

Cloud Computing

Title: Cloud Based Compiler

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Introduction

Build cloud based web application that provides developer an interface which helps in code compilation, execution, analysis and also provides code optimisation related suggestion if required in code.

Work Done

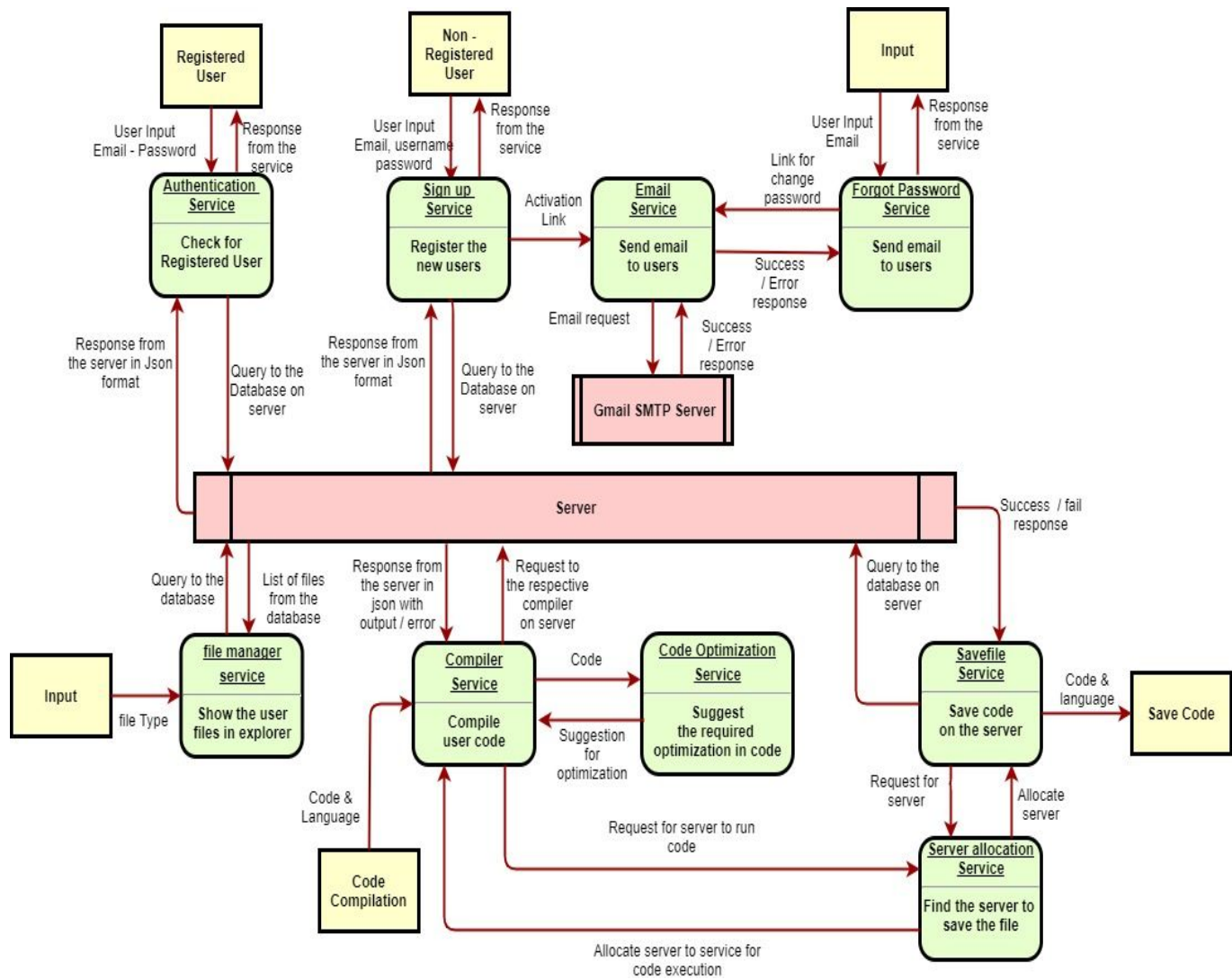
1. Successfully integrated compilers at server side
2. Created service oriented architecture for Code Editor
3. Implemented authentication service for user SignIn / SignUp
4. Designed a database and integrated it with the system
5. Implemented file storage system – Users can store their code on cloud
6. Users can show their activity on their dashboard
7. Developed an optimization service

Tools / Packages

- Front-end technology
 - i. HTML , CSS, Javascript
- Back-end technology
 - i. Python, Flask, Jinja
- Database
 - i. MySQL

Dataflow Diagram

- This diagram shows how data flows in the system



Description of the services

1. Authentication service:

This service compares the credentials provided by the user with the database of authorized users' information. If the credentials match, the process is completed and the user is granted authorization for access. If the credentials do not match, the user is not granted access and is requested to enter valid credentials to gain access.

2. Sign-up service:

If the user is not registered, then the user can use this service and enter his details (sign - up) which will be added to the database of authorized users. This service provides the email service with the activation link that the user can use to complete the registration process.

3. Email service:

This service, using the Gmail SMTP Server, sends emails to the users containing the link for completing the registration process or for changing the password in case the user forgot the password.

4. Forgot password service:

In case the user has forgotten the password, this service can be used to change the password. It provides the email service with the link that the user can use to change the password.

5. File manager service:

This service shows the user all the files that the user has saved. In addition, it also provides the user, specific types of files which the user wishes to see.

6. Compiler service:

This service performs the primary function i.e. it performs the compilation of the codes for the users. It requests the server allocation service to allocate a machine for the compilation of the code. The user provides the service as an input: the code and the language in which it has to be compiled. If the compilation of the code was successful, then this service calls the code optimization service which takes the code as an input and provides suggestions for optimization. In this case, the output of the code and the suggestions for optimization of the code are both returned to the user. If the compilation of the code was not successful, it returns the error which occurred during the compilation process.

At this stage, the compiler service compiles the code for C, C++, Java and Python.

7. Code Optimization Service:

This service takes the file containing the code as an input, analyzes the code and provides suggestions, which if implemented can optimize the performance in terms of the memory usage or the run-time of the code.

At this stage, this service optimizes the code for Java and Python.

8. Savefile service:

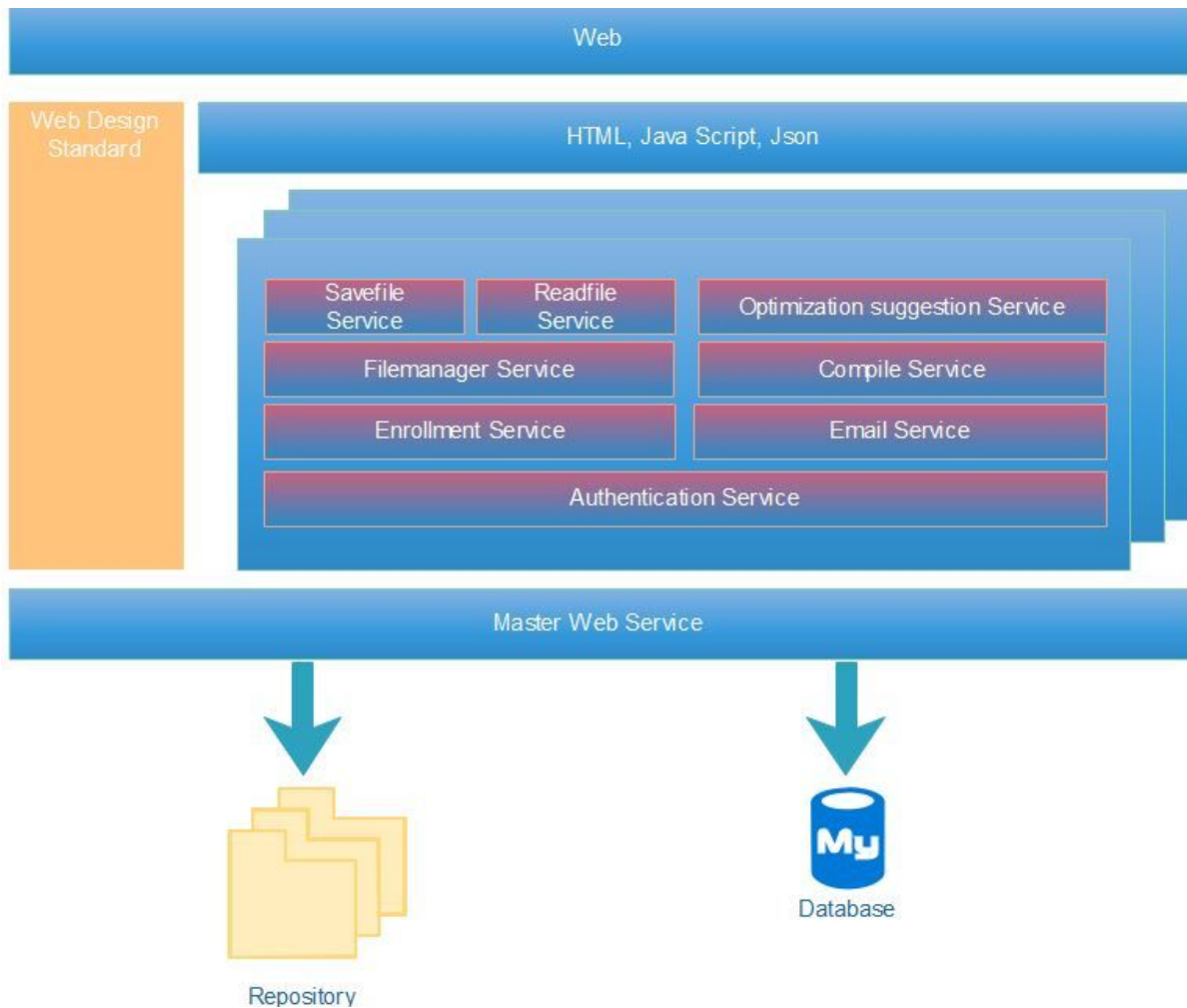
This service is used to save the code entered by the user in the database so that it can be accessed in the future. It requests the server allocation service to allocate a machine in which the code can be stored.

9. Server allocation service:

This service performs the function of allocating the machines and distributing the jobs for compilation and data storage. It checks the status for memory usage and storage availability in various machines that are available on the server side and allocates the machine which will be most suitable for compilation of the code or for storing the file containing the code.

Application Architecture

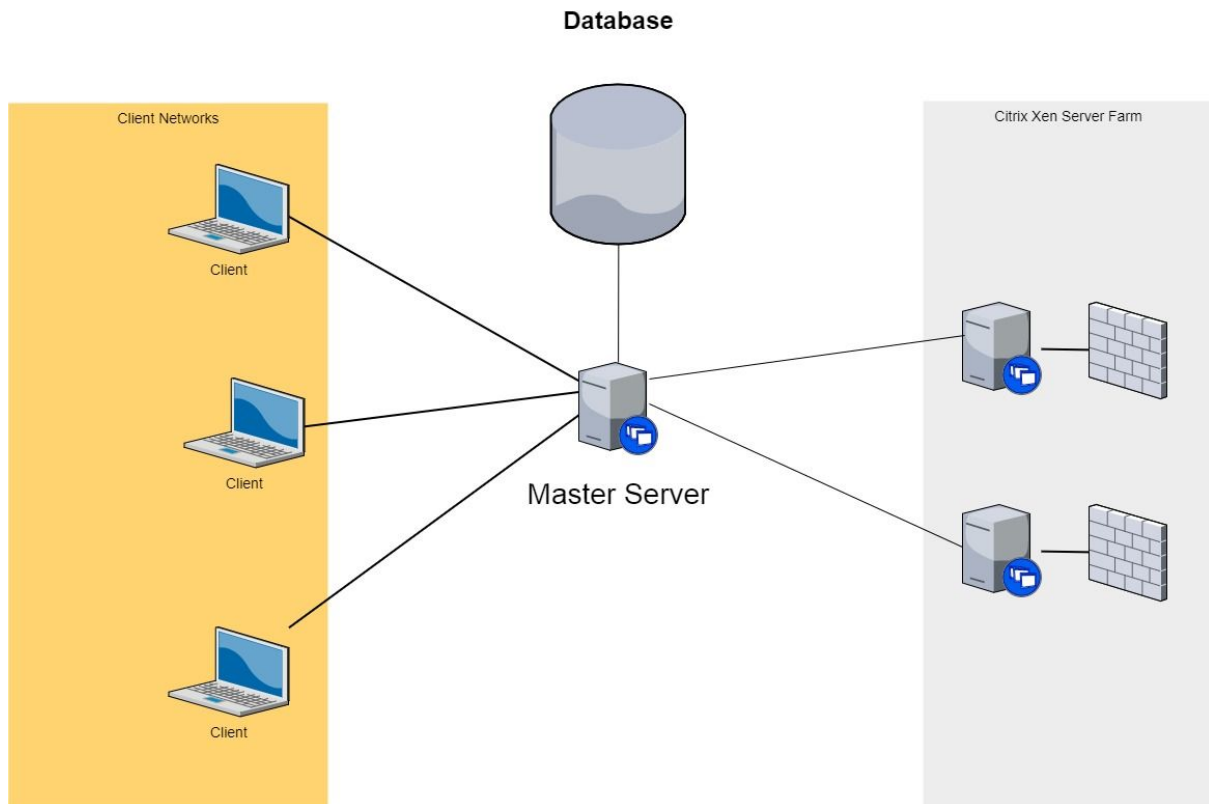
- Below architecture show how our application is organized



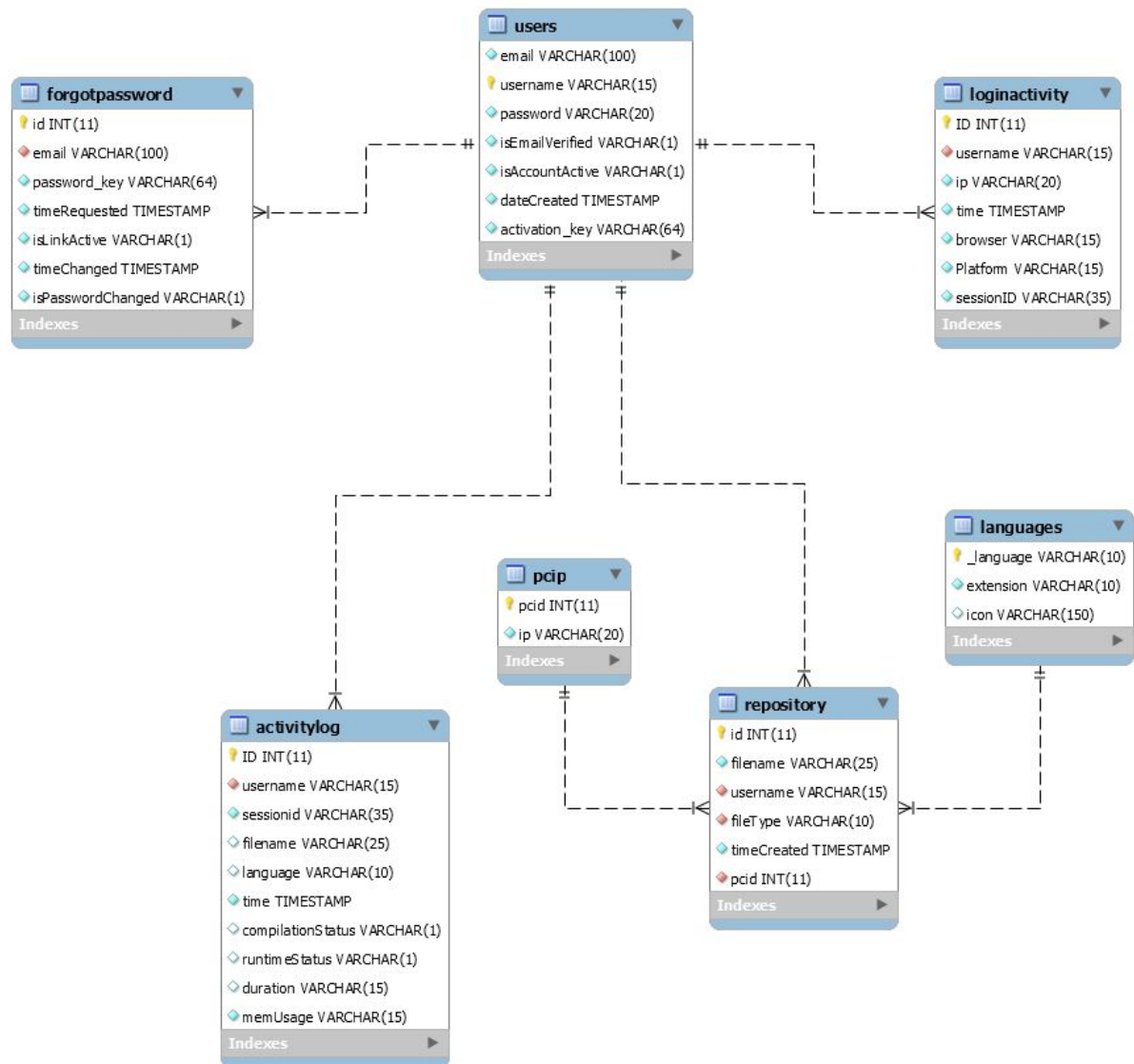
Cloud Architecture

- Below architecture show how our cloud is organized

Cloud Architecture

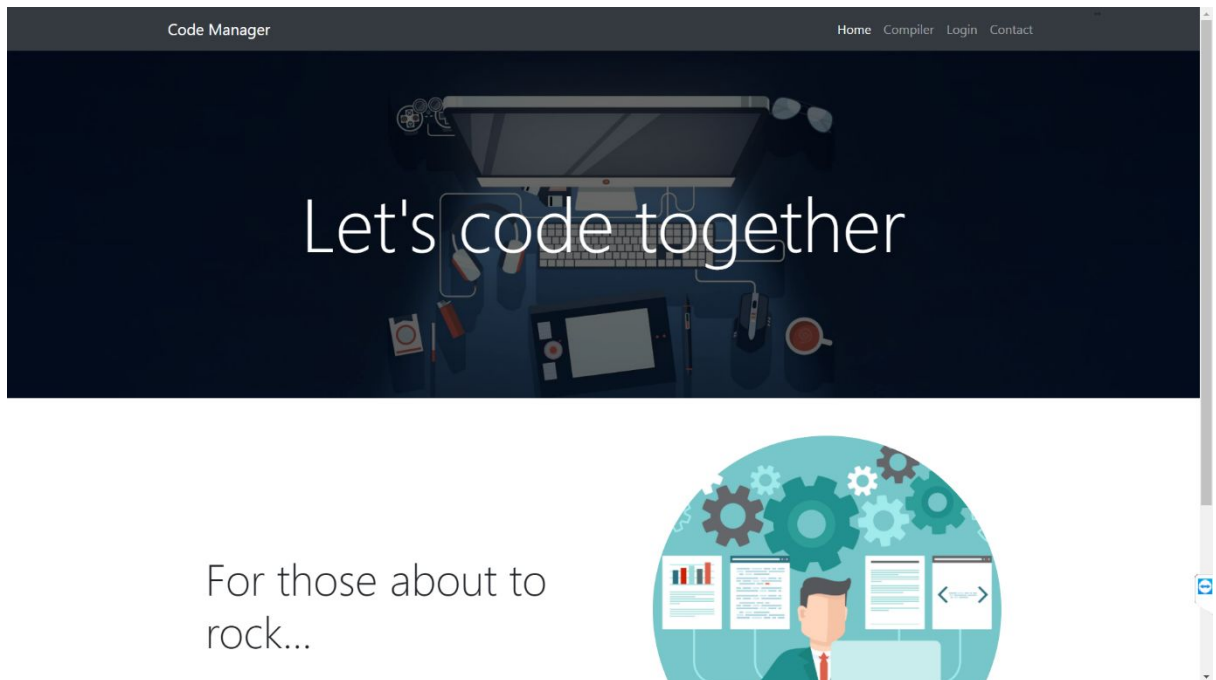


Database Schema



Screenshots

- Home Screen



- Login Screen

Code Manager

Welcome to Code Manager. Please sign in to your account

Email Address
Password
Sign in

[Create an account](#) - [Forgot your password?](#)

- Error based on user side input validation



Code Manager

Welcome to Code Manager. Please sign in to your account

[Sign in](#)

[Create an account](#) - [Forgot your password?](#)

- Error based on server side validation

Code Manager

Welcome to Code Manager. Please sign in to your account

Email id or password is wrong

[Sign in](#)

[Create an account](#) - [Forgot your password?](#)



- User need to verify the account before login by clicking the link sent to user's mail account

Code Manager

Welcome to Code Manager. Please sign in to your account

Before Login Please varify your email account .

Sign in

[Create an account](#) - [Forgot your password?](#)

- Sign up screen

Code Manager

Create your account.

Create Account

Already have an Account? [Sign In](#) - [Forgot your password?](#)

By clicking signin up, you agree to our [Terms of services & Policies](#)

- Server side validation for sign up

Code Manager

Create your account.

Email Id is already registered.
Username is already registered.

Username

Email address

Password

Confirm Password

Create Account

Already have an Account? Sign In - Forgot your password?

By clicking sign in up, you agree to our Terms of services & Policies.

- Forgot password Screen

Code Manager

Lost your password? Please enter your email address. You will receive a link to create a new password.

Email address

Send Password Reset

Just remembered your password ? Go to Sign In

- User side validation for forgotpassword

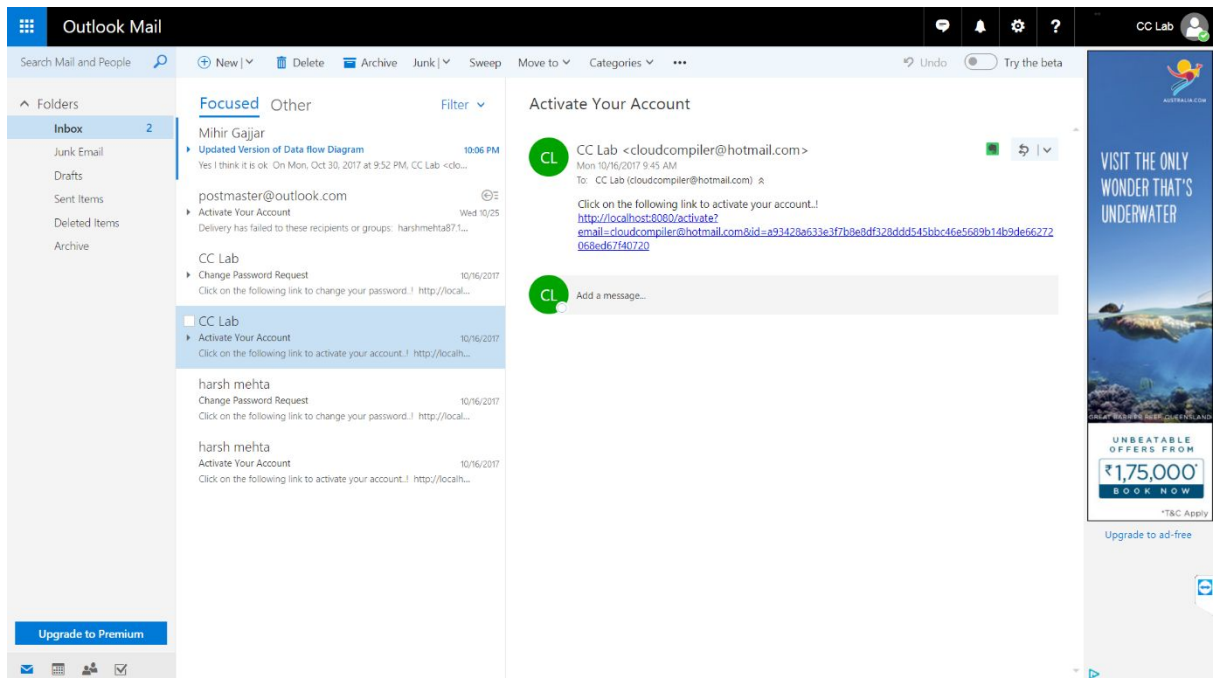


Code Manager

Lost your password? Please enter your email address. You will receive a link to create a new password.

Just remembered your password ? Go to Sign In

- Link sent to user to activate account

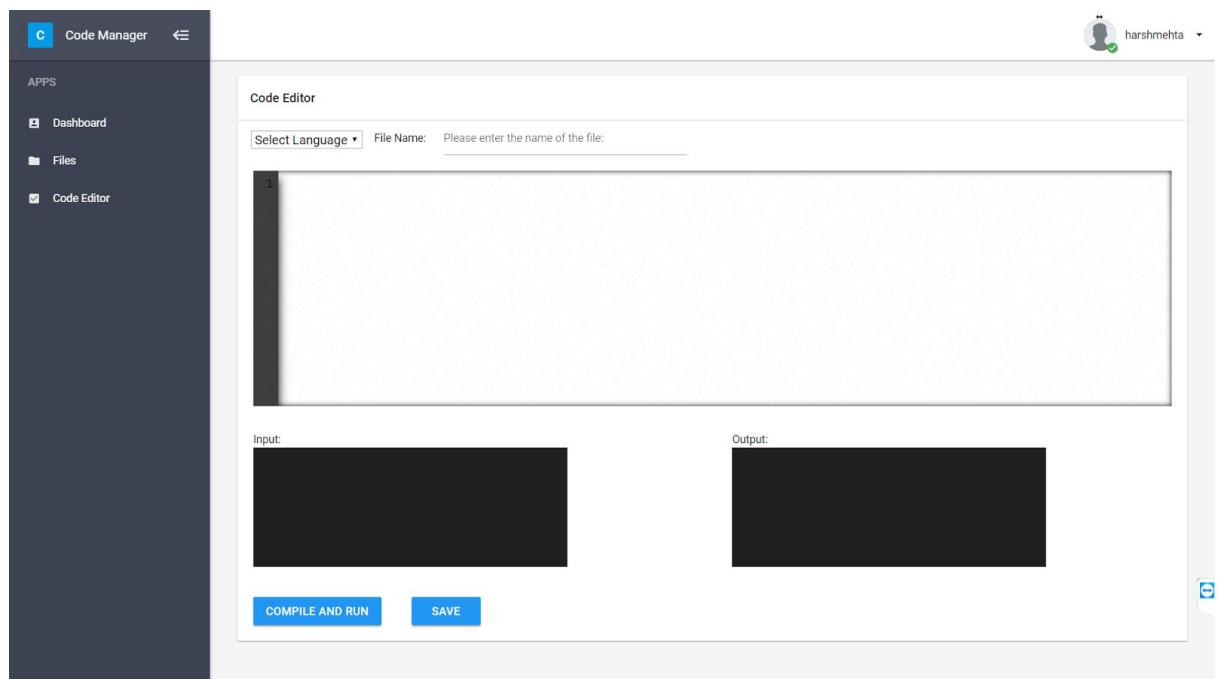


- When user go to the link for activation of an account

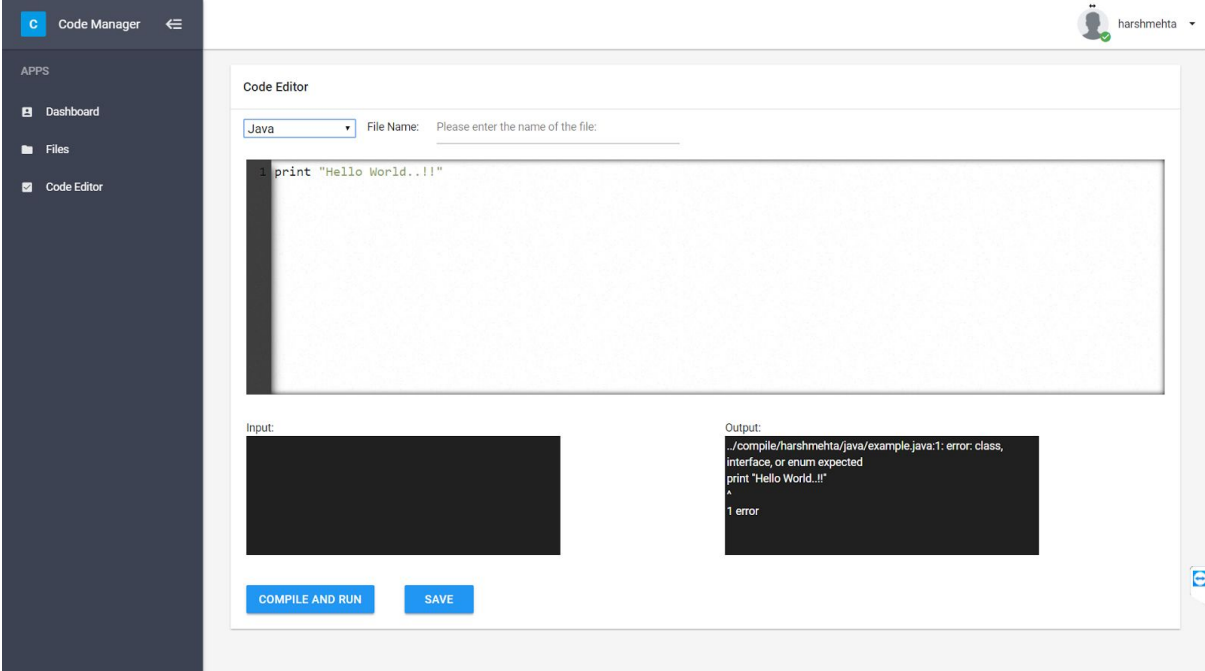
Congratulation..!
You have been successfully
activated your account :-)

[Go To Login Page](#)

- Code Editor screen

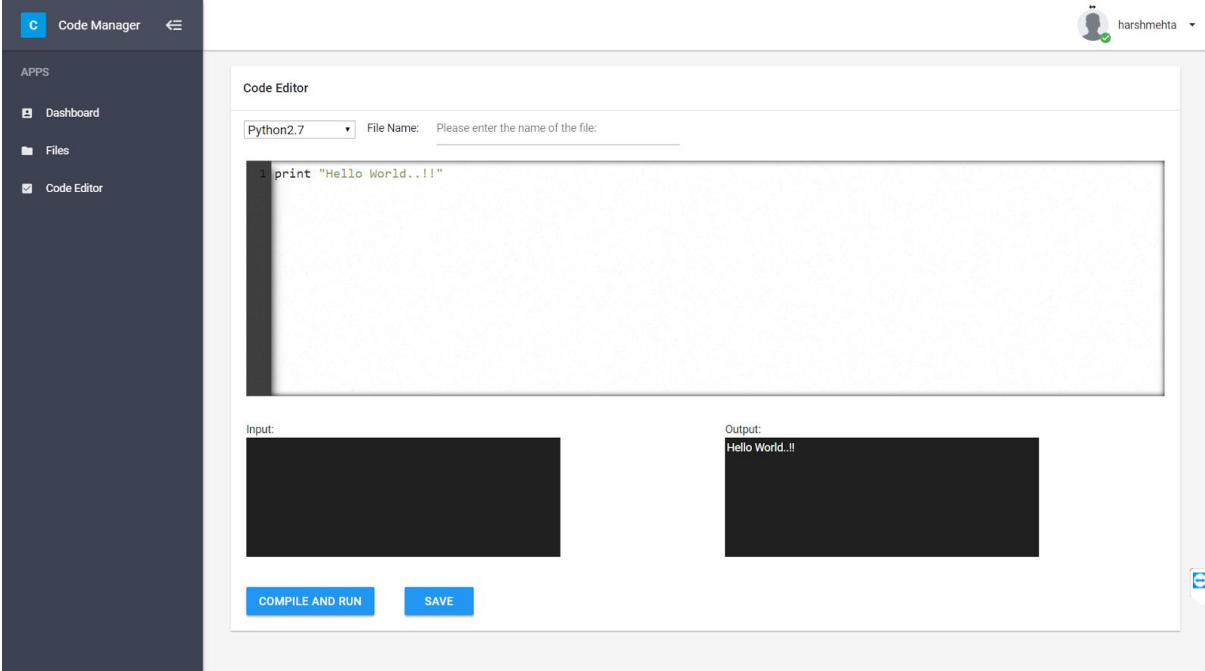


- Compilation error is showing in output



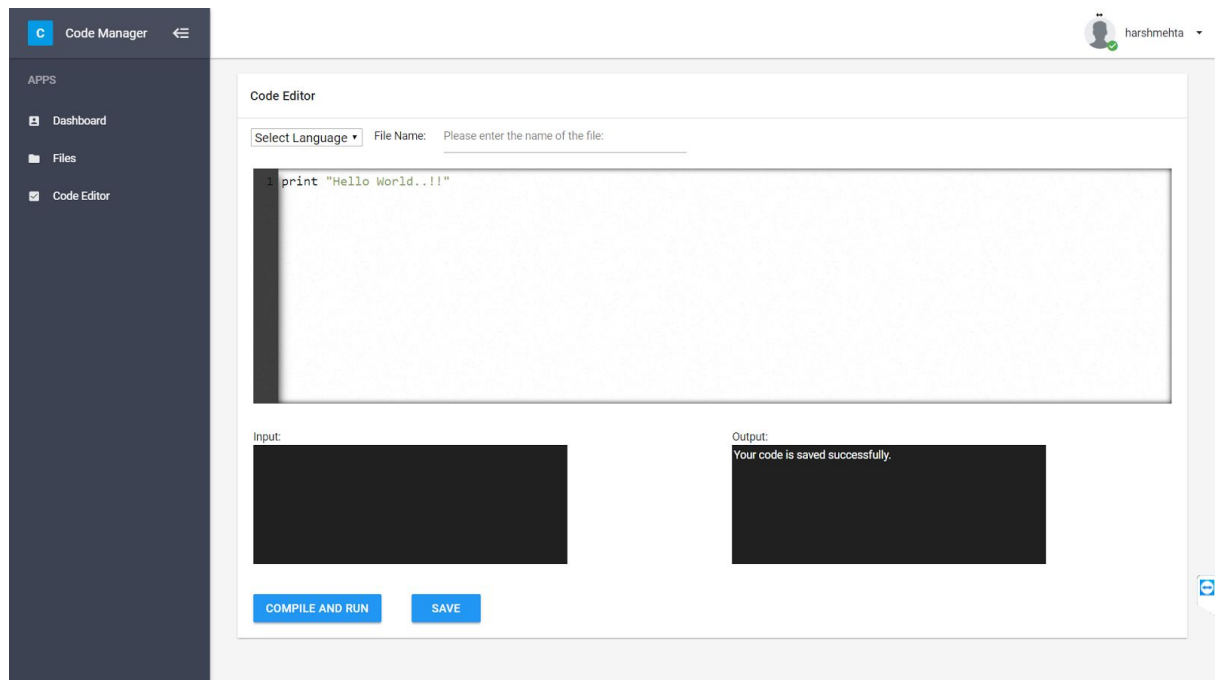
The screenshot shows the 'Code Manager' interface. On the left, a sidebar lists 'APPS' with options: 'Dashboard', 'Files', and 'Code Editor' (selected). The main area is titled 'Code Editor'. At the top, there's a dropdown menu set to 'Java' and a 'File Name' input field with the placeholder 'Please enter the name of the file:'. Below this is a large text area containing the code: `1 print "Hello World..!!"`. At the bottom left, there's an 'Input' text area. At the bottom right, there's an 'Output' text area displaying the following error message: `./compile/harshmehta/java/example.java:1: error: class, interface, or enum expected
print "Hello World..!!"
^
1 error`. Below the code editor, there are two buttons: 'COMPILE AND RUN' and 'SAVE'.

- Successful compilation

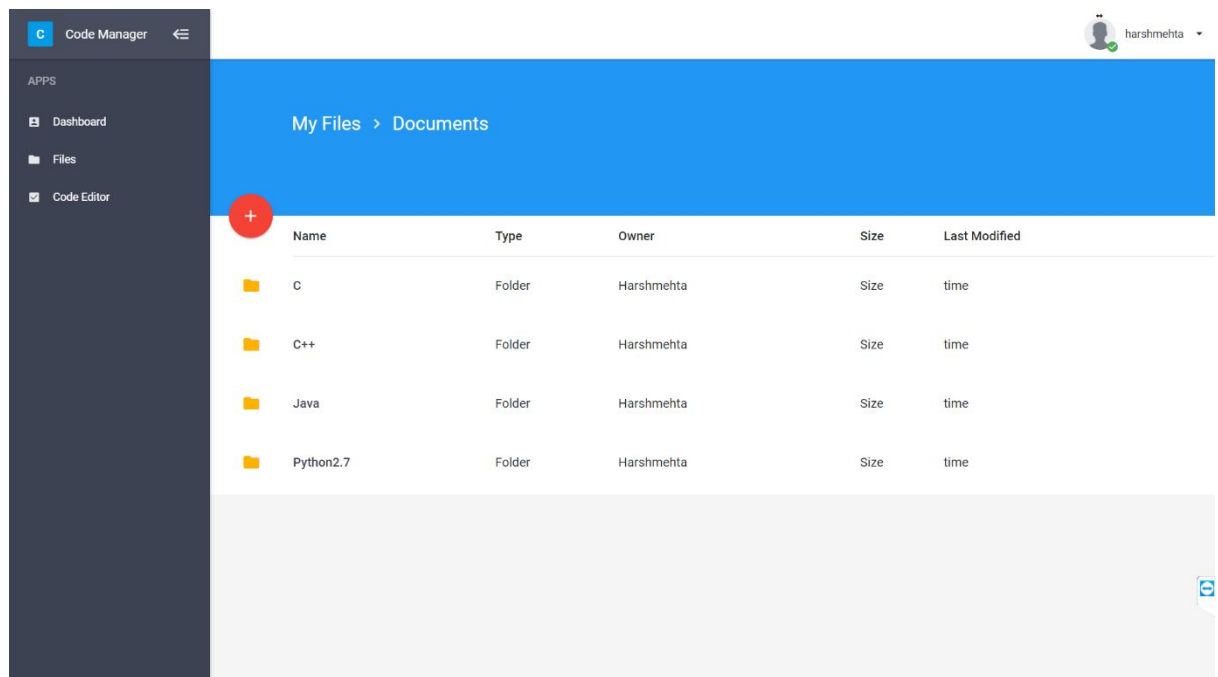


The screenshot shows the 'Code Manager' interface. On the left, a sidebar lists 'APPS' with options: 'Dashboard', 'Files', and 'Code Editor' (selected). The main area is titled 'Code Editor'. At the top, there's a dropdown menu set to 'Python2.7' and a 'File Name' input field with the placeholder 'Please enter the name of the file:'. Below this is a large text area containing the code: `1 print "Hello World..!!"`. At the bottom left, there's an 'Input' text area. At the bottom right, there's an 'Output' text area displaying the text: `Hello World..!!`. Below the code editor, there are two buttons: 'COMPILE AND RUN' and 'SAVE'.

- Save file



- File manager screen





C Code Manager

APPS

Dashboard

Files

Code Editor

My Files > Documents

+

Name	Type	Owner	Size	Last Modified
abc	C	Harshmehta	Size	2017-10-26
bcd	C	Harshmehta	Size	2017-10-26
FirstFile	C	Harshmehta	Size	2017-10-27
Second File	C	Harshmehta	Size	2017-10-27
thirdfile	C	Harshmehta	Size	2017-10-27
hello_world	C	Harshmehta	Size	2017-10-29
Hello World	C	Harshmehta	Size	2017-10-29

harshmehta

C Code Manager

APPS

Dashboard

Files

Code Editor

My Files > Documents

+

Name	Type	Owner	Size	Last Modified
cplusplus	Cpp	Harshmehta	Size	2017-10-26
input	Cpp	Harshmehta	Size	2017-10-29

harshmehta



C Code Manager


APPS

- Dashboard
- Files
- Code Editor

harshmehta

My Files > Documents

+

Name	Type	Owner	Size	Last Modified
 javafile	Java	Harshmehta	Size	2017-10-26

C Code Manager




APPS

- Dashboard
- Files
- Code Editor

harshmehta

My Files > Documents

+

Name	Type	Owner	Size	Last Modified
 pyrhonfile	Py	Harshmehta	Size	2017-10-26
 navifile	Py	Harshmehta	Size	2017-10-26
 firstPythonFile	Py	Harshmehta	Size	2017-10-29

Future Work

- Code Analysis: Our IDE will show the total memory used by user's program and total computational time of it. For finding total memory, we are going to work with proc - a file system at kernel level mode that contain the process information. Among the various information we are interested in size of data, bss, stack and virtual memory size.
- Steps to be follow
 - As soon as user submit his code, a program at server side will automatically fetch the process ID (pid) of the newly generated process
 - For almost every process running in the system, there is a directory created in /proc/. The directory name is the process id and it contains several useful files which convey important information. The two main files of our concern are **/proc/[pid]/status** and **/proc/[pid]/statm**
 - From, these two files we get memory usage in form of files, and each page is of 1KB we multiply total pages and page size and calculate the memory usage.