION

This section contains various screenshots from the entire application, which are explored further below:

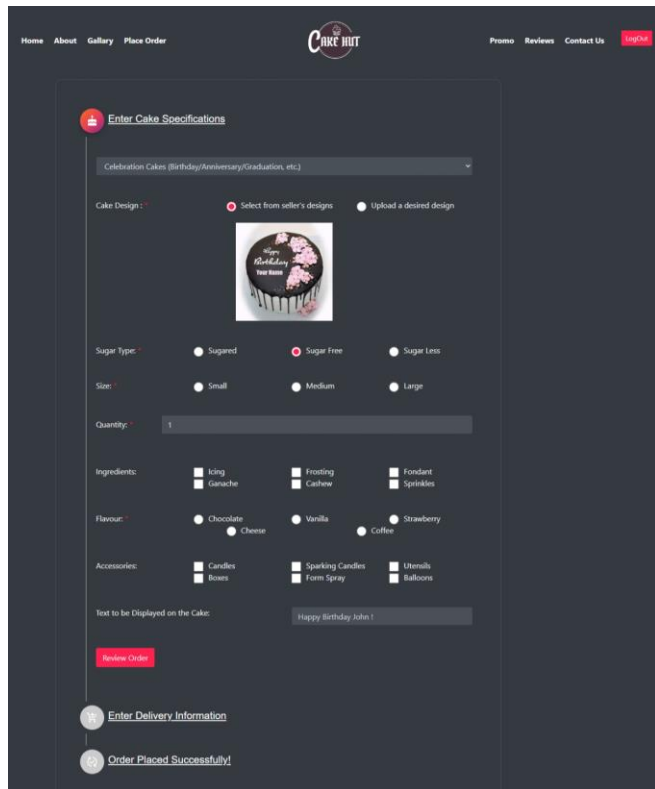


Figure 6: Place order (1st phase) UI

A new user can register to the system by using the registration form above [figure 5]. User cannot submit the form without filling all fields. The user needs to select the relevant account type from the drop-down list. After filling all the details, click the register button to submit the form. Email will be sent to the respective email address by informing the password. If the user wants to change the password, then he has an opportunity to do that. Then he can log in to the system using the relevant email address and the updated password.

Figure 6 shows the placing order interface for a customer. There are few mandatory input fields and if a user tries to submit without completing them, they will get a toast error notification. The placing order process is divided into 3 phases in this interface. User can review and verify the details of each phase when moving to next phase. In next phase a customer can enter delivery and payment choices.

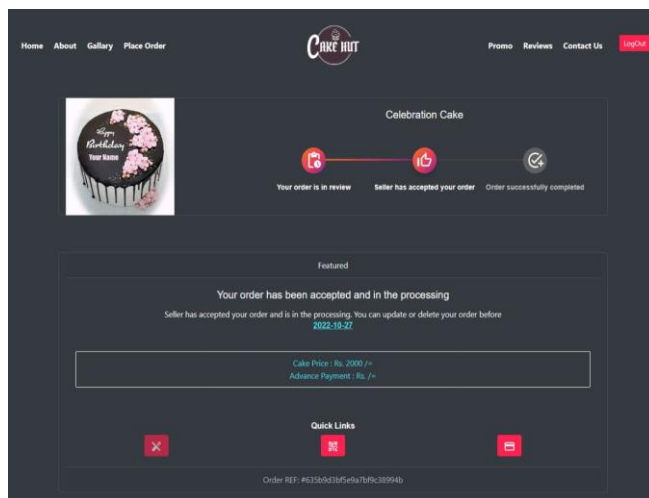


Figure 7: Order progress UI

Figure 7 shows the interface of the order progress. The progression bar will get changed depending on the order status.

Furthermore, the QR code button, payment button, edit button will also be enabled or disabled according to the status. If the order is accepted and the current date is inside the allowed order modification period, which was set by seller upon accepting order, the edit button will be enabled. Otherwise, disabled. And if the order is accepted and it is in the outside of the modifiable period, the QR code button will be enabled. If the payment selection is 'pay by credit/debit card' the payment button will be enabled. Otherwise, disabled.

When the seller logs into the system using the relevant email and password, the user is redirected to a page like this [Figure 8]. On this page it shows all the cake designs added by the respective seller. Seller can update and delete any of these cake designs by clicking on the respective button.

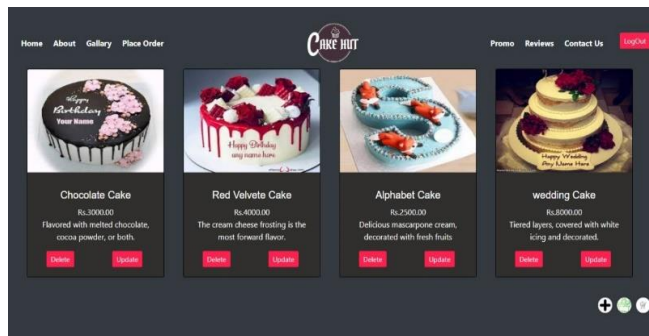


Figure 8: Seller home page UI

The built web application has been tested to ensure its reliability in processing different types of requests and to identify any flaws or errors in the design or coding. Using

Selenium IDE, regression testing [9] (re-running functional and non-functional tests) was executed to ensure that previously developed and tested software still performs after a change.

Also, SonarQube was used to continuous inspection of code quality to perform automatic reviews with static analysis of code to detect bugs and vulnerabilities. [10] All the modules of the system, inspected from SonarQube, is free from ‘blockers’ and ‘critical’ issues. You can view the SonarQube result from figure 9.

Overall, all the modules & functions tests were passes and successful. Table 1 shows overall results for all functions.

Module	Selenium result	SonarQube result
Registration	Passed	Passed
Login	Passed	Passed
Place order	Passed	Passed
View progress	Passed	Passed
Accept/reject order	Passed	Passed
Add new designs	Passed	Passed
View designs	Passed	Passed
Update/delete	Passed	Passed
Payment	Passed	Passed
Report generation	Passed	Passed

Table 1: Selenium and SonarQube results

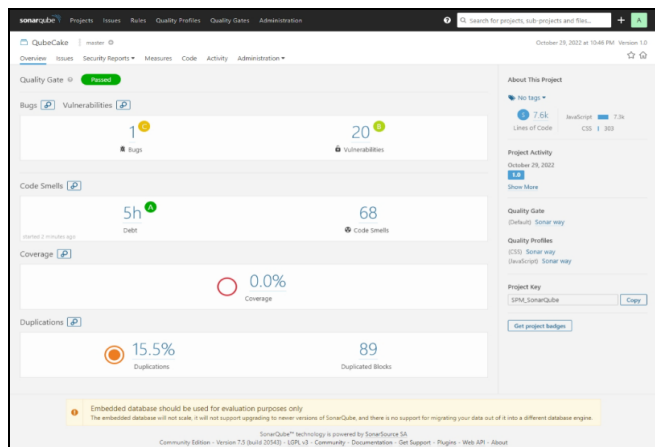


Figure 9: SonarQube output summary

VI. CONCLUSIONS AND FUTURE WORK

People will be able to order our items from the convenience of their own homes. Online buying is convenient, easy, time saving, and safe from the perspective of both the client and the delivery executive because it offers no-contact delivery. Our concept will help cake and cake businesses grow with less capital and greater earnings. Overall, it is possible to say that Cake-Hut's ordering mechanism met its goal. This is due to the fact that this system may be automated from a manual method to a web-based system. Furthermore, this newly built method may make it easier for clients to submit orders. It can assist merchants in managing client booking information. Furthermore, the creation of this system has offered a wealth of expertise in using web-based technology to more systematic ways rather than manual approaches.

However, certain enhancements will be recommended in the future to further reinforce this system. Among them, i) adding machine learning algorithms for image processing and automatically inspect uploaded images, ii) develop a native mobile app for customer's utilization, iii) extend searching capabilities with advance filtrations, iv) improve delivery features with integrating 3rd party vendors.

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