

# Clef Miner

Learn staffs the most amazing way!

## Team Members

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## Game Overview:

Clef Miner is an engaging 2D Platformer Game in which the player has to identify the music notes according to their corresponding staff notations appearing on them to achieve the goals. The game introduces the players with the basic notes and their staffs with the help of the note mining adventures of the central character, *Hazel*. It also incorporates a simple student model for generating feedbacks and selection of the subsequent levels. The game is designed and developed using Unity with the help of few other relevant tools like Garage Band, Crescendo for the audio processing part.

## Subject Matter and Learning Objectives:

The game is centered around the basic concepts of the *Musical Notation* theory. The staffs are the fundamental latticework of music notation used to express music in written form which is one of the very basic things anybody has to learn whenever he or she is starting off with any kind of musical education. Frequently we see that learners find it very difficult in the beginning to grab the concepts of even basic notations and often jumble up different notations and their audio feedbacks. Before going to start off with reading and writing complex scales and full songs in these symbolic notations, it is very important to grab the basic *symbol to sound mapping* at the very beginning of music education. Here we focus on teaching the rudimentary staff notations with their corresponding notes' audio feedback and the relevant basic

concepts a student needs to get themselves started with any kind of formal musical notation education in the most fun way.

## Target Audience:

The target audience domain of our game can be novices who has started to learn music or can be amateurs who have trouble in learning the notations spread across different age groups. Basically, anybody who is starting off with any kind of formal education in music will find it very useful. Even people who don't belong to any of these categories may find it interesting to play the game as one can learn some basic idea of written music in a fun way.




## Tutoring Functionalities:

The objective of the gameplay would be to mainly teach the players the mapping of *staff notations to their corresponding sounds*. The initial stages of the game start off with the single notes and their corresponding staff formations. Then it incrementally builds upon the baseline and teaches about various related concepts like *pitches, different clefs, duration signifiers, bars, rests* etc. Then slowly the game moves into the domain of chords and scales progressively. During the gameplay, the backend student modeling will be used to give constructive immediate feedback based on students' performance and keep suggesting new levels. The main idea behind this is to try to use the symmetry and repetitiveness of musical theory to dynamically generate new levels depending on what the ITS learns about the ability and progress of the player. The main concepts that we are trying to focus in the very beginning of the game are listed below (References for the technical terms given later). The levels with \* will be developed if there is enough time.

- A small introductory tutorial explaining the navigation and rules of the game. It also explains the notations very briefly.
- Introduction to 3 major Clefs F, C and G.
- First level consists of identifying different clefs.
- Second level focuses on different notes located in different clefs.
- Third level teaches the note duration and bars related concepts. \*
- Later states will simulate chords and scales and so on. \*

## Gameplay:

We have roughly thought about the layout and gameplay mechanics of the first few

Clef	Name	Note	Line
	G-clef	G4	passes through the curl of the clef.
	C-clef	Middle C (C4)	passes through the centre of the clef.
	F-clef	F3	passes between the two dots of the clef.

levels. The Clefs are the basic building blocks of the notation theory which tell us about the pitch of the notes. There are three major Clefs namely F, C and G which we will be covering in our environment. The idea of this stage is to familiarize the player with the symbols of the clefs, which are shown on the pic

on the left. (Source: Wikipedia). After the Clefs, there come actual notes. The notes are usually drawn using some symbols on a 5 line ruled sheet (Called the “Staff”). The exact location of the symbols on the Staff with respect to the positioning of one Clef describes a note which corresponds to one sound. For example, the following shows different notes and theirs corresponding staff notations. (Source: The Internet)



Staff for “A” note

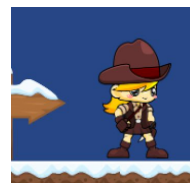


Staff for “G” note

A very interesting **gameplay mechanics** is to design a horizontally movable world where there will be a moving character who keeps searching for a specific note at one time as directed by the gameplay (Platformer Genre). The notes will be hidden at places and the player has to hunt for the treasure. As and when the player uncovers treasures, new objects will appear dynamically and the player will be moving horizontally and vertically to find the hidden treasure.

## Characters:

Clef Miner is a single player game. There is just one character in the game; her name is *Hazel*. She moves around the 2D world searching for musical notes that are hidden in different objects in the world. Hazel can perform several activities like run, jump, slide

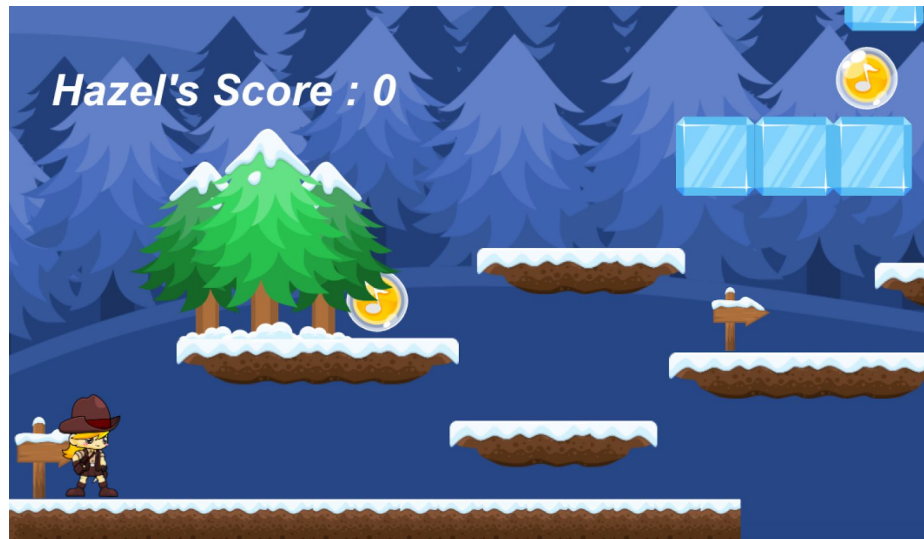


and later on in the game she acquires some cool powers like knife attack and shooting capabilities.

## Levels:

There will be two levels in the game. The first level will focus on the clefs and the second level will be based on the staffs. Other than that, the characters and background will be the same at both the levels. The learning content will be different.

**Level 1:** In this level when Hazel comes across a new clef, a short introduction will be shown as to how it looks and how it is used in staff notations. There is no sound associated with the clefs so only visual clue will be provided. The aim of the game is to collect all the similar clefs. There will be other musical notations which she will come across in the game but she will have to prevent them from hitting her. These clefs are significantly different from each other so we will have some animations associated with them.



**Level 2:** In this level, we introduce the staff notations. The gameplay is similar to the former level but the musical notes will be stationary as the staff notations are similar to each other with minor differences. However whenever a new notation is introduced, the note will be played as well along with the visuals.

## User Interaction and User Interface:

The Graphical User Interface of the game at the beginning will have typical basic level selection and settings buttons. Inside the Game Level Scene, the current scores,

time remaining for the level and some live feedback will be provided. However, the exact look and feel might change for the actual implementations depending on circumstances and the need of the gameplay.

## **Technologies and Platforms to be used:**

The game will be mainly designed in Unity. But few of our resources like staffs and notes might be very much customized and hence we will also be using some photo editing tools like Photoshop to design those resources. We will record and edit the Audio with POD HD 300 Edit and Apple Garage Band using feedbacks from synthesizers and Electric Guitar processing units(Line 6 POD HD 300). We are planning to use Crescendo for designing the staff notations.

## **Team Roles and Responsibilities:**

There are two team members and the work is roughly divided as follows. However, actual division might change depending on project needs.

### **Arnab:**

- GUI Integration.
- Building Student Model.
- Planning Scenes.

### **Himangshu:**

- Basic level design.
- Character animations and actions.
- Designing Staff Notations and Audio Recording

## **Project Milestones:**

The milestones are divided according to the timeline of the project. The February milestone has been completed and we are currently making the transition to March milestone.

**Feb** - Basic gameplay: Work on the characters and her powers. Work on the background and basic implementation of all the functionality. In short implement a working version of the game.

**Mar** - Implement the learning components of the game. Research about how to incorporate the music aspect of the game in Unity. Create the different levels of the game with different types of musical notes.

**Apr** - Implement a student model to understand what knowledge the student has mastered and where he is currently struggling. The musical notes will take the student model into account and generate the musical notes dynamically focusing more on the latter part. Testing of the components and developing on the final version of the game.

## References:

<https://method-behind-the-music.com/theory/notation/#staff>

<http://www.musicnotes.com/blog/2014/04/11/how-to-read-sheet-music/>

<https://en.wikipedia.org/wiki/Clef>

[https://en.wikipedia.org/wiki/List\\_of\\_musical\\_symbols](https://en.wikipedia.org/wiki/List_of_musical_symbols)