



Design Document for:

Norse Curse

A Viking history explorer game

“Let’s sail!!!”™

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Game Overview

Philosophy

Philosophical point #1: The use of ECG/EKG

The game will use Android smartwatch, which support electrocardiogram (ECG/EKG), to measure the heart rate (HR) of the players. A numeric indicator of player's HR will be shown on the top-left corner of the game screen. The players' HR will be split into 5 zones, the color of the indicator will be changed based on the change in HR of the players (Parnandi & Gutierrez-Osuna (2017).

A formula for maximum HR measurement is applied, in which the maximum HR of a person is subtracting their age from 220 (Leonard, 2021). Therefore, information about the age of participants will be collected before playing the game and will be stored securely.

Zone 1 • 50-60% Max HR

Very light activity, such as warm up/cool down

Zone 2 • 61-70% Max HR

Light activity, such as slow-paced jogging, walking up a flight of stairs, lightweight low resistance

Zone 3 • 71-80% Max HR

Moderate activity that increases aerobic endurance, such as moderate jogging, cycling, or rowing

Zone 4 • 81-90% Max HR

Hard anaerobic activity, such as high rep ball slams, boxing, or heavy weight lifting

Zone 5 • 91-100% Max HR

Extremely hard maximum exertion activity, such as sprinting. All out effort!

(Leonard, 2021)

Philosophical point #2: Game difficulty

Game difficulty and character ability will change depending on players' HR. Increase in difficulty level, from easiest to hardest, can happen rapidly to boost the player's excitement and the game's entertainment. However, every time the level drops back to 1, it will remain in easy mode for a minimum of 15 minutes (can be modified up by players), to stabilize their HR.

Zone 1:

- **Game:** The easiest game mode: If players' HR are in this zone, the difficulty of the game at that moment is considered low. Therefore, an increase in the difficulty of the game will be applied, NPCs, such as wild animals or randomly spawned characters, will become more aggressive, and the level of difficulty of puzzles will be increased.
- **Character:** character's stats, such as attack, defend, or speed, will remain normal at this zone. No new ability gained.

Zone 2:

- **Game:** Medium difficulty: Strengthen the enemies' power. Increase the number of enemies.
- **Character:** Strengthen basic stats of character. No new ability gained.

Zone 3:

- **Game:** Hardest level: New types of more dangerous and aggressive enemies are being spawned. Puzzles will hit the highest level. Players will need to pay more attention to the game. A red graphical frame will cover the edges of the game window. The maximum of playing time is 10 minutes (can be adjusted by players) every time players hit this level to avoid high HR in a long time continuously.
- **Character:** Maximize all basic stats of character. New abilities unlocked: axes throwing, multiple kills at once, or special shutdown animation, ...

Safety Concern: Zone 4 & 5: When HR reaches this zone, the game will automatically pause for the safety of players.

If the player keeps at easiest mode for more than 15 minutes, the game will create some challenges.

The difficulty based on HR zone is not only for the storyline (main quest), but also in free roaming mode.

Core mechanics

Limited Resource: some types of resources are limited, such as skill points, or silver, and some are unlimited, like plant or animal product

Reaction of NPCs: Different NPC types have different ways to react to the action of the player.

Loot system: items can be found in chest or in defeated enemies.

Skill tree: Mastering all the fields in their skillset is not available, only 1 skillset is available to be maximized

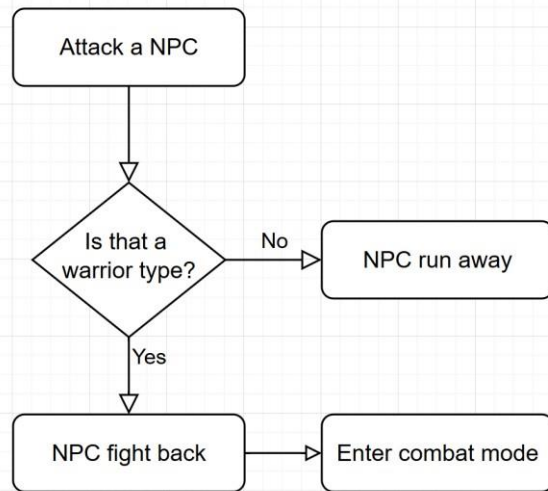
Visited location: Game save the locations visited by the character

Weapon: different combinations of weapons provide different advantages and disadvantages.

Parry and dodge: During some combat phases, parrying helps to block the hit and stun the attacker then open opportunity for a counterattack, and dodging allows to avoid the hit from enemies, reposition and counter.

Damage: A damage calculation formula will be applied. (discuss in the Weapons section)

Reaction of NPC



Common Questions

What is the game?

An open world RPG, take places in Scandinavia at Middle Age, and aim to be played on personal computer (PC).

Where does the game take place?

The main storyline takes place in Tordynjar (Thunder Bay), a fictional village, placed by a stormy bay.

What do I control?

Player will control a male historian, Erik in an open-world game. AI support will be available in some phases of the game.

How many characters do I control?

The players will control one character in the entire game.

What is the main focus?

Historical: vibe and design are required in the entire game.

Father and Son: The love of Erik to his son is major focus, and should be found in many scenes.

What's different?

Competitors: Assassin Creed's Valhalla (AC Valhalla) and God of War Ragnarok (GoW Ragnarok) Points that make Norse Curse different from its competitors:

Biofeedback: An application of biofeedback into an RPG game will help the players to get a feeling of "role-play" or live a life of their character.

Aspects \ Game	Norse curse	AC Valhalla	GoW Ragnarok
Game world	Ancient Swedish	British Isles, Norway	Ancient Scadinavia (Midgard), Vanaheim. and Asgard, ...
Featured action	Exploring, solving puzzle, discovering, ...	Raiding, Fighting, Conquest, ...	Fighting against mythological foes,
Main focus	Time travelling, the curse, save Erik's son, Erik's journey	Conquest and settlement in British Isle, Eivor's adventure	Norse myth, story of Kratos and his son

Feature Set

General Features

Huge game world: a great map depicted realistically a part of the Ancient Scandinavia

3D graphics: to create best visual world

32-bit color: It provides highest and most realistic visual for the game

Fighting: Not the focus of the game, but necessary at some points

Gameplay

Puzzle: Several puzzles to be solved are located at different places in the game. The difficulty of puzzles increases when the player progresses through the game.

Explore: Players will need to explore different locations in the game world, to find hints for his goals

Free Roaming: Gravity applied

Weapon choosing: Players can choose between different weapon sets

Barter system: Viking did not have a standard currency. Goods could be traded for another goods or silver.

Environmental interaction: interaction with some environmental object helps to gain goods or destroy that object, such as cutting down trees to gain wood or shooting a fire arrow to burn down a haystack.

NPC interaction: character can do several actions with NPCs, such as receiving tasks, talking, trading, ...

Resources hunting: Players will need to collect different kinds of material to exchange within the game.

Storyline: A linear storyline takes place in the main quest.

Fast travel: Character can teleport to specific visited locations.

Pathfinding: Character automatically travels to a marked location (AI control).

Combat Mode: Damage, and Parry and Dodge mechanic is applied in the combat phase.

Other Features

Side quests: Assigned by some NPCs across the map, the assigned tasks are easy to do, such as collecting a type of plant or guiding them to a location. Players are free to choose either to do or not, as it will not affect the main story line. Players will be rewarded after completing it.

Easter eggs: Some special events will happen in some specific places or conditions.

The Game World

Overview

The game includes an in-game economy where goods can be traded for other goods.

In-game Economy:

Type of collectable resources:

Resource	Source	Drain
Silver/jewelry (Limited)	In corpse, abandoned buildings, such as house, temple, grave, ... or left after a ritual. Rewarded after completing missions	Used as wage for NPCs
Animal products (Unlimited)	Animals in farms, fields, or forest	Traded with NPCs for, or converted into other goods
Plant products (Unlimited)	Plants across the map	Traded with NPCs for, or converted into other goods
Mineral (Limited)	Found in caves, mine	Traded with NPCs for, or converted into other goods

Barter System

Example of resource trading:

Goods	Components
Sword	Silver, animal products, plant products, mineral
Axes	Silver, plant products, mineral
Hammer	Silver, plant products, mineral
Shield	Silver, plant products, mineral
Armor	Silver, plant products, mineral

The Physical World

Overview

The game world will be placed in a huge 3D map, including different nature elements such as weather, mountains, lakes, ... Nature is also the boundary of the world. For example, a great mountain and ocean is the boundary, respectively, to the northside and south of the map.

Key Locations

Three key locations: Tordynjar, Mount Thursbun, Lokiskali:

Tordynjar: is a stormy village located in the west of Norway, by a coast. The village has a low population; however it is a coast village, therefore, the appearance of human in the daytime is not very rare. The presence of NPCs will only decrease by the night come. The village is depicted as a dark and haunting place, where the sunshine rarely reaches, villagers only focus on work, and feasts almost disappear.



Mount Thursbun: A dangerous and mysterious mountain, located at the north side of the map. The mountain is covered with fog and protected by Warg.



Lokiskali: A remote, poor village with low population located at the west side of the map. Where Asgrir used to live when he was a human.



Travel

There are different ways of movement to be applied depending on the situation of the game, such as walking, riding a horse, sailing, diving, ... Players can use fast travel, in the map section, to teleport to visited locations to save time, if they desire. A short cutscene or cinematic will be shown during the loading of this transition. In addition, players can turn on AI mode for automatic pathfinding, and the character will automatically travel to the marked location on the map. These options allow the player not to move for minutes fully. This can be built by using Unreal Engine Navigation System.

Different actions can be used while moving such as fighting or looking at map.



(Default keyboard key binding setting)

(Dan, 2021)

Scale

Game world map:



Objects

Weapon: in Viking style:

- Sword
- Single axe
- Long axe
- Shield

Character: Each character has their own visual, non-fictional NPCs (pawn) will have numerous visuals:

- Main character
- NPCs

Animal: Each type of animal has 3 different visuals:

- Pig
- Sheep
- Cow
- Bear
- Wolf
- Snake

Building: in old Norse style

Longboat: wooden boat with dragon head. Sail color depending on the army side.

Weather

Different weather conditions are applied in the game, changed depending on the time of the day.

Difference in weather conditions will change behaviors of other objects in the game:

- **Day time:** a little bit of sunshine but being covered by fog or rain. If no rain, villagers will go out to work as usual, however, if rains, the number of villages working will decrease.
- **Night:** Rain or sometimes storm. The fleeting appearance of Thor could be caught in a stormy night.

The weather system can be developed with existing features, or with “Ultra Dynamic Sky” of Everett Gunther – Blueprint (2015) in UE Marketplace via

<https://www.unrealengine.com/marketplace/en-US/product/ultra-dynamic-sky>

Day and Night

The game features a day/night cycle. Differences in the game appear between day and night:

- **Environment:** change such as weather, atmosphere, theme of the game, ...
- **Behaviors of NPCs:** change between day and night. For example, more farmers are found in the morning, or trading places are only available during the day. On the other hand, more stealthy thieves and wild animals appear in the nighttime, and they are way more aggressive.
- **Quest:** some quests can only be found at night
- **Easter eggs:** some hidden secrets can only be found at a specific condition, or time of the day, such as a fleeting appearance of a god, or some ancient ritual can be found in the forest at night.

Unreal Engine has a built-in tool called **Geographically Accurate Sun Positioning Tool**, which will help calculate the position of the Sun in a day as well as shadow (“Geographically Accurate Sun Positioning Tool”, n.d).

Time:

The in-game time is compressed, one full day in the game is equivalent to one hour in the real world, which means every hour in the game takes 2.5 minutes in real-time.

Rendering System

Overview

Unreal Engine is useful to render 3D games, as it provides numerous built-in tools and external 3D software package in its library. It is fit to this game because the game requires everything in 3D shape, to enhance the experience of the players.

2D/3D Rendering

RealityCapture re-creates 3D models of a real figure from sets of laser scans and/or images. It will be useful especially to reappear natural components in the game, such as cave or mountain. (“RealityCapture”, n.d)

Other built-in tools, such as building landscape, building open world game, collision in Unreal Engine could be used to build the game.

Camera

Overview

The game has a 3rd person view because it provides a greater view, players will have more control over the character in his action and movement, and the sense of the surrounding environment. It is suited with an RPG game, which will need the player to have a wider view. Lastly, it makes the game more cinematic. (“Why we decided on the third-person perspective”, 2022)

Camera Detail #1

360-degree camera rotated by computer mouse. The pace of camera depends on the players, players can adjust it in the setting as the preference.

Camera Detail #2

In some special cases, the point of view of the game will change to 1st person view. For example, if the character stands in front of a huge object, such as a big tree or a great mountain, which block the whole character from the back view, 3rd person point-of-view, the camera will then shift to 1st person view until the character move away from that blocking object. This feature helps the player move freely in the game world without any difficulty.

Game Engine

Overview

The game will develop using Unreal Engine 5, its built-in features, and packages in its library because of its suitability to the game scope, such as ability to render photorealistic graphics and work fantastic on the target platform, Windows.

Game Engine Detail

The game engine will keep track of almost everything in the game world, such as collision, interaction, lighting, water, ...

Water

Unreal Engine has different built-in features and setting options to customize water in the game. (“Water System”, n.d)

Some feature and settings to be used in the game:

- Ocean water body, Lake water body, River water body, and Wave, ... to customize the characteristic of in-game aquatic environment (“Water Body Actor”, n.d)
- Water buoyancy components to have physical setup of in-game objects, such as board, human, animals, ... (“Water Buoyancy component”, n.d)

Collision Detection

The Unreal Engine is a good platform for collision detection, as it has various features to handle collisions. Unreal allows developers to customize the collision mesh of objects, which will enhance the realistic of the game. Various kind of interaction is available, such as generate hit events, overlap and ignore or overlap and generate overlap events (“Collision Overview”, n.d).

Landscape Collision: Adjust the interaction between characters and the surrounding environment. It also provides options to set the collision mip level of each landscape component, which will then reduce the complexity of non-playable areas and focus more on critical areas. For most of the map, the Collision Mip Level should be set at 0, and 1 or 2 for Simple Collision Mip Level to keep the high quality and accuracy of collision (“Landscape Collision Guide”, n.d).

Lighting Models

Overview

The game will use the built-in Unreal Engine lighting model in the game because it makes the game more realistic, detailed, and enhances aesthetic. Varying types of lights will be used in the game in different environments and situations.

Lighting Model Detail #1: Day/ Night

Unreal Engine has a built-in tool called **Geographically Accurate Sun Positioning Tool**, which will help calculate the position of the Sun in a day as well as shadow. (“Geographically Accurate Sun Positioning Tool”, n.d). It will be used to enhance the reality and aesthetic of the game.

Lighting Model Detail #2: Lumen Global Illumination

This lighting feature supports all light types and solves diffuse indirect lighting, indirect specular, and reflection. It also makes the water surface a mirror (“Lumen Global Illumination and reflection in Unreal Engine”, n.d). This is important as water is a common component in the game.

The World Layout

Overview

The game’s world landscape, map, mini map, and objects will be built in Unreal Engine. The rendering quality of the game aims to be as high as it does not impact the gameplay experience in the target hardware, which is PC.

World Layout Detail #1

To create as realistic as possible, the game’s landscape aims to have multiple layers. Different blend types are applied to different landscape layers to create the best possible visual of the game world, decreasing the possibility of having lighting problems (“Landscape Material Layer Blending”, n.d).

Plant motion is applied because it is important, as it appears a lot, to make the game real. It also works together with lighting system and collision to make the game lifelike (“Grass Quick Start”, n.d). The placement of it will be either random or non-random, depending on the location of the placement (“Open World Tools Tips”, n.d).

World Layout Detail #2

The game’s main map, mini map and their components and action will be generated in Unreal Engine.

Some actions on main map (CodeLikeMe, 2022):

- Mark location
- Zoom in/ out
- Fast travel option
- Show/ hide icon (legend)
- Checkpoint distance indicator

Game Characters

Overview

The game includes several types of characters, which enhance the game experience and storyline, besides the main character, Erik Karlsson.

Main Character

Basic statistics:

Name: Erik Karlsson

Nationality: Swedish

Age: 32

Career: Historian

Hometown: Uppsala, Sweden (near where Tordynjar was located)

Child: Viktor Karlsson

Physical characteristics:

Height: 187cm

Weight: 89kg

Eye color: Blue

Hair color: Blonde

Skin color: white

Shape of face: Diamond

Habits: Drinking

Voice: Low

Favorite saying: ""

Emotional characteristics:

Strength: Proactive

Weakness: taciturn, quiet, easy to get angry if things get out of control

Default stats:

Attack: 60

Defend: 50

Speed: 55



Functional NPCs

NPCs will take different roles in the game, some might have functions, and some are just pawns move around. Here are some samples of functional NPCs in the game:



Avar the Smith:

The only blacksmith in the village. Taking materials and wage (silver) to forge weapon.

Harald family:

A farmer family. Trading goods with players.





Unukr Svidison: An old mysterious homeless man, disclosure hints about the curse to Erik after completing his tasks. Play an important role in the storyline

Rob: a character type, who might attack Erik in the forest in nighttime.



Enemies

Erik will face many challenges on his way to reach the goal in the game. Some major enemies in the main storyline are listed below:

Earl Thondi:

Physically the earl of Tordynjar but got controlled by Asgrir the Dread for almost the whole story. He (Asgrir) is the first one to realize Erik's abnormal, and he usually tries to stop or even kill Erik because of his suspicion.

Default stats:

Attack: 100

Defend: 80

Speed: 35





Warg:

A wild black wolf raised by Asgrir the Dread, and coached to obey his command. Asgrir uses it as a protector for his secrets on Mount Thursbun. Asgrir sometimes controls Warg directly to claim his goal.

Default stats:

Attack: 75

Defend: 36

Speed: 85

Heri Olafsson:

Loyal bodyguard of Earl Thondi. He is always ready to do whatever Earl Thondi commands, despite hearing about the rumor that Earl Thondi is being controlled by the other. His fighting ability is one of the most dangerous weapons to Erik.

Default stats:

Attack: 175

Defend: 90

Speed: 60



Asgrir the Dread:

An ancient spirit and mastermind of the crisis in Tordynjar. He did that to gain power and for people to obey him. His exact appearance is not shown in the entire game, but some can be found in caves.

Default stats:

Attack: ???

Defend: ???

Speed: ???



User Interface

Overview

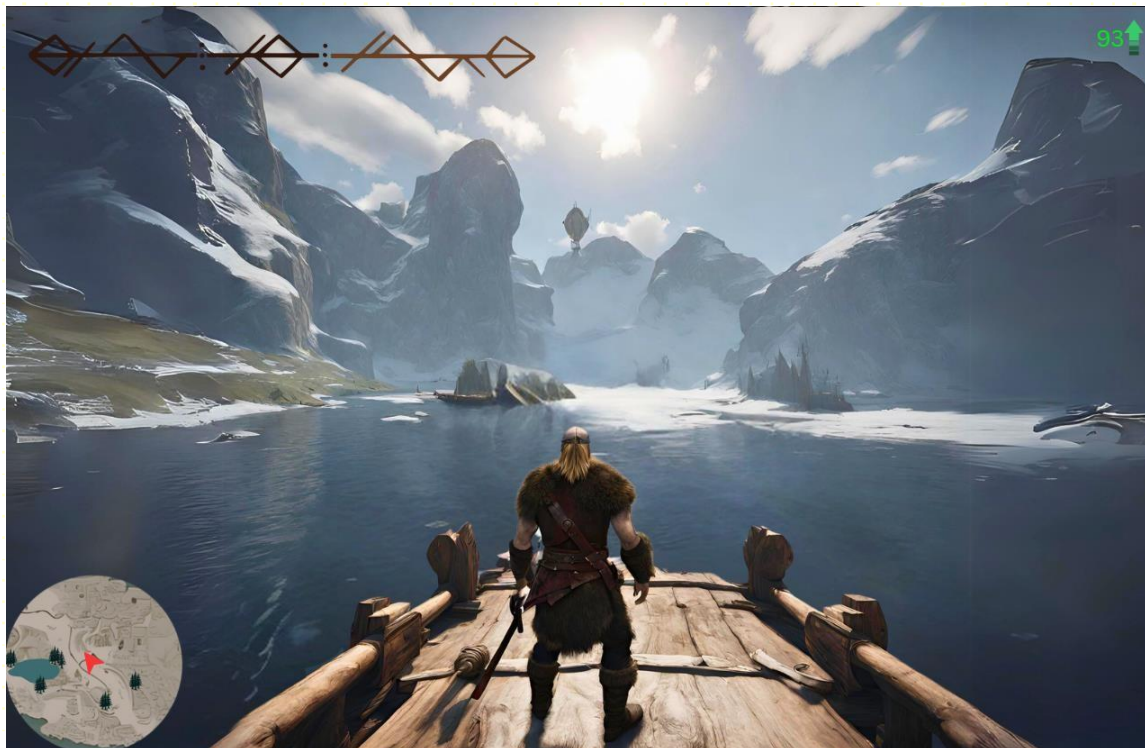
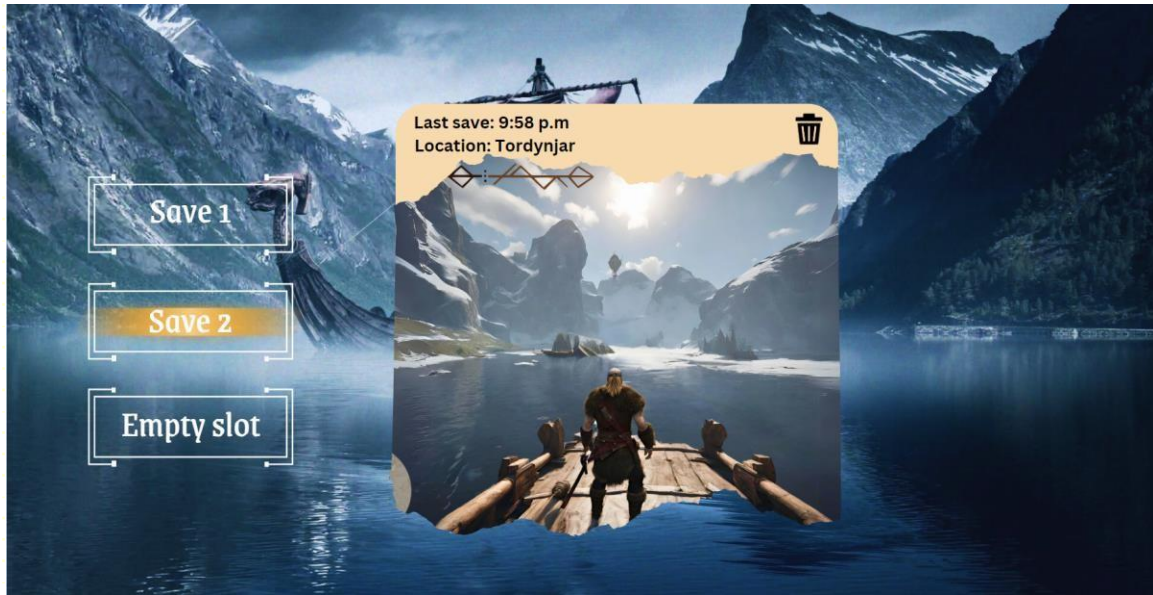
Interface aims to be easy to understand for players. Some iconic Viking culture elements, such as the compass in the map, or the health bar in the second sample, will be used to enhance the aesthetic of the game.

User Interface Detail #1: Map sample



User Interface Detail #2: Gameplay sample





Weapons

Overview

Character can have different weapons on both of his hands. Each combination of weapons has its own advantages and disadvantages. The initial weapon will be selected by the player at the very beginning of the game, either a sword or an axe. Other stronger weapons will be purchased during the game, with in-game currency. There are 3 available weapon combinations. The choice will depend on the players. The designs of the weapons are all based on the Viking style weapon.



(BenJ, 2023)

Weapons Details #1: 2 short attacking weapons

Players can choose between axes, swords, or both. This combination will enable players to enhance speed of movement and flexibility.

Advantages: this combination make character to be the fastest, most flexible and deal more damage #2

Disadvantages: character will have very low defending ability the deal less damage than #3

Weapons Details #2: 1 short attacking weapon and shield

Players can choose an axe or a sword on 1 hand, the other hand will hold a shield. This combination provides the ability to defend himself against danger.

Advantages: highest ability to defend, and faster than #3

Disadvantages: Lowest attacking ability, and the movement is slower than #1



(Arash, 2021)



(Jose, 2014)

Weapons Details #3: 1 long attacking weapon

Character holds 1 single big, long axe. This weapon will maximize the fighting ability.

Advantages: Deal most damage, and still have more defending ability than #1

Disadvantages: Slow down the character, and have less ability to defend than #2

Weapon stats table

Weapon \ Ability	Speed	Attack	Defend
#1: 2 attacking weapon	-2	+35	+17
#2: 1 attacking weapon and shield	-10	+20	+40
#3: 1 long attacking weapon	-17	+55	+12

Damage calculation formula

The combat system will follow this formula to calculate the damage from any character to the others.

```
if (attack >= defense) {  
    damage = attack * 2 - defense;  
} else {  
    damage = attack * attack / defense;  
}
```

(“The Simplest Non-Problematic Damage Formula”, 2022)

Musical Scores and Sound Effects

Sound API

Audiosocket: a music API allows access to a huge music data with rightful license (Audiosocket, n.d).

SplashKit: a game development API, providing sound effect API, and using C++, which is the same as Unreal Engine (“Audio”, n.d).

Sound Design

Music aims to be epic and uplifting in combat. And fantasy while exploring the world.

Sound Effect:

List of some featured sound effects:

- **Environment:** wind, wave, forest, or water dripping in cave
- **Combat:** clash of weapons
- **Moving:** different sound effect on different landscape
- **Action:** different actions have different sound effect
- **Echo** in cave

Single-Player Game

Overview

The game has a linear storyline. The storyline takes place in the main quest.

Single Player Game Detail

Other options beside the main quest: Free roaming, exploring, doing side quests, hunting,...

Story behind the curse

In 727, because of the trust in Asgrir, Tordynjar villagers held the first-ever sacrificial rituals hoping for the land's prosperity and power. Since then, the ritual became a village tradition, every 25 years, a villager would be selected to be the scapegoat. They believed that, in that way, Asgrir would bless them, as he said. However, after 100 years, the crops were still failing after years, and the weather conditions were still severe. They realized that they were wrong and decided to stop that cruel ritual. They didn't know they provoked Asgrir, and the crisis started on the land. Horki, the earl at that time had to make a promise to keep the ritual to prevent disasters from coming. Asgrir placed a curse on the village, if they break the promise, the whole village and their descendent will suffer terrible consequences. As time goes by, the tradition is kept up to the time of the main character, but secretly, only the those who have ancestors villagers of Tordynjar can know about and must be a part of that tradition. And Erik's family is one of them.

Initial Scene

The game starts with Erik's panicked face after dreaming of the sacrificial ritual, where his son is the scapegoat. Erik was informed about this a week ago, but he is still in shock. Viktor is his only son, or in the other way, his only family member. He has six last months to be with his son. At that time, one of his friends, Peter, was inventing the time travelling machine, however, it is only in the testing phase, and isn't announced to public. None of them know what can that machine result in, however, Erik asked Peter to take him to the past, with the hope that he could change some things. Erik, as a historian, he learnt about that age and that ritual a lot, he knew how dangerous it is, especially with that time machine, but he still wanted to take a risk to save his son.

Before his journey, Peter rented him a one week fighting session, with the hope that he could, at least, survive [Game tutorial phase].

Erik planned to travel back to 726, a year before the first ritual, to prevent the start of the tradition. However, because of an error of the time machine, Erik back travelled to 840, when the ritual already happened several times.

Ending

Erik discovers the mystery about the origin of Asgrir, forcing him to go to Hel

Hours of Gameplay

The game storyline can be completed within 7.5 hours.

Victory Conditions

Players need to complete the storyline to finish the game.

Character Rendering

Overview

Unreal Engine provides many features for character customization, such as creating character visual, setup movement in development phase. In addition, it also helps to build and control the behavior of NPCs in the game world. The character's visual is fixed, cannot be customized in this game.

Character Rendering Detail #1

Unreal Engine provides platform for user to customize aspects of character such as the visual, movement, action, or collision, ... ("Setting Up a Character", n.d).

Metahuman: is a built-in package of Unreal Engine, which allows creation of photorealistic digital humans. Another advantage of MetaHuman is its ability to reproduce facial performances by capturing the real human's performance and transfer it to the character. This feature is suitable in creating cutscene, as it helps to generate emotion on characters' face ("High-fidelity digital humans made easy", n.d).

Character Rendering Detail #2

The game will also need to render NPCs and their behavior in the game environment.

Pawn classes can be generated in Unreal Engine to determine the visual, behavior, interaction and collision of characters controlled by AI. ("Overview of Pawns", n.d)

The spawning and destroying of NPCs need to be managed to avoid lack of pawn or over amount.

Extra Miscellaneous Stuff

Junk I am working on...

Crazy idea #1: An extender (DLC) about the adventure of young **Unukr Svidison**

Crazy idea #2: Release a console version, which will have higher level of graphic.

References

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