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Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java

A Capstone Project
Presented to The Faculty of the
School of Computing
Holy Angel University



In Partial Fulfillment
of the Requirements for the Degree
Bachelor of Science in Information Technology
With Area of Specialization in Web Development

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APPROVAL SHEET

This capstone entitled "**INTERACTIVE WEBSITE FOR LEARNING THE FOUR PRINCIPLES OF OBJECT-ORIENTED PROGRAMMING IN JAVA**", prepared and submitted in partial fulfillment of the requirements for the degree Bachelor of Science in Information Technology with Area of Specialization in Web Development, has been examined and is recommended for acceptance and oral examination.

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Laus Deo Semper



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Interactive Website for Learning the Four Principles of Object-Oriented Programming in
Java

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Executive Summary

This study developed an interactive website to facilitate the learning of the four principles of object-oriented programming (OOP) in Java. Recognizing the challenges students face in comprehending OOP, particularly its fundamental concepts of inheritance, polymorphism, encapsulation, and abstraction, the website incorporated semi-gamified exercises (e.g., 4 Pics 1 Word, drag-and-drop, matching type), scenario-based learning, and instant feedback. Employing the Rapid Application Development (RAD) methodology, the system was iteratively refined based on student pre- and post-surveys, guided by FURPS quality attributes. Four IT experts validated the system using ISO 25010 criteria, and three OOP professors provided content validation. Results indicated that while students perceived OOP as challenging, they uniformly believed that an interactive platform enhanced their learning experience. To ensure security and appropriate user management, the system integrated role-based access control (RBAC), CAPTCHA verification, one-time password (OTP) authentication, and JSON Web Token (JWT) authentication. This project significantly benefited students at Holy Angel University by combining interactive and traditional teaching methods, with potential for broader implementation.

Keywords: Interactive website, Learning website, Object-Oriented Programming, Java, Inheritance, Polymorphism, Encapsulation, Abstraction

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Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java

Object-oriented programming (OOP) is a programming paradigm centered on objects or entities, contrasting with traditional logic-based programming systems (Parmar & Parmar, 2024). Nagineni (2021) highlighted OOP's significant role in software development, attributing this to its flexibility, reusability, and extensibility. Mastering OOP techniques is essential for leveraging the full potential of languages such as Java, C#, and the .NET framework (Budd, 2018). Universities frequently incorporate OOP into their programming curricula. Ou et al. (2023) investigated the current state of programming education and concluded that while the overall quality is suboptimal, improvements are feasible through interactive learning strategies that enhance student engagement. Saidova (2022) argued that traditional educational methods are inadequate for teaching OOP in contemporary contexts. However, Wang (2022) cautioned that the mere adoption of modern teaching methods, driven by technological advantages, does not guarantee effectiveness. They also asserted that traditional teaching can effectively enhance knowledge and test scores. Saira (2021) further contended that, despite the availability of diverse learning strategies, traditional teaching remains the most globally prevalent approach. Kolesnikova (2016) found that integrating traditional teaching with complementary methods yields superior outcomes compared to traditional methods alone. Consequently, Astuti et al. (2020) suggested that developing an interactive website that blends traditional instruction with interactive elements for teaching the four OOP principles could significantly benefit students and programmers. Thennakoon and Hettige (2022) emphasized that Abstraction, Encapsulation, Polymorphism, and Inheritance are fundamental OOP concepts, and a strong foundational understanding of these

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principles fosters clean code and improves logical thinking. Nes et al. (2021) concluded that combining traditional teaching with methods that enhance student engagement and learning processes produces positive knowledge acquisition outcomes. Rihatno et al. (2023) demonstrated that interactive websites effectively stimulate student interest. This approach does not replace traditional methods but rather integrates them, as Paul (2023) noted, significantly enhancing student engagement. Astuti et al. (2020) further indicated that the interactivity of learning websites can capture student attention by providing an enjoyable learning experience, thereby validating the effectiveness of developing interactive websites for teaching OOP principles.

The Philippine programming industry is experiencing increased popularity and demand, driven by the country's status as the world's second-fastest growing economy, which is crucial for tech companies (Segovia, 2015). Consequently, technology-related courses continue to be prominent choices in higher education. Babas (2020) assessed the Information Technology competency level in the Philippines as generally satisfactory but recommended improvements in instructional processes to enhance student skills and competencies. However, programming, particularly object-oriented programming, presents significant challenges for students lacking a solid foundational knowledge (Wong et al., 2017). Filipino students employ diverse learning styles, methods, and study habits (Magulod, 2019). Traditional teaching, characterized by live code demonstrations, remains a prevalent approach (Samuel, 2015). While this method has proven effective for some, Anderson et al. (2015) acknowledged its limitations for other students and advocated for modern learning methods, particularly in OOP education. Astuti et al. (2020) further supported this, demonstrating that interactive websites enhance learning through increased motivation,

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engagement, and ease of understanding. Wang (2022) highlighted the advantages of modern teaching methods in fostering student focus. Ningrum et al. (2024) found that interactive websites improve learning outcomes for students who struggle with traditional methods, indicating that interactive platforms for learning the four OOP principles can be highly effective in building foundational knowledge. Lukita et al. (n.d.) posited that interactive learning, such as through websites, enhances critical thinking by increasing student engagement and responsibility. Online learning also offers accessibility, time management, and convenience (Naseer & Perveen, 2023). While platforms like Brilliant | Learn Interactively (n.d.) and Codecademy (n.d.) provide interactive learning experiences, this proposed interactive website distinguishes itself by focusing specifically on the four OOP principles—abstraction, encapsulation, polymorphism, and inheritance—through beginner-friendly, scenario-based lessons and problem-solving puzzles. Weng (2022) suggested that puzzle-type logical thinking games not only improve problem-solving abilities but also enhance student learning attitudes.

Object-oriented programming (OOP) plays a crucial role in the programming industry, particularly in software development. Mastering OOP concepts offers numerous benefits, including enhanced skills and knowledge that reduce project development time in both academic and professional settings (Abbasi et al., 2021). In studying the object-oriented programming concepts, students can learn and develop visual projects in different programming languages with a better understanding of their written code (Saidova, 2022), and having a weak foundation of basic concepts of the four principles of the object-oriented programming can pose an issue for students as it limits their ability to organize code efficiently and develop a maintainable software, affecting their both academic and

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professional growth. However, mastering OOP requires basic programming skills, and it has become hard for students to understand its underlying concepts clearly in the beginning (Abbasi 2021). This challenge was corroborated through interviews with two OOP professors at Holy Angel University's School of Computing, who confirmed that many students experience failure or low grades due to a lack of OOP and programming language knowledge. A preliminary survey also indicated that computer science students at Holy Angel University find OOP challenging.

This study aimed to develop an interactive website to teach fundamental OOP concepts, specifically the four principles, through engaging features that extend beyond traditional coding exercises. While the website includes coding exercises and quizzes, its primary focus is on delivering interactive instruction on the basics of OOP. This learning platform provides an interactive learning experience using various tools such as drag-and-drop exercises, fill-in-the-blank coding, point-and-click lessons, 4pics1word-style activities, check-your-understanding prompts, and visual aids. These features are designed to maintain student engagement and facilitate a deeper understanding of the four OOP principles in Java through practical application. Furthermore, the inclusion of quizzes with positive reinforcement aims to sustain student motivation, even when they do not achieve perfect scores. The self-paced nature of the website allows students to learn at their own speed, fostering a supportive and motivating learning environment. The website also serves as a valuable supplementary resource for OOP instructors, reinforcing key concepts and building a solid foundation in OOP fundamentals. This interactive website is intended to benefit students seeking to learn programming, particularly those new to programming concepts or those who find OOP challenging. The platform offers a motivating and engaging learning

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experience. Interactive learning methods have been shown to optimize student learning and enhance motivation by providing an enjoyable educational experience (Nikolaevna et al., 2021).

Review of Related Literatures

Interactive online learning website

Interactive websites, which utilize various software to create engaging and practical online experiences, actively involve users. These websites offer advantages over traditional ones due to their compelling interactive elements and enhanced user-friendliness, which are expected to increase student engagement in learning (Rihatno et al., 2023).

Nikolaevna et al. (2021) indicated that interactive learning environments enhance students' perceptual accuracy, mental performance, and the development of intellectual and emotional attributes, including attentional stability, observational skills, and analytical and summarizing abilities. Moreover, interactive learning fosters communicative competence, boosts student motivation, and optimizes the learning process.

Educational institutions increasingly employ interactive learning resources, which facilitate more effective communication between educators and students. Research consistently demonstrates positive attitudes and behaviors related to learning and student engagement. Studies examining the use of interactive tools in educational settings have consistently shown their positive impact on student learning. Interactive applications are valued for their ability to encourage feedback and maintain student interest (Martín-Sómer et al., 2023).

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Interactive learning tools are becoming increasingly recognized as effective educational resources in the fields of computer science and engineering. This area of research is growing rapidly due to its beneficial effects on enhancing motivation and improving students' academic performance during the learning experience. The phrase interactive learning tool generally describes a computer-based platform that incorporates various learning modules such as audio, video, animations, simulations, graphics, and text. These tools allow students to engage with their subject matter in simple and expressive ways (Hamada & Hassan, 2017).

Thus, interactivity is one of the essential aspects that evoke a greater involvement from users and further stress on understanding the concepts involved in OOP. Interactive quizzes and coding exercises, such as fill-in-the-blank, as well as visual aids contribute to making learning much more accessible through hands-on experience.

Prior research has leveraged fill-in-the-blank questions. Murata et al. (2023) demonstrated that this approach enhances learning exercises and supports learning analytics. They incorporated fill-in-the-blank exercises in their Java programming education tool to improve understanding of students' learning processes and achievements. This method allows educators to easily modify questions to tailor challenges to students' needs. The tool also compiles comprehensive response records, including correct and incorrect answers and attempt durations. Analyzing these logs provides insights into student learning patterns, enabling teachers to refine their methods and improve the overall learning experience.

Multiple-choice questions are commonly used for assessments in education, providing a rapid and efficient means of evaluating students' knowledge and understanding. MCQs can demand a greater level of analytical thinking, enabling examiners to evaluate

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students' integration of knowledge, problem-solving skills, and application of knowledge. It can assess higher-order cognitive skills beyond mere factual recall, promoting critical thinking, deeper understanding, and learning engagement. Furthermore, electronic assessment using MCQs has several advantages, including objectivity and reliability in assessment, as well as the ability to assess a wide range of skills and provide rapid feedback, which is useful for students (Oc & Hassen, 2024).

Coding exercises are widely recognized as helping students with introductory programming courses. Educators teaching foundational programming courses typically concur that engaging students in coding tasks focused on particular constructs, such as expressions, assignments, if statements, or loops, enhances their ability to perform better on larger programming projects and examinations. Consequently, some institutions have developed auto-graded coding exercise tools, and numerous websites and commercial tools provide similar resources. These exercises are primarily viewed as formative assessments, designed to facilitate student learning rather than for instructors to ascertain student mastery. This approach is widely accepted for improving student performance in introductory programming course (Edgcomb et al., 2017).

Visual aids stimulate learner interest and assist educators in explaining concepts effectively. These instructional aids, used in classrooms, enhance the student learning process. Tools such as pictures, models, charts, maps, videos, slides, and real objects clarify and facilitate understanding of lessons. Visual aids clarify, establish, correlate, and coordinate precise conceptions, understandings, and appreciations, thereby making learning more active, motivating, encouraging, significant, and engaging. Visual aids enhance lesson

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plans and provide students with additional methods for processing subject information (Shabiralyani et al., 2015).

Scenario-based learning activities incorporate real-world scenarios, requiring learners to solve problems and navigate environments that reflect real-world challenges. This approach fosters learner engagement and critical thinking, enabling students to connect theory with practice (Xinogalos & Eleftheriadis, 2022).

Point-and-click interactive features are effective in educational settings, delivering educational content in an engaging manner. They allow students to learn at their own pace, explore environments comfortably, and develop problem-solving skills. Additionally, they provide users with autonomy and freedom to navigate the content, enhancing the learning experience (Papadimitriou et al., 2021).

The website will also include drag-n-drop activities. Drag-and-drop (D&D) items are used for tasks like matching and categorizing, offering a more authentic way to assess knowledge and skills compared to traditional multiple-choice questions. Besides accuracy and response time, D&D items provide process data that reveals insights into test-taker behavior and response strategies, helping test developers improve item design (Arslan et al., 2020).

Additionally, Chow et al. (2017) found that a hint button in tutorial learning systems offers personalized guidance, helping students better grasp concepts and improve their coding skills. This feature addresses the challenge of scaling formative feedback, which is particularly important for beginners who require more assistance. Similarly, exercises will also have a hint feature that guides users to help in better understanding the concept as

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Sammi et al. (2017) concluded that a hint button in a tutorial learning provides personalized guidance that helps students improve their coding skills.

Puzzle games are a popular educational game type, fostering critical thinking and problem-solving skills. They transform passive learners into active participants, thereby increasing interest, satisfaction, and academic performance. Puzzle games stimulate learner motivation and engagement through entertainment, which encourages enthusiastic problem-solving, and the Eureka effect, which provides immediate feedback and a sense of reward. In addition to maintaining interest, puzzle games enhance learners' self-efficacy, a key determinant of motivation and perseverance in learning (Li, 2023). Examples include "4 Pics 1 Word" and matching games.

Jaca et al. (2023) suggested that the "4 Pics 1 Word" game can effectively stimulate interest, motivate, and engage students by using visual imagery to present morphological challenges. This engaging activity adds an element of fun and enhances memory retention and critical thinking through visual learning. Incorporating "4 Pics 1 Word" as teaching material engages learners in critical thinking and analytical abilities, leading to improved learning outcomes. These types of gamification activities keep students' minds actively alert, thereby enhancing their cognitive analytical abilities.

A matching type test is a test that checks knowledge by associating related elements like events, dates, names, and places. It consists of two adjacent lists of related words, phrases, pictures, or symbols, and it's perfect for assessing relationships and associations in a wide variety of subjects. Teachers prefer the matching test items as they effectively test multiple facts in a small area of space, saving time in construction and administration.

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Furthermore, these tests are easy for the students to comprehend and complete. Therefore, the matching test item offers multidimensional efficiency (Masrie, 2019).

Real-time feedback and progress trackers enable learners to monitor their performance immediately. Mogwe (2018) argued that real-time feedback enhances students' self-regulation skills. Students can better evaluate their learning, gauge their understanding of concepts, and adjust their behavior accordingly. Unlike waiting for post-class consultations, which many students avoid, real-time feedback systems allow students to control their learning during lectures and seek clarification when needed. Real-time feedback is crucial in learning, as it allows students to track their progress and provide feedback for further clarification.

Høylandskjær (2024) stated that progress trackers give users a sense of control by providing information about ongoing activities. This transparency enhances user motivation and increases the likelihood of task completion. Effective progress trackers aid in monitoring task progression and visualizing remaining steps. They direct and motivate curiosity about subsequent content. Indicating remaining tasks incorporates unpredictability and curiosity, encouraging users to discover what follows.

Zahid and Cheema (2023) found that positive reinforcement is an effective method for modifying and shaping behavior. Positive reinforcement involves providing a stimulating item after the desired behavior occurs, increasing the likelihood of its repetition. Conversely, negative reinforcement involves removing a stimulus after a specific behavior, also increasing its likelihood. Negative reinforcement differs from punishment, as it increases behavior rather than decreasing it. Reinforcement motivates students and fosters interest in the learning process. Positive reinforcement can take various forms, including positive

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feedback, praise, rewards, and grades, both verbal and non-verbal. Effective teachers use positive feedback to encourage academic improvement and foster a conducive learning environment. Research indicates that positive reinforcement through feedback positively impacts students' interest.

Teo et al. (2018) developed and validated the 25-item Hikikomori Questionnaire (HQ-25) to assess severe social withdrawal. The study, involving participants from clinical and community settings, examined the questionnaire's psychometric properties and diagnostic accuracy. The HQ-25, comprising three subscales—socialization, isolation, and emotional support—demonstrated strong reliability and validity. The questionnaire effectively distinguished between hikikomori and non-hikikomori individuals, with a cut-off score of 42 showing high sensitivity and specificity. These findings highlight the effectiveness of a 25-item questionnaire as a reliable and efficient screening tool for early detection and intervention in clinical and community settings.

Online assessments enable instructors to conduct exams and quizzes both virtual environments and large classroom settings. A visible online timer during these assessments is essential for assisting students in managing their time effectively. Hott et al. (2023) conducted a semester-long investigation using various time-tracking displays across 29 online quizzes in three Computer Science classes, with a total of 113 participants. The timer visualizations included countdown and elapsed time text as a standalone display or in combination with graphical elements like a color-changing progress bar, gray-scale progress bar, or shifting phases of the moon. Students strongly preferred a countdown timer for the remaining quiz time, favored graphical displays over text-only options, and liked visualizations that changed color to better represent the passage of time. The results suggest

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that allowing students to select an online timer can create a more supportive and comfortable testing atmosphere (Hott et al., 2023).

Object-Oriented Programming

The Object-Oriented Programming (OOP) approach is currently the most widely used programming method in higher education institutions. Nevertheless, grasping OOP can be a mentally challenging endeavor for undergraduate learners. Various challenges and misunderstandings have been documented in the literature regarding both OOP principles and languages, particularly Java (Xinogalos, 2015).

Adopting the OOP approach offers numerous benefits, including reduced software development time and enhanced code reusability and organization flexibility. Nonetheless, becoming proficient in OOP necessitates fundamental programming abilities, and students often find it challenging to grasp its core concepts at the outset. Numerous research studies have been carried out to evaluate the obstacles and misconceptions students face when learning OOP. Furthermore, it is essential to identify the barriers that complicate programming education and how students can learn effectively and accurately; these concerns are often overlooked when creating learning environments aimed at achieving favorable learning results. Selecting the appropriate programming approach is crucial since factors like monotony and existing knowledge of programming concepts can influence students' academic performance (Abbasi et al., 2021).

Ikedilo et al. (2015) noted that Java, a general-purpose OOP language, supports OOP concepts. Object-oriented programming is the ideal programming paradigm to serve as an introductory course due to its widespread use and significant relevance. Java supports all the feasible features that support reusability of written code, enhanced software maintainability,

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fast development, reduced cost of development, high quality software, and enhanced software development productivity for an OOP language. Therefore, Java as the first programming language places students on the latest and most advanced programming paradigm.

Numerous studies have described the challenges students face in learning programming. Results indicate that students perceive understanding program execution and constructing and comprehending program solutions as the most difficult aspects of learning OOP.

Given the problems cited in learning Object-Oriented Programming such as, the cognitive demands, misconceptions and the need for the software development abilities at high levels. Rather than depending solely on static information, the interactive website seeks to address these issues by providing an interactive and dynamic explanation of the fundamentals of OOP. As highlighted in other studies, using interactive elements, visual aids, and a feedback system will help students understand complex concepts more easily, especially for those who find traditional teaching methods challenging. This approach will be beneficial to students to learn in a more practical manner which will make the learning process easier and more engaging.

Cheah (2020) proposed that although conventional teaching techniques utilizing fixed resources such as textbooks, notes, and presentations are beneficial in teaching computer programming, there is potential for enhancements to boost student engagement. The ineffectiveness of static teaching materials stems from the fact that they are not tailored to specific student groups but are instead directed at a broad audience. It never provides them with any live interaction and vibrant elements to explain the programming concepts. It would

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be ideal if the instructor could give immediate feedback and give detailed explanations whenever needed by the students. But, in reality, this is often not possible because of time limitations, manpower, and the large numbers of students that are available in a single class.

Students encountering OOP for the first time often master only basic material at the end of lectures and lack understanding of software engineering concepts. They must develop mental models to overcome misconceptions. Furthermore, their active learning abilities, self-management, and self-discipline are often underdeveloped. Efan et al. (2023) found that learning programming is a cognitively demanding task for students, slowing the learning process and increasing difficulty in understanding advanced concepts. Programming requires metacognitive skills, such as abstraction, deep understanding, persistence, and problem-solving abilities.

To address these gaps, the interactive website will incorporate a feedback system that elaborates on student errors and guides them toward better understanding. Additionally, scenario-based activities will provide real-world simulations, encouraging engagement, critical thinking, and the connection of theory with practice (Xinogalos & Eleftheriadis, 2022). Visual aids will also be included, as Holder et al. (2023) noted that interactive programming environments and gamified tools enhance comprehension and engagement. Moreover, the website will support professors by reducing the burden of individual student assistance, allowing them to focus on class discussion and broader student needs.

As this generation of students is exposed to high-end technology at early age, they find it hard to listen and pay attention to a teaching session delivered in the traditional approach, only speaking is used, explaining programming concepts and illustrating small fragments of the programming code. Therefore, new teaching methods that integrate the use

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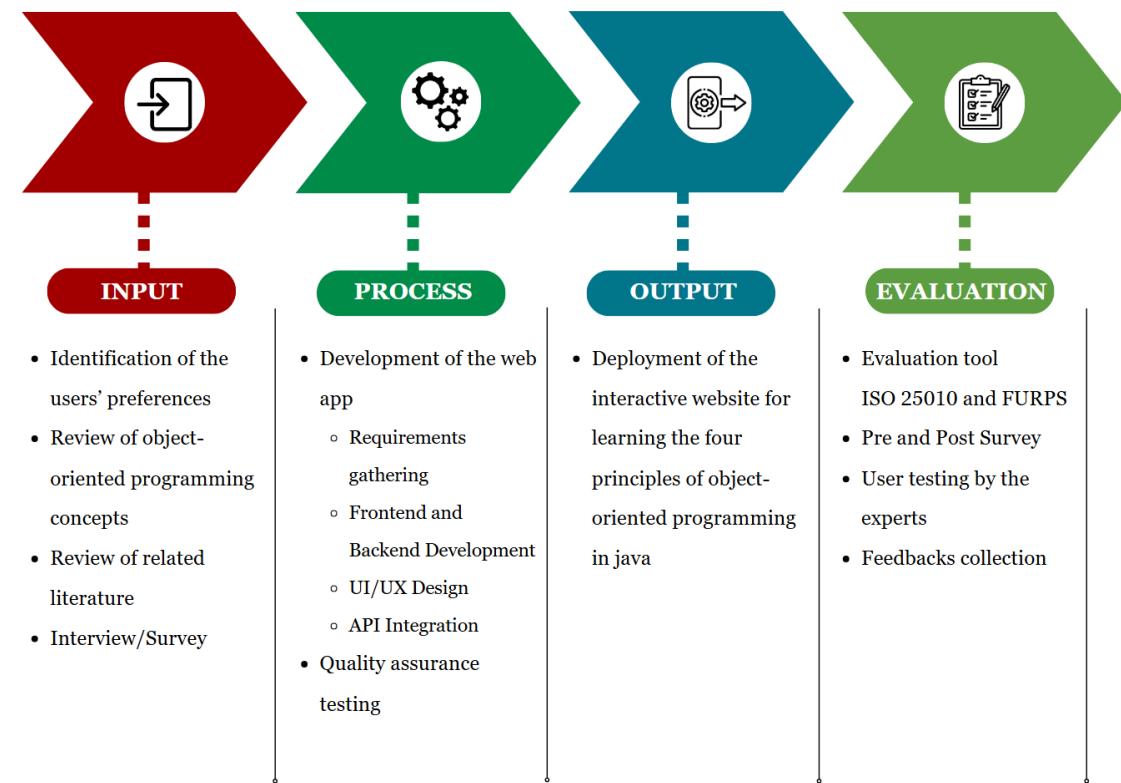
of technology should be used in teaching programming concepts. Different propositions have been made to enhance the teaching and learning of programming. Zhao et al. (2022) suggested that hands-on skills can be developed through laboratory sessions, projects, seminars, and tutorials combined with lectures. They emphasized the importance of motivation through edutainment-based pedagogy, problem-solving approaches, authentic contexts demonstrating real-world applications, conceptual learning, and authentic activities.

Yilmaz et al. (2018) highlighted that OOP facilitates the modeling of real-world entities in computer science. This approach allows programmers to define classes, create objects, and perform modifications. It also offers developers features such as inheritance, polymorphism, and encapsulation. These functionalities allow for the separation of processed data from other redundant applications. Due to its readily available features, OOP is favored significantly over other programming languages. The unique characteristics of OOP, which are not found in other application programming, include modularity, extensibility, and reusability. In summary, the OOP features of encapsulation, abstraction, polymorphism, and inheritance enable us to represent real-world entities on computers. Utilizing OOP can lead to the creation of more qualified and effective software.

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Conceptual Framework

Figure 1
Conceptual Framework



This study developed an interactive website designed to teach object-oriented programming (OOP) concepts to students. In the input phase, researchers identified user preferences regarding content and web application design through a survey. A comprehensive review of related literature on interactive OOP learning websites informed this process. Additionally, researchers interviewed OOP professors at Holy Angel University to assess the study's relevance and to identify students' challenges in learning OOP.

During the process phase, the researchers developed the web application step-by-step. This involved gathering core OOP concepts, designing the user interface (UI) and user

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experience (UX), and creating a general mockup or wireframe. Content was determined based on the gathered OOP concept data. The design and development phase included the creation of both front-end and back-end systems. API integration of these systems ensured optimal user experience. Following development, the web application underwent multiple quality testing iterations, incorporating real user feedback for improvement.

The output phase resulted in an optimized and functional interactive website teaching the four principles of OOP in Java. Professionals conducted user testing, and their feedback served as the primary means of evaluation for continuous improvement. The evaluation phase also utilized ISO 25010 and FURPS quality standards to ensure robust results.

Objectives of the Study

This research aimed to design, develop, and launch an interactive website for learning the four principles of object-oriented programming in Java. The specific objectives were the following:

- Conduct a needs analysis to identify the key object-oriented programming concepts and interactive teaching methods required.
- Develop an interactive website that teaches object-oriented programming concepts through lessons, exercises, and quizzes.
- Evaluate the web app with ISO 25010 and FURPS.

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Scope and Delimitation

Scope

The scope of this study was limited to the development of an interactive website designed for first-year and fourth-year Computer Science students at the School of Computing, Holy Angel University, who wished to learn or reinforce their understanding of the four principles of object-oriented programming. The website provided guided lessons that explained fundamental object-oriented programming principles through scenario-based and visual representations of object interactions to facilitate comprehension.

The website incorporated role-based access control (RBAC) with three user roles: User, Admin, and Superadmin (*see Appendix AE*). The User role, intended for students or learners, allowed access to lessons, exercises, and quizzes but restricted content modification. The Admin role, typically assigned to instructors, provided User-level access with the added capability to manage users and quiz content, including adding, editing, and deleting questions. However, Admins could not modify lesson and exercise content, as it was hard-coded. The Superadmin role, designated for developers, granted full control over the website, encompassing all User and Admin permissions, as well as the ability to edit all content. Consistent with Marquis (2024), RBAC was implemented to enhance database security.

Upon a user's initial visit, the website required sign-in or sign-up. To access website content, users needed to provide valid credentials. Sign-up procedures included reCAPTCHA verification to mitigate spam and malicious automated interactions, as suggested by Pettis (2022). Following successful sign-up, the system sent a one-time password (OTP) to the user's email for verification, a method supported by Almeida et al. (2024) to enhance

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authentication security. Upon successful login, users gained access to exercises, quizzes, and lessons. JSON Web Token (JWT) authentication was utilized for security, aligning with Hong et al. (2017), who found JWT to be effective against various attacks by preventing token alteration through a secret key.

Upon successful sign-in, users will access the web application's content. The lessons will follow a structured approach to teaching Object-Oriented Programming (OOP), beginning with an introduction and progressing through the four principles: inheritance, polymorphism, encapsulation, and abstraction. Each lesson will include an interactive discussion to facilitate user understanding of the subject in simplified terms. A circular progress bar will track user progress, enabling users to resume learning where they left off after exiting the website, thus monitoring their learning milestones. Following each lesson, a "check your understanding" section with multiple-choice questions will allow learners to assess their comprehension before advancing to the next topic.

The web application's content was derived from library books at Holy Angel University and other credible sources, including online open-source resources. Furthermore, Brilliant, Alice, and Codecademy served as inspirations for interactivity, design, and features such as quizzes, ensuring the resources are robust and aligned with current educational standards.

Quizzes and exercises will evaluate users' understanding of various lessons. Scenario-based exercises will enable students to grasp concepts through real-life situations, incorporating real-time feedback to correct errors and enhance comprehension. Practical coding exercises using fill-in-the-blank questions will be implemented, utilizing the Java programming language. Riggs et al. (2020) highlighted that coding exercises cultivate

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students' critical thinking and problem-solving skills in coding. Additionally, a hint feature will provide personalized guidance, as Sammi et al. (2017) concluded that hint buttons in tutorial learning improve coding skills. Multiple-choice quizzes will be used, as Abreu et al. (2018) noted that this format reduces grading bias and effectively tests concept recall. These exercises and quizzes will comprise a range of questions assessing understanding of OOP principles, encompassing both coding and real-life scenarios. Upon quiz completion, users will receive evaluated scores and feedback, including suggestions for improvement in understanding OOP, thereby providing positive reinforcement to bolster academic endeavors, as Ghafar (2023) suggested that positive feedback motivates improvement.

Angular, a TypeScript-based framework, will be employed for front-end development, alongside Bootstrap, an open-source CSS framework for creating responsive user interfaces. These technologies facilitate the development of complex and dynamic web applications, suitable for interactive websites. Laravel, a PHP framework, will be utilized for back-end development, streamlining tasks such as authentication, routing, and caching to create scalable web applications. Laravel's reliability and security features support the development of complex back-end architectures. MySQL, a relational database management system, will manage data, offering efficient handling of large databases. Its compatibility with PHP and ability to manage high-traffic websites make it ideal for complex web applications. The interactive website will support modern and traditional web browsers, including Chrome, Firefox, and Microsoft Edge, ensuring user-friendly accessibility.

Delimitation

The development of the interactive website for learning object-oriented programming focused solely on teaching the basic concepts of the four OOP principles, targeting first-year

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and fourth-year students. The web application excluded personal guidance and live teacher-led sessions. Although mobile responsiveness was considered, the application was optimized for a minimum screen size to ensure the best user experience. The lesson content comprised an introduction to object-oriented programming and the four principles: polymorphism, inheritance, encapsulation, and abstraction. Java was utilized as the programming language for all exercises and quizzes. These restrictions ensured that the interactive website maintained its focus on providing foundational comprehension of OOP concepts. Progress from quizzes and exercises was not saved. This design choice aimed to encourage students to repeat exercises and quizzes, thereby reinforcing learning through retrieval practice. Research supports this approach, indicating that actively recalling information strengthens long-term memory and comprehension (Agarwal et al., 2017). Quiz scores served exclusively for user evaluation and improvement guidance, with the option to retake quizzes. The project's scope was limited to evaluating the website's effectiveness in teaching OOP concepts. Regarding interactivity, the lesson section of the website featured point-and-click interactions and interactive visuals. The exercise page incorporated drag-and-drop activities and puzzle-type games, such as "4 pics 1 word" and matching exercise.

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Methods

Research Design

A descriptive research design was employed to understand user behavior and interaction with the interactive website. Siedlecki (2020) emphasized that descriptive research focuses on describing the characteristics of a population or phenomenon without manipulating variables. To support this, comprehensive data collection methods, including surveys for gathering user opinions and live observations for monitoring user interactions with the operational website, were utilized. These methods allowed researchers to gather insights into user experiences and preferences. Quantitative research principles were incorporated to quantify data and generalize findings from a sample across various perspectives, involving the collection, analysis, and interpretation of quantifiable data to test study hypotheses.

Surveys were the primary data collection method. These surveys assessed computer science students' perspectives and challenges and the relevance of the website. The questionnaires included Likert-scale and close-ended questions. Furthermore, the final system was refined based on pre- and post-surveys, also consisting of Likert-scale questions, which were evaluated by students, OOP-specialized professors, and IT experts. A psychometrician on campus validated the questionnaires used in the pre- and post-surveys. The findings informed the validation of lessons and guided the development of the interactive website's user experience, ensuring its benefit to students and its effectiveness as a supplementary tool for learning basic OOP principles.

To evaluate and validate the interactive website's content regarding OOP lessons, the evaluation occurred at the School of Computing, Holy Angel University. Professionals

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specializing in OOP from the School of Computing assessed the website to ensure the reliability of its content for teaching OOP. This aligns with the reliability standards of ISO 25010. The study sample included students interested in learning or improving their OOP knowledge, particularly first-year students at the School of Computing taking OOP. These students, who may lack familiarity or understanding of OOP concepts, were ideal candidates for using the web application. Interviewed professors indicated that some students lacked basic OOP knowledge, negatively impacting their academic performance.

Purposive sampling was utilized to select participants who could provide insights and feedback based on their familiarity and knowledge of OOP. Etikan (2016) defined purposive sampling as the intentional selection of participants based on their specific qualities. This technique involves identifying and selecting individuals or groups who are knowledgeable and well-informed about the phenomenon of interest. Criteria included knowledge, experience, willingness to participate, and the ability to articulate experiences and opinions reflectively. Unlike random sampling, which aims for a diverse cross-section, purposive sampling focused on individuals with specific characteristics relevant to the research.

Requirements Analysis

In developing the interactive website for learning the four principles of object-oriented programming in java, the primary goal is to address the challenge of effectively teaching the object-oriented programming concepts. Since the subject is a basic fundamental concept of the four principles of object-oriented programming in Java, the researchers will focus on how this website can make learning more engaging by using interactive techniques. In achieving this goal, there will be the use of Canva to create interactive objects and to design the wireframes. The design and development stage will be carried out on personal

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devices of the developers that have mid-range specifications. Additionally, to validate the effectiveness and functionality of the website, the researchers will conduct a post survey from students based on FURPS, IT experts based on ISO 25010, and the contents of the lessons will be validated by 1 internal OOP professor from Holy Angel University and 2 external OOP professors.

Given the challenges computer science students at School of Computing at Holy Angel University face when learning object-oriented programming, there are studies that have evaluated the relevance of tackling these issues, such as analyzing the current educational tools and assessing how these tools can improve the understanding of the principles of object-oriented programming. In addition, it has been shown that interactive learning techniques can greatly boost student engagement and students' motivation towards studies. So implementing this method will be a significant help to achieve the goal and objectives of the web application.

Sources of Data

Prior to website development, a survey was conducted with 20 second-year computer science students at Holy Angel University to assess their challenges and perspectives on OOP, and to evaluate the potential benefits of an interactive website for enhancing their learning experience and their preferences. Interviews were also conducted with two OOP professors from the School of Computing at Holy Angel University to determine the website's relevance, student performance in the subject, common challenges, and suggestions for an interactive website.

Before the pre-survey, the registrar's office provided data indicating a total of 101 first-year and 60 fourth-year computer science students, totaling 161 students. Slovin's



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formula was used to determine a sample size of 81 first-year and 52 fourth-year students, totaling 133 students. A pre-survey was then administered to these students to assess their familiarity with OOP and its four principles (*see Appendix N*). A separate post-survey was conducted for first-year students who answered "No" in the pre-survey and for fourth-year students who answered "Yes" in the pre-survey. The data from both surveys were analyzed to evaluate the website's effectiveness. The post-survey results for first-year students were examined to determine if they had developed a foundational understanding of OOP principles, while fourth-year student data were analyzed to assess if they gained new knowledge or enhanced their understanding and if the web application impacted learning in an engaging way.

A Likert scale was used to analyze participants' understanding of OOP and their satisfaction with various website aspects. The scale ranged from "strongly disagree" to "strongly agree" and "very unfamiliar" to "very familiar" (*see Table 17*). Weighted averages were calculated to determine overall satisfaction and the website's achievement of objectives. Both pre- and post-survey data were analyzed to assess student understanding of OOP.

During website development, including lesson content creation, various resources were utilized, such as books like Java: The Complete Reference (Schildt, 2018), Introduction to Java Programming (Pomperada, 2018), Java All-in-One for Dummies (Lowe, 2017), and An Introduction to Object-Oriented Programming with Java (Wu, 2010), and open-source resources like GeeksforGeeks, W3Schools, Javatpoint, and Codecadem.

For lesson content development, numerous resources were consulted to ensure the reliability of OOP lessons for Java. The content on abstraction, encapsulation, inheritance, and polymorphism was derived from multiple references to ensure accurate explanations. For

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example, the definition and concept of abstraction were obtained from Introduction to Java Programming (Pomperada, 2018, pp. 240-242), and real-life examples were taken from Java: The Complete Reference (Schildt, 2018, pp. 20). Similarly, encapsulation and its application in data protection were addressed using Introduction to Java Programming (Pomperada, 2018, p. 228) and Java: The Complete Reference (Schildt, 2018, pp. 20-21). Inheritance concepts, including various forms and applications, were discussed based on Introduction to Java Programming (Pomperada, 2018, pp. 237-238) and Java All-in-One for Dummies (Lowe, 2017, p. 278). Polymorphism lessons, covering overloading, method overriding, and interface usage, were obtained from Introduction to Java Programming (Pomperada, 2018, pp. 226, 257, 283), Java All-in-One for Dummies (Lowe, 2017, pp. 257-258, 283), and GeeksforGeeks.

Finally, four IT experts evaluated the website using Microsoft Forms based on ISO 25010. Additionally, one internal and two external OOP experts validated the website's content.

Research Instrument

To gather data, surveys comprising Likert-scale and close-ended questions were used to evaluate students' understanding of Object-Oriented Programming (OOP). A pre-survey assessed participants' familiarity with OOP and its four principles. Subsequently, a post-survey determined whether participants had developed a foundational understanding or gained new knowledge in the basic principles of OOP after using the website. Participants also completed evaluation forms based on FURPS. Additionally, IT experts assessed the website's overall performance using evaluation forms based on ISO 25010, while OOP

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experts provided content validation and evaluated educational effectiveness. A psychometrician on campus validated the questionnaires used in the pre- and post-surveys.

Participants

The study primarily focused on first-year students in the School of Computing at Holy Angel University enrolled in the object-oriented programming course. These participants, who may have lacked familiarity or understanding of OOP concepts, were considered ideal candidates for using the web application. Interviewed professors indicated that some students lacked basic OOP knowledge, which negatively impacted their academic performance. Additionally, fourth-year students were included to assess the website's effectiveness in building upon their existing OOP foundation, given their prior knowledge and experience.

A cover letter was sent to the registrar's office to request the total number of students enrolled in the first-year and fourth-year computer science programs. The registrar's office reported 101 first-year and 60 fourth-year students, totaling 161 students. To determine the sample size, Slovin's formula, $n = N / (1 + Ne^2)$, was used. Nyimbili (2024) indicated that Slovin's formula allows researchers to sample populations with a desired degree of accuracy, providing insight into the necessary sample size for reasonable result accuracy. Slovin's formula calculates the required sample size when the population is too large for direct sampling of every member. If the population has obvious subgroups, Slovin's formula can be applied to each subgroup rather than the entire group. The formula inherently incorporates purposive sampling to some extent, as the population is targeted based on objectives that must be fulfilled by the specific sample. Using this formula, the calculated sample size was

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81 students for the first year and 52 students for the fourth year, with a 5% margin of error and a 90% confidence level.

Statistical Treatment of Data

Slovin's formula was used to determine the appropriate sample size, which is expressed as follows:

Figure 5

Slovin's Formula

$$n = \frac{N}{1 + Ne^2}$$

Where:

- n = Sample size
- N = Total population
- e = Margin of error

For data analysis, the **Weighted Average Method** was used to measure and interpret responses. The formula for **Weighted Mean** is:

Figure 6

Weighted Mean Formula

$$\bar{X} = \frac{\sum f_i X_i}{\sum f_i}$$

Where:

- \bar{X} = Weighted mean
- f = Frequency of responses
- X = Assigned weight for each response
- $\sum f$ = Total number of responses

To interpret the results, a **Weighted Average Interpretation Scale** was applied, categorizing responses based on predefined ranges to assess students' understanding of

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Object-Oriented Programming (OOP) and evaluate the effectiveness of the interactive website.

1 Strongly Disagree 1.00 - 1.80

2 Disagree 1.81 - 2.60

3 Neutral 2.61-3.40

4 Agree 3.41 - 4.20

5 Strongly Agree 4.21 - 5.00

Requirement Documentation

Documentation commenced with interviews of two professors who taught object-oriented programming in the School of Computing (*see Appendix K & L*). The interviews covered research processes, the potential effectiveness of the web application in teaching, challenges encountered in teaching object-oriented programming, and the evaluation of the interactive website. The interactive website integrated specific features based on the gathered data, which are detailed in the Appendices. These features included a Data Flow Diagram illustrating data flow and organization, a Mock-up Wireframe depicting the website's layout and design, an Entity Relationship Diagram (ERD) showing database structure and entity relationships, and Role-based Access Control outlining user, admin, and superadmin permissions.

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Student as end-user

The web application provided students with an interactive way of learning the basics of four principles of object-oriented programming using the programming language Java. Upon accessing the web application, the user will prompt to login or register page wherein they should input a login credentials or register account by providing their first and last name with their email to send a one-time password (OTP) for verifying their credentials.

Following user authentication, the web application displayed the website's homepage, which provided an overview of lessons, quizzes, and exercises. The lesson page presented a list of available lessons: introduction, inheritance, polymorphism, encapsulation, and abstraction. Selecting a lesson displayed its topics, each with an overview, usage instructions, and a start button. Upon starting a lesson, users interacted with content using point-and-click actions until completion. Upon completion, the web application recorded user progress with a circular progress bar, indicating topic completion. If users exited the lesson page during browsing, their progress was saved, and they were redirected to their last point of access upon return.

The exercises page displayed the four principles, each containing ten exercises. Exercise types included "4 pics 1 word," fill-in-the-blanks, and drag-and-drop or matching activities, providing a gamified learning experience. Selecting an exercise lesson initiated a loading screen, followed by a sequence of "4 pics 1 word" problems, fill-in-the-blank coding problems, and drag-and-drop or matching activities. This page tested user comprehension and provided hints and answer buttons for assistance.

Upon accessing quizzes, users were directed to a dashboard listing available quizzes: introduction to OOP, introduction to Java, inheritance, polymorphism, encapsulation, and

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abstraction. Users could select a quiz, which included a timer and an "End Quiz" button.

Ending a quiz resulted in progress loss, necessitating a restart. A "Submit" button confirmed answers, displaying correct answers and explanations. Upon completion, the web application displayed scores and positive reinforcement feedback, motivating users to improve. Quizzes could be retaken, with the higher score saved.

Admin as end-user

The web application provided administrators permission to manage users and content of the quizzes. Only assigned administrators can access the admin panel. Upon accessing the admin panel, the administrator is required to input the assigned credentials. Once authenticated, the admin dashboard and analytics will display, offering an overview of the user management, progress of each student on the lessons, and to the side navigation bar, is the list of all the quizzes from introduction to oop, introduction to java, up until the four principles; inheritance, polymorphism, encapsulation and abstraction.

In the user management section, the administrator can view all of the registered users, and has the permission to modify or edit their names and passwords only if the user allows it, especially when they forget their password, and also can delete user accounts when necessary.

The administrator can also view lesson completion reports, which include collective progress data and analytics on the admin panel. This allows tracking of each user's performance, the date and time of the latest lesson completer, and the total number of users who have completed each lesson. For quiz content management, administrators have full access over the content of each quizzes such as creating, editing and deleting questions on quizzes. When adding or editing a quiz question, the input consists of a question prompt, multiple-choice

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options and its correct answer with explanation. Additionally, for coding-related questions, a code input field is provided optionally, allowing the administrator to create a coding problem question.

Research Procedures

Design of Software, Systems, Product and/or Processes

Following the determination of system specifications, researchers employed a selection of tools to describe the structure, features, and processes of the interactive website as a learning tool. These tools included user flow diagrams to illustrate user navigation through the system, and conceptualization of data dictionaries and an entity-relationship diagram to depict relationships within the system's database.

The web application development involved creating visual representations of the system's process model, illustrating data storage and transmission between the application and its environment. Aleryani (2024) noted that data-flow diagrams (DFDs) are commonly used for this purpose, providing a comprehensive representation of dynamic data exchange. Thus, a data-flow diagram (DFD) was used to model the web application's process, offering a clear and understandable visual representation of data flow.

To promote open and transparent data sharing, data dictionaries were used to provide information that facilitates user understanding of data sets (Buchanan et al., 2021). The system utilized a data dictionary to describe the purpose of data elements, interpreting database content such as names, keys, and relationships. Additionally, an entity-relationship diagram (ERD), a common technique for data modeling, was used to capture binary relationships between entities (Hingorani et al., 2017). Specifically, the entity-relationship diagram (ERD) documented the relationships between users and website content.

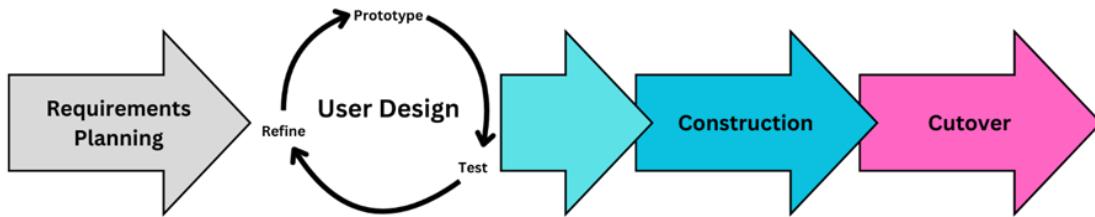
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Development and Testing

The study employed the Rapid Application Development (RAD) methodology, selected for its focus on rapid application development through iterations and continuous feedback. This framework prioritizes speed and agility, enhancing project development productivity (Chien, 2020). Given the project's time constraints, the RAD model was deemed optimal for timely completion.

Rapid Application Development engages users in the development process, improving communication between evaluators and developers and fostering a deeper understanding of user requirements. This approach enhances the development process. RAD leverages high-performance computing to benefit both experts and non-experts, enabling developers to utilize fundamental hardware effectively (Nalendra, 2021). The clear and structured stages of the RAD method significantly boosted project productivity (Fatimah et al., 2018).

The Rapid Application Development method consists of four main stages. Requirements Planning involves identifying project objectives, allowing for adjustments during prototyping. User Design focuses on developing and building prototypes through iterations. The Construction phase includes system development and testing, emphasizing quality and maintainability. Finally, the Cutover stage encompasses rollout, testing, and user training (Glaschenko, 2023).

Figure 2*Rapid Application Development (RAD) Model*

1. Requirement Planning

Developers initiated the website development process with the Requirements Planning phase. They gathered proposed object-oriented programming (OOP) concepts for website content. Developers interviewed professors to obtain suggestions, identify OOP teaching challenges, and validate the website's development for effectiveness. Additionally, developers sent formal letters to one OOP professor in the School of Computing at Holy Angel University and two external OOP professors, requesting they evaluate the website's content for its effectiveness as a Java OOP learning tool. To visualize the development timeframe, developers utilized a Gantt Chart, which detailed upcoming and completed tasks through the integration stage. Since first- and fourth-year Computer Science students at Holy Angel University comprised the target audience, developers-based content and design preferences on student input. However, content validation (lessons, quizzes, exercises) occurred after evaluation of the proposed materials. The Requirements Planning stage also included the creation of diagrams and models to visualize the web application and its flow.

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Developers produced a mock-up wireframe to aid in visualizing the design and communicating the web application's structure.

2. User Design

Following Requirements Planning, developers designed the web application, incorporating the gathered information. They used tools such as LucidChart, Figma, and Canva to create mock-up interfaces, wireframes, and user flow diagrams for enhanced visual representation. Sutipitakwong and Jamsri (2020) highlighted the wireframe's role in supporting project idea flow and achieving project completion. User flow diagrams also facilitated the creation of complex systems by illustrating data flow.

3. Construction

In the crucial Construction stage, developers translated proposed designs into a functioning web application. They employed Angular, a TypeScript-based framework, and Bootstrap, a CSS open-source framework, for front-end development, ensuring responsiveness. Laravel, a PHP framework, served as the backend, and MySQL managed the database. Developers used the XAMPP server to run programming code on a local web server before hosting.

Prior to coding, developers established a GitHub repository to store files and streamline development. After the accomplishment of the repository, the development of the web application will take place, focusing on the front-end development, beginning with the login/register page, homepage then the content of the website. After finalizing the UI, developers transitioned to backend development, focusing on component functionality and the web API for database connection.

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Following development, developers tested the web application to ensure effective and efficient performance. They evaluated content, such as quizzes, by completing each test to verify correct answers. As for the maintainability of the web application, the president of the Google Developers Group On Campus (GDGoC) agreed on sharing the website with their organization to utilize the platform as learning resources and also to maintain the web application (*see Appendix H*)

4. Cutover

For the Cutover stage, developers hosted the web application using Hostinger, a web hosting provider, after implementing final changes. They also registered a domain name matching the web application. After hosting, developers conducted an evaluation, wherein a School of Computing professional at Holy Angel University assessed the learning website's applicability and helpfulness for students.

Instrument

Following deployment, developers evaluated the web application using ISO 25010 to ensure it met user requirements. ISO 25010, also known as Software Product Quality Requirements and Evaluation (SQuaRE), provides eight characteristics for software analysis: Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability. Peters and Aggrey (2020) noted that developers can modify ISO 25010 to suit specific applications. Peters and Aggrey (2020) noted that developers can modify ISO 25010 to suit specific applications. Researchers used FURPS (see Figure 3) to evaluate student overall satisfaction and assessment. Yadav and Kishan (2020) explained that FURPS stands for Functionality, Usability, Reliability, Performance, and

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Supportability. Robert Grady developed this model, which establishes criteria for each of these five elements. Specifically, Functionality encompasses the system's capabilities, features, and functions. Usability includes aspects such as ease of use, interface, training, and user documentation. Reliability addresses accuracy, mean time between failures, and the frequency and severity of failures. Performance measures response time, speed, efficiency, and resource utilization. Supportability includes parameters that facilitate software maintenance, such as serviceability, adaptability, testability, and compatibility.

Considering the web application's user base, researchers selected Functional Suitability, Performance Efficiency, Compatibility, Usability, Security, Reliability, Maintainability, and Portability from the ISO 25010 software quality standards, and Functionality, Usability, Reliability, Performance, and Supportability from FURPS, to evaluate the developed web application. A psychometrician on campus validated the pre- and post-survey questionnaires. Additionally, one OOP professor from the School of Computing at Holy Angel University and two external OOP professors assessed and validated the web application's content.

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Figure 3.

FURPS Model

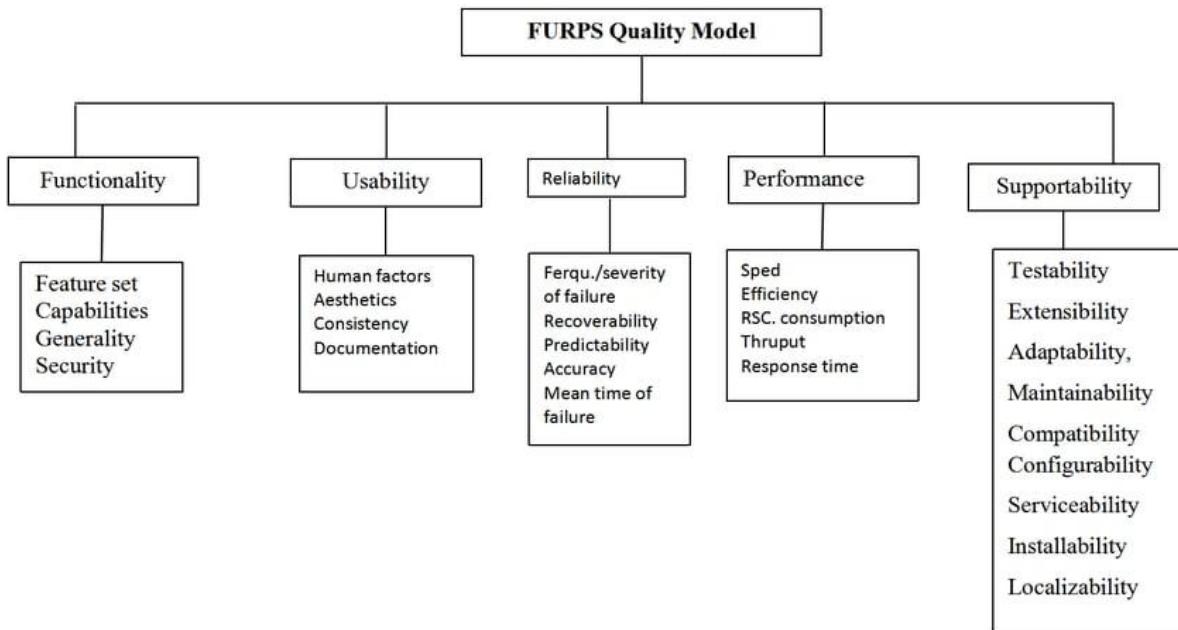
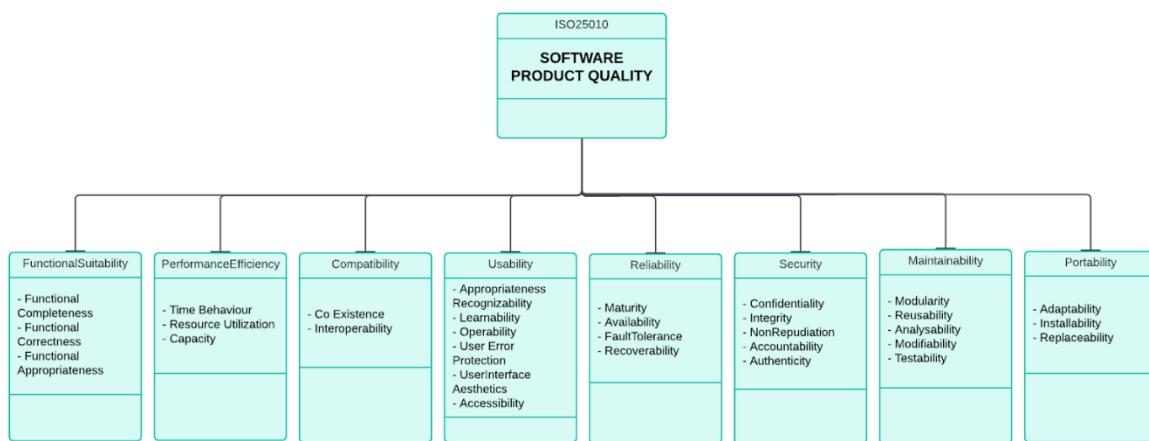


Figure 4.

ISO 25010 Standard Diagram



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Hardware and Software Specifications

During the interactive website's development, researchers categorized requirements into Hardware and Software, as detailed (*see Appendices AB and AC*). The web application operated on both client-side and server-side.

Data Analysis

Researchers primarily used Microsoft Forms to gather data. Before developing the website, they conducted a survey with 20 second-year Computer Science students and interviewed Object-Oriented Programming (OOP) professors at Holy Angel University's School of Computing to assess the website's relevance.

Additionally, researchers administered a pre-survey to 81 first-year and 52 fourth-year Computer Science students (totaling 133) to evaluate their knowledge of OOP and its four principles. They conducted a separate post-survey for first-year students who answered "No" and fourth-year students who answered "Yes" in the pre-survey. Researchers analyzed data from both surveys to evaluate the website's effectiveness. They examined post-survey results for first-year students to determine if they developed a foundation in basic OOP principles after website use. For fourth-year students, researchers analyzed data to assess if they gained new knowledge or enhanced their understanding of OOP, and if the web application impacted learning in an engaging way.

Researchers used a Likert scale (*see Appendix AD*) to analyze students' understanding of OOP and assess their satisfaction with various website aspects. The scale ranged from "strongly disagree" to "strongly agree" and "very unfamiliar" to "very familiar." They

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calculated weighted averages to determine overall satisfaction and evaluate how well the website met objectives. The analysis covered both pre- and post-surveys.

Implementation Plan

The researchers used a Gantt chart to track the progress of the website development, and the documentation includes the detailed outline of the project timeline. The process began with gathering insights from a professor to obtain expert feedback. Following this consultation, the researchers proceeded with the design and development of the website. Once the development was completed, the next step was securing a domain name, followed by the hosting of the website. Upon successful hosting, the researchers demonstrated it to the professor for the final review and then underwent a trial period with students to gather feedback and conduct a thorough evaluation.

Ethical Consideration

During the development of the interactive website for learning the four principles of object-oriented programming in Java, an interview was conducted with a professor (*see Appendix K & L*). To adhere to ethical standards, transparency was ensured throughout the interview process. The professor was provided with comprehensive information regarding the interview's objectives and how their feedback would be utilized during the web application's testing, ensuring their full understanding before participation. Consent was obtained for recording, and the interview was held in a private setting to guarantee confidentiality. Furthermore, the effectiveness of the interactive website was tested with the consent of students from the School of Computing, ensuring their participation remained confidential. All feedback and information were kept confidential, accessible only to

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authorized team members, and used solely for website improvement. Given the website's login system, security measures were implemented to protect user data and maintain confidentiality. This involved encrypting sensitive information and establishing secure login procedures.

Holy Angel University's Institutional Review Board (IRB) ethical and professional standards were followed to uphold integrity throughout the study's implementation.

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Results

Pre-Survey Results: Determining User Preferences

Researchers conducted a pre-survey using Google Forms with 20 second-year Computer Science students from Holy Angel University's School of Computing. They conducted this pre-survey during the proposal to assess students' perceptions of OOP's difficulty, determine if interactive features aided OOP learning, and identify desired interactive website features. Researchers believed 20 students provided sufficient insights for further website development. The survey included yes/no and Likert scale questions to gather student preferences. Researchers collected anonymous responses over one week.

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Table 1 displays the number of students who found Object-Oriented Programming (OOP) challenging. Results indicated that 17 of the respondents answered “Yes” and find OOP challenging, while three answered “No”. This concludes that for most of the respondents, OOP is a challenging subject.

Table 1

OOP a challenging subject

Level of Agreement	Level	Response	Percentage	Weighted Mean
Yes	1	17	85%	1.15
No	2	3	15%	
TOTAL		20	100%	

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Table 2 illustrates student confidence levels in their OOP understanding. Out of 20 respondents, 2 selected "Disagree," 10 selected "Neutral," 6 selected "Agree," and 2 selected "Strongly Agree." This indicated that most respondents were neutral or agreed regarding their confidence in OOP understanding.

Table 2

Confidence in understanding OOP

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	0	0%	3.4
Disagree	2	2	10%	
Neutral	3	10	50%	
Agree	4	6	30%	
Strongly Agree	5	2	10%	
TOTAL		20	100%	

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Table 3 shows whether students found OOP easy to understand when taught by instructors. Results revealed 8 students answered "Yes," and 12 answered "No." This indicated that most respondents did not easily understand OOP lessons taught by their professors.

Table 3

OOP when taught by professor

Level of Agreement	Level	Response	Percentage	Weighted Mean
Yes	1	8	40%	1.6
No	2	12	60%	
TOTAL		20	100%	

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Table 4 shows that all 20 respondents indicated that interactive websites would help them understand OOP better. This indicates a unanimous preference for interactive website-based OOP learning.

Table 4

Interactive website as a tool for learning OOP

Level of Agreement	Level Response	Percentage	Weighted Mean
Yes	1	20	100% 1.0
No	2	0	0%
TOTAL	20	100%	

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Table 5 reveals that 18 respondents used online resources to aid their OOP learning, while 2 did not. This demonstrates that the majority of students utilize online resources, such as interactive websites, for OOP learning.

Table 5

Used online resources in learning OOP

Level of Agreement	Level Response	Percentage	Weighted Mean
Yes	1	18	90%
No	2	2	10%
TOTAL	20	100%	

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Table 6 illustrates the perceived effectiveness of online resources. One respondent rated effectiveness as "Strongly Disagree," two as "Disagree," six as "Neutral," eight as "Agree," and five as "Strongly Agree." This suggests that most students found online resources effective.

Table 6

Effectiveness of the resources online

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	1	5%	3.5
Disagree	2	2	10%	
Neutral	3	6	30%	
Agree	4	8	40%	
Strongly Agree	5	3	15%	
TOTAL		20	100%	

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Table 7 demonstrates that all 20 respondents preferred learning OOP through visuals, reading materials, and interactive exercises. This underscores a universal preference for interactive learning features in OOP.

Table 7

Learning OOP with interactive features

Level of Agreement	Level	Response	Percentage	Weighted Mean
Yes	1	20	100%	1.0
No	2	0	0%	
TOTAL		20	100%	

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Table 8 shows that all 20 respondents preferred real-time feedback while learning OOP. This indicates a strong desire for immediate feedback during OOP learning.

Table 8

Real time feedback while learning OOP

Level of Agreement	Level Response	Percentage	Weighted Mean
Yes	1	20	100% 1.0
No	2	0	0%
TOTAL	20	100%	

The survey results indicated that students often found Object-Oriented Programming (OOP) challenging, even with professor assistance. Furthermore, all respondents agreed that interactive websites would significantly enhance their understanding of OOP concepts. These findings highlight the importance of developing creative and productive learning materials to improve learning outcomes in this challenging subject. Researchers used these insights to guide the interactive website's development.

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Pre-survey Results

Researchers conducted a pre-survey using Microsoft Forms with 81 first-year and 52 fourth-year Computer Science students from Holy Angel University (totaling 133) to assess their familiarity with Object-Oriented Programming (OOP) and support the study. The survey included yes/no and Likert scale questions. Researchers obtained 133 responses.

Table 9, "Do you have knowledge about OOP and its four principles?", showed 52 respondents answered "Yes," and 81 answered "No." This indicated that most respondents lacked knowledge of OOP, likely due to the majority being first-year Computer Science students.

Table 9

Knowledge regarding OOP and its four principles

Level of Agreement	Level	Response	Percentage	Weighted Mean
Yes	1	52	39.1%	1.61
No	2	81	60.9%	
TOTAL		133	100%	

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Table 10, "I am familiar with the concept of Object-Oriented Programming (OOP)," revealed 57 students selected "Very Unfamiliar," 21 selected "Unfamiliar," 8 selected "Somewhat Familiar," 27 selected "Familiar," and 20 selected "Very Familiar." This showed that most respondents were unfamiliar with OOP concepts.

Table 10

Familiarity with the concept of OOP

Level of Familiarity	Level	Response	Percentage	Weighted Mean
Very Unfamiliar	1	57	42.9%	2.49
Unfamiliar	2	21	15.8%	
Somewhat Familiar	3	8	6%	
Familiar	4	27	20.3%	
Very Familiar	5	20	15%	
TOTAL		133	100%	

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Table 11, "I am familiar with the concept of Java and how to use it in code," indicated 28 students selected "Very Unfamiliar," 30 selected "Unfamiliar," 35 selected "Somewhat Familiar," 25 selected "Familiar," and 15 selected "Very Familiar." This suggested that most respondents were somewhat familiar with Java concepts.

Table 11

Familiarity with the concept of Java

Level of Familiarity	Level	Response	Percentage	Weighted Mean
Very Unfamiliar	1	28	21.1%	2.77
Unfamiliar	2	30	22.6%	
Somewhat Familiar	3	35	26.3%	
Familiar	4	25	18.8%	
Very Familiar	5	15	11.2%	
TOTAL		133	100%	

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Table 12, "I am familiar with the concept of Encapsulation and how to use it in code within Object-Oriented Programming (OOP)," showed 57 students selected "Very Unfamiliar," 21 selected "Unfamiliar," 9 selected "Somewhat Familiar," 27 selected "Familiar," and 19 selected "Very Familiar." This revealed that most respondents were unfamiliar with Encapsulation.

Table 12

Familiarity with the concept of Encapsulation

Level of Familiarity	Level	Response	Percentage	Weighted Mean
Very Unfamiliar	1	57	42.9%	2.47
Unfamiliar	2	21	15.8%	
Somewhat Familiar	3	9	6.8%	
Familiar	4	27	20.3%	
Very Familiar	5	19	14.3%	
TOTAL		133	100%	

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Table 13, "I am familiar with the concept of Inheritance and how to use it in code within Object-Oriented Programming (OOP)," indicated 49 students selected "Very Unfamiliar," 29 selected "Unfamiliar," 11 selected "Somewhat Familiar," 26 selected "Familiar," and 18 selected "Very Familiar." This demonstrated that most respondents were unfamiliar with Inheritance.

Table 13

Familiarity with the concept of Inheritance

Level of Familiarity	Level	Response	Percentage	Weighted Mean
Very Unfamiliar	1	49	36.8%	2.51
Unfamiliar	2	29	21.8%	
Somewhat Familiar	3	11	8.3%	
Familiar	4	26	19.5%	
Very Familiar	5	18	13.5%	
TOTAL		133	100%	

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Table 14, "I am familiar with the concept of Polymorphism and how to use it in code within Object-Oriented Programming (OOP)," showed 58 students selected "Very Unfamiliar," 20 selected "Unfamiliar," 15 selected "Somewhat Familiar," 21 selected "Familiar," and 19 selected "Very Familiar." This revealed that most respondents were unfamiliar with Polymorphism.

Table 14

Familiarity with the concept of Polymorphism

Level of Familiarity	Level	Response	Percentage	Weighted Mean
Very Unfamiliar	1	58	43.6%	2.42
Unfamiliar	2	20	15%	
Somewhat Familiar	3	15	11.3%	
Familiar	4	21	15.7%	
Very Familiar	5	19	14.3%	
TOTAL		133	100%	

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Table 15, "I am familiar with the concept of Abstraction and how to use it in code within Object-Oriented Programming (OOP)," indicated 50 students selected "Very Unfamiliar," 30 selected "Unfamiliar," 11 selected "Somewhat Familiar," 23 selected "Familiar," and 19 selected "Very Familiar." This demonstrated that most respondents were unfamiliar with Abstraction.

Table 15

Familiarity with the concept of Abstraction

Level of Familiarity	Level	Response	Percentage	Weighted Mean
Very Unfamiliar	1	50	37.6%	2.48
Unfamiliar	2	30	22.6%	
Somewhat Familiar	3	11	8.3%	
Familiar	4	23	17.3%	
Very Familiar	5	19	14.3%	
TOTAL		133	100%	

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Table 16, "I am familiar with differentiating between classes and objects in Object-Oriented Programming," showed 58 students selected "Very Unfamiliar," 20 selected "Unfamiliar," 8 selected "Somewhat Familiar," 26 selected "Familiar," and 21 selected "Very Familiar." This indicated that most respondents were unfamiliar with classes and objects in OOP.

Table 16

Familiarity between classes and objects

Level of Familiarity	Level	Response	Percentage	Weighted Mean
Very Unfamiliar	1	58	43.6%	2.49
Unfamiliar	2	20	15	
Somewhat Familiar	3	8	6%	
Familiar	4	26	19.5%	
Very Familiar	5	21	15.8%	
TOTAL		133	100%	

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The calculated weighted averages revealed that most students were unfamiliar with Object-Oriented Programming (OOP) concepts and Java. Respondents disagreed with statements regarding their familiarity with OOP fundamentals, including encapsulation, inheritance, polymorphism, abstraction, classes, and objects. Specifically, Polymorphism (2.42) and Encapsulation (2.47) showed the lowest familiarity, while Java (2.77) showed slightly higher familiarity.

Table 17 indicated that, based on the weighted average interpretation scale, students' familiarity with OOP concepts primarily fell within the "Disagree" range (1.81-2.60), signifying low familiarity.

Table 17

Weighted Mean Interpretation Scale

Level	Level of Agreement	Range
1	Strongly Disagree	1.00 - 1.80
2	Disagree	1.81 - 2.60
3	Neutral	2.61-3.40
4	Agree	3.41 - 4.20
5	Strongly Agree	4.21 - 5.00

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Post-Survey For Students Who Answered No (*Without Knowledge*)

Researchers conducted a post-survey using Microsoft Forms with 81 first-year Computer Science students who answered "No" in the pre-survey. This post-survey assessed whether students developed a basic foundation in OOP concepts and its four principles. Researchers obtained 78 responses.

Table 18, "This website helped me build my foundation on the concept of Object-Oriented Programming (OOP)," showed 6 students selected "Strongly Disagree," 22 selected "Disagree," 16 selected "Neutral," 24 selected "Agree," and 10 selected "Strongly Agree." This indicated that most respondents built a basic foundation in OOP concepts.

Table 18

Helped build a basic foundation in OOP

Level of Agreement	Level Response	Percentage	Weighted Mean
Strongly Disagree	1 6	7.7%	3.13
Disagree	2 22	28.2%	
Neutral	3 16	20.5%	
Agree	4 24	30.8%	
Strongly Agree	5 10	12.8%	
TOTAL	78	100%	

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Table 19, "This website helped me build my foundation on the concept of the programming language Java," revealed 11 students selected "Strongly Disagree," 22 selected "Disagree," 5 selected "Neutral," 27 selected "Agree," and 13 selected "Strongly Agree." This demonstrated that most respondents built a basic foundation in Java concepts.

Table 19

Helped build a basic foundation in Java

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	11	14.5%	3.12
Disagree	2	22	28%	
Neutral	3	5	5.99%	
Agree	4	27	34%	
Strongly Agree	5	13	17.5%	
TOTAL		78	100%	

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Table 20, "This website helped me build my foundation on the concept of Encapsulation and how to implement it in code," indicated 12 students selected "Strongly Disagree," 14 selected "Disagree," 19 selected "Neutral," 20 selected "Agree," and 13 selected "Strongly Agree." This suggested that most respondents built a basic foundation in Encapsulation concepts.

Table 20

Helped build a basic foundation in Encapsulation

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	12	15.4%	3.10
Disagree	2	14	17.9%	
Neutral	3	19	24.4%	
Agree	4	20	25.6%	
Strongly Agree	5	13	16.7%	
TOTAL		78	100%	

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Table 21, "This website helped me build my foundation on the concept of Inheritance and how to implement it in code," showed 11 students selected "Strongly Disagree," 16 selected "Disagree," 9 selected "Neutral," 23 selected "Agree," and 19 selected "Strongly Agree." This revealed that most respondents built a basic foundation in Inheritance concepts.

Table 21

Helped build a basic foundation in Inheritance

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	11	13.6%	3.21
Disagree	2	16	21%	
Neutral	3	9	11.1%	
Agree	4	23	29.6%	
Strongly Agree	5	19	24.7%	
TOTAL		78	100%	

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Table 22, "This website helped me build my foundation on the concept of Polymorphism and how to implement it in code," indicated 13 students selected "Strongly Disagree," 16 selected "Disagree," 11 selected "Neutral," 18 selected "Agree," and 20 selected "Strongly Agree." This demonstrated that most respondents built a basic foundation in Polymorphism concepts.

Table 22

Helped build a basic foundation in Polymorphism

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	13	17.3%	3.21
Disagree	2	16	20.7%	
Neutral	3	11	14.5%	
Agree	4	18	21.59%	
Strongly Agree	5	20	25.9%	
TOTAL		78	100%	

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Table 23, "This website helped me build my foundation on the concept of Abstraction and how to implement it in code," showed 14 students selected "Strongly Disagree," 22 selected "Disagree," 9 selected "Neutral," 16 selected "Agree," and 17 selected "Strongly Agree." This indicated that most respondents were neutral regarding building a basic foundation in Abstraction.

Table 23

Helped build a basic foundation in Abstraction

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	14	18.5%	3.0
Disagree	2	22	27.9%	
Neutral	3	9	11.1%	
Agree	4	16	20%	
Strongly Agree	5	17	22.4%	
TOTAL		78	100%	

The responses, spread across different levels with a neutral average, suggested that the website provided some foundational understanding of OOP but lacked strong impact or consistent effectiveness for all students. This highlighted areas for improvement in engagement, clarity, and interactive website teaching methods.

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Post-Survey For Students Who Answered Yes (*With Knowledge*)

Researchers conducted a post-survey using Microsoft Forms with 52 fourth-year Computer Science students who answered "Yes" in the pre-survey. This post-survey assessed whether students gained new knowledge in OOP concepts and its four principles. Researchers obtained 51 responses.

Table 24, "This website was helpful for me in gaining new knowledge about the concept of Object-Oriented Programming (OOP)," showed 1 student selected "Strongly Disagree," 23 selected "Disagree," 3 selected "Neutral," 16 selected "Agree," and 8 selected "Strongly Agree." This indicated that most respondents did not gain new OOP knowledge.

Table 24

Gained new knowledge in OOP

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	1	1.9%	3.14
Disagree	2	23	46.2%	
Neutral	3	3	5.9%	
Agree	4	16	30.6%	
Strongly Agree	5	8	15.4%	
TOTAL		51	100%	

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Table 25, "This website was helpful for me in gaining new knowledge about the programming language Java," revealed one student selected "Strongly Disagree," 31 selected "Disagree," seven selected "Neutral," 10 selected "Agree," and two selected "Strongly Agree." This demonstrated that most respondents did not gain new Java knowledge.

Table 25*Gained new knowledge in Java*

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	1	2%	2.63
Disagree	2	31	60.8	
Neutral	3	7	13.7%	
Agree	4	10	19.6%	
Strongly Agree	5	2	3.9%	
TOTAL		51	100%	

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Table 26, "This website was helpful for me in gaining new knowledge about the concept of Encapsulation and how to implement it in code," indicated 1 student selected "Strongly Disagree," 23 selected "Disagree," 4 selected "Neutral," 17 selected "Agree," and 6 selected "Strongly Agree." This suggested that most respondents did not gain new Encapsulation knowledge.

Table 26*Gained new knowledge in Encapsulation*

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	1	1.9%	3.08
Disagree	2	23	44.2%	
Neutral	3	4	7.7%	
Agree	4	17	32.7%	
Strongly Agree	5	6	13.5%	
TOTAL		51	100%	

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Table 27, "The website was helpful for me in gaining new knowledge about the concept of Inheritance and how to implement it in code," showed 3 students selected "Strongly Disagree," 19 selected "Disagree," 3 selected "Neutral," 21 selected "Agree," and 11 selected "Strongly Agree." This revealed that most respondents gained new Inheritance knowledge.

Table 27*Gained new knowledge in Inheritance*

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	3	5.9%	3.12
Disagree	2	19	37.3%	
Neutral	3	3	35.9%	
Agree	4	21	41.2%	
Strongly Agree	5	5	9.8%	
TOTAL		51	100%	

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Table 28, "The website was helpful for me in gaining new knowledge about the concept of Polymorphism and how to implement it in code," indicated 5 students selected "Strongly Disagree," 23 selected "Disagree," 4 selected "Neutral," 15 selected "Agree," and 4 selected "Strongly Agree." This demonstrated that most respondents did not gain new Polymorphism knowledge.

Table 28*Gained new knowledge in Polymorphism*

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	5	9.8%	2.80
Disagree	2	23	45.1%	
Neutral	3	4	7.8%	
Agree	4	15	29.4%	
Strongly Agree	5	4	7.8%	
TOTAL		51	100%	

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Table 29, "This website was helpful for me in gaining new knowledge about the concept of Abstraction and how to implement it in code," showed 6 students selected "Strongly Disagree," 22 selected "Disagree," 4 selected "Neutral," 15 selected "Agree," and 4 selected "Strongly Agree." This suggested that most respondents did not gain new Abstraction knowledge.

Table 29*Gained new knowledge in Abstraction*

Level of Agreement	Level	Response	Percentage	Weighted Mean
Strongly Disagree	1	6	11.8%	2.78
Disagree	2	22	43.1%	
Neutral	3	4	7.8%	
Agree	4	15	29.4%	
Strongly Agree	5	4	7.8%	
TOTAL		51	100%	

The majority of students found the website somewhat helpful in understanding OOP concepts, but a significant portion remained neutral or disagreed. The survey results indicate that students somehow gained foundational knowledge in Encapsulation (3.08) and Inheritance (3.12), while their learning experience was less effective for Java fundamentals (2.63), Polymorphism (2.80), and Abstraction (2.78). Therefore, the researchers conclude that the website may not be as effective for students with prior knowledge of OOP, as the focus of the website is only the basic principles of OOP.

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Post-survey results for 1st and 4th year computer science students about FURPS

Researchers conducted a post-survey using Microsoft Forms with 133 fourth-year Computer Science students. This post-survey assessed the students' feedback about the website using FURPS. Researchers obtained 129 responses.

Table 30, regarding functionality, showed that 2 students selected "Neutral," 61 selected "Agree," and 66 selected "Strongly Agree" for "Objectiva's lessons, quizzes, and exercises function properly." For "Objectiva's interactive features respond correctly when I use them," 4 students selected "Neutral," 48 selected "Agree," and 77 selected "Strongly Agree." For "Objectiva provides all the features I expect from a learning website," 1 student selected "Disagree," 4 selected "Neutral," 58 selected "Agree," and 66 selected "Strongly Agree." The post-survey results indicated high satisfaction with the web application's functionality. Students confirmed or strongly confirmed that lessons, quizzes, and exercises functioned well, interactive elements responded appropriately, and the site provided expected learning website features. High weighted averages across all functionality aspects demonstrated Objectiva's effectiveness and dependability.

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Table 30*FURPS: Functionality*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva's lessons, quizzes, and exercises function properly	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	2	1.55%	
	Agree	4	61	47.29%	
	Strongly Agree	5	66	51.16%	
TOTAL			129	100%	
Objectiva's interactive features respond correctly when I use them	Strongly Disagree	1	0	0%	4.57
	Disagree	2	0	0%	
	Neutral	3	4	3.10%	
	Agree	4	48	37.21%	
	Strongly Disagree	5	77	59.69	
TOTAL			129	100%	
Objectiva provides all the features I expect from a learning website	Strongly Disagree	1	0	0%	4.47
	Disagree	2	1	1%	
	Neutral	3	4	3.10%	
	Agree	4	58	44.74%	
	Strongly Agree	5	66	51.16%	
TOTAL			129	100%	

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Table 31, regarding usability, showed that 1 student selected "Disagree," 3 selected "Neutral," 60 selected "Agree," and 65 selected "Strongly Agree" for "Objectiva is easy to navigate and understand." For "Objectiva's layout and design make it user-friendly," 7 students selected "Neutral," 56 selected "Agree," and 66 selected "Strongly Agree." For "Objectiva's interactive features are engaging and helpful," 5 students selected "Neutral," 58 selected "Agree," and 66 selected "Strongly Agree." The post-survey results demonstrated strong positive reception toward the web application's usability. Students concurred or strongly concurred that the platform was easy to use, had a clear design, and offered engaging and helpful interactive functionalities. Consistently high weighted averages affirmed the web application's success in providing a smooth and intuitive experience.

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Table 31*FURPS: Usability*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva is easy to navigate and understand	Strongly Disagree	1	0	0%	4.47
	Disagree	2	1	1%	
	Neutral	3	3	2.33%	
	Agree	4	60	46.28%	
	Strongly Agree	5	65	50.39%	
TOTAL			129	100%	
Objectiva's layout and design make it user-friendly	Strongly Disagree	1	0	0%	4.46
	Disagree	2	0	0%	
	Neutral	3	7	5.43%	
	Agree	4	56	43.41%	
	Strongly Disagree	5	66	51.16%	
TOTAL			129	100%	
Objectiva's interactive features are engaging and helpful	Strongly Disagree	1	0	0%	4.47
	Disagree	2	0	0%	
	Neutral	3	5	3.88%	
	Agree	4	58	44.96%	
	Strongly Agree	5	66	51.16%	
TOTAL			129	100%	

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Table 32, regarding reliability, showed that 10 students selected "Disagree," 29 selected "Neutral," 56 selected "Agree," and 34 selected "Strongly Agree" for "Objectiva runs smoothly without unexpected crashes." For "Objectiva rarely has errors or bugs," 11 students selected "Disagree," 34 selected "Neutral," 58 selected "Agree," and 26 selected "Strongly Agree." For "Objectiva works consistently without needing frequent refreshes," 10 students selected "Disagree," 32 selected "Neutral," 52 selected "Agree," and 35 selected "Strongly Agree." The post-survey results indicated overall web application stability, with most students agreeing or strongly agreeing that it ran smoothly, had minimal errors, and worked reliably without frequent refreshes. However, a significant number of students selected "Neutral" or "Disagree," suggesting occasional crashes, bugs, or the need for refreshes. While weighted averages indicated a good overall experience, these responses highlighted areas for system stability, error recovery, and performance tuning improvement.

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Table 32*FURPS: Reliability*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva runs smoothly without unexpected crashes	Strongly Disagree	1	0	0%	3.88
	Disagree	2	10	7.75%	
	Neutral	3	29	22.48%	
	Agree	4	56	43.41%	
	Strongly Agree	5	34	26.36%	
TOTAL			129	100%	
Objectiva rarely has errors or bugs	Strongly Disagree	1	0	0%	3.77
	Disagree	2	11	8.53%	
	Neutral	3	34	26.36%	
	Agree	4	58	44.96%	
	Strongly Disagree	5	26	20.16%	
TOTAL			129	100%	
Objectiva works consistently without needing frequent refreshes	Strongly Disagree	1	0	0%	3.87
	Disagree	2	10	7.75%	
	Neutral	3	32	24.81%	
	Agree	4	52	40.31%	
	Strongly Agree	5	35	27.13%	
TOTAL			129	100%	

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Table 33, regarding performance, showed that 18 students selected "Disagree," 15 selected "Neutral," 63 selected "Agree," and 33 selected "Strongly Agree" for "Objectiva loads quickly on my device." For "Objectiva's images, animations, and page navigation load smoothly," 19 students selected "Disagree," 19 selected "Neutral," 61 selected "Agree," and 30 selected "Strongly Agree." For "Objectiva performs well even with multiple tabs or sections open," 20 students selected "Disagree," 16 selected "Neutral," 60 selected "Agree," and 33 selected "Strongly Agree." The post-survey results showed overall good web application performance, with most students concurring or strongly concurring that it loaded quickly, displayed images and animations smoothly, and functioned well with multiple tabs open. However, some students selected "Neutral" or "Disagree," indicating potential slower loading, lag, or performance slowdown under heavier loads. While weighted averages suggested a pleasant user experience, further optimization regarding speed, resource usage, and responsiveness would improve overall efficiency.

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Table 33*FURPS: Performance*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva loads quickly on my device	Strongly Disagree	1	0	0%	3.86
	Disagree	2	18	13.95%	
	Neutral	3	15	11.63%	
	Agree	4	63	48.84%	
	Strongly Agree	5	33	25.58%	
TOTAL			129	100%	
Objectiva's images, animations, and page navigation load smoothly	Strongly Disagree	1	0	0%	3.79
	Disagree	2	19	14.73%	
	Neutral	3	19	14.73%	
	Agree	4	61	47.29%	
	Strongly Disagree	5	30	23.26%	
TOTAL			129	100%	
Objectiva performs well even with multiple tabs or sections open	Strongly Disagree	1	0	0%	3.82
	Disagree	2	20	15.50%	
	Neutral	3	16	12.41%	
	Agree	4	60	46.51%	
	Strongly Agree	5	33	25.58%	
TOTAL			129	100%	

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Table 34, regarding supportability, showed that 3 students selected "Disagree," 53 selected "Neutral," 48 selected "Agree," and 25 selected "Strongly Agree" for "Objectiva is compatible with different web browsers." For "Objectiva's layout and structure suggest that new features can be added smoothly," 3 students selected "Disagree," 49 selected "Neutral," 46 selected "Agree," and 31 selected "Strongly Agree." For "Objectiva can be updated without negatively affecting existing features," 3 students selected "Disagree," 53 selected "Neutral," 44 selected "Agree," and 29 selected "Strongly Agree." The post-survey results indicated good web application supportability, with most students agreeing or strongly agreeing that the application was compatible with multiple web browsers, had a flexible framework for adding features, and could be updated without affecting existing functionalities. A significant number of students selected "Neutral" for future-proofing and compatibility, indicating uncertainty or mixed results. While weighted averages were slightly positive, additional testing on various browsers and devices and ensuring smooth updates and new developments would enhance flexibility and continued use.

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Table 34*FURPS: Supportability*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva is compatible with different web browsers	Strongly Disagree	1	0	0%	3.74
	Disagree	2	3	2.33%	
	Neutral	3	53	41.09%	
	Agree	4	48	37.20%	
	Strongly Agree	5	25	19.38%	
TOTAL			129	100%	
Objectiva's layout and structure suggest that new features can be added smoothly	Strongly Disagree	1	0	0%	3.81
	Disagree	2	3	2.33%	
	Neutral	3	49	37.98%	
	Agree	4	46	35.66%	
	Strongly Disagree	5	31	24.03%	
TOTAL			129	100%	
Objectiva can be updated without negatively affecting existing features	Strongly Disagree	1	0	0%	3.82
	Disagree	2	3	2.33%	
	Neutral	3	53	41.09%	
	Agree	4	44	34.11%	
	Strongly Agree	5	29	22.47%	
TOTAL			129	100%	

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Post-survey Results for IT Experts based on ISO 25010

Researchers conducted a post-survey using Microsoft Forms with 4 IT Experts. This post-survey assessed the experts' feedback about the website using ISO 25010. Researchers obtained 4 responses.

In Table 35, IT experts evaluated the functional suitability of Objectiva. For the statement, "Objectiva provides all the essential functionalities expected from an interactive learning website," two experts indicated "Agree," and two indicated "Strongly Agree." Similarly, for the statements, "Objectiva includes comprehensive features that enhance the learning experience" and "Objectiva performs the required tasks accurately and consistently," two experts responded with "Agree," and two responded with "Strongly Agree." Overall, IT experts agreed that the interactive website met the essential functional requirements of an interactive learning website. These responses indicated that the platform met necessary functionalities, enhanced learner experience, and executed its functions accurately and consistently, suggesting that Objectiva was designed to fulfill ISO 25010 functional requirements.

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Table 35*ISO 25010: Functional Suitability*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva provides all the essential functionalities expected from an interactive learning website	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	2	50%	
TOTAL			4	100%	
Objectiva includes comprehensive features that enhance the learning experience	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	2	50%	
TOTAL			4	100%	
Objectiva performs the required tasks accurately and consistently	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	2	50%	
TOTAL			4	100%	

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In Table 36, the performance efficiency of Objectiva received positive feedback from IT experts, with weighted means ranging from 3.75 to 4.00. Most experts acknowledged that Objectiva ensured seamless lesson transitions and minimized loading delays. However, one expert indicated "Disagree" for the statements, "Objectiva efficiently loads media elements (e.g., images) without buffering" and "Objectiva loads quickly and responds smoothly during use," while two experts indicated "Agree," and one indicated "Strongly Agree" for each statement. While media optimization may require improvement to enhance the user experience, Objectiva demonstrated overall efficient performance.

The performance efficiency of the interactive website received positive feedback from IT experts, with weighted means ranging from 3.75 to 4.00. Most experts acknowledged that the technology guarantees seamless lesson transitions and reduces loading delays. However, one expert disagreed in two categories, raising some concerns about media loading speed. Although media optimization might be improved to improve the user experience, the interactive website performs efficiently overall.

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Table 36

ISO 25010: Performance Efficiency

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva efficiently loads media elements (e.g., images) without buffering	Strongly Disagree	1	0	0%	3.75
	Disagree	2	1	25%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	1	25%	
TOTAL			4	100%	
Objectiva minimizes loading delays when switching between lessons, quizzes, and exercises	Strongly Disagree	1	0	0%	4.00
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	4	100%	
	Strongly Disagree	5	0	0%	
TOTAL			4	100%	
Objectiva loads quickly and responds smoothly during use	Strongly Disagree	1	0	0%	3.75
	Disagree	2	1	25%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	1	25%	
TOTAL			4	100%	

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In Table 37, IT experts rated the compatibility of Objectiva positively ($M = 4.25$). Three experts indicated "Agree," and one expert indicated "Strongly Agree" for each of the following statements: "Objectiva works correctly on multiple browsers (Chrome, Firefox, Safari, Edge, etc.)," "Objectiva works seamlessly on both desktop and mobile devices," and "Objectiva's fonts, colors, and graphical elements render correctly across various screen sizes." These results suggested strong compatibility, ensuring a seamless user experience across various devices and systems.

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Table 37*ISO 25010: Compatibility*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva works correctly on multiple browsers (Chrome, Firefox, Safari, Edge, etc.)	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	
Objectiva works seamlessly on both desktop and mobile devices	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	
Objectiva's fonts, colors, and graphical elements render correctly across various screen sizes	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	

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In Table 38, Objectiva achieved a high usability rating ($M = 4.50$) from IT experts.

Two experts indicated "Agree," and two indicated "Strongly Agree" for each of the following statements: "Objectiva's design is visually appealing and user-friendly," "Objectiva ensures that buttons, links, and interactive elements are easily clickable and well-placed," and "Objectiva's interface is structured in a way that makes learning easy and seamless." This indicated a visually appealing, user-friendly design with well-placed interactive elements that enhanced the learning experience.

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Table 38*ISO 25010: Usability*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva's design is visually appealing and user-friendly	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	2	50%	
TOTAL		4		100%	
Objectiva ensures that buttons, links, and interactive elements are easily clickable and well-placed	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	2	50%	
TOTAL		4		100%	
Objectiva's interface is structured in a way that makes learning easy and seamless	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	2	50%	
TOTAL		4		100%	

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In Table 39, Objectiva received a strong security rating ($M = 4.00\text{--}4.25$) from IT experts. For the statements, "Objectiva's security features are reliable and effective" and "Objectiva has strong measures to prevent unauthorized access," one expert indicated "Neutral," two experts indicated "Agree," and one expert indicated "Strongly Agree." For the statement, "Objectiva ensures that passwords and sensitive user data are encrypted and stored securely," three experts indicated "Agree," and one expert indicated "Strongly Agree." These results indicated reliable security features, effective data encryption, and measures to prevent unauthorized access, although some experts remained neutral on certain aspects.

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Table 39*ISO 25010: Security*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva's security features are reliable and effective	Strongly Disagree	1	0	0%	4.00
	Disagree	2	0	0%	
	Neutral	3	1	25%	
	Agree	4	2	50%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	
Objectiva ensures that passwords and sensitive user data are encrypted and stored securely	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Disagree	5	1	25%	
TOTAL		4		100%	
Objectiva has strong measures to prevent unauthorized access	Strongly Disagree	1	0	0%	4.00
	Disagree	2	0	0%	
	Neutral	3	1	25%	
	Agree	4	2	50%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	

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In Table 40, The interactive website demonstrated high reliability ($M = 4.25\text{--}4.50$) according to IT experts. Two experts indicated "Agree," and two indicated "Strongly Agree" for the statements, "Objectiva operates without frequent crashes or errors" and "Objectiva maintains stable performance over extended periods of use." For the statement, "Objectiva ensures that completed quizzes, exercises, and progress data are not lost unexpectedly," three experts indicated "Agree," and one expert indicated "Strongly Agree." This indicated stable operation without frequent crashes, preservation of user progress, and consistent performance over time.

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Table 40*ISO 25010: Reliability*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva operates without frequent crashes or errors	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	2	50%	
TOTAL		4		100%	
Objectiva ensures that completed quizzes, exercises, and progress data are not lost unexpectedly	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Disagree	5	1	25%	
TOTAL		4		100%	
Objectiva maintains stable performance over extended periods of use	Strongly Disagree	1	0	0%	4.50
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	2	50%	
	Strongly Agree	5	2	50%	
TOTAL		4		100%	

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In Table 41, Objectiva demonstrated good maintainability ($M = 4.0\text{--}4.25$). All four experts indicated "Agree" for the statement, "Objectiva is easy to update and modify." For the statements, "Objectiva system structure allows for efficient debugging and enhancements" and "Objectiva documentation supports future maintenance and improvements," three experts indicated "Agree," and one expert indicated "Strongly Agree." This suggested an easy-to-update system, an efficient debugging structure, and supportive documentation for future improvements.

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Table 41*ISO 25010: Maintainability*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva is easy to update and modify	Strongly Disagree	1	0	0%	4.00
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	4	100%	
	Strongly Agree	5	0	0%	
TOTAL		4		100%	
Objectiva system structure allows for efficient debugging and enhancements	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	
Objectiva documentation supports future maintenance and improvements	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	

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In Table 42, Objectiva exhibited strong portability ($M = 4.25$). Three experts indicated "Agree," and one expert indicated "Strongly Agree" for each of the following statements: "Objectiva can be easily moved to a different hosting environment," "Objectiva can be exported or backed up without difficulties," and "Objectiva can be easily integrated with other services or applications." This indicated easy transferability to different hosting environments, seamless backups, and good integration with other services.

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Table 42*ISO 25010: Portability*

Question	Level of Agreement	Level	Response	Percent	Weighted Mean
Objectiva can be easily moved to a different hosting environment	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	
Objectiva can be exported or backed up without difficulties	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	
Objectiva can be easily integrated with other services or applications	Strongly Disagree	1	0	0%	4.25
	Disagree	2	0	0%	
	Neutral	3	0	0%	
	Agree	4	3	75%	
	Strongly Agree	5	1	25%	
TOTAL		4		100%	

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Discussion

This section presents the discussion, conclusions, and recommendations regarding the development and effectiveness of the web application.

The study aimed to develop an interactive website to teach the four principles of object-oriented programming (inheritance, polymorphism, encapsulation, and abstraction) through lessons, exercises, and quizzes. This interactive website was designed to complement, rather than replace, traditional teaching methods, integrating gamified exercises and interactive lessons.

A pre-survey, consisting of yes/no and Likert scale questions, was conducted with 133 respondents to guide and support the study's objectives and identify potential outcomes. The pre-survey results indicated that a majority of respondents ($n = 81$) had no prior knowledge of object-oriented programming, while 52 respondents possessed knowledge. It was noted that respondents with knowledge were likely fourth-year students, whereas those without knowledge were primarily first-year students.

For system development, Angular was used for front-end development, ensuring a dynamic and responsive interface. Laravel, a PHP framework, was used for back-end development to manage data and API calls, and MySQL was utilized for the database. Hostinger was selected for website hosting due to its performance, affordability, and security features, including SSL certification. Cross-Origin Resource Sharing (CORS) was enabled to facilitate seamless interaction between Angular and Laravel for efficient data retrieval. A One-Time Password (OTP) system was implemented during user registration to enhance security and verify email addresses.

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The developed system included user and admin panels. The user panel, accessible on both desktop and mobile devices, featured a homepage, lessons, exercises, quizzes, and account settings. The admin panel, optimized for desktop use, provided an overview of user accounts and allowed for the management of quizzes, including adding, editing, and deleting questions. Access to the admin panel was restricted to authorized administrators to maintain user accounts and quiz content.

Three professors with expertise in object-oriented programming were requested to validate the lessons presented on the website. The lessons were validated as suitable for first-year students, with suggestions to include advanced lessons for higher-year levels. Overall, the lessons were validated for teaching the basics of the four principles of object-oriented programming.

The post-survey, with responses ranging from 129 to 133, indicated that some pre-survey respondents did not complete the post-survey. In the post-survey, 78 respondents reported no knowledge of object-oriented programming (down from 81 in the pre-survey), and 51 reported having knowledge (down from 52). The FURPS quality model, developed by Hewlett-Packard, was used to evaluate the functionality, usability, reliability, performance, and supportability of the developed web application.

Four IT professionals with expertise in software engineering, quality assurance, and cybersecurity were also invited to review and assess the web application. The assessment focused on functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability, based on the ISO 25010 software quality model. Each expert provided feedback for website improvement, including modifications and

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technical issue resolutions to enhance user-friendliness (*see Appendix T*). The pre- and post-survey questionnaires were validated by a campus psychometrician.

Overall, the interactive website demonstrated positive effectiveness for first-year students in learning the four principles of object-oriented programming. This made them a suitable target audience for the website's purpose, which was to teach basic concepts. However, nearly half of the fourth-year student respondents indicated no acquisition of new knowledge after using the application. Despite this, some fourth-year students did report gaining new knowledge, suggesting the website's potential for higher-year levels if advanced content were incorporated.

Conclusion

The study successfully developed an interactive website for learning the four object-oriented programming principles, utilizing interactive lessons, gamified exercises, and quizzes with positive reinforcement feedback. The website effectively supplemented traditional teaching methods by integrating interactive learning features and gamified exercises. The website's strength lies in its ability to create an interactive learning tool by harmoniously blending interactive features with traditional teaching approaches.

Although the platform showed greater potential for first-year students, its potential for higher-year level students could be maximized by incorporating advanced concepts. The platform's success in engaging students through interactive features supports its role as a valuable complementary tool to traditional teaching methods, contributing to computer science education. The integration of conventional instruction with interactive, web-based learning proved effective in making complex OOP concepts more accessible and engaging.

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Recommendations

The following recommendations are provided to further develop the website and enhance the study:

- Implement advanced concept content on the lessons to better serve higher year level students.
- Incorporate a dynamic difficulty adjustment for lessons, rather than hardcoded levels, to bridge basic and advanced concepts, accommodating both beginners and advanced learners.
- Migrate lesson and exercise content to a database storage system to enable flexible content management for administrators and facilitate easy updates and version control.
- Expand target audience from 1st and 4th year computer science students to the entire School of Computing (SOC).
- Add analytics on the admin panel to track the progress of each user and their performance.
- Include a Frequently Asked Questions (FAQ) section to provide technical support for common issues.

These recommendations aim to enhance the web application's efficacy and reach within the School of Computing. However, as with any educational technology, continuous improvement is essential. The development team should adopt an ongoing improvement cycle, incorporating user feedback and technological innovations to ensure the platform remains a valuable and current learning tool.

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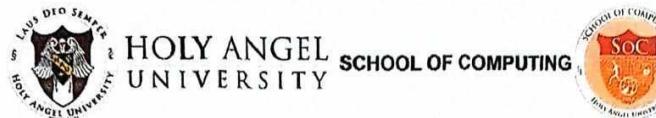
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HOLY ANGEL UNIVERSITY

Appendices

Appendix A.1

Consent Letter to the Dean



Date: October 17, 2024

Dr. Marlon I. Tayag
Dean, School of Computing

Dear Dr Tayag,

I hope this message finds you well. We are writing to respectfully request permission to use the modules and syllabus from the Object-Oriented Programming (OOP) course for our capstone project. We believe these materials will greatly enhance our understanding and ensure we meet the course's learning objectives. Rest assured, these resources will be used solely for our capstone project and will not be shared, distributed, or applied beyond this purpose in any capacity. We will ensure proper acknowledgment of the course content and adhere to academic integrity guidelines throughout our work.

Thank you for considering our request.

Best regards,
Group 9 of WD-401
Holy Angel University

Acknowledgment of Consent

I, MARLON I. TAYAG, DIT, the Dean of the School of Computing, hereby grant permission for the use of the modules and syllabus from the Object-Oriented Programming course for the purpose of the capstone project as outlined in this letter.

Signature: 
Date: October 17, 2024

HOLY ANGEL UNIVERSITY

Appendix A.2

Consent Letter to the OOP Professors for Interview



HOLY ANGEL
UNIVERSITY



Consent Letter for Participation in Interview

Date: October 15, 2024

Ms. Carisma A. Caro
School of Computing

Dear Ms. Caro,

We hope this letter finds you well. We are writing to request your consent to participate in an interview as part of our research on teaching methodologies and student performance in Object-Oriented Programming. This interview aims to gain insights from faculty members about their experiences in teaching the subject, challenges faced, and strategies used to improve student engagement and performance.

We kindly request your consent to participate in this interview, which will focus on questions such as:

- The overall performance of students in OOP subject
- Are there many students who fail or have low grades in this subject?
- What are the topics in the four principles of OOP that we should put in the content of the proposal?
- Does the capstone proposal can be beneficial to teaching the subject in the future?

We appreciate your consideration of this request and look forward to the opportunity to include your valuable insights in this research. If you agree to participate, kindly sign the acknowledgment below.

Sincerely,
Group 9 of WD-401
Holy Angel University

Acknowledgment of Consent

I, Carisma Caro, a professor at the School of Computing, hereby consent to participate in an interview regarding the Object-Oriented Programming course as outlined in this letter.

Signature: 
Date: 10/15/24

HOLY ANGEL UNIVERSITY



Consent Letter for Participation in Interview

Date: October 15 2024

Mr. John Rey Casingal
School of Computing

Dear Mr. Casingal,

We hope this letter finds you well. We are writing to request your consent to participate in an interview as part of our research on teaching methodologies and student performance in Object-Oriented Programming. This interview aims to gain insights from faculty members about their experiences in teaching the subject, challenges faced, and strategies used to improve student engagement and performance.

We kindly request your consent to participate in this interview, which will focus on questions such as:

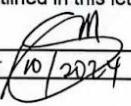
- The overall performance of students in OOP subject
- Are there many students who fail or have low grades in this subject?
- What are the topics in the four principles of OOP that we should put in the content of the proposal?
- Does the capstone proposal can be beneficial to teaching the subject in the future?

We appreciate your consideration of this request and look forward to the opportunity to include your valuable insights in this research. If you agree to participate, kindly sign the acknowledgment below

Sincerely,
Group 9 of WD-401
Holy Angel University

Acknowledgment of Consent

I, JOHN REY D. CASINGAL, a professor at the School of Computing, hereby consent to participate in an interview regarding the Object-Oriented Programming course as outlined in this letter.

Signature: 
Date: 15/10/2024

HOLY ANGEL UNIVERSITY

Appendix A.3

Consent Letter for the Participants



Dear Participant,

Greetings of peace!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAP2 - Capstone Project. Our project under development is entitled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

We have chosen you for you fit in the criteria as one of our participant groups (University Students), which are as follows: One of the projected users of the application are students at Holy Angel University who have no knowledge or have knowledge regarding OOP. This set includes users that are: (1) Currently enrolled students at Holy Angel University (2) In year 1st and 4th year College in School of Computing. In the survey process, you'll be given access to our web application for you to test and evaluate.

We will begin the study with a pre-survey conducted through Microsoft Forms. After completing the pre-survey, participants will receive a link to our website via their Gmail account. They will then explore the website, go through the lessons, complete exercises, and take quizzes. After using the website, participants will be asked to answer a post-survey to assess whether the website has helped them in understanding OOP concepts. We want to emphasize that participation in this study is voluntary, and all data and information shared will be kept strictly confidential.

The following students have expressed their intention to consider your prestigious institution for their project proposal as respondents:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

Your participation will be invaluable to our research and development process. We look forward to sharing the application with you. Thank you for your time and consideration, God bless!

Sincerely,

MR. GIAN TOLIBAS
Capstone Advisor, School of Computing

MS. CARISMA A. CARO
IT Chairperson, School of Computing

DR. MARLON I. TAYAG
Dean, School of Computing

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HOLY ANGEL UNIVERSITY

Appendix A.4

Consent Letter to Conduct a Room to Room Survey



DR. MARLON I. TAYAG

Dean, School of Computing

Dear Dr. Tayag,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAP2 - Capstone Project. Our project under development is entitled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

We would like to request permission to conduct a room-to-room pre-survey for our study among 1st-year and 4th-year Computer Science students. We understand that we will be taking a little bit of your time, and we truly appreciate your consideration. Students can participate by scanning a QR code linking to our Microsoft Forms survey. After the survey, participants will receive a link to our website via Gmail, where they can explore lessons, complete exercises, and take quizzes. A post-survey will follow to assess their understanding of OOP concepts. We want to assure you that participation in this study is entirely voluntary, and all data and information shared will be kept strictly confidential. We sincerely appreciate your time and consideration in allowing us to conduct this pre-survey.

The following students have expressed their intention to consider your prestigious institution for their project proposal as respondents:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

Your participation will be invaluable to our research and development process. We look forward to sharing the application with you. Thank you for your time and consideration, God bless!

Sincerely,


MR. GIAN TOLIBAS

Capstone Adviser, School of Computing


MS. CARISMA A. CARO

IT Chairperson, School of Computing


DR. MARLON I. TAYAG

Dean, School of Computing

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HOLY ANGEL UNIVERSITY

Appendix A.5

Consent Letter to the Registrar's Office



RMM Form # 005
Effective Date: July 1, 2023
Revision No. 1

DOCUMENT COPY REQUEST

REQUESTING UNIT <i>SOC</i>	DATE OF REQUEST <i>FEB. 4/2025</i>
DOCUMENT TITLE <i>INCLUSIVE WEBSITE FOR LEARNING THE FOUR PRINCIPLES OF INTEGRATED PROGRAMMING</i>	DOCUMENT NO.
REASON OF REQUEST <i>FOR CAPSTONE PROJECT</i>	
REQUESTED BY: <i>Aaron M. Pundalan</i>	APPROVED BY/UNIT/CLUSTER HEAD <i>JESUS D. Panilis</i>
TYPE OF ISSUED DOCUMENT	

CONTROLLED

UNCONTROLLED

APPROVED BY DCO <i>CORAZON Q. MALLARI</i>	DATE OF ISSUANCE <i>2/4/25</i>
--	-----------------------------------



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HOLY ANGEL UNIVERSITY

Enrollment Statistics Summary

<https://hau-erp.campus-erp.com/HAU/CampusNet/RptEnrollmentSt...>

Run Date 2025-02-04 16:34:11 gperlas

HOLY ANGEL UNIVERSITY
#1 Holy Angel Avenue, Sto. Rosario Angeles City, Pampanga Philippines 2009
Enrollment Statistics Summary
2nd Semester of S.Y. 2024 - 2025
School of Computing

MAJOR SOC	1st Year	2nd Year	3rd Year	4th Year	TOTAL
BSCompsci	101	143	90	60	394
BSCyberplusPSM	18	10	4		32
BSCybersecurity	47	32	21	16	116
BSEMC-DA	99	99	68	64	330
BSITAreaNetAdmi	33	15	27	24	99
BSITAreaWebDev	150	145	84	93	472
TOTAL	448	444	294	257	1443
GRAND TOTAL	448	444	294	257	1443



HOLY ANGEL UNIVERSITY



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING



DR. JESUS D. PANLILIO
University Registrar
This University

Dear Dr. Panlilio,

Greetings of peace!

As part of the requirements for the 6WDCAP2, Capstone Project for Web Development course for the Bachelor of Science in Information Technology (BSIT) with area of specialization in Web Development degree, students will perform a thorough analysis and construction of a web-application system. Students enrolled in the course are required to identify an organization and conduct a project proposal that includes data collection through actual website usage and surveys of the respondents. The group's approved title is "*Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java*", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

We are writing to formally request information on the number of students currently enrolled in 1st-year and 4th-year Computer Science students. As part of our pre-survey process, this information is essential in determining the number of potential participants who fit the criteria for our capstone research on the *Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java*.

We believe that these students best align with our study's objectives, and their participation will provide valuable insights. Please be assured that any data collected will be treated with the utmost confidentiality. We would greatly appreciate your assistance and are happy to provide any additional information or details you may require.

The following students have chosen to secure the number of our respondents for their project proposal at your prestigious institution:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

Thank you for considering our request. We look forward to your positive response.

Sincerely,


MR. GIANTON BAS
Capstone Adviser, School of Computing


DR. MARLON I. TAYAG
Dean, School of Computing

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Appendix A.6

Consent Letter for the IT Experts



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING



MR. GABRIEL CASTRO

Associate Software Engineer I

Clark Outourcing

Dear Mr. Castro,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAP2 - Capstone Project. Our project under development is entitled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

We would like to request your assessment of our website in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability based on the ISO 25010 software quality model. After evaluating the website, you will be asked to answer a post-survey form to provide feedback on its quality based on these criteria. Your insights will be valuable in improving our system and ensuring it aligns with software quality standards.

The following students have expressed their intention to choose you as their IT expert for their project:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Panzalan, Aaron M.
Sibal, Reuben Rob B.

We would greatly appreciate your time and expertise in this evaluation. Please let us know if you are available, and we will coordinate at your convenience. Thank you for considering our request, and we look forward to your response.

Kindly affix your signature below to confirm your acknowledgment and agreement to participate as our IT expert for this evaluation.

Sincerely,

MR. GIAS SOLIBAS

Capstone Advisor, School of Computing

Noted by:

DR. MARLON I. TAYAG

Dean, School of Computing

Acknowledged by:

MR. GABRIEL CASTRO

Associate Software Engineer I

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TEL. NO.: (045) 888-8971; 888-2802, 887-5746, 887-3455, 624-5277, 625-9619 | FAX: (045) 888-1756; 888-2514
EMAIL: HAU@HALLEDUPH | WWW.HAUEDU.PH

HOLY ANGEL UNIVERSITY



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING



MS. CLARISSE LIWANAG

Associate Software Engineer

Accenture

Dear Ms. Liwanag,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAP2 - Capstone Project. Our project under development is entitled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

We would like to request your assessment of our website in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability based on the ISO 25010 software quality model. After evaluating the website, you will be asked to answer a post-survey form to provide feedback on its quality based on these criteria. Your insights will be valuable in improving our system and ensuring it aligns with software quality standards.

The following students have expressed their intention to choose you as their IT expert for their project:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

We would greatly appreciate your time and expertise in this evaluation. Please let us know if you are available, and we will coordinate at your convenience. Thank you for considering our request, and we look forward to your response.

Kindly affix your signature below to confirm your acknowledgment and agreement to participate as our IT expert for this evaluation.

Sincerely,

MR. GIAN TOLIBAS

Capstone Adviser, School of Computing

Noted by:

DR. MARLON I. TAYAG
Dean, School of Computing

Acknowledged by:


MS. CLARISSE LIWANAG
Associate Software Engineer

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AND PHILIPPINE ASSOCIATION OF COLLEGES AND UNIVERSITIES - COMMISSION ON ACCREDITATION (PACUOA)

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EMAIL: HAU@HAU.EDU.PH | WWW.HAU.EDU.PH



HOLY ANGEL UNIVERSITY



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING



MR. TYRONE RALPH S. DE CASTRO

Software Quality Engineer

Cheq Systems Inc.

Dear Mr. De Castro,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAP2 - Capstone Project. Our project under development is entitled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

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Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

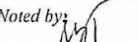
We would greatly appreciate your time and expertise in this evaluation. Please let us know if you are available, and we will coordinate at your convenience. Thank you for considering our request, and we look forward to your response.

Kindly affix your signature below to confirm your acknowledgment and agreement to participate as our IT expert for this evaluation.

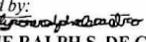
Sincerely,

MR. GIANSTOLIBAS

Capstone Adviser, School of Computing

Noted by:


DR. MARRON I. TAYAG
Dean, School of Computing

Acknowledged by:


MR. TYRONE RALPH S. DE CASTRO
Software Quality Engineer

ACCREDITED BY THE PHILIPPINE ACCREDITING ASSOCIATION OF SCHOOLS, COLLEGES, AND UNIVERSITIES (PAASCU)
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EMAIL: HAU@HAU.EDU.PH | WWW.HAU.EDU.PH



HOLY ANGEL UNIVERSITY



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING



MS. ASHLEY MARIE LOIS T. CASILLANO

Associate Software Engineer

Accenture

Dear Ms. Casillano,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAP2 - Capstone Project. Our project under development is entitled " Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java ", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

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Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

We would greatly appreciate your time and expertise in this evaluation. Please let us know if you are available, and we will coordinate at your convenience. Thank you for considering our request, and we look forward to your response.

Kindly affix your signature below to confirm your acknowledgment and agreement to participate as our IT expert for this evaluation.

Sincerely,

MR. GIAN TOLIBAS

Capstone Adviser, School of Computing

Noted by

DR. MARLON I. TAYAG

Dean, School of Computing

Acknowledged by:

MS. ASHLEY MARIE LOIS T. CASILLANO

Associate Software Engineer

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AND PHILIPPINE ASSOCIATION OF COLLEGES AND UNIVERSITIES - COMMISSION ON ACCREDITATION (PACUOA)

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HOLY ANGEL UNIVERSITY

Appendix A.7

Consent Letter for Content Validation



MS. CARISMA A. CARO

IT Chairperson, School of Computing

Dear Ms. Caro,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAP2 - Capstone Project. Our project under development is entitled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

As part of ensuring the accuracy and quality of our educational content, we would like to respectfully request your expertise in validating the lessons presented on our website. Your knowledge and experience in teaching Object-Oriented Programming in Java would be invaluable in verifying the correctness, clarity, and comprehensiveness of our materials. We would greatly appreciate your time and feedback on our lessons to ensure that they align with standard OOP principles and best practices.

The following students have expressed their intention to seek your expertise in validating the content of our website, particularly our lessons on Object-Oriented Programming in Java:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

Thank you for considering our request. We sincerely appreciate your time and expertise, and we look forward to your response. We acknowledge the value of your feedback and are fully onboard with implementing the improvements you recommended.

Sincerely,

MR. PATRICK PEREZ
Capstone Leader

Noted by:

MR. GIANPOLIBAS
Capstone Adviser, School of Computing

Acknowledged by:

MS. CARISMA A. CARO
IT Chairperson, School of Computing

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EMAIL: HAU@HAU.EDU.PH | WWW.HAU.EDU.PH



HOLY ANGEL UNIVERSITY



MR. EDMOND OCAMPO YUMANG

MT-I TVL – ICT / ICT Coordinator

Mabalacat National Senior High School

Dear Mr. Yumang,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAP2 - Capstone Project. Our project under development is entitled " Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java ", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

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Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

Thank you for considering our request. We sincerely appreciate your time and expertise, and we look forward to your response.

Sincerely,

MR. PATRICK PEREZ

Capstone Leader

Noted by:
MR. GIAN TOLIBAS
Capstone Adviser, School of Computing

Acknowledged by:
MR. EDMOND OCAMPO YUMANG

MT-I TVL – ICT / ICT Coordinator

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HOLY ANGEL UNIVERSITY



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING



MR. JOHN REY CASINGAL

HAU Instructor

Dear Mr. Casingal,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAPI - Capstone Project. Our project under development is entitled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

As part of ensuring the accuracy and quality of our educational content, we would like to respectfully request your expertise in validating the lessons presented on our website. Your knowledge and experience in teaching Object-Oriented Programming in Java would be invaluable in verifying the correctness, clarity, and comprehensiveness of our materials. We would greatly appreciate your time and feedback on our lessons to ensure that they align with standard OOP principles and best practices.

The following students have expressed their intention to seek your expertise in validating the content of our website, particularly our lessons on Object-Oriented Programming in Java:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

Thank you for considering our request. We sincerely appreciate your time and expertise, and we look forward to your response. We acknowledge the value of your feedback and are fully onboard with implementing the improvements you recommended.

Sincerely,

MR. PATRICK PEREZ
Capstone Leader

Noted by:

MR. GIAN TOLIBAS
Capstone Adviser, School of Computing

Acknowledged by:

MR. JOHN REY CASINGAL

HAU Instructor

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HOLY ANGEL UNIVERSITY

Appendix A.8

Consent Letter for Google Developers Group On Campus



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING



MS. FRANCINE LOUISE SANCHEZ

President, Google Developers Groups on Campus – Holy Angel University

Dear Ms. Sanchez,

Greetings!

We are students from the School of Computing at Holy Angel University, pursuing a Bachelor of Science in Information Technology with a specialization in Web Development. As part of our Capstone Project (6WDCAP2), we developed an Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java to help students grasp key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

Given your leadership as the president of the Google Developer Groups on Campus (GDGoC), we would like to request your approval to share this website with your organization. Our goal is for GDGoC to utilize the platform as a learning resource for students, ensuring that it continues to benefit the developer community.

The following students, who are part of this project, would like to request your approval for this transition:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

If approved, we will coordinate with you to facilitate a smooth transition, including handing over access and providing any necessary support. Please let us know your thoughts, and we would be happy to discuss any details further at your convenience.

We appreciate your time and consideration and look forward to your response.

Sincerely,

Mr. GIAN TOLIBAS
Capstone Adviser, School of Computing

Noted by:

MS. MA. LOUELLA M. SALENGA

Adviser, Google Developers Groups on Campus – Holy Angel University

Acknowledged by:

MS. FRANCINE LOUISE SANCHEZ

President, Google Developers Groups on Campus – Holy Angel University

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EMAIL: HAU@HAU.EDU.PH | WWW.HAU.EDU.PH



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Appendix A.9 Consent letter for the Psychometrician



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING



MS. MICHELLE C. ESGUERRA

Psychometrician, Holy Angel University

Dear Ms. Esguerra,

Greetings!

We are students from the School of Computing of Holy Angel University under the Bachelor of Science in Information Technology program with specialization in Web Development. As part of the requirements for our degree, we are taking 6WDCAPI - Capstone Project. Our project under development is entitled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java", designed to help students learn key OOP concepts through lessons, exercises, and quizzes in an engaging and interactive way.

As part of ensuring the accuracy and reliability of our research, we would like to respectfully seek your expertise in validating the survey questions designed for our study. Specifically, we request your feedback on the user preference survey, pre and post-surveys, and the survey questions aligned with the FURPS model and ISO 25010 standards. Your knowledge and expertise in psychometrics and survey design would be invaluable in ensuring that our questions effectively measure user perceptions, learning outcomes, and system quality. We would greatly appreciate your time and insights to ensure our research instruments are clear, reliable, and valid, aligning with established evaluation standards.

The following students seek your expertise in validating our research surveys, ensuring clarity, reliability, and alignment with FURPS and ISO 25010 standards:

Crisostomo, Chrisjohn G.
Perez, Patrick M.

Punzalan, Aaron M.
Sibal, Reuben Rob B.

Thank you for considering our request. We sincerely appreciate your time and expertise, and we look forward to your response. We acknowledge the value of your feedback and are fully onboard with implementing the improvements you recommended.

Sincerely,

Noted by:

MR. GIAN TOLIBAS

Capstone Adviser, School of Computing

Acknowledged by:

MS. MICHELLE C. ESGUERRA

Psychometrician, Holy Angel University



HOLY ANGEL UNIVERSITY

Appendix B

Letter of Intent to the Author of the Book

The screenshot shows a Gmail inbox with one unread email. The subject of the email is "Letter of Intent to Use Content from Java The Complete Reference Tenth Edition: Comprehensive Coverage of the Java Language". The email is from Aaron Punzalan <apunzalan500@gmail.com> to international_cs <international_cs>. The date is Sat, Feb 15, 11:18 PM (5 days ago). The body of the email reads:

Dear Mr. Herbert Schildt and McGraw-Hill Education,

We hope this email finds you well. We are students from the School of Computing at Holy Angel University, currently pursuing a Bachelor of Science in Information Technology with a specialization in Web Development. As part of our academic requirements, we are enrolled in 6WDCAP2 - Capstone Project and have developed a project titled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java."

Our project is designed to assist students in understanding key Object-Oriented Programming (OOP) concepts through engaging lessons, exercises, and quizzes. As part of our research and content development, we have included paraphrased material from your book, *Introduction to Java Programming Revised Edition*, specifically from pages 3,4,5,6,7,8,9,12,13,14,19,20,21,23,24,134,135,136,163,169,170,171,172,173,180,183,184, 198.

We would like to formally inform you that this paraphrased content is now integrated into our website. We have ensured that it is used exclusively for the purpose of this academic project and have taken steps to adhere to ethical standards and copyright guidelines. The material will not be distributed, reproduced, or used for any commercial purposes.

Please let us know if there are any concerns or if there are any additional steps we should take regarding the use of this material. We sincerely appreciate your time and consideration and would be grateful for your support.

Thank you and best regards,

Chrisjohn Crisostomo – cgcristom01@gmail.com
Aaron Punzalan – apunzalan500@gmail.com
Patrick Perez – patrickmperez22@gmail.com
Reuben Sibal – sibalreuben@gmail.com

The screenshot shows a Gmail inbox with one unread email. The subject of the email is "Letter of Intent to Use Content from Introduction to Java Programming Revised Edition". The email is from Aaron Punzalan <apunzalan500@gmail.com> to jakerpomperada <jakerpomperada>. The date is Sat, Feb 15, 10:52 PM (5 days ago). The body of the email reads:

Dear Mr. Pomperada and MindShapers Co., Inc.,

We hope this email finds you well. We are students from the School of Computing at Holy Angel University, currently pursuing a Bachelor of Science in Information Technology with a specialization in Web Development. As part of our academic requirements, we are enrolled in 6WDCAP2 - Capstone Project and have developed a project titled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java."

Our project is designed to assist students in understanding key Object-Oriented Programming (OOP) concepts through engaging lessons, exercises, and quizzes. As part of our research and content development, we have included paraphrased material from your book, *Introduction to Java Programming Revised Edition*, specifically from pages 211, 212, 213, 214, 215, 218, 219, 220, 224, 226, 228, 234, 237, 238, 239, 240, 241, 242, and 244.

We would like to formally inform you that this paraphrased content is now integrated into our website. We have ensured that it is used exclusively for the purpose of this academic project and have taken steps to adhere to ethical standards and copyright guidelines. The material will not be distributed, reproduced, or used for any commercial purposes.

Please let us know if there are any concerns or if there are any additional steps we should take regarding the use of this material. We sincerely appreciate your time and consideration and would be grateful for your support.

Thank you and best regards,

Chrisjohn Crisostomo – cgcristom01@gmail.com
Aaron Punzalan – apunzalan500@gmail.com
Patrick Perez – patrickmperez22@gmail.com
Reuben Sibal – sibalreuben@gmail.com

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Gmail in:sent

Letter of Intent to Use Content from Java All-In-One For Dummies: A Wiley Brand

Aaron Punzalan <apunzalan500@gmail.com>
to permissions Sat, Feb 15, 11:49 PM (5 days ago)

Dear Mr. Doug Lowe and For Dummies Publication,

We hope this email finds you well. We are students from the School of Computing at Holy Angel University, currently pursuing a Bachelor of Science in Information Technology with a specialization in Web Development. As part of our academic requirements, we are enrolled in 6WDCAP2 - Capstone Project and have developed a project titled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java."

Our project is designed to assist students in understanding key Object-Oriented Programming (OOP) concepts through engaging lessons, exercises, and quizzes. As part of our research and content development, we have included paraphrased material from your book, *Introduction to Java Programming Revised Edition*, specifically from pages 8.10, 46, 47, 48, 53, 54, 57, 58, 59, 68, 69, 193, 194, 195, 196, 201, 202, 203, 206, 237, 242, 249, 250, 253, 254, 255, 256, 257, 258, 278, 279, 283, 284, 285, 286, 287, 354, 424, 425.

We would like to formally inform you that this paraphrased content is now integrated into our website. We have ensured that it is used exclusively for the purpose of this academic project and have taken steps to adhere to ethical standards and copyright guidelines. The material will not be distributed, reproduced, or used for any commercial purposes.

Please let us know if there are any concerns or if there are any additional steps we should take regarding the use of this material. We sincerely appreciate your time and consideration and would be grateful for your support.

Thank you and best regards,

Chrisjohn Crisostomo – cgcristostomo1@gmail.com
Aaron Punzalan – apunzalan500@gmail.com
Patrick Perez – patrickmperez22@gmail.com
Reuben Sibal – sibalreuben@gmail.com

Gmail in:sent

Letter of Intent to Use Content from An Introduction to Object-Oriented Programming with Java Fifth Edition

Aaron Punzalan <apunzalan500@gmail.com>
to MHE-Permissions Sat, Feb 15, 11:01 PM (5 days ago)

Dear McGraw-Hill International Edition,

We hope this email finds you well. We are students from the School of Computing at Holy Angel University, currently pursuing a Bachelor of Science in Information Technology with a specialization in Web Development. As part of our academic requirements, we are enrolled in 6WDCAP2 - Capstone Project and have developed a project titled "Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java."

Our project is designed to assist students in understanding key Object-Oriented Programming (OOP) concepts through engaging lessons, exercises, and quizzes. As part of our research and content development, we have included paraphrased material from your book, *Introduction to Java Programming Revised Edition*, specifically from pages 40, 41, 43, 44, 47, 48, 94, 113, 114, 499, 743.

We would like to formally inform you that this paraphrased content is now integrated into our website. We have ensured that it is used exclusively for the purpose of this academic project and have taken steps to adhere to ethical standards and copyright guidelines. The material will not be distributed, reproduced, or used for any commercial purposes.

Please let us know if there are any concerns or if there are any additional steps we should take regarding the use of this material. We sincerely appreciate your time and consideration and would be grateful for your support.

Thank you and best regards,

Chrisjohn Crisostomo – cgcristostomo1@gmail.com
Aaron Punzalan – apunzalan500@gmail.com
Patrick Perez – patrickmperez22@gmail.com
Reuben Sibal – sibalreuben@gmail.com



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Appendix C

Interview Transcript

Interview Transcript of Mr. Casingal

Patrick: OOP subject, marami po bang bumabagsak o nahhirapan sa subject?

Sir John Rey: Umm...oo. Honestly, mahirap yung subject pero if wala kang basic ng java understanding fundamentals ni java...mahirapan ka sa OOP.

Patrick: So, ano po sir na subject dito...so sa tingin niyo sir, ang proposal po kasi namin interactive website for learning java OOP principles. So, sa tingin niyo po magiging relevant po ba siya or parang helpful sa mga students especially second year students? Yung tinuturo po na parang basic principles like—

Sir John Rey: Yung questions ko would be...anong difference niya sa nandoon na sa—

Patrick: Yung samin nakafocus siya doon sa four basic principles, yung...ah...abstraction, polymorphism, encapsulation atsaka inheritance ta's parang...uh...in a beginner level...kumbaga madaling intindihin ta's interactive na siya kumbaga parang sa brilliant.org yung ginawang reference po namin—

Sir John Rey: brilliant.org?

Patrick: Opo, para po siyang...parang mukha siyang game na habang binabasa mo siya sir nakakapag interact ka doon sa bot.

Sir John Rey: Paano yung interaction doon?

Patrick: Kunwari sir...uh—

Sir John Rey: Text lang?

Patrick: 'Di sir, yung parang sa...interact sa brilliant.org yung bago ka...bago siya p'wede ka mag next para magsagot ta's uh...kunwari connecting the dots parang drag and drop ganon.



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Sir John Rey: Parang ano yan...ano nga yun? Kung gagawin niyo for example...forgot the website—

Patrick: Yung alice.org

Sir John Rey: Yun ba yun? Yung parang ida-drag and drop nalang yung sections nung program.

Patrick: Dalawa po yung reference namin na ginawa yung alice.org astaka po yung brilliant kumbaga parang di naman po kokopyahin kumbaga gagawing...uh...inspiration. Mas ano po siya sa desktop, d'yan kasi sir magreregister ka muna. Sa gets started sir, ta's may mga parang nandoon...oo yung parang ganyan sir kaso dapat nakalog in po kasi.

Sir John Rey: Oh yung ganito...

Patrick: Kaso yan kasi si sir parang math yung tinuturo niya...yung samin four basic principle of OOP.

Sir John Rey: Sino yung mag aano niyan?

Patrick: Ang balak po naming parang...uh—

Sir John Rey: Magva-validate?

Patrick: Magva-validate yung mga ano... mga prof po dito sana...si Ma'am Caro po yung unang nainterview namin na gawing parang mag aassess to validate if helpful po siya o talagang makakatulong po siya...

Sir John Rey: Uhmmmm...kasi for me no kung meron na mga existing like alice.org ayan...ano yung difference?

Patrick: De sir, yung alice.org hindi po kasi sila ano...yung subject po na tinuturo nila hindi po sila OOP kunwari sa brilliant sir...nagtry po kaming ganon is parang mathematics po halos.



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Sir John Rey: Uhmm...so wala pang existing—

Patrick: Yung parang sa...uh..four basic principles...yun po kasi yung sinuggest nung panel namin na i-focus yung four na principles.

Sir John Rey: Kasi isa pang concern ko d'yan kung ganyan yung gagawin natin, paano yung...uhm...transitions let say for example...uh...ano yung programming language that would cater it? And also yung...uh...trends and practices kasi from let say for example, sa this year up to next year, there are certain updates ng programming languages na...uh...nag iiba yung practices if may mga bagong schematics ganyan—

Patrick: Ang dyan naman po sir una yung sa language ang gagamitin po namin is JAVA kasi yun po yung tinuro naming...ay tinuro samin nung second year kahit naman po ata ngayon JAVA pa rin? Ano kasi yung pangalawang tanong sir...nalito ako.

Sir John Rey: Sa transitions..kung ako magtuturo ako ng OOP mas efficient sakin yung C Sharp kasi si JAVA may mga questions...although yeah sabi ko nga magiging ano kasi 'yan...for me ah magiging...uhm...anong tawag dito? Uhh...dependent on programming language doon tayo magkakaroon ng problem, why? Kasi every programming language nag iiba, may mga updates like si C Sharp may mga bagong approach siya ng object-oriented programming na...uh...noon pina-practice ngayon hindi na...ganon. That's one. Second, is yung sa industry practices...uh...iba din yun. So, ano yung magiging basis natin? Kasi ang ano niyan would be...uh...either dependent siya sa programming language o sa industry practices?

Patrick: Magiging dependent po siya programming language...ang sinuggest din po kasi samin...si...yung nagpanel po samin...si Sir Jo atsaka yung isa...yung gusto po nilang

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gawing basis namin ng ano...yung parang is book parang libro. Kuha raw po kami ng libro, i-basis naming.

Sir John Rey: Kasi sakin no...uh...I would suggest generic hindi siya dependent sa programming language kasi in general discussion nung object-oriented pero parehas lang din naman yan eh depende nalang yan sa implications on the subject no...kasi there are certain implementations sa C Sharp na hindi p'wede sa JAVA and there are certain ano ng JAVA na hindi maintindihan as C Sharp developer...so yung mga ganong instances...uh..mas madali siguro at for me ah, mas kapaki-pakinabang sa student kapag in generic ano...hindi siya really nakadependent sa JAVA kasi ang object-oriented implementation kay JAVA hindi siya napa-practce sa C Sharp tapos kung object-oriented implementation kay C Sharp parang questionable din doon sa JAVA kasi tina-try ko parang ang awkward kapag...may instances na ganon...kapag nagtuturo...kasi more on C Sharp ako eh kaya nung nagtuturo ako nung JAVA on implementations ko on what I practice in C Sharp parang—

Patrick: Nagpapahalo mo, sir?

Sir John Rey: Hindi, kulang...kulang...for me ah kulang pa si JAVA pag sinabi na object-oriented programming as a whole I would prefer pa rin...though biased siguro in terms dahil C Sharp dev ako atsaka game dev pero on...there are lots of...uh...features na kasi lalo na C Sharp na hindi na...wala...walang feature si JAVA if f-for that I would...uh...go for generic discussions ng object oriented—

Patrick: Parang general?

Sir John Rey: General tapos...uh...example—

Patrick: Ay sir, doon po sa...nagdefense na po kasi kami for example, may proposal yung pong general na parang lahat po ng language ganyan pero—



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Sir John Rey: H'wag...h'wag...mamatay kayo niyan—

Patrick: Hindi po lahat.

Sir John Rey: Discussion lang ng object-oriented implementation?

Patrick: Discussion lang ng principles—

Sir John Rey: Kumbaga visualize ano...discussion...for me as I teach the object-oriented mas maa-apreciate ko yun kesa sa dependent sa isang language. Kumbaga ano...visualize na concept kasi na...ito siguro yung hindi naiintindihan ng ano eh...ng students to grasp the fundamentals of object-oriented siguro visualize interactive learning.

Patrick: Hindi lang puro coding, no sir?

Sir John Rey: Hindi siya coding kumbaga visualization kung ano si...yung polymorphism...yung essence niya...yun yung mga ano para for example, kahit sino ang gagamit nun kahi tanong programming language ang gamitin niya p'wede. So, visualize kung ano hindi lang siya nakadependent lang sa isang JAVA as a programming language kasi kung ako gagamit nun at...uh...if I ever I do on...uhmmm...object-oriented sa game development for example, no? Majority non C++ at C Sharp and tehere are certain approaches na ini-implement kay...as C++ at C Sharp na I think hindi possible kay JAVA...so, yung mga ganong instances. So, what if...uh...nagbago ngayon ang subjects na ituturo sa object-oriented hindi na magagamit yung system...so, yung mga ganon. Hindi naman lahat ng programming language pero ang discussion ninyo is virtual o...visuals inivi-visualize niyo kung ano yung...uh...meaning ni polymorphism, meaning ng inheritance, abstraction etc...

Patrick: Bali po yung pagdiscuss naming nung principles po na yun parang hindi po siya nakadependent lang sa subject...ay programming language?

Sir John Rey: Isang programming language.



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Patrick: Pero sir yung narevise...narevised na po kasi yung samin—

Sir John Rey: Ah yun lang.

Patrick: Tapos—

Sir John Rey: Pero yun yung?

Patrick: Yun po yung unang proposal namin yung hindi po siya isang language lang tapos yung parang gusto po nila magdependent nalang kami.

Sir John Rey: Yun nga, magkakaibang approach kasi eh. Kung code ang pag-uusapan—

Patrick: Kung sa coding po siguro, yung balak naman po namin sana magdedependent nalang po pag yung mga exercises...may mga exercises po kasi na gagawin—

Sir John Rey: Yun possible yun.

Patrick: Yun pong magiging dependent nalang sa isang language pero sa—

Sir John Rey: Pag discussion?

Patrick: Pag discussion hindi po siya parang—

Sir John Rey: Pero discussion niyo, wag coding.

Patrick: Opo, hindi po. Para pong—

Sir John Rey: Visual

Patrick: Ah maria basis po gan'yan. Hindi naman po yung scenaryong... scenario na scenario.

Sir John Rey: Visual niyo, I would recommend.

Patrick: Kumbaga parang...in real life—

Sir John Rey: Example polymorphism, if you'll discuss it on...uh... polymorphism creation of objects where in from a certain object to a certain object nagbabago



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yung...uhm...attributes niya or...uh...let say...uh...overloading a parameter or overriding of a...uhm...attributes so yung mga yun.

Patrick: Parang po...ih... lagyan po namin ng visualization in real life no? Para po bang ganon? Kunwari...uh—

Sir John Rey: Nasa inyo or a simple animation, let say for example...uh...isang simple blub.

Pag ano 'yan...uh...pag overloading lalagay ka ng mga parameters, pag overriding nag-iiba yung attributes mga...nasa inyo yun kung paano niyo i-aano.

Patrick: So yung sa ano po, last question, yung sa...ano po yung p'wedeng...ay topic or subtopic para sa abstraction, polymorphism, encapsulation atsaka inheritance?

Sir John Rey: What do you mean topics?

Patrick: Subtopics po kunwari sa abstraction na p'wedeng ilagay po doon.

Sir John Rey: For me...uh...siguro yung mga subtopics that is commonly used sa industry...commonly used sa industry and uh...applied talaga siya on...kasi there are certain example na approaches na wala sa books na minsan dini-discuss ko nalang sa klase.

Patrick: So sa...pag ganon po sir? Saan po yung parang basis po namin? In experience po ba or ihalo din namin?

Sir John Rey: You could...uh...ask the...or interview season devs lalo na yung mga season devs or mga senior programmers na...para makakuha kayo ng magagandang inputs. Let say for example, there are certain teams na solid principle ang ginagamit nila on OOP or object-oriented design concepts na implementation so yun. There are certain rin na...uh...dry or may mga like sa game dev...uh...nagsosolid kami at the same time...uhm...uh...yung mga design patterns na ginagamit like factory adapter, observer, singletons yung mga yun.

Patrick: Parang ganon po na topics?



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Sir John Rey: Mga ganong topics...so yun, siguro kung mag interview pa full of...uh...hindi naman literally professionals eh...uh...as a whole specific talaga yung kung nagpo-program talaga sila or ganon.

Patrick: Sa ano po sir, yung pang...ito po sir last na po 'to. Yung—

Sir John Rey: Ilang last na 'yan?

Patrick: Last na po, yung while learning OOP skills are important in development?

Sir John Rey: OOP and development...hmmm...kasi for me 'di niyo naa-appreciate yun dahil sa frameworks although magandang background yun if you are pursuing software dev or software engineering pero web dev as a whole depende sa frameworks na ginagamit niyo.

Patrick: Alam ko ginagamit po siya ngayon sa pinag-OJT po namin...ano...uh .netcore

Sir John Rey: Ah, .netcore mas maganda, mas magandang baon yun...uh... .netcore...uh p.net ginagamit niyo there are certain front end like react, angular...

Patrick: Nagagamit po yung OOP sa back end.

Sir John Rey: O diba, on...on...on different or majority ng industry ngayon C Sharp ang mas ginagamit, walang JAVA...kaya yun yun, isang tanong ko bakit JAVA?

Patrick: Atsaka yung sa k—, cash—, yung sa memory po...

Sir John Rey: Maganda ang C Sharp talaga, uy! Biased na pero yun isang ano yan...uh...siguro—

Patrick: Siguro pag discuss nalang po namin, di po siya nakadepende sa isang ano—

Sir John Rey: Well, hindi ako ang dapat tanungin mo doon dapat mga panel na nag ano sainyo.

Patrick: So, yun lang po. Thank you po.

Sir John Rey: Thank you.



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Interview Transcript of Ms. Caro

Patrick: Oh, yung ano ma'am... as a professor ng OOP, marami po bang bumabagsak or nahihiapan sa subject niyo?

Ma'am Caro: Marami. Marami. Actually, ngayong sem 'to, four sections ang handle ko siguro kalahati nun ahhh... wala masiyadong alam sa *inaudible*

Patrick: So, kung ipupush namin yun ma'am yung capstone namin makakatulong siya?

Ma'am Caro: Kaya sabi ko nga sainyo diba, i-persist niyo kumbaga nagtuturo kami as teachers makakatulong din yun kasi magagamit namin sakanila kung maganda ang pagkakagawa niyo.

Patrick: Bali relevant po siya nun kung sakali?

Ma'am Caro: Ah doon niyo masasagot... yun ang makakasagot sa research gap niyo kung kakailanganin.

Patrick: Paano po masasabi kung relevant yung website naming na nadefense?

Ma'am Caro: Obviously, ah magiging relevant siya in a way na matututo... ah additional knowledge yun para sa mga bata na fully yung mga tinuturo naming minsan mataas...

Patrick: So, kung ia-assess po yung development website kayo po ba yung mag aano?

Ma'am Caro: Ah depende kung sino yung magtuturo next sem, 'di ko alam kung ako yung magtuturo or yung mga ibang instructor. So, kung sino man yung nagtuturo ngayon na OOP niyo, sila ang mag eevaluate. So, apat yung instructors. Si John Rey Casingal, ako, si Maricris Manaloto, atsaka si Ronnie Delan. Yung dalawa is part time, yung dalawa is full time.



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Patrick: So, bali po sakanila po unang papa-assess yung mga yun?

Ma'am Caro: Ah pag gawa niyo na yung website saka namin ia-assess. Ngayon, yung content na ilalagay niyo doon sa website... you have to ask permission to the dean kung p'wede naming ibigay sainyo yung mga ginagamit naming modules.

Patrick: Yung ano po... yung about po doon p'wede po bang kung sakali hindi po siya yung gamitin namin na content?

Ma'am Caro: Ah sa... ano ang magiging basis niyo?

Patrick: By book po kasi may—

Ma'am Caro: Maraming libro d'yan sa library

Patrick: Opo, yun po kasi yung sinuggest nung panelist namin na—

Ma'am Caro: Na?

Patrick: Yung content daw po i-base naming sa book.

Ma'am Caro: Mas maganda siya kung sa libro galing

Patrick: Kung yun po yung—

Ma'am Caro: Parang dito yung magiging locale niyo...

Patrick: Yes, Ma'am.

Ma'am Caro: Ganon siya, p'wede naman kung papayag si dean, sige. Ah oo, kaya lang you have to ask the permission of ano—the author kung p'wede niyo siyang gamitin i-subissue niyo yun pag gagamitin ninyo.

Patrick: So, mas madali po sa modules nalang?

Ma'am Caro: Ganon din, hihingi din kayo ng permission. So, kapag nakita niyo na yung email address ng author ngayon pa lang i-email niyo na siya. Uh... if we can get some...uh...materials from the owner book to be published on our website ganon ang



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gagawin niyo ha, magsusulat kayo sa author na hihingi kayo ng permission na yung mga portion sasabihin niyo kung anong page...yung kokopyahin niyo at isa-cite niyo siya doon sa website niyo dapat...ganon siya. Okay, from the book of ganito ganyan...

Patrick: Ta's yung sa ano po...sa...ay yung mga topic sa ano ma'am...yung apat na principles—yung abstraction, polymorphism, encapsulation atsaka yung inheritance. Yung mga subtopics po ba ma'am ano po yung *inaudible*

Ma'am Caro: For encapsulation kasi you have to tackle doon kung paano natatago na...kasi pagdating sa OOP dalawa na...dalawang klase yung ginagamit mo ibig sabihin encapsulation na yun itatago mo yung mga variables...uh...using your own program hindi mo siya maa-access directly. So, doon pumapasok yung mga private...ganon yung use niya. Pagdating naman sa inheritance, we have to use minimum of three classes. So, meron tayong parent, child, tapos may *inaudible0* For polymorphism, dalawa 'yon. Meron kayong *inaudible* Ang inheritance, meron din siyang automatic na overriding...basta you're using the same link or class. Ngayon, pag magtatanong kayo baka later on kapag kayo ang gagawa ng code...sino ba ang magaling sainyo mag code ng OOP? Oo, matututo kayo niyan kasi pag-aaralan niyo siya literal. Good luck.

Ma'am Caro: Kailangan makitaan niyo...sabi ko nga tama yung unang tanong niyo. "Marami po bang bumabagsak sa OOP?" Prelim? Yes. Siguro yung mga estudyante ko yung isang class ko kalahati ata sakanila bagsak...kasi...basta may reason behind it. Mahirap naman kasi talagang object-oriented, totoo naman diba?

Patrick: Yes, Ma'am.

Ma'am Caro: Mahirap talaga siya. Ngayon, para makuha niyo yung need niyo doon either magpasurvey kayo sa mga second year...magpasurvey kayo sa mga second year marami yan



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ngayon...uh...by next week kumuha na kayo...magpasurvey kayo na nahihi—uh...are you having difficulty in the subject of OOP? Yes or no mga ganon lang. Atleast makukuha niyo doon sa survey pagdating doon sa defense niyo ng second sem bakit niyo ginawa 'yon? Kasi po nung nagsurvey po kami sa mga second year kailangan po nila ng additional supplementary na teaching—uh...learning pagdating po sa OOP kasi nahirapan sila.

Ma'am Caro: Actually, kakailanganin niyo yung OOP kapag lumabas kayo yung mga shortcut shortcut na ginagawa niyo. Most of them, yung mga back and type doon siya.

Ma'am Caro: Uh...ang tanong sainyo why would you cover third year atsaka fourth year?

Kasi hindi naman sila yung nangangailangan. Second year talaga ang nangangailangan. So, para kapag gumana na yung kuan niyo...program niyo...yung mga incoming na first year pwede naming gamitin na supplement yan para kunwari may kulang kami na naituro or hindi nila naintindihan masyado which is totoo naman pagdating sa classroom magiging additional ano niyo yan teaching aid.

Patrick: Bali po yung focus lang ng content naming yung four principles?

Ma'am Caro: Yun naman talaga kasi, doon umiikot talaga ang OOP dapat alam mo yung encapsulation, inheritance, uh...polymorphism pati abstraction. Yung abstraction hindi masyado pero yung abstraction ginagamit 'yan sa industry.

Ma'am Caro: Actually, p'wede naming gawin yan na supplementary. Kunwari yung may assignment tapos diba may...ano bang balak niyo d'yan for module?

Patrick: Yes, Ma'am.

Ma'am Caro: For module siya?

Patrick: Bawat module may topic.



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Ma'am Caro: Oo, may topic. Actually, may papagawa kayong code d'yan eh afterwards.

Tapos yung pinaka end niyo may mga scores 'yon. Paano yung scoring niyo doon? Who would check yung mga yun?

Patrick: Yung sa scoring, ma'am...uh...gagamit nalang po ba kami ng parang sa...ipo-program nalang po ba naming yun?

Ma'am Caro: Kaya lang, sino magche-check nung mga codes na kunware papasagutan niyo?

Patrick: Yung balak po kasi namin...yung parang sa coding hindi pa siya yung purong coding ng...

Ma'am Caro: Parang i-fifill upan lang niya?

Patrick: Opo.

Ma'am Caro: Medyo mahirap ng konti ah, medyo tingin muna kayo sa mga website kung papano sila nagche-check at yung mga ganon. Kasi yung makikita mo doon sa code academy sa start...madali lang kasi i-fifill in lang nila yung mga lines—

Patrick: ...mga blanks

Ma'am Caro: Oo, kaya lang how would your program check those? Yun yung magiging challenges sainyo pero magiging help naman sainyo yun...makakatulong naman talaga siya. So, ang gawin niyo nalang transcribe niyo nalang po 'yan...ininterview po namin si Ma'am Caro...ganito gan'yan gan'yan...pero dapat hindi lang ako ha? Kahit yung ibang instructor din.

Patrick: Si sir Casingal

Ma'am Caro: Kinausap niyo na siya?

Patrick: Hindi pa po.



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Ma'am Caro: Oh kausapin niyo na muna siya kung pwede siya pero si sir John Rey nalang i-ano ninyo baka mamaya busy yung tao. Basta pumunta kayo doon sa faculty room sabihin niyo ni refer kayo ni Ma'am Caro.

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Appendix D.1

Pre-Survey Questionnaire During Proposal for User's Preference

1. Do you find Object-Oriented Programming (OOP) a challenging subject?
2. I am confident in my understanding in Object-Oriented Programming (OOP)
3. When your professor teaches a topic about OOP, do you usually understand it easily?
4. Do you think an interactive website for learning OOP would help you understand the subject better?
5. Have you used any online resources to help you with OOP?
6. The resources online were effective
7. Do you prefer learning OOP through visuals, reading materials, or interactive exercises?
8. Do you think real-time feedback is important while learning OOP?

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Appendix D.2

Pre-Survey Questionnaire: Familiarity about OOP

Pre-Survey Questions	1 – Very Unfamiliar 2 - Unfamiliar 3 – Somewhat Familiar 4 - Familiar 5 – Very Familiar
1.) I am familiar with the concept of Object-Oriented Programming (OOP)	
2.) I am familiar with the concept of Java and how to use it in code	
3.) I am familiar with the concept of Encapsulation and how to use it in code within Object-Oriented Programming (OOP)	
4.) I am familiar with the concept of Inheritance and how to use it in code within Object-Oriented Programming (OOP)	



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5.) I am familiar with the concept of Polymorphism and how to use it
in code within Object-Oriented Programming (OOP)

6.) I am familiar with the concept of Abstraction and how to use it in
code within Object-Oriented Programming (OOP)

7.) I am familiar with differentiating between classes and objects in
Object-Oriented Programming (OOP)

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Appendix E.1

Post-Survey Questionnaire: With Knowledge in OOP

Post-Survey Questions	1 – Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 – Strongly Agree
1.) The website was helpful for me in gaining new knowledge about the concept of Object-Oriented Programming (OOP)	
2.) The website was helpful for me in gaining new knowledge about the programming language Java	
3.) The website was helpful for me in gaining new knowledge about the concept of Encapsulation and how to implement it in code	
4.) The website was helpful for me in gaining new knowledge about the concept of Inheritance and how to implement it in code	
5.) The website was helpful for me in gaining new knowledge about the concept of Polymorphism and how to implement it in code	



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6.) The website was helpful for me in gaining new knowledge about the concept of Abstraction and how to implement it in code

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Appendix E.2

Post-Survey Questionnaire: Without Knowledge in OOP

Post-Survey Questions	1 – Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 – Strongly Agree
1.) The website helped me build my foundation on the concept of Object-Oriented Programming (OOP)	
2.) The website helped me build my foundation on the concept of the programming language Java	
3.) The website helped me build my foundation on the concept of Encapsulation and how to implement it in code	
4.) The website helped me build my foundation on the concept of Inheritance and how to implement it in code	
5.) The website helped me build my foundation on the concept of Polymorphism and how to implement it in code	



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6.) The website helped me build my foundation on the concept of
Abstraction and how to implement it in code

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Appendix E.3

Post-survey Questionnaire: Performance of the website based on FURPS

FUNCTIONALITY:	1 - Strongly Disagree 2 - Disagree 3 - Neutral 4 - Agree 5 - Strongly Agree
7.) Objectiva's lessons, quizzes, and exercises function properly.	
8.) Objectiva's interactive features respond correctly when I use them.	
9.) Objectiva provides all the features I expect from a learning website.	
USABILITY	
11.) Objectiva is easy to navigate and understand.	
12.) Objectiva's layout and design make it user-friendly.	



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13.) Objectiva's interactive features is engaging and helpful	
RELIABILITY	
14.) Objectiva runs smoothly without unexpected crashes.	
15.) Objectiva rarely has errors or bugs.	
16.) Objectiva works consistently without needing frequent refreshes.	
PERFORMANCE	
17.) Objectiva loads quickly on my device.	
18.) Objectiva's images, animations, and page navigation load smoothly.	
19.) Objectiva performs well even with multiple tabs or sections open.	
SUPPORTABILITY	
20.) Objectiva is compatible with different web browsers.	
21.) Objectiva's layout and structure suggest that new features can be added smoothly.	

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22.) Objectiva can be updated without negatively affecting existing features.

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Appendix E.4

Post-Survey Questionnaire: Performance of the website based on ISO 25010

FUNCTIONAL SUITABILITY		1 - Strongly Disagree 2 - Disagree 3 - Neutral 4 - Agree 5 - Strongly Agree
Objectiva provides all the essential functionalities expected from an interactive learning website		
Objectiva includes comprehensive features that enhance the learning experience		
Objectiva performs the required tasks accurately and consistently		
PERFORMANCE EFFICIENCY		
Objectiva efficiently loads media elements (e.g., images) without buffering		
Objectiva minimizes loading delays when switching between lessons, quizzes, and exercises		
Objectiva loads quickly and responds smoothly during use		



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COMPATIBILITY	
Objectiva works correctly on multiple browsers (Chrome, Firefox, Safari, Edge, etc.)	
Objectiva works seamlessly on both desktop and mobile devices	
Objectiva's fonts, colors, and graphical elements render correctly across various screen sizes	
USABILITY	
Objectiva's design is visually appealing and user-friendly	
Objectiva ensures that buttons, links, and interactive elements are easily clickable and well-placed	
Objectiva's interface is structured in a way that makes learning easy and seamless	
SECURITY	
Objectiva's security features are reliable and effective	
Objectiva ensures that passwords and sensitive user data are encrypted and stored securely	
Objectiva has strong measures to prevent unauthorized access	

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RELIABILITY	
Objectiva operates without frequent crashes or errors	
Objectiva ensures that completed quizzes, exercises, and progress data are not lost unexpectedly	
Objectiva maintains stable performance over extended periods of use	
MAINTAINABILITY	
Objectiva is easy to update and modify	
Objectiva system structure allows for efficient debugging and enhancements	
Objectiva documentation supports future maintenance and improvements	
PORTABILITY	
Objectiva can be easily moved to a different hosting environment	
Objectiva can be exported or backed up without difficulties	
Objectiva can be easily integrated with other services or applications	

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Appendix F

OOP Professors Feedback

Questions	Answer
Do you find the content of the lessons accurate and aligned with standard OOP principles in Java? (Yes or No, If "Yes" and "No", Why?)	Yes Yes, if you are talking of basic standard principles of OOP but if you'll cover the core principles, Coupling, Association, Aggregation and Composition should be included.
	Yes
Are there any important OOP concepts that are missing or need further elaboration? (Yes or No, If "Yes" or "No", Why?)	No, most of the essential components are present. Yes, you could include Coupling, Association, Aggregation and Composition.
	No
Is the explanation of each OOP principle clear and easy to understand for students? (Yes or No, If "Yes" and "No", Why?)	Yes Yes Yes
	No, all terminologies and concepts are well defined and explained with examples.
Are there any technical terms or concepts that need better clarification or simpler explanations? (Yes or No, If "Yes" or "No", Why?)	Yes, there are few topics to be added like for example, Interface can be used on the definition of what the object can do (behaviors) and Abstract can be used on general classifications (categories). And among others.....
	Yes, need more elaboration on lesson
Are the provided code examples and explanations appropriate and relevant for students learning OOP? (Yes or No, If "Yes" and "No", Why?)	Yes, the important keywords are well defined. This principle. There are some items and codes in the exercises that are answered correctly but the system treats it incorrect.

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Need more difficult lesson

Do you have any additional feedback Yes, if possible provide an example that is separated or suggestions to improve the lessons from the main class, parent class, sub class.
of the website? (Yes or No, If "Yes" or "No", Why?)

Kindly proofread it as well, there are discussions that are hanging and needed to add more details and misspells.

Need more difficult lesson

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Appendix G

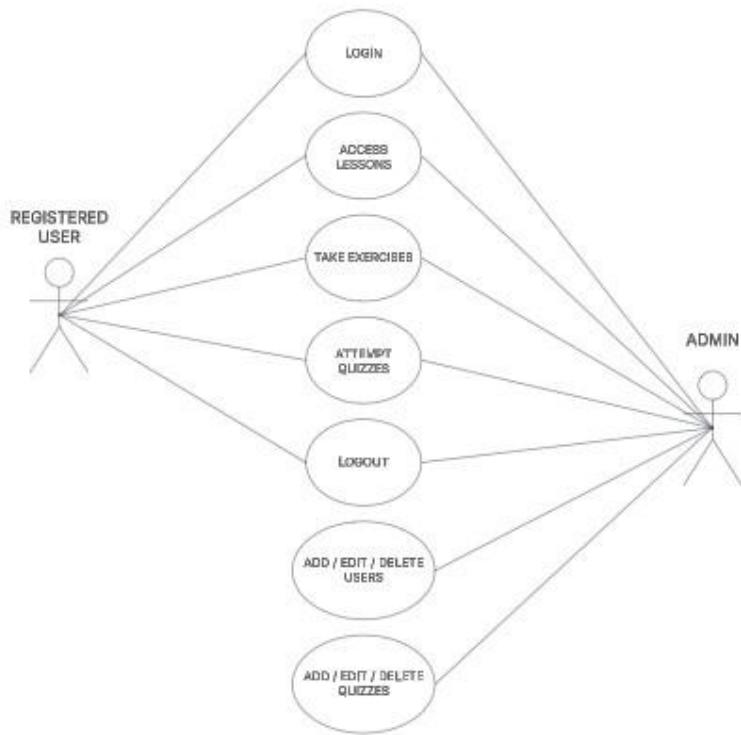
IT Experts Feedback

IT Expert	Feedback
IT Expert 1	Exit Quiz has no validation. What if I panic and I suddenly click the exit quiz
IT Expert 2	I think that Objectiva is a well-put-together website that allows its users to learn about objective-oriented programming and other related topics in a fun and interactive way. The website's design displays a unique environment that is easy to understand and content that is easier to digest. The issues that were present were minor and were quickly identified and fixed by the developers. My suggestions are that they integrate more ways to create a better experience for the user in terms of UI/UX improvement, but currently it is already easy to navigate as is. Good job to the developers.
IT Expert 3	Further comments has been shared with the developers through a different channel.
IT Expert 4	<ul style="list-style-type: none">-make the register and log in minimum 8 characters-icon in the log in page-issue in the exercises-issue in account settings-try to put show answer in exercises Well-designed

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Appendix H

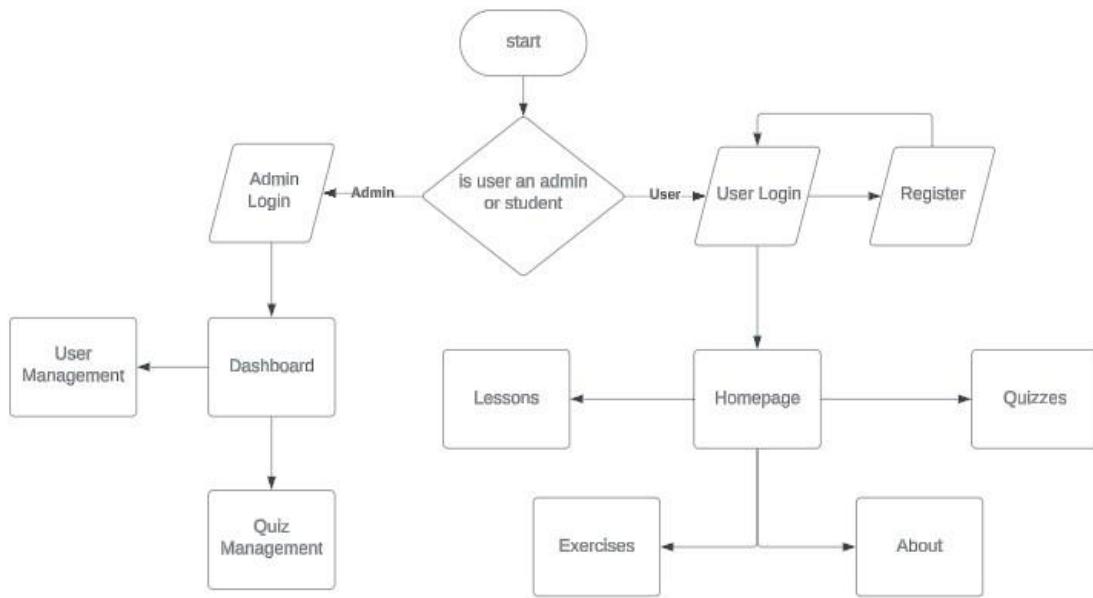
Use Case Diagram



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Appendix I

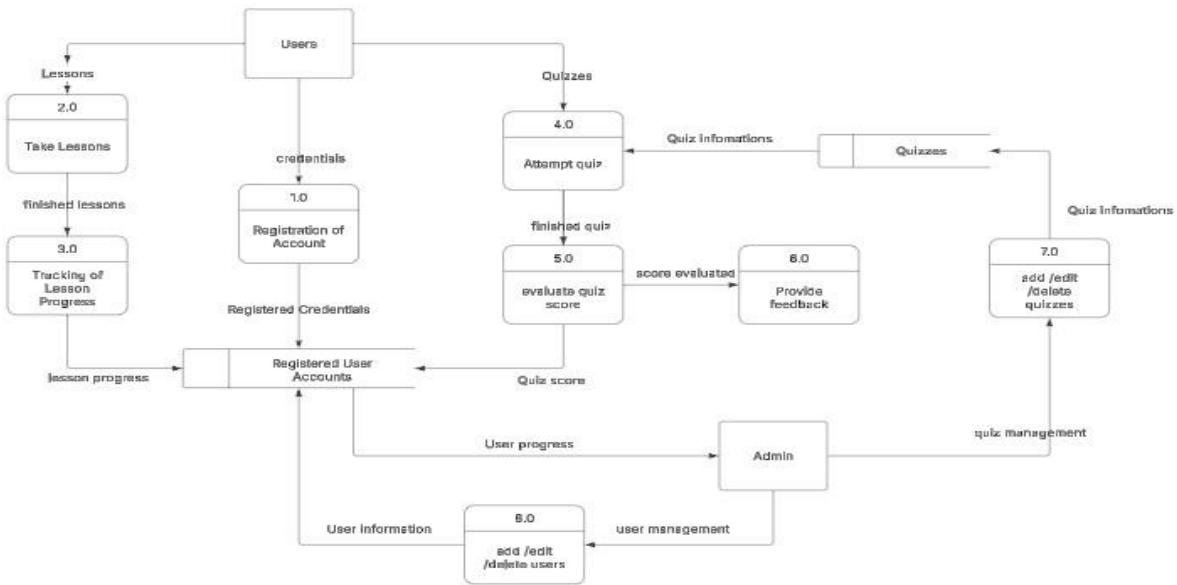
Flow Chart



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Appendix J

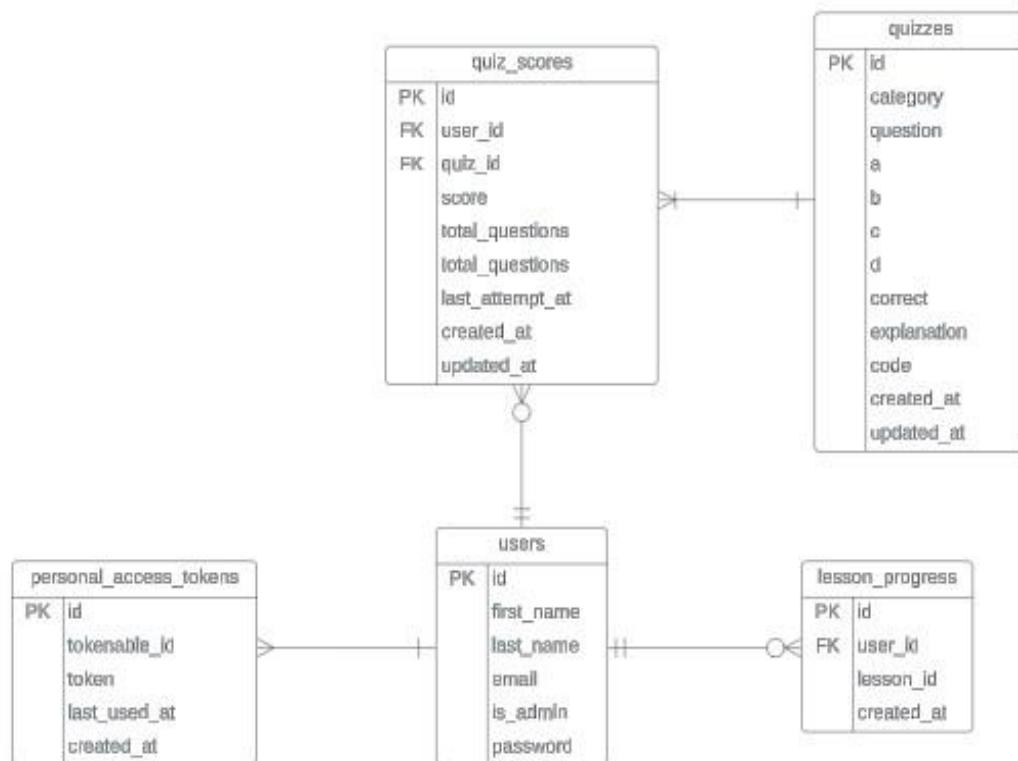
Data Flow Diagram



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Appendix K

Entity Relationship Diagram



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Appendix L

Data Dictionary

Table Name: users

Field Name	Data Type	Description	Key
id	INT	Unique identifier for the user	PK
first_name	VARCHAR	User's first name	
last_name	VARCHAR	User's last name	
email	VARCHAR	User's email address	
is_admin	BOOLEAN	Flag to indicate if user is admin	
password	VARCHAR	User's password (hashed)	

Table Name: quizzes

Field Name	Data Type	Description	Key
id	INT	Unique identifier for the quiz	PK



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category	VARCHAR	Category of the quiz question	
question	TEXT	Quiz question text	
a	VARCHAR	Option A	
b	BOOLEAN	Option B	
c	VARCHAR	Option C	
d	VARCHAR	Option D	
correct	CHAR(1)	Correct answer (a, b, c, or d)	
explanation	TEXT	Explanation for the answer	
code	TEXT	Optional code snippet (if applicable)	
created_at	DATETIME	Creation timestamp	
updated_at	DATETIME	Last update timestamp	

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Table Name: quiz_scores

Field Name	Data Type	Description	Key
id	INT	Unique identifier for the score entry	PK
user_id	INT	User who took the quiz (FK to users)	FK
quiz_id	INT	Quiz attempted (FK to quizzes)	FK
score	INT	Score obtained in the quiz	
total_questions	INT	Total number of questions in the quiz	
last_attempt_at	DATETIME	Last attempt timestamp	
created_at	DATETIME	Record creation timestamp	
updated_at	DATETIME	Last update timestamp	



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Table Name: lesson_progress

Field Name	Data Type	Description	Key
id	INT	Unique identifier for the score entry	PK
user_id	INT	User who progressed (FK to users)	FK
lesson_id	INT	ID of the lesson completed	
created_at	DATETIME	Timestamp when the progress was recorded	

Table Name: personal_access_tokens

Field Name	Data Type	Description	Key
id	INT	Unique identifier for the token	PK
tokenable_id	INT	User who progressed (FK to users)	



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token	VARCHAR	ID of the lesson completed	
last_used_at	DATETIME	Timestamp of when the token was last used	
created_at	DATETIME	Timestamp of when the token was created	

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Appendix M

Implementation Plan

ACTIVITIES	DURATION	PERSON INVOLVED
Gathering insights from a professor	1 day	Researchers, Professor
Design and development phase	4 Months	Researchers
Content Validation to the Professors	4 days	Researchers, Professor
Pre and Post Survey with Students and Experts	1 Month	Researchers, Professor, Students, IT Experts
Registering of domain name	1 day	Researchers
Hosting of the website	1-3 days	Researchers

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Appendix N

Gantt Chart

TASKS	NOVEMBER				DECEMBER				JANUARY				FEBRUARY			
	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 1	WEEK 2	WEEK 3	WEEK 4
Coding the frontend of login page			DONE													
Coding the frontend of the homepage				DONE												
Coding the structure of the website such as header & navigation			DONE	DONE												
Creating the list of lessons			DONE	DONE												
Creating the content of introduction lesson part				DONE												
Coding the UI of overview of each lessons and topics					DONE											
Coding the content of the introduction lesson part						DONE										
Creating the content of the inheritance lesson part							DONE									
Creating the content of the polymorphism lesson part								DONE								
Creating the content of the abstraction lesson part									DONE							
Creating the content of the encapsulation lesson part										DONE						
Coding the content of the inheritance lesson part											DONE					
Coding the content of the polymorphism lesson part												DONE				
Coding the content of the abstraction lesson part													DONE			
Coding the content of the encapsulation lesson part														DONE		
Creating the content of the introduction quiz page														DONE		
Creating the content of the inheritance quiz page															DONE	
Creating the content of the abstraction quiz page															DONE	
Creating the content of the encapsulation quiz page																DONE
Creating the content of the polymorphism quiz page																
Include progress tracker on the lesson page																
Added the jwtauthentication																
Coding the content of the introduction quiz page																
Coding the content of the inheritance quiz page																
Coding the content of the abstraction quiz page																
Coding the content of the encapsulation quiz page																
Coding the content of the polymorphism quiz page																
Include feedback on the quiz page																
Coding the exercises layout																
Creating the content of the inheritance exercise page																
Creating the content of the abstraction exercise page																
Creating the content of the encapsulation exercise page																
Creating the content of the polymorphism exercise page																
Coding the content of the inheritance exercise page																
Coding the content of the abstraction exercise page																
Coding the content of the encapsulation exercise page																
Coding the content of the polymorphism exercise page																
Added the account settings																
Added admin and superadmin																
Presented the website before recommendation																
Asked OOP professors to validate our content																
Hosting the website																



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Appendix O

Hardware Specifications

HARDWARE	DESCRIPTION
Processor	Intel(R) Core(TM) i7-7700HQ CPU @ 2.80GHz (8 CPUs), ~2.8GHz
RAM	16.0GB
System Type	64-bit operating system, x64-based processor
Monitor	15.6, 60hz monitor
Others	Keyboard, mouse, flash drive and printer

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Appendix P

Software Specifications

SOFTWARE	DESCRIPTION
Operating System	Windows 10
Back-end Development	PHP-Laravel
Front-end Development	Angular
Database	MySQL
Web Server	XAMPP / PHP built-in-server
Web Hosting	Hostinger
Text Editors	Visual Studio Code
Internet Browsers	Mozilla Firefox, Google Chrome, and Microsoft Edge

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Appendix Q

Likert Scale

Level of Agreement	Likert Scale
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

Level of Familiarity	Likert Scale
Very Unfamiliar	1
Unfamiliar	2
Somewhat Familiar	3
Familiar	4
Very Familiar	5

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Appendix R

Role-based Access Control

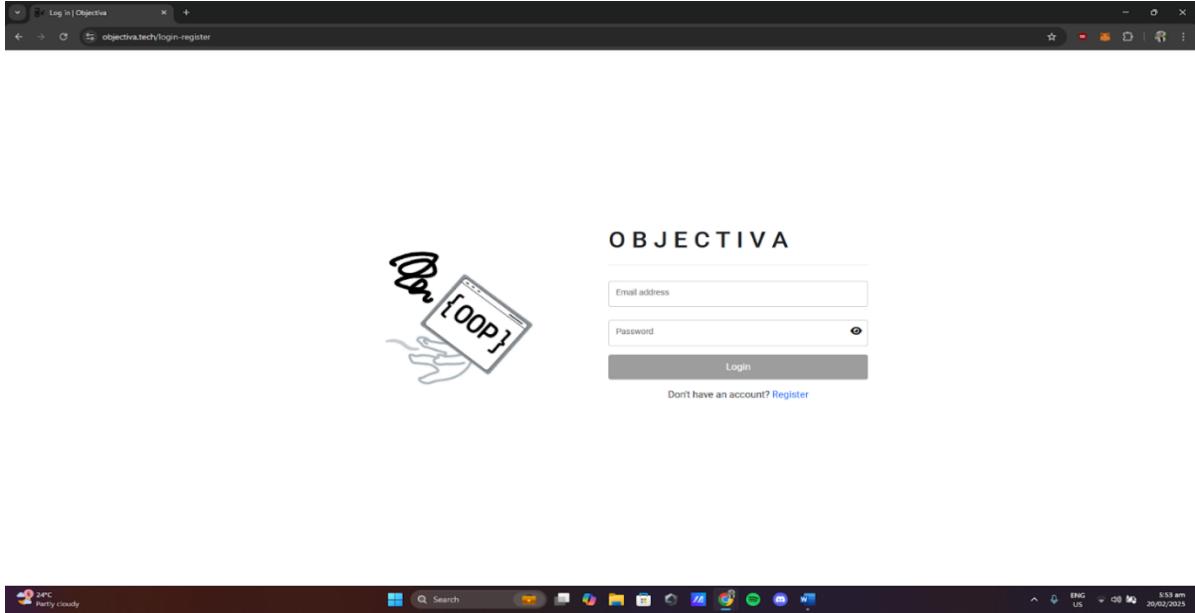
Role	Access Lessons	Access Exercises	Access Quizzes	Manage Users	Manage Quiz Content	Manage Lessons	Manage Exercises
User	✓	✓	✓	✗	✗	✗	✗
Admin	✓	✓	✓	✓	✓	✗	✗
Superadmin	✓	✓	✓	✓	✓	✓	✓

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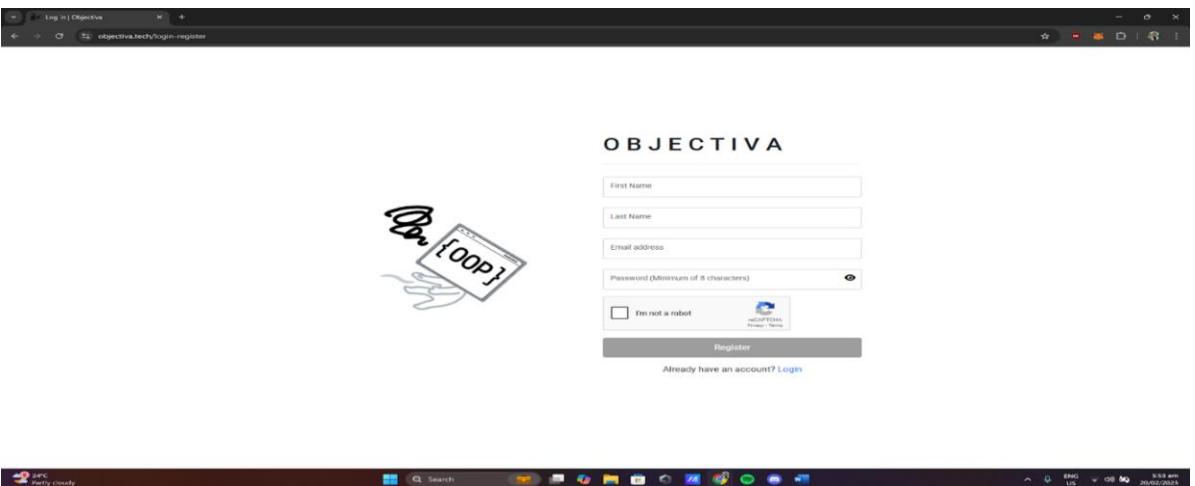
Appendix S

Official Website

Login Page-If the user has already created an account, he can already log in his/her credentials.

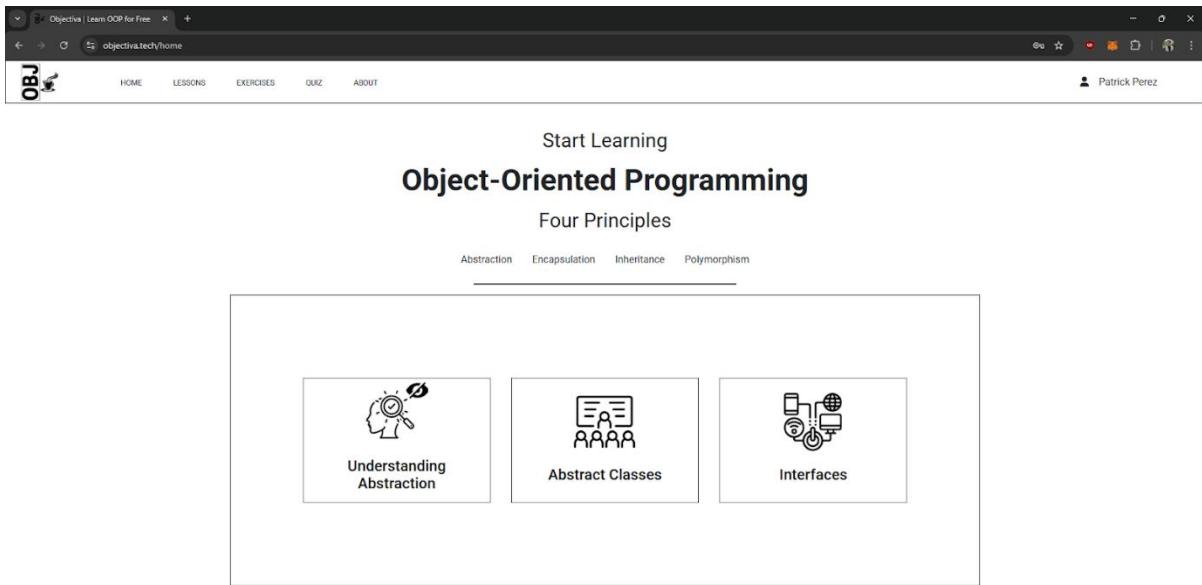


Register Page- This is where the user can register his/her account.

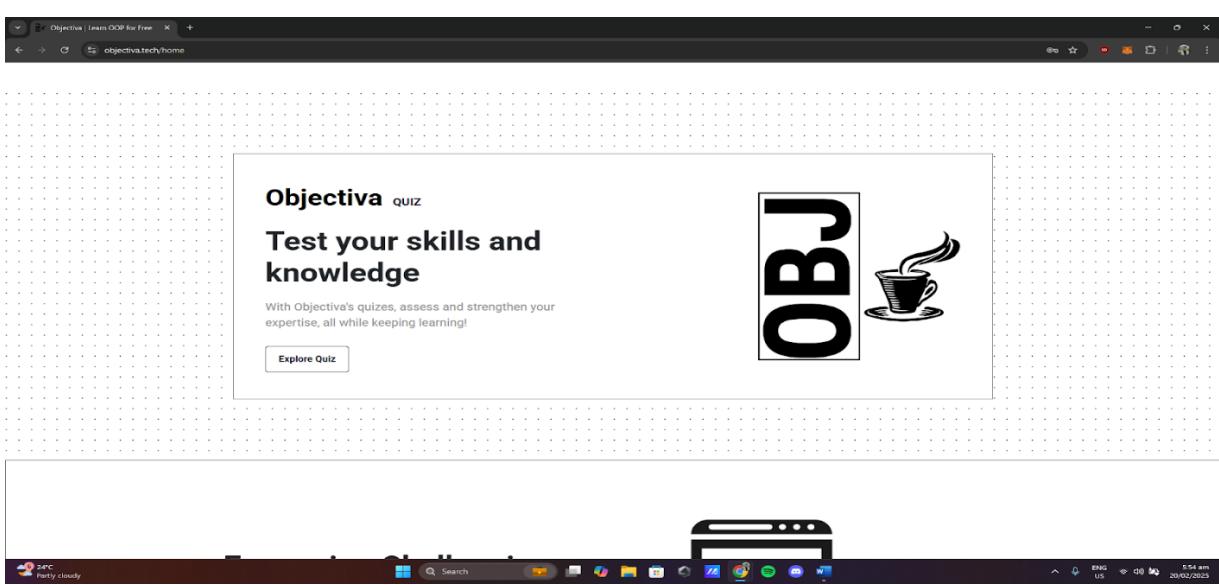


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Homepage- This is the overview of our lessons page where the user can see the four principles and the sample lessons that are inside of it.

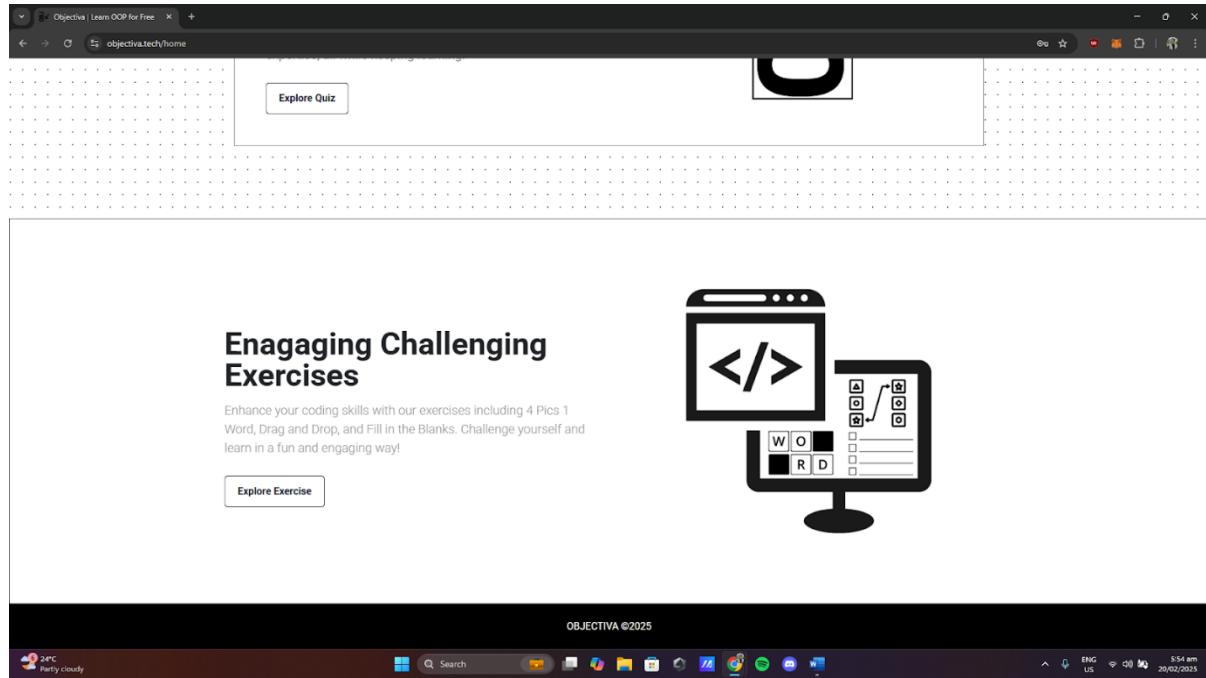


Homepage- This is the overview of our quiz page where the user can click “Explore Quiz” to be redirected to the Quizzes.

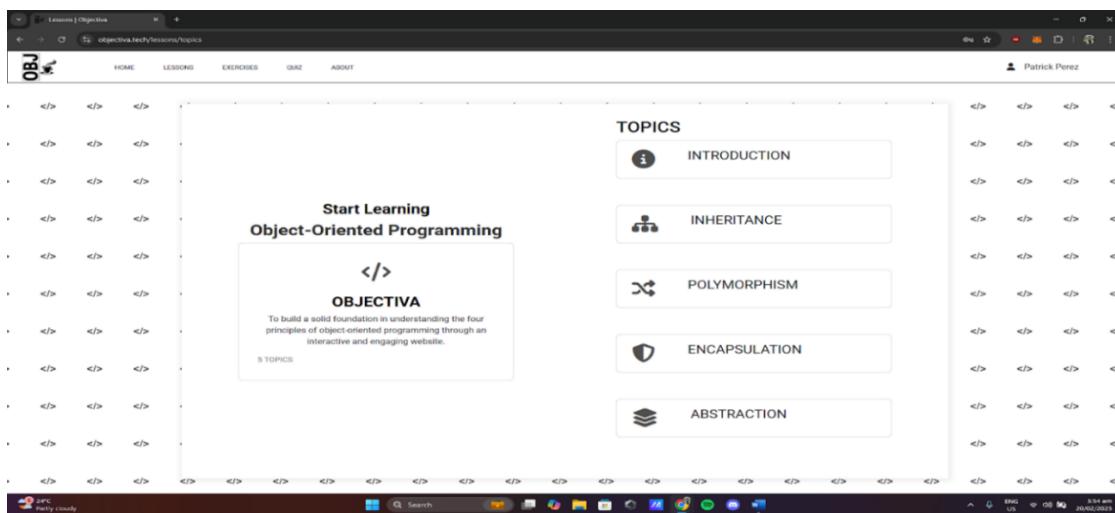


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Homepage- This is the overview of our exercises page where the user can click the “Explore Exercises” to be redirected to the Exercises.



Lesson Section- When the user clicked the lessons on the navbar they will be redirected to this page where they can see the different lessons the website has to offer starting from introduction followed by the four principles of OOP.



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Introduction Topics- These are the lessons under the introduction page and below each of the lesson title is the progress of each user.

The screenshot shows the 'INTRODUCTION' section of the Objectiva.tech platform. It features a grid of eight cards, each representing a lesson:

- Introduction to Object-Oriented Programming**: Click to view lesson. Progress: 80% (green circle).
- Understanding Object and Classes**: Click to view lesson. Progress: 100% (green circle).
- Introduction to Java**: Click to view lesson. Progress: 100% (green circle).
- Basic OOP Concepts in Java**: Click to view lesson. Progress: 100% (green circle).
- Class Structure and Access**: Click to view lesson. Progress: 100% (green circle).
- Basic Object-Oriented Design**: Click to view lesson. Progress: 100% (green circle).
- Java Class Libraries Overview**: Click to view lesson. Progress: 100% (green circle).
- Object Interactions**: Click to view lesson. Progress: 100% (green circle).

Lesson Overview- When the user clicks the lesson title they will be redirected to the overview of that topic and what topics the user will learn in this lesson.

The screenshot shows the 'Introduction to Object-Oriented Programming' lesson overview page. It includes the following sections:

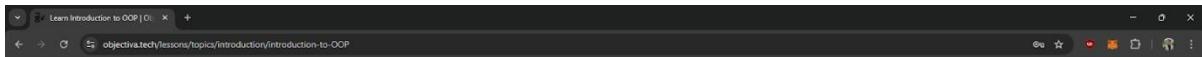
- Introduction to Object-Oriented Programming**: A brief description of the lesson.
- Start Lesson**: A button to begin the lesson.
- Instructions**: A box containing instructions: "Click  to go to the next step or topic, and  to finish the lesson."
- WHAT YOU WILL LEARN IN THIS LESSON?**: Three sub-topics:
 - What is Programming?**: Understanding the basic concepts.
 - What is Object-Oriented Programming?**: Learn about classes, objects.
 - Why Choose OOP / Benefits of OOP**: Explore why OOP is a powerful.

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Lesson Content- Each lesson contains visual depictions of what the lesson is about.

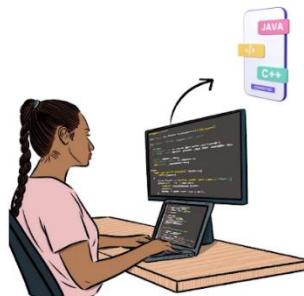


Lesson Content- Each lesson contains visual depictions of what the lesson is about.



What is Programming?

Programming is the process of writing instructions for a computer to follow or creating a computer program.



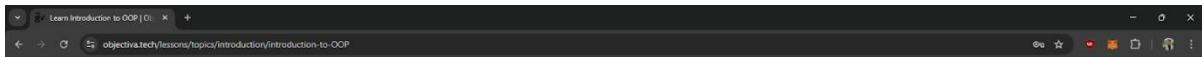
It is used to solve problems and automate computational processes.

There is a classification, style or way of programming that is called **programming paradigms**. It is an approach to solve problems by using programming languages.



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Lesson Content- Each lesson contains visual depictions of what the lesson is about.

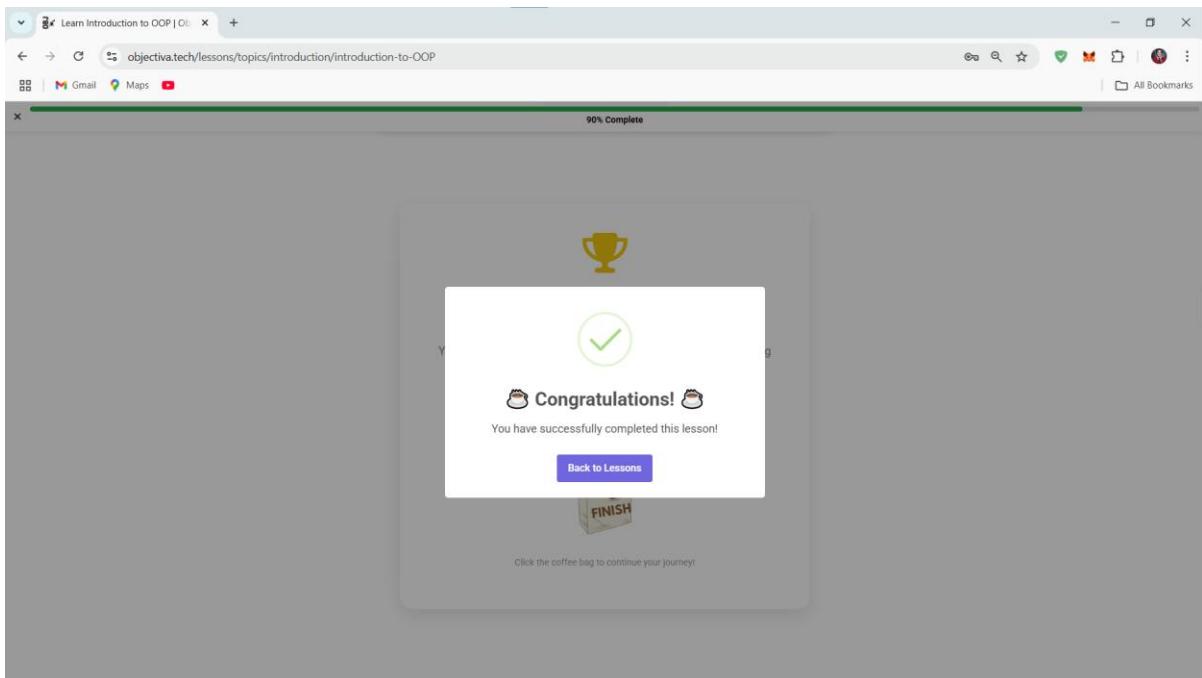


Imagine a car as an object in OOP. The **CAR** class would define the common attributes and behaviors that all cars have, like make, model, color, and the ability to start, accelerate, and brake.

From this **CAR** class blueprint, you can create specific car objects, like a **Honda Civic** or **Toyota Corolla**. Each of these car objects would have their own unique values for the attributes, like **red** for their **color** and **2003** for their **model year**, but they would all share the same underlying car-related capabilities in the class.



Completed the certain lesson- This is what will pop-up if the user clicked the “Finish” button



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Inheritance Topics- These are the lessons under the inheritance page and below each of the lesson title is the progress of each user.

The screenshot shows a web browser window titled "Learn Inheritance | Objectiva". The URL is "objectiva.tech/lessons/topics/inheritance". The page header includes links for HOME, LESSONS, EXERCISES, QUIZ, and ABOUT, and a user profile for Patrick Perez. The main content area is titled "INHERITANCE" and contains five cards with progress indicators:

- Understanding Inheritance**: Click to view lesson. Progress: 100% (green circle).
- Single Inheritance**: Click to view lesson. Progress: 100% (green circle).
- Types of Inheritance in Java**: Click to view lesson. Progress: 100% (green circle).
- Method Overriding**: Click to view lesson. Progress: 0% (grey circle).
- Advanced Inheritance Concepts**: Click to view lesson. Progress: 0% (grey circle).
- Implementation in Java**: Click to view lesson. Progress: 100% (green circle).

Polymorphism Topics- These are the lessons under the polymorphism page and below each of the lesson title is the progress of each user.

The screenshot shows a web browser window titled "Learn Polymorphism | Objectiva". The URL is "objectiva.tech/lessons/topics/polymorphism". The page header includes links for HOME, LESSONS, EXERCISES, QUIZ, and ABOUT, and a user profile for Patrick Perez. The main content area is titled "POLYMORPHISM" and contains six cards with progress indicators:

- Understanding Polymorphism**: Click to view lesson. Progress: 0% (grey circle).
- Compile-time Polymorphism (Static)**: Click to view lesson. Progress: 0% (grey circle).
- Runtime Polymorphism (Dynamic)**: Click to view lesson. Progress: 0% (grey circle).
- Advanced Polymorphic Concepts**: Click to view lesson. Progress: 0% (grey circle).
- Polymorphism with Interfaces**: Click to view lesson. Progress: 0% (grey circle).
- Implementation in Java**: Click to view lesson. Progress: 0% (grey circle).

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Encapsulation Topics- These are the lessons under the encapsulation and below each of the lesson title is the progress of each user.

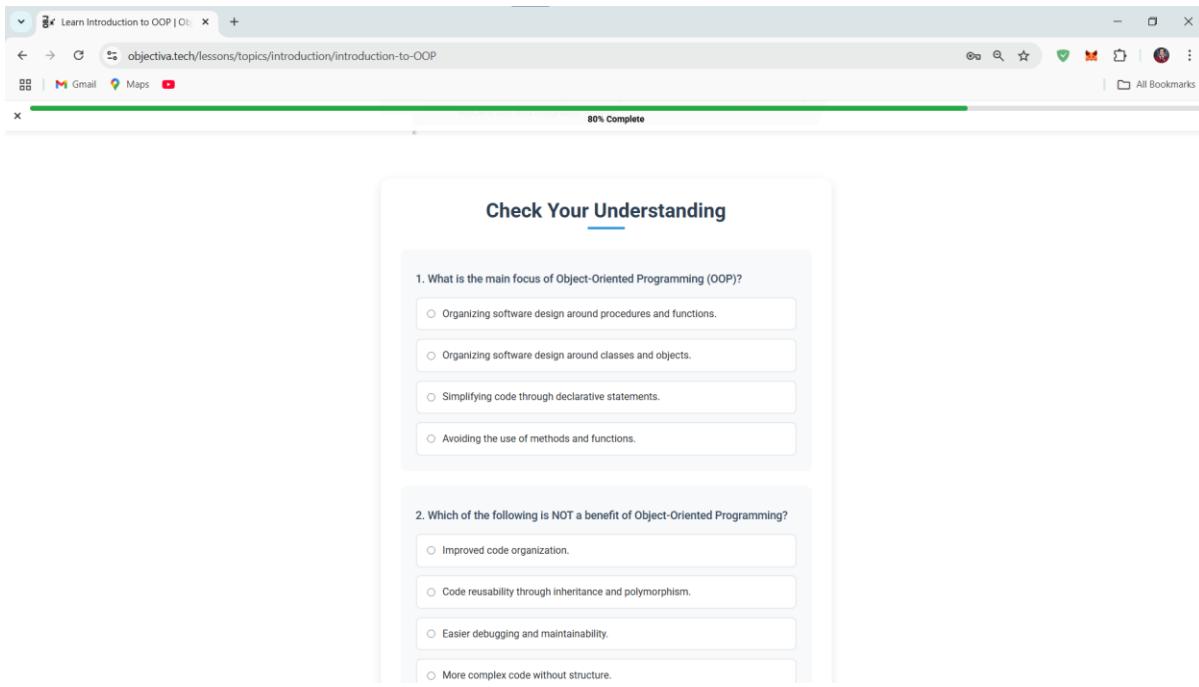
The screenshot shows the 'Learn Encapsulation' section of the Objectiva tech website. At the top, there's a navigation bar with links for HOME, LESSONS, EXERCISES, QUIZ, and ABOUT. A user profile for 'Patrick Perez' is visible on the right. Below the navigation, the word 'ENCAPSULATION' is centered in bold capital letters. Underneath, there are four cards representing different sub-topics: 'Understanding Encapsulation' (progress 100%, icon of a shield), 'Access Modifiers' (progress 0%, icon of a key), 'Getters and Setters' (progress 0%, icon of a wrench), and 'Data Validation' (progress 0%, icon of a checkmark). Each card has a 'Click to view lesson' link. The background features a light gray grid pattern.

Abstraction Topics- These are the lessons under the abstraction page and below each of the lesson title is the progress of each user.

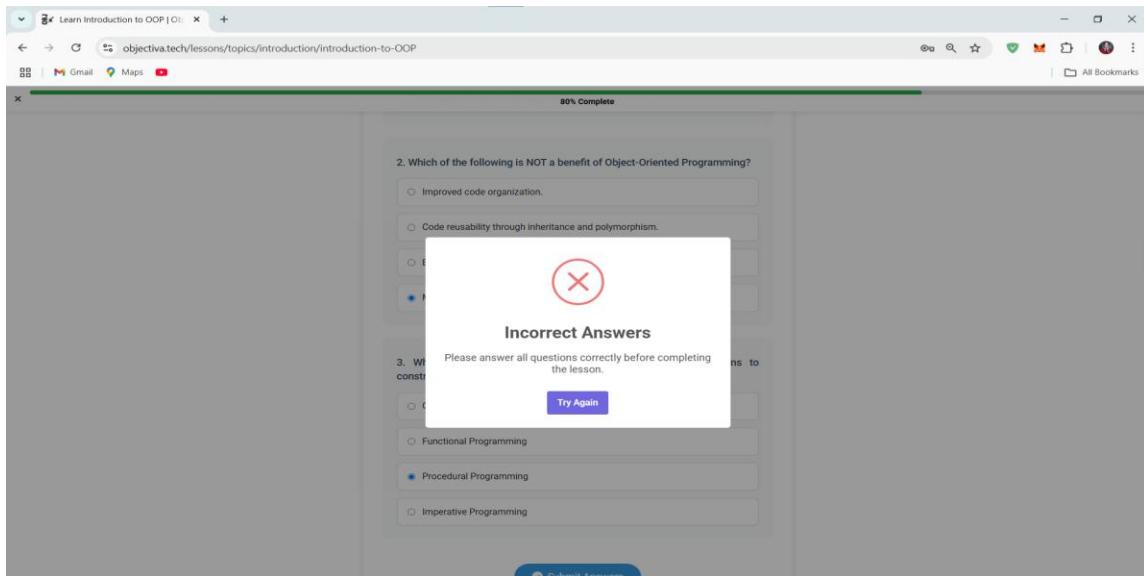
The screenshot shows the 'Learn Abstraction' section of the Objectiva tech website. The layout is identical to the Encapsulation page, with a navigation bar, user profile, and a central 'ABSTRACTION' heading. Below it are four cards for abstraction topics: 'Understanding Abstraction' (progress 100%, icon of a lightbulb), 'Abstract Classes' (progress 0%, icon of a person), 'Interfaces' (progress 0%, icon of gears), and 'Implementation in Java' (progress 0%, icon of a coffee cup). Each card includes a 'Click to view lesson' link. The background features a light gray grid pattern.

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Check your understanding after each lesson- After each section of the lesson there is a check your understanding to assess whether the user learned something.

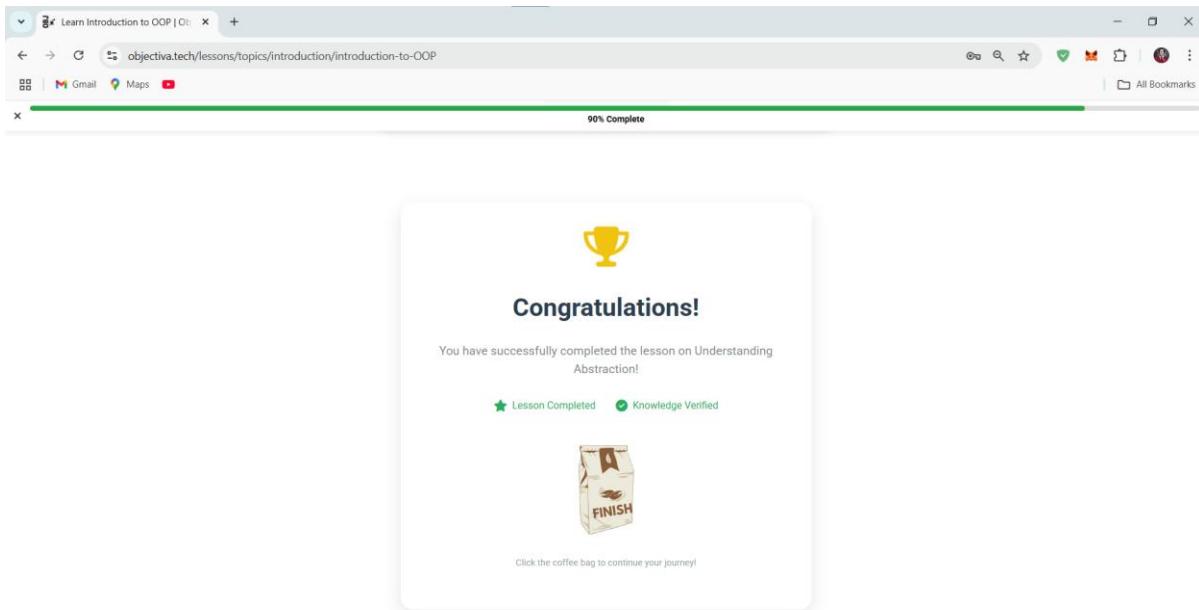


Check your understanding (if incorrect)- This will pop-up if the students answer in the check your understanding section is wrong.

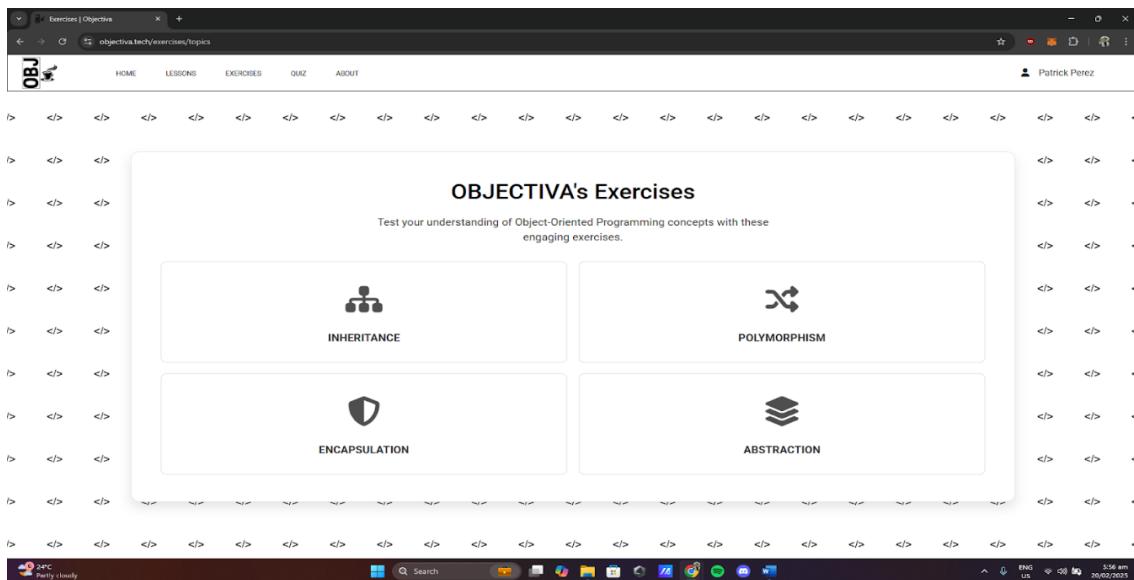


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Check your understanding (correct)- This will pop-up if the students answer in the check your understanding section are correct.

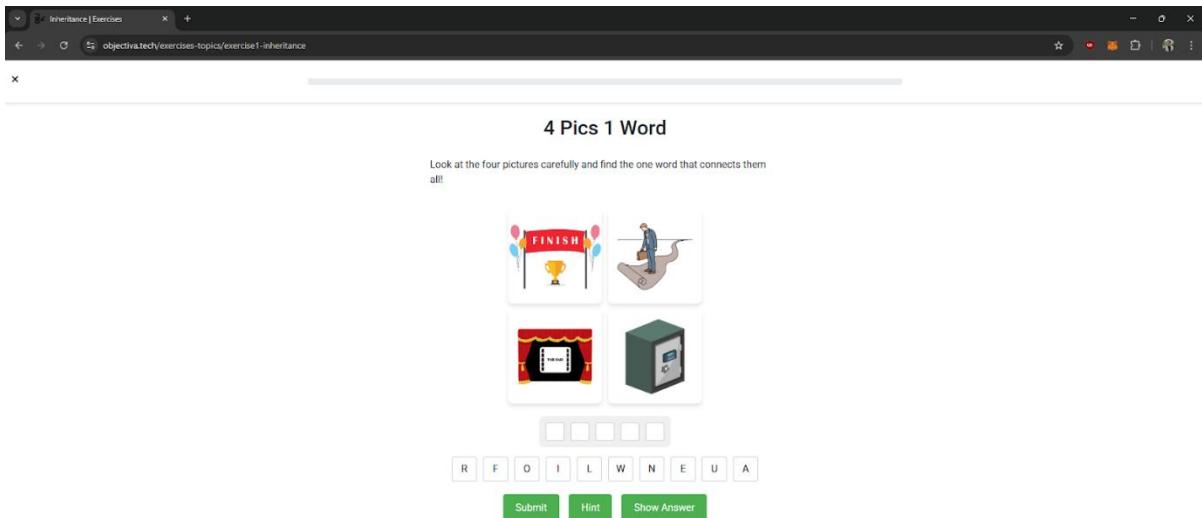


Exercises Section- This is where the user will be redirected when he/she clicked the “Exercises” in the navbar which consist of the exercises under the four principles of OOP.

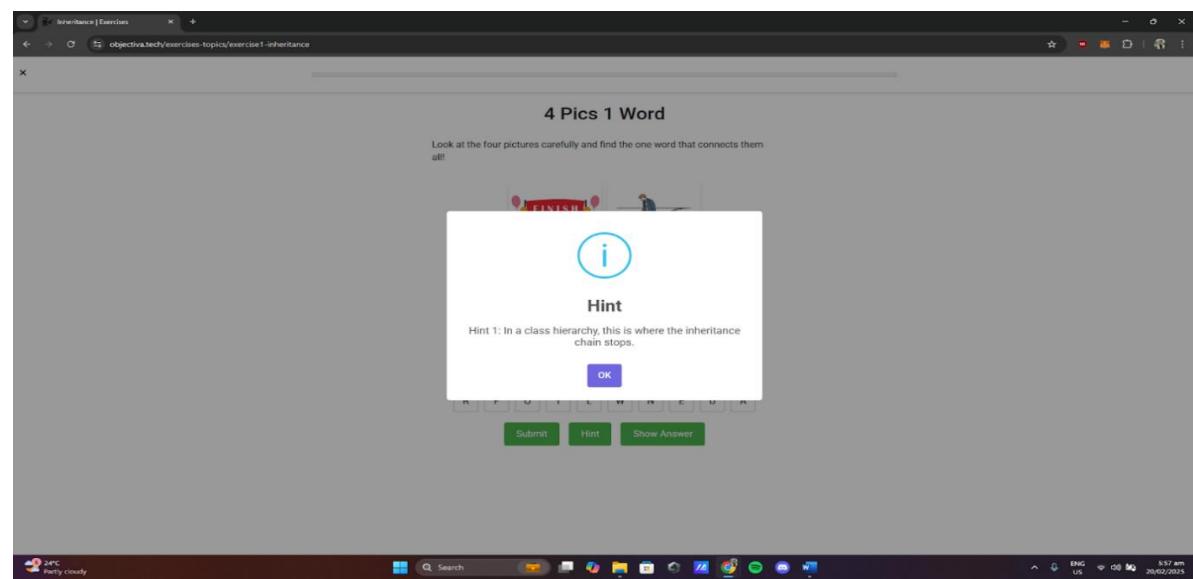


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Exercise Content (4 pics 1 word)- This is what it looks like when the user clicked one of the exercises. The one in the example is a 4 pics 1 word exercise.

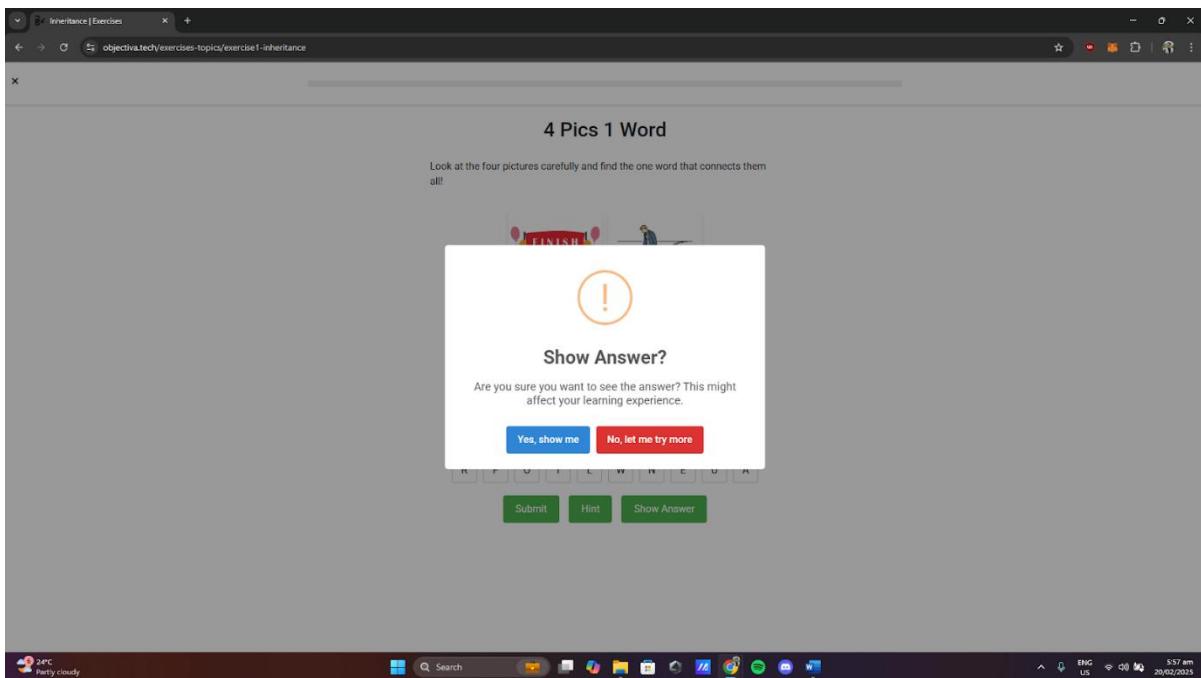


Exercise Hint- This will pop-up if you clicked the “Hint” button which will serve as a guide to help you answer the exercise.

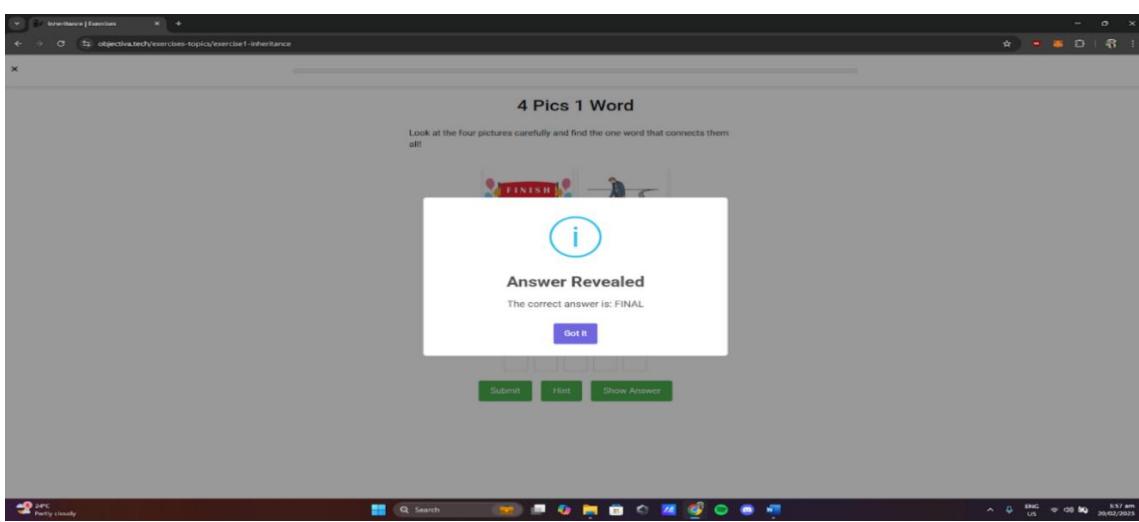


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Exercise Show Answer- This will pop-up if you clicked the “Show Answer” button which shows the user two more button which is the “Yes, show me” which will show the answer and “No, let me try more” if the user want to try more.

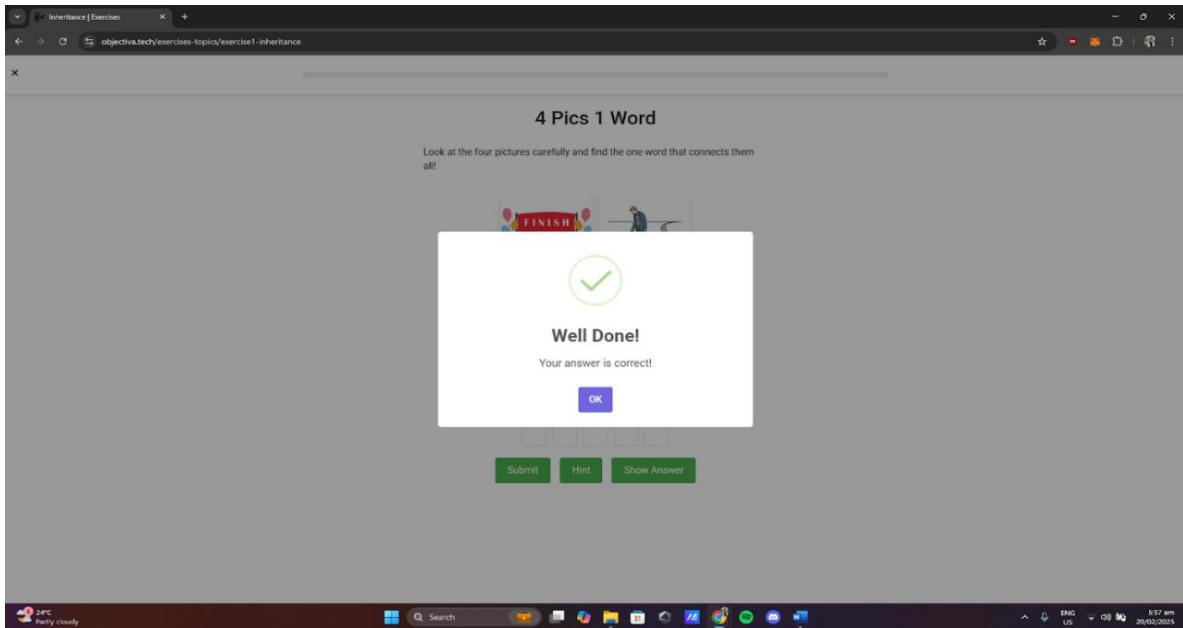


Exercise Show Answer- This is what it looks like if the user clicked the “Show Answer” and chose “Yes, show me”.

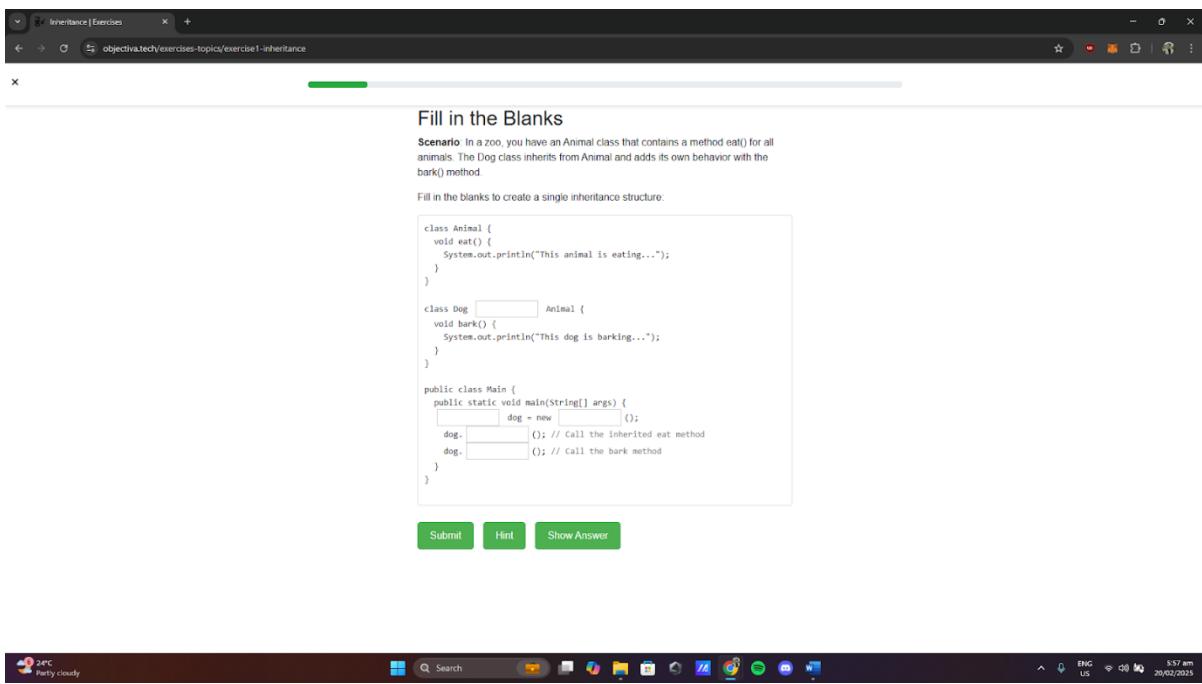


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Exercise (Correct Answer)- This is what will pop-up if the user got the correct answer.



Exercise Content (Fill in the blanks)- This is what it looks like when the user clicks one of the exercises. The one in the example is a fill in the blanks exercise.



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Exercise Content (Fill in the blanks)- This is what it looks like when the user clicks one of the exercises. The one in the example is a fill in the blanks exercise.

The screenshot shows a Java code editor window titled "Inheritance | Exercises". The URL in the address bar is "objective.tech/exercises-topics/exercise1-inheritance". The main content area is titled "Fill in the Blanks". It contains a scenario: "In a zoo, you have an Animal class that contains a method eat() for all animals. The Dog class inherits from Animal and adds its own behavior with the bark() method." Below the scenario is a code snippet with several blank fields for the user to fill in:

```
class Animal {  
    void eat() {  
        System.out.println("This animal is eating...");  
    }  
  
    class Dog extends Animal {  
        void bark() {  
            System.out.println("This dog is barking...");  
        }  
  
        public class Main {  
            public static void main(String[] args) {  
                Dog dog = new Dog();  
                dog.eat(); // Call the inherited eat method  
                dog.bark(); // Call the bark method  
            }  
        }  
}
```

At the bottom of the code editor are three buttons: "Submit", "Hint", and "Show Answer".



Exercise Content (Drag and drop)- This is what it looks like when the user clicks one of the exercises. The one in the example is a drag and drop exercise.

The screenshot shows a Windows desktop environment with a taskbar at the bottom. The main window is titled "Inheritance | Exercises" and has the URL "objective.tech/exercises-topics/exercise2-inheritance". The title of the content area is "Match OOP Concepts with Definitions". It lists three types of inheritance with corresponding drop zones:

- Type of inheritance where the class inherits from only one parent class.
Drop here
- Type of inheritance where one class is inherited by multiple subclasses.
Drop here
- Type of inheritance where a class inherits from another, and the second class is inherited by a third class, forming a chain.
Drop here

To the right of these drop zones is a "Type Of Inheritance" column with four options:

- Hierarchical Inheritance
- Multiple Inheritance
- Multilevel Inheritance
- Single Inheritance

At the bottom of the window are four buttons: "Submit", "Hint", "Reset", and "Show Answer".



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Exercise Content (Drag and drop)- This is what it looks like when the user clicks one of the exercises. The one in the example is a drag and drop exercise.

The screenshot shows a web-based exercise titled "Match OOP Concepts with Definitions". The exercise involves dragging concepts from a list on the left to their corresponding definitions on the right. The concepts listed are: "Type of inheritance where the class inherits from only one parent class.", "Type of inheritance where one class is inherited by multiple subclasses.", and "Type of inheritance where a class inherits from another, and the second class is inherited by a third class, forming a chain.". The definitions listed are: "Hierarchical Inheritance", "Multiple Inheritance", and "Multilevel Inheritance". Below the definitions is a note stating: "This type of inheritance is not supported in Java to avoid ambiguity and complexity when inheriting methods with the same name but different implementations from multiple classes.". At the bottom of the page are four buttons: "Submit", "Hint", "Reset", and "Show Answer".

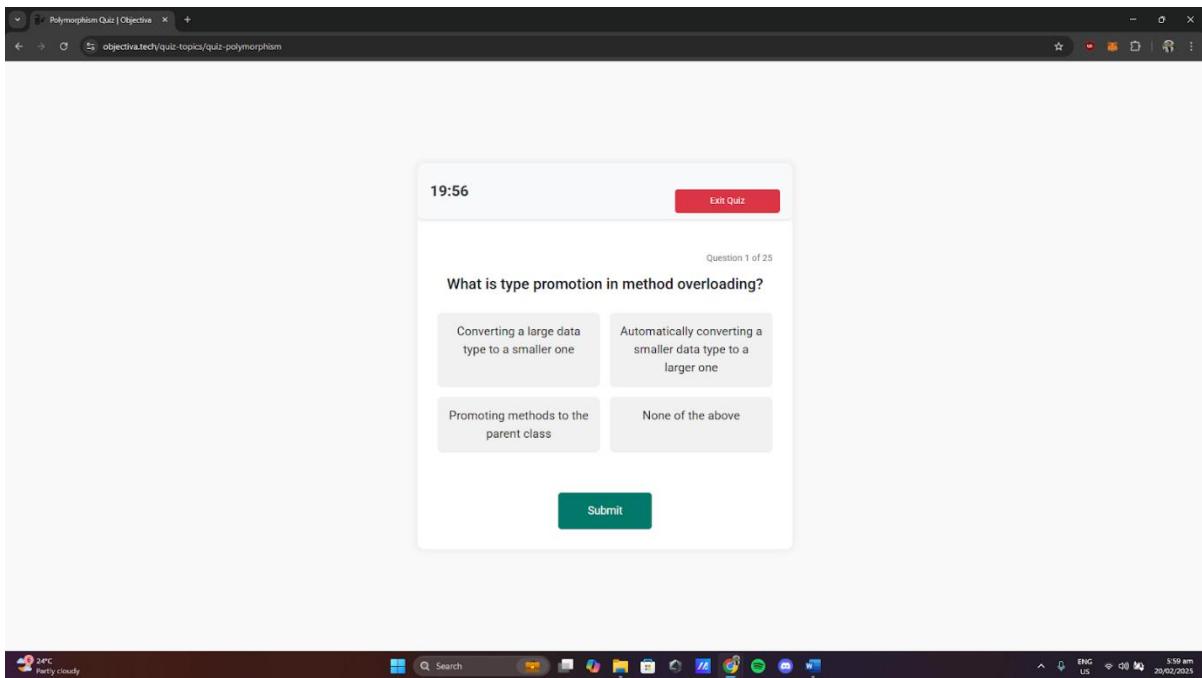
Quizzes Dashboard- This is where the user will be redirected when he/she clicked the “Quiz” in the navbar which consist of the quizzes starting from the introduction to OOP and java followed by the four principles of OOP.

The screenshot shows the "OOP Quiz Dashboard" with a grid of six boxes, each representing a different quiz category. The categories and their grades are: "Introduction to OOP" (Grade: 20 / 25), "Introduction to Java" (Grade: 8 / 25), "Inheritance" (Grade: / 25), "Polymorphism" (Grade: / 25), "Encapsulation" (Grade: / 25), and "Abstraction" (Grade: / 25). Each box contains a "Take" button. The dashboard is set against a background of a Windows desktop environment with various icons and a taskbar at the bottom.



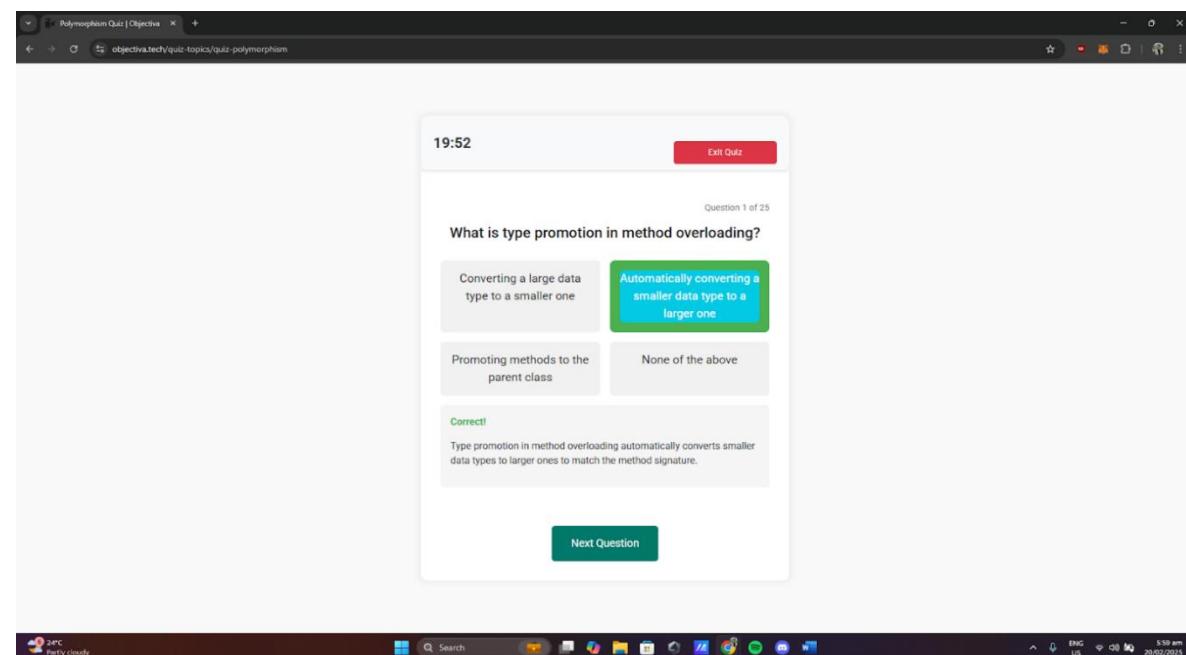
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Quiz Content- This is what the user will first see if he/she clicked any topic in the Quiz Page.



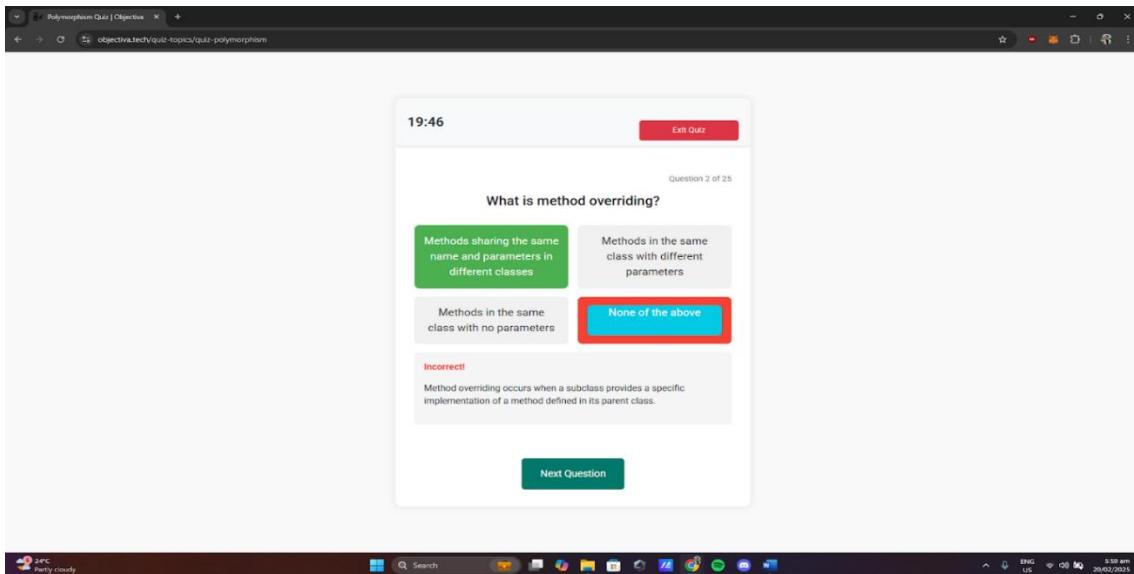
Quiz Content (Right Answer)- This is what it looks like if the user chose the correct answer.

The background color of the border will turn green.

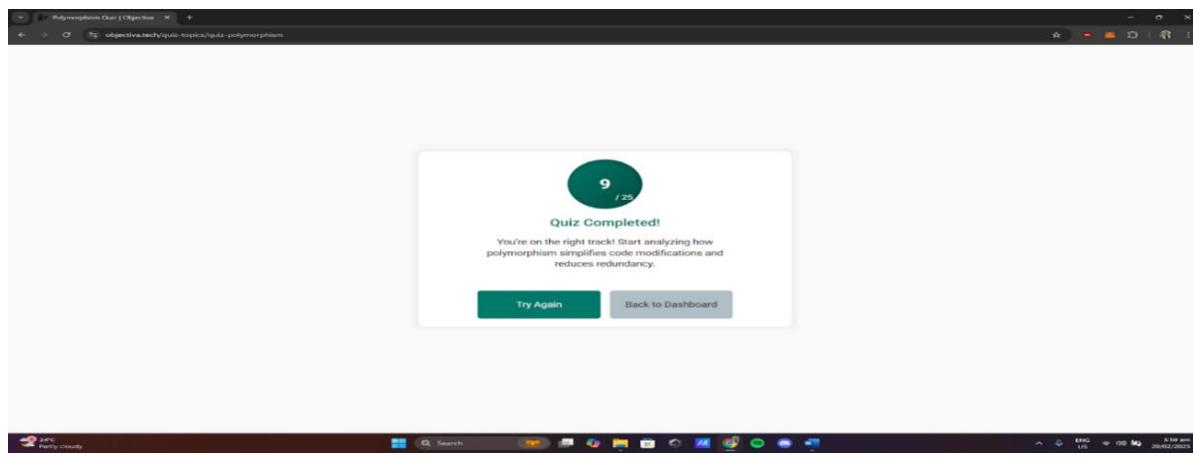


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Quiz Content (Wrong Answer)- This is what it looks like if the user chose the incorrect answer. The background color of the border of the chosen answer will turn red, While the correct answer will turn green.

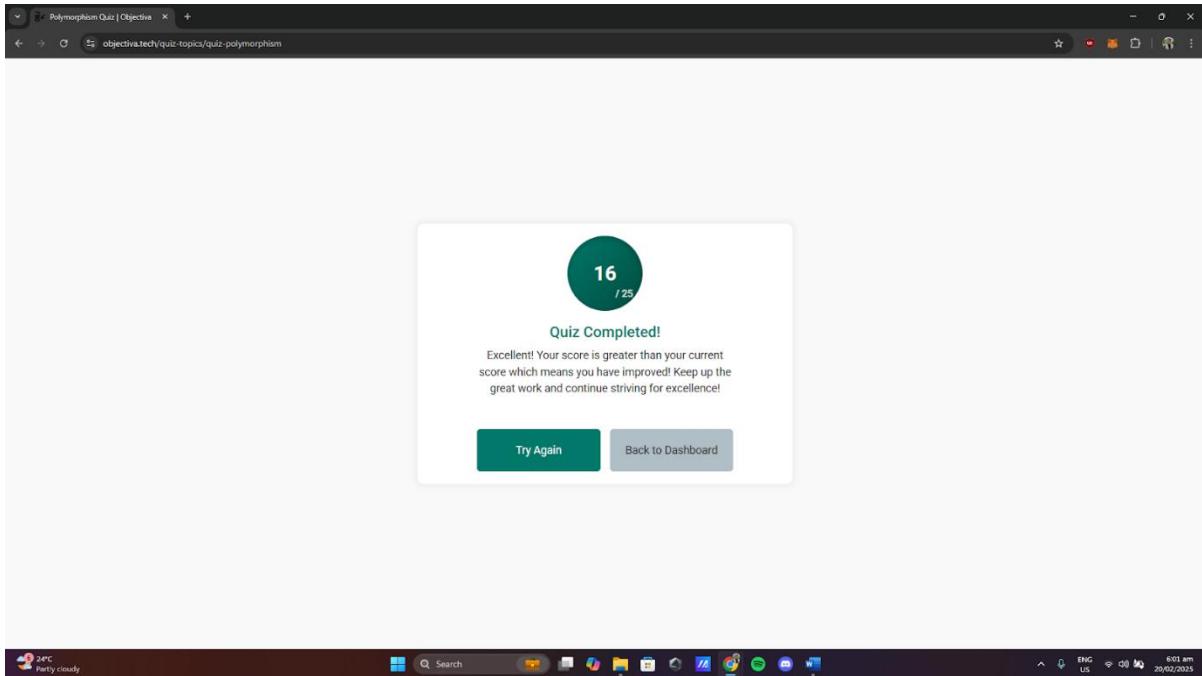


Quiz Feedback- This is what the user will see after taking the quiz, it consists of their scores and positive reinforcement feedback. There are also two buttons which are the “Try Again” that will let the user retake the quiz and the “Back to Dashboard” where the user will go back to the quizzes dashboard.



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Quiz Feedback (Higher Than Previous Score)- This is what the user will see if they got a higher score compared to their previous one.

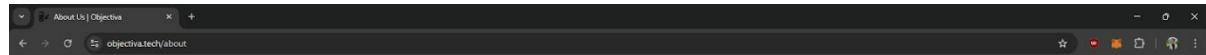


About Page- This is what the user will see if they clicked the “About” in the navbar wherein the user can see a short description about the website and developers.

A screenshot of a web browser window titled "About Us | Objective". The URL in the address bar is "objectivatech/about". The page features a dark header with the "OBJ" logo and navigation links for HOME, LESSONS, EXERCISES, QUIZ, and ABOUT. The "ABOUT" link is highlighted. The main content area has a dark background with white text. It starts with "ABOUT US" and a welcome message from the team. Below that is a section titled "WHAT WE DO" with a paragraph of explanatory text. To the right of this text is a large "OBJ" logo with a coffee cup icon to its right. At the bottom, there is a section titled "Our Team" with a subtext "Meet the Team! We are a group of passionate students working together to bring our ideas to life." The browser's taskbar at the bottom shows various open tabs and system icons.

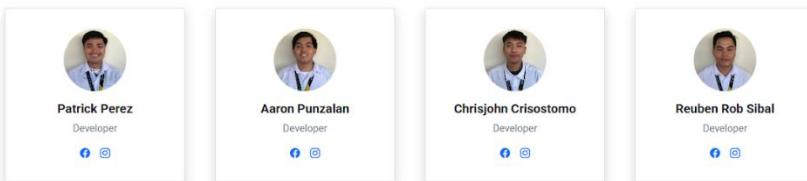
HOLY ANGEL UNIVERSITY

About Page- This is what the user will see if they clicked the “About” in the navbar wherein the user can see a short description about the website and the developers.

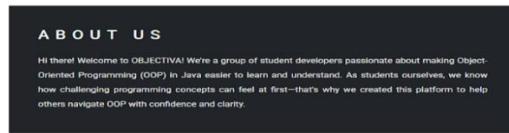


Our Team

Meet the Team! We are a group of passionate students working together to bring our ideas to life.



Account Navigation- This is what a user would see if they clicked on their account, a dropdown will appear wherein they can either go to the account settings or logout of the website.



WHAT WE DO

We're not experts (yet), but we're dedicated to making this platform as helpful and accessible as possible. Our focus is on creating a fun and engaging way to learn the core ideas behind Java's OOP concepts, especially for fellow students like us. This website is part of our capstone project at Holy Angel University, and it's our way of contributing to the learning journey of others while improving our own skills as developers. Thank you for visiting OBJECTIVA! We hope you find this platform useful and enjoyable. Let's learn and grow together!



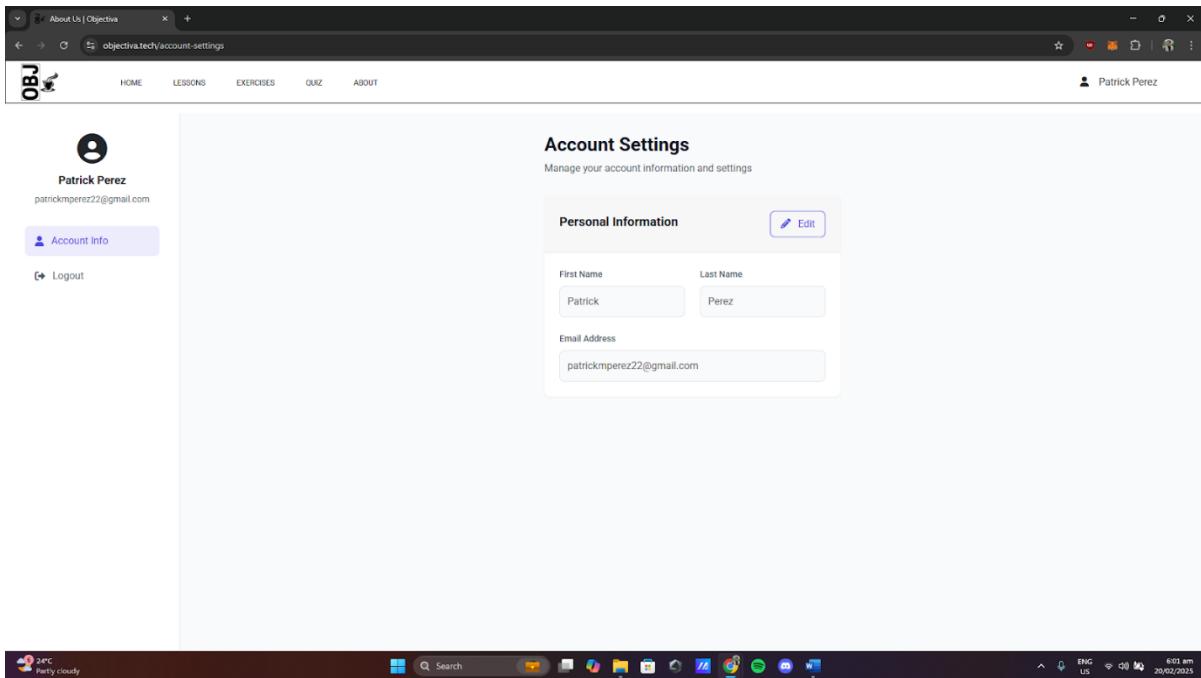
Our Team

Meet the Team! We are a group of passionate students working together to bring our ideas to life.

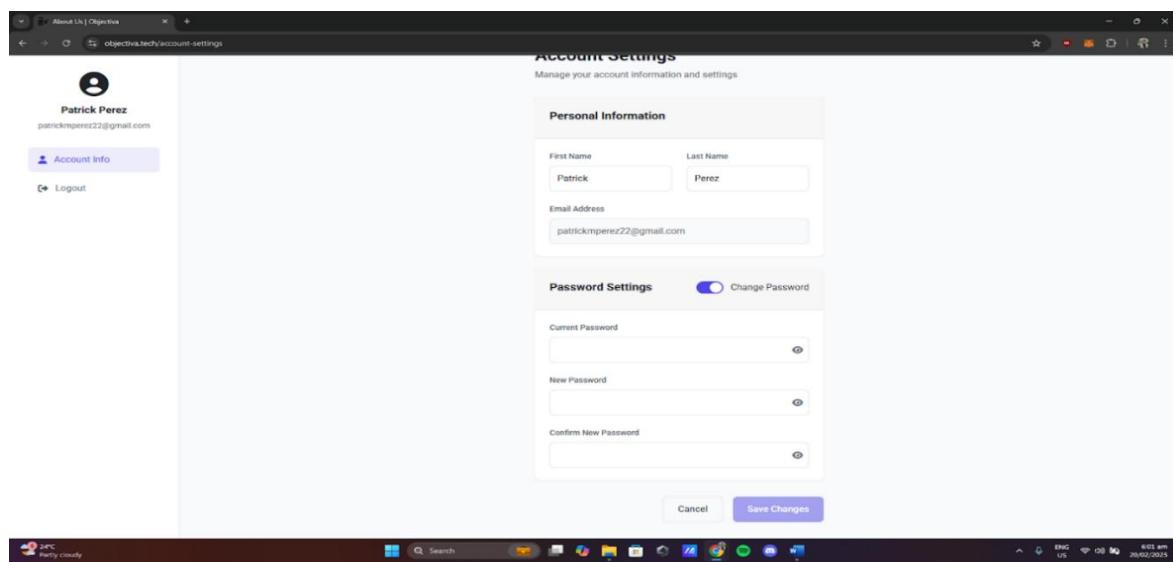


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Account Settings- This is what the user would see if they clicked the Account Settings on the dropdown.



Account Settings (Edit)- This is where the user can edit their account by either changing their first name, last name, email address and also the password.



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Appendix T

Book Pages References

INTRODUCTION

Lesson	Source	Pages
Introduction to Object-Oriented Programming	Pomperada (2018) – <i>Introduction to Java Programming</i>	211
Understanding Object and Classes	Pomperada (2018) – <i>Introduction to Java Programming</i> , Lowe (2017) - <i>Java All-in-One. For Dummies</i>	212, 57, 58
Introduction to Java	Lowe (2017) - <i>Java All-in-One. For Dummies</i> , Schildt (2018) - <i>Java: The Complete Reference</i>	8, 9, 12, 13, 14
Basic OOP Concepts in Java	Schildt (2018) - <i>Java: The Complete Reference</i>	20-24
Class Structure and Access	Pomperada (2018) - <i>Introduction to Java Programming</i> , Lowe (2017) - <i>Java All-in-One. For Dummies</i>	218, 254, 255
Basic Object-Oriented Design	Pomperada (2018) - <i>Introduction to Java Programming</i>	220



HOLY ANGEL UNIVERSITY

Java Class Libraries Overview	Wu (2010) - <i>An Introduction to Object-Oriented Programming with Java</i> , Lowe (2017) - <i>Java All-in-One. For Dummies</i>	499, 10
Object Interactions	Lowe (2017) - <i>Java All-in-One. For Dummies</i>	59

ABSTRACTION

Lesson	Source	Pages
Understanding Abstraction	Pomperada (2018) - <i>Introduction to Java Programming</i>	240
Abstract Classes	Pomperada (2018) - <i>Introduction to Java Programming</i>	240-241
Interfaces	Schildt (2018) - <i>Java: The Complete Reference</i>	183, 184, 198
Implementation in Java	Pomperada (2018) - <i>Introduction to Java Programming</i>	242



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ENCAPSULATION

Lesson	Source	Pages
Understanding Encapsulation	Pomperada (2018) - <i>Introduction to Java Programming</i>	228
Access Modifiers	Lowe (2017) - <i>Java All-in-One. For Dummies</i>	254, 255, 284
Getters and Setters	Lowe (2017) - <i>Java All-in-One. For Dummies</i>	255, 256, 257
Data Validation	Pomperada (2018) - <i>Introduction to Java Programming</i>	228
Implementation in Java	Pomperada (2018) - <i>Introduction to Java Programming</i> , Schildt (2018) - <i>Java: The Complete Reference</i>	228, 20, 21

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INHERITANCE

Lesson	Source	Pages
Understanding Inheritance	Pomperada (2018) - <i>Introduction to Java Programming</i>	234
Single Inheritance	Lowe (2017) - <i>Java All-in-One. For Dummies</i>	242
Types of Inheritance in Java	Lowe (2017) - <i>Java All-in-One. For Dummies</i>	278
Method Overriding	Lowe (2017) - <i>Java All-in-One. For Dummies</i>	283
Advanced Inheritance Concepts	Lowe (2017) - <i>Java All-in-One. For Dummies</i> , Schildt (2018) - <i>Java: The Complete Reference</i>	285-287, 169-173
Implementation in Java	Pomperada (2018) - <i>Introduction to Java Programming</i>	238

POLYMORPHISM

Lesson	Source	Pages
Understanding Polymorphism	Pomperada (2018) - <i>Introduction to Java Programming</i>	226

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Compile-time Polymorphism (Static)	Lowe (2017) - <i>Java All-in-One. For Dummies</i>	257, 258
Runtime Polymorphism (Dynamic)	Schildt (2018) - <i>Java: The Complete Reference</i>	180
Advanced Polymorphic Concepts	Lowe (2017) - <i>Java All-in-One. For Dummies</i> , Schildt (2018) - <i>Java: The Complete Reference</i>	283, 134-136
Polymorphism with Interfaces	Schildt (2018) - <i>Java: The Complete Reference</i>	183-184
Implementation in Java	Pomperada (2018) - <i>Introduction to Java Programming</i>	226

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Appendix U

OOP Professor Curriculum Vitae

EDMOND O. YUMANG
Contact No.: 0905-6356-570
Email Add.: edmond.yumang@deped.gov.ph
Home Address: L-41, B-123, St 35th Bacolor Ave.
Phase 2, Madapdap Rest. Mabalacat City

LICENSES AND ACCREDITATION:

Licensed Professional Teacher
Philippines Licensure Examination for Teachers
September 29, 2013

TESDA Trainor's Methodology Level I
TESDA
March 27, 2021

Microsoft Ambassador for Education
Microsoft Corporation
May 25, 2017

WORK EXPERIENCES:

College Faculty - Part Time
ACLC College
Mabalacat Campus
August 2022 – February 2024

Master Teacher I
Mabalacat National High School (SHS)
San Isidro, Dau, Mabalacat City
July 15, 2019 – Present

Secondary School Teacher III
Santos Ventura National High School-(SHS)
Tabun, Mabalacat City
May 2016 – July 14, 2019

Secondary School Teacher I
Santos Ventura National High School (SHS)
Tabun, Mabalacat City
July 2014 – May 2016

Industrial Engineer
Billerby Corporation
14-C Building Philexcel, Clarkport Pampanga
April 2013 – April 2014

Computer Teacher
Madapdap Rest. High School
Madapdap Rest., Mabalacat City
Sept. 2010 – April 2013

EDUCATIONAL BACKGROUND:

GRADUATE SCHOOL:
Masters in Information Technology (CAR)
Tarlac State University
Tarlac City, Tarlac
August 2015 – April 2016

TERTIARY EDUCATION:
B.S. Information Technology
Pampanga State Agricultural University
Magalang, Pampanga
June 2007 – July 2010

Method of Teaching
Pampanga State Agricultural University
Magalang, Pampanga
June 2012 – May 2013

PERSONAL CHARACTERISTICS:

- Open- Minded, Analytical Thinker, Methodical, Highly Organized,
Persistent and Easy to learn on task Assign.

PERSONAL INFORMATION:

Date of Birth: August 13, 1988
Place of Birth: Porac, Pampanga
Gender: Male

CHARACTER REFERENCES:

Dr. Anthony Rayley M. Cabigting
Education Program Supervisor – I in TLE&TVL
Deped – Mabalacat City
0977-725-7456

I hereby certify that the information above are true and was answered to the best of my knowledge. I am more willing to hear queries from you with regards to my resume.

EDMOND O. YUMANG



HOLY ANGEL UNIVERSITY

Appendix V

IT Experts Curriculum Vitae

Gabriel Castro Software Engineer

 gabminer05@gmail.com  +63 906 354 7138  Gabriel Castro

 Porac, Pampanga, Philippines

PROFESSIONAL EXPERIENCE

Associate Software Engineer I

Clark Outsourcing

May 2023 – Present

- Manage AWS infrastructures eg. EC2, S3, RDS, SQS, Elastic Beanstalk, CodePipeline, and IAM, ensuring high availability, security, and performance.
- Designed and develop a Ticketing and Task Management System, removing the organization reliability through third party softwares (eg. Airtable and PandaDocs).
- Optimized the organization's Timekeeping System, significantly enhancing accuracy and streamlining calculation processes for faster, more reliable time tracking.
- Implemented a Permission Security System to manage user access to tools and sensitive information.
- Transitioned all system notifications and alerts from Slack to Google Chat, ensuring seamless communication and integration.
- Collaborate into the development and architecture of the Portal Ecosystem, centralizing all necessary tools needed for the organization operations.

Dev Intern

Clark Outsourcing

Jan 2023 – Apr 2023

- Attend trainings such as Angular Training, Laravel/Lumen Training, and MySQL training.
- Participate on different activities such as creating different web application from scratch at the same time following the specific requirements and completing before the deadline.

SKILLS

Programming Languages: Typescript, Javascript, PHP, Python, Java, SQL |

Libraries and Frameworks: Angular, React, Next.js, Node.js, Laravel, Django, Bootstrap, Tailwind |

Cloud: AWS, Google Firebase, Heroku | **Database:** MySQL, PostgreSQL, Firebase Realtime DB |

Development Tools: Git, Github, Jira, Ubuntu, MySQL Workbench

EDUCATION

Bachelor of Science in Computer Science

Holy Angel University

Jun 2019 – Jun 2023

- Consistent Dean's Lister, Lead Developer in Thesis project

AWARDS

Outstanding Thesis Project For BS Computer Science For the Academic Year 2022-2023

Holy Angel University

Jun 23, 2023

The Thesis Title: Application of the Dynamic Programming Algorithm for Cargo Loading Optimizer through Solving the Binary Knapsack Problem

CERTIFICATES

- AWS Academy Graduate - AWS Academy Cloud Foundations 
- CyberOps Associate 



HOLY ANGEL UNIVERSITY

TYRONE RALPH DE CASTRO

SOFTWARE QUALITY ENGINEER

(+63) 9338544638
Lipa City, Batangas
decastrotyronealph@gmail.com

SUMMARY

Proactive and results-driven Software Quality Engineer with over 3 years of experience in software testing, quality assurance, and process improvement. adept in creating and executing manual and automated test plans, identifying bugs, and ensuring the delivery of high-quality software. Strong expertise in various testing methodologies including functional, regression, and performance testing. Proficient in using testing tools such as Selenium, JIRA, TestRail, and Git for version control.

SKILLS

- Attention to Detail
- Problem Solving
- Communication and Documentation
- Collaboration and Teamwork
- Time Management
- Critical Thinking
- Adaptability and Flexibility
- Manual Testing
- Automated Testing
- Test Case Design and Execution
- Test Automation Frameworks
- Performance Testing
- Regression Testing
- API Testing
- SQL/Database Testing
- Code Review & Static Analysis Tools

WORK EXPERIENCE

CHEQ Systems, Inc.

Software Quality Engineer • 2022 - Present

Software Tester

- As a Software Quality Engineer at CHEQ Systems Inc., I play a critical role in ensuring that our products meet the highest standards of quality and performance. My main responsibility is to design, execute, and maintain test plans and test cases, identify and troubleshoot defects, and work closely with developers and product managers to deliver seamless, bug-free software solutions.

E-Digital Solutions Inc.

Quality Assurance Intern • 2021 - 2022

- As a QA Tester Intern at E-Digital Solutions Inc., I'm gaining hands-on experience in testing and quality assurance under the mentorship of experienced professionals. My role allows me to actively participate in ensuring the quality and functionality of software by assisting in various testing tasks, learning new tools, and applying industry best practices.

EDUCATION

Bachelor of Science in Computer Science

De la Salle Lipa • 2018-2022

Major in Game Development

OTHER

Civil Service Certification

Certification Passer

De la Salle Lipa

Dean's List (2020 - 2022) & Best Thesis Award



HOLY ANGEL UNIVERSITY

CLARISSE LIWANAG

(+63) 991 438 9441
clarisseliwanag.personal@gmail.com
San Jose, Batangas

SUMMARY

Results-driven SAP Ariba Consultant with experience in the implementation, configuration and support of SAP Ariba solutions. Expertise in integrating SAP Ariba with other enterprise systems, workflows and ensuring smooth data exchange. Strong background in troubleshooting, system testing and delivering quality results within the given time frame. Proven experience of helping client optimize procurement processes and supply chain management through end-to-end SAP Ariba solutions.

SKILL

- SAP Ariba Procurement solutions
- Supplier Management
- Project Management
- Data migration and system integration
- Business Process Mapping
- SAP S4/HANA Integration

EXPERIENCE

Associate Software Engineer, Accenture, Inc. 2022 - Present

SAP Ariba

- Extended support in testing an enhancement for the interface adding information in the API cxml outbound and the validations needed in Ariba
- Extended support in developing automated feature in Ariba Production to help fix discrepancies with data interfacing to S4/HANA
- Extended support in the maintenance of automated tool that helps gather and consolidate listed products of the business
- Assisted with client supply chain management and procurement process
- Assisted with monitoring and deployment of interface changes and break fixes
- Assisted business with the resolution of P2 critical issues and provided Job Aids as part of user training
- Assisted in managing the monitoring team which handles the multiple reports regarding transactions that encounters errors interfacing in S4/HANA system and Ariba P2P modules

Internship, Research Assistant 2021

Research Development and Extension Services

- Developed department's site to support student's proposed capstones
- Organized and maintained thesis and capstones
- Coordinated with different organizations and company as part of the extension services
- Assisting in drafting reports and research papers as well as execution of studies

EDUCATION

Bachelor of Science in Computer Science 2018 - 2022

Batangas State University

- Thesis on "Evaluation of the Efficiency of BERT Algorithm in Classifying Documents".

ADDITIONAL INFORMATION

The Philippine National IT Standard (PhilNITS)
Information Technology Passport Passer

Procurement AMS Learning
AMS Certification Passer

Certified Civil Servant
Honor Graduate Eligible (Professional)

GEN AI for Delivery Practitioners
Certification Passer

Batangas State University
Latin Honor Graduate



HOLY ANGEL UNIVERSITY

ASHLEY MARIE LOIS CASILLANO

ASSOCIATE SOFTWARE ENGINEER

(+63) 9041811663
Lipa City, Batangas
casillanashley@gmail.com

SUMMARY

Experienced and detail-oriented professional with a background in DevOps and cybersecurity. Adequate hands-on experience with security tools and processes as well as automation tools. Knowledgeable in multiple programming languages, software development methodologies, and database management systems. Strong problem-solving skills and ability to work effectively in a team-based environment.

SKILLS

- | | | | |
|------------------------|------------------------|----------------------------|--------------------------------|
| • Analytical skills | • Leadership | • Access Control | • CI/CD Pipelines |
| • Critical thinking | • Collaboration | • Network Security | • Scripting and Automation |
| • Problem-solving | • Communication | • Risk and Compliance | • Infrastructure as Code (IaC) |
| • Attention to details | • Interpersonal Skills | • Vulnerability Management | • Cloud Platforms (AWS, Azure) |

WORK EXPERIENCE

Accenture, Inc.

Associate Software Engineer • 2022 - Present

DevOps

- Set up automation tools to enable the auto-deployment of APIs, designing, building, and maintaining Continuous Integration/Continuous Deployment (CI/CD) pipelines using tools like AWS Code Pipeline and Jenkins. Write scripts in languages such as Python, Bash, or PowerShell to automate routine tasks and develop custom scripts and YAML files for deployments, monitoring, and system configurations.

Cybersecurity

- Monitor and respond to security incidents, assist with vulnerability management, and support the implementation of security measures. Help monitor alerts from the security dashboard to identify suspicious activities, and escalate critical issues to senior teams when necessary. Gain hands-on experience with security tools and processes while building foundational knowledge of incident response and risk mitigation.

Batangas State University

Accounting Office Intern • 2017 - 2018

- Organized and maintained financial records, ensuring the accurate input of invoices, payments, and expenses; assisted in reconciling statements with financial records, and reported discrepancies to senior accountants.

EDUCATION

Bachelor of Science in Computer Science

Batangas State University • 2018-2022

OTHER

GenAI for Delivery Practitioners

Certification Passer

Philippine National IT Standards Foundation

Information Technology Passport Passer

Civil Service Certification

Certification Passer

Batangas State University

Latin Honor Graduate



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Appendix W

Editor's Note



HOLY ANGEL
UNIVERSITY

SCHOOL OF COMPUTING

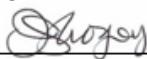
DR. MARLON L. TAYAG
Dean

This is to certify that the document of the capstone entitled **Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java** authored by the following proponents:

Chrisjohn G. Crisostomo
Patrick M. Perez
Aaron M. Punzalan
Reuben Rob B. Sibal

has been checked for grammatical and typographical errors.

Yours truly,


Maria Cristina C. Nogoy, LPT, MAEd
Faculty, Comm and Languages Department

March 23, 2025



HOLY ANGEL UNIVERSITY

Appendix X

University's Plagiarism Scanner Certificate



HOLY ANGEL UNIVERSITY RESEARCH OFFICE
UNIVERSITY

CERTIFICATION

This certifies that the research paper entitled "**Interactive Website for Learning the Four Principles of Object-Oriented Programming in Java**" by Patrick M. Perez, Chrisjohn G. Crisostomo, Aaron M. Punzalan and Reuben Rob B. Sibal, is essentially clear of plagiarism, as subjected to Turnitin review. Scanned and reviewed by the University Research Office on March 26, 2025 with the following details:

Total number of words	18930
Final rate	20%

Certified by:


DR. RICHARD L. FIGUEROA
Director, University Research Office

HOLY ANGEL UNIVERSITY

Appendix Y

Researchers' Curriculum Vitae



**Chrisjohn Gumin
Crisosotomo**
 chrisjohncrisosotomo.jobs180.com

OBJECTIVE

Keen and motivated person with a solid understanding of frontend and back-end technologies. Eager to apply academic knowledge, adapt quickly to real-world development challenges, and looking forward to using my skills for the growth of the organization and myself.

PERSONAL INFORMATION

Birthdate: October 25, 2002
Civil Status: Single
Nationality: Filipino
Address: Blk23, Lot10-12, Alvin St., Xavera, Mabalacat, Pampanga, Central Luzon (Region III) 2010
Gender: Male

CONTACT INFORMATION

Mobile: 09276184914
Email: cgcrisosotomo1@gmail.com

SKILLS

- HTML, CSS, JavaScript
- CSS Framework (Bootstrap)
- JavaScript Framework (Angular)
- PHP Framework (Laravel)
- MySQL
- Team-oriented
- Versatile
- Adaptability

LANGUAGES

- English
- Filipino
- Kapampangan

WORK EXPERIENCE

Clark Outsourcing
(2024 Jul to 2024 Sep)

Position: Full-Stack Developer Intern Trainee
Specialization: IT/Computer - Software Development
Industry: Computer / Information Technology (Software)
Nature of Work:

- Contributed to the maintenance and enhancement of the HRIS application by addressing minor bugs and implementing new features.
- Improved user experience by applying responsive design techniques, ensuring smooth functionality across devices.
- Utilized Bootstrap and Angular to develop dynamic front-end components, and used Laravel-Lumen with MySQL for back-end development, optimizing API performance and data management.

EDUCATION

2025 Apr Bachelor's/College Degree Holy Angel University (HAU)
Major: Web Development
Field of Study: Computer Science/Information Technology

CERTIFICATIONS

2024	JavaScript Essentials 1	2024	AWS Academy Graduate - AWS Academy Cloud Foundations
2024	FreeCodeCamp Responsive Web Design	2023	CyberOps Associate
2023	Google Analytics	2021	Introduction To Cybersecurity
2021	Introduction To IoT		

SEMINARS

2020	CYBERSECURITY IN THE AGE OF AI: NAVIGATING THE DOUBLE-EDGED SWORD	2020	Cyber Resilience In The AI Era: Empowering Business Leaders & Executives
2020	SEO RANK AND RISE	2020	Introducing Next-Gen Cybersecurity
2020	UI/UX Using Figma	2020	Basis Web Development Workshop

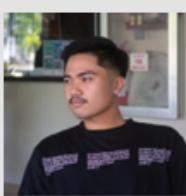
REFERENCES

Erlan Quimba
Peer
Graphic Designer
Perfect Present
(+63) 9512096298
erlanqop@gmail.com

Mr. Chris Almocera LPT CLPD
Professor
Practicum Coordinator
Holy Angel University
(+63) 305-489-9045
calmocera@hau.edu.ph

View more of my ResuméLink at <http://chrisjohncrisosotomo.jobs180.com>

HOLY ANGEL UNIVERSITY



**Patrick Manalang
Perez**

patrickmperez.jobs180.com

OBJECTIVE

Motivated and detail-oriented web developer with a strong foundation in front-end and back-end technologies, including Angular, Laravel, PostgreSQL, etc. Skilled in building user-friendly applications, including inventory systems and dashboards. Always eager to learn new technologies and improve my skills. Looking for an opportunity to work with a great team and contribute to exciting projects or creating projects.

PERSONAL INFORMATION

Birthdate: February 22, 2003

Civil Status: Single

Nationality: Filipino

Address: Block 10 Lot 14 Villa Remedios Homes
Cutud Angeles City, Central Luzon
(Region III) 2009

Gender: Male

CONTACT INFORMATION

Mobile: 09087041134

Email: patrickmperez22@gmail.com

SKILLS

- Frontend Development
- Backend Development
- Problem Solving
- Adaptability
- Hardworking & Dedicated

LANGUAGES

- Filipino
- English
- Kapampangan

WORK EXPERIENCE

IT Squarehub

(2024 Jun to 2024 Oct)

Position: Full-stack Developer
Trainee

Specialization: IT/Computer - Software Development

Industry: Computer / Information Technology (Software)

EDUCATION

2025 Apr	Bachelor's/College Degree Holy Angel University (HAU) Major: Web Development Field of Study: Computer Science/Information Technology
2021 May	Senior High School Diploma Holy Angel University Major: Information Technology Field of Study: Academic Track: Science, Technology, Engineering and Mathematics (STEM)
2019 Apr	High School Diploma Holy Angel University Field of Study:

CERTIFICATIONS

2024	Responsive Web Design - FreeCodeCamp
2023	Red Hat System Administration I (RH124)
2021	Introduction To Cybersecurity - CISCO

SEMINARS

2024	SEO Rank & Rise - The Beginner's Blueprint To Web Winning - Code Geeks	2024 1st Regional Blockchain Conference - "Innovate, Educate, And Elevate With Blockchain"
2024	From Sketch To Screen - Creating A Seamless Future With UI UX - Google Developer Student Club	2022 Design Of The Times - Exemplifying The Beauty Of Design Through Implementation - Code Geeks
2021	Professional Development Workshop Training	

View more of my ResumèLink at <http://patrickmperez.jobs180.com>



HOLY ANGEL UNIVERSITY



**Aaron Mendoza
Punzalan**

aaron-punzalan.jobs180.com

OBJECTIVE

Enthusiastic web developer with experience in a project utilizing Angular during my internship, where I gained valuable insights and learned new technologies. Committed to continuous learning and eager to enhance my skills while contributing to innovative web solutions in a collaborative environment.

PERSONAL INFORMATION

Birthdate: January 01, 2003

Civil Status: Single

Nationality: Filipino

Address: 4011 Lot 10-C Evergreen Compound, Purok 4 Brgy. Mining Angeles City, Central Luzon (Region III) 2009

Gender: Male

CONTACT INFORMATION

Mobile: 09612809123

Email: apunzalan500@gmail.com

SKILLS

- HTML, CSS, Bootstrap
- Angular (JavaScript Framework)
- Git
- Wordpress
- UIUX, Figma, Canva
- Hardworking
- Teamwork
- Always Eager To Learn And Improve
- Attention To Detail

LANGUAGES

- Filipino
- Kapampangan
- English

ACHIEVEMENTS

- 1st Year Dean's Lister (1st And 2nd Semester)
- 2nd Year Dean's Lister (2nd Semester)
- 3rd Year Dean's Lister (1st And 2nd Semester)

WORK EXPERIENCE

IT Squarehub Global Services

(2024 Jun to 2024 Sep)

Position: Full Stack Web Developer Intern Trainee

Specialization: IT/Computer - Software Development

Industry: Computer / Information Technology (Software)

Nature of Work: -Developed and refined the front end of an Inventory System using Angular, improving user experience and interface usability.

-Developed and refined the front end of a Performance Management System using Angular, improving user experience and interface usability.

EDUCATION

2025 Apr Bachelor's/College Degree

Holy Angel University (HAU)

Major: Information Technology Major In Web Development

Field of Study: Computer Science/Information Technology

CERTIFICATIONS

2025

FreeCodeCamp Front End Development Libraries

2024

FreeCodeCamp Responsive Web Design

2024

Cisco JavaScript Essentials 1

SEMINARS

2025 3rd Regional Cybersecurity Conference

2025 Cyber Resilience In The AI Era

2024 SEO Rank & Rise The Beginner's Blueprint To Web Winning

2024 Git It Done Build A Foundation With Version Control

2024 1st Regional Blockchain Conference

2022 Design Of The Times Exemplifying The Beauty Of Design Through Implementation

REFERENCES

Mr Chris Almocera LPT CLPD

Professor

Practicum Coordinator

Holy Angel University

09054899045

calmocera@hau.edu.ph

View more of my ResuméLink at <http://aaron-punzalan.jobs180.com>



HOLY ANGEL UNIVERSITY



**Reuben Rob
Bondoc Sibal**
 reubenrob.sibal.jobs180.com

OBJECTIVE

A passionate and dedicated front-end web developer with a strong focus on creating user-friendly and visually appealing websites using modern technologies. Willing to learn and hungry for knowledge, even if it takes time to grasp concepts at first, but once understood, can work consistently and efficiently. Capable of working independently or as a team, embracing challenges with a step-by-step approach to achieve success. Always striving to grow and deliver high-quality result.

PERSONAL INFORMATION

Birthdate: October 05, 2002

Civil Status: Single

Nationality: Filipino

Address: 1910 Planters Ville, Mabiga, Mabalacat City, Pampanga, Central Luzon (Region III) 2010

Gender: Male

CONTACT INFORMATION

Mobile: 09514209285

Email: sibalreuben@gmail.com

SKILLS

- HTML, CSS, Javascript
- Adobe Illustrator, Photoshop
- AngularJS, NodeJS
- Wordpress
- MySQL

LANGUAGES

- English
- Filipino
- Kapampangan

WORK EXPERIENCE

IT SQUAREHUB

(2024 Jun to 2024 Oct)

Position: Content And Creative Intern Trainee

Specialization: Arts/Creative/Graphics Design

Industry: Outsourcing (Call Center / BPO)

Nature of Work: As an intern at IT Squarehub, I am responsible for designing multimedia content to support both the marketing team and the company's website. My tasks include video editing, 3D modeling, and graphic design, ensuring that all visual materials are engaging, high-quality, and aligned with the company's branding. I collaborate closely with the marketing team to create promotional materials such as social media graphics, advertisements, and video content that effectively communicate the company's message. Additionally, I contribute to the website's design by developing visually appealing elements that enhance user experience and brand identity. Through this role, I am gaining hands-on experience in digital media production, creative problem-solving, and working within a professional design team.

EDUCATION

2025 Apr Bachelor's/College Degree

Holy Angel University (HAU)

Major: Web Development

Field of Study: Computer Science/Information Technology

CERTIFICATIONS

2024

AWS Academy Graduate - AWS Academy Cloud Foundations

2024

Javascript Essentials 1

2022

Red Hat Academy

2021

CyberOps Associate

2021

Introduction To IoT

2021

Introduction To Cybersecurity

REFERENCES

Carisma Caro

Professor

School Of Computing IT Chairperson

Holy Angel University

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View more of my ResumèLink at <http://reubenrob.sibal.jobs180.com>

