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Bachelor's Thesis

Erebos Gheil Regnum

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ABSTRACT

This project presents the development of a narrative driven interactive game using Unity, focusing on character interaction and player dialogue decision making. The visual novel game, titled "Erebos Gheil Regnum," follows the protagonist's story as they navigate a fantasy themed academy and world. The primary objective was to create an engaging and immersive game with the assistance of Artificial Intelligence (AI).

Key game segments include a welcoming home screen, a name customization screen, a dynamic dialogue screen with a comprehensive scene management structure, and a credits end page. The game's architecture leverages Unity's asset management and scripting capabilities to facilitate seamless transitions between different scenes. Unity was chosen for its robust features, cross-platform capabilities, and strong community support, providing the necessary tools for asset management, scene creation, and scripting.

The development process integrated various AI tools to enhance the creative process and ensure high quality outputs. ChatGPT-4 was utilized for dialogue improvement and coding assistance, generating realistic and engaging conversations. Stable Diffusion was employed to create high quality character and scene artwork, providing a means to quickly and flexibly produce visually appealing assets that matched the game's aesthetic. The AI music generator Suno, along with Soundraw, was used to compose the game's soundtrack, creating adaptive music that enhanced the game's atmosphere. Additionally, AI tools like AI background removers were used to efficiently handle background removal tasks, further streamlining the content creation process.

These tools significantly enhanced the creative process with fast workflows, enabling the efficient generation of high quality content. The project demonstrates the feasibility and transformative potential of integrating AI in game development, offering insights into the design and implementation challenges associated with such projects. The relevance of this work lies in its potential applications in both educational and entertainment sectors, providing a framework for developing interactive games with AI. The outcome highlights the ability to create complex and breathtaking games within a game engine, showcasing the practical benefits and future possibilities of AI enhanced game development.

Keywords: Visual Novel, AI Applications, Unity Game Development, Dynamic Dialogue System

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1 Introduction

1.1 Background

The gaming industry has rapidly evolved, with visual novels emerging as a distinct genre that emphasizes narrative driven gameplay combined with rich visual and audio elements. Unlike traditional action oriented games, visual novels focus on storytelling and player choices. This genre allows for a deep exploration of characters, plot and themes, making it a powerful medium for storytelling.

Artificial Intelligence (AI) has significantly influenced game development, allowing the creation of dynamic environments, realistic character interactions, and personalized experiences. In visual novels, AI can be used to generate dialogues, lifelike scenery, and compose adaptive music and sound effects, thereby enhancing the overall player experience.

"Erebos Gheil Regnum"(EGR) is a visual novel set in a fantasy themed academy. The development of this game leverages AI to enhance the creative process and deliver an immersive experience. The game was developed using Unity, a robust game development platform known for its powerful asset management and scripting capabilities. Several AI tools were integrated into the development process. ChatGPT-4 was used to improve dialogues and assist with coding, generating realistic and engaging conversations. Stable Diffusion created high quality character and scene artwork, while Suno, an AI music generator, composed soundtracks.

1.2 Objectives

The primary objective of this thesis is to explore and demonstrate the potential of integrating Artificial Intelligence (AI) tools in the development of narrative driven interactive games, specifically within the visual novel genre. The project focuses on creating a game titled Erebos Gheil Regnum.

A key objective is to develop an engaging and immersive storyline that captivates players, allowing them to make meaningful choices. The narrative aims to be rich with character development and plot twists. The project also aims to implement essential components of the game, including a welcoming home screen, a name customization screen, a dynamic dialogue system, comprehensive scene management, and a credits screen.

Additionally, the thesis seeks to evaluate the effectiveness and impact of AI enhanced game development. This includes assessing the efficiency of the development process, the quality of the generated content, and the overall player experience. By achieving these objectives, the project aims to demonstrate how AI can be effectively integrated into game development to create more dynamic and engaging interactive narratives.

1.3 Significance of the Study

This study is significant as it explores the integration of Artificial Intelligence (AI) tools in developing video games, particularly within the visual novel genre. By utilizing AI technologies, the project demonstrates it can enhance the game development process, making it more efficient and cost effective.

Additionally, the techniques explored in this project have broader applications in educational and training contexts, providing a framework for creating engaging and effective interactive content. The study also offers practical insights into the challenges and solutions of integrating AI in game development, contributing valuable knowledge to the fields of AI and game creation.

1.4 Thesis Structure

This thesis is organized into seven main chapters, each focusing on different aspects of the development of the game "Erebos Gheil Regnum."

Chapter 1: Introduction
This chapter introduces the project by providing essential background information on the gaming industry and the visual novel genre. It outlines the objectives of the study, emphasizing the significance of integrating AI in game development. Additionally, it offers an overview of the entire thesis structure, setting the stage for the subsequent chapters.

Chapter 2: Literature Review
This chapter conducts a comprehensive review of relevant literature. It begins by discussing the fundamentals of game development, including the key stages and considerations involved. The chapter then explores the characteristics and evolution of visual novels, highlighting their unique narrative and interactive elements. It also

examines the application of AI in game development, detailing various AI techniques and their impacts. Finally, the functionalities of the Unity game engine are reviewed, showcasing its capabilities and advantages for game development.

Chapter 3: Methodology

This chapter describes the methodology used in the development of "Erebos Gheil Regnum." It details the preproduction phase, which involved defining the game concept, storyline, characters, and overall design. The production phase is then discussed, focusing on the tools and technologies employed, such as Unity, Visual Studio, Photoshop, and Git. The integration of AI tools, including ChatGPT-4, Stable Diffusion, and Suno, is also covered, illustrating how these tools enhanced various aspects of the game. The chapter concludes with an explanation of the design process for key game components, such as character and scene design, audio, and story.

Chapter 4: Game Architecture

It provides a detailed description of the game's architecture, highlighting its main components. The home screen serves as the entry point for players, setting the tone for the game. The name customization screen allows players to personalize their experience. The dialogue screen, as the core of the visual novel experience, is designed to display text, character portraits, and backgrounds cohesively. Finally, the credits screen provides recognition of the development team. The chapter explains how these elements work together to create a seamless and immersive player experience, leveraging Unity's powerful features and scripting capabilities.

Chapter 5: Results and Discussion

This chapter presents the findings from the development and testing of the game. It begins by discussing the overall gameplay experience, emphasizing the narrative depth and player dialogue choices. User feedback is then analyzed, highlighting the positive aspects of the game as well as areas for improvement. The performance evaluation section covers the game's optimization across various hardware configurations. Finally, the chapter addresses the challenges encountered during development and the solutions implemented to overcome these obstacles, providing insights into the iterative process used to refine the game.

Chapter 6: Conclusion

Conclusion is the key findings of the study, discussing the implications of the results and suggesting directions for future research. It reflects on the overall success of the project and its contributions to the fields of AI and game development. The chapter emphasizes the transformative potential of AI in game development, underscoring the insights gained from this project and their significance for ongoing innovation in the industry.

Chapter 7: References

This chapter lists all the references cited throughout the thesis, providing full bibliographic details to support the research and findings presented. It ensures that the sources of information are properly acknowledged and allows readers to locate the original works for further reading.

Appendices

The appendices include additional material that supports the main text. This includes detailed descriptions of characters, extended user feedback questionnaires, and examples of in game screenshots and messages. The appendices provide supplementary information that enhances the reader's understanding of the development process and the final product.

2 Literature Review

2.1 Game Development

Game development is a process that involves the design, creation, and release of games. It encompasses a wide range of disciplines, including programming, graphic design, audio design, narrative development, and user experience (UX) design. The process typically begins with the conceptualization of a game idea, followed by the development of game mechanics, storylines, and visual and audio assets. This section provides an overview of the key stages and considerations in game development.

The initial phase of game development is preproduction, where the concept of the game is defined. This involves brainstorming sessions to develop the game's core idea, genre, target audience, the gameplay mechanics, story, characters, levels, and user interface and selling points.

Following preproduction, the production phase starts, which is the most intensive and time consuming part of game development. During this phase, programmers, artists, and designers work together to build the game according to planned ideas. Programmers develop the game's code, ensuring that the game mechanics function as intended. Artists create the visual assets, including characters, environments, and animations, while audio designers produce the sound effects and music that will be used in the game.

One of the critical aspects of game development is the iterative process of testing and refining the game. Playtesting is conducted to identify bugs, balance gameplay, and ensure that the game provides an enjoyable experience. It’s necessary to adjustments and improvements each step of the way. This cycle of testing and refinement continues until the game meets the desired quality standards.

The final phase is postproduction, which involves polishing the game, fixing any remaining bugs, and preparing for the game's release. Marketing strategies are also developed during this stage to promote the game to potential players.

The advent of advanced technologies, such as powerful game engines like Unity and Unreal Engine, has significantly streamlined the game development process. These engines provide developers with a comprehensive suite of tools for creating and managing game assets, rendering, and scripting. They also support cross platform development, allowing games to be published on multiple platforms, such as PC, consoles, and mobile devices.

In recent years, the incorporation of Artificial Intelligence (AI) in game development has opened new possibilities for creating more dynamic and immersive gaming experiences. AI can be used to enhance various aspects of game development, including content generation of all kinds, non-player character (NPC) behavior, and the list goes on.

2.2 Visual Novels

Visual novels are a genre of interactive storytelling that combines narrative driven gameplay with visual and audio elements. Originating in Japan, they have gained worldwide popularity for their storylines, character development, and player choices that influence the story's outcome.

Visual novels present their stories through text, dialogue, and static or animated images, often accompanied by music, sound effects, and voice acting. The focus is on narrative and character interactions rather than action or complex gameplay mechanics. Players progress by reading and making key choices, leading to multiple branching paths and different endings, which enhances replayability. The genre's flexibility accommodates diverse themes, from romance and mystery to horror and science fiction.

Character development is crucial in visual novels, with well developed characters whose personalities, backgrounds, and motivations create meaningful and impactful player choices. High quality artwork, voice acting, and sound enhance the storytelling experience, making characters and scenes more immersive.

Game engines like Unity and Ren'Py, have expanded the capabilities of visual novels, features like animated sprites and dynamic lighting, make the development much more powerful. Same goes for the integration of AI in visual novel development as it offers new ways of including diverse dialogues, realistic interactions, and personalized stories based on player preferences, leading to more dynamic storytelling experiences.

2.3 Use of AI in Game Development

AI has become a crucial component in game development, enhancing both creation and player experience. Its applications include procedural content generation, NPC behavior, adaptive difficulty, and game analytics.

Procedural Content Generation

AI generates complex game worlds, levels, and environments, saving time and resources while providing unique player experiences. Games like "No Man's Sky" use AI to create vast universes with billions of unique planets.

NPC Behavior

AI algorithms create intelligent, realistic NPC behaviors that adapt to player actions, enhancing immersion. For example, "The Last of Us" uses sophisticated AI to make NPCs respond dynamically to player strategies.

Adaptive Difficulty

AI driven adaptive difficulty adjusts game challenges based on player performance, ensuring an engaging experience for all skill levels. Games like "Left 4 Dead" use AI Directors to balance intensity in real time.

Game Analytics

Analytics provide insights into player behavior, helping developers refine game design, balance mechanics, and enhance satisfaction. AI can also predict player behavior and optimize in game purchases.

Narrative and Dialogue Generation

AI, like OpenAI's GPT-4, enhances narrative content and dialogues, creating diverse, contextually appropriate interactions. This adds depth to character interactions and storylines, making narratives more immersive.

Personalization and Player Experience

AI personalizes games by adapting content to player preferences, enhancing engagement. For instance, "Shadow of Mordor" uses AI to create personalized nemesis systems, where enemies remember and react to past encounters.

2.4 Unity Game Engine

The Unity game engine is a widely used and versatile development platform known for its powerful features, user friendly interface, and extensive community support. Introduced by Unity Technologies in 2005, Unity supports both 2D and 3D game development, making it suitable for a range of applications but mainly for game development.

Core Features of Unity's intuitive editor allows for easy scene design, object creation, and asset management. It supports various graphics APIs like DirectX and OpenGL, ensuring high performance rendering. The physics engine enables realistic simulations, including collision detection and particle effects.

Unity's scripting capabilities, primarily through C#, offer extensive functionality to control game behavior, manage assets, and interact programmatically with the editor. The integrated development environment (IDE) supports debugging, code completion, and version control.

Unity excels in cross platform development, allowing games to be built and deployed on multiple platforms, including Windows, macOS, Linux, PlayStation, Xbox, Nintendo Switch, iOS, Android, and VR/AR devices.

Unity facilitates team collaboration with tools like Unity Collaborate and integration with version control systems such as Git. Cloud build services streamline the process of building and testing games across different platforms.

Unity boasts a large and active community that contributes and supports on forums, tutorials, and documentation. Unity Technologies also provides comprehensive documentation, online courses, and certification programs to help developers master the engine.

Unity industry use is used by both indie developers and large studios to create a diverse range of games, such as "Cuphead," "Monument Valley," and "Hearthstone." Beyond gaming, Unity is used in architecture, automotive design, and film production, showcasing its versatility.

3 Methodology

3.1 Overview of Methodology

The development process for "Erebos Gheil Regnum" was thoughtfully planned and executed to ensure a high quality final product. The process began with preproduction, which involved defining the game concept, storyline, characters, and overall design. This phase included extensive brainstorming sessions and research.

During production, the focus was on bringing the initial concepts and ideas to life. As the sole developer, I undertook the roles of programmer, writer, artist, and designer to create game mechanics, assets, and scenes. Without a formal Game Design Document (GDD), I directly translated my ideas into the game through a "ask GPT how and just do it" approach. Continuous testing and refinement were integral to the workflow, ensuring each aspect of the game met quality standards.

3.2 Tools and Technologies Used

The development of "Erebos Gheil Regnum" utilized a variety of tools and technologies to streamline the process and enhance the game's quality:

- **Unity:** The primary game engine used for development. Unity was chosen for its robust features, cross platform capabilities, and strong community support. It provided the necessary tools for asset management, scene creation, and scripting.
- **Visual Studio:** The integrated development environment (IDE) used for coding in C#. Visual Studio's features, such as debugging, code completion, and version control integration, facilitated efficient programming.
- **Photoshop:** Used for helping with the creation and altering of 2D art assets, such as character and backgrounds sprites. (Alter sizes of selected segments, fixing lighting, removing backgrounds, etc.)
- **Aseprite:** Used for drawing and fixing art. (I have a bit of drawing experience)
- **Word:** Used to write the story and retain notes for the game.
- **Git:** Version control system used to backup code and assets, tracking changes throughout the development process.

3.3 AI Tools Integration

AI tools played a pivotal role in enhancing various aspects of "Erebos Gheil Regnum," significantly improving the creative process and the final product's quality:

- **ChatGPT-4:** This natural language processing model. It assisted in debugging and coding functionality in the game.
- **Stable Diffusion:** An AI tool employed to generate character and scene artwork. It provided a means to quickly and flexibly produce visually appealing assets that matched the game's aesthetic.
- **Suno and Soundraw:** AI music generators used to compose soundtracks.
- **Removal**: AI background remover

These AI tools streamlined content creation, reduced development time, and ensured quality outputs that would have been more challenging to achieve manually.

3.4 Character and Background Design

Character and background design was a critical component of "Erebos Gheil Regnum,". AI tools like Stable Diffusion and ChatGPT assisted in generating, as well developed characters and backgrounds are essential for an engaging visual novel.

The character design process is nuanced and varies depending on the character. Detailed character profiles are created, including their backgrounds, personalities, and visual appearances. A priority is ensuring that each character is visually distinctive and aligned with the game's theme.

Generally, the process begins with writing a specialized prompt and generating a starting backbone character sprite that meets the initial concept criteria. This initial sprite is then refined into the final design by using repeated inpainting, prompt and settings adjustment with each iteration. This way it’s possible to ensure consistency and quality throughout the game, achieving the target result for each character. The same principles and philosophy apply to background sprite creation as well. This process becomes exponentially harder the higher the quality and uniqueness of the target sprite is, due to lack of training datasets it can slowly become futile. (Note: Photoshop and Aseprite come in handy when inpainting, prompt and settings adjustment aren’t enough and don’t yield the wanted results)

Finally, when the character sprite is completed, the background from the character sprite must be removed. To do so we can combine the power of AI background removers and Photoshop. The big chunk of the background is to be removed from the AI and the details can be fixed in Photoshop

This overall method ensures that both character and background sprites maintain a high level of quality and coherence, enhancing the overall visual experience of the game.

3.5 Audio Design

Audio design was straight forward for creating an immersive and engaging experience. AI tools like Suno and Soundraw were employed to generate soundtracks that enhanced the game's atmosphere. Suno produced high quality music with a prompt, while Soundraw with limited select themes (No prompt) allowed for segment adjustments, providing more flexibility to the composer. The goal was to ensure that the music complemented the narrative and visuals, enriching the overall player experience. Questions I would ask myself would be along the lines of “What kind of music would suit this scene and why?” for example, solving these questions was a task

For sound effects there are many AI generator options to choose from, by entering a simple prompt any sound effect can be recreated and be ready for use, but unfortunately, the project hasn’t reached that segment of the development as of yet. So, there won’t be insights about it in this paper.

3.6 Story Design

Story was written in mind as one of the major selling points and now reaching around 14000 words to achieve at least the very least few hours of reading content. The storyline evolved organically and was fleshed out as time went on. The narrative focused on creating a rich, immersive experience with amazing characters and plot twists. The process involved outlining key story arcs and integrating player dialogue choices which some where funny and creative and some where lethal to the player leading to the death screen. ChatGPT-4 was used to assist in generating, rephrasing and evaluating some dialogues. Not only that but, researching for inspiration using it was more efficient than using google, coming up with great ideas and themes has become easier than ever. Alas ensuring engaging and contextually appropriate story for the player.

The story can be summarized as such:

“Erebos Gheil Regnum" is a visual novel set in a fantastical academy where the protagonist, alongside their childhood friend Yua, navigates a complex world filled with intrigue, magic, and personal growth. The narrative begins with the protagonist's arrival at the academy, reuniting with Yua, and quickly diving into the academy's vibrant life.

Throughout the story, the protagonist encounters various characters such as Stacy, a resilient girl adopted by the restaurant owner Mr. Gustav, and Shikoumori, the enigmatic bat queen who reveals hidden secrets about the academy. The narrative weaves through everyday experiences, intense duels, and significant discoveries about the protagonist's and Yua's pasts.

The story is filled with unexpected events, such as a surprise birthday party for Yua organized by Stacy, and a dramatic duel involving Takeko and Gozen, which highlights the political and cultural conflicts in the world. Magical elements, including different kinds of spells and the mysterious dark magic association, add depth to the narrative.

The plot thickens with intense twists and hidden secrets, creating an atmosphere of mystery and suspense. The lurking unknown threats and oblivious behavior often lead to misfortune, heightening the stakes.

In essence, "Erebos Gheil Regnum" is a tale of friendship, loyalty, and the struggle for peace in a world where magic and politics collide. The protagonist's choices shape their path, leading to a deeply immersive and interactive storytelling experience.

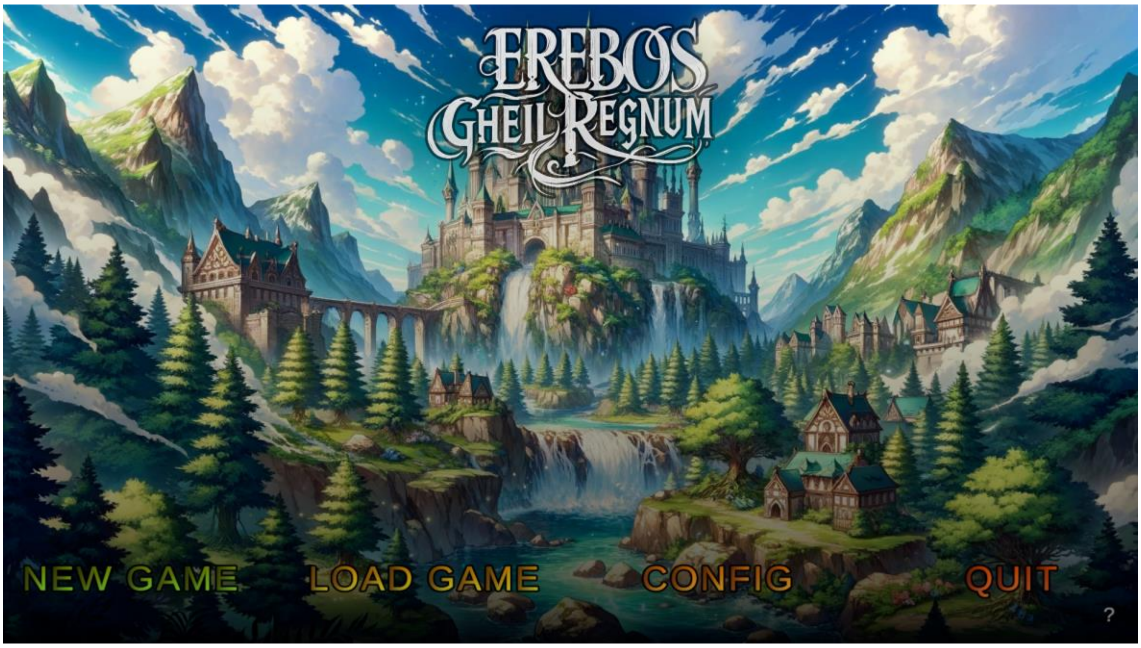
4 Game Architecture

4.1 Overview of Game Architecture

The architecture of "Erebos Gheil Regnum" was designed to ensure a seamless and immersive player experience. The game comprises several key components, each playing a vital role in the overall functionality and narrative flow. These components include the home screen, name customization screen, dialogue screen, and credits screen. Unity's powerful features and scripting capabilities were leveraged to manage these components, ensuring smooth transitions and consistent performance across different scenes.

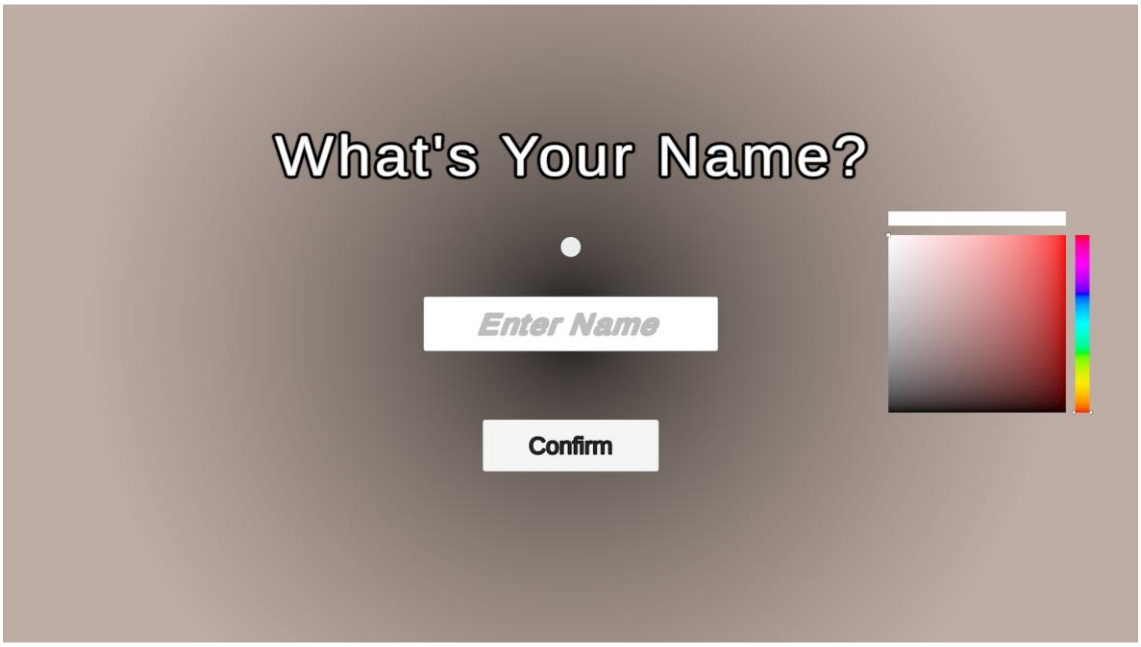
4.2 Home Screen

The home screen serves as the entry point for players, setting the tone for the game. It was designed to be visually appealing and intuitive, providing easy access to the game's main features. The home screen includes options such as "New Game," "Load Game," "Config," "Quit," and “Help(?).” The layout and design elements were carefully chosen to be simple and fit into the screen nicely. Animations and background music were integrated to enhance the immersive experience right from the start. The home screen also includes AI generated artwork to capture the game's aesthetic and draw players into the world. The calligraphic title text was also generated the same way



4.3 Name Customization Screen

The name customization screen allows players to personalize their experience by choosing a name and color display for their protagonist. This feature enhances player immersion by making them feel more connected to the story. The design of this screen is simple yet elegant, with input fields and confirmation buttons styled to match the game's overall theme. There was a 1-15 characters character limit put in place to prevent funky business



4.4 Dialogue Screen

The dialogue screen is the core of the visual novel experience, where most of the storytelling and character interactions occur. It was designed to display text, character portraits, and backgrounds in a cohesive manner. The layout includes text boxes for dialogues, character portraits on either side of the screen, and dynamic backgrounds that change based on the scene.

The interface features several interactive buttons to enhance user experience. The **Next Button**, typically located at the bottom right of the dialogue box, allows players to advance the dialogue to the next sentence. This button can also be activated by pressing the Space, Enter, or Right Arrow keys on the keyboard. Conversely, the **Previous Button**, often positioned to the left of the Next Button, enables players to go back to the previous sentence or scene, which can be triggered using the P, Backspace, or Left Arrow keys.

For players who prefer a more hands free experience, the **Auto Play Button** is available. This button toggles autoplay mode, which automatically advances the dialogue without requiring player input. It can be activated by clicking the button or pressing the A key. To manage game progress effectively, the interface includes a **Save Button** that lets players save the current game state. This feature is crucial for preserving progress and can be accessed by pressing the S key. The **Load Button**, which can be triggered using the L key, allows players to load a previously saved game state, ensuring they can resume their adventure from where they left off.

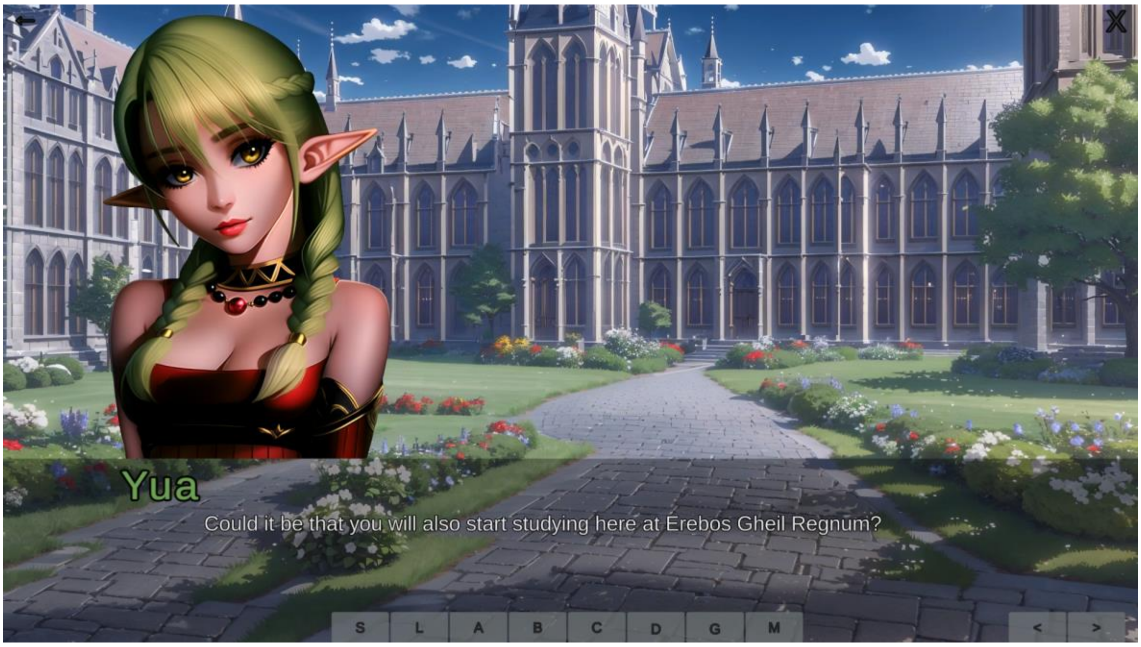
Additionally, the **Gallery Button** opens a gallery where players can view unlocked artwork and listen to music tracks that they have encountered during their gameplay. This feature enriches the player's experience by providing access to visual and auditory content outside of the main narrative. The **Dialogue Log Button** offers a history of past dialogues, allowing players to review previous logged conversations. This log is particularly useful for recalling important plot points or character interactions and can be accessed by pressing the D key.

The **Close Game Button** is a crucial feature for player convenience, prompting the player with an option to quit the game. This button can be activated by pressing the Escape or Q keys. For an immersive visual experience, the **Background Only Button** toggles the visibility of the UI, allowing players to view only the background scene. This feature is ideal for players who want to appreciate the game's artwork without distractions and can be triggered by pressing the B key.

To manage audio settings, the **Mute Button** mutes or unmutes the game audio, providing control over the sound environment. This can be activated by pressing the M key. The **Configuration Button** opens the settings menu, allowing players to adjust various settings such as text speed, volume levels, and other preferences. This ensures that players can tailor their experience to their liking and can be accessed by pressing the C key.

During decision points in the dialogue, **Decision Buttons** (D1 and D2) are presented to the player. These buttons allow players to make dialogue choices, adding an interactive element to the storytelling. These decision buttons are context sensitive and appear only when a choice is required, enhancing the engagement and interactivity of the game.

These buttons provide comprehensive control over the dialogue and game settings, significantly enhancing the player's interactive experience by allowing them to customize their interaction with the game's narrative and visual elements.



Yua

Could it be that you will also start studying here at Erebos Gheil Regnum?

Dialogue Management and Structure

The dialogue system in "Erebos Gheil Regnum" is managed by the `Dialogue_Manager` class, which handles the display and flow of dialogues, character images, backgrounds and transitions. The structure of the dialogue system is as follows:

> **Scene Structure**: Each scene in the game is represented by the `Scene_Structure` class, which contains a list of sentences (`List<sentence>`) to be displayed. Each sentence includes the text, the speaker, and optional voice clips.

```
[CreateAssetMenu(fileName = "newstoryscene", menuName = "Data/New Story Scene")]

[System.Serializable]

public class Scene_Structure : ScriptableObject

{

    public List<sentence> sentences;

    public Sprite background;

    public Scene_Structure nextscene;

    public Scene_Structure previousscene;

    public AudioClip BackgroundMusic;
    [System.Serializable]

    public struct sentence

    {

        public string text;

        public Speaker speaker;

        public AudioClip voice;

    }

}
```

Speaker Structure: The `Speaker` class defines the properties of a speaker, including their name, text color, and character sprite. This helps in dynamically displaying different characters with their respective visual attributes.

```
[CreateAssetMenu(fileName = "NewSpeaker", menuName = "Data/NewSpeaker")]

[System.Serializable]

public class Speaker : ScriptableObject

{

    public string speakerName;

    public Color textColor;

    public Sprite characterSprite;

}
```

Dialogue Manager: The `Dialogue_Manager` class controls the flow of dialogue scenes. It handles input from the player, manages the display of text and images, and ensures smooth transitions between sentences and scenes.

- **Text Display**: The dialogue text is displayed using a typewriter effect controlled by a coroutine. This creates a dynamic and engaging way to present the text to the player.
- **Character Images**: Character sprites are displayed alongside the text, and their visibility and positions are updated based on the current sentence.

- **Background and Music**: The background image and music for each scene are updated as the player progresses through the dialogue.

```
public class Dialogue_Manager : MonoBehaviour {

void Start()

  {

    UI_functionality.decisionFlag = -1;

    StartCoroutine(FadeScreenIn());

    PlayScene(currentScene);

  }



  void Update()

  {

    HandleInput();

  }



  private void HandleInput()

  {

    // Input handling logic for advancing dialogue and interacting with UI

  }



  private IEnumerator TypeText(string text)

  {

    dialogueText.text = "";

    state = State.PLAYING;

    isTyping = true;
    foreach (char c in text)

    {

        dialogueText.text += c;

        yield return new WaitForSeconds(TypeTextSpeed);

    }

    state = State.COMPLETED;

    isTyping = false;

}


private void PlayNextSentence()

{

    if (sentenceIndex < currentScene.sentences.Count - 1)

    {

        sentenceIndex++;

        StartCoroutine(UpdateSentenceDisplay());

    }

    else

    {

        HandleSceneCompletion();

    }

}


private IEnumerator UpdateSentenceDisplay()

{

    var sentence = currentScene.sentences[sentenceIndex];
```

```
        string playerName = PlayerPrefs.GetString("PlayerName", "Player");

        sentence.text = sentence.text.Replace("(name)", playerName);



        speakerNameText.text = sentence.speaker.speakerName == "(name)" ?
playerName : sentence.speaker.speakerName;

        speakerNameText.color = sentence.speaker.textColor;



        if (sentence.speaker.characterSprite != null)

        {

            characterImage.sprite = sentence.speaker.characterSprite;

            characterImage.gameObject.SetActive(true);

        }

        else

        {

            characterImage.sprite = null;

            characterImage.gameObject.SetActive(false);

        }



        PlayVoice(sentence.voice);

        typingCoroutine = StartCoroutine(TypeText(sentence.text));

    }



    private void PlayVoice(AudioClip voice)

    {

        nextvoice.Stop();
        if (voice != null)

        {

            nextvoice.PlayOneShot(voice);

        }

    }

}
```

UI Functionality: The `UI_Functionality` class manages the user interface elements related to the dialogue system, such as buttons for advancing dialogue, toggling auto-play, and displaying additional UI components like the dialogue log and gallery.

```
public class UI_Functionality : MonoBehaviour {

private void AssignButtonListeners()

    {

        NextButton.onClick.AddListener(() =>
dialogueManager.HandleSpaceInput());

        PrevButton.onClick.AddListener(() =>
dialogueManager.PlayPreviousSentenceOrScene());

        DialogueLogButton.onClick.AddListener(() => ToggleDialogueLog());

    }



    private void ToggleDialogueLog()

    {

        DialogueLogBar.SetActive(!DialogueLogBar.activeSelf);

    }

}
```

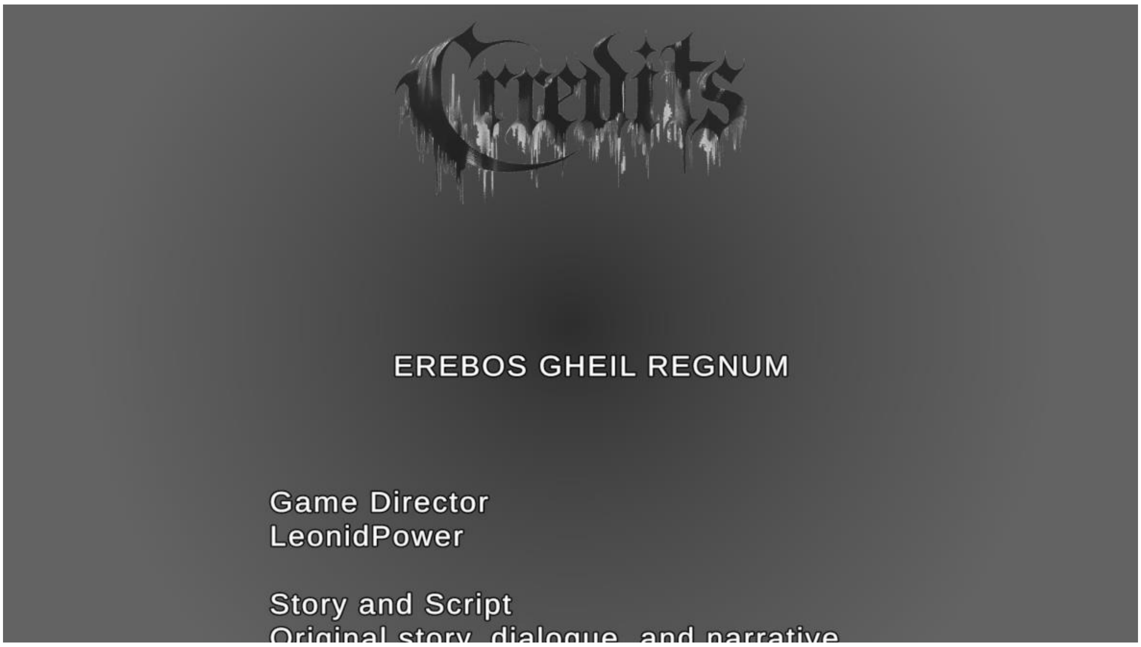
FadeScreenIn Coroutine: This coroutine handles the fading in of the screen at the beginning of a scene or dialogue segment. It gradually increases the opacity of a UI image overlay, making the scene visible.

```
private IEnumerator FadeScreenIn()
{
    CanvasGroup canvasGroup = GetComponent<CanvasGroup>();
    float fadeDuration = 1.0f;
    float elapsedTime = 0f;

    while (elapsedTime < fadeDuration)
    {
        elapsedTime += Time.deltaTime;
        canvasGroup.alpha = Mathf.Lerp(1, 0, elapsedTime / fadeDuration);
        yield return null;
    }
    canvasGroup.alpha = 0;
}
```

4.5 Credits Screen

The credits screen provides recognition of the development of "Erebos Gheil Regnum." It is designed to be both informative and visually appealing, maintaining the thematic consistency of the game. The credits roll format was chosen, with scrolling text displaying the names and roles of contributors (me), accompanied by background music composed by Suno. AI tools were used to generate the calligraphic credits text.



Credits

EREBOS GHEIL REGNUM

Game Director
LeonidPower

Story and Script
Original story, dialogue, and narrative

5 Discussion of the Findings

5.1 Gameplay Experience

The gameplay experience of "Erebos Gheil Regnum" was designed to be immersive and engaging, focusing on narrative depth and player dialogue choice. Players navigate a fantasy themed academy, following the storyline and character relationships. The game's dynamic dialogue system, powered by ChatGPT-4, ensures that conversations are contextually appropriate and varied, providing a unique experience in each playthrough. Visual and audio elements, including AI generated artwork and adaptive music, contribute to the atmospheric and emotional depth of the game. Overall, the gameplay experience has been positively received for its compelling narrative and rich character development.

5.2 User Feedback

User feedback was gathered through beta testing phases, where a diverse group of players provided insights into their experiences with the game. Feedback was collected via interviews. Players appreciated the high quality artwork, engaging story, and the impact of their choices on the narrative. However, some areas for improvement were identified. This feedback was invaluable in refining the game, addressing bugs, and enhancing the players experience. Over all the players where surprised and excited from the quality and sheer work that was honed into the game

5.3 Performance Evaluation

Performance evaluation was conducted to ensure the game ran smoothly across various hardware configurations. Metrics such as frame rate, load times, and memory usage were monitored during testing. The game was optimized to maintain high performance, with particular attention to rendering efficiency and asset management. The final version of the game achieved consistent and fast performance, providing a seamless experience for players on both high end and lower spec systems since no feature would exceed 2 second load process time.

5.4 Challenges and Solutions

The development of "Erebos Gheil Regnum" presented several challenges, ranging from technical issues to creative obstacles. This section outlines the key challenges encountered during the project and the solutions implemented to address them.

Challenge 1: Maintaining Consistent Quality Across Assets Problem: Ensuring consistent quality across different types of assets, such as character sprites, backgrounds, and music, was challenging. Variations in styles and quality could disrupt the player's immersive experience. Solution: A standardized workflow was established for asset creation and refinement. For visual assets, Photoshop and Aseprite were used alongside Stable Diffusion to ensure consistency. Regular reviews and iterative refinements helped maintain a cohesive art style. For audio, guidelines for tone, mood, and style were established, and tools like Suno and Soundraw were used to generate music that matched these guidelines.

Challenge 2: Creating Dynamic and Engaging Dialogues Problem: Developing dynamic and engaging dialogues that the player chooses required a sophisticated dialogue management system. Ensuring dialogues were contextually appropriate and varied was crucial. Solution: ChatGPT-4 was leveraged to generate and refine dialogues while also summarizing big chunks of story to create notes to be able to continue writing the story without having to read it and recall it from the start. A robust dialogue management system was implemented, which included features for dialogues and conditional responses based on player choices.

Challenge 3: Managing Development as a Sole Developer Problem: Handling all aspects of development, including programming, writing, art, and design, as a sole developer was overwhelming and time consuming. Solution: Effective time management and task prioritization were crucial. Plans with milestones and deadlines were created to stay on track. Additionally, leveraging AI tools significantly reduced the workload by automating parts of the content creation process. Regular breaks and seeking feedback from peers helped maintain motivation and ensure high quality output.

6 Conclusions

The development of "Erebos Gheil Regnum" has been a profound journey, demonstrating the remarkable synergy between artificial intelligence and game development. This project not only serves as a testament to the capabilities of AI tools in enhancing various aspects of game creation but also paves the way for future advancements in the field. The insights gained from this endeavor highlight the transformative potential of integrating AI into the creative process, offering valuable lessons and setting a precedent for the next generation of game developers.

One of the primary achievements of this project is the seamless integration of multiple AI tools to streamline and enhance the development process. ChatGPT-4 played a crucial role in generating and refining dialogues, providing a dynamic and engaging narrative experience. Stable Diffusion contributed significantly to the visual aspects, creating high quality character and scene artwork that added depth and immersion to the game. Suno and Soundraw, the AI music generators, produced adaptive soundtracks that enriched the game's atmosphere, ensuring an immersive audio experience. The use of AI background removers further streamlined the content creation process, enabling efficient handling of visual assets.

Throughout the development, numerous challenges were encountered, each presenting unique obstacles that required innovative solutions. Ensuring consistent quality across different types of assets was a significant challenge, but a standardized workflow for asset creation and iterative refinement helped maintain a cohesive art style. Developing dynamic and engaging dialogues demanded a sophisticated dialogue management system, which was achieved with the complicated Scene manager and ChatGPT-4. Managing the development as a sole developer was overwhelming, yet effective time management, task prioritization, and leveraging AI tools significantly reduced the workload and facilitated the creation of a high quality final product.

The game architecture was meticulously designed to provide a seamless and immersive player experience. Key components such as the home screen, name customization screen, dialogue screen, and credits screen were developed using Unity's powerful features and scripting capabilities. This ensured smooth transitions and consistent performance across different scenes, enhancing the overall gameplay experience.

User feedback was instrumental in refining the game, providing insights into areas of improvement and validating the positive aspects of the gameplay. The performance evaluation ensured that the game ran smoothly across various hardware configurations, maintaining high performance and providing a seamless experience for players on both high-end and lower-spec systems.

The narrative of "Erebos Gheil Regnum" emerged as a major selling point, offering a rich and immersive story filled with engaging characters and plot twists. The storyline evolved organically, with the help of AI tools to generate and refine content, ensuring a compelling and contextually appropriate narrative for players.

7 References

- **Stable Diffusion** (2024). Stability AI, Stability AI website.
- **Suno** (2024). AI music generator, Suno website.
- **Unity Technologies** (2024). *Unity Game Engine Documentation*, Unity website.
- **Visual Studio** (2024). Microsoft, Visual Studio website.
- **Soundraw**. AI music generator, Soundraw website.
- **Removal**. Background remover, Removal website

APPENDIX

Survey Questionnaire

The following questions were used to gather user feedback during the beta testing phase of "Erebos Gheil Regnum":

1. **How did you feel about the visual and audio elements of the game (artwork, music, sound effects)?**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied

2. **Who is your favorite character?**
   - [Open ended response]

3. **How do you feel about the UI (user interface)?**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied

4. **Did you encounter any bugs or technical issues during your gameplay?**
   - Yes (please specify)
   - No

5. **What improvements would you suggest for the game?**
   - [Open ended response]

Character Examples

Yua: A charming elf girl with a warm personality. Yua is a kindhearted friend who cherishes her past memories with the protagonist and is happy to rekindle their bond.

Shikoumori: The Bat Queen with a mysterious and alluring presence. She has a cool and playful side while also having an artistic and dreamy personality and is involved in the academy's protection.

Stacy: A resilient and kindhearted girl adopted by the owner of the Battling Fork restaurant. Stacy is known for her dedication to her friends and her exceptional culinary skills.

Fuyuko: "A highly esteemed royal maid from France, sent to Japan to learn and improve her skills". She may comes off as cold and passive aggressive but reveals a different side of her later on.

Takeko: A skilled warrior known for her combat prowess and unyielding determination. She upholds the name "voice of the dragons", trying to bring back once lost peace.

Gozen: A master tactician, strategist and duelist, revered for her intellect, quick thinking and deadly moves. One of 16 elite commanders and is now in charge of the Glory Walker division.

Rose: is the daughter of Robert White, owner of the prestigious White Garden. Known for her elegance and leadership, she manages her family's garden affairs and engages with the community. Despite her aristocratic background, she remains approachable and compassionate person

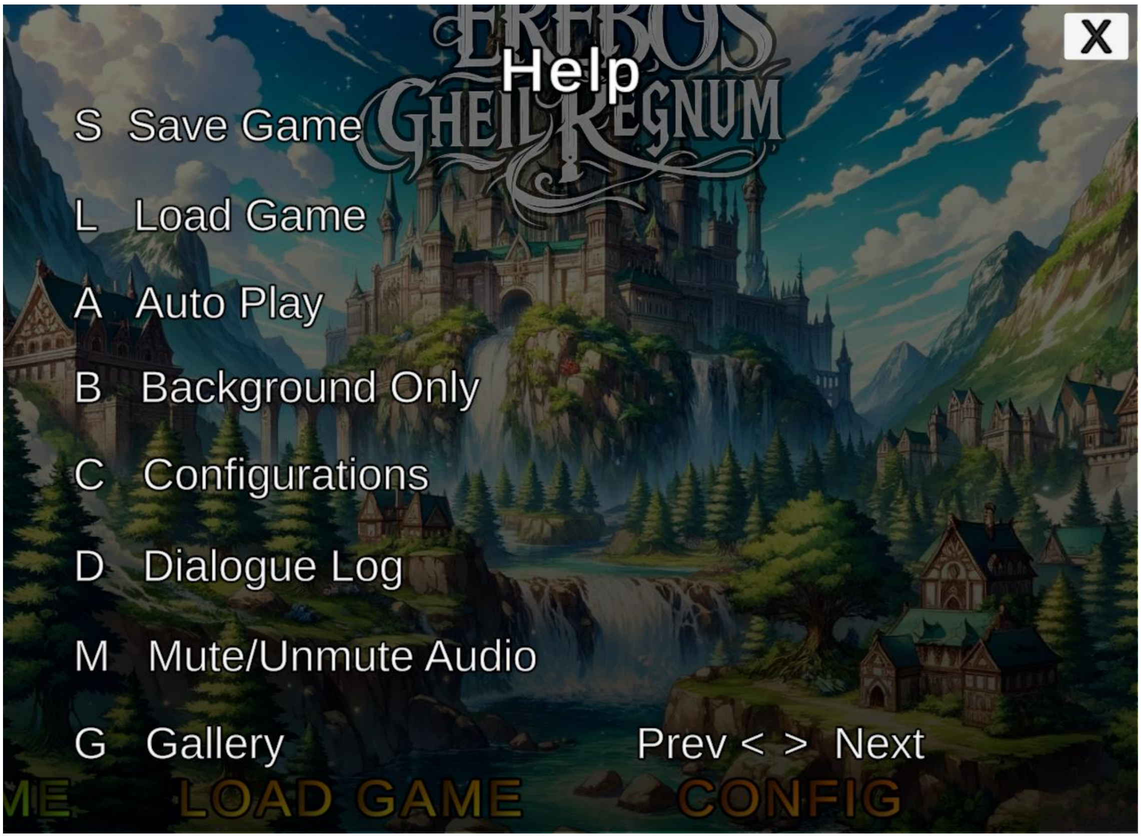
Birsha: An enigmatic sorceress with deep connections to ancient magic. She uses her vast knowledge of spells and rituals to protect and guide her companions.

Music Example

Fade Into the Rain.mp3 Echoes of Rain.mp3 Track1.wav Track2.wav

Extra In game Screenshots

Help Tab



Help

S Save Game

L Load Game

A Auto Play

B Background Only

C Configurations

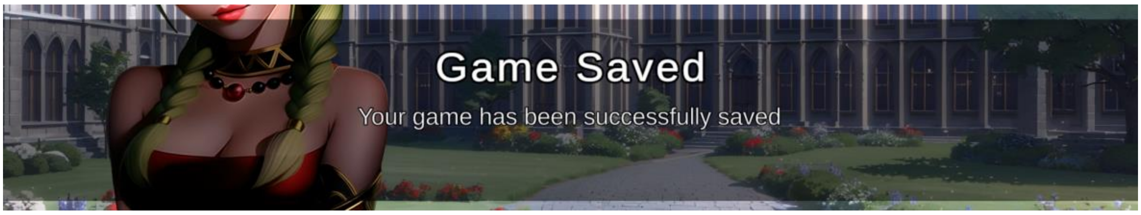
D Dialogue Log

M Mute/Unmute Audio

G Gallery

Prev < > Next

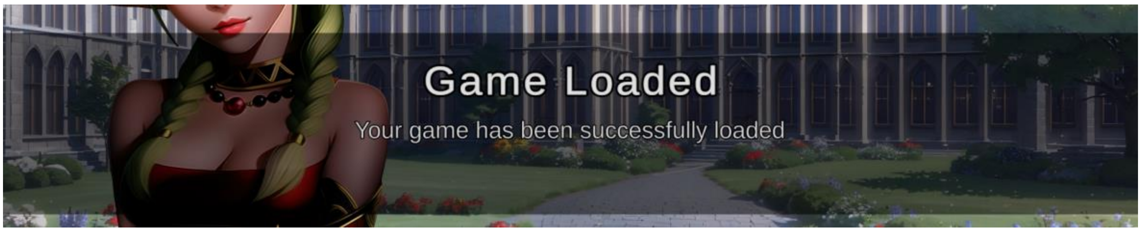
Game Saved state bar message



Game Saved

Your game has been successfully saved

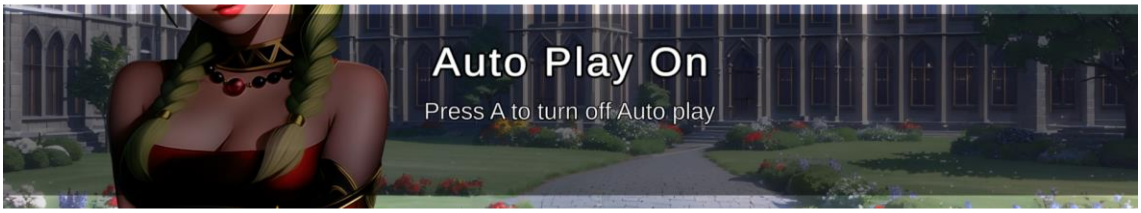
Game Loaded state bar message



Game Loaded

Your game has been successfully loaded

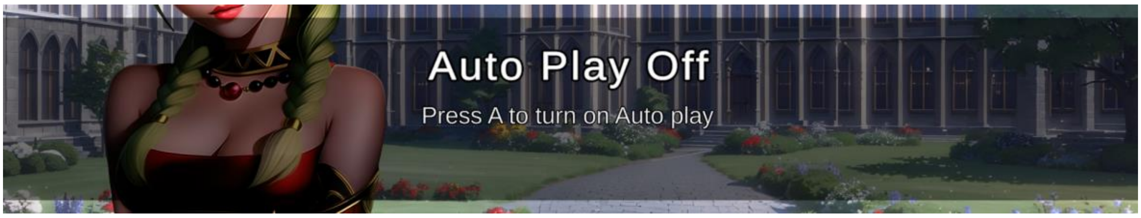
Autoplay On state bar message



Auto Play On

Press A to turn off Auto play

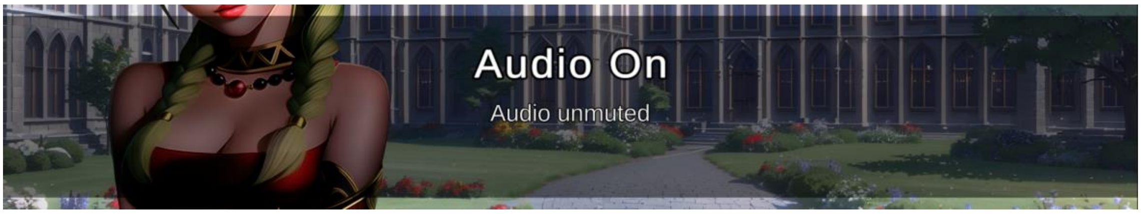
Autoplay Off state bar message



Auto Play Off

Press A to turn on Auto play

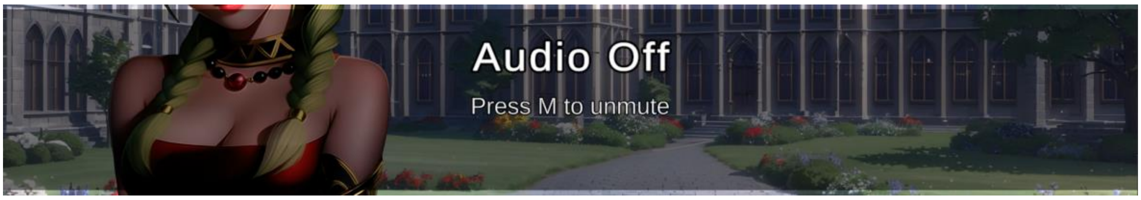
Audio On state bar message



Audio On

Audio unmuted

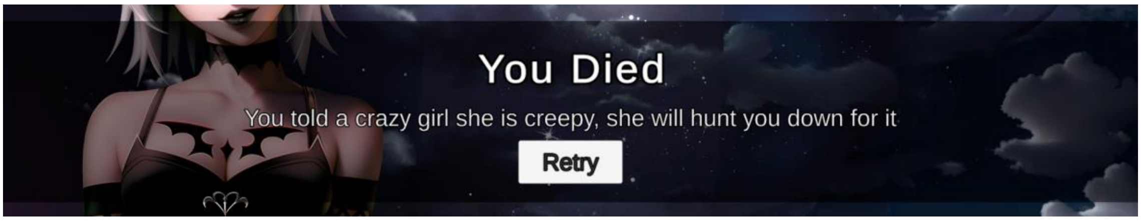
Audio off state bar message



Audio Off

Press M to unmute

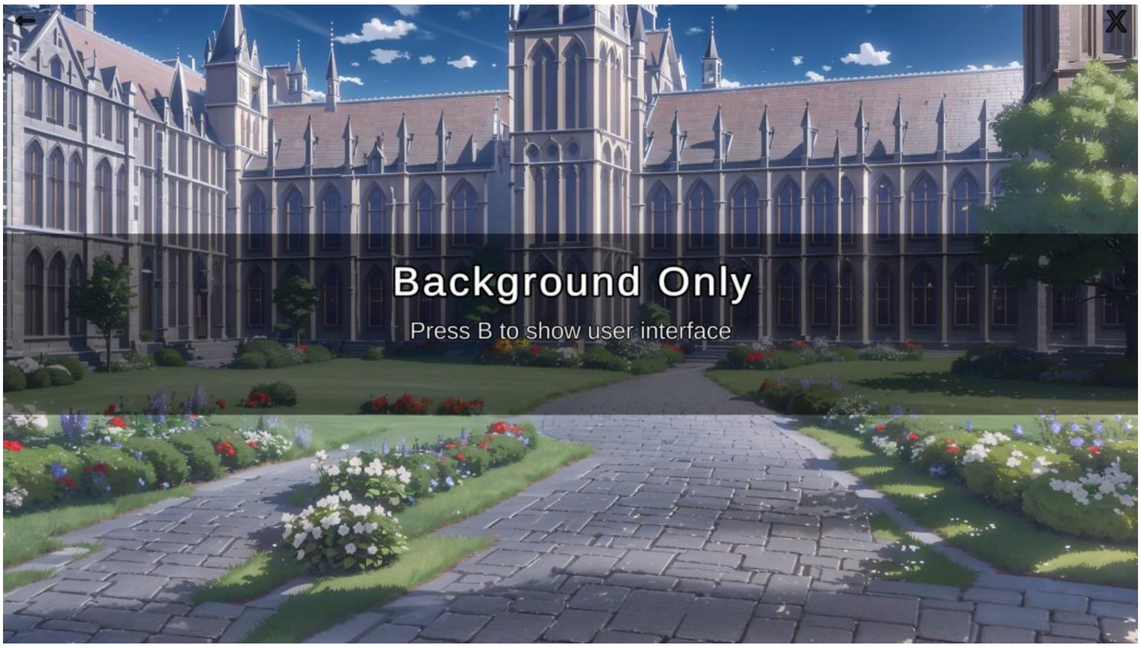
You Died state bar message



You Died

You told a crazy girl she is creepy, she will hunt you down for it

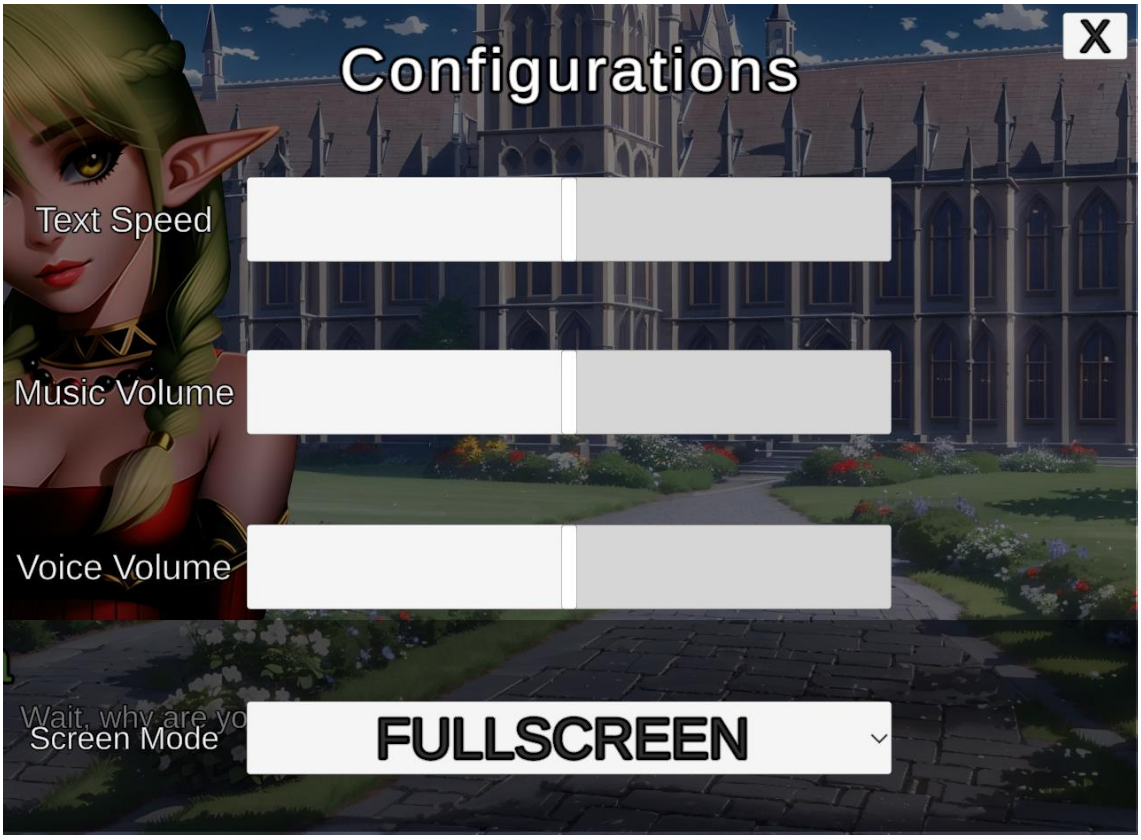
Background Only state bar message



Background Only

Press B to show user interface

Configurations tab



Configurations

Text Speed

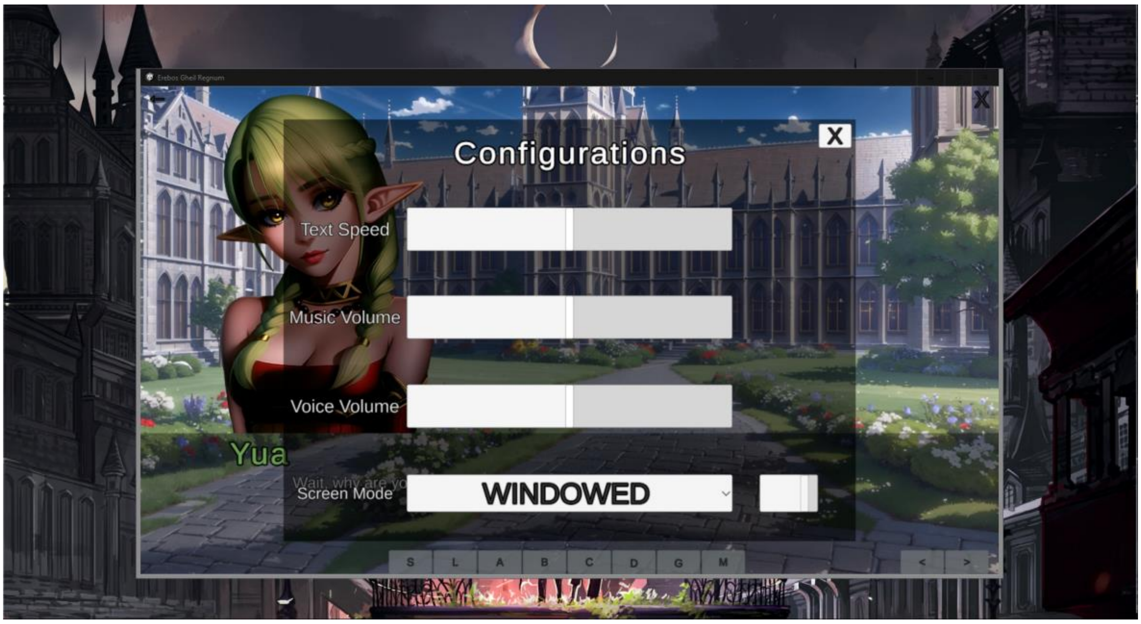
Music Volume

Voice Volume

Wait, why are yo

Screen Mode FULLSCREEN

Configurations tab windowed mode big size



Configurations

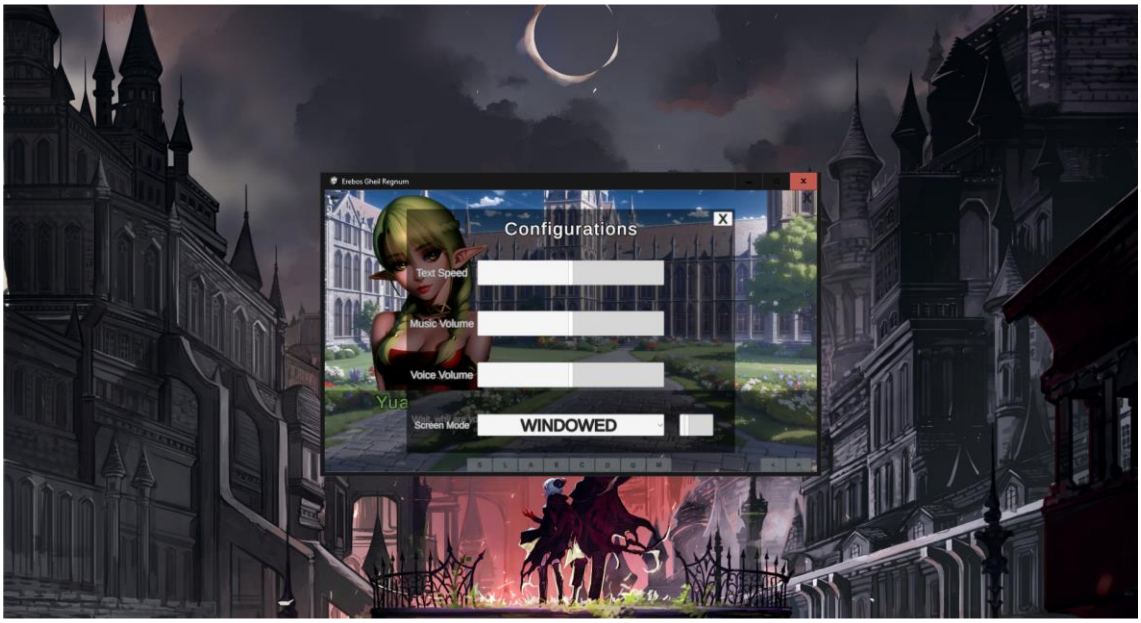
Text Speed

Music Volume

Voice Volume

Screen Mode: WINDOWED

Configurations tab windowed mode small size



Configurations

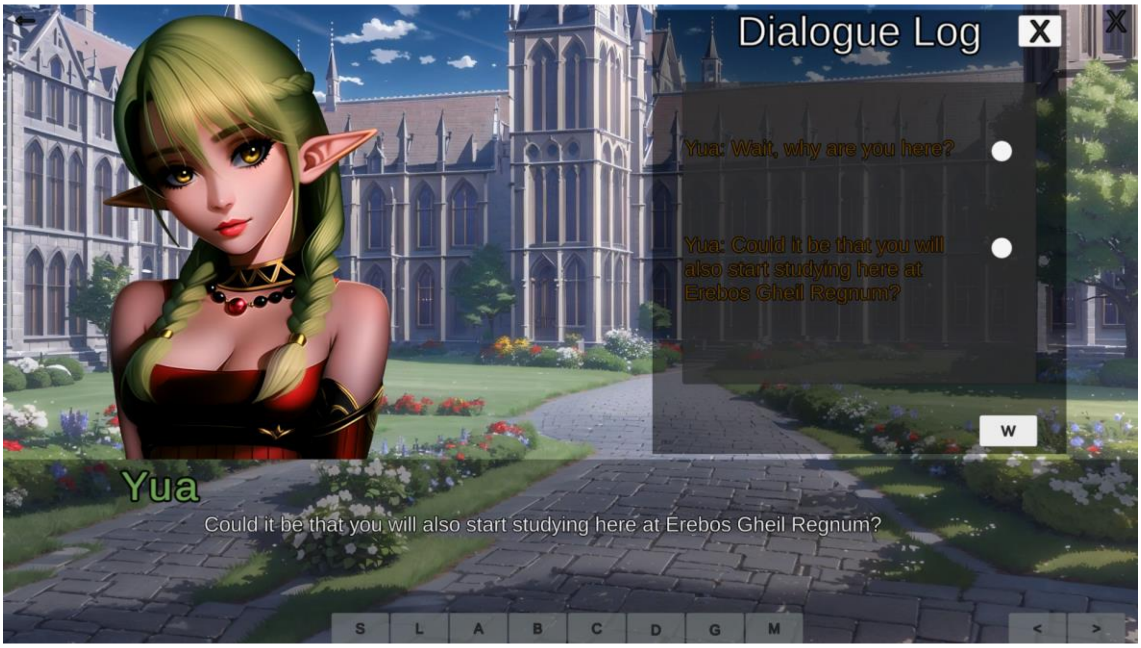
Text Speed

Music Volume

Voice Volume

Screen Mode: WINDOWED

Dialogue Log Tab



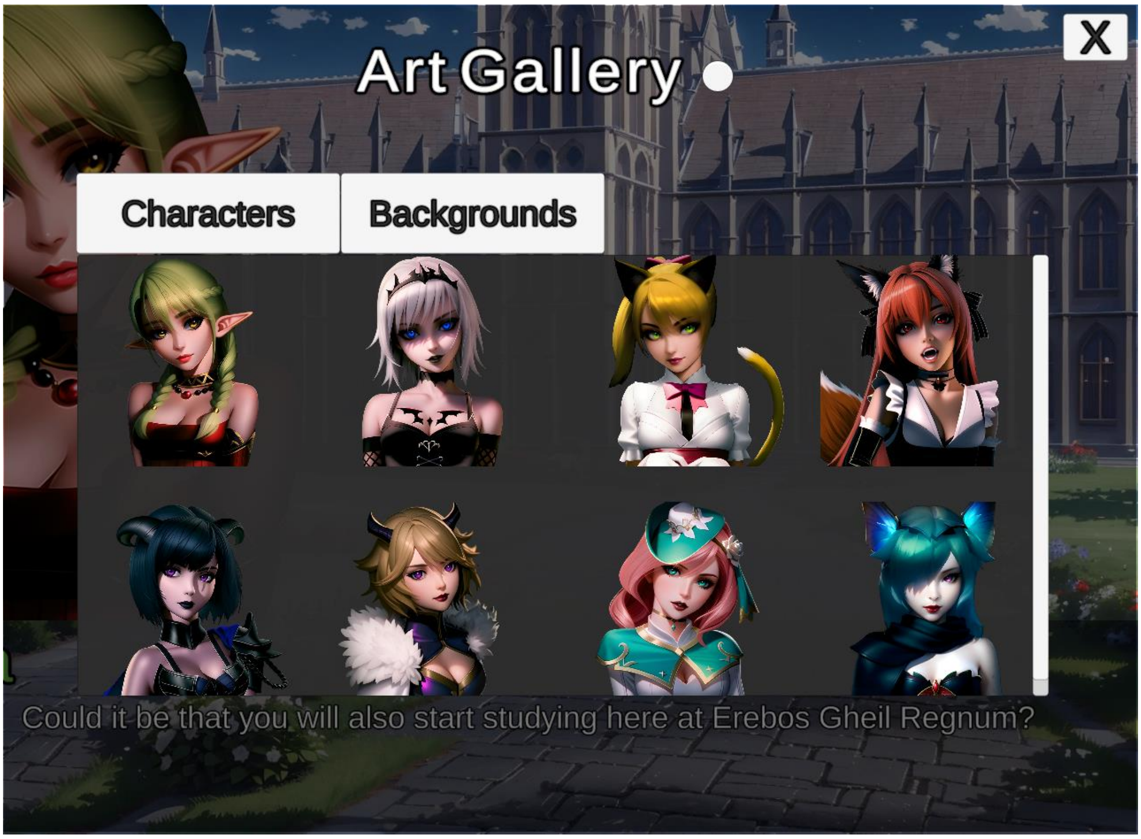
Yua: Wait, why are you here?

Yua: Could it be that you will also start studying here at Erebos Gheil Regnum?

Yua

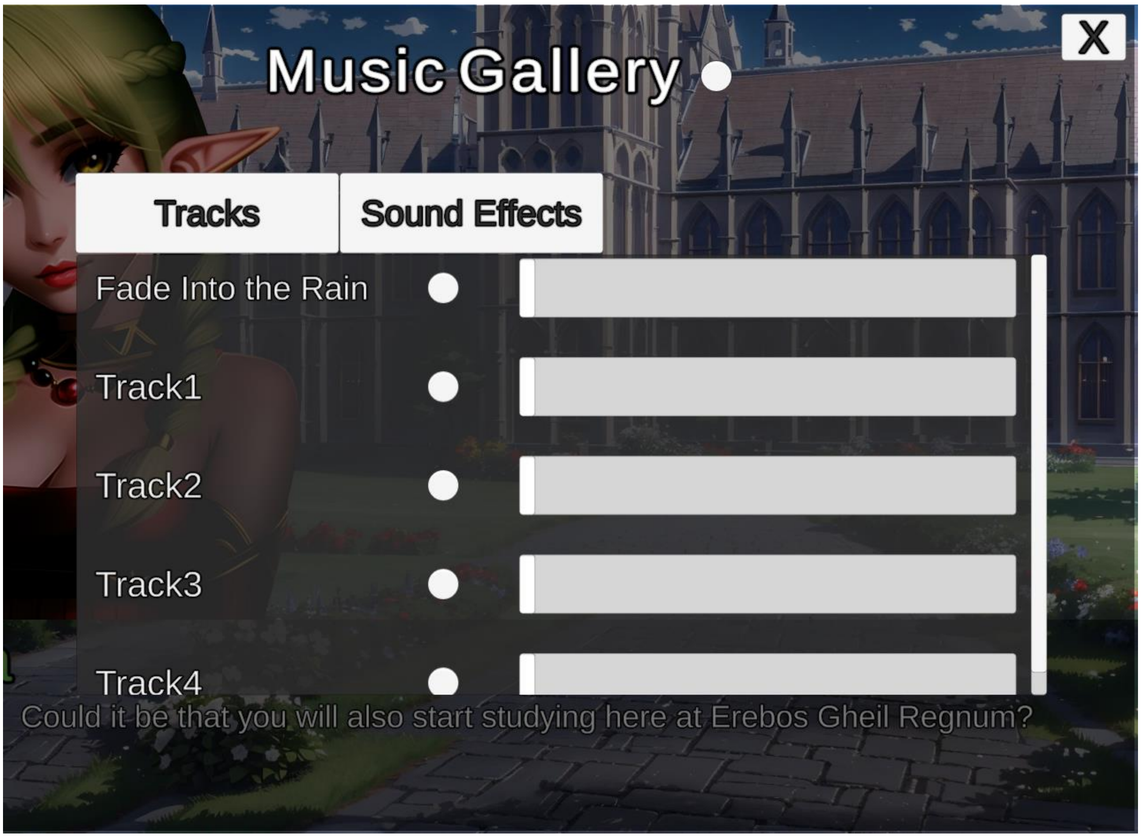
Could it be that you will also start studying here at Erebos Gheil Regnum?

Art Gallery Tab



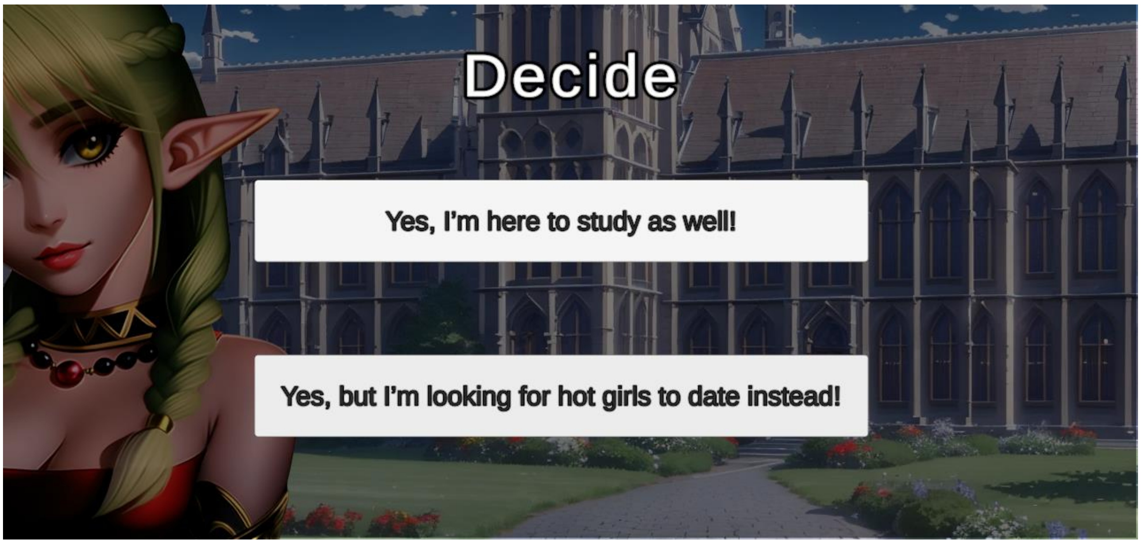
Could it be that you will also start studying here at Erebos Gheil Regnum?

Music Gallery Tab



Could it be that you will also start studying here at Erebos Gheil Regnum?

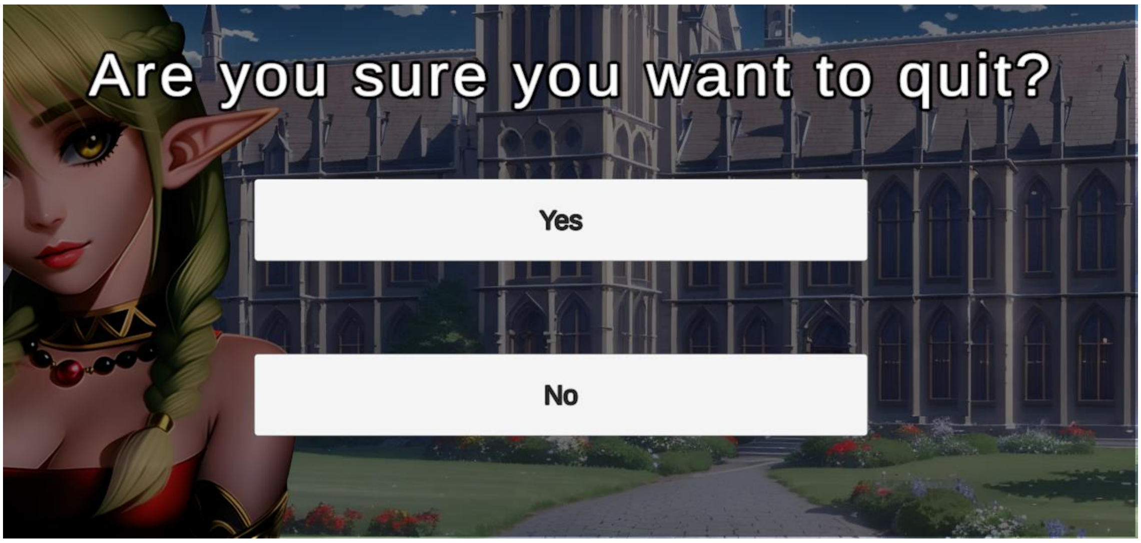
Decide State (Dialogue)



Yes, I'm here to study as well!

Yes, but I'm looking for hot girls to date instead!

Decide State (Quit)



Are you sure you want to quit?

LIST OF ABBREVIATIONS

EGR:	Erebos Gheil Regnum
AI:	Artificial intelligence
UX:	User Experience
UI:	User Interface
NLP:	Natural Language Processing
IDE:	Integrated Development Environment
NPC:	Non-Player Character
GDD:	formal Game Design Document