International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 SJIF 2023: 8.176 ISSN: 2582-3930

CODING SMASH

Aatif Javed Shaikh, Khajamiyan Shaikh, Abdul Muttalib Shaikh , Junaid Javed Jahagirdar

Guide: Prof. Nargis Shaikh

Bachelors of Engineering

Rizvi College of Engineering

Department of Computer Engineering

ABSTRACT

To create a Coding Environment in our College and to create its own Coding Platform. Coding Smash is for all students in any field who like learning programming technologies and interested in Coding and contributing towards creating a coding Arena in our College. Students can practice their coding skills in our own embedded compiler, and can improve their problem solving skills. The programming languages include C, C++, Python, Java, and HTML. This study analyzes various publications of scientists on the training of future IT specialists and the features of training programming using online simulators. Coding Smash is a website that will also host Competitive programming contests and Data structures and Algorithms contests along with practicing various problems to learn and increase the problem solving skills. This will also help learn and acquire computational thinking(CT) skills. It is important to use online simulators in the learning process as an additional tool for the formation of professional competencies, which provides more intensive involvement of students in the process of writing code and practical (situational) application of existing knowledge. Gamification of the process of training future IT specialists helps to increase cognitive activity and hence – the quality of the educational process and distance learning in particular. Owing to the quick development of

the cutting edge data society, it is important to instruct youngsters who are liable for the fate of the Information Technology (IT). Problem solving is a serious discovery that is implemented to improve abilities and upgrade information on the IT.

Keywords: Coding, Competitive Programming, Website development, Computational Thinking, Problem Solving Skills, Compiler.

Chapter 1

Introduction:

Learning code has never been easier. Many free resources can help a beginner master a programming language or build a new web project. Coding Smash is for our College students with their specific goals covering all the aspects of development. The authors recommend the use of online programming simulators as an additional tool for teaching computer science disciplines, taking into account their functionality, as well as the level of preparation of students and the expected learning outcomes. Coding smash is a collective education effort by user-creators to teach various techniques and comment with constructive feedback. Community leaders moderate the content. Achieving code mastery by working through challenges with your peers. Coding smash is a resource to learn code step-by-step and improve existing coding skills. Write real code within minutes of starting your first lesson. Assess what you've learned with in-lesson quizzes and advance your skills with practice. Coding smash will include Data Structures practice problems, with our own embedded compiler for different languages like C, C++, Java, Python, etc.

Two main components of our website will be an Article and a Compiler.

An Article will include the space for the 1. Problem Statement and 2. the detailed definition of the problem along with the 3. explained Test cases and 4. The Hints.

The Compiler – Research in compiler construction has been one of the core research areas in computing. Researchers in this domain try to understand how a computer system and computer languages associate. A compiler translates code written in human-readable form (source code) to target code (machine code) that is efficient and optimized in terms of time and space without altering the meaning of the source program.

Chapter 2

Review of Literature

2.1 Paper-1 The use of online coding platforms as additional distance tools in programming education

2.1.1 Introduction: The modern world, as events in early 2020 have shown, was not ready for extreme challenges of various kinds. For example, the situation with the spread of COVID-19 showed that most countries around the world were unprepared for such events. The economic recession and social turbulence have affected all spheres of human activity [9]. Ukraine's higher education system was no exception, as it was neither morally nor technically ready for an emergency transition to distance learning. It is clear that higher education institutions (abbreviated – HEI) in our country are quite diversified, so some, mostly private and leading national universities, were able to mobilize faster and within a few weeks to transfer their students to distance learning platforms such as Moodle, Google Classroom, iSpring Online, etc. number of free educational institutions, not having sufficient resources and time, approached the problem of organizing distance education by using a variety of cloud services that provide support for conferencing such as Zoom, Google Meet, MS Teams, Skype, as well as streaming lectures and teaching educational video content on YouTube. In other cases, HEI or a separate category of scientific and pedagogical staff was limited to the use of various managers (Viber, Telegram), social networks, as well as e-mail. We are not currently evaluating the effectiveness of the use of certain ways, we can talk about this later, including the results of higher education students in the summer session, but it should also be noted that the choice of one or another approach in the organization of distance education largely depends on specialties, educational and professional programs, the profile of the Free Economic Zone, the expected learning outcomes.

Specialty 122 “Computer Science” focuses on the acquisition of in-depth theoretical and practical knowledge, skills, computer science, information technology, general principles of professional methodology, other competencies sufficient for the effective implementation of professional tasks in the design of information systems and their components. At the Kyiv National Economic University named after V. Hetman anonymous survey among students of the first (bachelor's) level of higher education (March 2020) showed that 2/3 of the students as a key motive for choosing a specialty identified knowledge of programming languages of different levels, which, in principle, is logical. On the other hand, as the practice has shown, the absence of a teacher

(mentor, curator) in mastering the components of the educational and professional program related to the study of programming languages, including independent, practical and laboratory tasks in students constantly cause difficulties. According to the results of the survey, it was found that 73% of respondents have problems with distance learning and independent performance of practical tasks, of which 58% – full-time students. These data show that for students of full-time form of education a sharp transition to distance learning is a certain "stress", which likely can affect the final learning outcomes. The most common problems of students, identified during an anonymous survey of students, are presented in figure 1. Specialty 122 "Computer Science" focuses on the acquisition of in-depth theoretical and practical knowledge, skills, computer science, information technology, general principles of professional methodology, other competencies sufficient for the effective implementation of professional tasks in the design of information systems and their components. At the Kyiv National Economic University named after V. An anonymous survey among students of the first (bachelor's) level of higher education (March 2020) showed that 2/3 of the students as a key motive for choosing a specialty identified knowledge of programming languages of different levels, which, in principle, is logical. On the other hand, as the practice has shown, the absence of a teacher (mentor, curator) in mastering the components of the educational and professional program related to the study of programming languages, including independent, practical and laboratory tasks in students constantly causes difficulties. According to the results of the survey, it was found that 73% of respondents have problems with distance learning and independent performance of practical tasks, of which 58% – full-time students. These data show that for students of full-time form of education a sharp transition to distance learning is a certain "stress", which likely can affect the final learning outcomes. The most common problems of students, identified during an anonymous survey of students, are presented in figure 1.

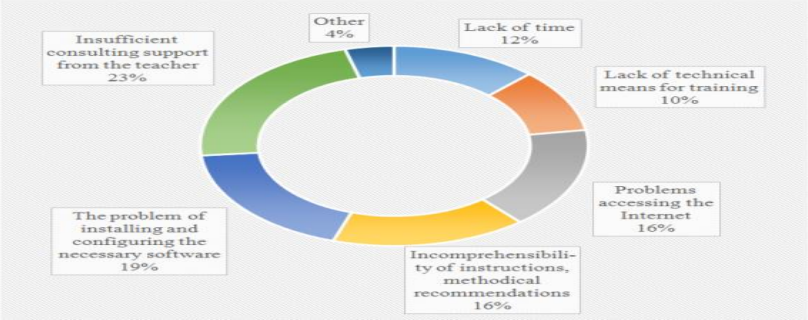


Fig. 2.1 Problems that prevent students from mastering computer disciplines in distance learning.

The issue of finding modern and popular tools to improve the quality of the educational process, mastering programming languages and developing technical skills is quite relevant, both for Ukraine ([9]) and for the world as a whole. Referring to foreign practice, scientists emphasize the expediency of diversifying the ways and methods of teaching programming, among which are the relevant interactive online simulators and coding platforms. In particular, in [2], the experience of using an interactive learning platform for the development of parallel programming skills – Parapple is described. The authors emphasize that the use of the game form of learning implemented in the platform significantly increases the efficiency of students' learning of programming languages.

In [5] and [9] it is emphasized the need to involve students studying computer science in competitions (contests, competitions), for which there are a number of web platforms, in particular: Coderbyte, CodeFights, Codeforces, E-Olymp, Facebook Hacker Cup, Google Code Jam, etc. The high efficiency of using special interactive programming simulators, in particular, the CodeWrite web resource, at the stage of acquaintance with the basic rules and syntax of the Java program code is emphasized in [4]. In [1] it is noted that the use of online simulators to master and consolidate programming skills greatly simplifies the procedure for teachers to check the code written by students, identify errors, and help to detect in the early stages of lag in mastering the code by individual students. Despite the popularity of online platforms for learning programming, there is still a lack of thorough research to analyze what skills are acquired through the use of different platforms. The article [6] analyzed clickstream data from 3,355 participants who studied in several seminars on computational thinking using the online platform

Kodetu. Participants used Kodetu coding blocks to solve problems with increasing complexity. The results after evaluation of data on the characteristics of participants (age, gender, previous knowledge), the similarity with previously made decisions, and the degree of inconsistency with the optimal solution are presented.

2.1.2 Existing System

In English literature, the term “online coding platform” is used to denote the concept of online simulators for mastering and consolidating programming skills. There is no fixed phrase in Ukrainian–language practice, so we use the concept of online programming simulators (abbreviated – simulators, or “online coding platform” as in English), which will denote a web resource that gives the user free or paid access to various types of tasks (group and doubles tournaments, games, static situations, search for errors, testing, etc.), which allow getting acquainted with the basic concepts of writing program code and deepen existing knowledge. The peculiarity of these OCP is: they are publicly available, their use does not require the installation of any additional software, the availability of powerful computer equipment, installed operating systems, the need to use proprietary software products.

These web resources can be accessed from anywhere in the world; for use, students must have access to the Internet (sufficient at the level of services provided by the mobile operator) and a convenient device. Note that a laptop or computer is not necessary, a smartphone with a more or less user-friendly screen is enough to work with OCP; tasks are visualized, students do not have to spend a lot of time studying instructions and teaching materials to perform a specific task, just get acquainted with the problem statement, input constraints (e.g., RAM, program execution time, etc.) and go to write code that corresponds initial conditions. Visualization of tasks in simulators is various, it all depends on the creativity of developers, the orientation of a web resource and its popularity, etc. For example, in modern simulators tasks can be presented in the form of animations, graphs, game scenes, the actual code and visual representation of results, crossword puzzles, tests, quizzes; performance of tasks on OCP is not trivial. A student can write a code to solve a problem that satisfies the input conditions by copying it, for example, from a textbook or finding it on a forum. If the simulators are aimed at developing existing

programming skills, then in addition to the formal implementation of the task, the evaluation algorithms embedded in them analyze the originality of the proposed code, for which you can get additional points in the ranking. This develops in students a tendency to creativity, self-realization and critical thinking; tasks are performed in an interactive mode "task-writing code-evaluation of results", which promotes greater involvement of students in the programming environment, causes some excitement and develops motivation, as each registered user is assigned a certain rating and with increasing student success and knowledge in programming this rating is rising; the counseling support available to students when working with program code is very important. The functionality of most simulators expands the teacher's ability to provide such support, in addition to the student's direct contact with his teacher, he has access to reference materials and books on the programming language being studied; it is possible to seek advice from the community that also works with this simulator; tasks are differentiated both by programming

languages and by the initial level of students' knowledge. At the same time, if a student sees that he cannot cope with a specific task, it is always possible to go back and fill the gaps in knowledge; most OCP check students' performance of tasks automatically, so teachers have time to focus on the content of their own distance learning courses, to explain the difficult points and help solve problems that are unclear to students while studying on such simulators; most OCP provide employment services free of charge or for a fee. That is, employers, following the TOP-ratings of participants, analyzing their logic and software solutions can offer work in their companies to future programmers and IT professionals. In addition, some web resources have the option of sending a resume.

Table 2.1 : Comparative characteristics of online programming simulators ("+" is yes, "–" is no or very bad, " " is partial or exact information not found).

OCP / Categories	leetcode.com	checkio.org	hackerrank.com	codechef.com	codeforces.com	codewars.com	freecodecamp.org	repl.it	codingbat.com	exercism.io
A set of skills practiced in the exercises:										
▪ syntax;	±	–	+	+	+	+	+	+	+	+
▪ semantics;	±	–	±	±	+	+	+	+	–	+
▪ algorithmization;	+	–	±	+	+	+	+	+	–	+
▪ logic;	+	+	±	±	+	+	+	+	+	+
▪ variables;	±	+	+	+	+	+	+	+	+	+
▪ arrays;	±	+	+	+	+	+	+	+	+	+
▪ loops;	±	+	+	+	+	+	+	+	+	+
▪ functions;	±	+	+	+	+	+	+	+	+	+
▪ objects.	±	+	+	+	+	+	+	+	+	+
Types of training exercises:										
▪ challenge;	±	–	+	+	+	+	+	+	–	+
▪ static problems;	+	–	+	+	+	+	+	+	+	–
▪ story games;	–	+	–	–	±	+	–	–	–	–
▪ tests;	±	–	–	+	±	–	+	–	–	–
▪ other.	+	+	+	–	+	–	–	–	–	+
Support for group work on the task	+	+	±	±	+	±	–	+	–	+
Additional training and explanatory material (tutorial)	+	+	+	+	+	+	+	+	+	+
Evaluation of training success (leaderboard)	+	+	+	±	+	+	+	+	+	+
Skills certification	±	–	+	+	–	–	+	–	–	–
Feedback	±	+	+	±	+	+	+	+	+	+
Available programming languages	9	JavaScript (TypeScript), Python	47	50+	±	51	21	50+	Java, Python	50
Recruitment options	+	–	+	+	–	+	+	–	–	–

In table 1, the authors of this article made a comparative description of several online programming simulators. The criteria for choosing these resources were the following circumstances: first, the subjective experience of the authors in the use of these resources based on their own experience; secondly, the requirements of the educational-professional program “Computer Science” (2018) to the program results and the acquisition of professional competencies of applicants for the higher education of the first (bachelor's) level at the Kyiv National Economic University named after Vadym Hetman (in particular, knowledge of programming languages Java, JavaScript, PHP, C#, C++) [9]; third, the popularity of web resources on the Internet by the number of unique visitors and traffic statistics rated by Alexa (https://www.alexa.com/), a company that is part of Amazon.com. A similar approach to the

selection of web resources for online learning is used in [9]; fourth, the free basic set of features for training.

2.1.3 Related Work/ Limitation Existing System/ Research Gap:

The obtained results testify to the difference between OCP. In particular, the fundamental difference is in the most important, in terms of teaching and organizing quality distance education, as a set of skills covered by the exercises, the ability to support groups (joint, including with a teacher or classmates) work on tasks, a variety of available to learn programming languages. The fact that these OCP support a different set of programming skills does not indicate their ineffectiveness for educational purposes, but the need for students to have basic knowledge of the basics of programming, syntax, semantics. It follows that students of 1-2 courses of free economic education, who are just mastering programming (for example, learning their first language – C ++), it is advisable to offer to work with simulators such as Exercism.io and Repl.it. They have an intuitive interface, the tasks are offered to solve, mainly as challenges and the support of a mentor or teacher. Exercism.io gives the student the opportunity to share the results with the teacher so that he can check the written code and give recommendations for possible improvement. For its part, Repl.it, in its free license, supports collective cooperation with a restriction of two people, and subject to payment of a group license, it is possible for teachers to organize an individual room for joint and individual work with their students (Repl.it Classroom). For students who master the knowledge of Java and JavaScript within the educational-professional program, it is mainly students of 2-3 courses, we recommend turning to OCP built on a game basis – CheckIO (the result of Ukrainian developers) and Codewars. The ideology of both simulators involves immersion in the programming environment through a game scenario of exercises. And if for CheckIO it is a game like RPG, where a student performing various tasks masters the map of the islands, complicating the task as he develops programming skills. The idea of Codewars is for a student to create their own karate clan or join an existing clan to work together on applied problems. The simulator also supports changes in the form of sparring between karate players, for example, when the code is alternately refactored or bugs are fixed. As for the possibilities of collective work of teachers and students, it is somewhat limited in these simulators. For example, ScheckIO supports the creation of an

individual teacher's office only for mastering the Python language. Codewars has the ability to create teaching Code Classrooms but on a fee basis. Students of 3-4 courses can be recommended to develop programming skills in HackerRank simulators. This web resource contains tasks of medium and advanced complexity, there are fewer tips and tricks for completing tasks, which encourages students to develop imagination and creativity in writing code. In addition to basic programming languages, it allows us to deepen knowledge of the basics of algorithmization, databases, SQL, functional programming, mathematics, etc. This simulator contains good recruitment support, which means an opportunity for students to demonstrate their skills to potential employers.

2.1.4 Problem Statement/Objective:

This study analyzes various publications of scientists on the training of future IT specialists and the features of training programming using online simulators. The authors of the article made a comparative description of different online platforms for teaching programming according to certain criteria, selected interesting tasks from the online platform hackerrank.com, which have already been used to teach students. Online programming simulators have significant potential in organizing an effective distance learning system in Ukrainian universities. It is important to use online simulators in the learning process as an additional tool for the formation of professional competencies, which provides more intensive involvement of students in the process of writing code and practical (situational) application of existing knowledge. Gamification of the process of training future IT specialists helps to increase cognitive activity, and hence – the quality of the educational process and distance learning in particular. The authors recommend the use of online programming simulators as an additional tool for teaching computer science disciplines, taking into account their functionality, as well as the level of preparation of students and the expected learning outcomes.

2.1.5 Scope

An example of my own experience of using online coding platforms One of the authors of this publication has been using one of these platforms for over 5 years in order to improve their programming skills and to select assignments for students in which he teaches programming.

This platform is hackerrank.com, which positions itself as follows “HackerRank is a technology hiring platform that is the standard for assessing developer skills for over 2,000+ companies around the world. By enabling tech recruiters and hiring managers to objectively evaluate talent at every stage of the recruiting process, HackerRank helps companies hire skilled developers and innovate faster” [8]. It should be noted that, indeed, as a result of some competitions, the author received letters with proposals for cooperation from various companies. In addition to a significant number of different tasks and competitions, it is worth noting the excellent visualization of various aspects of the results [9]. In figures 2-5 show variants of such visualization.

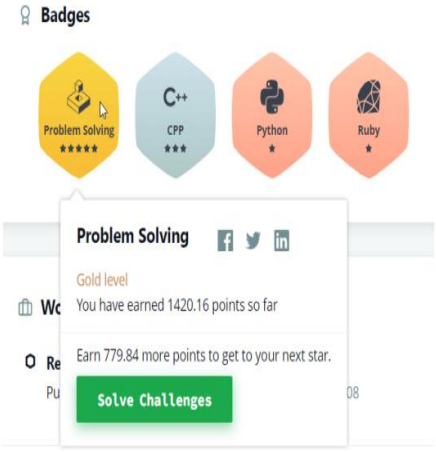


Figure 2. Example of Badges visualization on HackerRank [10].

Figure 3. Example of Ratings visualization on HackerRank [10].

Fig. 2.2 Example of Badges visualization on HackerRank[10].

Fig. 2.3 Example of Ratings visualization on Hackerrank[10].

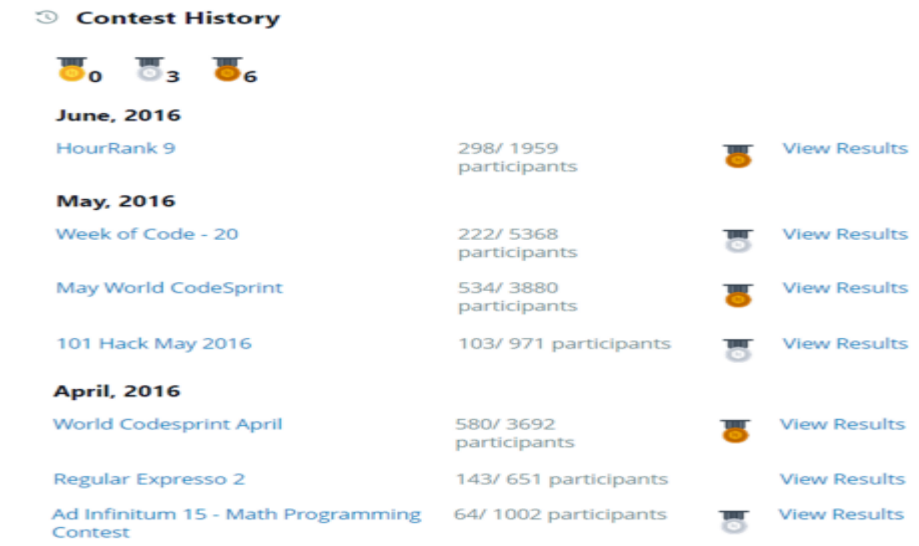


Figure 4. Example of Contest History visualization on HackerRank [10].

Fig. 2.4. Example of Contest History visualization on HackerRank[10].

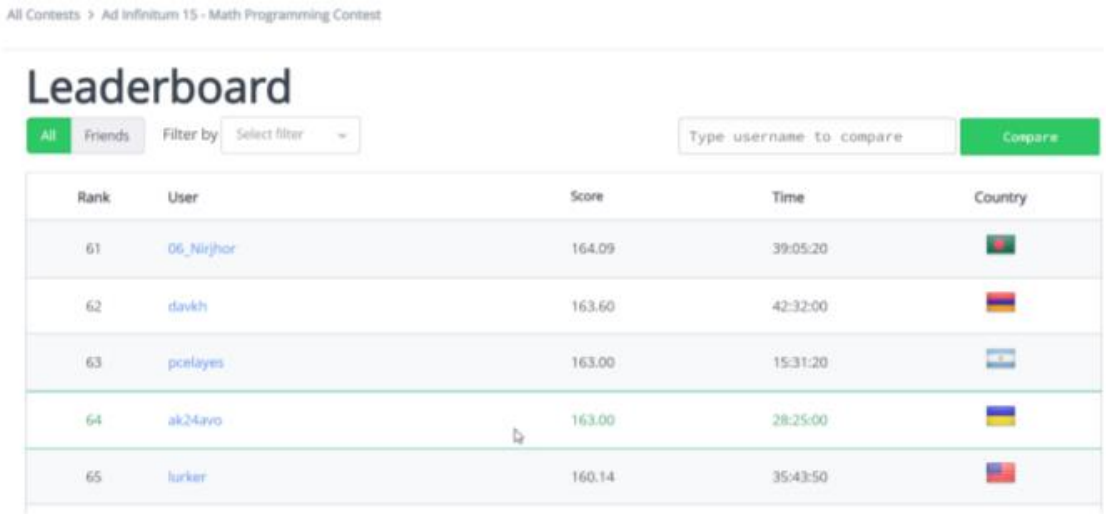


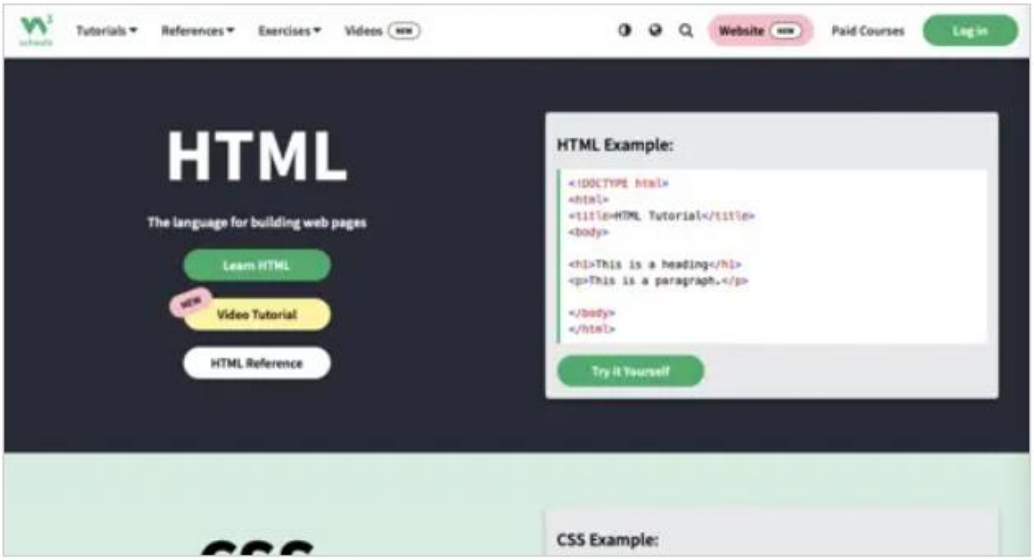
Figure 5. Example of Leaderboard visualization on HackerRank [10].

Fig. 2.5. Example of Leaderboard visualization on HackerRank[10].

Some other examples include W3Schools, Code Conquest, Code Academy, Hackr.io, etc.

W3Schools:

W3Schools is for web developers, covering all the aspects of development. Tutorials range from basic to professional and include skill quizzes. Premium features include full self-paced courses and certification. W3Schools launched in 1998 but is unaffiliated with the W3C, the World Wide Web Consortium.



W3Schools

Fig. 2.6 W3Schools Image

2.2 Paper-2 Competitive Coding Website

2.2.1 Introduction:

Competitive programming is an analytical sport in which programmers compete to solve the most algorithmic problems in the shortest time possible. Many of the CS subjects used in app development, such as networking, GUI, and databases, will not be covered in these competitions. It's all about the ability to solve algorithmic problems, data structure understanding, and implementation skills. ACM-ICPC organized a competition at Texas A&M University in 1970 that gave birth to competitive programming. Competitive programming, according to (Competitive Programming [8]), is a mind sport in which participants attempt to program according to given requirements over the Internet or a local network. Sport programmers are the names given to the contestants. Several international software and Internet firms, such as Google, Facebook, and IBM, understand and promote competitive programming. Programming contests are held on a regular basis by a number of organizations. In most programming competitions, the host presents the participants with a series of logical or mathematical problems to solve (who can vary in number from tens to several thousand), and contestants are required to write computer programs capable of solving each problem. Scoreboards are updated in real time, and participants experience an exhilarating thrill when they solve a tough problem and beat their opponents. At higher levels of competition, the best athletes from each area or school congregate in one place to compete for a gold, trophy, or even cash prize.

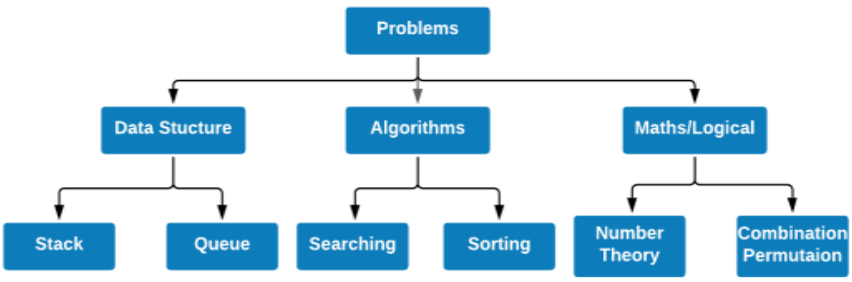


Fig 1.Problem Tree

Fig. 2.7 Problem Tree

2.2.2 Existing System

Many competitive coding platforms exist, including CodeChef [2], Spoj [3], CodeForces [4], and HackerEarth [5], which support over 50 programming languages and have a wide community of programmers who help students and professionals test and develop their coding skills. Its goal is to provide a learning, competition, and improvement environment for students and aspiring software developers. On competitive programming platforms, a variety of programming competitions are held. There are two kinds of contests: long-term and short-term. Each short-term competition round lasts 1 to 3 hours. Long-term competitions will last anywhere between a few days to several months. Since the number of entrants is typically very high, most competitions are usually arranged in many rounds. Except for the final round, which needs onsite participation, they normally require online participation in all rounds. Gold, silver, and bronze medals are presented to the top performers at IOI and ACM-ICPC, while cash prizes are awarded to the top finishers in the other contests.. Also hitting the top places in the score tables of such competitions may attract the interest of recruiters from software and Internet companies. Programming is a very practical and hands-on skill. One has to continuously do it to be good at it. It is not sufficient to solve the problem theoretically; you must also code the solution and have it accepted. Knowing which algorithm to use and putting it into practice are two completely different things. To be a good programmer, you need both. Many programmers claim that the issues with competitive programming have little to do with real-world programming. It is, for the most part, right. However, it improves your efficiency. Critical test data assists you in writing right solutions all at once! Furthermore, it improves the debugging skills. Hard problems require you to break the problem down into bits, solve each one separately, and then put it all together to solve the main problem. Competitive programming is not the only way to master these qualities but it is one of the best ways to do so.

2.2.3 Related Work/ Limitation Existing System/ Research Gap:

In the first paper, the author provides positive results on the use of programming as an educational resource, this illustrates the need for more longitudinal studies in schools, using broader groups of students to obtain concrete conclusions on the forms of learning that could be strengthened by programming. Multiple planning tests that are as step-by-step sub-goals for Specification in part. And based on time, we set the law of partial points and plus or minus points. The device illustrates the outcome of Judgment and instantly shows the rating

tab. There is a sub-system of teacher help, which consists of Functions for tracking and tutoring. There is a web page first. To track a classroom, each student, and issues Include views of time series and graphs that allow a teacher to advise students who are not performing so well and to recognize errors which many learners are making. The educational process Effects of frequent and early submission through performance testing Series and points in time. There are some plans for the enhancement of Usability by a teacher's user test. In the 2nd paper, they disclose how to utilize tools in programming that are expected to improve abilities and upgrade information on IT. These programming challenges for secondary school understudies assume a significant part in data training however examinations of their impact and job in the instruction framework have been scant. In this examination, an investigation structure dependent on an overview of programming challenges is proposed and a comparing investigation apparatus for assessing and dissecting a programming challenge is made. The outline of the study, the subtleties of the system, and the apparatus are clarified in this paper. In the third paper, we become more acquainted with the Online passing judgment on a framework for a programming challenge. A reasonable application is needed to make a straightforward, responsive, and exact decision on a framework for the opposition. In any case, issues emerge when there are a few adjustments made to fulfill the global guideline rules, particularly the use of the programming language. In this paper, UM Framework-based Online Judge (OJ) framework is proposed to defeat the connected issues. In this proposed strategy, an adaptable passing judgment on the framework is planned which can be utilized for any programming rivalries, both locally and globally like ACM ICPC, SPOJ, and so on It has been shown that the proposed internet passing judgment on the framework has a source code ordering pace of 3.6 seconds per code and precision up to 99.9%.

2.2.4 Problem Statement

Owing to the quick development of the cutting edge data society, it is important to instruct youngsters who are liable for the fate of the Information Technology (IT). Problem solving is a serious discovery that is implemented to improve abilities and upgrade information on the IT. . To improve serious programming understanding among students, we have implemented a competitive coding website. Most of the students lack the skills even to analyze a short piece of code. We have also developed a Competitive coding website, the contest management Web server. The server evaluates the submitted software using input and output data in an execution test. We deliver several planning tests for step-by-step sub-goals as

partial requirements to adapt a contest for beginners. Which also provides the solution at the end. It also manages the progress of the student and his performance. We're building a teacher support system that includes features including tracking and tutoring.

Chapter 3

Theory, Methodology, and Algorithms

3.1 Analysis / Algorithms / Framework

3.1.1 ReactJS:

React (also known as React.js or ReactJS) is a free and open-source frontend Javascript library for building user interfaces based on UI components. It is maintained by Meta(formerly Facebook) and a community of individual developers and companies. React can be used as a base in the development of single-page, mobile, or server-rendered applications with frameworks like Next.js. However, React is only concerned with state management and rendering that state to the DOM, so creating React applications usually requires the use of additional libraries for routing, as well as certain client-side functionality.

3.1.2 Javascript:

JavaScript, often abbreviated as **JS**, is a programming language that is one of the core technologies of the World Wide Web, alongside HTML and CSS. As of 2022, 98% of websites use JavaScript on the client side for webpage behavior, often incorporating third-party libraries. All major web browsers have a dedicated Javascript engine to execute the code on user's devices.

JavaScript is a high-level, often just-in-time compiled language that conforms to the ECMAScript standard. It has dynamic typing, prototype based object orientation, and first-class functions. It is multi-paradigm, supporting event-driven, functional, and imperative programming styles. It has application programming

interfaces (APIs) for working with text, dates, regular expressions, standard data structures, and the Document Object Model (DOM).

The ECMAScript standard does not include any input/output (I/O), such as networking, storage, or graphics facilities. In practice, the web browser or other runtime system provides JavaScript APIs for I/O.

JavaScript engines were originally used only in web browsers, but are now core components of some servers and a variety of applications. The most popular runtime system for this usage is Node.js.

3.1.3 Compilers :

A compiler is a computer system software that transfigures source code into an intermediate code which afterwards transforms into target code without altering the meaning of the source code. The result of this transformation (machine code) must be efficient and optimized in terms of time and space (memory size). The interface between a computer programmer and a computer system is the compiler and the operating system. A compiler detects an error(s) in the source code during compilation processes and handles. There are three types of error in computer programming. They are syntax, runtime and logic errors . The only detected error during compilation processes is the syntax error. The other two types of errors occur during program execution

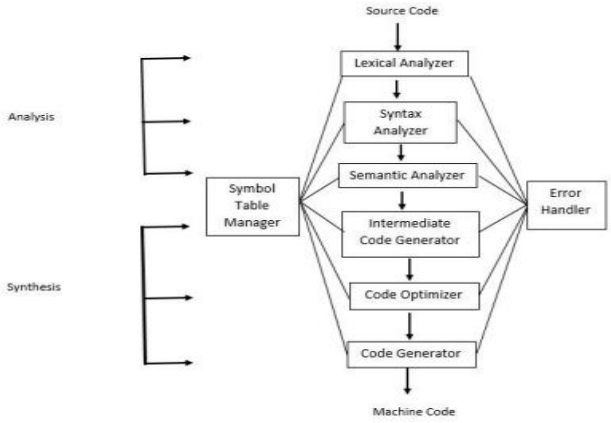


Fig. 3.1 Block diagram of Compiler

3.2 Details of Hardware and Software:

3.2.1 Minimum HardWare Requirements

1. Processor : Intel i5 or AMD Ryzen 5

2. RAM : 3 GB

3. Hard Disk Drive : 200 GB

4. Peripherals : Keyboard, Mouse, Monitor, Camera

3.2.2 Minimum Software Requirements

1. Operating System : Windows 8/10

2. Browser : Brave / Google Chrome

3.3 Methodology:

3.3.1 Methodology-I

A programming contest is a competition in which the contestants face a set of programming tasks, also called problems, to be solved in a limited amount of time and under some time and space constraints. A single task can be broken into different subtasks of increasing complexity: basic techniques might be enough to solve, within the given time and/or space limits, some of the subtasks are the most difficult ones that might require very specific algorithmic techniques and data structures. Among the programming contest, we mention

1. The International Olympiads in Informatics (IOI), is an annual programming competition for secondary school students patronized by UNESCO. http://www. ioinformatics.org/

2. Google Code Jam is based on multiple online rounds that conclude in the World Finals. https://code.google.com/codejam/.

3. The very recent International Informatics Olympiads in Team (IIOT) that started in 2017 is a team competition like ACM ICPC, differently from IOI (individual competition).

4. Facebook Hacker Cup, which is an annual worldwide programming competition where hackers compete against each other for fame, fortune, glory, and a shot at the coveted Hacker Cup. https://www.facebook.com/hackercup/.

5. The ACM International Collegiate Programming Contest (ICPC) is a multitier, team-based, programming competition operating under the auspices of ACM. https: //icpc.baylor.edu/

In general, students participating in programming contests have at their disposal several programming contest platforms, including Codeforces, USACO, COCI, TopCoder, Codechef, and HackerEarth, which run contests with different periodicity. The programming languages allowed in the competitions vary considerably: for example, IOI and IIOT accept only C.C++, and Pascal; ICPC adds to the list also Python (both 2 and 3), Java, and Kotlin. We implemented the system with JavaScript, PHP, NodeJS, Ajax, and MYSQL. GCC is the C compiler for judgment of C language code, Java8 compiler is for judgment of Java language code, and

Python3 is for Python language code on the server-side. After participating in a contest, the problem list page shows the headline information of each problem. Each problem page has Title of the problem, Description of the Problem, Code editor, and INPUT editor and display section. To keep the same page without page transition by inner frame technique. The Problem statement shows sample data, implementation hints, and the input form for uploading a source code as an answer.

3.3.2 Methodology-II

The implementation is done in two portions first where the user will just code and run it there will be no problem statement we named that part as compiler page and the second portion is the problem statement page where the user will get a set of problems and when the user will choose any of the problems to solve then on summiting the solution the user output get compared with actual output this comparison is done on the server-side as mentioned figure.

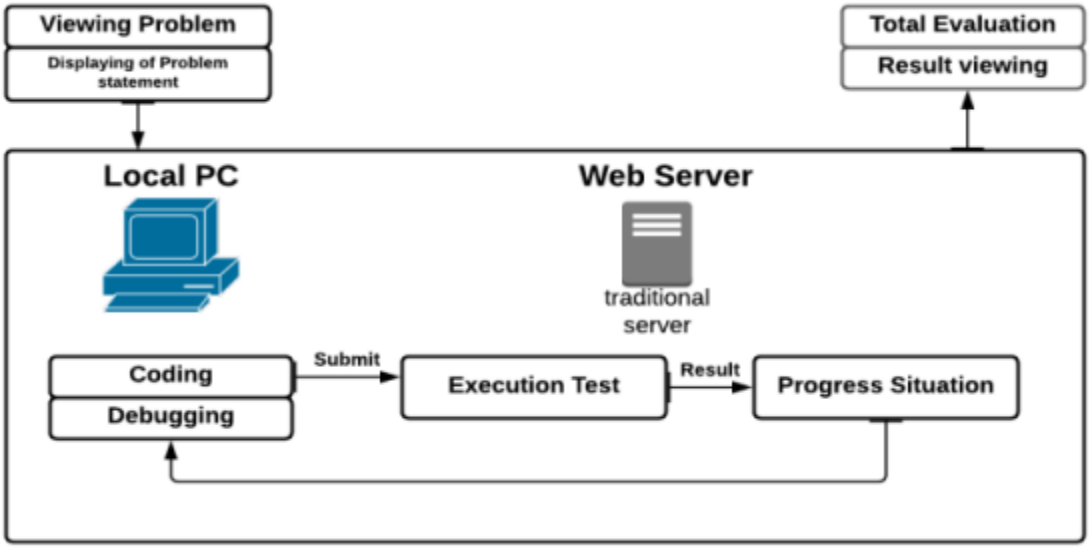


Fig 3.2. The exercise style with a small contest

Here when the user will submit code it will be converted to a file on the server-side which will be named as for c language main.c for Java language main.java and same as for python. That generated file will be converted to a machine code file with the help of compilers and executors

for the C language. It will be .exe for Java it will be a class file. If there is an error in the code that error will be push on a user side and if the code compiles successfully then executing the compiled file will produce an output file that output file will be compared with the actual output file which was embedded with problem statement output file if both the output file get match successfully with no any differences then it is a correct verdict otherwise it is a wrong verdict and this message will be e shown to the user as a response of his submission code and as the response has sent to the user then all server-side generated file that is compiled file and the executable file will be get deleted then the process has been completed. Based on the successful completion of the task that is with the correct verdict the user will be rewarded with scores. These scores will be added to its progress scores to add a problem statement on the server-side to view a list of problems on the problem statement page; the only website administrator has the authority to add a problem statement. The

description of a problem statement and the output of the problem statement will be in the form of file.txt there will be a form with a field like the title of problem, description of the problem, field to submit the description of problem statement file, the output of problems (file). There will be a profile page where the user can see their activities list examples like solved problems and their credential MySQL database handle all user credential, user activity (submission), problem statement database MD5 algorithm is used to encrypt the user credential like password mail, etc.

We proposed the programming exercise style with a small contest adjusted to beginners. The system judges an answer program automatically which is uploaded and compiled by execution with given sample data. It notifies a user of. The judgment results immediately and exhibits the progress situation of all users in the profile section. We adopt execution test series with the flexible matching method for step-by-step refinement. During the development of this project, we understood how competitive programming is important, how it influences the IT industry, and Computer Science Graduates. Competitive Programming is one of the ways Universities make their mark in academia. Competitive Programming reflects the talent present at Universities. Through Competitive Programming, students build their problem-solving skills which are essential in the day-to-day task at tech-giant product-based companies (Facebook, Twitter, and Google). It is also important for rigorous Coding Interviews carried out by these

tech-giants. Currently, India ranks a lot behind ACM-ICPC, which is organized annually. Hardly, one team gets selected for Finals from India or in rare cases none. India is becoming an IT Hub but this Hub bubble contains the majority only Service Based Companies. Although few tech giant offices are present, very few Computer Science or IT graduates work at such places. Improvement of Computer Science/IT Graduates in Competitive Programming is necessary.

3.4 Relevance to PO and PSO of the Department:

Following PO's and PSO's of the department were fulfilled in the process:

PO's

- To understand and identify the problem

- To apply basic engineering fundamentals and attempt to find solutions to the problems.
- Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach.
- To develop communication skills and improve teamwork amongst group members and inculcate the process of self - learning and research.

PSO’

- Identify societal/research/innovation/entrepreneurship problems through appropriate literature surveys
- Identify Methodology for solving above problems and apply engineering knowledge and skills to solve it.
- Use standard norms of engineering practices and project management principles during project work.
- Demonstrate capabilities of self-learning, leading to lifelong learning.
- Develop interpersonal skills to work as a member of a group or as a leader.

3.5. Process behind building the Website:

3.5.1 Defining and Planning the Project:

Define **Who the website** is for. Is it for yourself? For a client or your agency or your freelancing business.

Define business and User Goals.

Define a target Audience.

Plan and gather website content. Content is usually provided by the client. But you can also help them produce and find some content. For bigger sites plan out the sitemap. What pages the site needs and how they are related to one another. Define the Website personality.

3.5.2 Sketching, Designing and Building:

Think about what components you need, and how you can use them in layout patterns. Get ideas out of your head. This is an iterative process. You don't need to sketch everything. Use decisions, contents and sketches

from step I and II to design and build the website with HTML and CSS. You already have the components and layout. In this step you need to design the actual visual styles. Create the design based on selected website personality.

3.5.3 Testing and Launching

Make sure that the website works well in all other major browsers. Test the sites on mobile devices. Optimize all images in terms of dimensions and filesssize. Fix simple accessibility prosblem. Run the Lighthouse performance test. Once all work is done everything is perfect and you get approval from your client. Upload your website's files to a hosting platform. Choose and buy a great domain name.

3.5.4 Maintaining and Updating

Keep the website content updated over time. Install analytics software to get statistics about website users.

3.6 Implementation plan:

3.6.1 Gantt Chart

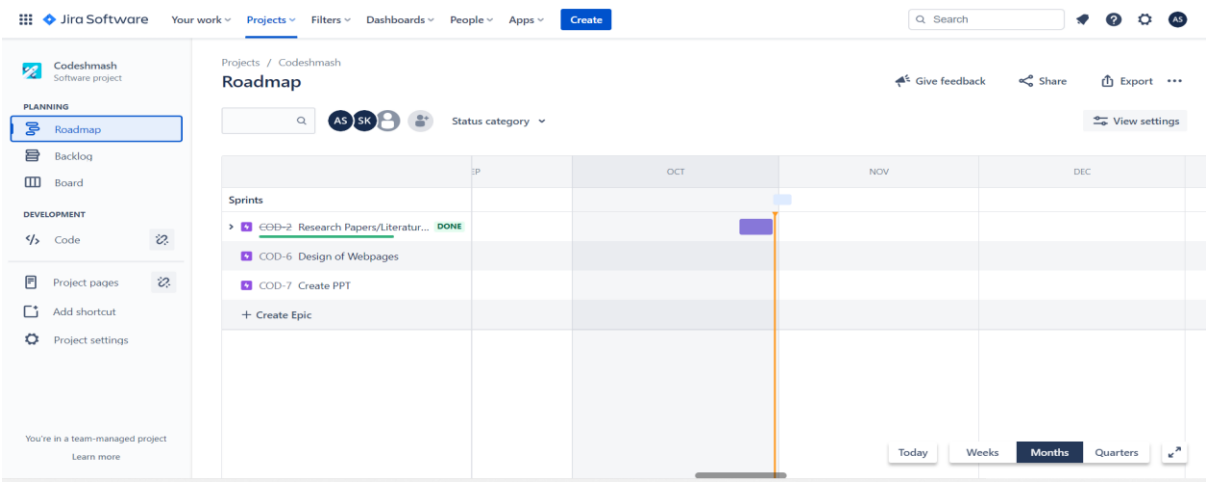


Fig. 3.3 Gantt Chart-I

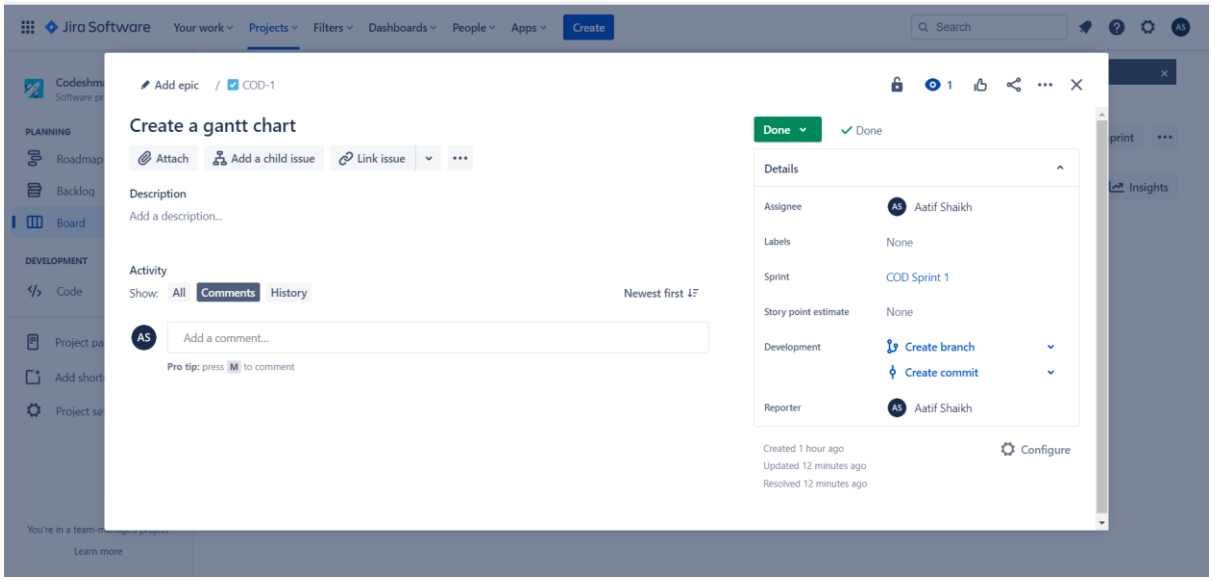


Fig. 3.4 Gantt Chart-II.

3.6.2 Main Page and Problem Set:

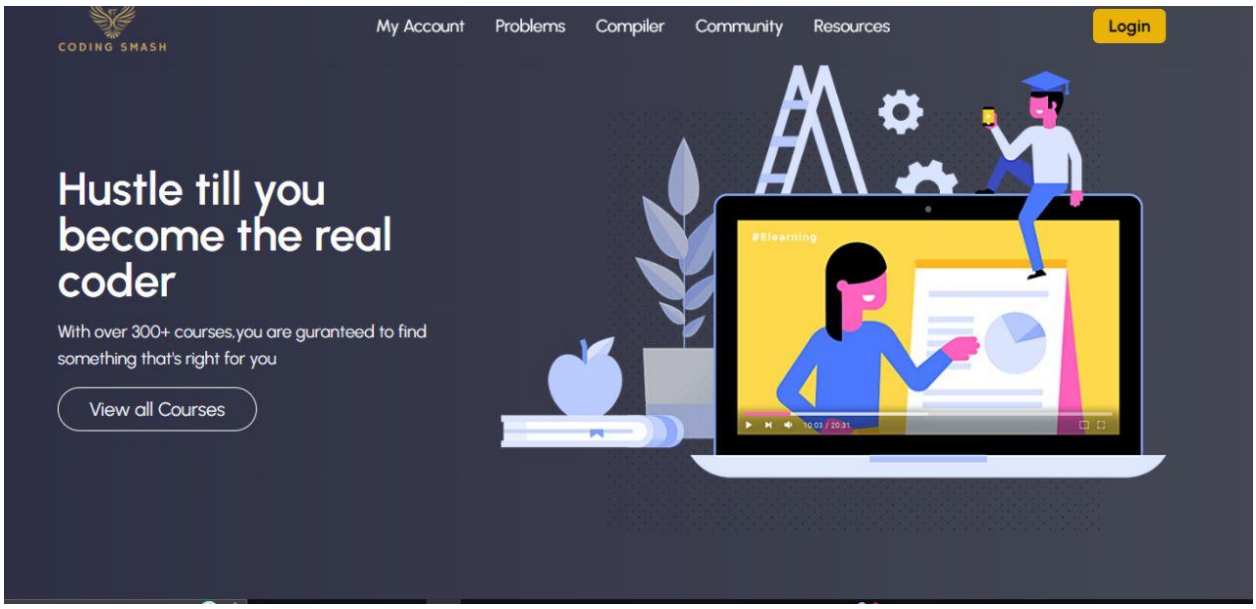


Fig.3.5 Main page

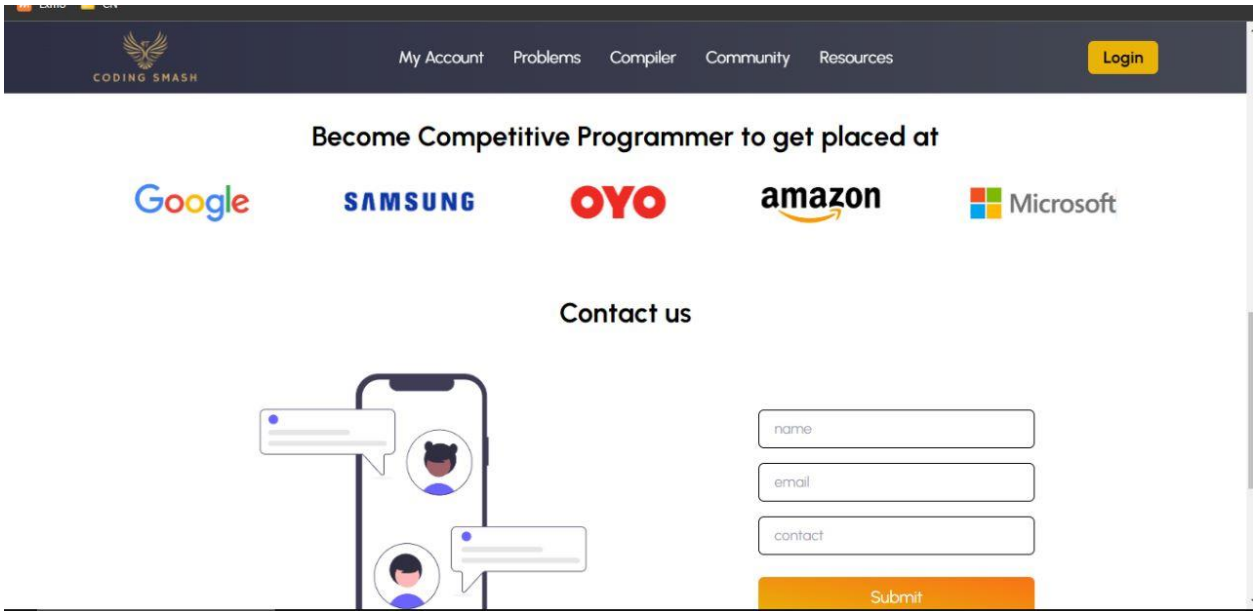


Fig. 3.6 Main-Middle-Page.

Fig. 3.7 Footer Page

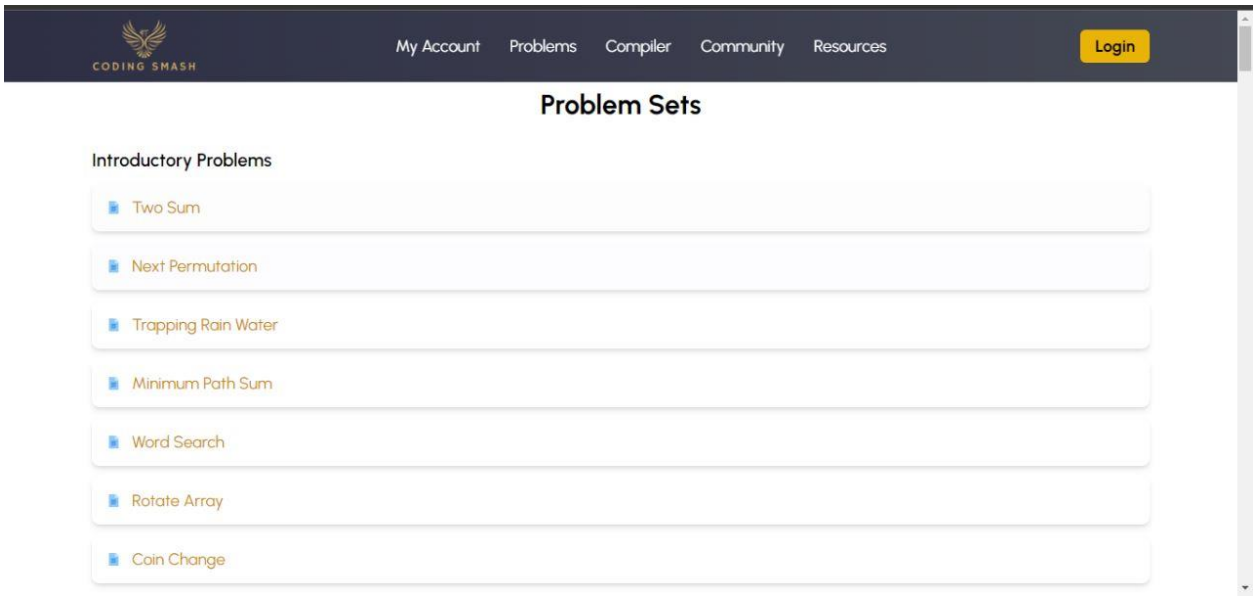


Fig. 3.8 Problem set page

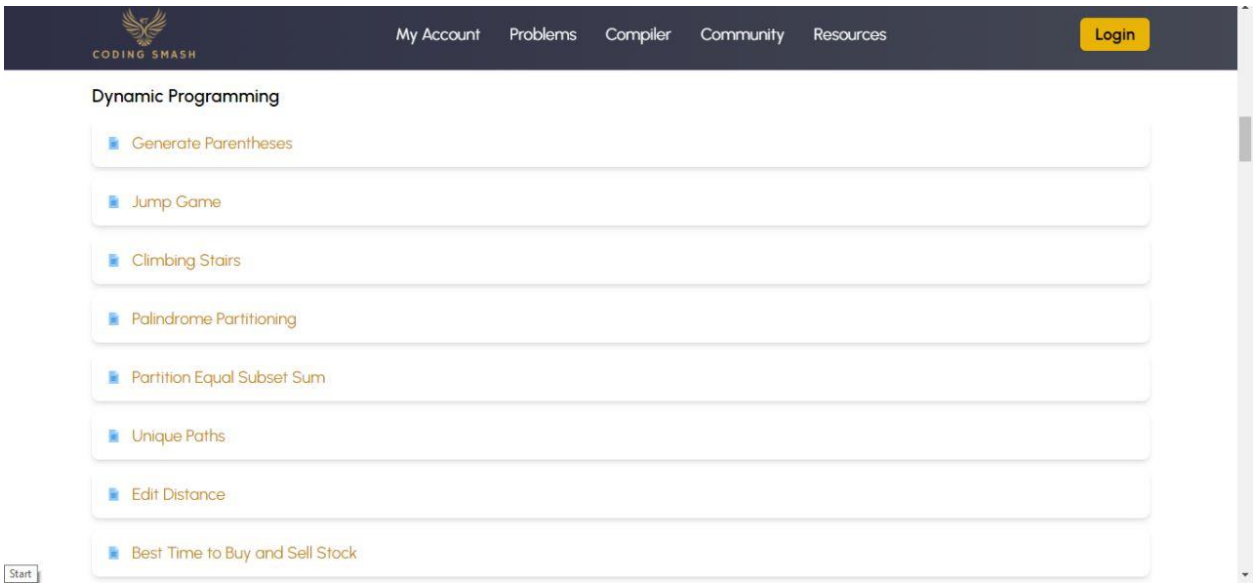


Fig. 3.9 DP Problem page

Chapter 4

Results and Discussions

In this paper, we like to address that competitive programming contests are based on problem-solving and help to improve coding skills. We have done a literature survey and gathered the information to obtain the required results. Data of a programming contest will be accumulated in the database system. This paper also explains what a compiler is and gives an overview of the steps involved in translating a programming language into object code. A compiler translates source code into an object without tempering with the meaning of the source code. The steps involved in translating a language are six namely; lexical, syntax, semantic, intermediate representation, code optimizer and code generator. Each of these phases perform a single task.It can analyze and manage to program contests that are proposed. We have implemented different activities which provide online programming contests training. And we are also thinking of further implementation of this technology. The use of Coding Smash in the educational process as an additional tool for the formation of professional competencies will provide more intensive involvement of students in the process of writing code and practical (situational) application of existing knowledge in a more informal and more convenient environment for higher education. Playful and interactive forms of learning contribute to the increase of cognitive activity, and hence – the quality of the educational process and problem solving skills in particular.

Chapter 5

Conclusions

1. The use of Coding Smash in the educational process as an additional tool for the formation of professional competencies will provide more intensive involvement of students in the process of writing code and practical (situational) application of existing knowledge in a more informal and more convenient environment for higher education. Playful and interactive forms of learning contribute to the increase of cognitive activity, and hence – the quality of the educational process and problem solving skills in particular.

2. In this paper, we like to address that competitive programming contests are based on problem-solving and help to improve coding skills. We have done a literature survey and gathered the information to obtain the required results. Data of a programming contest will be accumulated in the database system.

3. It can analyze and manage to program contests that are proposed. We have implemented different activities which provide online programming contests training. And we are also thinking of further implementation of this technology.

4. This paper also explains what a compiler is and gives an overview of the steps involved in translating a programming language into object code. A compiler translates source code into an object without tempering with the meaning of the source code. The steps involved in translating a language are six namely; lexical, syntax, semantic, intermediate representation, code optimizer and code generator. Each of these phases perform a single task.

5. In many countries, the national curriculum aims to expose all pupils to some form of Computational Thinking and coding skills during their first-year studies. Many apps offering various programming lessons, puzzles, and challenges to teach core coding concepts to children have increased in recent years. Further research on this topic is needed on their ability to support early computer science learning truly.