Compiler Web Application Using Cloud

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ABSTRACT

In Today's world the scope and use of cloud computing has increased in everyday life. The most important thing in IT field is product development and for product development programming skills are very much important. So, we came up with a centralized solution in programming for beginners and professionals. This Solution is in the form of web application easy to access and fast enough to execute programs. Our web application will use a common server to execute different programming languages. The solution will completely remove the process we usually follow in learning process for every programming language.

Keywords – Cloud Computing, AWS, Compiler, Programming, PAAS, Integrated Development Environment, PHP, EC2, RDS.

I. INTRODUCTION

Every product has a scope and use-cases on which the product is mainly based on. We have designed our product by inspiring from the new skills and technology to deliver a better product on which the people can rely on. Our product is inspired from the true power of cloud computing, cloud computing lets us run the resources remotely, launch instances with required resources and functionalities, scaling the resources as required on the fly. Due to the high availability and scalability we can focus more on the software development rather than managing the resources. Using this technology, we have built a solution that will be ease for those who are trying to learn a new programming languages.

Cloud-compiler web application will let you perform coding in different languages like C, C++ and python without any need of downloading and installing compilers, installing different IDE's, and setting up environment variables every time. Beginners will always face some problems while setting up the programming environment in the traditional way. While facing these problems they might even stop taking efforts towards programing. Our solution is targeting mostly those students who are taking their first step towards learning and also for those who are encouraged to learn new skills without any hustle. Executing source code online significantly reduces both the hardware and the software requirement of programmers or learner when working on any project. It can be accessed from anywhere using any device like

Desktop, mobile which has an internet connection. It gives benefit in portability that is one of the purposes behind the development of online compiler. Ultimately users can spend more time on programming rather than investing a lot of time on configuring the environment.

II. APPROACH

To deliver the solution which is based on the features of the cloud computing, we thoroughly understood the services offered by the AWS and decided which services to use to develop the product. We have developed the User Interface which is required for better customer experience and firstly, we developed our project locally on our machine. All functionalities and required compilers installed and tested locally before using the cloud services. After the satisfactory results, we opted to use the cloud resources to make the product more reliable, available and scalable.

Our main objective was to provide single platform solution for all the coding languages. We have designed an interface where user can select and write the code and we internally managed to differentiate between the languages user has selected for execution. We have used the binaries of that specific language to process the code further and whatever output is achieved on the server end it is displayed on the output screen of web interface. If at all code has any errors they are also displayed in the same screen.

III. LITERATURE SURVEY

SaaS (Software as a Service) is the widely used feature of cloud computing. The cloud provides more flexibility and low cost to make account and maintenance. The public cloud providers provide many software services via internet. Online programming language Compiler Using Cloud Computing is a SaaS application. As of this is the ending of 2020, there are a few researchers that have implemented the similar system of cloud-based coding application whether they may be web application or android application. Most of these people had an approach of compiling and executing the codes in the programming languages like C, C++, python, java and so on which was a very good alternative back in the day but as for

now technology is rapidly evolving that we need to pull our sleeves to cope up with this evolving world in order to get most of advantages from this technology.

The main drawbacks of these previous systems are they have interface and functionalities for only one technology at atime to execute so, we are planning to counter this need in our project and develop a platform where we can integrate different technologies for a project to build a more feature enriched project.

[1] Online compiler as a cloud service by Arjun data - The application was a great advantage in the world of using cloud computing reduces the price of storage.2014 IEEE International Conference on Advanced Communications, Control and Computing Technologies.

[2] A cloud-based Java compiler for smart devices by Tanko Y. Mohammed - This research aims to leverage cloud computing, the availability, prevalence the ever-growing market of Android devices to provide users with text editors.2016 15th International Conference on Information Technology Based Higher Education and Training (ITHET).

[3] Online C/C++ compiler using cloud computing by Aamir Nizam Ansari, Siddharth Patil - The paper aims to describe an online compiler which helps to reduce the problems of portability and storage space by making use of the concept of cloud computing.2011 International Conference on Multimedia Technology2011 International Conference on Multimedia Technology.

IV. SYSTEM DESCRIPTION

The cloud based Integrated development environment is a Cloud dependent system where we are using the cloud services such as AWS EC2, AWS RDS. To develop an environment which will acquire all the necessity prerequisites that we will use to execute the programs in different programming languages and functionalities in different technologies. Here we are using cloud services to deliver a PAAS (Platform as a Service) to the users where they can develop a full-fledged project on top of our system.

A) **Interface** –

The User Interface is most important aspect in terms of frequent use from the users, the interface must be clean and easy to handle. Every product with a simple but effective user interface creates an impact on the user and can easily navigate through the product with no issues. We created a Set of modules as follows:

i) **Login and Registration module** –

Users can login to the main dashboard of the web application using their login credentials. If user do not have any login credentials, he may create a new profile/account by providing minimal information and then proceeding towards login page.

ii) **Learning Module** –

As mentioned above the user can execute code in 3 different languages, so accordingly we have provided tutorials for these three languages separately on our web page. User can refer to these pages for easy implementation of the code.

iii) **Compiler Module** –

In the compiler module we have 3 different language options as mentioned so accordingly user can choose the languages whichever they want to execute, after writing code in the compiler they will submit the code, this code will be received by the internal functions so accordingly these functions will process the code as well as checking for any errors, if the code is correct output will be displayed on the output screen.

iv) **User Profile** –

User profile is where we can create our personal profile after registering in the web application. User can add information like contact number, education, position, email, date of birth, and social media profile links like twitter, Facebook, Instagram and LinkedIn. Automatically generated ID will also be assigned to every user. This will display the information given by the particular user which is logged in into the system.

B) **Functional Work Flow** –

As cloud computing is highly scalable, have rapid elasticity and on-demand resource allocation it is the best solution to use for the development of a system where we need resources with high scalability properties.

1. We are launching an EC2 instance on the AWS cloud services, an EC2 instance will allow us to launch a virtual machine with the configuration of OS, CPU, memory, storage and networking as per our need. We are using free tier services of the AWS, so we have launched t2.micro instance by configuring it with Ubuntu OS, 1 CPU, 1GB memory and 10 GB of storage which we can expand till 30 GB.

2. We have deployed our application on the instance and the files are stored '/var/www/html' location which is the path of apache web server. As we have launched ubuntu operating system, we have installed all the compilers, and packages manually on the ubuntu instance for the C, C++, and Python.

3. After configuring the compilers and packages we configured the environment and gave path to all compilers in our web application.

4. For the gcc, g++, python binary packages, we have used apt package manager of the Ubuntu. It will fetch the packages required from the official repositories and will install on our instance.

5. For the database, we have used AWS RDS service, we have

launched a database instance with MySQL. We have migrated from our local database to the AWS RDS. The endpoint of this instance has been integrated with the php connectivity file to access and fetch the data from the database.

6. AWS RDS don't have a public IP so, no one can access the database directly. It will only be accessed through the front-end of the application.

7. Whenever user will input the code of a particular language, after hitting on run code, it will be sent to the particular language compiler and temporary file will be generated for that code, and then it will compile, execute the code and the output, will be fetched by the application and be displayed on the screen to the user.

V. IMPLEMENTATION

The Following images are representing our infrastructure that's providing resources for the web application COMPILE.
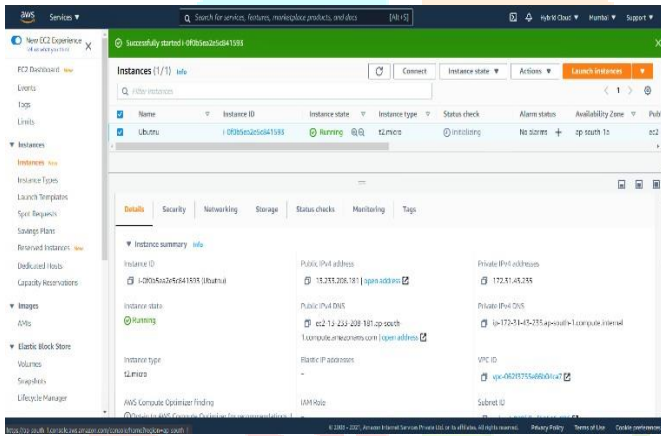

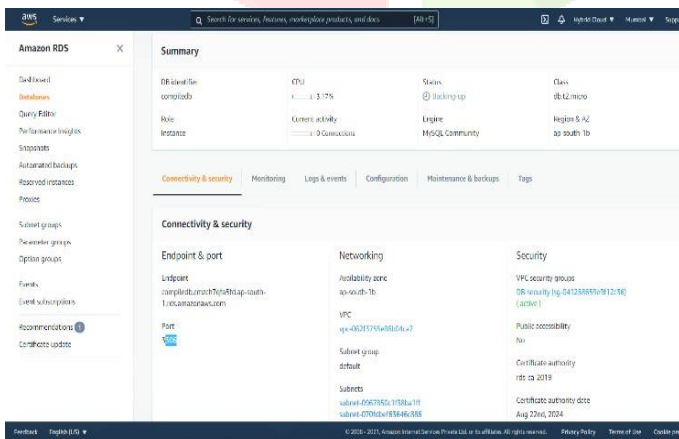Fig 1) EC2 is holding our Front-end application.

Fig 2) required database running on AWS RDS.

Although the Compile web application is designed to be as simple as possible with only a few commonly used options, it is

sufficiently functional and can be used quickly. If input code area is empty, system will display the warning message. Otherwise use Run code to represent the result of compilation that are returned from the server. After successful compilation without any errors compile web application will provide user with desired output.
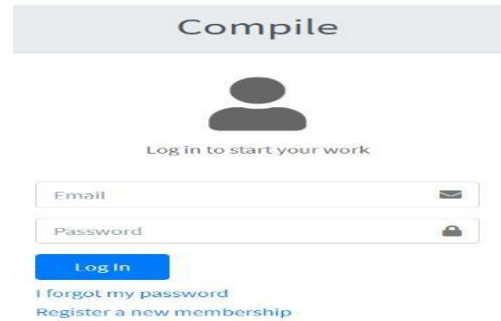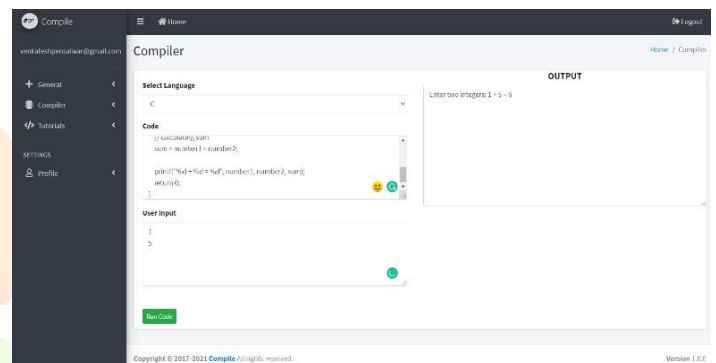

Fig 3) Sign UP Module

Fig 4) Main Compiler Module

VI. FUTURE SCOPE

Cloud compiler web application gives a long-term solution in the field of online coding platform, this platform can be developed further in a form of full-fledged online integrated development environment which lets you manage your project, with a workspace where we can create and import project files, with an integrated terminal for windows command line or Linux command line. We can include various programming languages like JavaScript, Go, Dart, C#, PHP, Scala, Ruby. We can add personalized themes according to the need of user. We can integrate tools like IntelliSense which will allow the code auto completion when user writes the code in the IDE.

One interesting solution that can be provided in the future that is to use this platform for the coding competitions and hackathons where students can remotely perform coding and can participate in different events which may be held using this platform. We can integrate web-hooks and actions due to which when user will commit the code, it will directly go to GitHub and the code will be deployed as user will mention it

in the web-hooks. Many new technologies will be invented in the future, main concept of this project is being able to integrate new technologies in this platform. We can integrate Debugging tools which will let user to have the ability to completely test your application before the deployment. Virtualized technology allows servers and storage devices to be shared and utilization to be increased. We can provide the solution to businesses where they can develop Enterprise level applications more securely and on the large scale, clients can opt for this platform and they will have highly available and scalable resources as well as an environment configured with respect to their needs for the ease of development.

VII. CONCLUSION

The use of cloud computing makes it highly scalable and on-demand resource allocation will be useful where higher demand is observed. This platform will eliminate the drawbacks of traditional methodologies and will make it more advanced in terms of functionalities. Moreover, in today's world we require everything fast, efficient and accessible for all. This system encounters all of the problems and requirements that we face in this technology driven world. By integrating and enhancing the capabilities of technologies, we are introducing the 'Cloud-based Compiler Web Application'. In conclusion, we can say that this system will make a great contribution towards the ease of programming as well as professional programmers where the integration of different technologies is efficient and reliable. Where beginners can learn basics of programming by implementation and professionals can use it on daily basis to reduce on premise resources as it available to public so anybody can use it from mobile device as well as professionals can use it for onsite implementation and testing where the resources are not available.

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