De La Salle University- Manila
Gokongwei College of Engineering

"Chasing Change: The Escape Room for World Changers"

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Final Project Proposal

LBYCPEI

Object Oriented Programming Laboratory

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by

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Monday and Thursday (2:30 PM - 5:30 PM)

June 26, 2023

I. Introduction

"Chasing Change: The Escape Room for World Changers" is a groundbreaking application that reimagines the traditional escape room game concept, with an emphasis on promoting and educating users about the 17 Sustainable Development Goals (SDGs) set by the United Nations. This virtual escape room experience presents players with real-world challenges, driving them to unlock solutions towards a sustainable future. By combining game-play, education, and global issues, the group aims to foster a sense of urgency and empowerment to tackle global challenges.

In the digital age, the way people learn and engage with global issues has shifted dramatically. The younger generation, in particular, is more receptive to interactive and gamified learning experiences. This application seeks to leverage this trend to educate users about the SDGs in a fun, engaging, and immersive manner. This game also acts as an innovative tool for promoting awareness and understanding of sustainability issues, thereby contributing to the larger conversation about our planet's future.

The main goal of our program is to mesh interactive play and education, providing users with a comprehensive understanding of the Sustainable Development Goals (SDGs) and the vital role of sustainability, all while ensuring an engaging gaming experience. This program aims to help users grasp the SDGs via a gamified context, fueling a comprehensive understanding of these complex global issues. By offering puzzles that mirror real-life sustainability challenges, the game encourages critical thinking and problem-solving skills. Furthermore, the group plans to have features such as timed progress, scoring, leaderboards, and achievements to foster a competitive spirit and invite repeated participation. The ultimate objective is to construct a virtual environment so immersive that it not only educates but also inspires and empowers users to bring about change in their own communities, reflecting the spirit of the SDGs themselves.

The scope of this project covers the development of the "Chasing Change: The Escape Room for World Changers" application, with each escape room themed according to a specific SDG. While ideally, all 17 SDGs will be represented, a minimum of five will be included in the initial launch due to time constraints. The group plans to have several key features to ensure a rich, engaging experience for users. These include immersive gameplay that pulls users into the heart of each SDG, educational content to foster understanding, and diversified puzzle challenges that demand creative thinking. To maintain the excitement and stimulate repeated engagement, the application will include timed progress and a scoring system, topped off with a leaderboard to encourage friendly competition. Personalized characters are another highlight, enabling users to navigate the virtual space in a more relatable and immersive way.

The main constraints for this project include time, resources, and technical limitations. The initial launch aims to cover only three of the SDGs, expanding to include more in future

updates. The game's quality and educational value will be prioritized over the quantity of SDGs included at launch. In terms of resources, constraints may come from limitations in budget, manpower, and technical know-how. Lastly, technical constraints may affect the game's design and overall user experience, particularly the balance between graphics-intensive gameplay and device capabilities.

II. Methodology

The group's approach to this project leans heavily on the four pillars of Java programming: encapsulation, abstraction, inheritance, and polymorphism. The aim is to build a well-structured, maintainable, and scalable application that functions effectively and also provides an engaging and informative user experience.

The group will start by defining and encapsulating various classes of objects related to the escape rooms, including the individual rooms themselves, puzzles, timers, scores, and player characters. Using encapsulation will be essential to preserve the data integrity within each class and facilitate secure and straightforward modification. For instance, the 'score' class would encapsulate fields like points, bonus points, penalties, etc., with methods to safely update or retrieve these values.

To simplify the game design's complexity, abstraction will be employed, exposing only the necessary information to users and hiding the more complex underlying details. As a result, users don't need to understand the intricate logic behind the scoring system or the puzzle-solving mechanics; they interact only with the simplified interface.

The group will use inheritance to establish a hierarchical structure of classes, leading to reusable code and a cleaner codebase. A possible implementation could involve a base class 'room' with general attributes like 'theme' and 'timer'. Each room themed with a specific SDG would then be a subclass, inheriting properties from the 'room' superclass but also featuring unique properties and methods.

With polymorphism, the group will be able to use the same interface to perform different tasks, adding to the code's flexibility and extensibility. For example, a 'solve' method could behave differently for each unique puzzle in the game, yet be invoked with the same interface.

The groups' project will unfold in major phases:
1. **Planning:** During this foundational phase, the group will establish the project's requirements, deciding which of the Sustainable Development Goals (SDGs) to focus on first and outlining the corresponding puzzle challenges, scoring system, and other key

features. Strategic decisions regarding the game logic, interaction dynamics, and functionalities will be made at this stage.

2. **Design and Development:** After setting a comprehensive plan, the group will advance to the design phase where they'll shape the application's structure and user interface. Development will proceed in parallel, involving the creation of Java classes and the coding of game logic, guided by the four pillars of Java programming: encapsulation, abstraction, inheritance, and polymorphism. This approach will ensure the development of a robust, flexible application.

3. **Testing and Troubleshooting:** Following initial development, the group will rigorously test the application's functionality, game logic, user experience, and performance. They will resolve any issues or bugs identified during this phase, aiming to guarantee the application's efficiency and stability prior to launch.

4. **Documentation:** Post-testing and troubleshooting, the group will prepare comprehensive documentation. This will encompass all facets of the application, spanning from its design and development to its functionalities and user guide. Such detailed documentation will serve as a valuable resource for users and team members alike, facilitating seamless future updates and improvements.

5. **Presentation:** The concluding phase involves the group presenting their completed project. They will demonstrate the functionalities of the game, elucidate its alignment with the SDGs, and discuss its role in raising awareness and understanding of global sustainability challenges. This presentation will incorporate a demonstration of the application in action, providing tangible proof of its educational and engaging design. This collective showcase will signal the official completion and readiness for launch of the group's project, "Chasing Change: The Escape Room for World Changers".

III. Project Description

The project, "Chasing Change: The Escape Room for World Changers", is ingeniously designed around a series of interactive screens to maximize user engagement and learning. Upon opening the game, players are introduced to a captivating title screen, setting the stage for their immersive journey. The design further incorporates a character customization screen, adding a personal touch and fostering a deeper connection to the gaming experience. The main menu, functioning as the game's central hub, seamlessly guides players to various features and game sections.

Additionally, the design includes personal leaderboards and an achievements menu. These features transform the educational experience into an exciting challenge, motivating players to excel. At the heart of the design are three meticulously designed escape rooms, each themed around a specific Sustainable Development Goal chosen by the developers. These rooms present players with engaging puzzles that simultaneously promote awareness of global sustainability issues. Every screen and its respective components have been thoughtfully designed to facilitate smooth and intuitive user interactions. The project aims to provide an immersive virtual environment that fosters understanding of the SDGs through a compelling and interactive gaming experience.

In contextualizing the proposed design of the project, the group has decided to create an IPO (Input-Process-Output) chart and a hierarchy chart.

Input-Process-Output (IPO) Chart

INPUT	PROCESS	OUTPUT
➔ Mouse clicks ➔ Keyboard clicks ➔ 3 SDG-themed puzzle challenges ➔ Player's time input ➔ Player's name ➔ Player's appearance ➔ Player's score data	➔ Mouse clicks and keyboard clicks detect user's interaction to navigate around the game, select options, solve puzzles, and interact with the game environment. ➔ In the SDG-themed puzzle challenges, the program accepts the input, processes the user's solutions, and checks for correctness against the game's pre-set answers. ➔ The player's time input is used to measure the time taken by the player to solve puzzles and overall game progress. ➔ The player's name and appearance is used to personalize the	➔ Player's in-game actions, such as moving around, picking up items, manipulating objects, or solving puzzles. ➔ Feedback on whether the user's solution is correct. Every correct solution will progress the user in the next level/room of the three rooms. If wrong, hints or prompts are displayed. ➔ A personalized game character and personalized game experiences. ➔ An updated player's game progress based on its total attempts and scores, and individual times for each accomplished

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	player's game character and game experience. ➔ The player's score data processes the score based on the speed and accuracy of solving puzzles ➔ The player's score and time are utilized to generate the leaderboard of the program	room. ➔ An updated leaderboard and achievements section

In the project's overall development, three key components are identified: Input, Process, and Output.

INPUT: The "Chasing Change: The Escape Room for World Changers" game involves multiple forms of input, contingent on the player's actions and decisions. The primary inputs are mouse and keyboard clicks, which drive the player's movements and decisions within the game. In the three SDG-themed puzzle challenges, the player's input consists of their proposed solutions to the puzzles. Other important inputs include the time taken by the player to solve puzzles, the player's name, and their chosen character appearance.

PROCESS: Complex algorithms and processes are at work in the game. In the game's environment, the mouse and keyboard clicks are processed to determine the player's actions such as movement and interaction with objects. In the SDG-themed puzzle challenges, the game processes the player's solutions and compares them against the correct answers. The time taken by the player to solve puzzles is also processed to track their progress and adjust the game's difficulty. Additionally, the player's name and appearance are used to personalize the game character and experience. The player's score, based on puzzle-solving speed and accuracy, is processed to update the leaderboard.

OUTPUT: The game generates a variety of outputs based on these processes. For the in-game actions, the output is the result of the player's movements and interactions within the game. In the puzzle challenges, the output is feedback on the correctness of the player's solutions, and if correct, progress to the next level. Personal inputs like the player's name and appearance lead to a personalized game character and unique experiences. The player's progress and position on the leaderboard are regularly updated, creating a competitive gaming environment. Lastly, each player's total attempts, scores, and time are utilized to provide a comprehensive view of their performance in the game.

Hierarchy Chart
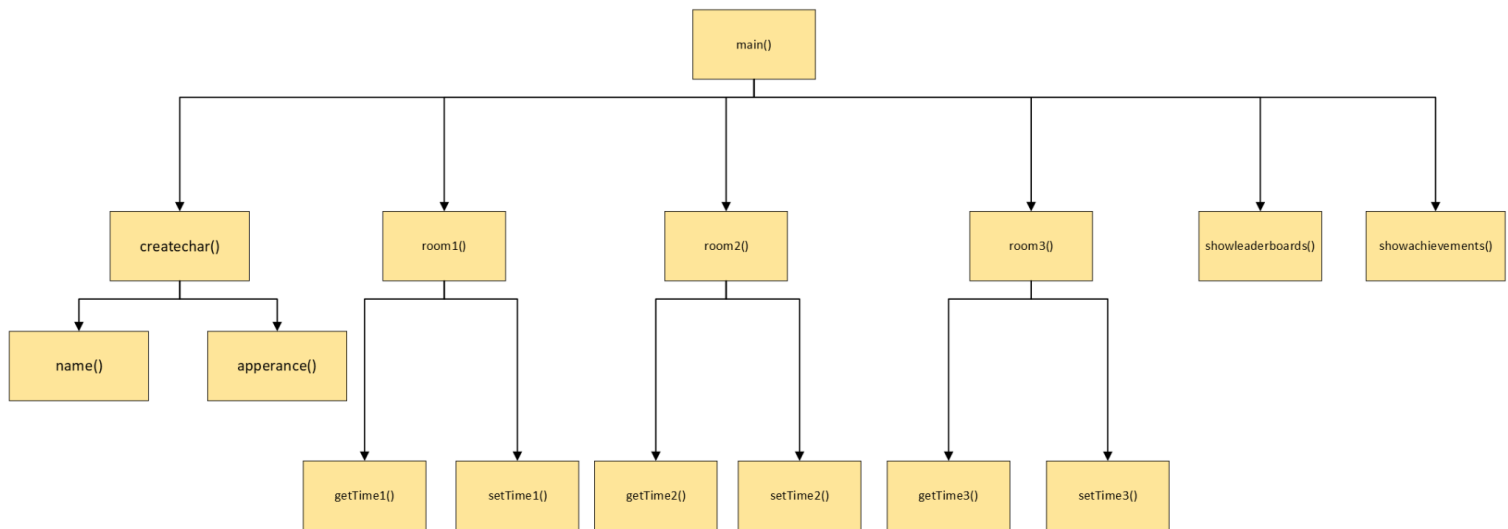
In the hierarchy chart, it can be seen that the *main* function is branched into 6 components namely *createchar, room1, room2, room3, showleaderboards,* and *showachievements*. The *createchar* subprocess is responsible for personalizing the user's name and appearance in the game. With this, the subprocess is further divided into *name* and *appearance.* The *room1, room2,* and *room3* subprocesses are responsible for establishing the overall layout and game mechanics of each room. Additionally, these subprocesses are branched into two components each: *getTime1* and *setTime1* for *room1*; *getTime2* and *setTime2* for *room2*; and *getTime3* and *setTime3* for *room3*. These functions are responsible for assigning and obtaining the time values for each room. Other than this, the *showleaderboards* and *showachievements* subprocesses are tasked to display the user's leaderboards and achievements respectively.

IV. Deliverables

The figure above is the Gantt chart representing the project task management of the group. This chart consists of 5 processes: planning, design and development, testing and troubleshooting, documentation, and presentation.

1. Planning: Spanning from the first week to the second week, this process represents the initial phase where all members of the group participate in outlining the essential components of the project.

2. Design and Development: Spanning from the second week to the fifth week, this phase involves creating the project's blueprints, layout, and flow. Furthermore, roles are assigned to each member in order to accomplish this phase. These roles include the lead developer, the GUI (graphical user interface) designer, and the game mechanics designer.
3. Testing and Troubleshooting: In the final week of the project making process, this phase involves performing various tests to ensure the functionality of the project. If any problems are identified, they are to be addressed and resolved. This phase is highly crucial for quality assurance.
4. Documentation: Spanning from the second week to the sixth week, this process involves recording detailed information about the project, its design, development, testing, and any other modifications made. This is essential in establishing the overall documentation or report of the group's project.
5. Presentation: Running parallel with the Testing and Troubleshooting phase, this process involves presenting the fully established and completed project in the form of an audio-visual presentation.

Additionally, the group will provide both a User Manual and API Documentation to ensure a comprehensive understanding for both users and developers, facilitating effective interaction with the application. The User Manual has been thoughtfully crafted to guide users through the application. It provides a detailed set of instructions complemented by visual aids such as screenshots and diagrams. This ensures that the application is user-friendly and accessible to individuals of varying technical proficiency levels. On the other hand, the API Documentation will delve into the technical aspects of the application, covering elements such as methods, classes, functions, and return types. It aims to provide a clear understanding of how the application's components interact with each other. With this, the inclusion of both the User Manual and API Documentation underscores the group's commitment to facilitating not just an effective, but also an inclusive user experience.

V. Evaluation

The evaluation of the application will focus on assessing user engagement through frequency, and duration of gameplay sessions, as well as gathering feedback to understand overall satisfaction. Additionally, the educational impact and problem-solving skills will be evaluated by conducting pre- and post-gameplay surveys or quizzes to measure users' knowledge and understanding of the SDGs. The application's ability to promote critical thinking will be assessed through the complexity and variety of puzzles and challenges, and feedback within the game will gauge users' problem-solving abilities. Furthermore, adoption and retention rates will be monitored to determine the success of attracting and retaining users over time. The impact on inspiring real-world action towards sustainability will be evaluated through post-gameplay surveys, and technical performance will be assessed through user reviews, bug reports, and

testing. User satisfaction will be measured by gathering feedback, ratings, and reviews, while the application's accessibility and inclusivity will be evaluated through visual and auditory features, and adherence to inclusive design principles.

By evaluating user engagement, educational impact, problem-solving skills, adoption and retention, impact on action and behavior, technical performance, user satisfaction, and accessibility and inclusivity, the "Chasing Change: The Escape Room for World Changers" application can be assessed for its performance, effectiveness, and user satisfaction. This evaluation will provide insights to enhance the application's overall experience and ensure its ability to educate and inspire users towards a sustainable future.

VI. Conclusion

The "Chasing Change: The Escape Room for World Changers" project represents a unique fusion of entertainment, education, and social responsibility. It transforms the traditional escape room experience into an immersive, interactive journey focused on the United Nations' Sustainable Development Goals (SDGs). The application targets a pressing need for public education and awareness about these critical goals, using a gamified environment to engage users and encourage a deep understanding of global sustainability issues.

By incorporating puzzles tied to real-world challenges, this application stimulates critical thinking and empathy, fostering a sense of urgency and motivation to contribute towards a more sustainable future. It utilizes the power of interactive technology to move beyond mere awareness, inspiring action and lasting change in users' real-world communities. Thus, the project is not just a game, but a potent tool for education and change, making complex global issues more accessible and tangible for everyone.

Through its thoughtful design, well-implemented Java principles, and commitment to the SDGs, this project contributes significantly to the broader conversation on sustainable development and the role of technology in driving societal progress. It is a testament to the group's dedication and the transformative potential of combining technology with learning and social responsibility.

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