A Laravel Based Web Application With AI Chatbot And Live Hosting On AWS

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Abstract - Technology has become a crucial aspect of our everyday lives in today's world. The use of the Internet and modern technology is rising rapidly. These technologies are used by all kinds of businesses because they make things easier and clean. Every day, a lot of information and data are exchanged over the Internet all over the world. Web users are larger than other users. Web users get timely and accurate results. Therefore, the field of web application development is expanding as more businesses seek to build online presences and consumers increasingly rely on web applications to meet their needs. However, the web application development process requires more time and resources and is not suitable for this technology world. The growing demand for web development has also helped overcome this problem. That's why the PHP framework was introduced. There are thousands of frameworks. This paper describes his web application development using PHP Laravel framework. With its elegant and expressive syntax, Laravel stands out as a web application framework. Cloud computing has enabled the globalization of web applications and expanded their use beyond the local level. We want all types of users to use the services of the cloud service and pay only for what they use. There are many cloud service providers in this space. Websites powered by AWS are the most widely used services today. The whitepaper also explains how to use AWS services for web development. The paper also concludes that the system uses an embedded artificial intelligence chatbot to quickly reply to end-users.

Keywords – PHP, Framework, Laravel, AWS, AI, RDS, EBS, Natural Language Processing, Web Application, Database, Cloud Computing, Migration, MVC, Technology.

I. INTRODUCTION

PHP is widely regarded as a top scripting language for web application development. This is because it enables the creation of dynamic and interactive web pages with ease and is also user-friendly and accessible to learn[1]. The World Wide Web is growing rapidly as a result of the surge in server-side scripting. Many people are now using web applications to expand their businesses, as they are more cost-effective compared to traditional approaches. [5]. As a result of this surge, there is a clear need for a highly effective and simple method of web development. PHP is dominating the web development market, but in order to create a website, one must be familiar with the PHP language as well as other supporting tools such as CSS and JavaScript. During the development of PHP, business logic is intertwined with database queries and presentation tags. To solve this problem, we sometimes have to write code multiple times in the same project. In other words, it can either accelerate or halt the development

process. Frameworks produce more stable and secure final applications.

In today's modern IT world, web developers should be familiar with at least one framework. Frameworks are used to solve problems related to using PHP. PHP frameworks enable the swift development of applications (RAD - Rapid Application Development). Developers need to be aware of how to select the ideal framework that offers the best support features for their project. PHP frameworks typically follow the Model-View-Controller (MVC) pattern. Out of all the PHP frameworks, Laravel has established itself as one of the most successful ones.

Developers have a plethora of PHP frameworks to choose from, including: Cake PHP, CodeIgniter, Laravel, Symfony, Yii, etc. Each have their own strengths and weaknesses. The utilization of a trusted framework can also enhance the security of your website.

A chatbot is a software program that can engage in text-based conversations and simulate human dialogue through the application of artificial intelligence (AI). There are two primary categories of chatbots: command-based chatbots, which rely on a database of pre-defined answers, and chatbots based on AI or machine learning algorithms. This AI chatbot uses natural language processing (NLP) to craft responses to user requests. Chatbots on your website make life easier for your support team[3]. Significantly improved response rates compared to human support teams. The most important advantage of chatbots is that they are available 24/7.

Many organizations in the current world require computerization, but significant investments in infrastructure and IT resources are not feasible[4]. Cloud computing is the automatic collection, usage,

and management of computer resources through an Internet-based platform. The discipline of cloud computing has undergone enormous growth during the past several years. Nowadays, a lot of cloud service companies have appeared. AWS, Microsoft Azure, Google's cloud, among others, are some of the cloud service providers. The most dependable and well-known cloud platform worldwide is Amazon Web Services (AWS), which is one of those. You can save time, money, and labor with an AWS implementation. Also, they offer an AWS training to familiarize us with the technology. Many services offered by AWS are free, and the corporation also offers a 12-month free tier.

The remainder of this paper will first examine the pertinent research, then moves on to the architecture plan. An overview and analysis of the findings are then given.

II. LITERATURE REVIEW

A. Web (Back-end)

Web backend programming languages are essential for building robust and dynamic web applications that can handle complex business logic and data management tasks. Several of the most widely used backend programming languages for web development comprise: PHP, Python, Ruby, Java, and Node.js. Each of these languages has its own unique features and strengths, which make them well-suited for different types of applications. Backend programming languages are responsible for managing the server-side logic of web applications, including data processing, database management, and user authentication.

PHP is the most popular scripting language for web backends, based on the platform by language survey conducted by JetBrains (the platform by language 2022 shown in Fig. 1)[7]. One of the advantages of

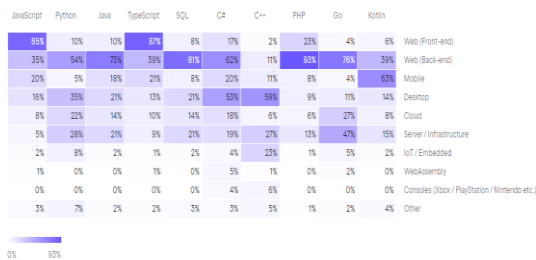PHP is its compatibility with various databases, including MySQL, Oracle, and PostgreSQL.

Fig. 1

B. Framework

This research paper places great importance on the efficiency of the framework in terms of two performance parameters that assess a web application's efficacy from the end-user's perspective: 1) the maximum time to serve the request; 2) in a definite time period, how many requests can be served. Five general criteria that developers use to select a framework were indicated in[2]. These parameters include architecture, documentation, community support, flexibility, and feature set. While these criteria are crucial, they may not be tailored to specific tasks and may lack implementation details.

Laravel is the most commonly utilized PHP framework among developers; which PHP frameworks and platforms do you use on a regular basis? conducted by JetBrains (shown in fig. 2)[9]. Half of the PHP developers stick to using a single framework.
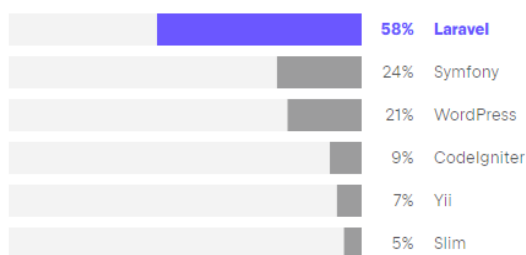

Fig. 2

C. Cloud Computing

Zhong et al. [6] examined the capabilities of major cloud service providers. We have researched AWS, Google, and Microsoft and concluded that end users should use multiple enterprise service providers due to the diverse capabilities offered by incumbent service providers.

Amazon Web Services (AWS) is a cloud computing platform that provides a diverse array of services and tools to develop and deploy web applications. It has 1.45 million customers and $62.2 billion in revenue. AWS is not only the most used cloud platform, but also the most popular and sought after, based on a survey of cloud platforms conducted by Stack Overflow (see Figure 3)[10].
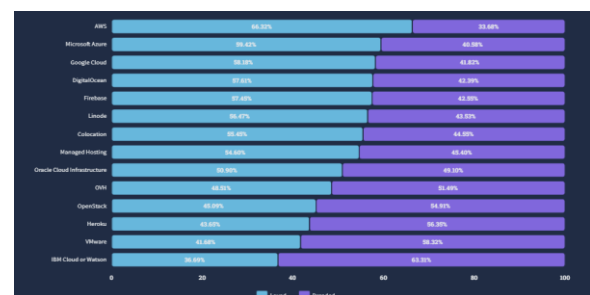

Fig. 3

III. Proposed Methodology

A. Laravel

Laravel is among the most widely used PHP frameworks, which offers pre-written code to streamline web application development. Developers simply add this information to their modules according to their requirements. Developing web applications using the Laravel framework is straightforward and uncomplicated, but it is essential to have a fundamental knowledge of PHP to comprehend the framework's structure.

A.1 Laravel requirements

Before creating a new Laravel application, the developer needs to install necessary software such as PHP and Composer. For developers using macOS, PHP and Composer can be installed by hand. Developers also use Docker images for all services.

A.2 Laravel Requirements Lifecycle

The initial entry point for all requests to a Laravel application is public/index.php. This file contains some important files. This file loads the autoload definitions generated by Composer and grabs an instance of bootstrap/app.php. The request is then sent to the kernel located at app/HTTP/Kernal.php. It comprises a list of bootstraps to be loaded and defines the HTTP middleware that all requests must go through before they are processed by the application. The request then loads all service providers. One of the most common service providers is RouteServiceProvider, which loads the appropriate controller or view files[13].

A.3 Laravel structure

The Laravel framework implements the Model-View-Controller (MVC) approach to software development. This methodology separates the data (Model) from the application's view and logic (Controller) when developing an application. Models are employed to handle database queries and manipulate data. A view is a representation of a web page created with HTML, CSS, JavaScript, etc. The controller acts as the intermediary between models and views, facilitating communication between them. Figure 5 shows the MVC processing flow.
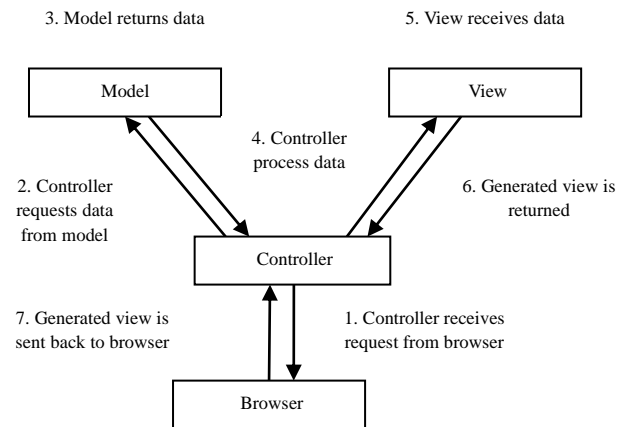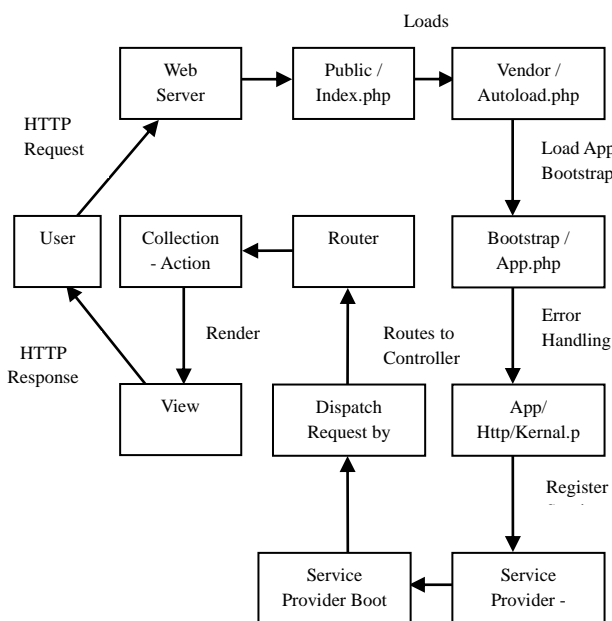
Fig. 5

A.4 Database migration

Laravel has support for a broad range of popular database services. It utilizes raw SQL, a fluent query builder, and an eloquent ORM to provide a straightforward way of interacting with databases across the multiple databases it supports. Laravel stores the draft schema of each table in a migration file. This schema design executes SQL commands and creates tables in the database.

Use Artisan's PHP command artisan migrate to migrate all migration files. fig. 6 shows the migration file workflow in Laravel[14].
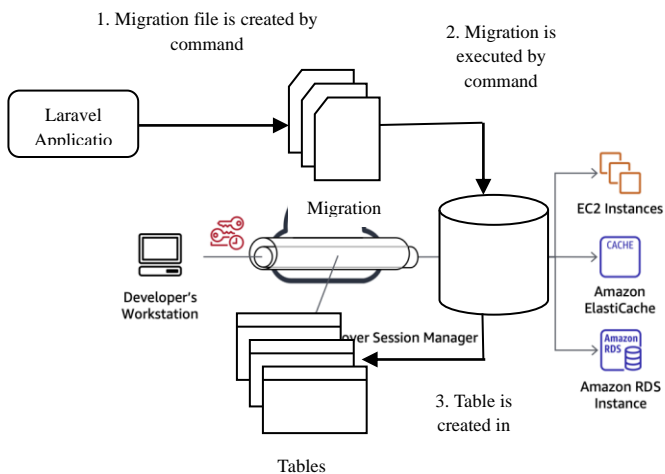
Fig. 4

1. Migration file is created by command

2. Migration is executed by command

Laravel Applicatio

Migration

Developer's Workstation

over Session Manager

3. Table is created in

Tables

EC2 Instances

Amazon ElastiCache

Amazon RDS Instance

Fig. 6

B. Amazon Web Services

B. 1 Elastic Beanstalk (EBS)

With Elastic Beanstalk, developers can effortlessly upload their code, and the platform takes care of the provisioning process automatically. Elastic Beanstalk takes care of all the essential aspects of running a web application, from capacity provisioning, load balancing, and autoscaling to monitoring the health of the application. It also provides continuous, fully managed patching and security updates, ensuring that the web application stays secure and up to date.. Elastic Beanstalk is considered to be the easiest way to deploy and run web applications on Amazon Web Services. [10].
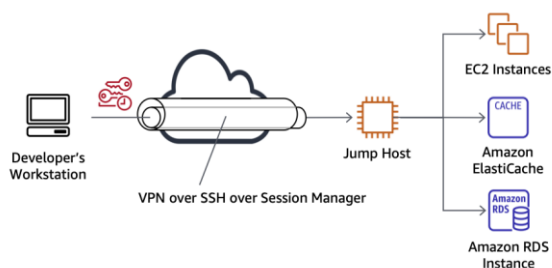

Developer's Workstation

VPN over SSH over Session Manager

Jump Host

EC2 Instances

Amazon ElastiCache

Amazon RDS Instance

Fig. 7

B. 2 Relational Database Service (RDS)

The RDS database preview environment allows developers to use upcoming betas, release candidates, and early production versions of his PostgreSQL engine. A preview environment instance is fully functional, allowing developers to easily test new features in their applications. Developers can choose the region in which the database instance will be created. Cost per request varies by region[11].
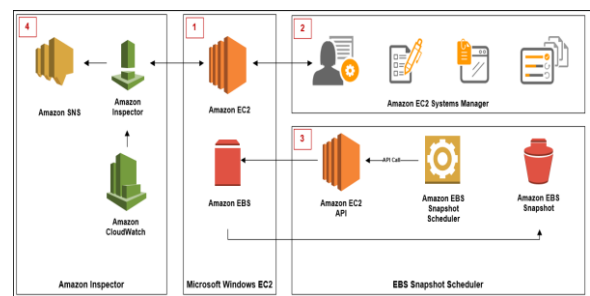

Fig. 8

B. 3 CodePipeline

AWS CodePipeline makes it easy to connect remote repositories to AWS instances so developers can quickly start modeling their software release process. AWS CodePipeline is a fully managed continuous delivery service that eliminates the need for developers to deploy or set up servers. It seamlessly integrates with existing tools and systems, enabling developers to rapidly and reliably release code changes. [12].
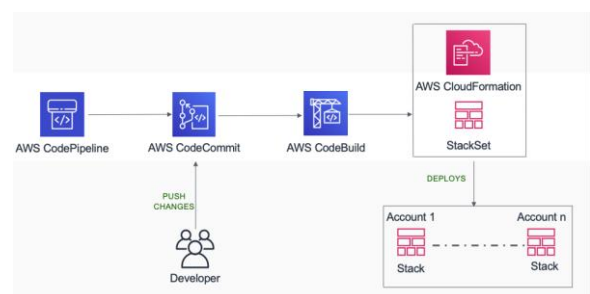

Fig. 9

B. 4 Route 53

This service is used to register a custom domain for your application and connect AWS instances to the domain. Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service that developers can use to perform domain registration, DNS routing, and health check.

C. NLP

NLP chatbots use natural language processing techniques to understand and interpret user input, enabling them to provide more human-like responses. This is in contrast to rule-based chatbots, which rely on pre-defined rules and responses. With NLP, chatbots can analyze the context, syntax, and semantics of user input to provide more accurate and relevant responses. This makes them useful for a wide range of applications, including customer service, e-commerce, and personal assistants.

NLP chatbots are designed to mimic human conversations and provide users with an interactive and personalized experience. We use machine learning algorithms to understand the intent behind the user's request and extract relevant information from it[3]. NLP chatbots also use natural language generation technology to generate relevant and relevant responses to user queries.
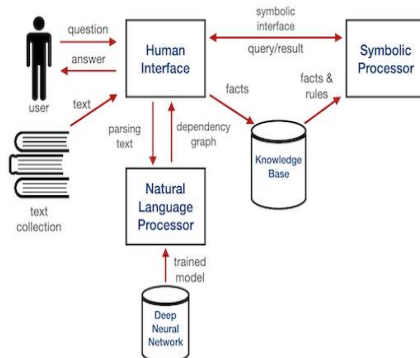

Fig. 10

D. Package Used
D. 1 Laravel Breeze

The purpose of Laravel Breeze is to provide lightweight and easy-to-use authentication scaffolding for Laravel applications.

D. 2 Spatie

The purpose of Spatie is to provide a collection of high-quality PHP packages that can be used to simplify common web development tasks and improve the performance of web applications.

D. 3 Bumbummen99

The purpose of Bumbummen99 is to provide a simple and flexible way to manage shopping carts in Laravel applications.

D. 4 Intervention

The purpose of Intervention is to provide a simple and powerful image processing and manipulation library for PHP applications.

D. 5 Yajra

The purpose of Yajra is to provide a comprehensive set of tools for working with data tables in web applications, including support for pagination, searching, sorting, and filtering.

IV. RESULT AND DISCUSSION

Laravel performs well for file read/write operations. Code generation in Laravel is done through the CLI (Command Line Interface), which is not supported in CodeIgniter, Phalcon, and Zend Framework. Laravel also provides a command scheduler that allows developers to define command schedules easily. Additionally, Laravel provides a unified API for different queue

backends, making it easier for developers to work with queues in their applications.

The project demonstrated the power of Laravel and AWS in developing and hosting a web application with an AI chatbot. Laravel provided an easy-to-use and flexible framework for developing the web application, while AWS provided reliable and scalable cloud services for hosting the application. The use of NLP for the chatbot implementation provided accurate and appropriate responses, enhancing the user experience.

The implementation of security measures using Amazon's security services ensured that the web application was secure and protected against attacks. This is important, especially when dealing with user data, which may be sensitive.

The project has a wide range of applications, including e-commerce, customer support. For e-commerce, the AI chatbot can assist users in finding products and making purchases. For customer support, the chatbot can provide assistance to customers, reducing the workload of customer support agents.
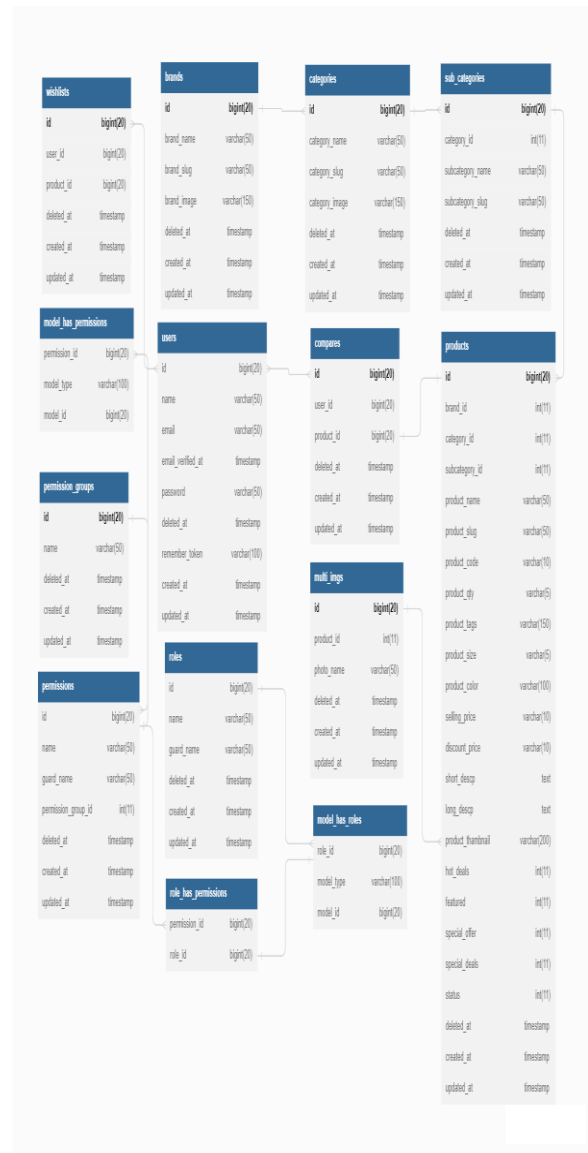

Fig. 11

It is a data flow diagram that shows how each user's data moves from their devices to the suggested system. It is a model application created using the laravel framework.

Fig. 12

This is the procedure for locating and specifying the attributes on one table in a database that are connected to the attributes on another table. These connections make it possible to retrieve and analyses data in an efficient and precise manner.
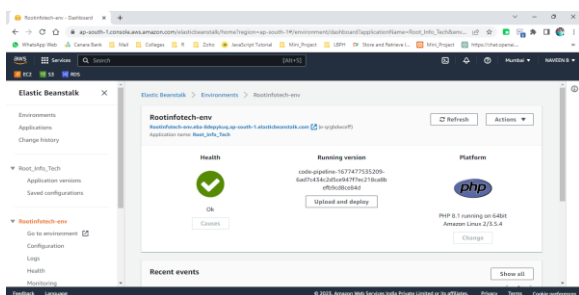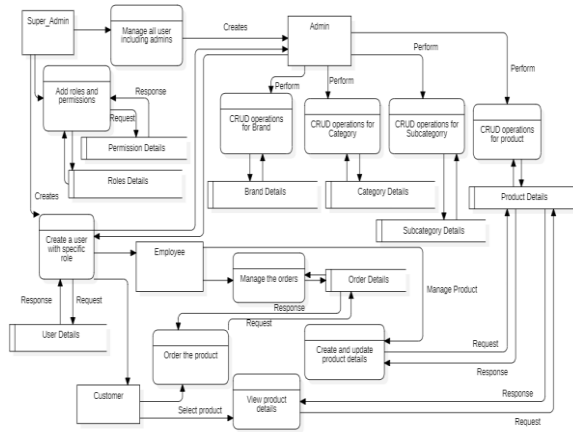
Fig. 13

This image shows the state of the environment for laravel apps in elastic beanstalk.
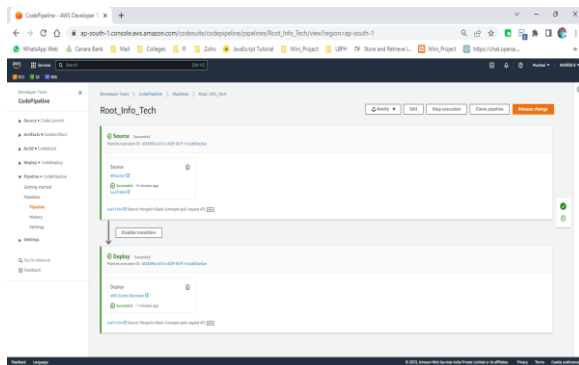

Fig. 14

The performance graph of the application environment in elastic beanstalk is displayed in this image.
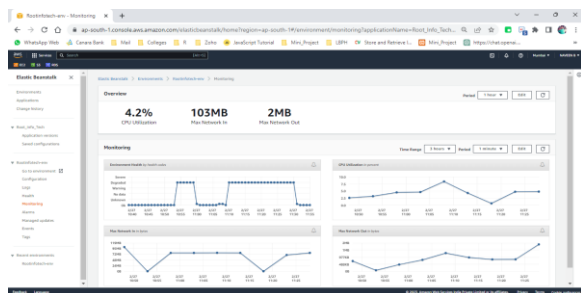

Fig. 15

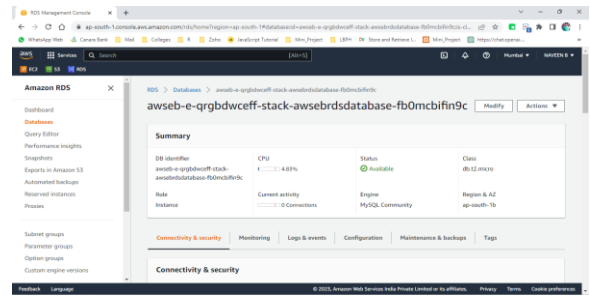This picture shows the RDS database instance that was set up for the application.

Fig. 16

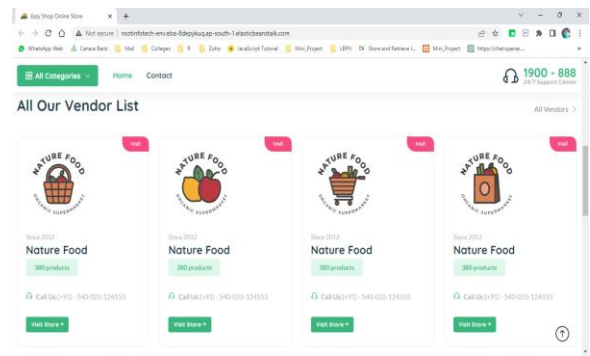This screenshot displays an RDS instance's memory and CPU use graphs.

Fig. 17

This graphic demonstrates the connection between an amazon EB instance and a bitbucket repository using codepipeline.
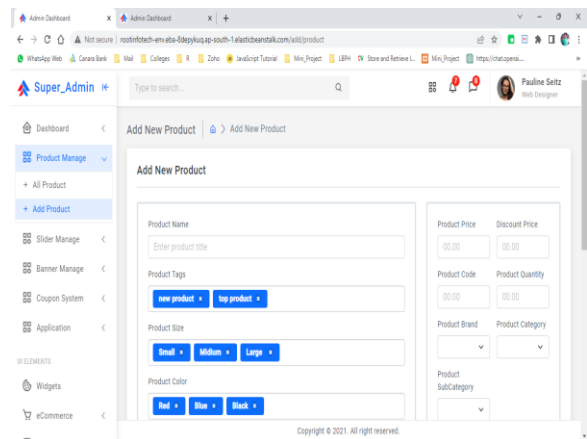

Fig. 18

It is a sample laravel-built web application home page that is hosted on AWS.
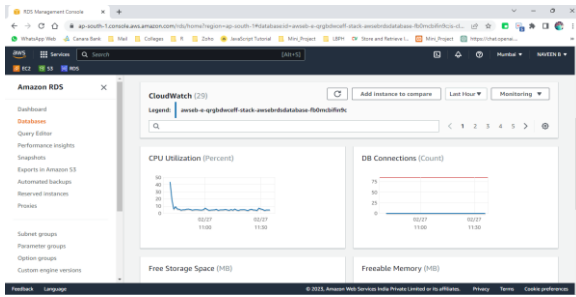
Fig.19

It is a demo admin panel for a laravel-built web application that is hosted on AWS.

V. CONCLUSION

Technology plays an essential role in our daily lives, and businesses rely on it to establish their online presence. However, web application development can be time-consuming and resource-intensive. To overcome this problem, PHP frameworks like Laravel are introduced, which provide an expressive and elegant syntax to develop web applications. With the globalization of web applications, cloud computing has become a better option for users, and there are many cloud service providers like AWS available. This paper emphasizes the usage of AWS for web development and concludes with the usage of an AI chatbot for providing quick responses to end-users. Overall, the paper showcases the importance of technology, cloud computing, and PHP frameworks in web application development.

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