

# Web Based Integrated Development Environment

Mala Dutta, Kamal K Sethi, Ajay Khatri

**Abstract-** *Integrated Development Environment is an application which provides facilities to programmer for software development such as code completing and fixing, source code editing and management, automated testing, etc. Software is rapidly moving from the desktop to the Web. The Web provides a generic user interface that allows ubiquitous access, instant collaboration, integration with other online services, and avoids installation and configuration on desktop computers. Moving IDEs to the Web is not just a matter of porting desktop IDEs, a fundamental reconsideration of the IDE architecture is necessary in order to realize the full potential that the combination of modern IDEs and the Web can offer. This paper discusses implementation of Web based IDE environment for compilation and execution of codes written in different languages like C, C++, C#, VB, Java, Pascal, Perl, Python, Ruby, Fortran, PHP, SQLite, CSS, HTML, JavaScript, VBScript languages. Users can edit, write, compile, debug and store their code on server. Users need not to spend their time for finding and installing an IDE for different languages. User can use IDE in any device like PC, tablet and mobile devices which has browser with internet connection. Web Based IDE can be used in low configuration systems also.*

**Index Terms**—*Integrated Development Environment, Web, Compiler, programs.*

## I. INTRODUCTION

Software is moving from the desktop to the Web. Online services are rapidly replacing traditional downloadable software products. Based on the latest developments in Ajax technologies, vastly improved JavaScript engines, and the introduction of HTML5, there is now even a small but growing collection of browser-based code editors. Fully fledged integrated development environments (IDEs) are still lagging behind in this pull towards the Web. Modern, desktop-based IDEs integrate a wide range of software engineering tools, and provide a platform for writing, maintaining, testing, building, running, debugging, and deploying software. They increase developer productivity by incorporating many different kinds of editor services specific to the syntax and semantics of a language. These services assist developers in understanding and navigating through the code, they direct developers to inconsistent or incomplete areas of code, and they even help with editing code by providing automatic indentation, bracket insertion, and

content completion. The integration of complete tool suites for software development and the development of language-specific editor services took a tremendous effort for the current generation of IDEs such as Eclipse and Visual Studio[19].

This paper discusses the implementation of Web Based Integrated Development Environment (IDE) for the different languages to code, compile and run the code. The Web Based IDE will allow easy development and testing of applications. The users have the privilege to register on to the system write, save and manage programs online. After the language is chosen by the user the request is forwarded to the respective compiler. Multiple users can write programs in different programming languages and also can compile and run the program.

## II. WHY WEB BASED IDE

Software development is an important activity in today's world. In old days, programmers used to write codes into the text files and then by using compiler and similar tools which are command line based, these written codes were turned into software programs. As the computers evolve, size and the complexity of software production increased. With this increasing complexity, accomplishing tasks such as code editing, build automation and debugging started getting more and more difficult. Solution for this problem of programmers is found to be Integrated Development Environments which are commonly referred as IDE's. Although IDE's are life saver for programmers, these software applications have couple of drawbacks. Local systems IDE's are installed on a system and one need to use that computer to use features of IDE and develop the software. Stand alone IDE high computer resources, as IDE's supported more facilities to the programmer, they require much more computer resources, especially memory and CPU, which may not be available all the time.

Most of the desktop based IDE's require the development environment to be set up on their machines. This development environment requires language specific integrated development environment like eclipse or visual studio to be downloaded and configured within the user's machine. If the user decides to work on a different machine the entire development kit and IDE has to be installed in the new system which makes the process tedious and extremely inconvenient.

Web based IDE thus provides a solution to the given problem and gives user the flexibility to start a web browser and open his/her project. The basic requirement here is that the user must have access to an internet connection to be able to connect to the Web IDE. We will install all programming development environment on a server.

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### III. RELATED WORK

Many efforts have been made to implement online compiler and runtime environments in past few years. In this section we briefly discuss recent developments.

Python Fiddle [7] is a code editor and code execution environment that allows programmers to run snippets and debug scripts on the go. It supports a plethora of third-party packages, boasts superb documentation, comes with a wide array of built-in hot keys and is also open source to boot.

Coderun Studio [2] offers users a cross-platform tool for writing ASP.NET, JavaScript, C#, HTML and CSS. Its default Visual Studio compatibility is a nice touch and should have Microsoft-focused coders feeling right at home. It comes equipped with the usual bells and whistles like code completion and syntax highlighting.

Remote Application Platform [1] Project is an open-source software project under the Eclipse Technology Project which aims to enable software developers to build Ajax-enabled rich Internet applications by using the Eclipse development model, plugins and a Java-only application programming interface (API). It can be considered a counterpart for web development to the Rich Client Platform (RCP). Sourcekit is a lightweight, browser-based alternative to bloated desktop development suites. Supported languages include all the majors you'd expect, such as C/C++/C#, PHP, Python, Javascript, MySQL, Java and Ruby.

Kodin [3] allows developers to code in PHP, Python, Perl and Javascript while working with popular frameworks like Django, Ruby on Rails and Node.js. WeScheme [6] is an educational programming environment, embedding CodeMirror [4] for syntax highlighting and bracket matching. However, these can be useful tools for coding small programs, they do not provide a comprehensive environment with all the facilities that are especially important for productivity in larger projects. They also do not offer any support for collaboration.

Another IDE, specialized to IronPython, is provided by VoidSpace, and uses SilverLight for its implementation [8]. There is currently one open source initiative for creating an extensible IDE for the Web, allowing developers to add new components using JavaScript. The Cloud9 project [9] integrates the Mozilla SkyWriter [10] and ACE editors, and provides a plugin based IDE architecture in HTML5 and JavaScript. Compileonline[17] provides more than 50 language compilers online but does not provide facility for store the program. Using compilr [18] we can learn programming languages and execute programs online.

An Online Programming Tutor named Problets by Kumar [11] is designed as a tutoring system for students to learn Java, C++, and C# OO programming. It mainly covers Java programming and basic programming constructs.

In Cloud9 IDE [9] front end is all Javascript, while the back end relies on the popular NodeJS framework. It has syntax highlighting for C#, C++, Python, Perl, Ruby, Scala and a few others as well. Codeanywhere [20] is a code editor in a browser with an integrated ftp client, and all popular web formats are supported (HTML, PHP, JavaScript, CSS, and XML). Cloud IDE [5] is a solid Web IDE which supports the usual languages like Javascript, Ruby, Groovy, Java and HTML.

### IV. SYSTEM DESIGN

#### A. Architecture

Users are required to register through the web interface. Whenever a new user registered, all the required data will be created in the database and a predefined workspace will be assigned for the user. Later, user will be able to login and logout the system anytime.

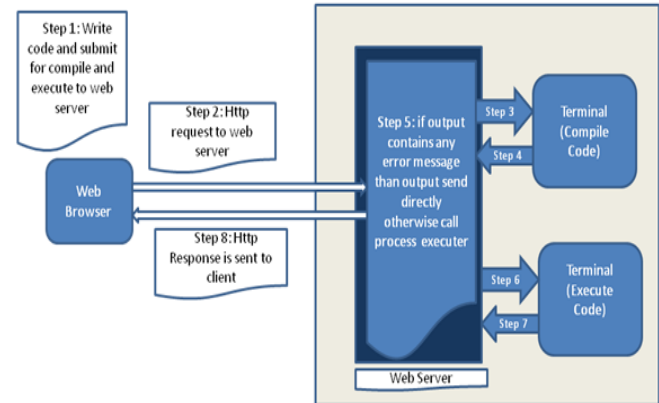


Figure 1: Architecture of Web Based IDE

Steps for web based IDE are as follows.

*Step 1, 2:* Types the program code on the text area provided on the web page and submits the code to server.

*Step 3:* Web server will call appropriate script to compile the program (E.g. javac, tcc, csc).

*Step 4, 5:* After the compilation of the program if there are any errors present in the program then those error messages are transferred back to the client side.

*Step 6, 7, 8:* If there are no errors then process executor is called and the output of the process is transferred back to client side so that the user can view the output of the program.

#### B. Technology

##### 1) Visual Studio 2010

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop console and graphical user interface applications along with Windows Forms or WPF applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight.

##### 2) MS SQL Server

Microsoft SQL Server is a relational database management system developed by Microsoft Inc. As a database, it is a software product whose primary function is to store and retrieve data as requested by other software applications, be it those on the same computer or those running on another computer across a network.

##### 3) JavaScript

JavaScript is a technique for manipulating HTML documents in the browser. This is often called client-side scripting. It allows the page author to incorporate facilities such as buttons that change in appearance when you move the mouse over them and menus that expand.

4) jQuery

jQuery is a fast and concise JavaScript Library that simplifies HTML document traversing, event handling, animating, and Ajax interactions for rapid web development.

5) Ajax

Ajax (also AJAX an acronym for Asynchronous JavaScript and XML) is a group of interrelated web development techniques used on the client-side to create asynchronous web applications. With Ajax, web applications can send data to, and retrieve data from, a server asynchronously (in the background) without interfering with the display and behavior of the existing (JSON is often used instead), and the requests do not need to be asynchronous.

C. Implementation

We have implemented Web Based IDE in ASP.NET using C# as frontend and SQL Server as a backend. User first creates a login ID to access the compilers. After creating login ID user must login in the system. After login user select the compiler for which he wants to use. After selecting the compiler user type his code in the editor and use the button or shortcut keys to compile and execute the code. The output is displayed on the output tab. Although the frontend is designed to be as simple as possible with only a few commonly used options, it is sufficiently functional and can be used quickly. Proper validations are used. User code is submitted to server. Server side code compiles the code and displays warning message or show the results on the client window, CompilerHelper class to represent a compiler error or warning. After successful compilation compiler generate execute file (exe). This exe file produce the desired output for the given source code.

Following figures show the Web Based Interface design and working.



Figure 2: Login Page

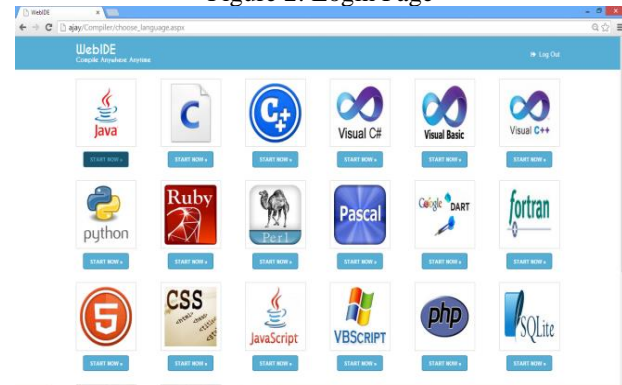


Figure 3: User Select a language for development

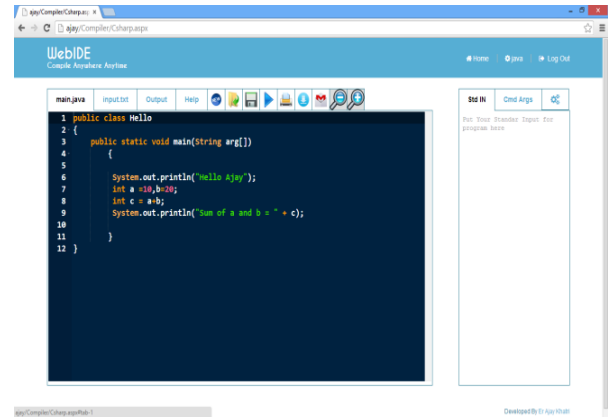


Figure 4: Web Based editor for editing code

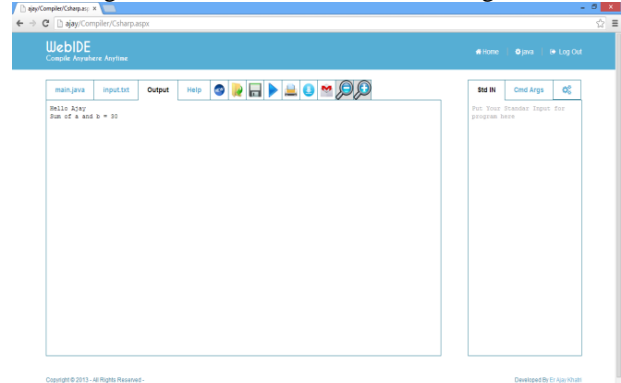


Figure 5: Output is displayed in the new tab window

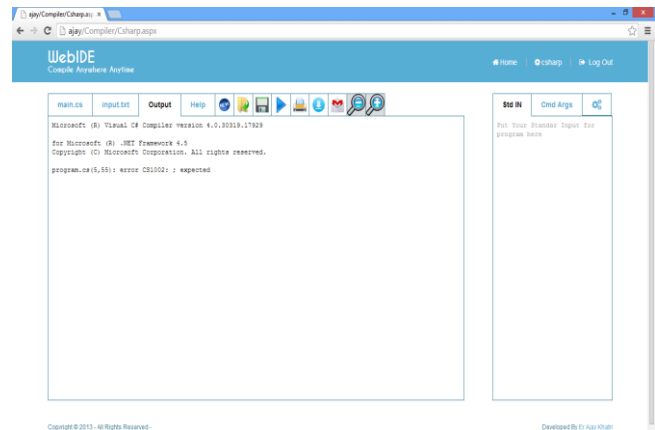


Figure 6: Error is displayed on the output tab

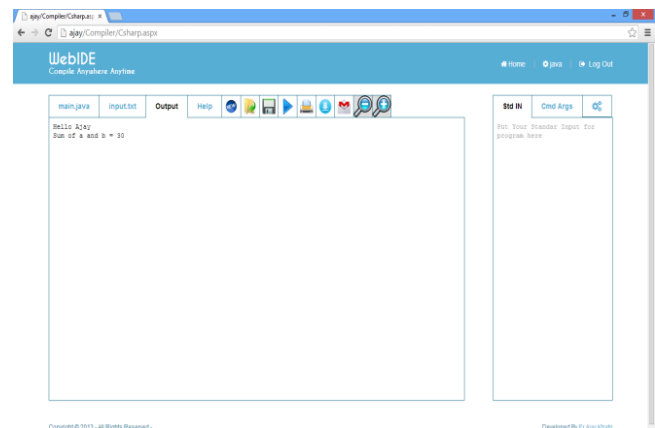


Figure 7: Output is displayed in the new tab window



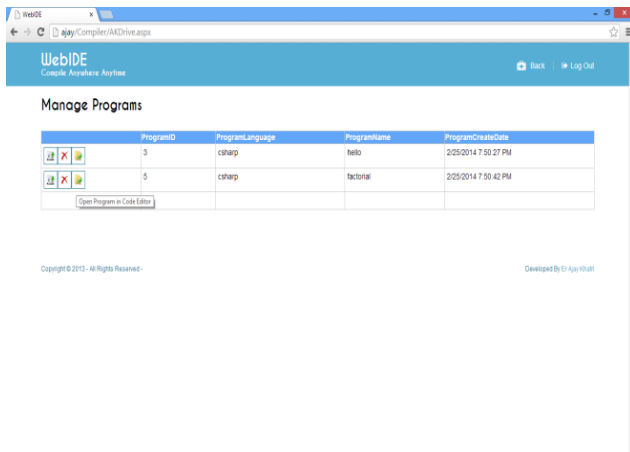


Figure 8: User can manage the code files[Rename, Delete, Open]

- 7) *Compile & Run*: - This module allows the users to compile and run their code. The result of compilation is displayed to the user.
- 8) *Send to Mail*: - This module allows users to send code to their email id.
- 9) *Change Theme*: - This module allows users to change the theme of code editor.
- 10) *Font Size*: - This module allows users to change the font size.
- 11) *Download*: - This module allows users to download the code.

### V. ADVANTAGES AND DISADVANTAGES

#### A. Advantages

- 1) Development can happen on any Web-enabled machine, and execution resources can be shared among developers.
- 2) Development can be done by low configuration devices.
- 3) User can use any device with internet connection for execution of code.
- 4) Collaboration becomes easier, and might amount to as little as sharing the URL to the same IDE “workspace”
- 5) Scaling from one machine to many becomes a matter of configuration – acquiring, setting up and maintaining the hardware is handled by the cloud provider.
- 6) For web applications, there is very little difference between testing, debugging and deployment: the mechanism for deploying in the edit-compile-run cycle is the same as for testing and as for production.



Figure 9: User can change the theme and font size of editor

#### B. Disadvantages

- 1) Developer gives up (some) control of the execution environment and might be unable to diagnose problems which require access to logs and process inspection tools.
- 2) Network bandwidth and latency make some applications, especially graphically intensive ones, infeasible to develop remotely.
- 3) Duplication of most of the essential tools and concepts already provided by the operating system on the user’s machine, though this can be mitigated by exposing the deployment/ testing/debugging host through a remote shell, i.e. by breaking out of the traditional Web interface.
- 4) Integration with existing deployment and debugging tools is likely to be difficult, if not impossible.

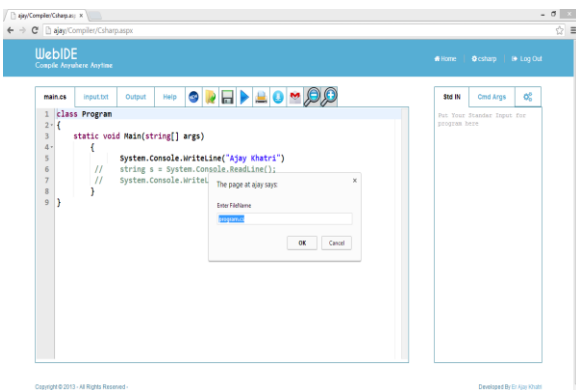


Figure 10: User can save their code on server

#### D. Operations

- 1) *Registration*: - This module accepts the details of a new user and stores it in the database. This action is logged in the Logs database. This module ensures that the user is registered before the first login.
- 2) *Login*: - A registered user should login with his username and password to use the IDE.
- 3) *Create new Project/ File*: - This module permits valid users to create new Project.
- 4) *Open Project/ File*: - This module permits valid users to open existing projects. The user’s access rights to the projects and files are checked from the database.
- 5) *Delete Project/ File*: - This module permits the valid users to delete a project.
- 6) *Save*: - This module allows the valid users to save their projects. These projects are stored in database.

### VI. APPLICATIONS

The application of the project is provide different compiler over network. A Web Based IDE can be used in small companies for centralized compiler installation. Because of centralized compiler on the server side, client desktop need not to be very high configuration. A Web Based IDE can be used in school / college / Institutes for practical examination also using this student can have facility to use/learn multiple programming languages with any devices like PC, tablets or Mobile.

## VII. CONCLUSION

In this paper we have discussed Web Based IDE from the stand alone desktop to the Web. The proposed research questions arose from placing ourselves in the seat of the software developer who already develops for the Web, but now wants to transition his daily development activities to the Web, and take advantage of the hallmarks of the Web, pervasive collaboration, zero deployment, instant-access from anywhere, and vast computational resources. We discussed how we can move the software development environment from one paradigm (the desktop) to another (the Web). This can be used for E-learning platform that lets students write, execute and test programs entirely in their browser. With Web Based IDE allows the user to write and manage their programs on the server. The programs stored on server, the compilation of the programs will be managed by the server by forwarding the request to the required processor. Based on the programming language in which program/code is written and sends that program/code to the respected compiler. The proposed system showed how Web Based IDE can be used to eliminate the problem of storage. Many more applications are possible when taking into account.

## REFERENCES

1. Remote Application Platform Available: <http://www.eclipse.org/rap/>
2. Coderun Studio Available: <http://coderun.com> .
3. Koding Available: <https://koding.com/>
4. CodeMirror Available: <http://codemirror.net/> .
5. Cloud IDE Available: <https://codenvy.com/>
6. D. Yoo, E. Schanzer, S. Krishnamurthi, and K. Fisler, "We-Scheme: the browser is your programming environment."
7. Python Fiddle <http://pythonfiddle.com/>
8. The Eclipse Foundation. Voidspace python online Available: <http://www.voidspace.org.uk/ironpython/silverlight/index.shtml>.
9. Cloud9 IDE. <https://c9.io> .
10. M. Labs. Mozilla labs: Skywriter.
11. Problets by Amruth N. Kumar <http://problets.org/>
12. Suryawanshi Harshal, Rokade Chakrapani Ambhore Ajay, Rathod Sharad, "Compiler as Service over Cloud", International Journal of Computer Applications (0975 – 8887) Volume 70– No.1, May 2013
13. Ansari Mohd. Arshad, Khan Arshiya, Shaikh Sana, Mirza Zainab, "Compilers on Cloud", International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 Vol. 2 Issue 9, September-2013
14. M.Pabitha, T.Selvakumar, S.Punitha Devi "An Effective C, C++, PHP, Perl, Ruby, Python Compiler using Cloud Computing", International Journal of Computer Applications (0975 – 8887) Volume 69– No.7.
15. Mayank Patel "Online Java Compiler Using Cloud Computing", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-2, Issue-2.
16. A.Rabiyathul and Basariya k.Tamil Selvi, "Centralized C# Compiler Using CloudComputing", IJCE Volume 06– No.6, Issue:02, March2012.
17. Compile Online IDE Available: <http://www.compileonline.com> .
18. Online Compiler Available: <http://www.Compile.com> .
19. Lennart C. L. Kats, Richard Vogelij, Karl Trygve Kalleberg, Eelco Visser "Software Development Environments on the Web: A Research Agenda"
20. Codeanywhere Available: <https://codeanywhere.net/>.

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