

Analytics and Game Mechanism

1. Analytics

In this part, we are supposed to analyze the data collected from API, assign score for users and determine the initial price of each artist and how prices are going to fluctuate with the influence of both performance of artists and the trading market.

* The data being used in this part are **playcount** and **listeners**, which can be collected from *artist.getInfo*.

1.1 Point system

A score will be calculated for each artist on daily basis to reflect how they performed within the previous day, which is also a measurement of how each player did in the game. There will be leaderboards of daily, weekly, monthly and lifetime scores.

The formula for calculating the daily score of an artist is:

$$\text{Daily Score} = 0.0005 * \Delta S + 0.05 * \Delta L$$

ΔS means the increase in playcount and ΔL means the increase in listeners.

Then points for the players are the sum of all artists they had traded.

1.2 Initial prices

Each artist will have an initial price to start with, which can be derived from:

$$\text{Initial Price} = 0.07 * s / l^{1/2}$$

s means the value of playcount and l means the value of listeners.

1.3 Market prices

The market prices should be based on both performance of the artists and player actions

◇ Market prices change regarding demand and supply

·Each time a player buys an artist, the price will increase by:

$$\text{last_closing_price} * 0.01 * (10 - 9 * \text{no_available} / \text{max_available}) / \text{max_available}$$

·Each time a player sells an artist, the price will drop by:

$$\text{last_closing_price} * 0.01 * (1 + 9 * \text{no_available} / \text{max_available}) / \text{max_available}$$

2. Game mechanics

◇ Each player(account) can have **only one portfolio**, which should be initialized to have **20,000 dollars** and **no score** at the time of creation.

◇ Players can **only trade with system** and each player may own at most **one share per artist**.

- When a player wants to **buy an artist**:

----if the artist is already in the market, the player will then obtain **current price** of the artist.

----if the artist is not in the market, the player will obtain the **initial price** of the artist calculated in a way as stated in 1.2 and the current price is then updated. (This would take some time since relevant data needs to be fetched via API in response to this specific call)

◇ If the number of shares for the artist has **run out**, the artist is then temporarily unavailable. The number of shares can be calculated by using the formula:

$$\text{No. of shares} = \text{Ceil}(0.1 * n * L / L_Max)$$

n means number of players and L_Max means listeners of the most popular artist

- When a player wants to **sell an artist**:

The player will be provided with **current price** of the artist. There will be a **2% tax** applied to each selling transaction.

◇ Players are given **dividends** on daily basis regarding the performance of artists they hold, the amount of which is calculated with the formula:

$$\text{Dividends} = 0.01 * (3 * \Delta S^{1/2} + 0.05 * \Delta L)$$

◇ There is a button for **reset** (both points and money) which is allowed to press **at most once per week**.