**IAT460**

**A2 Implement a Rule-Based System**

**Che-wei, Lin**

**301449899**

**Technical Documentation (System Overview & Design Decisions)**

**System architecture and design decisions**

The fantasy story generator utilizes two generative techniques, Free Context Grammar and Markov Chain. CFG structures and logically organizes the story format, while Markov chains add variety while maintaining consistency. The design decisions for this project were driven by the balance structured storytelling and ensuring logical coherence in every generated story. CFG to structed the story, and Markov chain to make unpredictable action.

**Description of Rules, Grammars, and Models Used**

The project's procedural story generator uses two core generative models to construct Free Context Grammars (CFGs) and Markov chains. These two models are responsible for balancing the structure and randomness of the generated fantasy stories. The Free Context Grammar component uses text created based on Freytag's Pyramid, and the Markov Chain model adds randomness to the setting, action, and combat sections.

**Analysis of the generation process**

The generation process of this system combines context free grammars and Markov chains. First, the system generates a story from the CFG with a coherent narrative arc, including the introduction, conflict, climax, and ending. Next, placeholders such as {CHARACTER}, {PLACE}, and {ENEMY} dynamically populate the text generated in the CFG or by the Markov chain model. Markov chains are trained on fantasy-themed text, allowing them to generate contextually relevant and unpredictable phrases, ensuring that story variants are maintaining a consistent logical structure. The final output has consistent character names, correct story flow, and a minimum word count of 100 words.

**Discussion of Challenges and Solutions**

Ensuring grammatical coherence is a major challenge when incorporating Markov chain-generated text into a structured CFG framework. Since Markov chains unpredictably change key words, some phrases in the story can be difficult to understand. To address this issue, CFG is prioritized for use with key story elements, while Markov chains are limited to generating descriptive elements such as

actions and motivations. Another challenge is the repetitive or broken sentences in Markov chains, which need to be de-trained by a larger amount of text to have a better output.

## Creative Statement

### Artistic/creative goals of the project

The goal of this project is to simulate a fantasy story that is de-generated through markov chain and a predefined story grammar, primarily in the creation of immersive and unpredictable narratives. This method of generating programmatically can provide dynamically generated plots, providing inspirational tools for writers, game developers, and RPG world-building, thus encouraging creative storytelling.

### Inspiration and design process

This project is inspired by the combination of games and literary works, originating from the game Harry Potter Hogwarts Legacy. Re-learning the process of game making, it was thought that having a generator for developing scripts would make the development of fantasy games more efficient. The design process of this project is to combine CFG and Markov Chain. A Markov Chain model is trained on samples of fantasy text to ensure that the generated text remains coherent. Finally, the text is filtered and adjusted to improve readability

### Reflection on the Results

The project succeeds in generating coherent fantasy stories that are well-structured but unpredictable. The system performs well in generating narratives, but has some limitations. Markov chain models occasionally produce more than phrases or disjointed sentences. In the future, more features can be added to allow users to go for better tuning of their desired requirements.

### 5 sample of output

### Story 1:

Long ago, The Lost Wizard roamed world he had saved., searching for purpose. They With a final, and stumbled upon of Revenants was unleashed,, unknowingly setting forth an irreversible fate. As they ventured deeper, an ancient demon emerged from the shadows, driven by are fleeting, legends

endure. The. Despite the peril, The Lost Wizard pressed forward, determined to fulfill their destiny. The air crackled with magic as steel clashed against dark sorcery. The battle raged on, and the land trembled under their struggle. Just as defeat seemed imminent, a beacon of hope emerged—a cunning rogue arrived and revealed a hidden truth. Summoning their last reserves of strength, The Lost Wizard and a cunning rogue combined forces. With a final, desperate attempt, their last reserves of was unleashed, striking at the heart of darkness. As dawn broke over world he had saved., silence fell upon the battlefield. The Lost Wizard, forever changed, gazed upon the world they had saved. Though victories are fleeting, legends endure. The darkness was defeated, and history would remember this moment as the dawn of a new era.

**Story 2:**

Long ago, a wandering knight roamed imminent, a beacon of, searching for purpose. They the peril, Alden and stumbled upon on, and the land, unknowingly setting forth an irreversible fate. As they ventured deeper, a wicked warlord emerged from the shadows, driven by forces. With a final, desperate. Despite the peril, a wandering knight pressed forward, determined to fulfill their destiny. The air crackled with magic as steel clashed against dark sorcery. The battle raged on, and the land trembled under their struggle. Just as defeat seemed imminent, a beacon of hope emerged—a talking owl arrived and revealed a hidden truth. Summoning their last reserves of strength, a wandering knight and a talking owl combined forces. With a final, desperate attempt, Alden pressed forward, determined was unleashed, striking at the heart of darkness. As dawn broke over imminent, a beacon of, silence fell upon the battlefield. a wandering knight, forever changed, gazed upon the world they had saved. Though victories are fleeting, legends endure. The darkness was defeated, and history would remember this moment as the dawn of a new era.

**Story 3:**

Long ago, The Lost Wizard roamed seemed imminent, a beacon, searching for purpose. They broke over the and stumbled upon reserves of strength, Alden, unknowingly setting forth an irreversible fate. As they ventured deeper, an ancient demon emerged from the shadows, driven by heart of darkness. As dawn. Despite the peril, The Lost Wizard pressed forward, determined to fulfill their destiny. The air crackled with magic as steel clashed against dark sorcery. The battle raged on, and the land trembled under their struggle. Just as defeat seemed imminent, a beacon of hope emerged—a wise old mage arrived and revealed a hidden truth. Summoning their last reserves of strength, The Lost Wizard and a wise old mage combined forces. With a final, desperate attempt, emerged from the shadows, was unleashed, striking at the heart of darkness. As dawn broke over seemed imminent, a beacon, silence fell upon the battlefield. The Lost Wizard, forever changed, gazed upon the world they had saved. Though victories are fleeting, legends endure. The darkness was defeated, and history would remember this moment as the dawn of a new era.

**Story 4:**

Long ago, a wandering knight roamed curse, unknowingly setting forth, searching for purpose. They deeper, the Wraith and stumbled upon One day, he uncovered, unknowingly setting forth an irreversible fate. As they ventured deeper, a dark sorcerer emerged from the shadows, driven by magic as steel clashed against. Despite the peril, a wandering knight pressed forward, determined to fulfill their destiny. The air crackled with magic as steel clashed against dark sorcery. The battle raged on, and the land trembled under their struggle. Just as defeat seemed imminent, a beacon of hope emerged—a cunning rogue arrived and revealed a hidden truth. Summoning their last reserves of strength, a wandering knight and a cunning rogue combined forces. With a final, desperate attempt, ancient tomb and stumbled was unleashed, striking at the heart of darkness. As dawn broke over curse, unknowingly setting forth, silence fell upon the battlefield. a wandering knight, forever changed, gazed upon the world they had saved. Though victories are fleeting, legends endure. The darkness was defeated, and history would remember this moment as the dawn of a new era.

**Story 5:**

Long ago, an elf archer roamed arrived and revealed a, searching for purpose. They ventured deeper, the and stumbled upon curse, unknowingly setting forth, unknowingly setting forth an irreversible fate. As they ventured deeper, a dark sorcerer emerged from the shadows, driven by was defeated, and the kingdom,. Despite the peril, an elf archer pressed forward, determined to fulfill their destiny. The air crackled with magic as steel clashed against dark sorcery. The battle raged on, and the land trembled under their struggle. Just as defeat seemed imminent, a beacon of hope emerged—a celestial spirit arrived and revealed a hidden truth. Summoning their last reserves of strength, an elf archer and a celestial spirit combined forces. With a final, desperate attempt, struggle. Just as defeat was unleashed, striking at the heart of darkness. As dawn broke over arrived and revealed a, silence fell upon the battlefield. an elf archer, forever changed, gazed upon the world they had saved. Though victories are fleeting, legends endure. The darkness was defeated, and history would remember this moment as the dawn of a new era.

**Brief Explain:**

Each of the five stories generated follows the structured narrative framework established by the Free Context Grammar coupled with the stories generated by Markov Chain.The CFG framework ensures that each story maintains a logical structure from the introduction of the main character, the emergence of a major conflict, the climactic battle, and the eventual triumph over darkness. The Markov chain model is responsible for generating descriptive details that supplement character actions, locations, and specific phrases throughout the story. However, it is problematic that Markov-generated elements sometimes interfere with the integrity of the narrative structure, resulting in the occurrence of broken phrases and misplaced words thus losing coherence. For example, in Story 1, "The Lost Wizard Roams the World He Saved" contains an unnatural phrase that was likely generated by the Markov chain without adequate filtering. A similar problem occurs in Story 2, where phrases such as "a wandering knight roams the coming place, a lighthouse" lack grammatical coherence, suggesting that Markov chain-generated content sometimes undermines the readability of

the narrative. Stories 3 and 4 both demonstrate the correct placement of the CFG-driven protagonist and structured conflict, but when incorrect phrases are generated for the enemy's motivation this leads to a drop in readability. Story 5 generally has a structure that meets expectations, but there are some issues such as key events such as the protagonist's motivations or place names being disrupted by Markov-generated output, which leads to slight readability issues.