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CANTEEN MANAGEMENT SYSTEM USING RFID TECHNOLOGY BASED ON CLOUD COMPUTING

Lavina Mall*, Nihal Shaikh
Computer Engineering Department, Rizvi College of Engineering, India

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ABSTRACT

We are currently in the midst of a technological and computing revolution that will drastically change our lives and potentially redefine what it means to be human. Automation in many fields has replaced the old school pen and paper and at the same time proved to be more efficient, correct and less cumbersome making our life much easier. This automation process when applied on an integral part of the working people i.e. "canteen" helps reduce the service time, eliminates queues, there is no burden to provide the exact change to the staff for the order; to name a few benefits on the canteen's customer side and on the other hand it provides a reliable way of storing records and keeping the money safe as mostly the payments are made online via virtual money; benefits for the canteen owner. We achieve this automation process by using Radio Frequency Identification (RFID) card, an RFID card reader, a tablet and hosting the application on cloud.

KEYWORDS: Cloud computing, RFID, Virtual memory, e-wallet.

INTRODUCTION

Traditional canteens are based on pen-paper records, cash, manual calculations and manual record keeping of credits which in today's time in an inefficient way to operate a business. Rendering exact changes proves to be an all-time struggle. Also, the existing system lacks data integrity due to the use of books/files to store entries as these may be altered or easily misplaced and there aren't any backups for such cases. The cashless and automated canteen system will be able to overcome the disadvantages of the traditional canteens and also offer other advantages of automation like total bill amount, total profit/loss of the business, usage of food stock, an online menu, and the most trending food items, also keep record of the employees' attendance, a much safer way to hold the money and as payments are online there will not be a need to provide change to the customers. Also records of past years can be easily stored and compared if needed without any hassle.

PROPOSED SYSTEM

This system is based on cloud, virtual money and RFID card. Hosting on cloud provides advantages of auto-scaling, load balancing and eliminates the hardware cost along with the elimination of maintenance to a great extent. This software can be used on tablets, laptops and even smart phones. At times when the number of requests are at a particular time is huge like in cases of colleges it happens in the break time and same with other companies and institutes. This might result in a software crash; but this drawback is eliminated by load balancing feature of cloud. Also, backup of the stored data is available in case of a mishap or a disaster.

All the user must get an RFID card by registering themselves with the manager and recharge the card with some amount. This card stores the mobile number of customer that will uniquely identify the customer, the card number and the balance in the card of the customer. If the card is lost or damaged it can be blocked by through the website or by requesting the administrator and a new card can be issued against the same mobile number. (*The card can also be recharged online*). To place an order, the student must provide the card to the staff taking the order who checks for sufficient balance and if found places the order.

The system will hold the total number of sales made by the canteen in a day or month which can be reviewed by the owner or the manager for the purpose of analysis. The record of grocery bought, used, remaining and the amount spent on them is also maintained. The profit or loss incurred by the business is also displayed. As these details can be entered by authorized users only the chances of manipulation of data or data lose is almost reduced to none.

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There are different types of customers for the system- owner of the canteen system, the staff working for the owner (manager, controller: to take orders, chefs etc.) and the customers of the canteen. A secure login is provided to all the users of the canteen for basic access to his profile, balance, order history and transaction history. For the controllers they can place orders, check their attendance along with the other accessibility. The manager can mark attendance for the controllers, recharge, block and issue cards to people.

MECHANISM

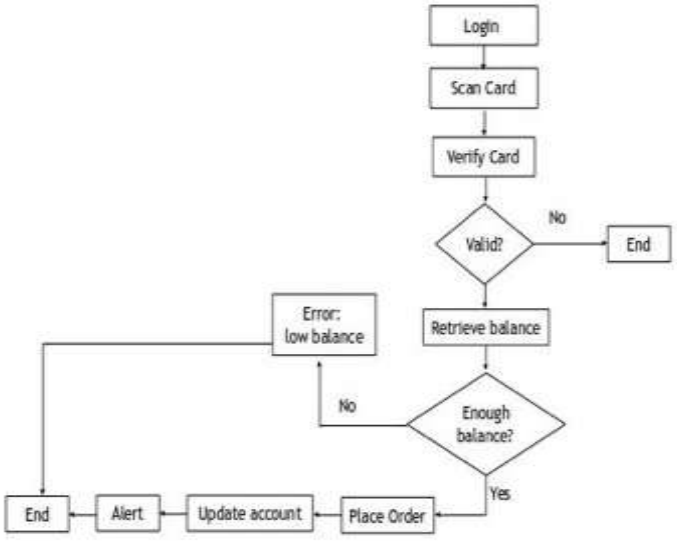
Initially, the records until now should be uploaded to cloud or else a new start can also be done and a brief introduction of the working of the software will be explained. Once the system is setup, the customers must register themselves to the manager by providing his mobile number. The entry will hold the mobile number, RFID card number, initial balance, the type of customer and password. On successful completion of the process a card will be given. The mobile number will act as the username and the password can be changed by the customer as by default a random password will be set.

After the card is issued monetary transactions can be started. To place an order the customer must provide his card to the controller who scans the card and checks if the customer has enough balance for his order, if the balance is sufficient then the order is placed and the amount of order is deducted from his balance. The updated balance is instantly reflected. A menu to display the food items along with the prices is provided which can be accessed by anyone even by a not registered person however, to place an order one must be logged in. The controller can search through the menu for a particular item or select the item from a table that holds the popular dishes. Food items that have the maximum number of orders is displayed in the favourites table. He can click on the add button to add the item in the cart.

The customers get a detailed account of the transactions and orders that they have placed during the month via email. Also, every transaction that has occurred will be notified to the customer by an SMS that will mention the amount debited or credited by his card and the time of the event.

The manager looks after the finances, inventory and employee attendance. He is the authorized person who also manages the data that is entered in the database related to all aspects. He can update or change the contents of the menu, its prices, add offers to menu or other offers if any to lure customers and also the monthly costing is added by him. The attendance is marked manually by the manager for each employee for each day. In case the manager forgets to update the attendance of a particular day he can later add it by selecting the date and the attendance will be stored for that day.

Figure-1:



Process of placing order using RFID

TECHNOLOGY USED

RFID: A basic Radio Frequency Identification system consists of three components:

i. *An antenna or coil*
ii. *A transceiver*
iii. *A tag holding unique information*

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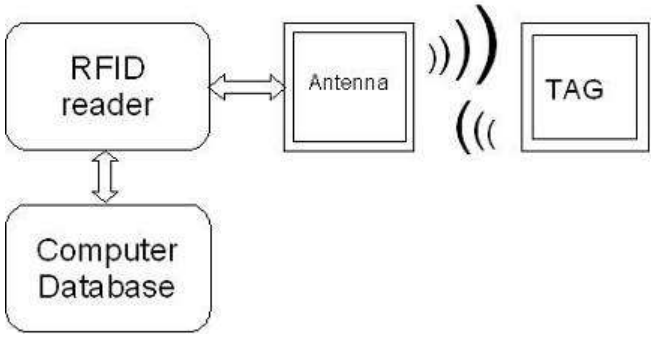
Figure-2:

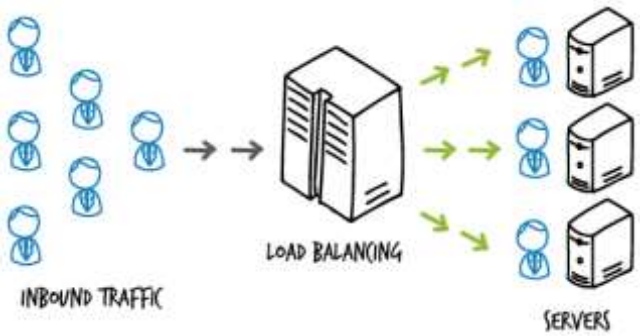


RFID components and their interaction

The process happens in the following steps:

1. *Data- stored within an RFID tag's microchip waits to be read.*
2. *The tag's antenna receives electromagnetic energy from an RFID reader's antenna.*
3. *Using power from its internal battery the tag sends radio waves back to the reader.*

The reader picks up the tag's radio waves and interprets the frequencies as meaningful data.
RFID tags broadcast over a portion of the electromagnetic spectrum and hence the exact frequency is variable and therefore interference with other electronics or among RFID tags and readers in the form of tag or reader interference can be avoided. RFID systems can use a cellular system called Time Division Multiple Access (TDMA) to make sure the wireless communication is handled properly RFID systems can make use of Time Division Multiple Access systems.
RFID is one method to Automatic Identification and Data Capture (AIDC). RFID uses electromagnetic fields to automatically identify tags attached to the object. These tags store information electronically and also these are not required to be in the line of sight of the reader as in the case of a barcode.
RFID tags are an advancement over bar codes because these tags have read and write capabilities. Data stored on RFID tags can be changed, updated and locked.
Cloud Computing: the use of remote servers hosted on the internet to store and process data rather than using a local server and provides different models such as Infrastructure as a service (Iaas), Platform as a service (Paas) and Software as a service (Saas). Amazon Web Services (AWS) is a secure cloud service platform that offers complete database storage, content delivery, compute power, flexibility, scalability load balancing and auto scaling along with additional advantages mentioned earlier.
Load Balancing distributes workloads across multiple servers to manage application workloads. The goal is to achieve maximum utilization of resources, minimizing response time thereby increasing the output. It distributes the incoming user requests. This feature helps in managing a large number of requests to the application.
Figure-3:



Load Balancing in Cloud

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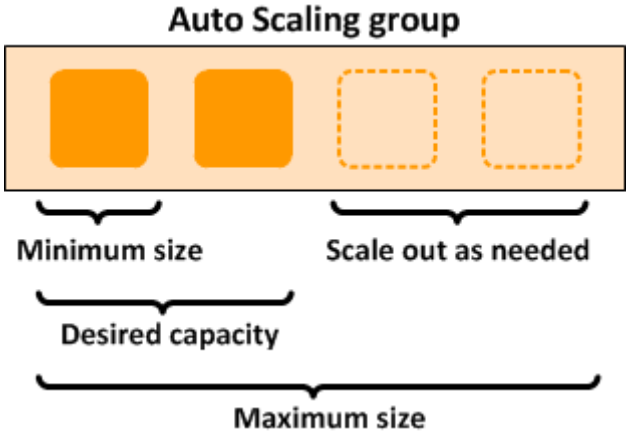
Auto Scaling: It is a method where the amount of computational resources in a server pool, typically measured in terms of the number of active servers, scales automatically based on the load on the pool. It has many advantages:

1. *For companies running their own web server infrastructure, auto scaling allows some servers to go to sleep during times of low load, saving on electricity costs.*
2. *Auto scaling can also sometimes take care of replacing unhealthy instances and therefore providing some protection against hardware, network and application failures.*
3. *Auto scaling can offer greater uptime and more availability in cases where production workloads are variable and unpredictable.*

Figure-4:



Auto Scaling in AWS

REQUIREMENTS

Hardware Requirement

a. *RAM 1GB or above*
b. *32/64 bit system*
c. *RFID reader*
d. *Tablet, laptop, smartphone*

Software Requirement

a. *Operating System: Windows XP and above*
b. *Coding: HTML5, CSS, PHP, MySQL*
c. *Web browser: Chrome, Firefox, Safari*
d. *Amazon web service: EC2*

CONCLUSION

The aim achieved by this project is to automate and simplify a Canteen's business processes using Cloud Technology, based on the analysis of existing solutions, the current and future market needs. This concept is very feasible and with the right exposure it can be extended on a global scale. Hence we emphasize on the various benefits of Cloud and RFID Technology.

The project intents to create a software prototype .The software application will comfort the customers who regularly visit the canteen. The customers can place order in a relaxed and pleasant way. The benefit of RFID which is a long-range wireless technology is being used in this application. The advantage of using RFID technology over any other wireless technology is that it is contact-less and can be accessed and operated more easily. RFID cards are cheap and more durable.

The model can be customized as per the cliental analysis keeping the basic functionality same and also giving the canteen's using this model an added advantage over the old outdated system. This is done by reducing the paperwork and costs. This model can be easily scaled according to the requirement.

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