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# Cloud Based Customer Care Registry Application with Chatbot

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**ABSTRACT**: Developing cloud-based customer care applications is not only about solving customer complaints, but also giving them the satisfaction of using a particular business product by providing Software as a Service (SaaS). This application helps customers to complain about various issues they are facing with their products. Not only the products but also the issue can be raised on any social issues. Customers should provide a detailed description and priority of the issue they are facing. In addition, the complaints filed are checked by the manager and agents are assigned to complaints filed by customers. These complaints and agent information are stored in the IBM dB2. Each customer with a complaint will receive an email notification regarding the process this will be done by the SendGrid. Additionally, they can see the status of their complaint and at each step in the process of resolving the issue, the customer is kept up-to-date and what did the agent do to resolve the issue. The application is completely containerized using Docker and orchestrated using Kubernetes.

**KEYWORDS:** Cloud, Software as a Service (SaaS), IBM dB2, Send Grid, Docker, Kubernetes.

## I. INTRODUCTION

Customers are the centre of attention of each business. The survival of the business depends on the satisfaction of its customers. Customers expect high-quality services, and are even willing to pay a premium for premium service. Smart service quality leads to permanent customer relationships. Service is fundamentally different from production; This difference contributes to the cumulative complexity of service quality.

Therefore, companies strive to create high-quality services to satisfy customers. However, despite best efforts, sometimes the criticism involved is unavoidable. However, an honest takeover will turn disgruntled customers back into loyal customers. The key to success lies in realizing importance of responding fairly and effectively to customer complaints. Complaints are often a storehouse of accumulated knowledge, leading to constructive concepts for future service enhancement.

Research shows that many unhappy customers actually complain and give businesses a chance to correct their mistakes. It is therefore essential to resolve complaints honestly at the earliest, rather than taking a defensive approach. Structured handling of customer reviews is the gospel for long-term negative intervention. This article decided to develop such a customer service subscription model.

## II. OBJECTIVE

A complete online customer service solution involves managing customer interactions and complaints with service providers by phone or email. The system must be able to integrate with any service provider from any domain or industry like Banking. Telecommunications insurance. Customer service, also known as client care, is the provision of services to customers. Its importance varies by product and sector. In many cases, customer service is more important if the information is related to the service than the customer. Customer service can be provided by a customer service representative. Customer service is often an integral part of a company's customer value proposition.

### III. LITERATURE REVIEW

1.Godson Michael D'silva, Sanket Thakare, Sharddha More, and Jeril Kuriakose,"Real World Smart Chatbot For Customer Care Using A Software As A Service (SaaS) Architecture"
This journal employs chatbot for customer care. This is done by providing a human way interaction using LUIS and cognitive services. Tools used: AWS Public Cloud, AWS Lambda, API Gateway, LUIS, Ejabberd, Chatbot. Cloud Computing & Machine Learning are the technology used.

2. Stephen W.L. Cheng, K.L Choy, H.Y. Lam, "An Intelligent Cloud-Based Customer Relationship Management System To Determine Flexible Pricing For Customer Retention"
This paper proposes that the customer is categorized based on purchase behaviours, historical ordering patterns and frequency of purchase customize customer care and promotions are given. Intelligent Cloud-based Customer Relationship Management is the algorithm used.
Customer care is given based upon purchase behaviours, features of the product purchased without any interaction

3. Asbjorn Folstad, Cecilie Bertinussen Nordheim, and Cato Alexander Bjorkli, "What Makes Users Trust A Chatbot For Customer Service? An Exploratory Interview Study"
In this paper customer trust chatbots to provide the required support. Chatbots represent a potential means for automating customer service. The tools used in the paper is Chatbot and JavaScript. Cloud computing, Machine Learning,This provides automated customer service with the use of the cloud.

4. Aapo Koski, Kati Kuusinen, Sampo Suonsyrjä, Tommi Mikkonen, "Implementing Continuous Customer Care First-Hand Experiences From An Industrial Setting"
In this paper, we employ the software as a service (SaaS) model which introduces drastic improvement to the situation, as the service provider can now have direct access to the user data and analyse it if agreed appropriately with the customer. It employs JavaScript, HTML, Google analytics algorithm in its operation. It works on Artificial Intelligence and Machine Learning technologies. Feedback loops are used that allow the service provider to capture feedback at the point of experience. One way to find out is to conduct continual end-user experience monitoring to determine if users are happy. It is not always easy for SaaS providers to know what customers are experiencing.

5. Ngoc Dang Khoa Nguyen, Imran Ali, "Implementation Of Cloud Customer Relationship Management In Banking Sector: Strategies, Benefits And Challenges"
The cloud customer relationship management (CRM) has emerged as an innovative tool to augment the customer satisfaction and performance of banking systems. Cloud CRM allows to collect, analyse and utilize customer-associated information and update the systems. Cloud CRM Strategy and AWS Cloud are the two algorithms used. Cloud computing, Mobile computing are the technologies around which this has been employed.CRM implementation, reduce cost, and ensure revenue growth. This can help departments share the same customer information and integrate processes, people, and technology to serve customers and enhance customer satisfaction and loyalty.

### IV. EXISTING METHOD

It is a cloud-based customer care system that offers powerful solutions for customer service. The existing system unifies conversations from email, phone, web, chat, and social, and helps you resolve issues across channels effortlessly.

The online ticketing system simplifies your team's work. It's full of features that foster collaboration within your team. You can use tagging, add private notes, assign tickets to specific team members and create canned responses. Some of the existing systems are: Helpdesk and Freshdesk

**DEMERITS**
A. Emails get caught in Spam sometimes when they aren't spamming.
B. There is an obvious lack of control over training, nuances can be lost. Customers may find it too impersonal.
C. Tickets sometimes get lost, and following a ticket doesn't support much. Also, tickets can get lost when transferred to another team.

## V. PROPOSED TECHNIQUE

### A. PROBLEM STATEMENT
- How might we sort and solve the issues posed by the customer?
- How might we assign an agent for the issue raised?
- How might we notify the tracking status of the customer?

### B. SOLUTION DESCRIPTION
- The detailed description regarding the issue should be collected from the customer and should be stored in a database.
- The information, details, and efficiency of the Agents should be stored in a database.
- Customers should be alerted regarding their agent and the current status of their issue through mail/phone calls through SendGrid.
- These databases and SendGrid shall be accessed by the user via our application which runs in the Kubernetes cluster.

### C. UNIQUENESS
- The customer can raise issues regarding any sector whether it can be a Banking sector, Network sector, social issue, Product based, or political based.
- The updates and status of the issue will not only be shared through E-mail but also through Phone calls and Messages or any other social media.

### D. MERITS
- The customer can raise issues regarding any sector whether it can be a banking sector, network sector, social issue, product based, or political based.
- The updates and status of the issue will not only be shared through e-mail but also through social media apps and messages.
- Automated ticket closure, status shown to the customer.
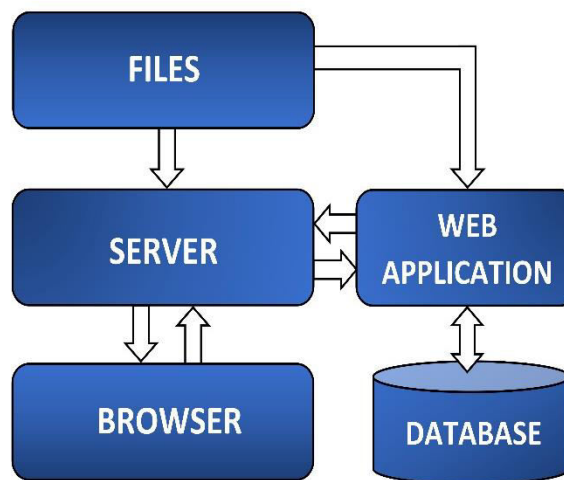
## VI. APPLICATION ARCHITECTURE



Fig. 1. Web Application Block Diagram

Web applications are designed in HTML. HTML is the building block of a website. Defines the meaning and structure of web content. Technologies other than HTML are commonly used to describe the appearance/display (CSS) or functionality/behaviour (JavaScript) of web pages.

The HTML files are on the server side. They would comprise of static resources such as CSS and Script image. These files provide HTML templates for the web application. The web application is connected with the Data base. Hence, it fetches the data from the Data base. Here we use IBM dB2. DB2 is a database product from IBM. It is a Relational Database Management System (RDBMS). DB2 is designed to store, analyse and retrieve the data efficiently. DB2 product is extended with the support of Object-Oriented features and non-relational structures with XML.

The client will give HTTP request to the server. The server requests the web application in two ways URL Encoding and GET/POST-Data.

The web application works further to furnish the HTML data and sends it to the server. The server finally sends the HTTP response to the client.
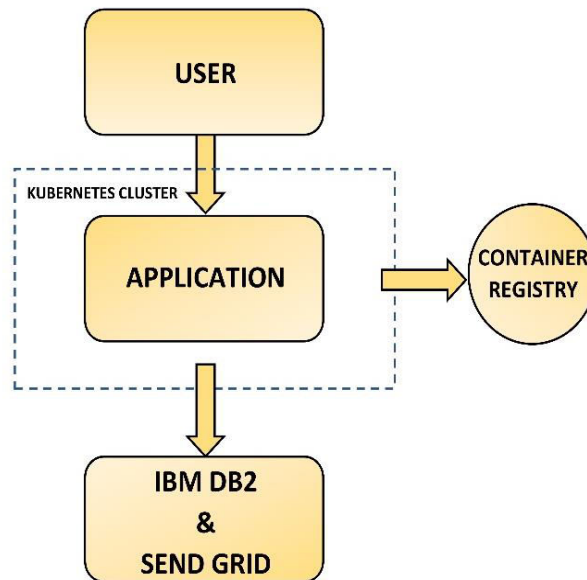
## VII. TECHNICAL ARCHITECTURE



Fig. 2. Technical Architecture Block Diagram

The figure depicts the Technical Architecture of the application.  The application consists of:
- Admin
- User (Customer)

The users are the ones who make use of this application. Admin administers the whole application. The web application is designed with HTML and JavaScript. Further, Flask is used as the API. So that it can be easily deployed in the cloud. The developed application has been containerised using container registry. Container is a software that packages up code and all its dependencies so that the application runs quickly and reliably from one computing environment to another. By this, the application could be used explicitly.

When we witness a greater number of users, there is an evident traffic due to server congestion. In such cases, containers would be acting as a server. Kubernetes clusters come into play in such conditions. It scales the containers by providing many numbers of servers when there are many users. Data base stores complaints of the customer and also the information of the agent assigned. This would be directly connected to the web application. Additionally, we use SendGrid to provide SMS and email notifications regarding the customer complaints.

### A. KUBERNETES

Kubernetes is an open-source container orchestration platform that automates many of the manual processes associated with deploying, managing, and scaling containerized applications.
Maximize the resources needed to run your enterprise applications by making better use of your hardware.
Scale containerized applications and their resources on the fly.

### B. DOCKER

Docker is a software platform that lets you quickly build, test, and deploy your applications. Docker packages software into standardized units called containers that contain everything your software needs to run, including libraries, system tools, code, and runtime. Docker allows you to quickly deploy and scale your application to any environment while knowing your code is running. Docker works by providing a standard way to run code. Docker is an operating system for containers. Just as virtual machines virtualize server hardware (without having to manage it directly), containers virtualize the server's operating system. Docker installed on each server provides simple commands that can be used to create, start, or stop containers.

### A. IBM WATSON

Chatbots are customer service support systems. Chatbots use artificial intelligence and natural language processing to simulate conversations with users in messaging apps, websites, mobile apps, etc., and can provide accurate and relevant information. By enhancing your AI chatbot with Watson Assistant, you can create tools that avoid the hassles associated with traditional chatbot platforms and improve customer support.

### B. SENDGRID

SendGrid is a cloud-based email delivery service that helps businesses and organizations send emails at scale. It is designed to be a reliable and cost-effective way to send a high volume of emails, including transactional emails and marketing emails.

With SendGrid, you can send emails through APIs or SMTP (Simple Mail Transfer Protocol) integration. You can use the SendGrid API to add email sending functionality to your application, or you can use the SMTP integration to send emails directly from your own servers or applications.

SendGrid offers a number of features to help you manage and track your email campaigns, including analytics and reporting, email templates, and email testing tools. It also has robust security measures in place to protect against spam and other forms of abuse.

Overall, SendGrid is a useful tool for businesses and organizations that need to send a high volume of emails on a regular basis.

## VIII. RESULT

The Web application has been developed using HTML and Python Flask and deployed in cloud as a containerized form using Docker. These containers are orchestrated by Kubernetes.This is the welcome page of the containerised Web application.
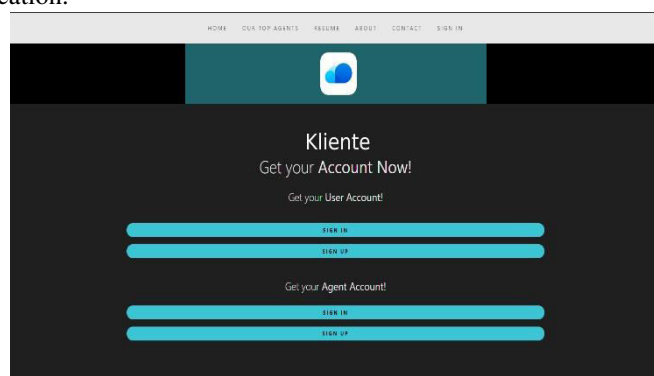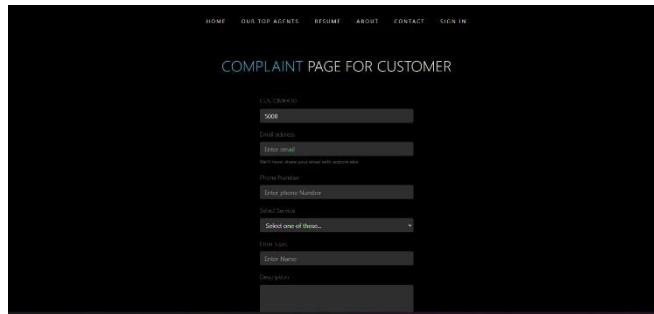


Fig. 3. Welcome Page

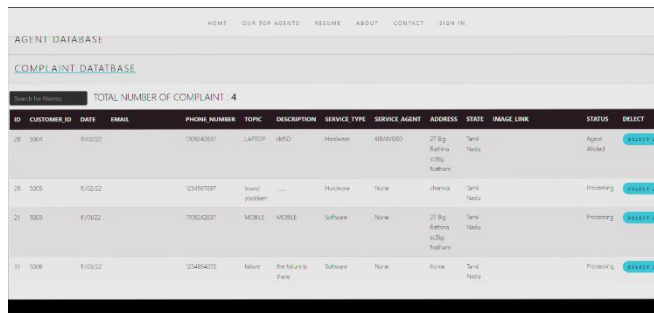Fig. 4. Customer Complaint Portal



Fig. 5. Customer Complaint Portal

The complaints of the customer will be registered in the customer complaint portal. The description of the complaint will be displayed on the complaint description page to the agent.
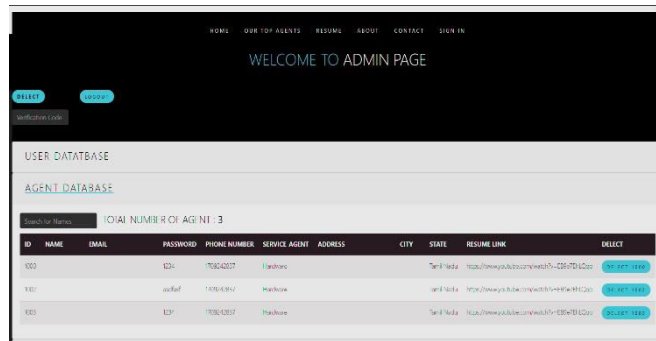


Fig. 6. Admin Page

The agents will be assigned to the raised complaint by the admin in the admin page.

## IX. CONCLUSION

This application has been developed for customer assistance by processing their complaints. A ticket has been created as soon as a customer raises complaint. Immediately an agent is assigned to address the complaint of the customer. The agent resorts to the issue and solves the issue. Step by step updates will be reaching the customer via SMS, Email or any other mailing services. The application finally notifies the customer after the complaint is rectified.

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