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Android Cloud Compiler

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Abstract – *Cloud compiler is a computer program which is used to convert code that written in one programming language into another language. To execute different programming languages the programmers need to install different compilers and its desirable files on system. It leads to slow down of the system performance, and memory management issues. By using a cloud compiler we can solve this problem. The cloud compiler is a tool for compilation which helps the programmers to execute and run their programs in any language without installing different compiler. Apart from local machines we can implement cloud compilers on android, so the programmers can easily be run programs on smart phone. It led to a new branch of cloud technology called mobile cloud computing.*

Key Words: **Android, Cloud Compiler, Software, Smart Phone, Computing, Amazon EC2.**

1. INTRODUCTION

Internet technology plays an important role in today's world. Different fields in IT contributed a lot in development section. One of them is cloud computing in which data are processed and store since early 2000s. Cloud computing is all about storing and retrieving of data, and it provides services on demand over internet. The National Institute of Standards and Technology definition of Cloud Computing states that "Cloud computing is a model for sanctioning convenient, on demand network access to a shared pool of configurable computing resources that can be provisioned immediately as required and released with minimal management work". Millions of users are connected in a virtual space provided by cloud through internet. In cloud there are different servers present at different location. Users can access them any time. Many modern web applications use cloud. E-Mail, Web Conferencing, Customer Relation Manager (CRM) mainly relies on cloud services.

The main aim of this paper is to bring the cloud computing and android together which helps the programmers to work on their code by just using the smart phone. Without the system, they can compile the program and Installation of separate compiler on each machine is avoided. By using cloud based compilers it provides a platform independent environment which are free of restriction, complication, and compatibility issues related to platform. The compilers make the compilation of code easy by using cloud virtual machine. Parallel access and portability provides the mobile cloud computing much popular. The next generation of open operating system won't be relying upon computer or mainframes, but on mobile devices that we use every day. The innovation of this new environment will leads to new application area and markets and will enable great integrations.

This project deals with a new Integrated Development Environment for multiple languages to code, compile and run the code using the android based IDE through the Internet. The users have to register onto the system and can write Programs online & save those in their profile and manage it. The programs are then stored on the cloud can then be compiled and/or executed depending on the language chosen by the user on the front end(IDE). After, the language is chosen by the user the request is forwarded to the respective compiler. Multiple users can write programs at a time in several programming languages and can also compile and run the program. While the program is running user can give input in program therefore the program is execute and also displays the output.

2. RELATED WORK

The main aim behind this project is to reduce the problems of portability of storage and space by making use of the concept of cloud computing. The paper presents an android application that the programmer can use the benefit of the Cloud compiler service. The user can compile any code or file with extension C/C++, Java, Python. An analysis was done on different topic while designing android compiler. Cloud computing provides different services for actions like Storage, Operating Systems, Machine Learning, Security, etc. Users need compilers installed in their machine to run the programs. Different compilers are expected to run different programming languages. Users can access cloud compiler online. So that, users can run their programs at any time they need.

Here the author (**Datta and Paul, 2014**) specifies the online storage for the users, so that, they can access their program at any time. All compilers used separate virtual machine. It is time-consuming activity. Now-a-days all the applications, programs, servers, resources are stored in cloud for a better access. In this web application user can create a group of members to access the same file. By accessing the same file, a collaboration between the users will occur. The web application also provides the functionality like sharing the code with other users, etc.
Here in (**Murli Manohar1, 2017**) the android based Java compiler can be used to run the java programs. They are using SOAP as a protocol which is used in implementation of

web services for exchanging structured information. SOAP's primary use is for inter-application communication. So, it performs a very important role between service requester which is user and service provider. It is centralized and on cloud, so upgrade, update or installing compiler is not the issue for user, and it can also be run on low end devices.

Authors (**Tushar Saxena, Utkarsh Agrawal, 2019**) gave an online compiler for creating and managing python code in clod using SAAS and C4.5 algorithm. The advantage of this project is that whenever the compiler package is to be upgraded it is often done easily without again installing it on each and every machine.

3. PROPOSED FRAMEWORK

We can divide the entire architecture of the system into three layers.

A. Application Layer (Front End)

B. Connection Layer

C. Data Layer(Back End)

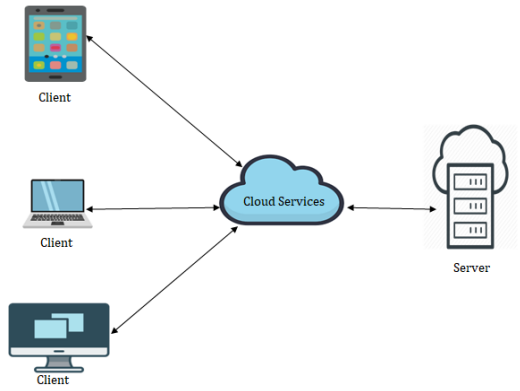

Fig -1: Cloud Computing

Application Layer: The application layer is an interface between the client and the cloud system. It is an android application which support only for versions lollipop and above. This layer provides output and seeks input from user. In this application user can type their code in console or upload a file from mobile phone and choose corresponding programming language. They can compile the code using application and can see the output on the console. Any error occurs in the code are shown on the console during the compilation of the program. But it requires high speed internet connection otherwise editors can be used to writing the code and storing it in database. When device get proper internet connection it will automatically upload the code.

Connection Layer: After selecting the programming language the flow will move into the connection layer. The connection layer is an important part of the architecture. After it detects the corresponding language, code can be sent to cloud, chooses the corresponding compiler and sent the code to that compiler. Information of the user will be stored in the database using connection layer. It connects the server when user registers, sign in user account or submit code.

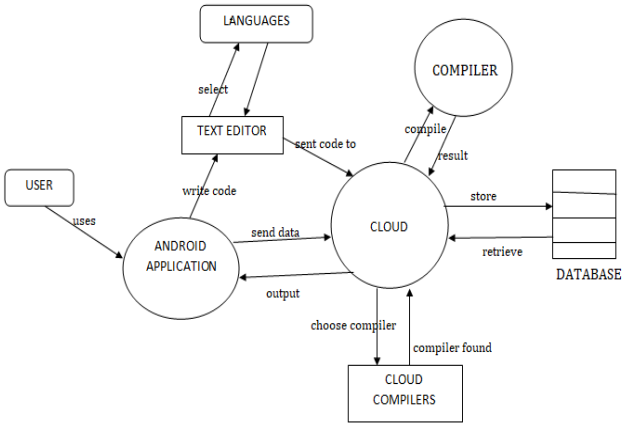

Fig -2: Architecture of System

Data Layer: All the user information and files are stored in the back end database in an encrypted format. These files are accessible by the user at anytime from cloud.

4. IMPLEMENTATION

Before explaining the implementation there are many chances to arise a question that how to compile a program in the mobile that doesn't contain a compiler or where it based. Actually, the cloud is a virtual workspace that provides many services like hardware, operating system and also compiler for compilation of program. This project's main aim is, we can easily write program, compile and debug it in online using smart phone. This system is portable and the computation can be done onthe-go. Installation of separate compiler on phone is avoided.

In this system, the cloud would include compilers for Java, C, C++ and PYTHON code. User is able to login to the server only if he/she has a login id and password. The application will provide a text editor to enter the above mentioned programming languages or user can upload a new file. After entering the program code then he/she should choose a programming language. Cloud will assign the compiler depend on the languages selected by the user. A run button is available to execute and run the entire program. The system would compile the program and if no errors are found, it will start executing the program. If any error occurs it will be displayed in output section. If the program can takes input from user then there is an extra textbox. Before executing the program user can add input to that box. All the programs are saved automatically and the user can change the program whenever required. Also user can delete the files by just swiping it to the left side.

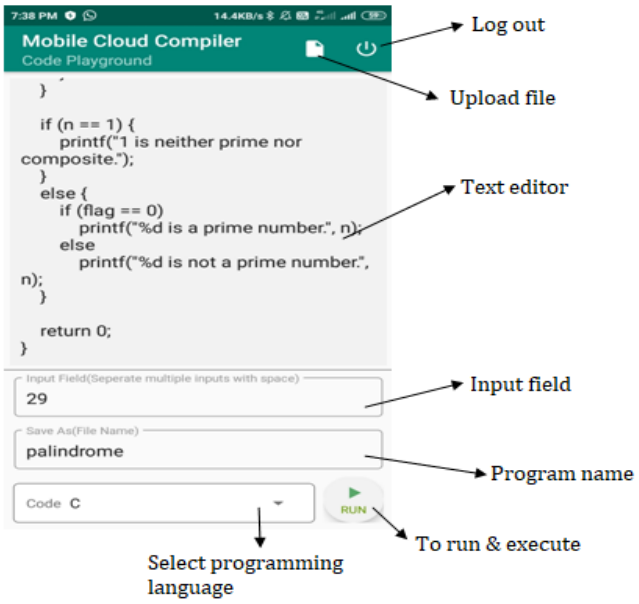

Fig -3: User Interface Design

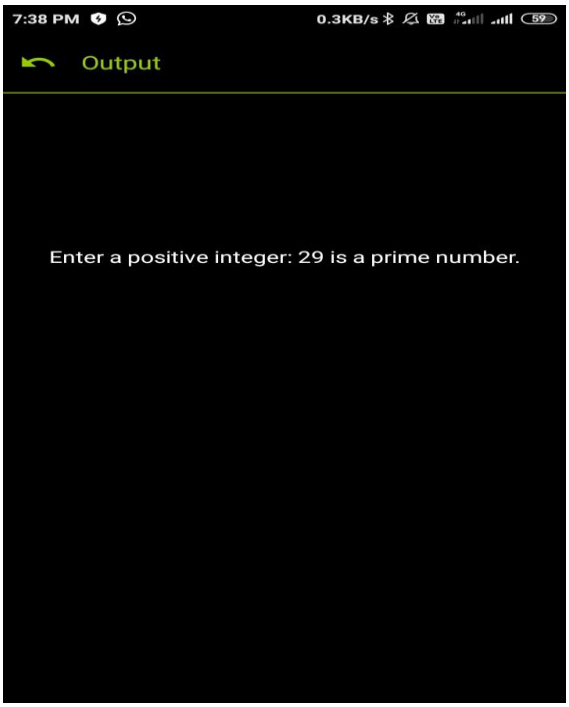

Fig -4: Output

4.1 System Requirements

A) Software Requirements

Environment : Android studio 8.0

Operating System : Windows 8.1

Language : JAVA

Application : Android Application

Front End : Android studio 8.0

Back End : MY SQL (CLOUD)

Other Tools : Adobe Photoshop, LATEX, Paint

B) Hardware Requirements

Processor : Intel Core i3

RAM : 4 GB

Hard Disk Drive : 1 TB

4.2 Development Tools

A) Android Studio

We can easily develop android app with the help of android studio. Android Virtual Device Manager and Android Device Monitor aids in the running of the android application and makes it much easier. Gradle helps in the configuration of the the application with ease. It also ensure that the code is bug free. Android Studio makes android app development process very easy and fun filled, with minimal effort and a bit of coding knowledge, any app can be developed. Android Studio provides a way to add UI(User interface) in the app: By directly writing the required code.

B) Amazon EC2

Amazon Web Services is a subsidiary of E- Commerce giant Amazon which provides cloud services. It offers such various services such as: Data storage, Data processing Offering software as a service: Infrastructure as a service and Platform as a service.

4.3 System Design

The different modules included in Android IDE to Code in the Cloud are as per the following:

- Registration: -

  User can access the service from cloud after this step.

- Login:-

  Authorized user can login with his username and secret password.

- Open Project/File:-

  This module is used to open existing documents and tasks.

- Delete Project/File:

  This module allows user to either delete particular file or remove the whole program itself.

- Run: -

  This module allow user to run the code. The outcome will be shown by the user.

5. ANALYSIS AND RESULT

- This android application successfully works on android device with a cloud compiler. All the executions are perfect.
- It will successfully upload the program code and compile it and shows output or errors if any.

The android compilers are compiling the user code and generate the output in the text editor. It gets the input from the user and also shows the error that is generated by the code. The user needs to register with this application by using their username and password. This application will help the user to easily create the files by selecting the programming language and typing the input and program name. Once the run button pressed, it automatically executed the program and saved. The user can upload their code to the cloud compiler by selecting the program file. Also the user can delete or edit the program whenever required.

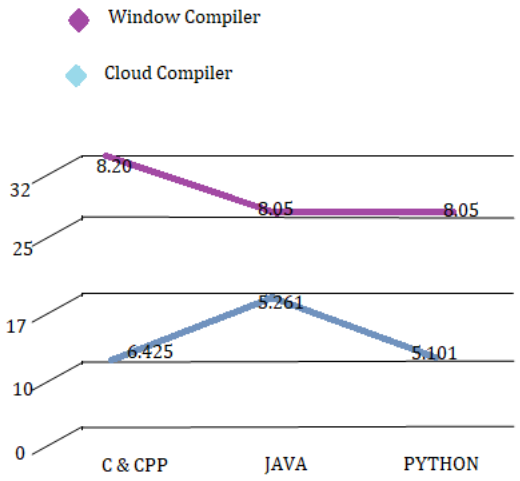

Fig -4: Execution time of Cloud vs. Windows compilers

In this figure it compares the execution time of c, c++, Java, Python in the cloud with Windows compilers. The x-axis represents the number of program that compiled by cloud compiler and windows compiler at a time. Y-axis shows Execution time of the program in cloud and Windows compiler. This cloud compiler will helps to reduce storage space and it provide portability.

6. CONCLUSIONS

The project aims at creating & compiling C, C++, PYTHON and JAVA code in the cloud. As compared to the current scenario where each mobile phone needs to separate installation of compiler software and it execute and utilize large amount of phone memory. The main advantage of this project is we can run many programming language in mobile phones without installation of separate compilers. The programs are stored on could and the compilation of the programs will be managed by the cloud. The cloud manager identifies the programming language in which program is written and sends that program/code to the respected compiler. The proposed system showed how android and cloud computing could be combined to eliminate the problem of storage.

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