De La Salle University - Manila

Ripple Effect

The main focus of this project is to educate the audience/players about clean water and sanitation as it is one of the most important things that we need in our daily lives.

A Term Project
Presented to Mr. Ramon Stephen L. Ruiz
In Partial Fulfillment of the Requirements for
Object-Oriented Programming Laboratory (LBYCPEI)
Section EQ5

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I. Introduction

“Clean Water and Sanitation” is the sixth of the 17 Sustainable Development Goals (SDGs) for 2030, the most important areas of development and objectives deemed by the United Nations. The sixth SDG focuses on ensuring the availability and proper management of clean and safe water for both drinking and sanitation purposes. It mainly addresses the current global water crisis, which is also essential in improving other sectors covered by other SDGs, such as but not limited to health and well-being, education, and economic productivity.

Our project, titled **"Ripple Effect"**, is an interactive Java game that aims to educate players about the importance of water conservation. It is important to educate the people around us on the importance of water conservation as the drinkable water ratio is decreasing each year, and proper sanitation of water is also important as we drink water every few minutes in our lives, and consuming dirty water can result in many illnesses which could harm our body. These challenges are all related to water usage and sanitation practices. Players are rewarded with in-game achievements for making sustainable choices and penalized for wasteful behavior. Other features that will be implemented include the following:

- Difficulty levels
- Educational information about SDG 6 and its significance
- Player Statistics — allowing players to compare their scores with previous ones
- A tutorial to assist players in understanding the gameplay mechanics and the importance of water conservation
- Player Names Customization
- In-game achievements for reaching specific milestones or demonstrating exemplary water-saving behaviors
- Incorporated real-world data and statistics to emphasize the global water crisis and the impact of individual actions
- Educational quizzes or trivia questions about water-related facts and statistics to further enhance players' knowledge on the subject

Some potential **constraints** that we may encounter while developing the "Ripple Effect" game could include:

- **Design constraints:** The game's design, including its visual style, user interface, and gameplay mechanics, may be constrained as we are not that advanced in UI development which means that we could only perform simple interfaces for this project.
- **Content**: The game's educational content may need to be carefully researched and fact-checked to ensure its accuracy and relevance. This may require additional time and resources.
- **Time and resources**: Developing a game can be a time-consuming and resource-intensive process. As there are only a few weeks to accomplish this task, we would need to allocate sufficient time and resources to design, implement, and test the game's various components and features.
- **Target audience**: The game's target audience (e.g. age range, educational background) may affect the design and implementation of certain features, such as the difficulty levels or educational content.
- **Testing and feedback**: Playtesting the game and gathering feedback from players is an important part of the development process. However, this can be time-consuming and may require additional resources which leads us to only give feedback to each other as we develop the project since it would be the most efficient way for us to use less time and energy into accomplishing this task.

II. Methodology

We would be utilizing **IntelliJ IDEA** as our integrated development environment (IDE) which allows us to work simultaneously using the **Git** function with **GitHub** access to the repository implemented into the IDE. We would then be using **Java Platform Standard Edition** (Java SE) as our development platform kit in order to compile and run our source code. We would also be utilizing **cpei.jar** as our library/program dependencies as it includes important libraries such as Scanner, Arraylist, ConsoleProgram, GraphicsProgram, ACM Graphics, and so on. We would be utilizing what we have learned in class and the **Java Documentation** as a guide for us just in case we would get lost in how we would implement a method. It is crucial as it would equip us with the knowledge and skills needed to complete the code and debug mistakes. So that we are able to be successful and organized in addressing the problem, implementing the functionality, and accomplishing the project, we would be utilizing the **Four Pillars of Java**:

1. **Abstraction**: Start by identifying the key components and features of the game, such as the gameplay mechanics, user interface, and educational content. Define abstract classes or interfaces to represent these components and their behaviors.
2. **Encapsulation**: Organize the game's code into classes and packages that encapsulate related functionality. Use access modifiers such as private and protected to control access to the class's internal state and behavior.
3. **Inheritance**: Use inheritance to create a hierarchy of classes that share common attributes and behaviors. For example, you could create a base GameEntity class that defines common properties and methods for all game entities, such as their position and size. Then, you could create subclasses such as Player and Obstacle that inherit from GameEntity and add additional properties and behaviors specific to those entities.
4. **Polymorphism**: Use polymorphism to create flexible and reusable code. For example, you could define an Interactable interface with an interact() method that is implemented by all game entities that can be interacted with by the player. Then, you could use a single interact() method in your game logic to handle interactions with different types of entities, without having to write separate code for each entity type.

Major Phases of the Project

1. Start by defining the game's core mechanics and gameplay loop. This includes the challenges or puzzles that players will face, the difficulty levels, and how players will be rewarded or penalized for their actions.
2. Create a storyboard or flowchart to outline the game's narrative and progression.
3. Design the game's visual assets, including the user interface, characters, and environments.
4. Implement the game's core mechanics and gameplay loop using the chosen Java game development framework.
5. Integrate educational information about SDG 6 and its significance into the game. This can be done through in-game text or dialogue, or by incorporating real-world data and statistics.
6. Add additional features such as a tutorial, player customization, in-game achievements, and educational quizzes or trivia questions.
7. Playtest the game to ensure that it is engaging, challenging, and educational. Make any necessary adjustments based on feedback from playtesters.

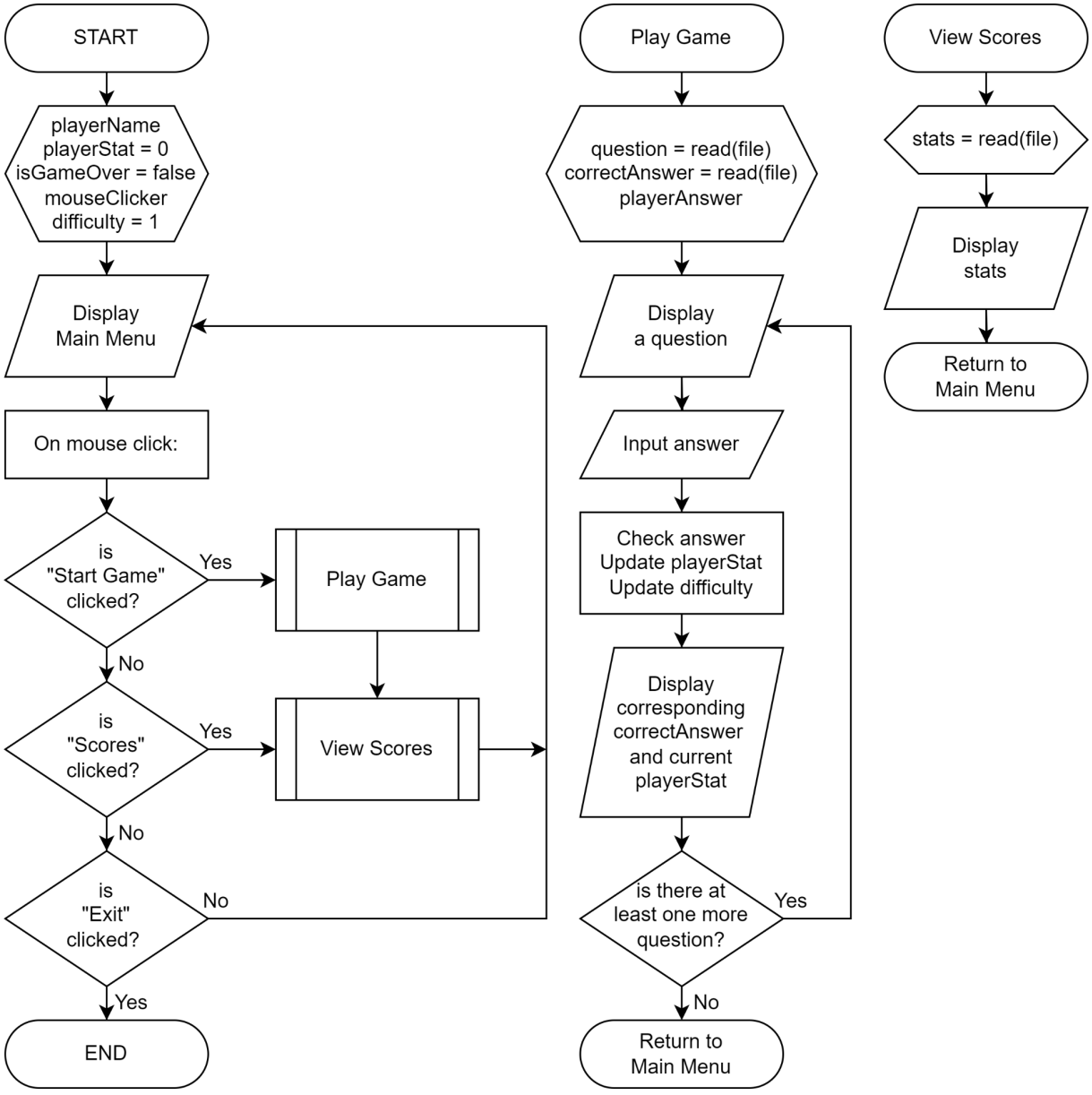
III. Project Description

IPO

Input	Process	Output
Player interaction with game Player answers to educational quizzes or trivia questions Player's selection of difficulty level Player's customization of name Real-world data and statistics on global water crisis	Game mechanics calculate player choices and actions Game checks answers for correctness Game adjusts challenge level accordingly Game stores player's name Game incorporates data into gameplay and educational content	Graphical User Interface and Experience (UI/UX) Game Mechanics In-game achievements and penalties Feedback on player's knowledge of water-related facts and statistics Appropriate level of difficulty for player Personalized gameplay experience Enhanced player understanding of the impact of individual actions on global water crisis

Flowchart

The current flowchart does not represent the final project source code as it is only the outline that would guide us in accomplishing the tasks and the structuring of the program code.



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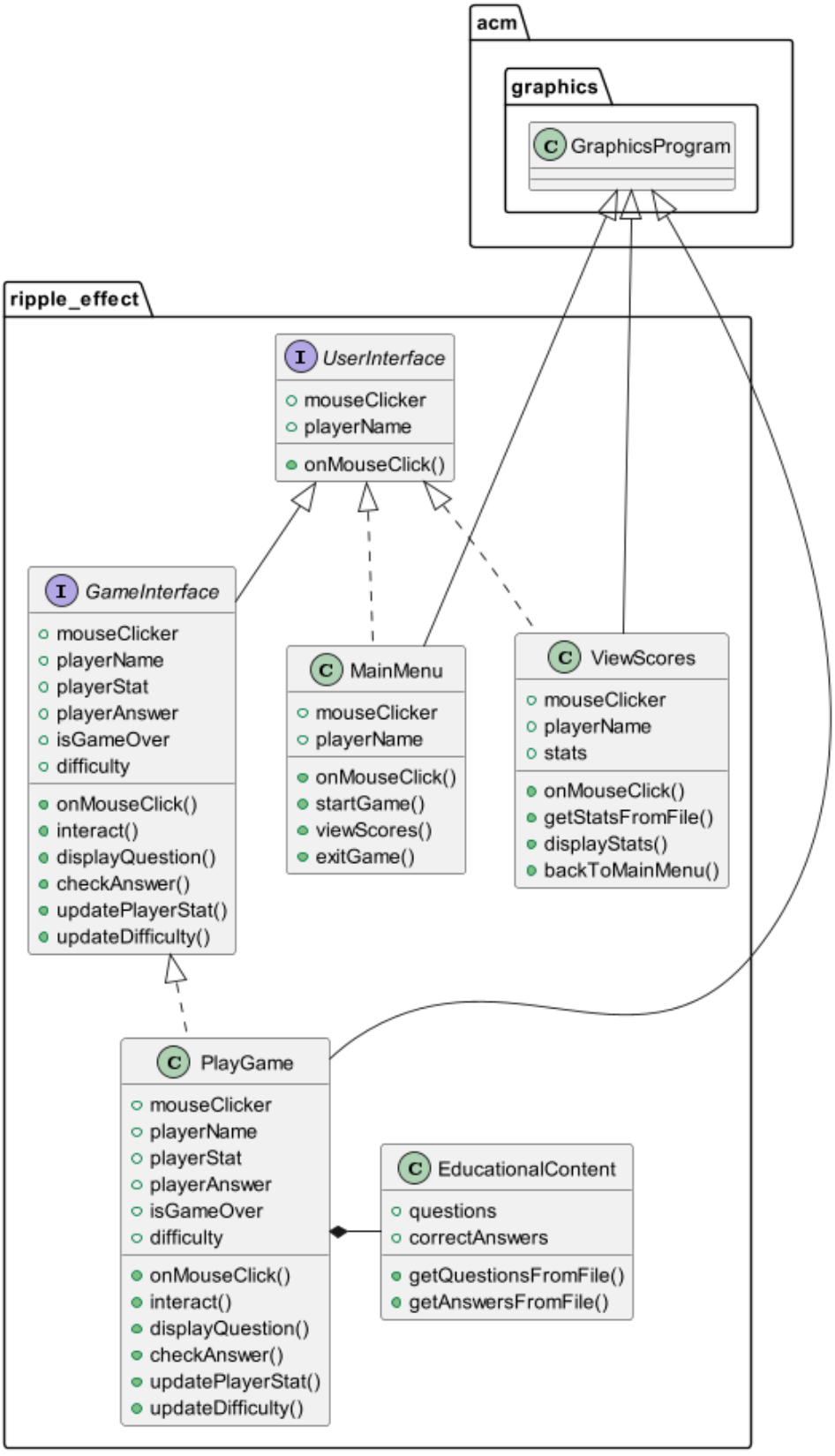
acm
graphics
GraphicsProgram
ripple_effect
UserInterface
mouseClicker
playerName
onMouseClick()
GameInterface
mouseClicker
playerName
playerStat
playerAnswer
isGameOver
difficulty
onMouseClick()
interact()
displayQuestion()
checkAnswer()
updatePlayerStat()
updateDifficulty()
MainMenu
mouseClicker
playerName
onMouseClick()
startGame()
viewScores()
exitGame()
ViewScores
mouseClicker
playerName
stats
onMouseClick()
getStatsFromFile()
displayStats()
backToMainMenu()
PlayGame
mouseClicker
playerName
playerStat
playerAnswer
isGameOver
difficulty
onMouseClick()
interact()
displayQuestion()
checkAnswer()
updatePlayerStat()
updateDifficulty()
EducationalContent
questions
correctAnswers
getQuestionsFromFile()
getAnswersFromFile()

IV. Deliverables

Tasks/Deliverables	***Description***	***Date***	***Person-in-Charge***
Initial Planning	● Brainstorming for ideas and deciding on which one to use for our project. ● Efficient distribution of tasks/ deliverables to group members. ● Search for references and resources that can be utilized for this project.	June 15, 2023	Win Sy Leigh Tabanao Timothy Tiu
Program Structuring	● Planning of Java code structures using a flowchart, IPO diagram, and Plant UML diagram.	June 15-26, 2023	Leigh Tabanao
Final Proposal	● Finalization of project proposal to be uploaded in the GitHub repository.	June 26, 2023	Timothy Tiu
Program Coding	● Coding of the program for the project, utilizing the four pillars of Java	June 27, 2023 - July 17, 2023	Win Sy
Documentation	● Writing of Project Documentation and User Manual ● Finalization of Project Paper		Leigh Tabanao Timothy Tiu
Project Review	● Review of the program codes and files uploaded to GitHub to make sure no errors are found	July 18, 2023	Win Sy
Presentation and Demonstration	● Making of video presentation and demo to be uploaded in YouTube and the link included in the README.md of the project repository	July 19, 2023	Win Sy Leigh Tabanao Timothy Tiu

V. Evaluation

We will evaluate our project based on the following:

Criteria	***Description***
Graphical User Interface (GUI)	We will assess how aesthetically pleasing the visual assets are for the GUI in addition to how easy it is to understand the game mechanics through user experience and/or the included tutorial/s. We may also seek the opinions of other students for this criteria.
Program/Code Structure	We will evaluate the organization and readability of the code, as well as its efficiency and use of appropriate data structures and algorithms.
Educational Content	We will assess how well the game teaches its intended subject matter and how effectively it conveys information to the player.
Game Difficulty	We will evaluate whether the game provides an appropriate level of challenge for its intended audience and whether it offers a good balance between difficulty and accessibility.
Player Engagement	We will assess how engaging and enjoyable the game is to play, taking into account factors such as its pacing, replayability, and overall fun factor.

VI. Conclusion

At the end of the game, the players are more informed on proper water conservation and waste management. By engaging in different parts of the game, they will be able to realize the differences in conserving limited amounts of water. In reality, not everyone is given the same amount of water for survival and daily usage. The project will enlighten its audience on the importance of conserving water and how to use them properly.

VII. References

BSG for SDG. (n.d.). Quiz on SDG 6 "Clean Water and Sanitation". Bharat Soka Gakkai (BSG) for Sustainable Development Goals (SDGs). https://www.bsgforsdg.org/sdg-quiz/quiz-on-sdg-6-clean-water-and-sanitation

Centre for Systems Solutions - CRS (2018). Flood Resilience Game (Games4Sustainability). https://floodresilience.socialsimulations.org/?_gl=1%2A1kzcan%2A_ga%2AMjAzMDQzMjcxNC4xNjg3NDA5OTk5%2A_ga_2N5PHNFQV0%2AMTY4NzQwOTk5OS4xLjEuMTY4NzQxMjAzMi4wLjAuMA..

Centre for Systems Solutions - CRS (2018). P.I.P.E.S.: Public Infrastructure Participatory Engagement Simulation (Games4Sustainability). https://pipes.socialsimulations.org/

Centre for Systems Solutions - CRS (2019). Nexus Game (Games4Sustainability). https://nexus.socialsimulations.org/

HomeWater. (2022). Water Conservation: Why It's Important and What You Can Do. HomeWater. https://www.homewater.com/blog/water-conservation-why-its-important

Martin. (2022). Water and Sanitation. *United Nations Sustainable Development*. https://www.un.org/sustainabledevelopment/water-and-sanitation/

Research guides: Digital Pedagogy - A Guide for Librarians, Faculty, and Students: Game Based Learning - Why Do it: Benefits, Challenges. (n.d.). https://guides.library.utoronto.ca/c.php?g=448614&p=3505475

Rotary Service and Engagement (2018). 5 ways to improve water quality and access to water. https://rotaryserviceblog.org/2018/03/02/5-ways-to-improve-water-quality-and-access-to-water/

Silver, N. (2023). Why Is Water Important? 16 Reasons to Drink Up. *Healthline*. https://www.healthline.com/health/food-nutrition/why-is-water-important#saliva

The World Bank. (n.d.). Clean water and sanitation (Statistical Data). *The World Bank*. https://datatopics.worldbank.org/sdgatlas/archive/2017/SDG-06-clean-water-and-sanitation.html

Water Use It Wisely. (2022). Fun Activities - Kids and Teachers. *Water Use It Wisely*. https://wateruseitwisely.com/kids-teachers/fun-activities/

WHO. (2019). Water, sanitation and hygiene (WASH). *World Health Organization*. https://www.who.int/health-topics/water-sanitation-and-hygiene-wash