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Standard Evaluation Module Of Attainment

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Abstract: ***In colleges today, learning computer languages is becoming more popular not only because the current job market highly demands jobs requiring these skills, but also because many STEM fields require programming skills.***

Java is one of the most widely used languages in client-server applications because of its rich API, portability, simplicity, and object-oriented features.

To learn their first programming languages, students must write many programs for practice on the path to mastery. More programming assignments increase the workload of faculty.

This project presents an integrated online system to help instructors manage programming assignments effectively, providing immediate compiling and runtime messages, and display of the results when the students submit the program. This immediate feedback improves the student learning experience, with targeted information and encourages student success

Index Terms: Java, J2EE, PHP, programming assignments, MySQL, web server

I. INTRODUCTION

To encourage student mastery in language initial programming, students are encouraged to learn through practice writing programs regularly to gain experience and build individual experience. Regardless of languages, it is difficult for students to understand and use the correct syntax of the language, implement the code instructions, and use programming logic. Therefore, to weekly programming tasks in programming courses first and second semester it is necessary for students to practice, building a solid base, and gain more experience coding. His practice is often aided by the integrated development environment (IDE) such as Eclipse, BlueJ and NetBeans, which are very popular in coding and teaching Java. IDEs provide an easy to use graphical user (GUI) automatically highlight syntax errors, use different colors to identify the keywords of Java and variables by the user matches pairs matrix defined [] and block braces {}, and instructs the data members and methods of a class object. It also provides debugging tools to track the code and provide values for the variables in the batteries.

Popular textbooks in Java using Eclipse IDE and other tools for teaching purposes. Although IDE tools help students with writing programs, some students may still have problems coding accurately. Students who rushed can send code without completing the programs, make last minute changes without recompiling the programs, or programs copying other students without making any changes. If instructors have not the student code to execute programs and see the output, instructors will not know if the student code can be compiled or if the code is expected, the correct output.

In a class has 20 students with 12 assignments one-semester program, in addition to assignments, quizzes, midterm and final, the evaluator programming tasks can consume a significant amount of time if the instructors were to retrieve student programs, compile the code, run programs, and check the output. Therefore, teachers, while supporting the teaching aspect of student programming, may hesitate to

give weekly programming tasks because of the time needed to qualify each programming assignment.

Hesitation is particularly significant in colleges and universities, and in the K-12 environment where the teacher is responsible for all classification and evaluation. Therefore, if there was a time consuming method efficient, less for evaluation of submitted student programming tasks, students and teachers would benefit.

He who has taught a course-level programming first or second year knows how difficult and time consuming it can be to address issues of style program student submissions. Even if the instructor discusses many examples of well-written code in the class, many students ignore or mangle these templates when writing your own programs. Often the class is so large that the teaching assistant / degree can spend a few minutes in each program, checking to see if the result expected for entries selected test occurs. This naturally leads students to the conclusion that a good program is one that has the behavior of input / output desired, and no matter how getting behavior. A student could get a perfect score on all assignments and still be poor writing code. When teaching assistant not take the time to inspect student programs, issues of subjectivity arise. Case code quality are difficult to define, more so if multiple TA for different sections of the same course or over time are used. The potential for inconsistency makes reluctant to give much weight to style program for calculating grades instructor. If the student misses only a few points for a poorly written program, you will have little motivation to follow the corrections received from the teaching assistant. It could even dismiss these remarks as a reaction of the idiosyncrasies of the AT.

The student could reach higher level courses before an instructor arrives whose grading policy enforces good programming practices. At this point the student and may have developed bad habits programming. These bad habits transported in advanced classes which are an obstacle to the student and a headache for the instructor. There has been much interest recently in making quality education more accessible to students worldwide use information technology. Several education initiatives as EDX, Coursera and Udacity are competing to offer online courses on various subjects at university level ranging from computer science to psychology. These courses, also called massive open online courses (MOOC) are typically taken by thousands of students around the world, and have many scalability interesting challenges.

The most frequently used methods are the comments about programming problems are: (I) feedback based test cases and (ii) peer-feedback. Based on feedback test case, the student program running on a set of test cases and test cases failing reported to the student. This is also how the 6.00x course (Introduction to Computer Science and Programming) offered by MITX currently provides feedback processes Python programming. Feedback from test cases fail, however it is not ideal; especially for novice programmers who find it difficult to assign test cases have no errors in your code. This is reflected in the number of students who publish their presentations in the discussion forum to seek the help of instructors and other students after struggling for hours to correct mistakes. In fact, for the classroom version of the course Introduction to Programming (6.00) taught at MIT, requires that teaching assistants to manually go through each student submission and provide qualitative information describing exactly what it is wrong with the presentation and how to correct it. This handbook feedback by teaching assistants is simply prohibitive for many students in the classroom environment online.

II. SURVEY

A. VARIOUS DIVISIONS IN THE PROJECT

TEACHERS PORTAL

This division of the project is implemented as a dynamic web application which will be deployed on any of the available web application servers like apache tomcat or Jobs' wildfly etc.

This portal will be available to the teacher of this project and we allow them to perform various operations like creating a new assignment, viewing the previously created assignments, viewing the grading component, providing the review for each answers and many more.

This division can be accessed via some modern web browsers like Google Chrome, Mozilla Firefox etc. by sending a request to the server.

STUDENTS' PORTAL

This division of the project is implemented as a dynamic web application which will be deployed on any of the available web application servers like apache tomcat or Jboss wildfly etc.

This portal is made available to all the students of this portal where they can start answering the assignment questions created by their teachers, view their review and grading scores, and most importantly we provide an ability for these students to compile the programs then and there and evaluate its output against various test cases. We nearly supports upto 75+ languages as of now.

This division can be accessed via some modern web browsers like Google Chrome, Mozilla Firefox etc. by sending a request to the server.

B. GENERAL DESCRIPTION

PRODUCT PERSPECTIVE

Provide the Account access management for both students and teachers efficiently

Provide the online compiler component so that the user can readily execute and test his/her program against various test cases

Ability to input various test cases

Ability to provide the code samples for all the languages supported by this portal at this moment of time.

Ability to evaluate the standard input and standard output of the program through online compiler

Ability to compute the grading score based on the review from the teachers

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PRODUCT FUNCTIONS

The teacher of this project will be using the teacher portal and he/she will be creating the assignment questions and will be providing the review comments.

The students of this project will be starting answering to assignment questions and will be viewing the grading scores

The other components like submission component, viewing component, grading component, review component etc will be interacting with each other

C. USER CHARACTERISTICS

In this project we will need a small amount of configuration work to be done in the Eclipse box to set up the application

User also needs to install WildFly AS 9.1 version Application server or Tomcat v8.0 to host the Admin Portal

The input provided by the users should be the source program from any of the supported 75+ languages.

D. ASSUMPTIONS AND DEPENDENCIES

JDK has to be installed in all the machines where the applications are deployed and also where the configuration manager has been executed.

The application servers like either the JBOSS or the Apache Tomcat will have to be supported by the host machines

There shall not be any firewall or other engines that prevents the remote requests from the interface portal.

There shouldn't be any permission related issues on any cluster. The host operating system should take of permitting all the requests to the cluster from the interface layer.

E. OBJECTIVE AND SCOPE OF THE PROJECT

Objective of this project is to develop an integrated online system to help instructors manage programming assignments effectively, providing compiling and runtime messages, and display of the results when the students submit the program.

This immediate feedback improves the student learning experience, with targeted information and encourages student success.

We also implement an intelligent system which analyzes the programs submitted by students for Coding standards.

F. PROPOSED SYSTEM

A system such as the one presented here can help both students in learning and instructors in managing the programming assignments. Students should be able to see if their programs meet the instructor's requirements immediately after submission. It is important to give frequent programming assignments when learning a new computer language. However, instructors should focus on preparing the materials and improving the curriculum for the class, rather than spending time on grading the assignments.

The system presented takes minimal efforts for instructors to grade the assignments, and will not limit the number of assignments given to students. The most attractive benefit is that it is very easy to implement and all required resources are free. If the operating system has been configured with the send mail function, the system can call the PHP mail function using student email addresses to automatically notify the instructor and student about the assignment submission status – success or failure in compile and runtime stages – and the output. The instructor can then reply to the email from individual student about his/her grade and make comments. Students might resubmit their assignments and overwrite the same assignment. Instructors should only need to check student's latest version.

The system can be expanded to incorporate more functions such as specifically searching if students have implemented the required functions and comparing the output with expected output. The system might be able to doautomatic grading, if the grading rules can be clearly defined. However, automatic grading is outside the scope of this project, and will require additional research on defining the grading rules.

III. SYSTEM REQUIREMENTS

A Software Requirements Specification (SRS) – a requirements specification for a software system – is a complete description of the behavior of a system to be developed. In addition to a description of the software functions, the SRS also contains non-functional requirements. Software requirements are a sub-field of software engineering that deals with the elicitation, analysis, specification, and validation of requirements for software.

SOFTWARE REQUIREMENT SPECIFICATION

Front end:
HTML5, CSS3, Skeleton, Bootstrap, JQuery
Back end:
Java, JEE
Database:
Oracle/ MySQL
Application Server for deployment
Web logic

HARDWARE REQUIREMENT SPECIFICATION

Hard Disk
40GB HDD
Primary Memory
2GB RAM

IV. SYSTEM ARCHITECTURE

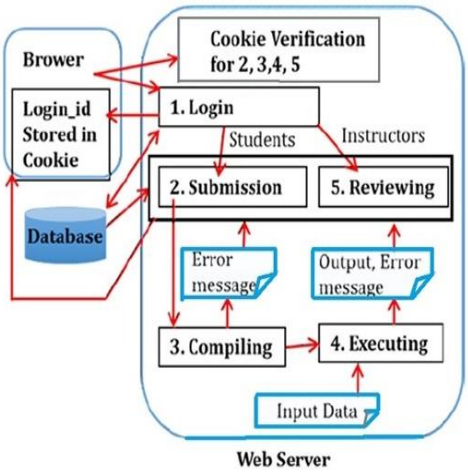

Figure 1

The architecture presented here contains five major components 1. Login, 2. Submission, 3. Compiling, 4. Executing, and 5. Reviewing. The course and student folders should be created under the instructor or submission account on the Linux webserver.

LOGIN COMPONENT

Support for two types of users is provided: 1. Students who will submit the program assignments, 2. Instructors who will review students' programs, verify results, and grade to the submitted programs. Information for both types of users should be created and added in the database first in order for the users to login. The login page is implemented using PHP for security purposes, such as blocking unknown IPs from accessing the login pages, and also acting as a gatekeeper to protect and limit the access to the database. All login access information should be logged for tracking and security purpose. For security, the login codes in PHP program should be implemented using mysqli_escape_() to protect against MySQL injection. After a user successfully logins to the system, a summary page will be displayed and the user's login ID will be saved into a cookie, allowing the later web pages to verify the user without having to keep accessing the database.

SUBMISSION COMPONENT

The summary page shows the logged-in student's current grades and a link to the submission page where students can select the year/term, program assignments, and files. This component is done with the HTML post method with cookies to check for security purposes. This ensures that the student that is logged in is the only person who can view his/her grade and submit the program under his/her account. Then, a PHP program will verify the cookie before receiving the submitted java source code after students click the submit button. After the Java file is successfully uploaded, it will be saved under a student folder on Linux. Since Java requires the file name and the public class name to be the same, the submission component will verify if the submitted file name matches the selected program assignment, and if the student's name and course# are included in program's comments. If any of the two conditions fail, an error message will be displayed and system will not continue to run. If the submitted program passes both verifications, it will be represented by a variable $prog in the PHP code.

COMPILING COMPONENT

After the program is saved on the webserver, the PHP codes use a variable $prog.java to represent the file name. The system will utilize the Linux standard output 1 and standard error 2 to redirect the messages to from showing on-screen to the files. The system will generate the following command $cmd and call the PHP function system($cmd) to invoke the Linux command system call to run $cmd. $cmd= "javac $prog.java 1> $prog.compile_msg 2> $prog. compile_err" where $prog.compile_msg is the file kept as a result of the compile error message generated by javac. $prog. Compile err is the file kept as a result of the error message which could be generated by the system. The compile errors are syntax problems such as missing semicolons, class name not matching the file name, or undefined variables in java programs. In addition to the compile error, javac might cause system errors that are thrown through standard error 2, not through to standard output 1. For example, a missing java library, the missing java files, or the inability for PHP to make system call will be considered a system error. If the file sizes of $prog. Compile_msg and $prog.compile_err are not zero, their contents will be displayed on browser using <pre></pre> HTML tag in red colour and the system will not be able to continue to run.

EXECUTING COMPONENT

If student's assignment can be successfully compiled without any warning and error messages, the system will display a message saying "the assignment can be successfully compiled". The assignment related *.class files should be generated. Since the system knows which program assignment was selected, it will know if input data will be needed. $prog.in is the file containing specific input data to test a specific java program. The data file should be created before the students can submit their assignments. The executing component will generate the following command $cmd to execute the assignment, if it requires standard input: $cmd="java $prog <$prog.in 1> $prog.run_msg 2> $prog.run_err" If there is no input required, the following command $cmd will be used: $cmd= "java $prog 1> $prog.run_msg 2> $prog.run_err" where the $prog.run_msg is the output of running the program, and $prog.run_err is the runtime error message. The system will call the PHP function system($cmd) to invoke the Linux command system call to run $cmd. If the file size of $prog.run_err is not zero, its content will be displayed on browser using the <pre></pre> HTML tag in red colour, and the system will not continue to run. If there is no error message, the system will show a message in green color on browser - "The assignment can be run successfully, and the instructor will review the assignment and verify the output.

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REVIEWING COMPONENT

In order to review students' assignments, the instructor needs to first login to the system. Once the instructor has successfully logged in, the system will keep instructor login ID in a cookie for further pages to verify. It will bring the instructor to the summary page where all students' grades will be displayed. There will be a link for instructor to click to enter the Submission Component. The instructor need to select which assignment to review, but won't need to choice a file to upload. After instructor clicks the submit button, the system will display every student's login ID, source codes in blue colour, output in green colour, and compile and display runtime error messages in red colour. If the student did not submit the source code.

USE CASE DIAGRAM

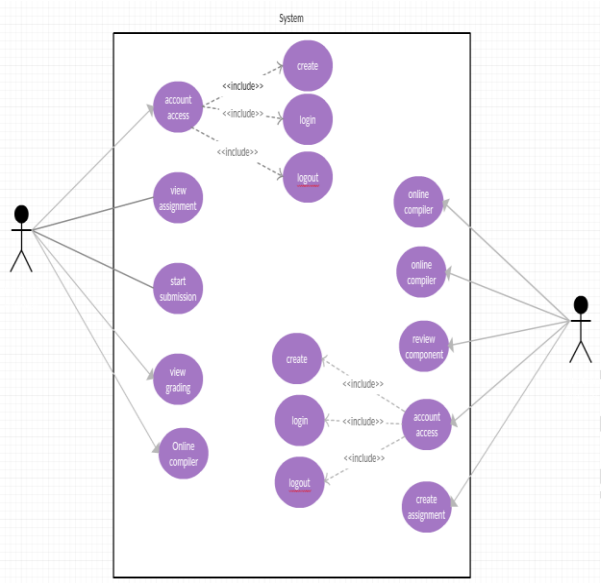


Figure 2

V. DATA FLOW DIAGRAM

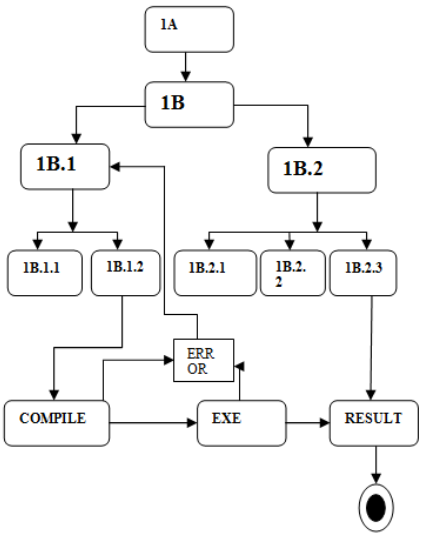


Figure 3

DESCRIPTIONS OF THE DATA FLOW DIAGRAM

1A : USER
1B: LOGIN
1B.1:STUDENT
1B.2:INSTRUCTOR
1B.1.1:CHECK ASSIGNMENTS
1B.1.2:SUBMIT ASSIGNMENTS
1.B.2.1:CREATE/DELETE ASSIGNMENTS
1.B.2.2:VIEW SUBMISSION
1.B.2.3:REVIEW GRADING

Data flow diagram is the data flow between the system modules of Figure shows the data flow diagram for the project.

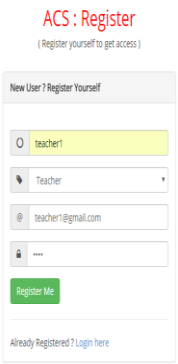
A data flow diagram is the graphical representation of the data flow through an information system. DFD is useful in understanding a system and can be used efficiently during analysis.

A DFD shows the flow of data through a system. It is a vision system as a function that transforms inputs into desired products. Any complex systems do not perform this transformation in one single step and data typically a series of transformations will undergo before it becomes the output.

With a data flow diagram, users are able to visualize how the system will work the system will achieve and how the system, data flow diagram of the old system can be developed and compared with a new diagram will be implemented data flow systems for comparisons to implement a more efficient system.

Data flow diagram can be used to provide the end user with a physical idea where the data input, ultimately, as an effect on the structure of the entire system.

VI. RESULTS



Screen Shot 1

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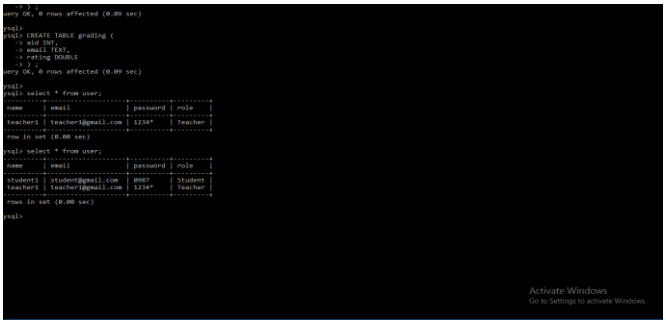

Screen Shot 2

VII. CONCLUSION

A system such as the one presented here can help both students in learning and instructors in managing the programming assignments. Students should be able to see if their programs meet the instructor's requirements immediately after submission. It is important to give frequent programming assignments when learning a new computer language. However, instructors should focus on preparing the materials and improving the curriculum for the class, rather than spending time on grading the assignments. The system presented in this paper takes minimal efforts for instructors to grade the assignments, and will not limit the number of assignments given to students. The most attractive benefit is that it is very easy to implement and all required resources are free. If the operating system has been configured with the send mail function, the system can call the PHP mail function using student email addresses to automatically notify the instructor and student about the assignment submission status – success or failure in compile and runtime stages – and the output. The instructor can then reply to the email from individual student about his/her grade and make comments. Students might resubmit their assignments and overwrite the same assignment. Instructors should only need to check student's latest version. The system can be expanded to incorporate more functions such as specifically searching if students have implemented the required functions and comparing the output with expected output. The system might be able to do automatic grading, if the grading rules can be clearly defined. However, automatic grading is outside the scope of this project, and will require additional research on defining the grading rules.

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