Player Ranking / Matchmaking Overview

Scope of feature:

- Accurately grade every player's skill.
- Provide a balanced system that matches players with opponents and teammates of similar skill levels.
- Allow players to feel progression through visual representation of their current skill level.
- Create a challenging environment for players to test their skills against better opponents.
- Avoid frustration for players. Attempt to avoid long losing streaks for all players. Provide favorable matchups when possible to increase chances of winning.
- Encourage positive player behavior.
- Discourage negative player behavior.
- Separate matchmaking queue for consistent negative behavior players.

Player Ranking

Glossary of terms:

- **MMR (Matchmaking Ranking)**
  - Value assigned to each player representing current skill level
- **League**
  - An abstract / visual representation of the current player's skill level.
- **League Rank**
  - A subcategory for each league meant to give players a more precise appreciation of their skill level.
- **Promotion / Relegation**
  - Moving up or down from one League Rank to another higher / lower one.
- **League Threshold**
  - The lower / higher MMR limit of a League Rank.

Overview:

- Estimated player skill level is represented by an internal MMR number.
    - The MMR number is not available to the player, it is stored server side and is never displayed.
- MMR is gained or lost after every matchmade game a player finishes.
- The League system visually represents the current player MMR value.
    - Initially we would have 6 Leagues, ranked from lowest to highest:

    - The Leagues are named, from lowest to highest : **Castaway, Survivor, Hunter, Veteran, Ghost, Legend.**
    - Each League is split into 3 League Ranks, rank 3 being the lowest value and rank 1 being the highest value.

    - Leagues and League Ranks represent a possible MMR value interval, forming a continuous interval.

- When a player passes either the lower or the higher threshold of ther current league, a promotion to the next league or relegation to the previous one happens.
    - A new promotion / relegation for this player cannot happen for the next 20 games.
- Creating a new multiplayer profile sets initial MMR to a default value.
    - For the first 10 multiplayer matches played, a significant multiplier is applied to all MMR gains / losses.

    - After the first 10 multiplayer matches are completed, the MMR value is used to calculate the initial League and League Rank for the player.

Matchmaking Process

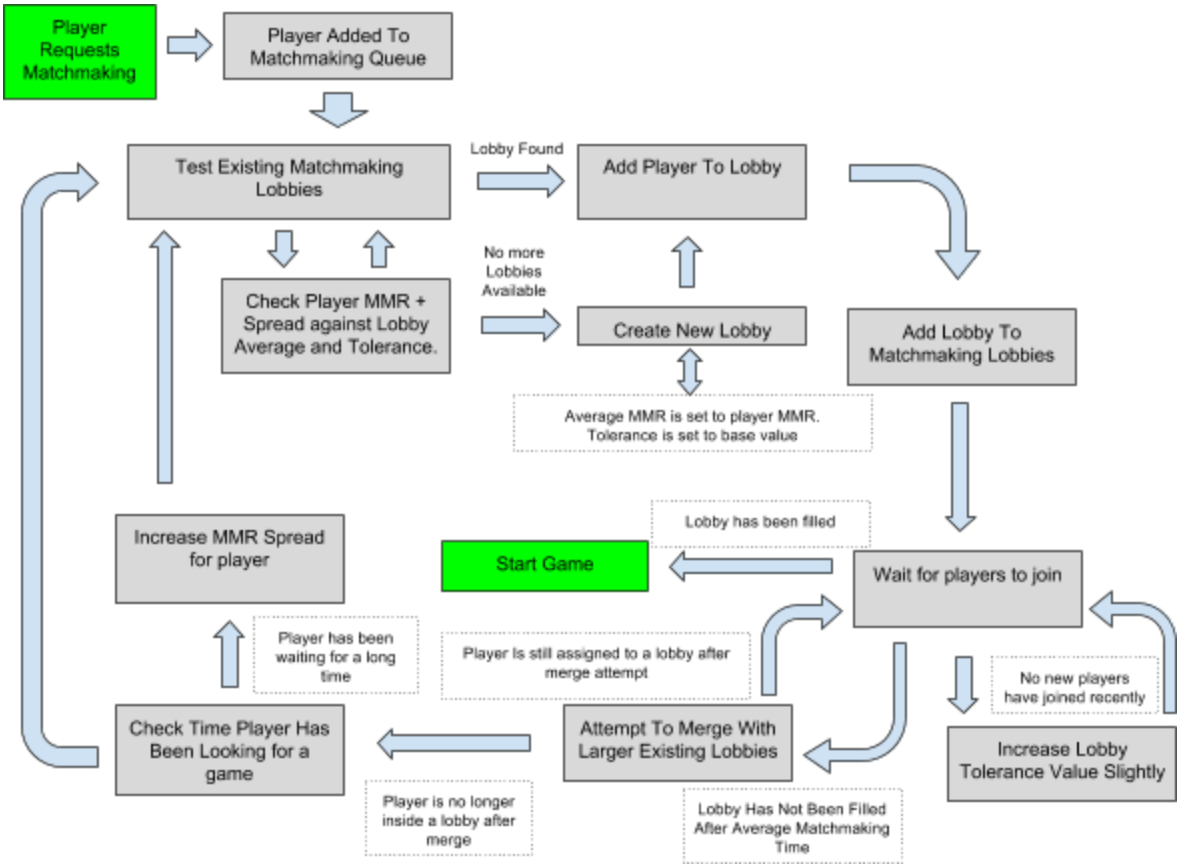
Glossary of terms:

- **Matchmaking Lobby**
    - A new game instance that contains between one and the minimum amount of players required to start the match.
- **Average Matchmaking Time**
    - The average wait time for players from a certain League requesting a matchmade game in the past hour.
- **MMR Tolerance**
    - Value assigned to a Matchmaking Lobby.
    - It represents the allowed deviation from the average MMR of member players, when a new player wants to join.
- **MMR Spread**
    - Value added or subtracted from player MMR during matchmaking.
    - Increases the chances of finding a game when a player has been in queue for a long time.

Overview:

- The matchmaking server groups players with similar MMR into Matchmaking Lobbies.
- A new multiplayer match is started when the lobby contains a minimum amount of players.
- The matchmaking server creates new lobbies and combines existing lobbies dynamically to find suitable matches for players as quickly as possible.
- The server calculates an average matchmaking time for players in order to avoid long wait times for individual players.
- The matchmaking server increases the acceptable MMR Tolerance of a Matchmaking lobby over time.
- The matchmaking server slowly increases the MMR Spread of a player that has been waiting for longer than the average matchmaking time.

Matchmaking Request Diagram:



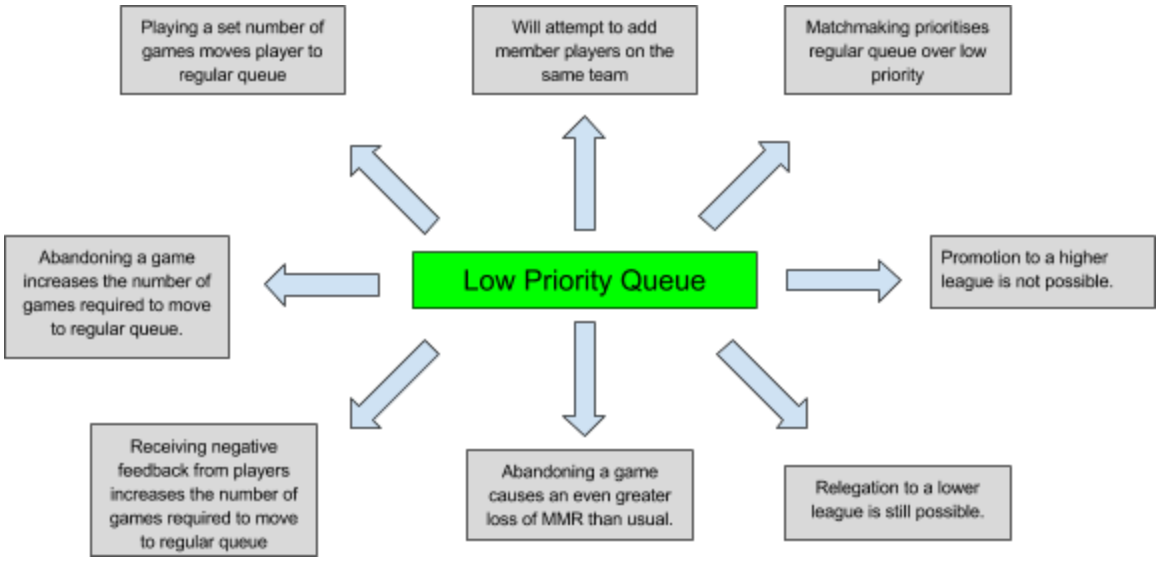
Calculating MMR at end of match

Glossary of terms:

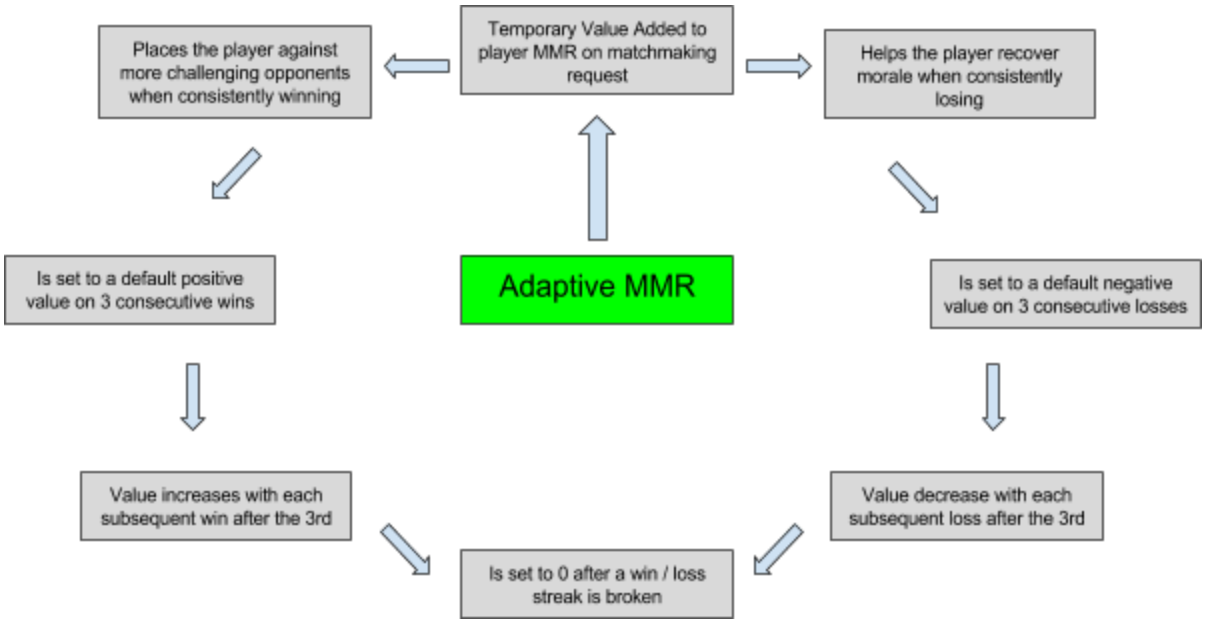
- **Adaptive MMR**
  - Value assigned to each player representing a temporary increase / decrease to current MMR based on losing / winning several consecutive matches.
- **Regular Matchmaking Queue**
  - A list containing all the players that are currently searching for a matchmade game.
- **Low Priority Queue**
  - A list containing all the players that have recently left a significant number of games or who have been reported multiple times for negative behavior.

Overview:

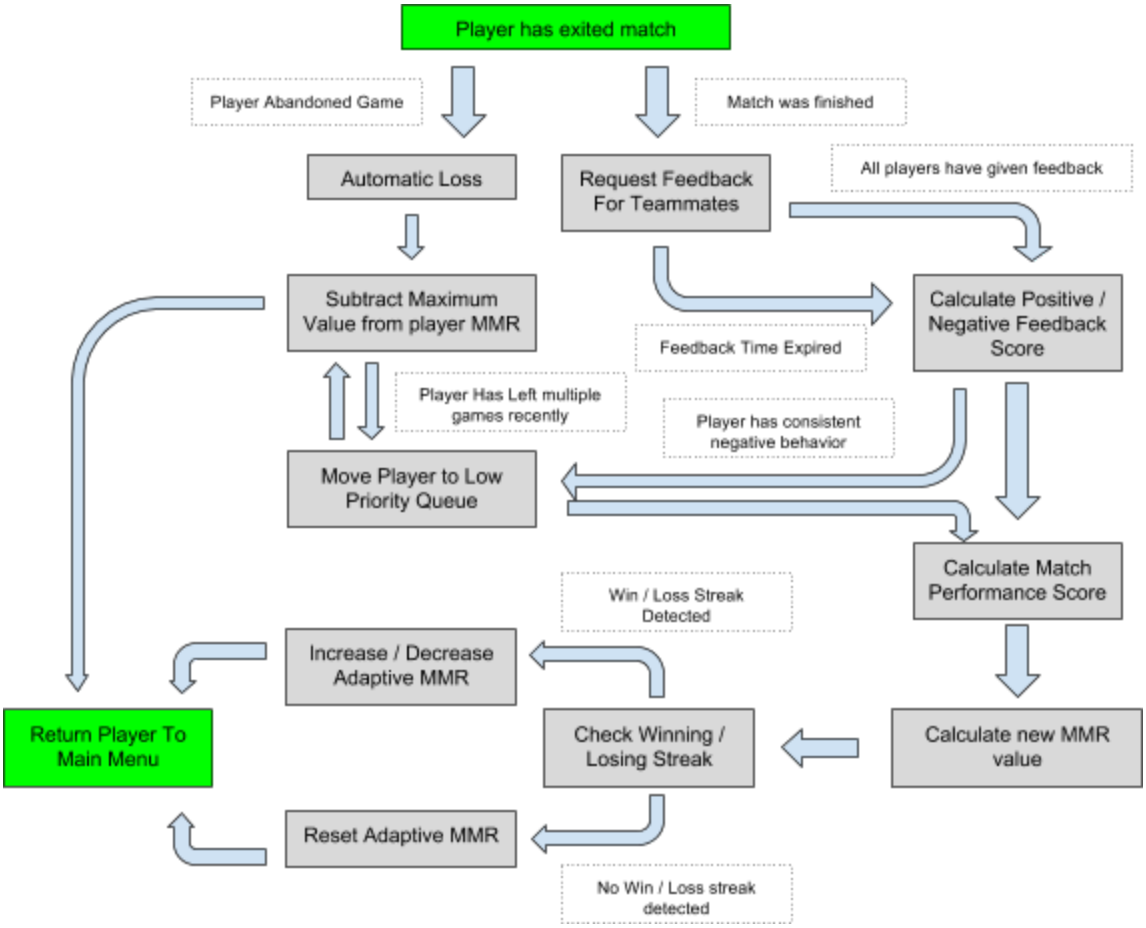
- Winning a game causes a player's MMR to increase.
- Losing or abandoning a game causes the player's MMR to decrease.
- The amount won / lost depends on both player performance indicators and positive / negative feedback that player received at the end of the match.
- Abandoning a game causes the player to lose the maximum possible MMR.
- Abandoning multiple games in a short period of time or receiving consistent negative feedback from teammates over multiple games causes the player to be moved to the Low Priority Queue



- Every player has an Adaptive MMR value assigned to them.



Matchmade End-Game Diagram:



End Game Player Feedback

Overview:

- Offer an incentive for players to cooperate and assist each other during gameplay.
- Encourage positive player interactions during gameplay.
- Players are allowed to commend one teammate at the end of the game for being friendly, either a very skilled player or a good teammate in general.
    - Receiving at least one commendation at the end of a game will cause a player to receive a small bonus to their end game MMR update.
- Players are allowed to report negative attitude players.
    - The player will be able to select from multiple categories of negative behavior to report.
    - Multiple negative reports received by one player will cause them to receive a penalty at the end of game MMR update.

Calculating End Game Performance

Overview:

- After a matchmade game ends, all players update their MMR value.
- Primary score value used is whether the game was won or lost.
    - We can consider a base value of +/- 30 points for any victory / defeat.
- Additional player performance indicators are used to calculate additional modifiers to the final score.
    - Secondary values are related to the primary objectives of every particular gamemode.
    - Tertiary values are related to general player skill but are not particularly important for the specific gamemode.
- Secondary and tertiary values are what differentiates MMR calculations for gamemodes.
- The sum of all secondary and tertiary modifiers can never be more or less than 50% of the win / loss primary score value.
    - After a win, players can gain between 15 (50%) and 45 (150%) MMR based on performance.
    - After a loss, players can lose between 15 (50%) and 45 (150%) MMR based on performance.

Team Deathmatch Scoring:

Secondary Values:

- Bonus for total player kills.
- Bonus for total healing done.
- Bonus for total kill assists.
- Penalty for total player deaths.
- Penalty for friendly fire kills.

Tertiary Values:

- Bonus for team score ranking (placing in the top 3 team-player scores for kills / deaths).

CTF Scoring:

Secondary Values:

- Bonus for enemy flags captured.
- Bonus for enemy flags delivered.
- Bonus for defending friendly flag zone.
    - Killing an enemy that is inside the friendly flag area.
    - Killing an enemy carrying friendly flag.
    - Recovering a friendly flag dropped on the ground.
- Bonus for Flag capture assist
    - Killing an enemy that is inside the enemy flag area.
    - Killing an enemy that is near a friendly flag carrier.

        - Killing an enemy that has shot a friendly flag carrier recently.
        - Healing an ally carrying the enemy flag.
    - Penalty for friendly fire kills.

Tertiary Values:

- Bonus for total player kills.
- Bonus for total healing done.
- Bonus for total kill assists.
- Penalty for total player deaths.