Cloud Compiler Based on Android

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Abstract: *A cloud in an IT environment represents a framework for managing and measuring remotely located resources. Cloud computing refers to the technology that uses the concept of Cloud for enabling convenient network access to configurable computing resources. Introducing cloud computing in mobile devices led to a new branch of cloud computing known as Mobile Cloud Computing. The new branch, mobile cloud computing merges the services provided by Cloud and their access through mobile devices. The mobile cloud computing has been becoming widely popular due to its portability and parallel access to resources. This idea created a base for this paper which discusses on compiler deployed on cloud and their access through Android Smartphone and the web. In this system, the cloud would include compilers for Java, C, and C# code. The system would compile the program and if no errors are found, it will start executing the program. The facility for providing inputs to the program is also provided. Many programmers can take advantage of the ability to use compiler application on mobile devices. Thus, enabling them to easily access, modify and compile the code and removing errors on-the-go. This will transfer the responsibility of installation, upgrade and maintenance of compilers from general users to cloud compiler service providers.*

Keywords: cloud, compiler, android, portability, mobile, java, c#, c

1. Introduction

Information Technology has contributed a lot in development of whole world in this era. Different fields in IT sector have extended their hands for the drastic rise in improvement of human lifestyle. Cloud Computing is one such field which revolutionized the way in which data is stored and processed since early 2000s. Cloud is an idea of providing a computing service to the user instead of providing a product to use. 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". Exploring cloud can vary from different perspective because it can be used for various purposes. In short, cloud computing means accessing and storing the data and programs over the Internet instead of using your own computer's hard drive. Thus, using cloud computing would provide access to files anywhere provided network connectivity is present.

The system aims at bringing cloud computing and Android operating system together for supporting programmers to work on their code using mobile platforms. The programmer can use the benefit of the Cloud compiler service through an Android application. The system built, is not restricted only to Android users as it also provides a web interface, so that it can be accessed through a web browser using any internet-enabled device. In our system, cloud plays an important role of providing services of program compilation. And if successfully compiled it will generate proper outputs too. Users from different variety of backgrounds can be benefitted by using this application. These users can create their account and can have their private workspace for files and project sharing.

2. Methodology

A. System Design
The system is designed to work for three fields, we call it as zones. So, the system is divided in specially three zones:
1) Application Zone
2) Communication Zone
3) Database Zone

Application Zone: The application zone consists of the interface from where client can interact with the proposed system. The modules included in this zone are the Android application and the browser. The Android application is only for versions Gingerbread and above. Any person who doesn't have Android can also use the proposed system through web browser. This web browser can be for any platform like Windows, Linux, Mac OS, etc. These interfaces will provide the user with editors and various options through which user can avail functions needed such as compile and file upload. The application zones must be provided with an Internet connection. Without Internet connection, the compilers can't be used. Only editors can be used for writing the code and can be stored. Whenever the device gets Internet connection, the files will be uploaded automatically if the user wants.

Communication Zone: After once code being sent for compilation, the flow will move into the communication zone. The communication zone is the core part of the model. First, the code's language is used to detect the type of language the code consists, so that the code can be sent to the appropriate compiler. Communication zone also includes scheduling the compilation queue and to check whether the compiler is idle or not, if not then the code goes to wait state. After the compiler being detected in the idle state, the codes are sent directly for execution. For getting access to the workspace, the user has to register first time and then login. This transferring of user-name and passwords in an encrypted format is included under communication zone.
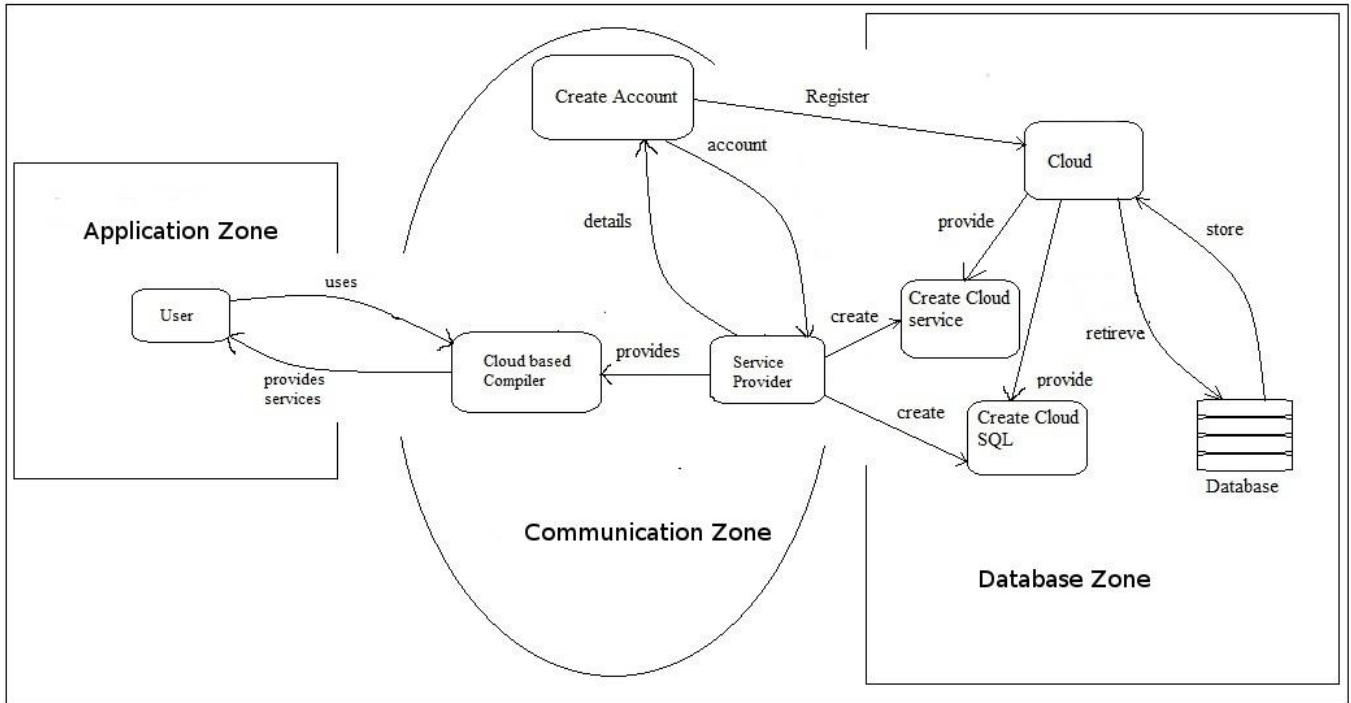
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Figure 1: Architecture of System

Database Zone: The database zone consists of total back end contents such as workspace, user-name and passwords. These passwords are saved in encrypted format in the tabular database. The users will be provided with the limited workspace for storing their codes or mini-projects. Whenever any individual user logs in, he will be provided with his workspace only. These files are accessible either from Android application or from the web browser.

B. Working

The whole system is made to compile a program on a system which doesn't have compiler in it. So, the question arises that from where it searches the compiler. Actually, the cloud is web space which provides the service of compilation of the program.

1. The program can be written onto two editors provided in the system about which we are discussing.
   a) One of which is an Android application interface and
   b) Another is a web interface which can be accessed using a URL.
2. Unlike other online compilers it is having an additional feature of manipulating run-time interaction by passing parameters.
3. A user can register him and use the small web storage space into the account. A special database of maintaining usernames and passwords is maintained. These passwords will obviously be in encrypted forms for ensuring its level of security.
4. This storage will be useful in storing the program on cloud and can be shared using the link.
5. When a program is reached at server side it will be looked for an appropriate compiler and then assigned.
6. The compiler will accept the program with the parametric inputs provided and will compile it.
7. It will execute if found with zero errors and display the output on respective android Application or on browser.

3. Design

Fig.2 shows the image of compiler page on web browser and how exactly it works. In compiler page the first option is load file which helps user to upload their source code. Then two buttons are provided, one is to upload a file and second button is to compile, which compiles the uploaded code. After compilation, it gives output which may either be result or errors in code. Shown below are the two windows, the first window will show the result or output of the given code and second window will show errors or error summary.

Figure 2: Compiler page on web browser

The compiler design interface on Android device is shown in Fig.3. First as we open the app on any android device the first window it will prompt for language selection where user can select programming language e.g. C, C#, Java. There is space provided for users to type their code. Two buttons are provided, one is for saving changes if and second button will take you to a new intent which will provide an option for accepting arguments, uploading and compiling the code.
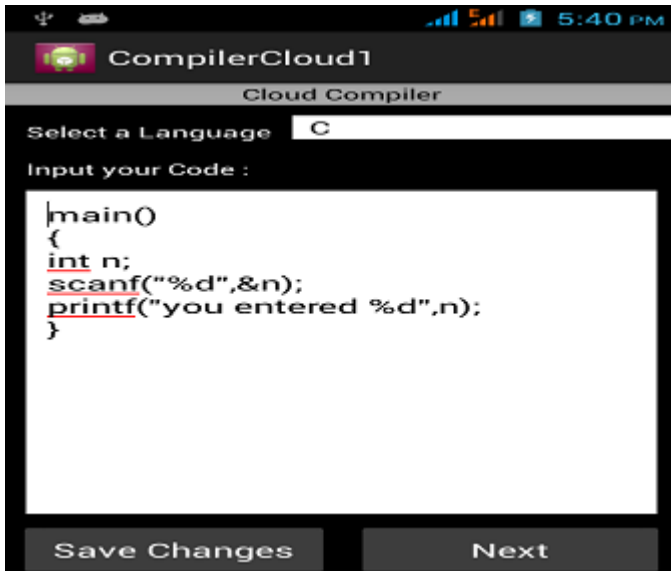
Figure 3: User Interface design of Android Application

Fig.4 shows the detailed stages of compiler. Figure shows how the compiler will work exactly step by step from user or user interface to web services and cloud compiler.
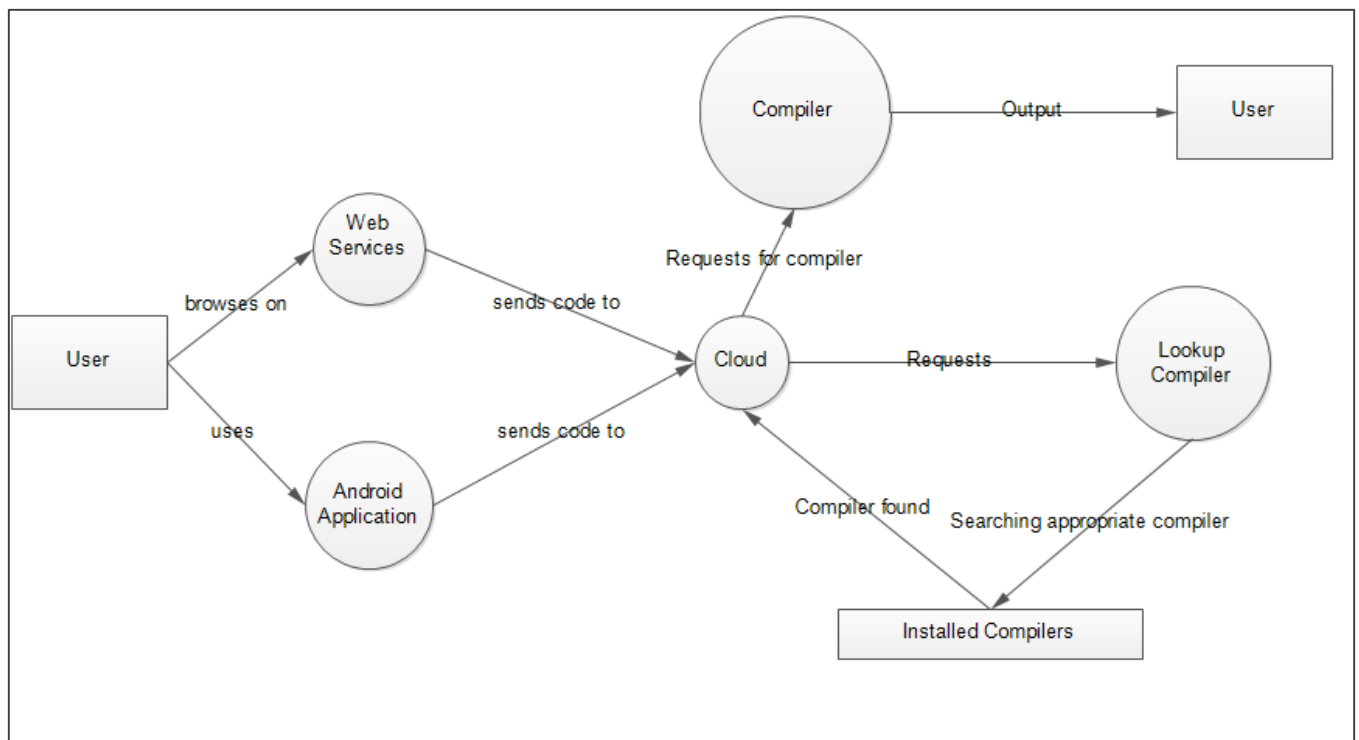

Figure 4: Detailed stages of system

C. System requirements for cloud compiler

1) Hardware requirements –
- An Android phone for running Android application
- Any other device capable of running browsers can contribute to the working of system.

2) *Software requirements -*
- Mobile Client - Our Android application on client's device.
- Client Using Web Browser -Web Browser (Firefox, Chrome, Internet Explorer, Safari), Operating System (Any).
- Database Server – MySQL, SQLite, Operating System (Any).

- Development End - (Java, .Net framework, HTML, ASP), OS (Windows,Linux), Web Server, StarUML, Eclipse or Netbeans.

D. SOAP (Simple Object Access Protocol)
SOAP is a protocol which is used in implementation of web services for exchanging structured information. In cloud compiler module, SOAP's role is very important because SOAP is used by the web services for standard messaging. 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.

In fig.5 overview of SOAP is shown below:
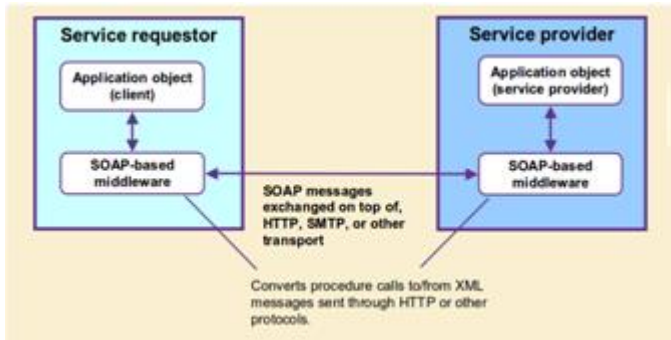
Figure 5: Overview of SOAP

We use SOAP because it provides portability. By using SOAP there is no issue of portability. It is also having ability of interoperability which is useful for cloud compiler system.
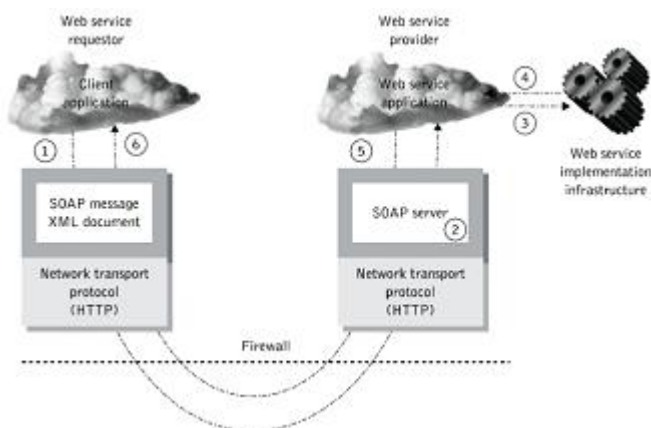
Figure 6: SOAP's working in distributed messaging

4. Implication

1) This system is portable, the computation can be done on-the-go.
2) This system provides great flexibility.
3) This system is location independent.
4) This system provides better reliability as data is stored on secure server.
5) This system gives ability to use different compilers allow the programmer to pick up the fastest and the most convenient tool to compile the code and remove the errors.
6) Cloud computing can reduce both capital expense and operating expense costs.

5. Result and Testing

- It successfully works on android device using android app for cloud compiler it will perfectly perform its work. It will successfully upload the user code and compile it and shows output or errors if any.
- In non-android system it will also work with the help of web browser it was also successfully tested that on any web browser user can open cloud compiler web page and upload their code and gets the output of the code and it will also show errors if any errors present in uploaded code.

6. Conclusion

Cloud Computing is an vast domain which provides storage, computation, data retrieval services without the end-user having the knowledge of configuration and physical location of the system that provides the services.

The main idea behind developing this project is that it eliminates the need of installation of compilers in each and every device as the cloud provide services for compilation of programs. Also, it will act as a centralized repository for C, C# and Java in which user will have a facility of storing the programs and accessing their files through their respective login details. It is centralized and on cloud so upgrade, update or installing compiler is not the issue for user and it can be also be run on low end devices. Another advantage is it can also be used or access by non-android user through any web browser. We have also provided authentication and personalization by providing username and password.

7. Acknowledgment

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